

Permaculture Design Process

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Design of Large Land

Design of large land begins with a decision of whether it will be subdivided. Sometime an acre or so is set aside for future home sites for relatives or for economic insurance.

The second challenge of large land is the overwhelming size for maintenance. This is where the concept of zones and sectors is helpful to determine where to concentrate your energy and money.

The goal in large land is to achieve the highest quality of life experience with the lowest input of money and energy, as well as low-input maintenance. It is very important if you like everything ordered, neat and “taken care of” to not, as my mother would say, bite off more than you can chew. Large land works best if it is designed to fit in with the undisturbed landscape.

One of my clients taught me the trick of drawing on the land with mulch. After construction, the disturbed areas looked so offensive to her. She simply distributed mulch over the area, mimicking the litter of nature and blending the area into the natural landscape.

Another client wanted lawn, planting beds and lots of room to putter in the yard. Unfortunately, the “yard” is something you need to define in a large lot situation or you will find yourself in a “manor house” position, needing lots of labor for yard care.

So ... right away define how much you want cared for intensively. Designing an area with internal boundaries is important. This is achieved with fences, walls and different outdoor floors. A floor can be a wildflower clearing, forest floor, driveway, patio, sports court, kitchen garden, mulch or simply a mowed area.

After you have designated your zone 1, your job is to analyze the surface water flows, the micro climate and how to prevent disasters. Make analysis maps. They will probably determine the functional patterns for your landscape choice.

You can't do too much observation and research. This is where you catch all the mistakes you can that will cost you time and money.

As you move through the design process, harmonious decisions for your land will become apparent to you. The design of your land will begin to show itself to you.

Beginning A Design:

1. Make a Base Map

This will be a map of your design area drawn to scale, with all of what you want to keep on the map. For large land it is a good idea to make two maps: One of the entire property, and One of the home site on the property at a larger scale. Take these maps to a copy center and make

around 15 to 25 copies upon which to put your research observations, and ideas including sketches, bubble plans, and final designs.

2. Observation of Physical Space,

(Walk the site with a Compass, Level, Field ID books for Regional Species, Note book, Colored Pens, Scale Rule, a Camera, a Tape Measure, a Shovel, and several empty Jars with good wide lids, marking tape and flags)

Put your observations on a copy of the base map to show where they are located.

Visit at different times, and seasons if possible. Be OBSERVATIONAL - EXPERIENTIAL - Free thinking

Note phenomenon

Infer (make guesses)

Become conscious – of yourself, feelings, environment

Can be free conscious or thematically conscious

Zazen – walking without thinking, unreflective

Sit on a hill – look down on site

Creative visualization

Sit and observe quietly.

Look for historical and archeological materials

Look for animal signs and homes

Know where your utilities are

Look at the site in its own right as a living community of plants and animals

- Grasp the essential character of the system

- Make sketches

- Take color samples

- Take photos

- Make notes

Ask yourself what belongs here? Careful site observation will help you with accurate placement.

3. Research

Make sure you can do what you want to on your land. Limits are set by your governing entities and the disaster proofing needed to be safe and make a wise investment.

- Collect historical materials, photos, maps, etc.

- Check articles on the archeology of the region.

- Find good topography and soil maps

- Learn what goes on in your area that may affect your design, noise, views, dust, transmitting towers, etc.

- Make sure you know the setbacks and right of ways on your land.

- If you are new in the area, talk to your neighbors to learn about your site.

- Study your local weather!!!

- Learn what disasters are common in your area and how to take care of yourself and family.

- Collect materials to learn your soils, and vegetation.

- If you are building, know the building and health department laws.

- Collect articles on Green Building techniques.

- Know your watershed, and how it relates to your property.

Helpful Maps Are:

- A to-scale aerial photo

- Topography map

A copy of the base map with observation notes
Destruction and Removal map
Climate Information map
Tree survey map and vegetation map
Soil map
Business Map
Neighborhood Map
Utility Map
Watershed Map
Bioregional Map

4. List Wants and Needs

It is very important to separate needs from wants. That will help you to prioritize your design goals and not miss an important need. When you are doing this consider more than one generation, the needs of other species, and how to protect your investment. Needs are things you must have or the design simply won't work for you. Wants are things you would like to have, but if necessary you could do without. It helps to prioritize the lists for spreading the installation over 5 or more if there are a lot of elements.

List your design values and ethics to have them clearly in mind. Examples are: Beautiful, Ecological, Water Wise, Kid Friendly, ADA Compliant, and so on.

5. Make a Program

Put the conclusions, from the foundation stage of the design, into a paper with lists, which tell what your design will include. This is called your design program. It is your selection of elements you wish to include in your drawings of the design, it can be a simple checklist of what you want to draw. Have your maps and photos, and notes on hand to reference.

Guides for Land Design Decisions:

A. Zones (placement close or far)

It is useful to consider the site as a series of zones, which can be concentric rings, a single pathway through the system, starting with the home or village center and working out.

The placement of elements in each zone depends on importance, priorities, and number of visits needed for each element, e.g., a chicken house is visited every day, so it needs to be close (but not necessarily next to the house). An herb garden would be close to the kitchen. Proximity invites good management – distance encourages neglect.

The emphasis is on access and schedules.

Examples:

Zone I_ Visit daily, Home center, Very intensive, Transition spaces, Out-door rooms, Start at house doors with herbs and vegetable gardens.

Zone II_ Places visited several times a week, well maintained, dense planting (Use stacking), Some animals, workshops, and well-mulched orchard.

Zone III_ Connected to Zone I and II for easy access, Storage buildings, Windbreaks, firebreaks, Hardy trees and bush species, native wildflowers and Larger animals grazing, Nut tree forest.

Zone IV Timber, Long-term development Agro forestry systems, wildlife plan.

Zone V_ Wildlife corridors, native forest re-growth and regeneration, Hunting, Leave mainly alone.

B. Sector and Orientation (placement for climate and sun shade needs)

The aim of sector planning is to understand from what direction influences come to the property, and how to place elements to make the most of, or protect from those influences. Things to look out for are: Sun, Wind, Fire, Flood, Friends, Noise, Smells, Dust, Seasonal Changes, Deliveries, and Views. The placement of an element for sun, shade, and climate, function and needs.

C. Slope (placement to save energy and maximize water)

Place an element on slope so that gravity is used to maximum efficiency. Use slope to move materials down hill without added energy. Let slope work for you.

D. Guild (the design of beneficial assemblies of companion plants, insects, and animals)

This is an excellent system for increasing yields while reducing maintenance and expenses.

Guilds are made up of a close association of species clustered around a central element (plant or animal). This assembly acts in relation to the element to assist its health, aid in management, or buffer adverse environmental effects.

We have long recognized companion planting in gardens as well as crop mixes of various species in agriculture that do well together. Hence the concept of guilds that rely on composition and placement of species that benefit -- or at least do not adversely affect -- each other. Benefits can include the following:

- * Reducing root competition from invasive grasses. Almost all fruit trees thrive in herbal ground covers, not grasses. Comfrey, for example, allows tree roots to feed at the surface and produces mulch and worm food when it dies down in winter, while spring bulbs (daffodils, Allium species) die down in the summer and do not compete with trees for water during warm dry periods.
- * Providing physical shelter from frost, sunburn or the drying effects of wind. Examples are hedges and borders of hardy trees and shrubs that deflect strong winds, and scattered trees that provide partial shade for crops such as coffee and cocoa.
- * Providing nutrients in the form of leguminous annuals, shrubs or trees.
- * Assisting in pest control by providing chemical deterrents, Tagetes like Marigolds fumigate the soil of certain types nematodes); hosting insect predators (Umbelliferae plants such as dill, carrot and fennel); and using animal foragers such as chickens to clean up fallen fruit.

Plants can be defined as interacting positively or negatively in regard to pest control in the garden, orchard and cropland. Of great importance in crop mixtures are pest interactions and functions of the plant species involved. Some of these are as follows:

- * Insectary plant: The plant acts as a host (a food plant) for predatory insects, which prey upon the crop pests.
- * Sacrificial plant: Pests prefer to attack this plant, but this does not prevent it from setting seed. Other plants nearby escape severe predation.

* All-season host plant: Pests overwinter or live in this type of plant, enabling them to build up larger populations (e.g., pests of citrus are hosted off-season by oleanders).

* Predator or pollinator attractor plant: The crop or hedgerow species provides flowers to feed the adult predators (e.g., buckwheat in or near a strawberry crop).

* Trap crops: Some crops can attract and kill pests, or the pests can be caught or destroyed on these crops.

Trees, shrubs, flowers and vines all serve these important functions so that any farmer who carefully selects hedgerow species to be in one or more of the above categories has substantial pest control capabilities.

If we have a system with diverse plant and animal species, habitats and microclimate, the chance of a bad pest situation arising is reduced. Plants scattered among others make it difficult for pests to go quickly from one food plant to another. However, once pests do breed on any one tree, insect predators perceive this as a concentrated food source and congregate to take advantage of it. In monoculture, the food for pests is concentrated; in a polyculture the pest itself is a concentration of food for its predators.




E. Stacking (vertical design)




For example: root plants, ground cover, shrubs, understory trees, and over-story trees. Use trellises in small spaces.

F. Apply patterns effectively

Design emphasizes the patterning of landscape, function and species assemblies. Every day we work with pattern in design. It is the basis of all computer design, management, financial systems, social systems, health and healing. Use pattern to organize and support functions.

The Basic Patterns Nature Uses to Organize are are:

<p>The Branch: The <u>Branch</u> gathers, collects and distributes the flow of water, air, energy or material. It increases exchange and transport. Having a walk divide several times is a great efficient way to move to different destinations in a yard and have the most area visited with less hard surface.</p>	
<p>The Net: The <u>Net</u> or <u>Mesh</u> is useful for sorting, collecting, filtering and small surface exchange. It distributes tension and distributes force. Planting in a net pattern supports slopes and makes it harder to see into a property.</p>	
<p>The Lobe: The <u>Lobe</u> provides surfaces for exchange, edges or interfaces where two things meet. The edge is the most productive and fecund part of a system, where the most interesting things happen. Placing lobe gardens along a walk increases productivity.</p>	

<p>The spiral The <u>Spiral</u> has the function of speeding up or slowing down, of sorting, of concentrating or dispersing (depending upon which way the flow is going), A spiral walk in a yard makes a yard seem larger.</p>	
<p>The Wave: The <u>Wave</u> patterns – streamlines, zigzags and flows – provide pulsation, timing and the possibility of measurement over time into a system. When you zigzag a fence it is stronger and repels sound better.</p>	
<p>The Scatter: The <u>Scatter</u> pattern introduces the element of chance into a system. It breaks things up and slows them down. A forest grows in a scatter pattern. A scatter pattern of rocks beyond a splash plate breaks the water up, slows the water down, and oxygenates it.</p>	

G. Edge (The edge is the most productive part of a natural system),

Increase edge and you increase productivity

H. Analyze the Synergy of Elements

Make sure each element in the design has its functional support nearby. For each element ask: "Where does this element go? How can it be placed for maximum benefit in the system?" What does the element need? List the elements together in sets, like outdoor kitchen, herb garden, chickens etc. Make sure all needs of each use are placed together.

A great game to play is to see how many functions or services one design choice will serve. Balance water, plant, and hard surface in proportions that mimic your bioregion for harmony.

I. Put time in The Design

- Leave enough space for things to grow/happen.
- Plan things close together so they will force each other taller sooner.
- Plan temporary choices to hold space.
- Plan to do everything at once in each area to save energy and budget
- Design in stages if the budget requires.
- Sequence; imagine how you would move through the finished plan. Consider expansion/contraction, light/dark, closed/open, slow/fast, alone/together, short/long, and steep/level.
- Plan for seasonal and diurnal cycles.

K. Create Micro climates to passively cool, heat and protect

To cool, use these:

- Screens and shade sails
- Frost dams
- Orientation and aspect: use north-facing structures

- 90-degree angles
- Transpiration
- Shade
- Places open to summer cooling breezes
- Locate structures midway on slopes.
- Venting
- Have outdoor utilities for misters, fans, and sprinklers.
- Create outdoor evaporative cooling.
- Design growing walls.
- Use solar cookers (instead of heating the house with a stove).
- Wind chimney
- Wind directed over ponds, and under shade

To warm, use these:

- Windbreaks
- Convection and radiant heat transfer, i.e. mass
- Sun traps
- 45-degree angles
- Orientation and aspect: use south and west facing structures.
- Mechanical heaters
- Fire pits
- Heat reflected from ponds

To both heat and cool, use these:

- Vines
- Insulation
- Radiant heat reflection
- Underground constructions, basements, root cellars and wells
- Day / night temperature extenders and adjustments
- Design microclimates and niches

L. Assist Water to do its' Duties

This basically means to use shapes of buildings, berms, raised planters, ditches, and rain gardens to move water rainwater to where you want it and to infiltrate water for long term watering.

M. How to disaster-proof

- Test for radon and vent if necessary.
- Manage erosion by spreading, channeling, slowing down, and breaking up storm water.
- Use roads, paths, wildflower meadows and ponds as firebreaks.
- Have accessible standing water to dip into if the water stops.
- Design with fire retardant plants.
- Make fire and wind walls to break the advance of wild fire.
- Keep leaves out of gutters and away from structures.
- Use fire retardant materials for buildings and structures.
- Channel the wind away from structures, because fire travels on wind.
- Create wind shelters from fire and destructive winds.
- Do not put structures in a flood path.
- Design access for emergency response vehicles.

- Design storage for disaster equipment, fire extinguishers, wool blankets, buckets, drinking water, and first-aid kit.
- Use trees to mitigate wind.
- Have disaster instructions built into your designs.
- Design to avoid growing mold.
- Have fire escape ladders where needed.
- Design for security and crime proofing.
- Design well-protected entries
- Use post light, light on ground, security light, and underwater lights.
- Outdoor lighting needs to have a security switch which turns on bright floodlights for emergencies.
- Keep safety in mind with each design choice.
- Plant street trees to slow down traffic and cool urban warming.
- If there is a loud sound in the area, like a superhighway next door, or loud music at a nearby performance area, solid walls or solid walls with insulation inside can help cut the sound.
- White noise from falling water can help muffle sound.
- Trees do not muffle sound; they only hide the source of the sound from view.

N. Design in air, soil, water, cleaning (bioremediation)

. DUST

- Air/wind carries dust – tons of dust – up to 9km into air
 - Most dust particles are aerosols – so small they remain suspended – aerosol dust (fine dust from crops and pollutants) are charged with positive ions – they are too small to act as ice nuclei
 - When they become charged with negative ions, they collect together and fall down
 - Plants produce negative ions and collect dust on leaf surface (honey locust is very effective dust collector)
 - Forest collects these particles which mix with organic particles, especially colonies of bacteria that live on leaves (e.g., pseudomonas)
 - NEGATIVE IONS are produced by trees which attract positive ions (dust and pollution) – particle cleansing of atmosphere = healthy air.
 - Deficiency of negative ions in air cause depression, headache, and sluggishness – CITIES. Also zero deficiency in cities – critical.
- Dust rising from trees through evaporate-transpiration and wind contains bits of leaf and pollen, bacteria that live on leaves, oil and wax exudates from leaves
 - These organic particles form nucleus of inland raindrops.
 - The trees bring the rain by seeding the clouds.

O. Select Appropriate Renewable Energy

Solar is affordable. A simple solar water pump can raise water 75 feet below ground and pump it many feet above ground. Consider them for rain storage distribution.

P. Design in:” Livings”, Local Economics, and Recycling

Always choose local and bioregional sources for selections first. Barter and trading systems are common now in many parts of the world. Take the time to locate and be an active member of them. You can be clever about using recycled materials.

Q. Design with Recycling

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Put it on Paper

1. Create Bubble Diagrams

On at least three copies of your base map draw round shapes with words in them showing rough placement of the design elements on your map. Connect these shapes with lines to show the flows between these elements. The shapes need to be roughly to scale. The shapes will show placement of your “outdoor rooms” or use spaces. The flow lines will show the connections of these rooms and your paths. Do these fast and loose. Use the concepts of zones and sectors to help you with placement. Colored felt tip markers are good for this. You can do as many of these as you want. Each new design will bring new ideas. Sometimes I make 2D models to scale of the furnishings I want to place in these outdoor rooms and cut them out of colored paper. I can move them around before gluing them where I want them. This helps me stick with scale and experiment with placement. Have fun!

Combine your best ideas from your bubble diagrams into one master bubble diagram that will be refined into your design. This diagram will have improved flows, stacked uses, and better scale.

2. Create your Final Design

Ideas to assist placement choices

- Intellectual perspective can help to make a small area feel more spacious.
- The landscape tells you where things can be and can't be:
 - Where it is strongest to put a road
 - Where you can run electricity and water
 - Where wastewater bioremediation can happen
 - Where fruit trees can grow and bear
- The most beautiful places need to be protected. Where are they?
- Where will you put places to read, rest, visit, eat, cook, store, play, work, wash, bathe, play music, plug in, hide, mediate, and exercise?
- You need a place to sit with your back to a wall on a south side, sheltered from the winter sun.
- Construct well-protected entries.
- Use side yards for seating, water harvest, and animals.
- Have sunshine and light, shadow and light, airflow, protection from sounds, privacy, protection from smells, and soft surfaces – unless intentionally creating a barrier (then make it prickly).
- Design for other animals.
- Deal with insects, birds, and other life forms.
- Allow space to screen parking from view.

Take time to layout your final drawing and report so they will look good on your page. It will include your design drawn over a copy of your base map and you can add details and lists (schedules) You can do the type on your computer and copy it through tracing paper or paste it

on your drawing. You can paste photos of plants, furniture, or art on the page to dress it up and help show what you want to communicate. Sometimes it is helpful to create separate hard surface and plant drawings. I use overlays to do utility details. You can list plants, including sizes, and surface materials, including amounts, on separate sheets of paper. You can make a black-and-white copy and color it with pencils, felt-tip pens, watercolor, or oil pastels (or any combination of these). Whatever. Have a good time with it. Sometimes I use photos of the site that I alter with whiteout, colored pencils, and oil pastels to look like how I want the final result to look.

How Nature Works, Guiding principles of the Designer:

- Everything is connected to everything else
- Every function is supported by many elements; e.g. guild, soil
- Every element can serve many functions; Elements are placed in relationship to another so that they assist each other or make the least change for the greatest possible effect
- The edge is the most productive area in a natural system; you increase productivity (creativity) by increasing edge
- Diversity is related to stability. It is not, however, the number of diverse elements you can pack into a system, but rather the useful connections you can make between these elements
- Nature abhors a vacuum
- A healthy system will tend to correct its own minor imbalances if allowed to do so

Permaculture design asks the question, "Where does this (element) go? How is it placed for maximum benefit in the system?"

Permaculture is made up of techniques and strategies:

- **Techniques:** concerned with how to do things (one-dimensional), e.g., organic gardening
- **Strategies:** concerned with how and when (two-dimensional), e.g., Seed Balls, Organic Gardening with Seasons
- **Design:** concerned with patterning, time, placement, selection, ascetics (multi-dimensional)

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