Permaculture Diploma Application

Prepared for: Blue Mountains Permaculture Institute

Prepared by: Daniel Sya, Malaysia

Field of Diploma: Land/Site Design and Site Development

25 September 2016

COURSES AND EDUCATION

July 2012 Permaculture Design Course with Warren Brush at the Permaculture Research Institute Australia, Zaytuna Farm.

August 2012 Permaculture Earthworks Course with Geoff Lawton at the Permaculture Research Institute Australia, Zaytuna Farm.

August 2012 Permaculture Urban Landscape Design Course with Geoff Lawton at the Permaculture Research Institute Australia, Zaytuna Farm.

August 2012 Permaculture Design Course Teacher Training Course with Geoff Lawton at the Permaculture Research Institute Australia, Zaytuna Farm.

August 2012 Seed Saving Course with Kay Baxtor at the Permaculture Research Institute Australia, Zaytuna Farm.

September 2012 Compost Soil Biology & Natural Fertilizer Course with Paul Taylor at the Permaculture Research Institute Australia, Zaytuna Farm.

July - September 2012 10-Week Permaculture Internship Program with Geoff Lawton at the Permaculture Research Institute, Zaytuna Farm.

WORK AND GENERAL EXPERIENCE

Before Permaculture

To begin with, I have been volunteering and getting involved with the Nation Building Pioneers Association of Malaysia (NBPA), a non-governmental organization aimed to equip and empower the next generation with skills and the confidence to one day play a role in the macro perspective of Nation Building. The volunteering stint with NBPA started since 2010 while I was still in high school, in their nation building roadshows & camps.

Things began to radically change while I was in college (2011) doing my undergraduate program and concurrently volunteering with NBPA as they have recently started developing Green Technology Garden, a 10-acre youth development site in the rural area just 100km south of the Malaysia's capital city, Kuala Lumpur. I was selected as one of the volunteers to help out in the site's early establishment days, and it was then that I was introduced to Permaculture by the NGO.

From then, I've agreed to join a team of Malaysians that went to Permaculture Research Institute, Australia – Zaytuna Farm in 2012 to complete the Permaculture Design Course (PDC) and the 10-week internship program.

After Completion of Permaculture Design Certificate (PDC), Permaculture Courses and 10-week Permaculture Internship.

The 'Permaculture' Journey begins.

With the paradigm shifting and empowering Permaculture experience at PRI Australia, I've returned back to Malaysia to work with NBPA to transform the Green Technology Garden, the training site using Permaculture design principles with the goal of incorporating Permaculture demonstration and education to reach out to the youths and the local community on positive solutions to the ever growing environmental problems we face today.

However, there was only one catch. With no prior background in Horticulture, Agriculture or any field of natural sciences before Permaculture, the main challenge I faced was adapting Permaculture design specifically to the wet humid tropical climate of Malaysia, it took me a much longer time to get acquainted with the local tropical species of flora and fauna to get things going.

After 2 years of research through trial and error application of Permaculture design, many mistakes were made and most profoundly realizing that Permaculture design systems have to be holistic and not just treating the symptoms. It was during this period that I've learnt what doesn't work and what could have been done better.

It was a great learning curve and then in 2014, I've started re-designing the property with the experience and knowledge gained over that past 2 years of trial and error.

The Permaculture Impact

There has been a real lasting impact ever since I have taken the Permaculture Design Certificate Course (PDC) in 2012 and it has begun with a paradigm shift in the way I view the natural world and mankind's current relationship with the natural ecosystem, it has also lead me to have a greater appreciation for all the wonders and beauty of the earth, a beauty that is fading and degrading at an extremely fast pace, a beauty that ought to be preserved and restored for the future generations. Permaculture has been an eye opener to the real practical solutions that can aid in the process of preservation, conservation and rehabilitation of our natural ecosystems.

After taking the PDC, there is a big change in the way I view problems and how they are caused, Permaculture has aided me in the process of identifying the root cause of the problems faced on the landscape and how we can solve them using the ecological design process that is with the incorporation of Permaculture ethics and principles.

After gaining a more holistic viewpoint of the natural ecosystems, I then began to realize that the solutions are all around, resources are just right in front of me and it is all just a matter of taking up the position as the designer and to put them all together into a master plan.

Permaculture has also helped me in my daily life, I begin to manage 'stacking' time and space differently, I begin to apply Permaculture Principles even in my daily life. For instance, when I'm reorganizing a storage room I begin to see space differently, such as vertical stacking to maximize space in the storage room, and to arrange the items in the way that requires the least energy input and a beneficial relationship with the other elements in the storage room. In addition, when planning logistic movements, Permaculture principles has helped me to maximize each trip in terms of saving time and conserving as much fuel, labor (energy) as possible to get the maximum result.

With the ripple effect of transformation through Permaculture design in my life, the transformation had to translate into reality in order for others to enjoy the fruits of this transformation. The journey then progressed to transforming the landscape using Permaculture Design Principles.

There has just been so much that I have learnt whilst applying Permaculture to the land. The following outlines my journey in designing and developing my first Permaculture design project, Green Technology Garden using Permaculture:

TROPICAL PERMACULTURE TRANSFORMATION OF GREEN TECHNOLOGY GARDEN, MALAYSIA

PROJECT PROFILE

Site name: Green Technology Garden, Malaysia

Property size: 4 acres

Climate type: Wet tropics

Geographic location: Seri Menanti, Negeri Sembilan, Malaysia.

Project type: Rural, Demonstration,

Project commencement: 2011

Design goal: Convert Green Technology Garden, Malaysia into a tropical Permaculture demonstration site.

PERMACULTURE DESIGN PROCESS FOR GREEN TECHNOLOGY GARDEN, MALAYSIA

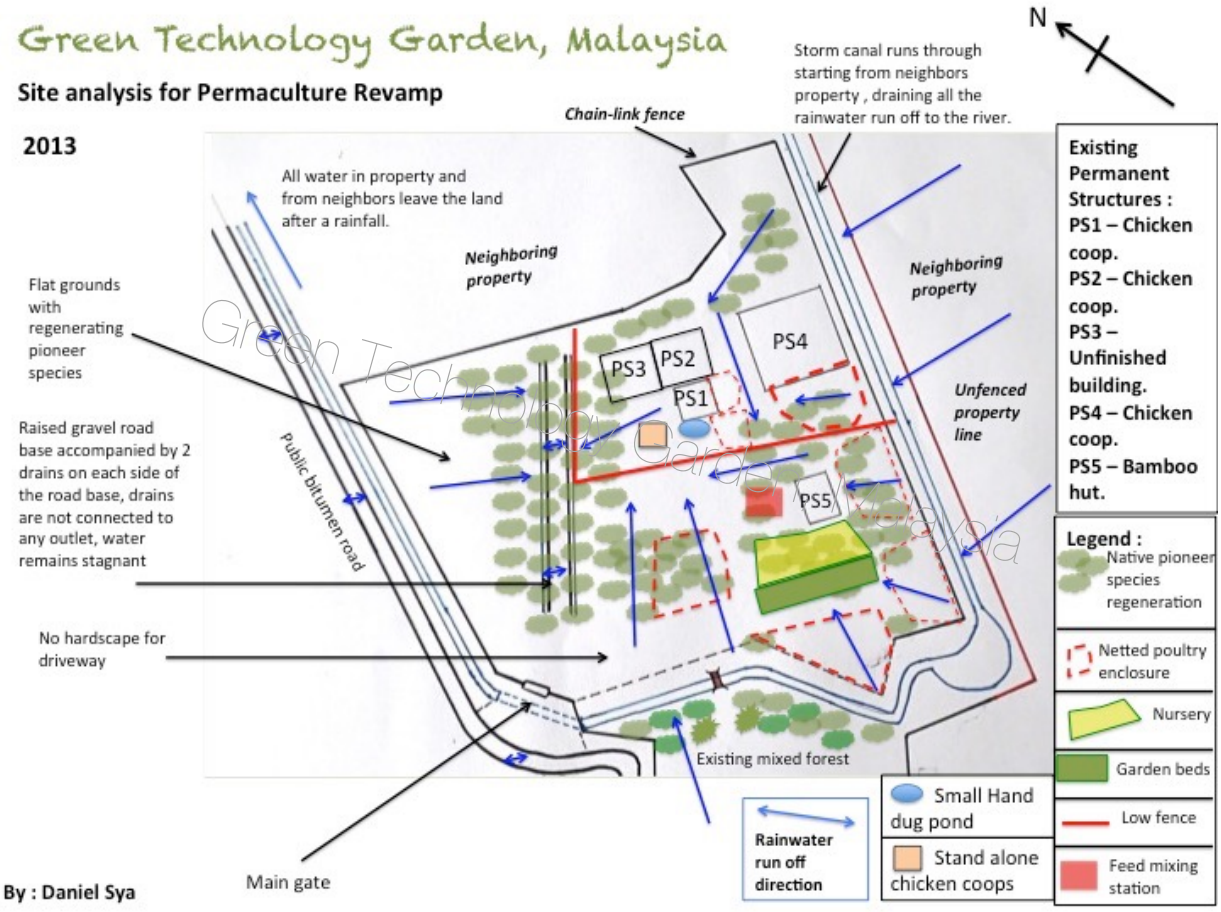
Site Survey and analysis

The very first thing I did when I got back on site after returning from Australia was to spend some time to 'observe and interact' (Holmgrem, 2002) with the landscape, and it started off with a site survey and site analysis. The volunteering experience for 1 year in GT garden came in very useful, as GT garden is a site that I'm familiar with.

After learning about Permaculture, I'd often put on my gumboots, raincoat and walk around the property during the heavy downpours to observe the patterns and water flows. During this preliminary stage of the design, I have spent most of my time observing the problems that were faced on site and also to take note of the resources that are on site and how the current elements are interacting with each other.

I have summarized my site observations in the diagram below (see figure 1) and also describe GT garden before the 'Permaculture revamp' in various categories.

Figure 1: Permaculture Site analysis of Green Technology Garden, Malaysia before' Permaculture revamp'.



Description of site before Permaculture revamp

Historical land use

Based on the information gathered from the local residents of the 'Kampung' (village), they mentioned that the former land use of this property and the areas surrounding was in the cultivation of rice in paddy fields that can date back to approximately 100 years back when the early settlers came over. However, due to the river levels dropping over the years (possibly due to the growing population and deforestation of the area for subsistence and commercial agriculture), the land could no longer be flood irrigated for rice cultivation as the river that runs through the area no longer overflows its banks.

The land has been cleared repeatedly following the retirement of paddy cultivation in the area. However, before we stepped in, the land has been left idle for more than 3 years since it's last crop production / clearing and the native indigenous pioneering species then took over and reforested the site.

Water & Earthworks

Introduction

This site pictured in figure 1 has an area of approximately 2 acres and has varying terrains and boundaries in comparison with the other surrounding land in the area. Most of the site is relatively flat, soils with very high clay content with very good water retention properties as it used to be a paddy field.

The property has large raised berms (that used to be access roads and paths for the rice paddies) around the edges of the property and also a higher saddle on which all the houses in the village are built on.

Earthworks before Permaculture revamp

The initial earthworks of the property were carried out approximately two years before the site analysis was carried out for the Permaculture revamp. The criteria for the earthworks that was done on this site in 2011 was mainly:

- Land clearing of gazetted areas for cultivation.
- Biomass were all grouped into large piles and was left to decompose over a period of 1 year, no burning of the biomass was conducted.
- Preservation of large shade casting and fruit bearing trees.
- Fruit trees and large trees were marked before the land clearing with the backhoe.
- Preservation of areas with native pioneer species regeneration as a privacy screen.

There was no use of Permaculture design principles and water harvesting strategies to design the site at that stage.

Figure 2: Earthworks during early site development of GT garden.

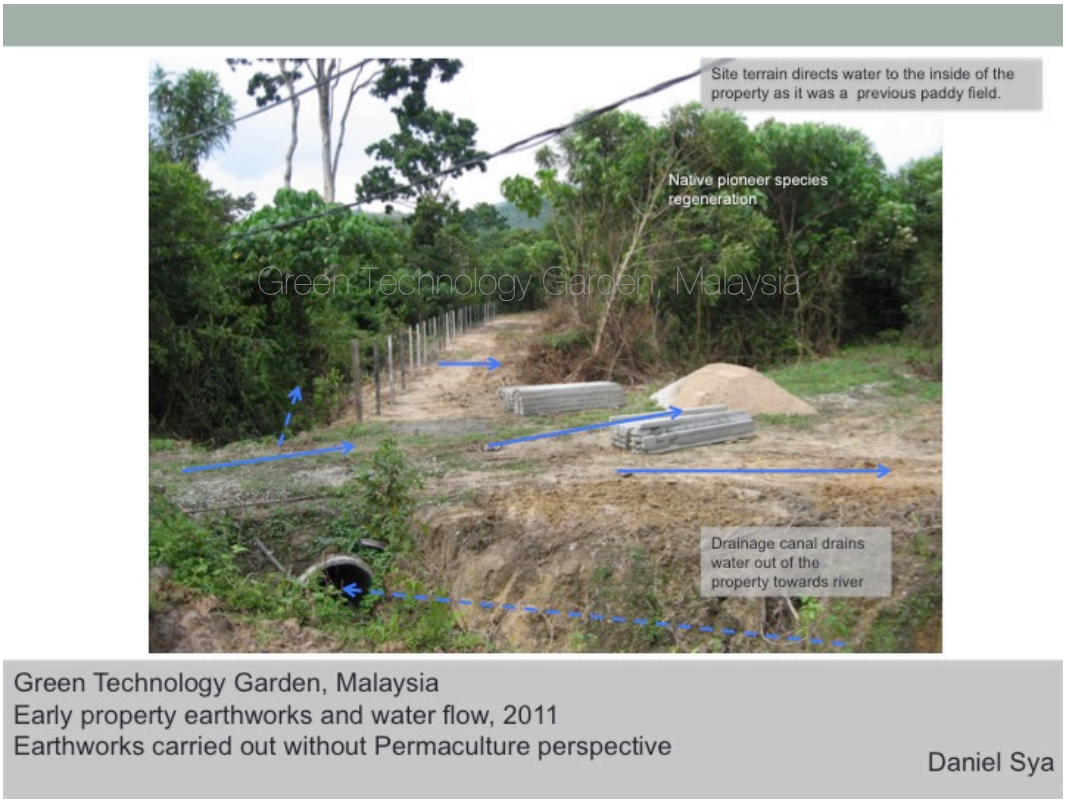


Figure 3: Early property earthworks and water flow, 2011

Access

The most favored paths by people walking through the land mainly determined the access on site, and it usually is the shortest, easiest route to get to the destination. However, the placement of these walkways and driveways were not planned or specifically constructed (elevated with a hard surface) resulting in some access paths going through the flood-prone areas.

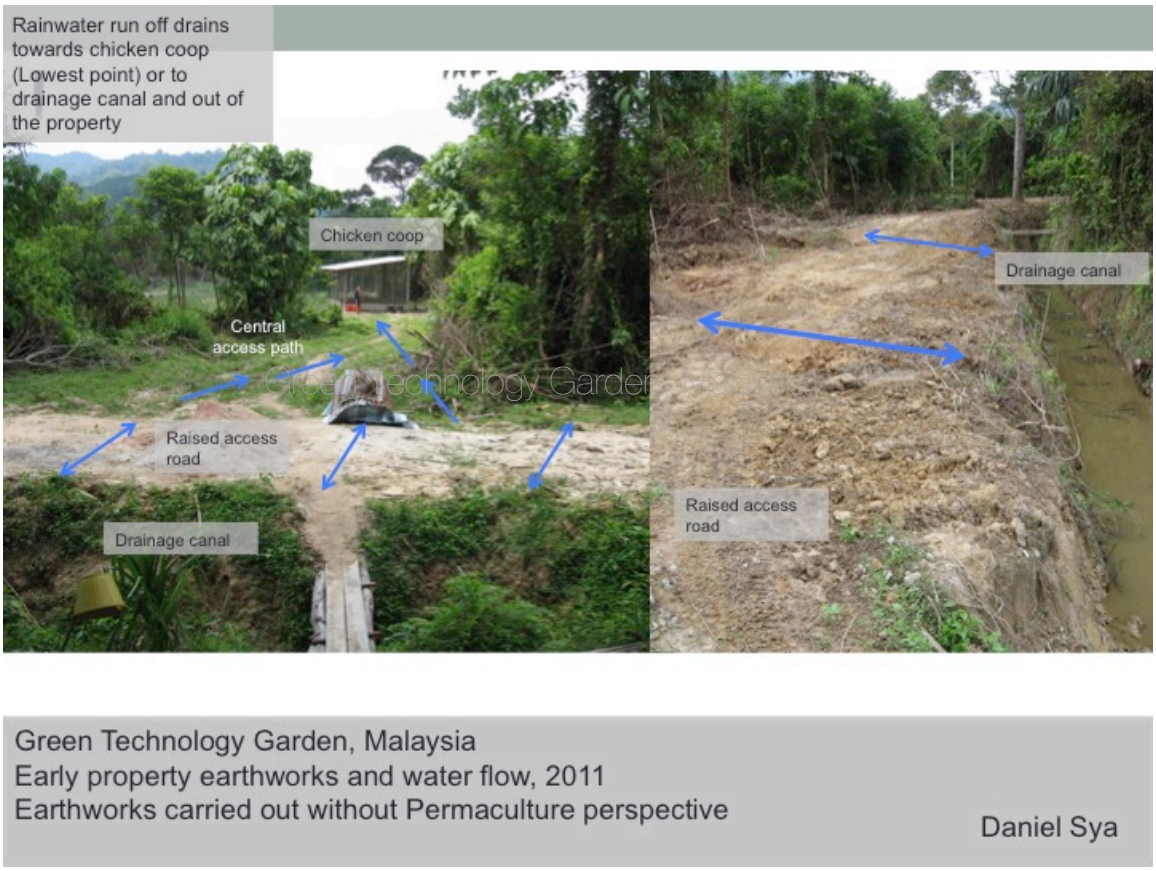


Figure 4: Early property earthworks and water flow, 2011

Structures

There were several structures that have been constructed on the site before the Permaculture revamp. Many factors were not taken into consideration prior to siting these structures. The structures that were on the site were mainly chicken coops and a small bamboo hut (see figure 5&6). Some of the chicken coops were placed in the areas that were in the flood-prone areas.

The property has also been fenced off with a chain-link fencing with a concrete base to prevent wild animals from entering.

Figure 5: Existing structures on site before Permaculture revamp, 2012

Plants

Most of the existing vegetation on the site consisted only of the native pioneering species and some fruit trees that were planted down near the human settlements.

Animals

On-site animal systems

- Poultry housing - fixed location.
    - Chicken coop built from conventional building materials - Timber, Brick, Mortar, Wire mesh, corrugated zinc roofing.
    - Makeshift chicken enclosures using nylon netting to provide birds with more space to roam.

Figure 6: Existing animal systems and structures on site before Permaculture revamp, 2012

Human integration

During this stage, most of the human integration are the full-time volunteers that resided on site and part-time volunteers that come in to help on a regular basis.

Sector Analysis

Right after conducting the site analysis, I then conducted a sector analysis of the site based on my observations of the frequently used paths by people and the external energies and factors that affected the site.

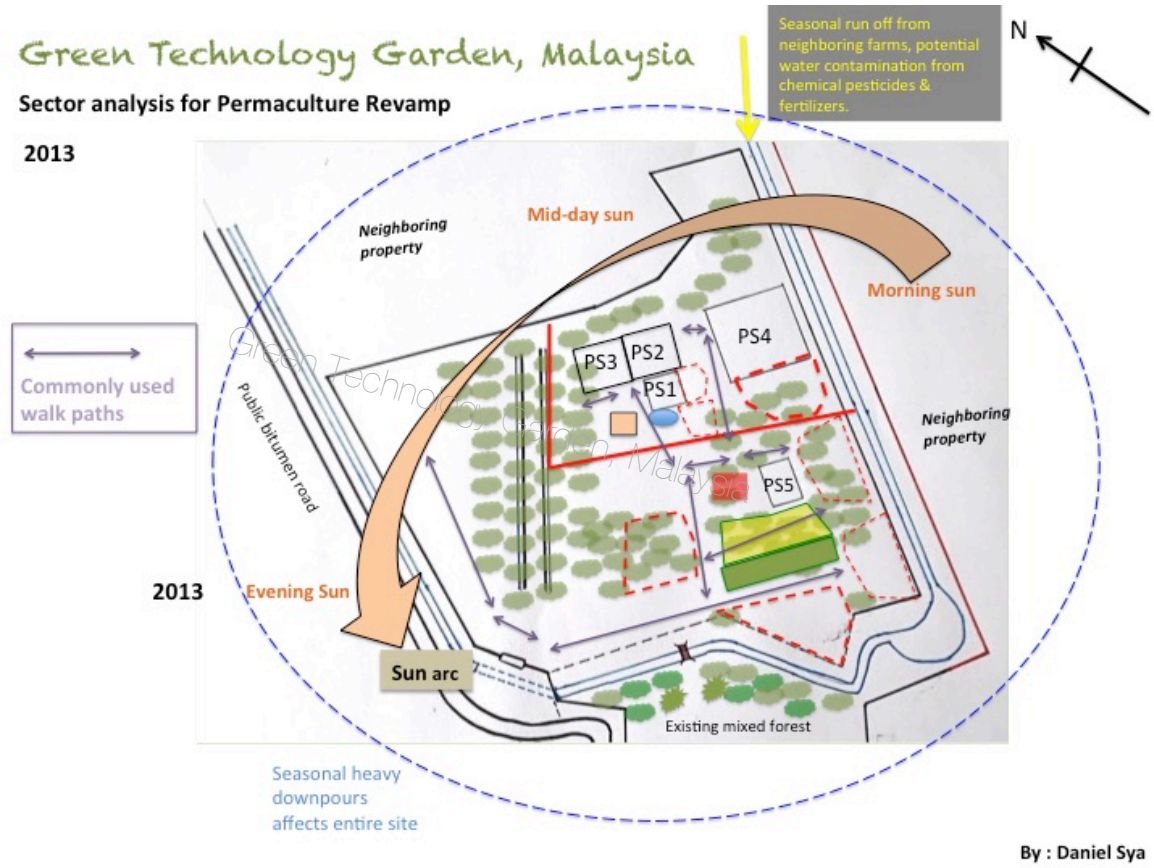


Figure 7: Sector analysis of Green Technology Garden, Malaysia

After gathering all the information detailed above, it was time for me to start designing the master plan, starting from designing from “Patterns to details” and to apply Permaculture principles whilst doing so.

Permaculture Master Plan

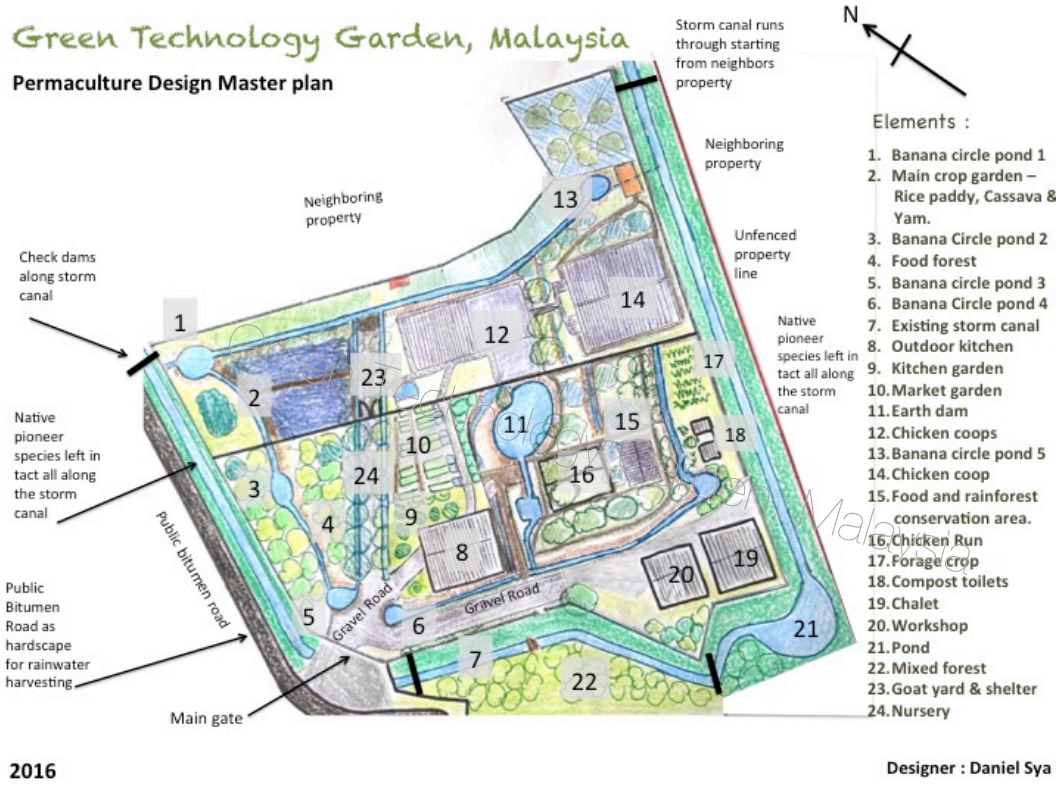


Figure 8: Permaculture master plan of Green Technology Garden, Malaysia

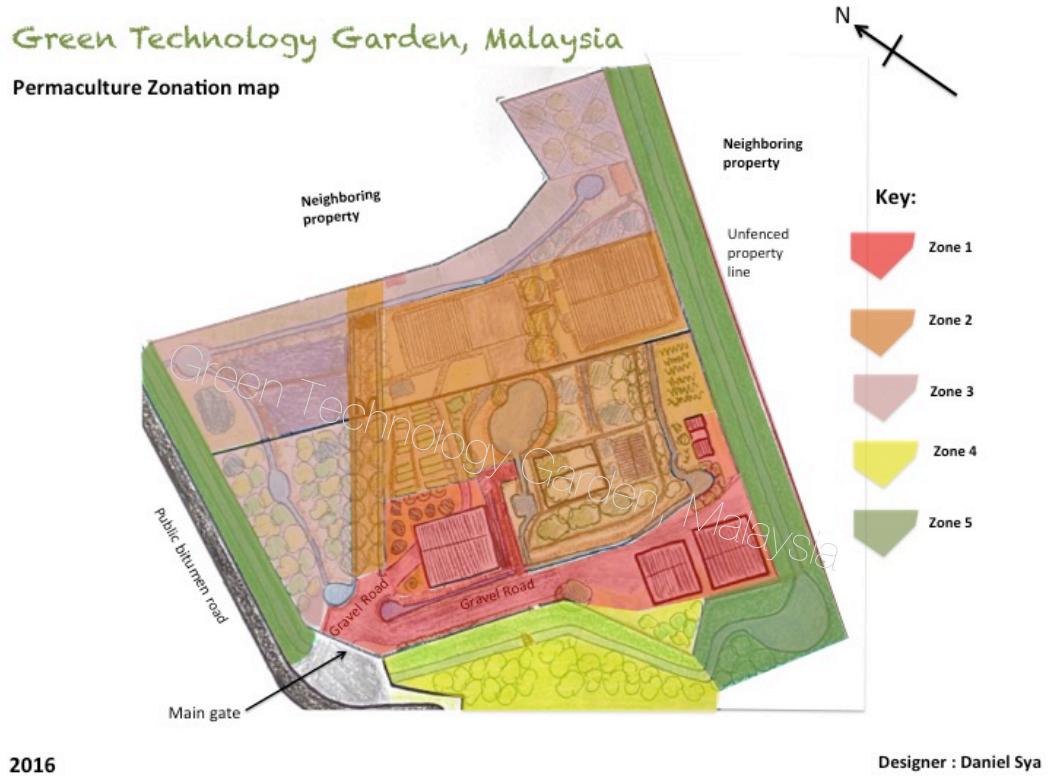


Figure 9: Permaculture zonation of Green Technology Garden, Malaysia

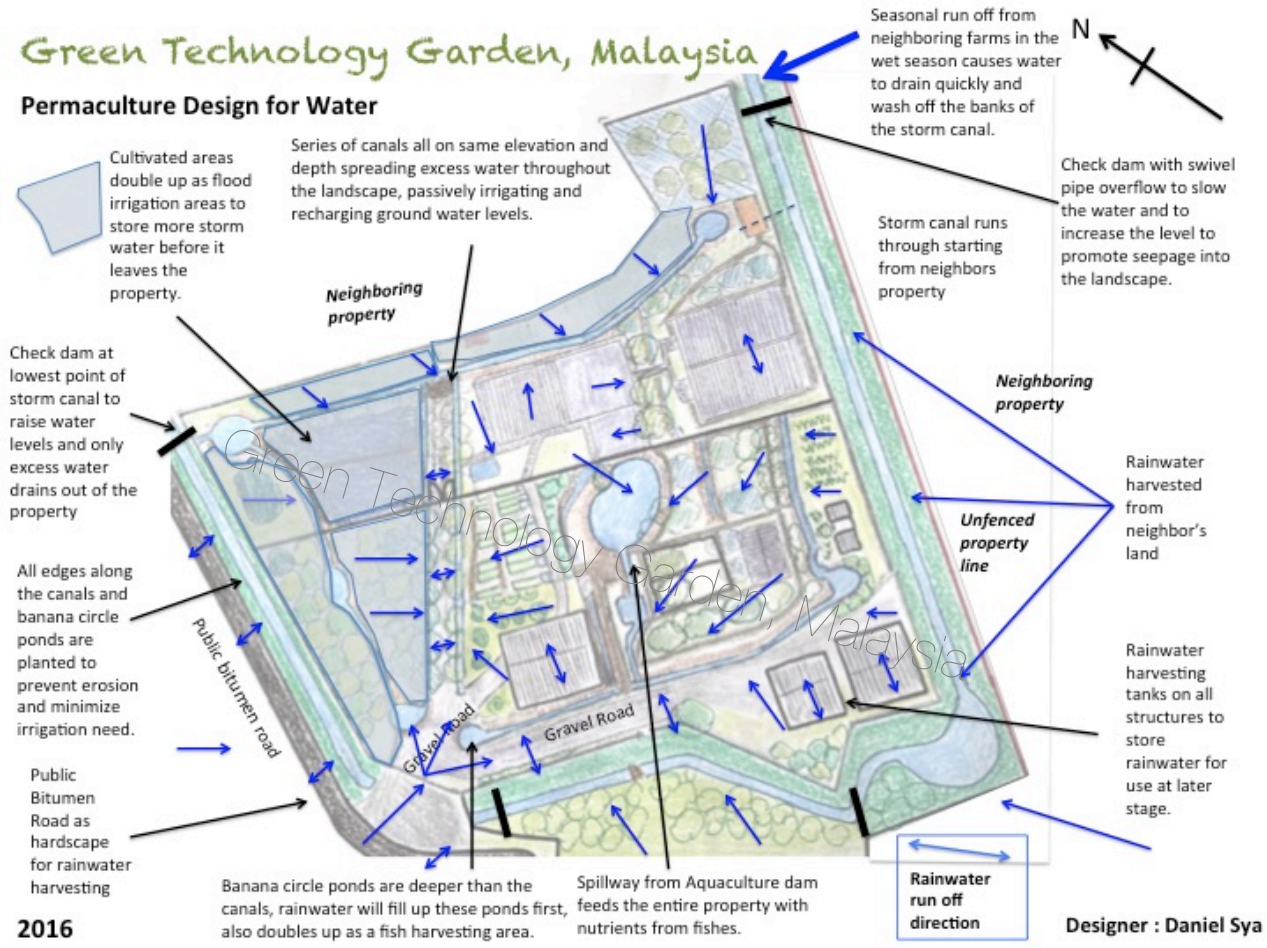


Figure 10: Permaculture design for water in Green Technology Garden, Malaysia

IMPLEMENTATION OF PERMACULTURE DESIGN FOR GREEN TECHNOLOGY GARDEN, MALAYSIA

'THE PERMACULTURE REVAMP'

In 2014, we have started implementing the design and I have identified this phase as the Permaculture revamp. This is when the rubber meets the road and when all the design work is put to the test. Below are some examples of the implementation of the Permaculture revamp.

Shaping up the property with earthworks

The Permaculture revamp mainly began with the earthworks stage. Before the backhoe that was contracted came on site, much of the site's existing temporary structures such as the makeshift chicken coops were dismantled to make way for the earthmoving to take place.

The following pictures describe the implementation of the design in one area in Green Technology Garden in its various stages before, during and after the Permaculture revamp.

Example 1: Transformation of chicken coop area (Figure 11-15) "The problem is the solution" (Mollison, 1998)

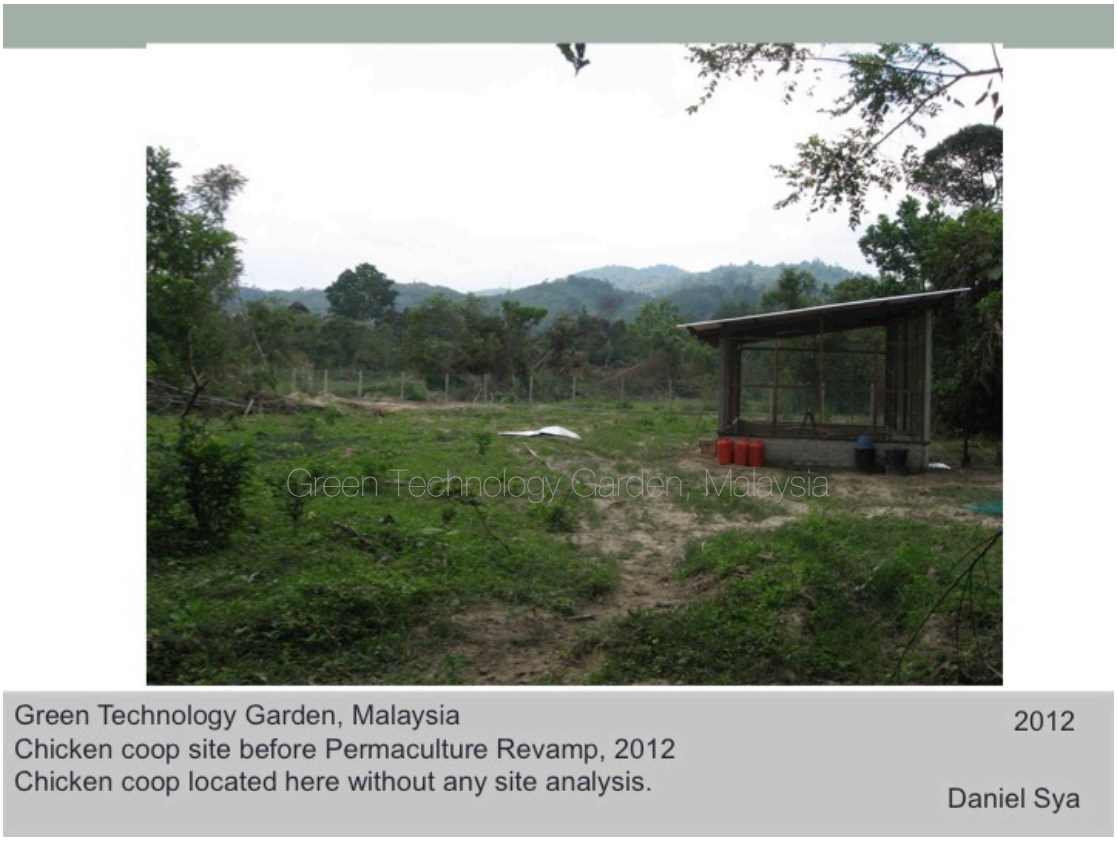


Figure 11: Chicken coop site before Permaculture revamp, 2012

Figure 12: Flooding problems that followed due to wrong placement of elements.

Figure 13: How we tried to solve the problems before applying Permaculture design.

Figure 14: After designing master plan and water management plan, it was time to implement.

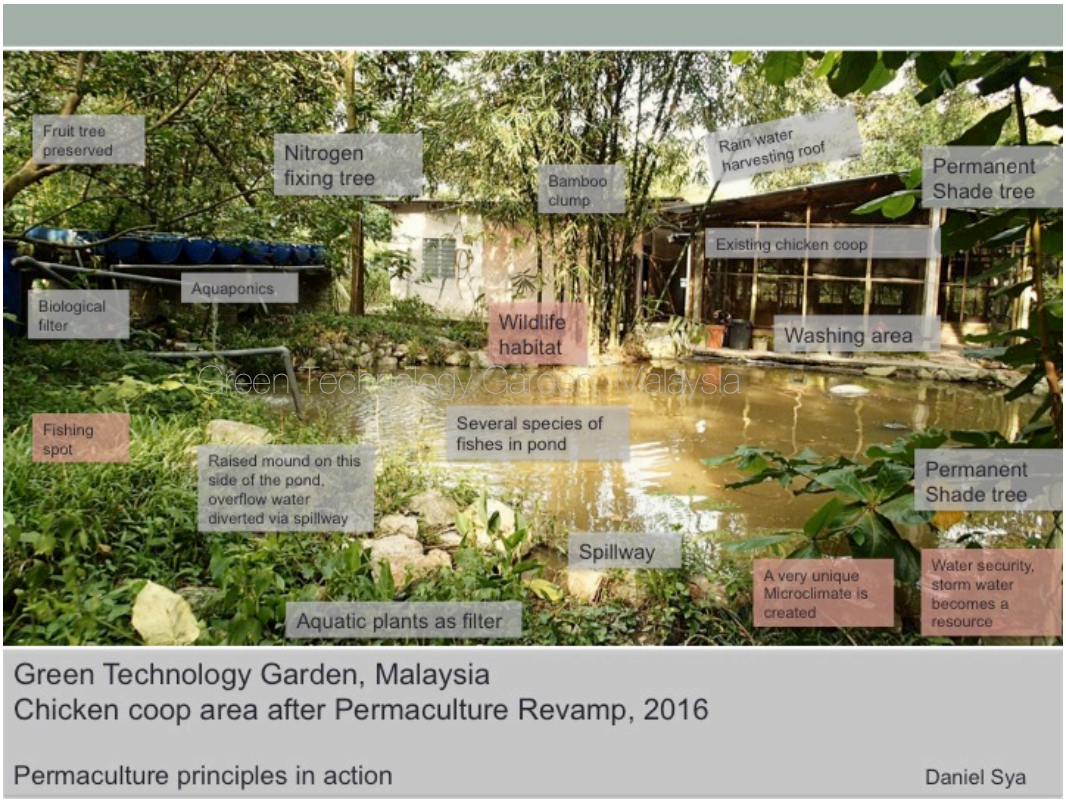


Figure 15: 2 years after Permaculture revamp and the diversity of yields from the system.

Example 2: Transformation of central access path (Figure 16-18) "Make the least change for the greatest possible effect" (Mollison, 1988)

Figure 16: Central access path flooding due to an absence of water harvesting earthworks on site.

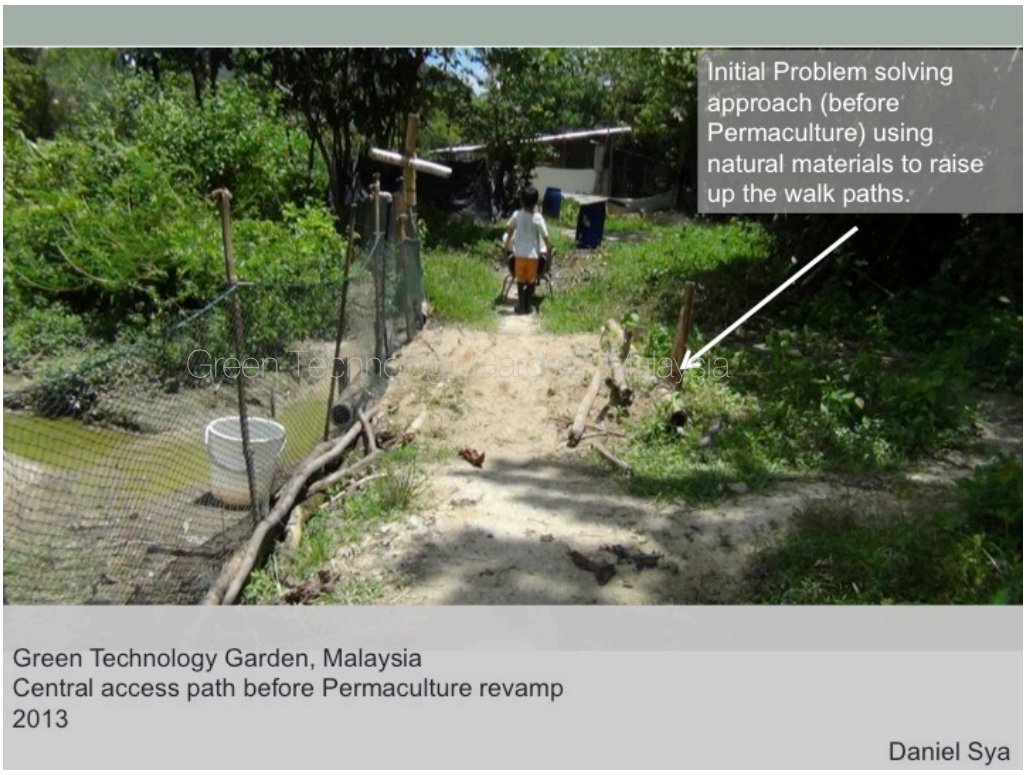


Figure 17: Initial problem-solving approach without Permaculture perspective.

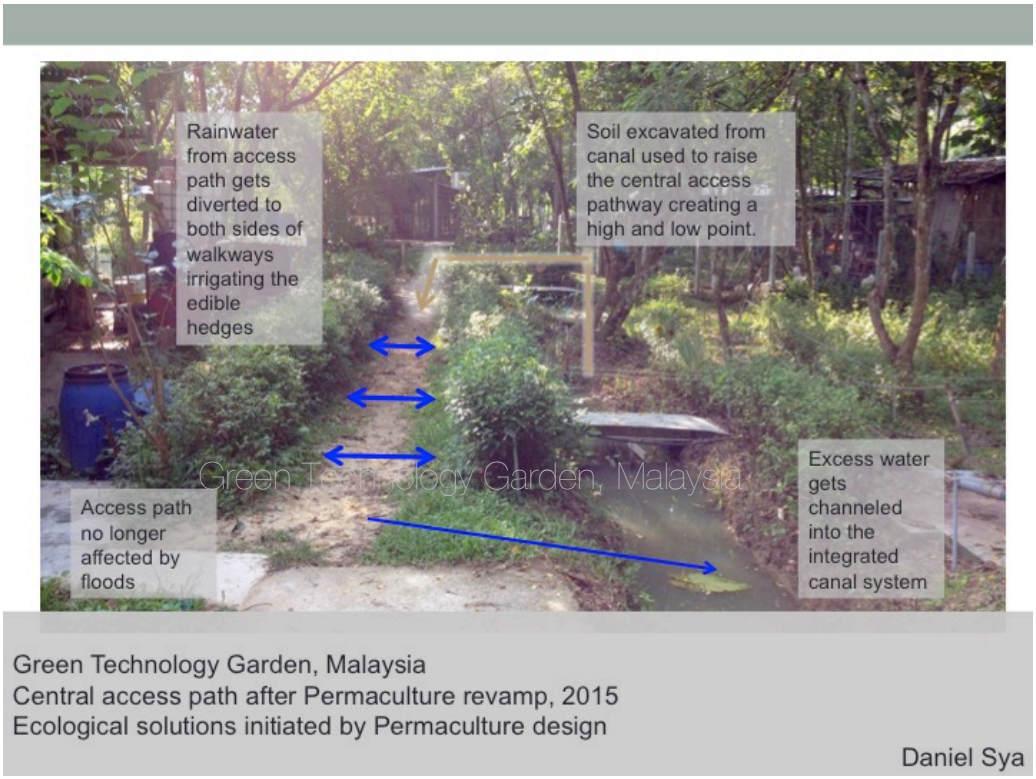


Figure 18: Central access path 1 year after Permaculture revamp.

Example 3: Transformation of Food forest and main crop garden through Permaculture earthworks (Figure 19-49) "Working with nature and not against it" (Mollison, 1998)

Figure 19: Main crop & food forest garden before and during Permaculture revamp, 2014.

Green Technology Garden, Malaysia

Main crop garden & Food forest after Permaculture revamp, 2015

Figure 20: Main crop & food forest garden 1 year after Permaculture revamp, 2015.

Green Technology Garden, Malaysia

Food forest garden before and after Permaculture revamp.

Daniel Sya

Figure 21: Main crop & food forest garden before and after Permaculture revamp.

Figure 22: Main crop & food forest garden during Permaculture revamp – earthworks, 2014.

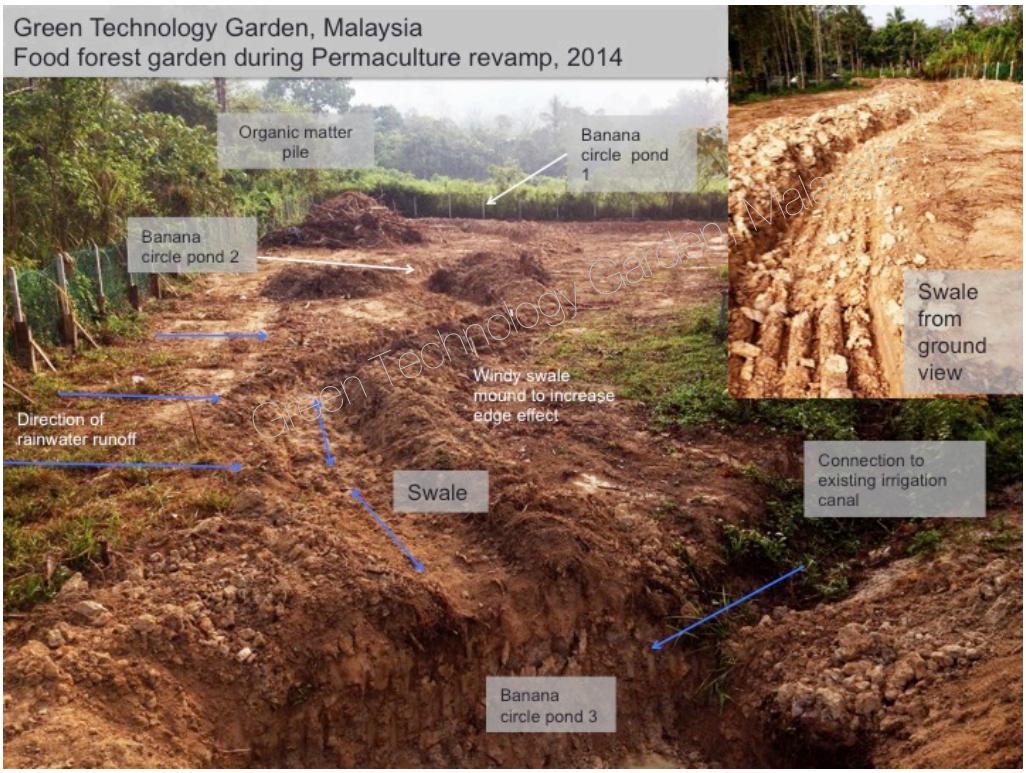


Figure 23: Main crop & food forest garden during Permaculture revamp – earthworks, 2014.

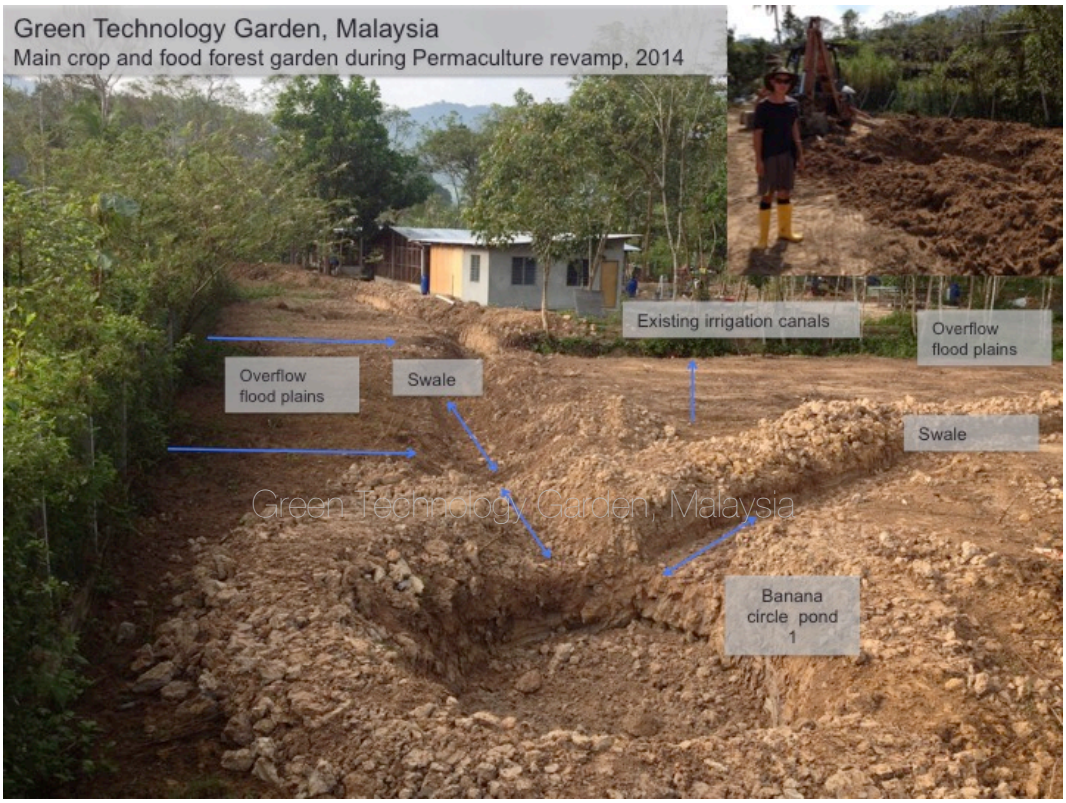


Figure 24: Main crop & food forest garden during Permaculture revamp – earthworks, 2014.

Figure 25: Main crop & food forest garden during Permaculture revamp – earthworks, 2014.

Figure 26: Main crop & food forest garden during Permaculture revamp – earthworks, 2014.

Figure 27: Existing irrigation canal transformed to 'Chinampa' aquaculture system.

Figure 28: Main crop & food forest garden after Permaculture revamp – planting after earthworks, 2014.

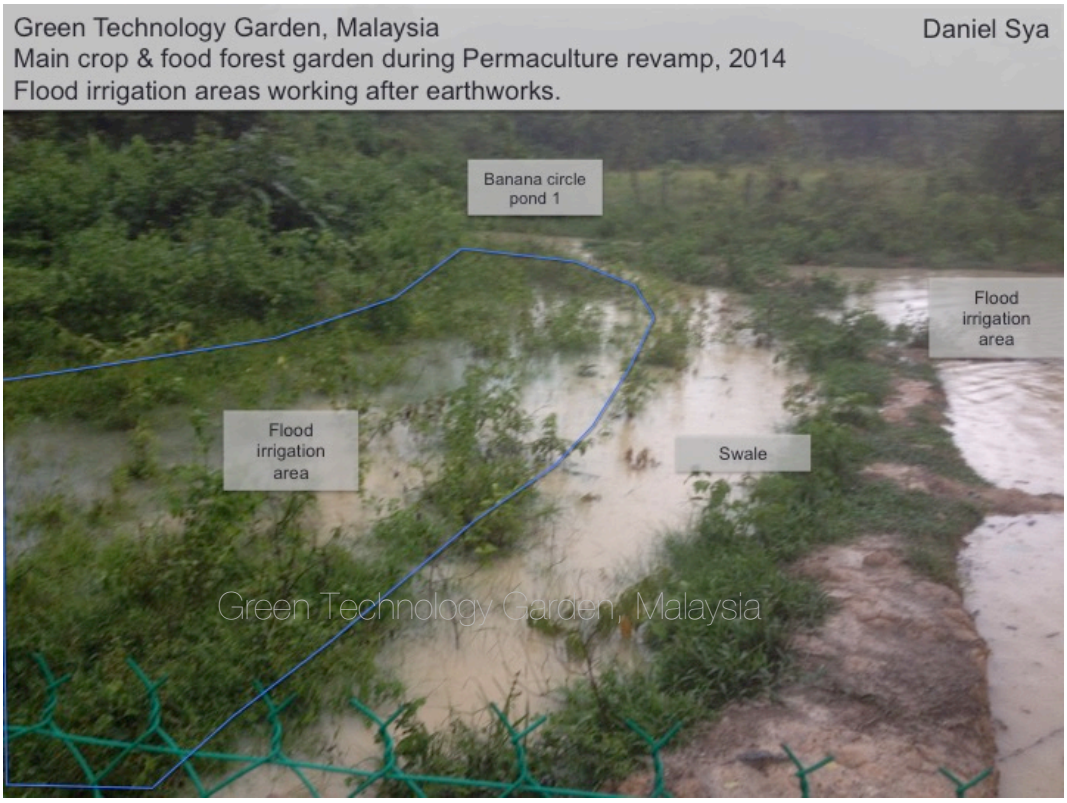


Figure 29: Earthworks put to the test and working, flood irrigation from heavy downpour.

Figure 30: Earthworks put to the test and working, flood irrigation from heavy downpour.

Figure 31: Earthworks put to the test and working, flood irrigation from heavy downpour.

Figure 32: Pile of biomass from earthworks converted to a Cassava mound.

Figure 33: Food forest garden – 3 months after planting after earthworks. Geodesic dome chicken tractor used to establish food forest.

Figure 34: Food forest garden 3 months after planting after earthworks.

Figure 35: Food forest garden 6 months after planting after earthworks.

Figure 36: Food forest garden 6 months after planting after earthworks.

Figure 37: Food forest garden 6 months after planting after earthworks.

Figure 38: Food forest garden 9 months after planting after earthworks.

Figure 39: Food forest garden 9 months after planting after earthworks.

Figure 40: Food forest garden 9 months after planting after earthworks.

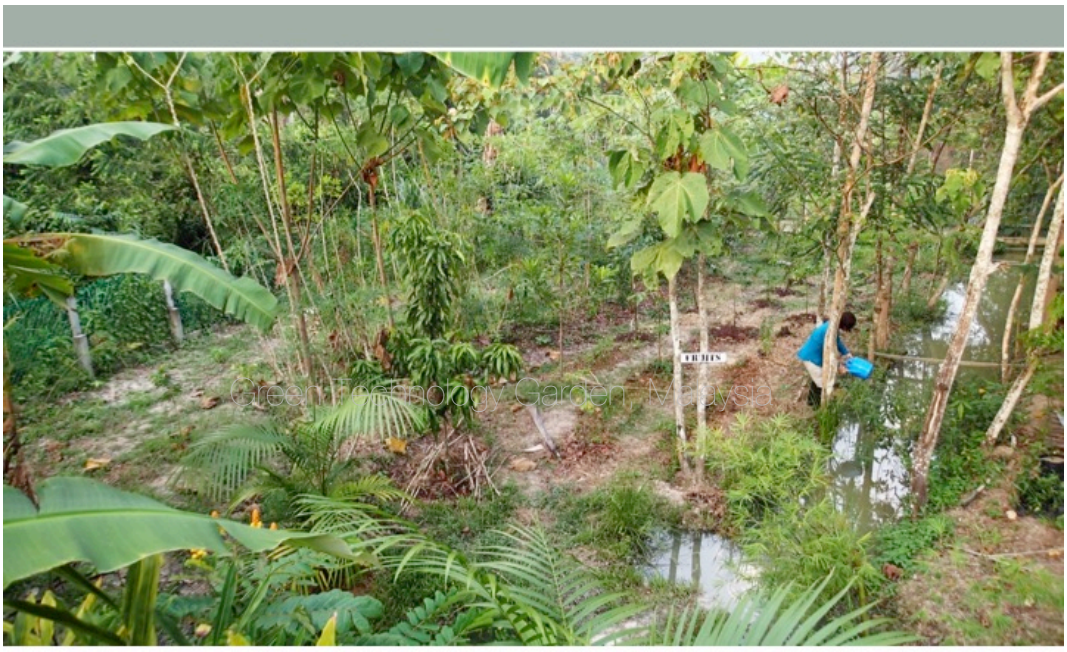
Figure 41: Food forest garden 9 months after planting after earthworks.

Figure 42: Food forest garden 1 year after planting after earthworks.

Figure 43: Food forest garden 2 years after planting after earthworks.

Green Technology Garden, Malaysia
Food forest garden after Permaculture revamp, 2016
2 years after planting after earthworks
Daniel Sya

Figure 44: Food forest garden 2 years after planting after earthworks.



Green Technology Garden, Malaysia
Food forest garden after Permaculture revamp, 2016
2 years after planting after earthworks
Daniel Sya

Figure 45: Food forest garden 2 years after planting after earthworks.

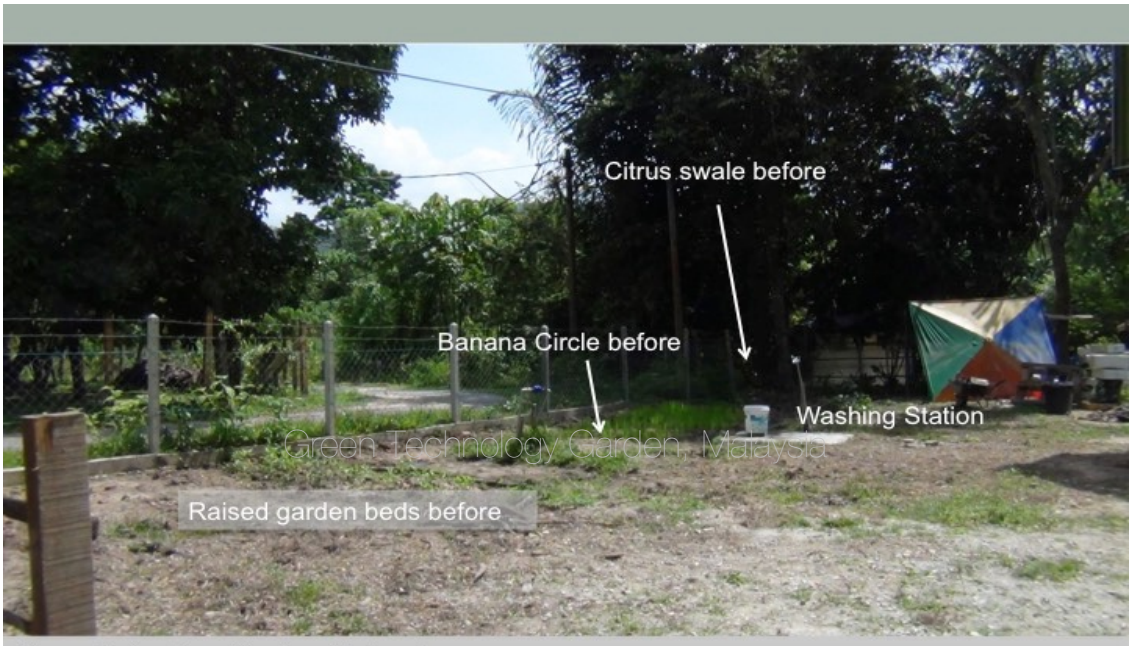
Figure 46: Food forest garden 2 years after planting after earthworks.

Figure 47: Food forest garden 2 years after planting after earthworks.

Figure 48: Food forest garden 2 years after planting after earthworks.

Figure 49: Food forest garden 2 years after planting after earthworks.

Example 4: Transformation of zone 1 garden (Figure 50-58) "Obtain a yield" (Holmgrem, 2002)



Green Technology Garden, Malaysia
Zone 1 garden before Permaculture
2013
Daniel Sya

Figure 50: Zone 1 garden before Permaculture revamp, 2013

Green Technology Garden, Malaysia
Zone 1 garden after Permaculture
2015
Daniel Sya

Figure 51: Zone 1 garden 2 years after Permaculture revamp, 2015

Figure 52: Zone 1 garden before Permaculture revamp, 2013

Figure 53: Zone 1 garden during Permaculture revamp, 2014

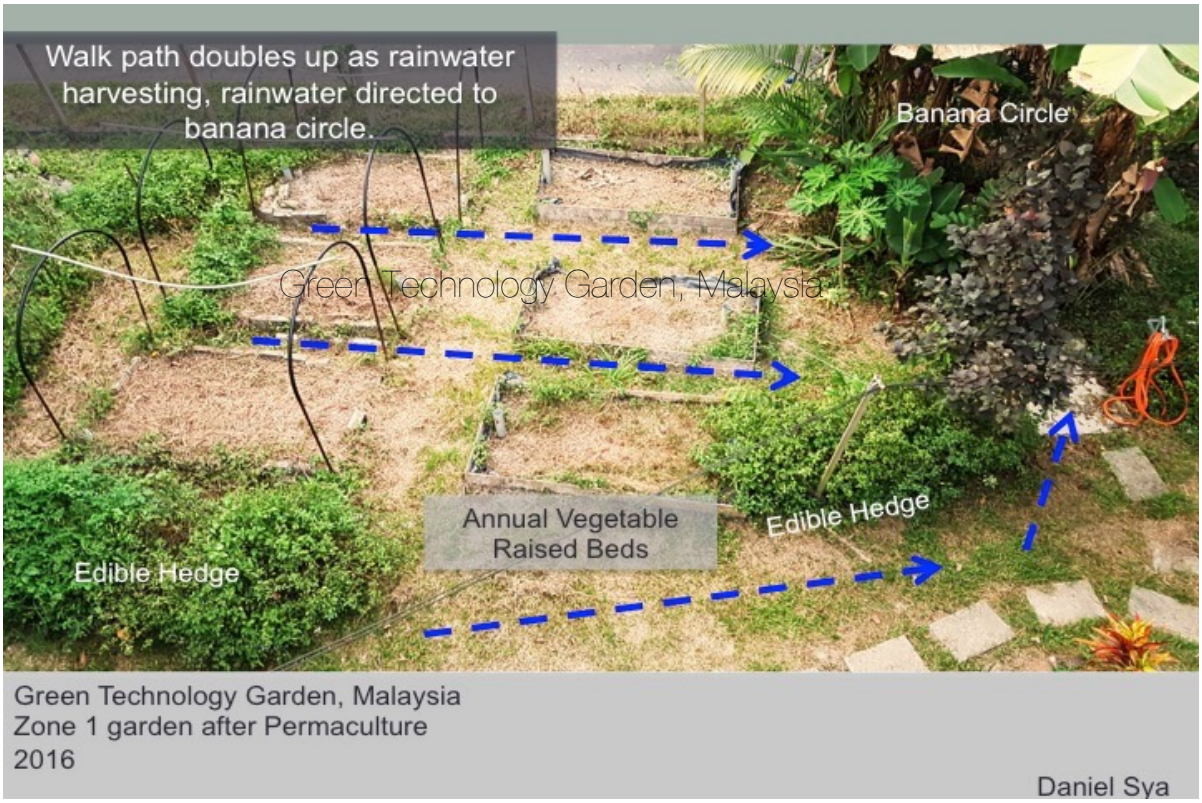


Figure 54: Zone 1 garden 3 years after Permaculture revamp, 2016

Figure 55: Zone 1 garden 3 years after Permaculture revamp, 2016.

Figure 56: Zone 1 garden before Permaculture revamp, 2013

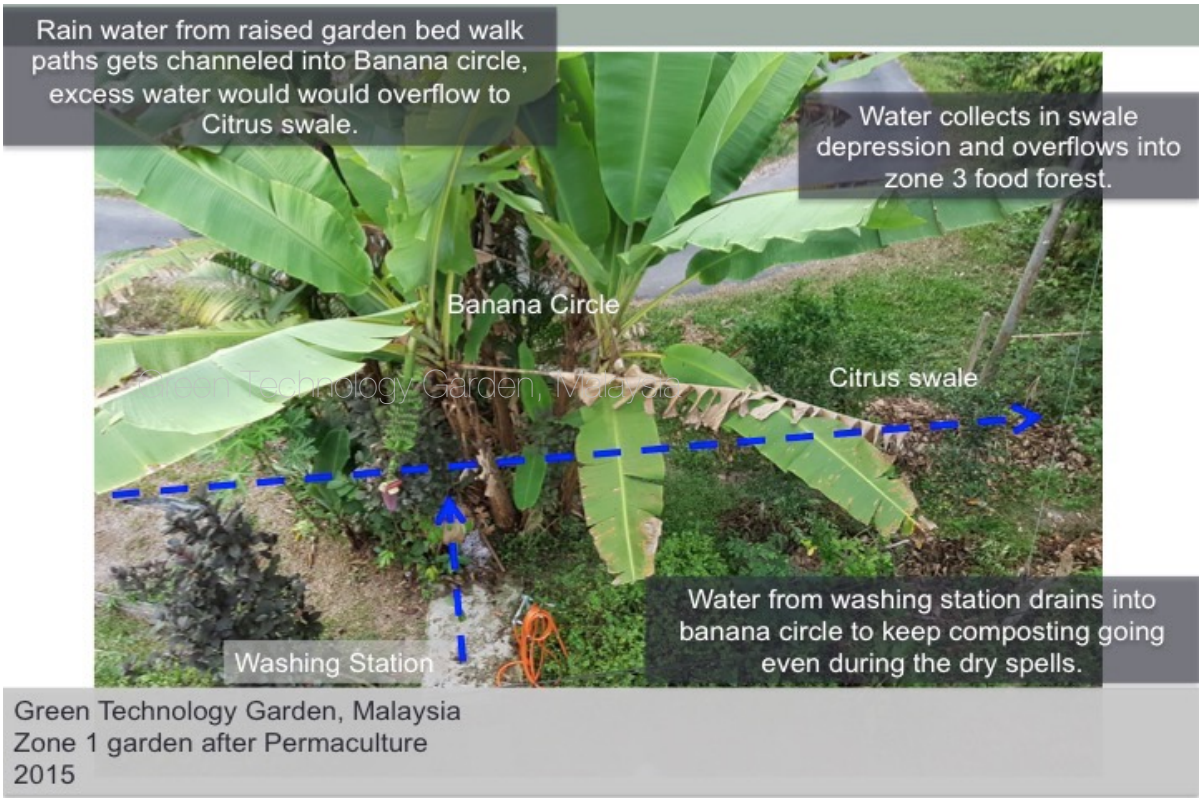


Figure 57: Zone 1 garden 2 years after Permaculture revamp, 2015

Green Technology Garden, Malaysia 2016
Zone 1 garden after Permaculture
Citrus swale and Banana Circle after 3 years of implementation. Daniel Sya

Figure 58: Zone 1 garden 3 years after Permaculture revamp, 2015

Banana Circle Pond – A twist to the classic Permaculture Banana Circle.

The Permaculture banana circle has been one of the most successful design elements for the tropics, with that, I have attempted to 'integrate rather than segregate' a fusion of water harvesting swales and irrigation canals together with a larger version of the banana circle to form an integrated water harvesting, irrigation, and aquaculture system. The system is currently under trial and observation to see how well it will work as an aquaculture system.

However, after just 2 years of after it's implementation, I have noticed a large growth spurt in the food forest after the water table levels have risen after the gley material has formed at the base of the swales and banana circle ponds.

How does the Banana circle pond differ from the banana circle?

A banana circle pond is basically an enlarged and deeper banana circle primarily designed in conjunction with water harvesting swales to direct the rainwater run-off and biomass from the trees around into the deep pit of the banana circle pond, the build up of these 2 elements forms a layer of gley that helps with the water retention over time. This design strategy is currently on trial on a tropical flat land with high clay soils and may not be applicable to other sites with varying conditions.

The banana circle pond is different to the permaculture banana circle mainly because it does not act as a compost heap in the center of the pit and it is mainly designed to catch nutrients and rain water run off and

then during heavy rainfall events when water levels rise, the excess water and nutrients spread out throughout the landscape through the swales and canals.

Integration with aquaculture

The pit is designed to be deeper than the swale depressions to form a deep pit where water can accumulate and thus create a habitat where fishes can converge during the dry season. This also would enable us to harvest fishes in the dry season when the swale levels are depleted.

During the wet season and when water levels rise in the swales and canals, the fishes then functions as a biological control for mosquito larvae.

Integration with irrigation systems

The earth mound of the banana circle pond is planted down with a wide diversity of plant species to kick-start the food forest with early succession pioneering perennial plant species such as Bananas, Papayas, Galangal, Turmeric, and peanuts. The concentration of run-off water in these pits would be of benefit to the plants planted down and in return once the plants have taken off, they produce food and shade for the banana circle pond creating a microclimate for the aquatic species. All the Permaculture principles are put into action: Relative location, Diversity, Edge effect, Accelerating succession and evolution, each important function is supported by many elements, each element performs many functions. (Source: 'Introduction To Permaculture' – Bill Mollison & Reny Mia Slay)

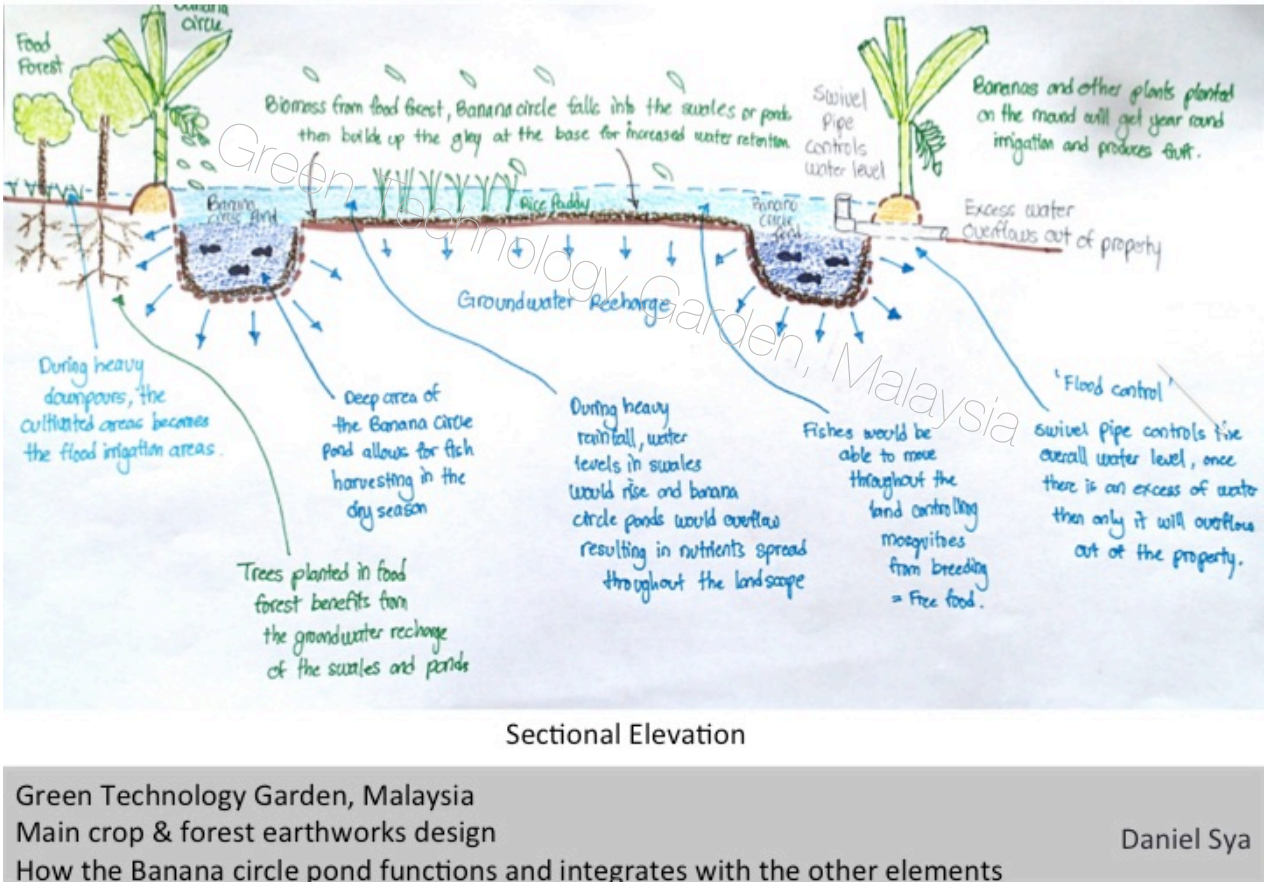


Figure 59: Integration of banana circle ponds with other elements in Green Technology Garden, Malaysia.

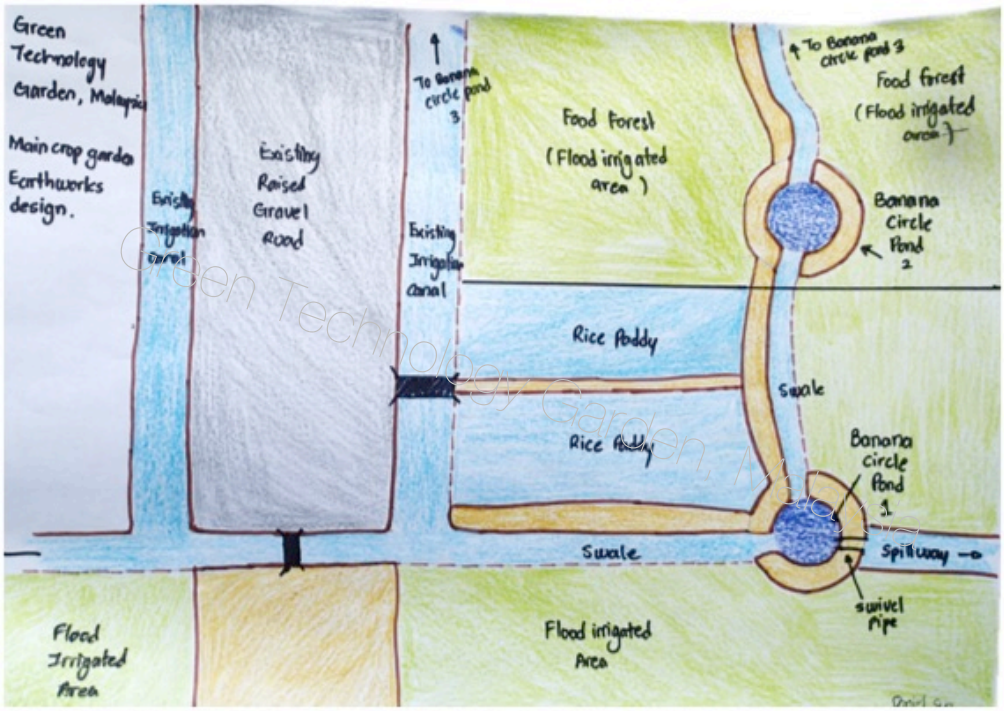


Figure 60: Integration of banana circle ponds with other elements in Green Technology Garden, Malaysia.

Site establishment process of Green Technology Garden, Malaysia.

2011 (Before Permaculture)

In late 2011, the pioneering work of setting up the property has begun.

- Property survey (demarcation of land boundaries) and a basic botanical survey.

2012 (Before Permaculture)

- ***Earthworks*** - Land Clearing. A backhoe was contracted to clear up the shrubs, bushes. Fruit trees and all large trees were preserved. Some areas with the native bush species were preserved during the earthworks.
- ***Structures -*** Selection and construction of main house site.
- ***Structures*** Fencing of property using chain-link fence, concrete poles and concrete base.
- ***Animal Systems*** Site selection and construction of chicken coops. Development of animal systems scattered around the property.
- ***Plants*** Planting down of plants.
- Maintenance of system - manual irrigation, manual weeding, manual feeding and watering of poultry flock.

2012 Permaculture Education (PDC, Short courses, Internship)

2012 - 2013 After Permaculture

- Site survey and analysis
- Sector analysis
- Permaculture Master Plan

2014 Permaculture revamp and transformation

- **Water** harvesting earthworks
- **Access** roads and pathways
- **Structures** - Workshop, Compost toilets, Communal kitchen, dining, multipurpose area.
- **Plants –** Planting down of plants mainly food forests and main crops
- **Animal systems –** Improvement of animal systems
- **People -** Organization of human energy – volunteers

2015 Site establishment and maintenance

2016 Site maintenance

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