

Permaculture

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Architectural Design Studio 2

ZERO+ House of the FEW's

Spring Semester of 2016

Politecnico di Milano



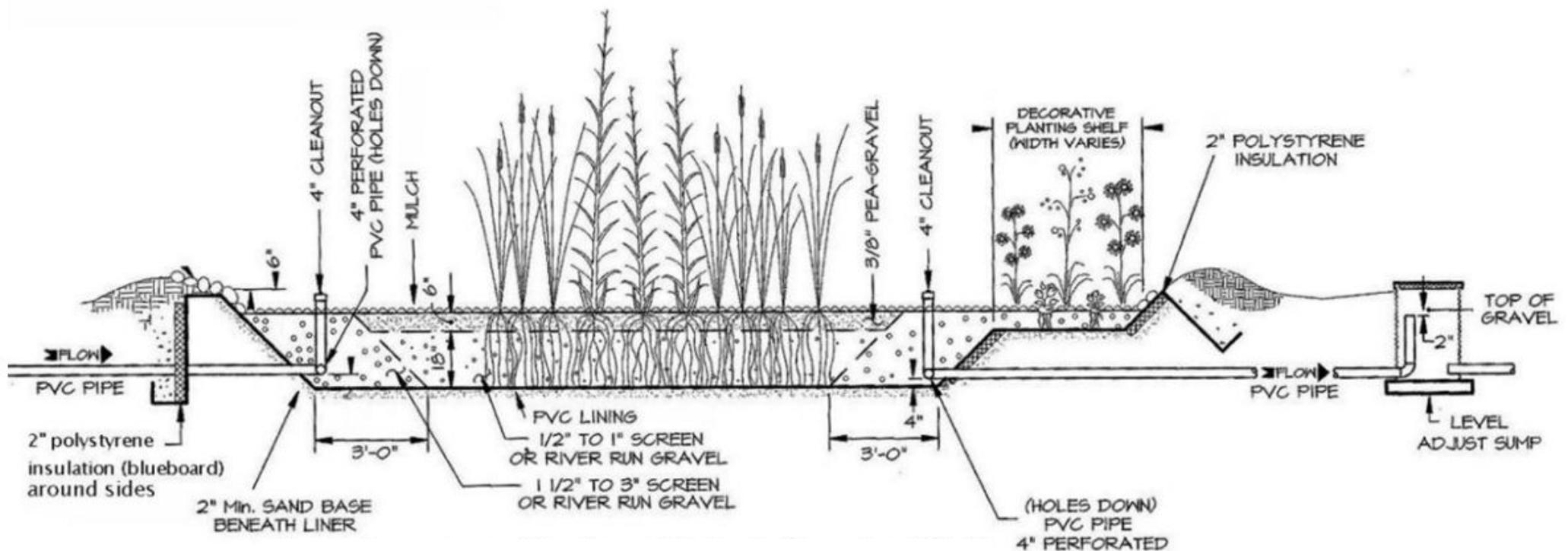
What is permaculture?

Permaculture is a design concept for sustainable, food producing landscapes mimicking the diversity and resilience of natural ecosystems. Although concepts included in permaculture design have been in practice for millenia by various cultures worldwide, the term “permaculture” as it is currently understood was first coined in Tasmania by Bill Mollison and David Holmgren in the mid-1970's.

Mollison and Holmgren described permaculture as, “an integrated, evolving system of perennial or selfperpetuating plant and animal species useful to man”.

The use of the word, and scope of the definition, has varied greatly since the 1970's; much like the use of ‘sustainability’ and ‘ecology’.

Holmgren later expanded the definition to, “consciously designed landscapes which mimic the patterns and relationships found in nature, while yielding an abundance of food, fibre and energy for provision of local needs”.



Permaculture

Permaculture combines three key aspects:

An ethical framework, understandings of how nature works, and a design approach.

This unique combination is then used to support the creation of sustainable, agriculturally productive, non-polluting and healthy settlements. In many places this means adapting our existing settlements. In other cases it can mean starting from scratch. Both offer interesting challenges and opportunities.

The word 'permaculture' comes from 'permanent agriculture' and 'permanent culture' - it is about living lightly on the planet, and making sure that we can sustain human activities for many generations to come, in harmony with nature. Permanence is not about everything staying the same. Its about stability, about deepening soils and cleaner water, thriving communities in self-reliant regions, biodiverse agriculture and social justice, peace and abundance.



Before



After

Why Permaculture?

society

A Global Movement

A network of interconnections without borders

Fosters Ecological Literacy

Empowerment through pattern recognition of surroundings

A Dynamic world

Responsive development to work with Nature to fulfil human needs

Honours Diversity

Culture that embraces differences and reinforces cooperation over competition

Inspires Eco-Innovation

Social/ eco entrepreneurship addresses needs and capitalizes on wastes and fulfils niche markets

Strengthens Local Economies

Purchasing local develops bio-regional enterprises which supports reskilling

A Better Tomorrow

By addressing the key issues of our time from a multitude of approaches Permaculture provides a framework for truly sustainable development

A Proactive Approach to Sustainability

Directing creative energy and regenerative actions for a better future

Strengthens Everything Local

Inclusive techniques for community self reliance and ecosystem repair

Revitalizes Soil Life

Cycles Carbon to build complexity and diversity in the soil food web

Develops Biodiversity

Enhanced Ecosystems yielding abundance and stability

Earth Shaping

Sculpting to build natural capitol with regenerative earthworks

economy

Stable and Resilient Investment

Consistent yields relying on diversity of crops and build up of natural capitol

A High Return Potential

Premiums for products that are local or organic and minimum inputs

Poverty Alleviation

Meeting basic needs on a personal and community level

Multiple Income Streams

Promotion of a layered approach to financial security

Mitigates Climate Change

Reduces strain on infrastructure and budgets from extreme climatic conditions

Green Economy

Job Creation from focused ecosystem repair and lower carbon resource development

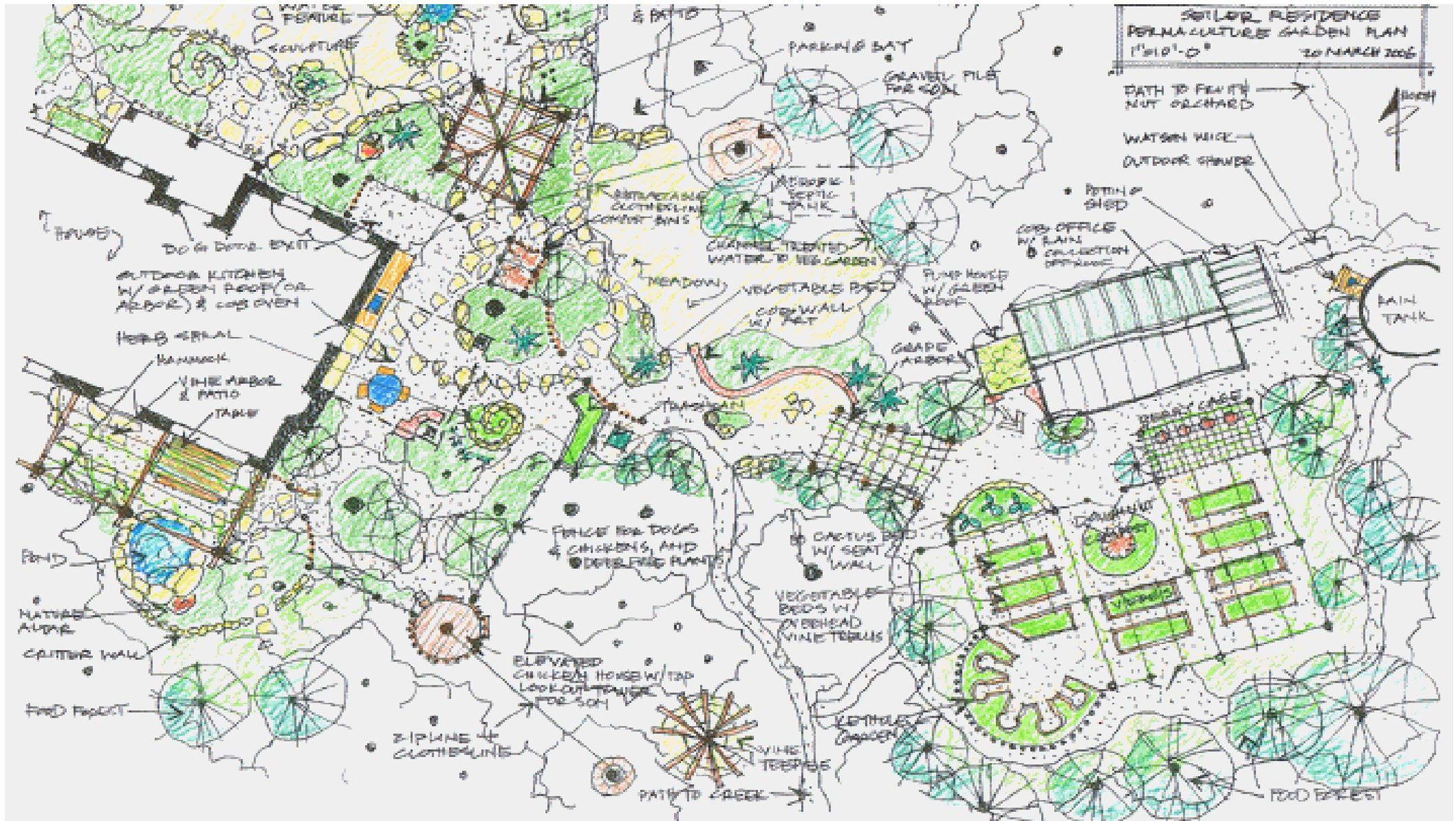
Fulfil Full Hydrological Cycle

Recharges groundwater and creates zones of oasis

environment

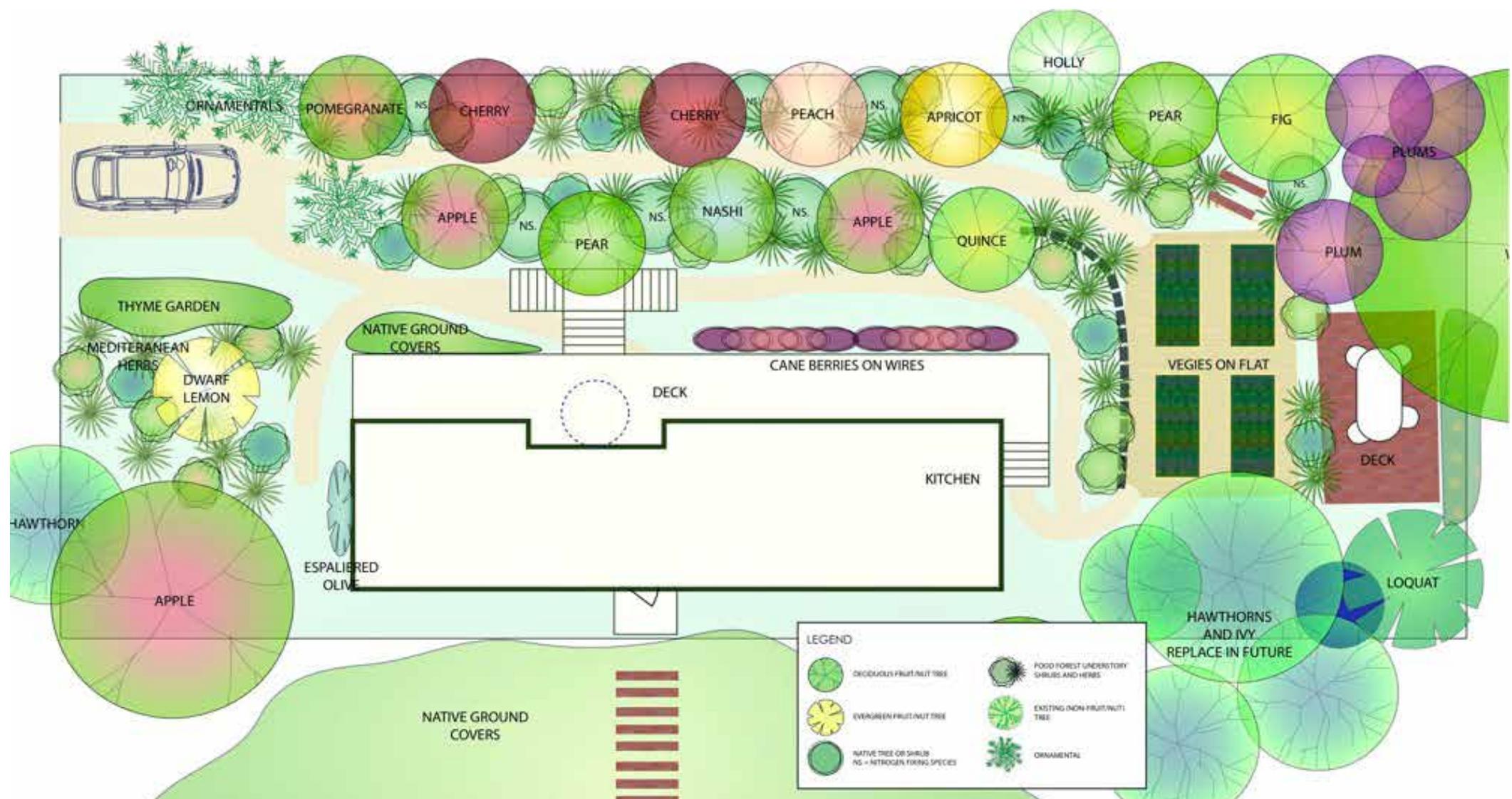
Permaculture Theory

Before breaking soil and designing structures, permaculture practitioners first observe patterns and characteristics of the environment at the chosen site. This includes visiting the site at various times of the day, during various seasons and weather conditions, and observing the landscape from different viewpoints. Following is an elaboration of the theory behind permaculture design.



This preference for man-made, mechanical solutions is not conducive to the adoption of permaculture theory. Another factor that would encourage a group or an individual to adopt permaculture practices would be a worldview that included a developed sense of place.

If people feel connected to their community and environment, they would be more likely to embrace permaculture. Humans can develop a sense of place by observing patterns, processes, and cycles within nature. Humans must reconnect their aspirations and activities with the evolution of natural systems, regenerating as opposed to degenerating our landscapes.



“Sustainability”

As world population and resource consumption continue to follow an upward trend, the importance of humans reconnecting with natural systems increases. Problem solving, conflict resolution, and increased stewardship are required for world populations to continue - or sustain.

Oftentimes, sustainability is defined as using less, or using up capital more slowly. That definition creates an illusion of achievability, and leaves out the most integral elements of the human race's ability to sustain itself. Sustainability is value laden, and achieving sustainability requires problem solving. Permaculture integrates the human value aspect by approaching problems through ecology, systems thinking, and holistic inquiry. Ethics and considerations ingrained within those overarching approaches:

- Land and nature stewardship
- The built environment
- Tools and technology
- Culture and education
- Health and spiritual well-being
- Finances and economics



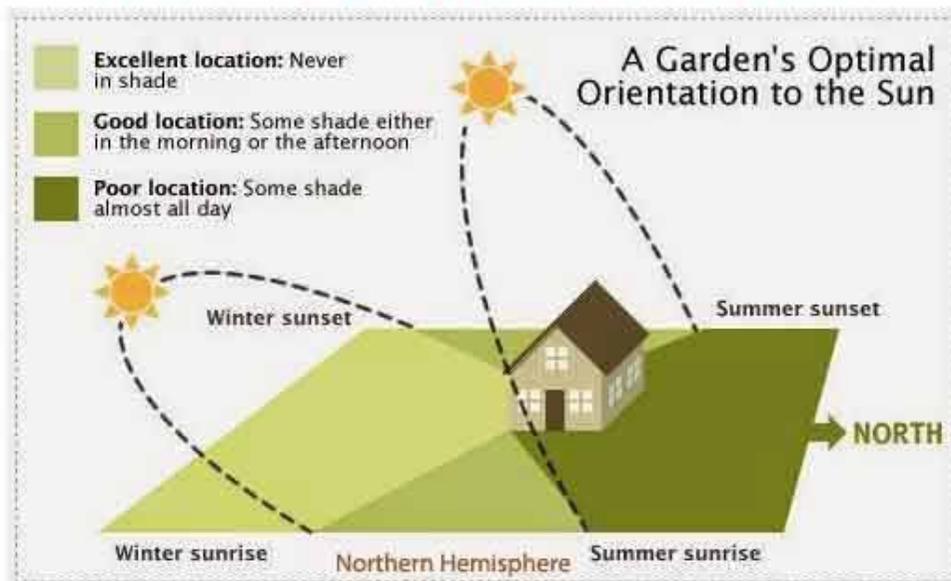
The three core tenets of permaculture

Care for the earth: Provision for all life systems to continue and multiply. This is the first principle, because without a healthy earth, humans cannot flourish.

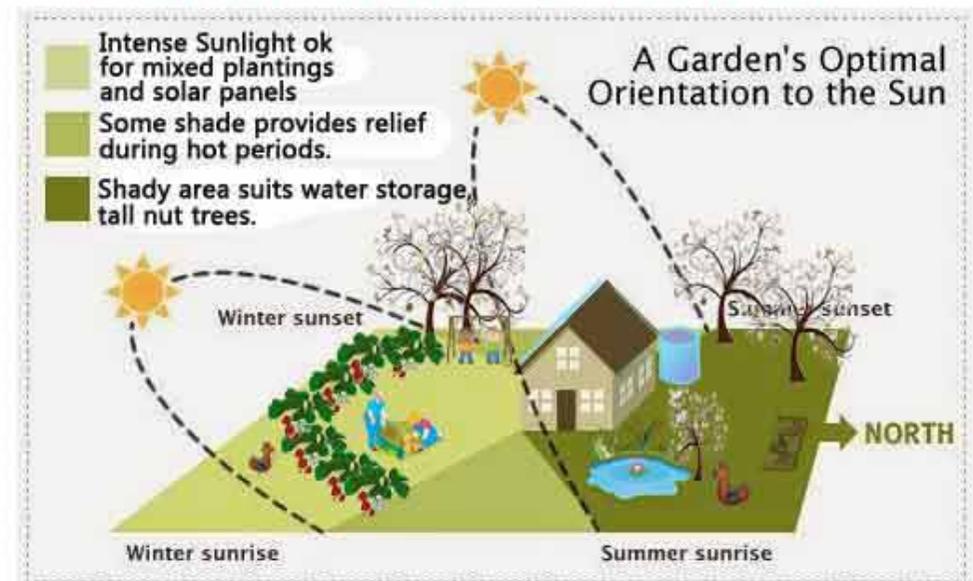
Care for the people: Provision for people to access those resources necessary for their existence.

Return of surplus: Reinvesting surpluses back into the system to provide for the first two ethics. This includes returning waste back into the system to recycle into usefulness. The third ethic is sometimes referred to as Fair Share to reflect that each of us should take no more than what we need before we reinvest the surplus.

Conventional Advice



Permaculture Advice



In Permaculture we see all the sectors as having usefulness. We use shaded areas for mixed forest growth and storage of resources such as water, semi-shaded areas for mixed plantings and protective of some plants during harsh summers. Full sun suits conventional vegetables and a variety of plants, annual and perennial provide protection for one another against the harsh sunlight and pests.



Permaculture Principles



Observe and Interact

Design should consider different seasons, times of day, and cultures. Ways to work and design with existing patterns in nature should be considered.

Catch and Store Energy

Renewable ways of capturing and utilizing energy should be a priority. Energy, which gives us the ability to work, should never be wasted. True costs (i.e. negative externalities, human welfare, habitat protection, etc.) should be a central part of energy dialogue. Infrastructure improvements, retrofitting, passive design, and alternative storage techniques should be prioritized.

Obtain a Yield

Design should focus on principles of self-reliance. Producing an agricultural yield is necessary for independence and continuity. Yields are encouraging, and they create 'positive feedback loops'.

Apply Self-Regulation and Accept Feedback

With better understanding of how positive and negative feedbacks work in nature, systems can be designed that are more self-regulating, thus reducing the work involved in repeated and harsh corrective management.

Use and Value Renewable Resources and Services

We live as a result of the ability of the living world to regenerate. A diversified use of renewable resources, at an appropriate level of use, can help us limit our consumption.



Produce No Waste

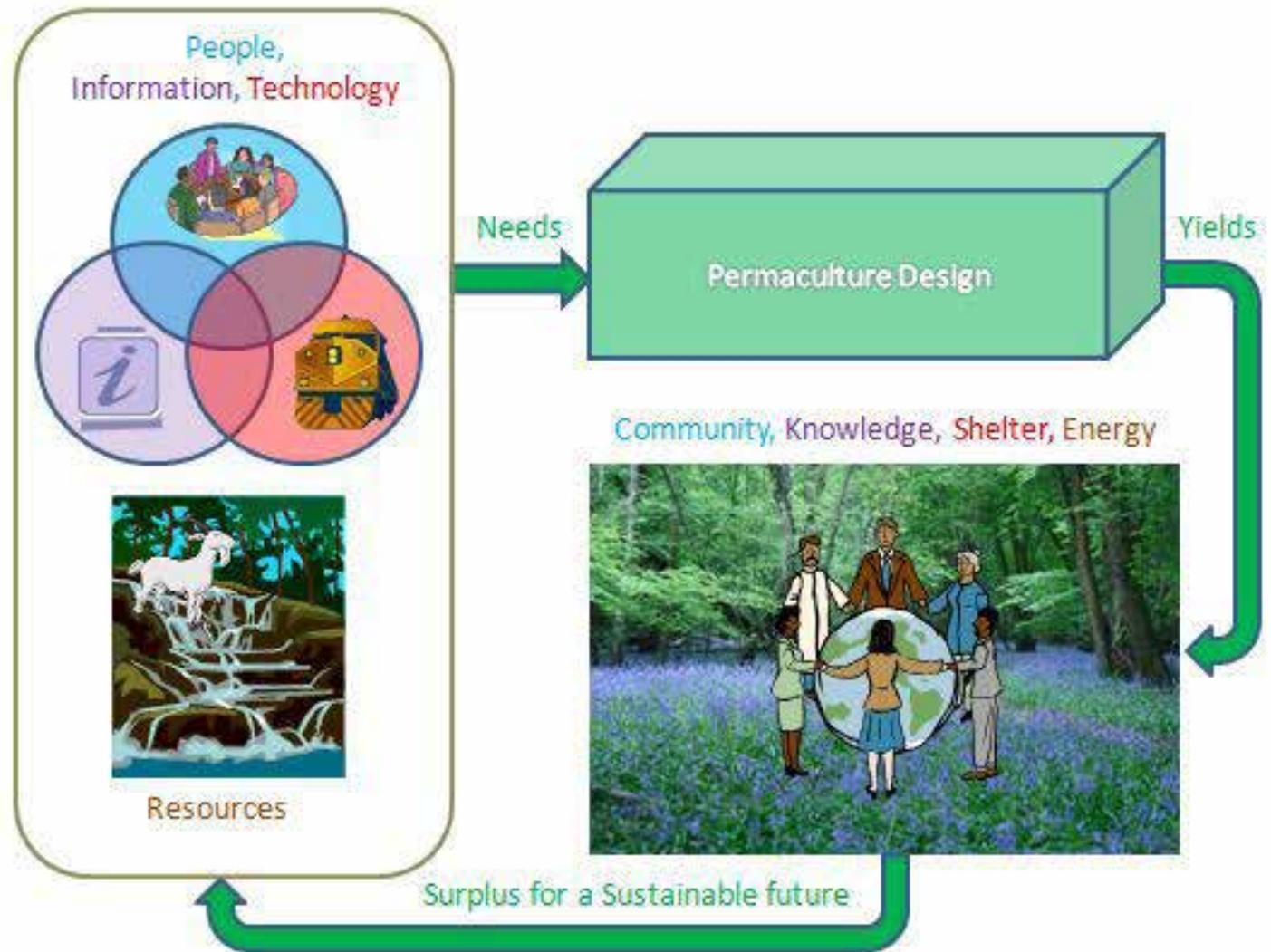
Look for ways to make waste a useful input in our system, rather than just an output. Recycling, composting, and reducing waste are increasingly important as population increases.

Design from Patterns to Details

By stepping back, we can observe patterns in nature and society. These can form the backbone of our designs, with the details filled in as we go. Thoughtful design is a way of addressing and solving many of our problems at the source.

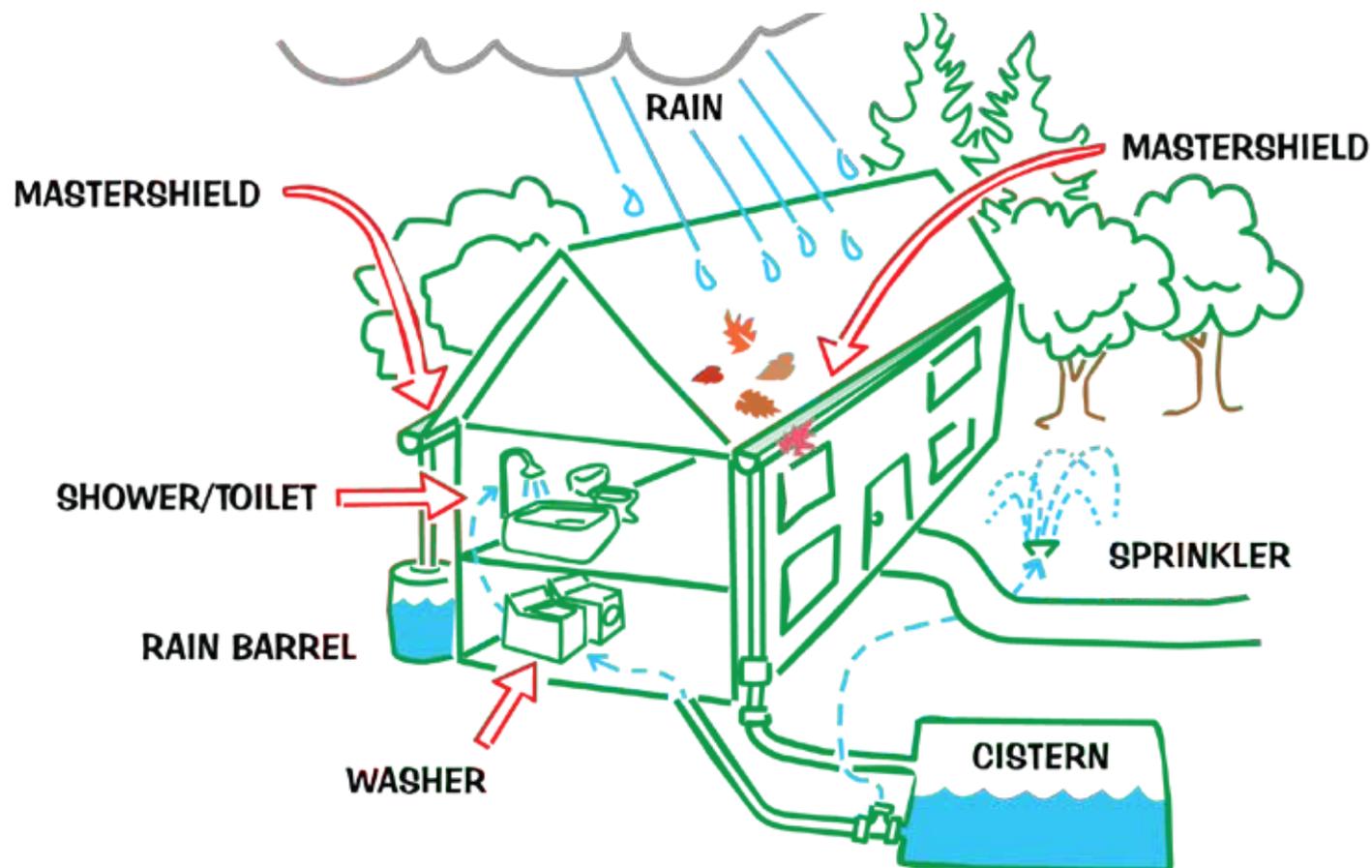
Integrate Rather than Segregate

This requires the recognition of complex connections in nature, and making beneficial use of those interactions. We must brainstorm the many functions that each element can perform.



Harvest Rainwater

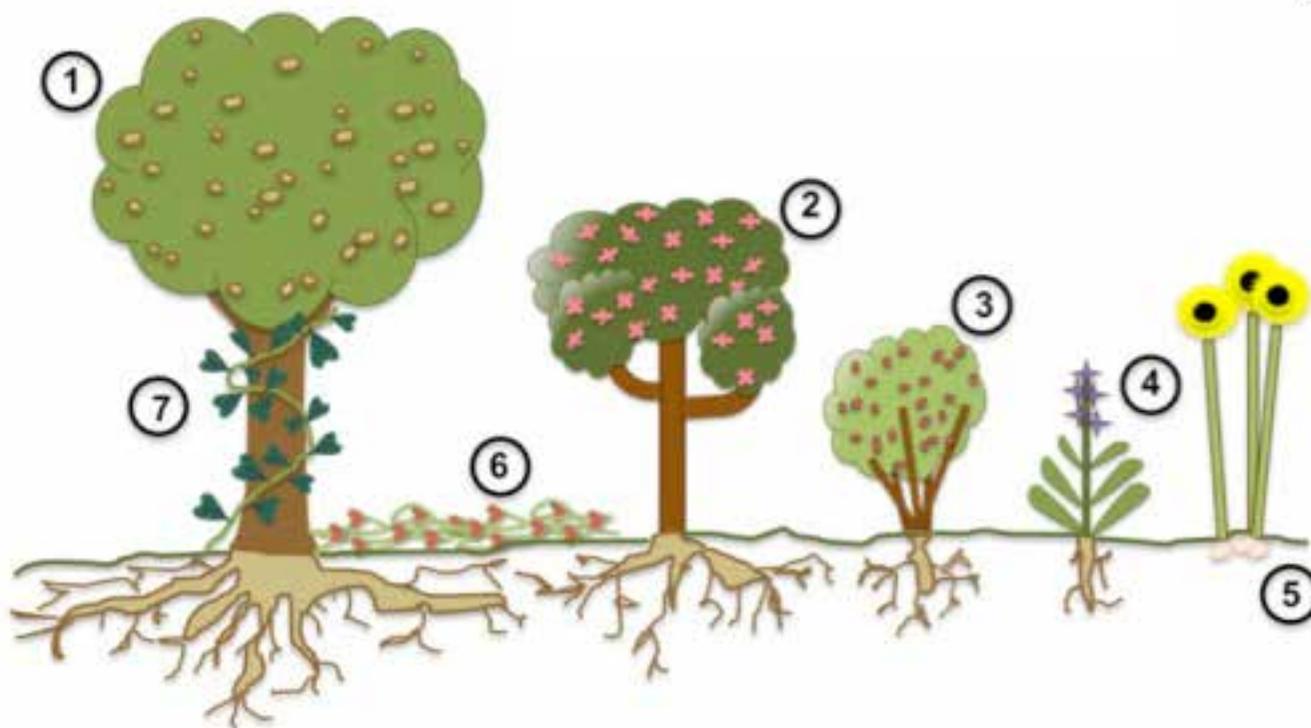
A basic start to harvesting rainwater is to build or purchase a catchment system, such as a barrel attached to your household eaves trough runoff point. However, to maximize use of your catchment system, design your landscape in a manner that naturally harvests rainwater as well. This includes building infiltration basins, also known as swales (indented gardens), as opposed to mounds (elevated gardens). Swales can be connected to runoff points in your landscape to maximize natural rainwater harvesting. An advanced concept of this is to build a diversion swale. “A diversion swale is built slightly off contour, allowing a portion of the water to soak into the soil locally while moving surplus water slowly downhill from one place to another, infiltrating water all along the way.” This helps slow water flow, decreases water inputs and associated costs, and prevents erosion.



Stack Functions

Stacking functions, or companion planting, is a great way to reduce your external inputs. What this means is to consider the entire spectrum of benefits any plant can provide, and also to consider what that plant needs to thrive. Do the same for several plants and determine whether any one plant can meet the nutritional or structural needs of another, when interplanted closely together.

A great example of stacking functions can be taken from the Native American tradition of a Three Sisters Garden of corn, beans and squash. Corn provides a natural pole for beans, beans fix nitrogen in the soil that other plants use, and squash provides a natural ground cover to reduce weeds, retain soil moisture, to serve as a natural mulch, and the prickly hairs help deter pests.



The result is known as “overyielding,” where the combined yield of all three crops grown together on the same land is generally higher than what any one of the crops could produce in the same area of land if planted alone. Lastly, the three sisters also nutritionally complement each other. Beans are rich in protein, balancing a lack of needed amino acids found in corn; corn provides carbohydrates; and squash yields vitamins from the fruit and oil from the seeds.

Herb Spirals

Herb spirals are compact vertical gardens allowing for individualized management of wind and water flow. Use a solid material, such as rocks or used bricks, to build the spiral frame. Ensure the center of the spiral is the highest point.

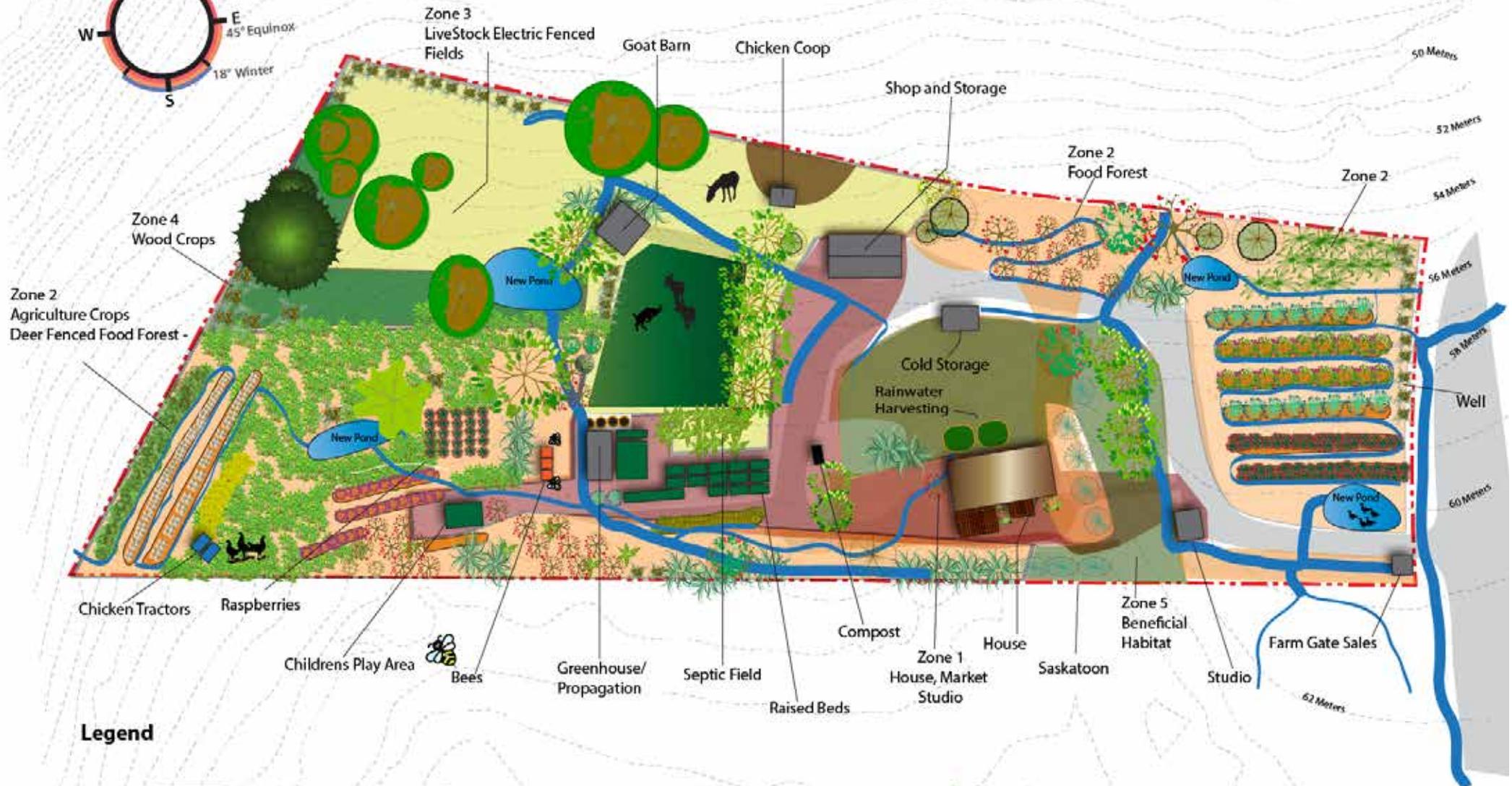
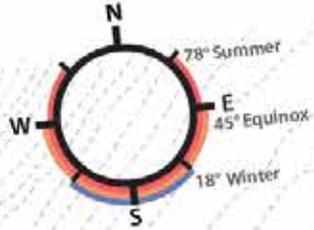
Plant herbs that thrive in dryer soils and full sun at the top and use the various angles and heights to plan where to plant herbs depending on their sun and water dependence. The stone or brick walls provide heat retention, insulating the plant roots from cold snaps. Herb spirals can also be built as swales that indent into the ground.

Remember, in the northern hemisphere, water runs off in a clockwise direction, so be sure to build your spiral in this same manner to work with the natural flow of water.



Project: **Many Hands Farm**
7460 Westholme Rd.

0 100 ft 200 ft
 Date: **Sept 15, 2013**
 Contour interval 1 meter



Legend

Roadway		Saskatoon		Cherry Tree		Fir Tree		Peas	
Zone 1		Raspberry		Maple Tree		Hardy Kiwi		Cedar Tree	
Zone 2		Blueberry		Chinese Chestnut		Bee Forage		Walnut	
Zone 3		Sea Buckthorn		Monkey Puzzle Tree		Broom		-	
Zone 4		HoneyBerry		Apple Tree		Garlic		-	
Zone 5		Bamboo		Pear Tree		Buckwheat		-	
Goat Pasture		Blackberry		Plum Tree		Clover / Cover Crop		-	
Chicken Run		Comfrey		Fig Tree		Coppiced Maple		-	

Plant List:

1. Plum (Mariposa)
2. Apricot (dual graft Moorpark - Trevatt)
3. Plum (Satsuma)
4. Lemon (Meyer)
5. Fig (White)
6. Cherry (Starkrimson) - dwarf
7. Pear (Williams syn. Bartlett)
8. Pear (Nashi - Nijissoiki)
9. Lemon (Lisbon)
10. Apple (Granny Smith)
11. Apple (Pink Lady)
12. Lime (Tahitian) - dwarf
13. Mandarin
14. Babaco
15. Apple (Gala)
16. Mulberry (Black)
17. Apple (Red Jonathan)
18. Mango (Kensington Pride syn. Bowen)
19. Yellow Guava (Lemon Guava)
20. Peach (Pixzee) - dwarf
21. Nectarine (Nectazee) - dwarf
22. Orange (Navalina) - dwarf
23. Orange (Valencia) - dwarf
24. Grapefruit (also with Mandarin graft)
25. Pomegranate
26. Pineapple Guava (Feijoa)
27. Cherry Guava (Strawberry Guava)
28. Sloe Plum (Blackthorn)
29. Babaco
30. Tamarillo (Orange) - in front yard
31. Tamarillo (Red) - in front yard

- a. Raspberry (Everbearer)
- b. Blueberry
- c. Blueberry
- d. Chilean Guava
- e. Chilean Guava
- f. Youngberry
- g. Golden Currant
- h. Grape - Golden Muscat
- i. Grape - Sultan
- j. Thornless Gooseberry
- k. Thornless Blackberry
- l. Loganberry
- m. Blackberry (in pot)
- n. Blackcurrant
- o. Redcurrant
- p. Raspberry (Autumn bearing)
- q. Raspberry (Everbearer)
- r. Redcurrant
- s. Golden Currant
- t. Goji Berry
- u. Golden Currant
- v. Goji Berry
- w. Goji Berry
- x. Goji Berry
- y. Goji Berry
- z. Raspberry (Autumn bearing)
- aa. Blackcurrant



Deep Green Permaculture - Urban Backyard Food Forest - Demonstration Site

Dimensions: Total Backyard Size - 150 sq. metres. Total Garden Size - 85 sq metres (including paths), Total Garden Bed Area - 64 sq metres

Construction: Single height redgum sleeper raised beds, paths between raised beds approximately 50cm wide and covered with pine bark mulch

Design: Intensively planted, 'over-stacked' food forest design, utilising Backyard Orchard Culture principles for tree spacing. Design utilises 'vertical stacking' to maximise use of vertical space - by combining trees, shrubs, herbaceous plants, ground cover plants, root crops, and climbers. All garden beds are also planted with herbs, annual and perennial vegetables, and companion plants.

Designed by Angelo Eliades, Deep Green Permaculture, <http://deepgreenpermaculture.com/> [25/04/2011]

