

Permaculture Design Project

for

The Pfalzer Earthship Residence

Myaaka, Florida
March 2009

Permaculture or permanent agriculture as defined by Bill Mollison is:

“The conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability, and resilience of natural ecosystems. It is the harmonious integration of landscape and people providing their food, energy, shelter, and other material and non-material needs in a sustainable way.”

This permaculture design was created for the grounds of the Pfalzer home in Myakka City, the first full Earthship to be built in Florida. The project was conducted by the Permaculture Design Course students (PDC) as part of the permaculture certification classes held at the site in March 2009. Wayne Weiseman, an international permaculture expert, taught the certification course and informed the design.

General Description of Plan -

The PDC studied the Earthship plans and site and surveyed such factors as the topography including slope, solar, water, wind, soil, plant and wild life, roads and pathways. The owners' requests, their lifestyle, and the time and labor they could dedicate to the care of plants and animals were considered in the design process as well.

The plan the PDC designed provides edible, functional, and aesthetic elements which can be implemented fully or in stages as the owners' ability to focus on this project grows. Many of the plantings, once established, will prosper with minimal care for many years while others will require periodic care. The gardens for daily or frequent use will require more attention but are sized to fit the needs of two people. Many native plants were identified on the property that are edible and/or otherwise useful that won't require any care.

Zone planning was used to guide the choice of plants for areas around the house and through much of the grounds. Proximity to the house (zone 0) was determined by how often the plants (and animals) are used or need to be serviced. The design plan covers Zones 1 through IV with intensity of use decreasing as zone numbers increase.

In Zone I, plants and flowers were chosen for the earthship's berms that can control erosion and are edible and ornamental. Herbs and edible plants and flowers and a chicken coup and worm bin were chosen for the areas near the kitchen that would likely be visited daily. Off to the side of the main entrance to the house, an entertainment and outdoor kitchen area was envisioned with an arbor and various plantings to beautify, shade, be edible and repel mosquitos. Trellises of flowers are recommended to cover the walls of the container-constructed garage to enhance its appearance. Around the North and East sides of the house, trees provide fruit and plants are edible, medicinal, attractive to pollinators, bird habitats and/or simply beautiful.

In Zone II, in the open area furthest west from the house, various fruit trees were placed along the planned pathway. Here, a compost staging area can be placed at the southwest side of the existing berm. In the opposite direction, beyond the gardens to the east of the house, the PDC imagined a private garden and nearby, a pavilion on the pond, both with a good variety of trees, self seeding flowers, grasses and water plants and flowers to provide fruit, beauty, butterflies, birds and bees, as well as construction wood.

In Zone III, east of the pond, the PDC sited a super guild orchard or food forest. It includes low maintenance fruit and nut trees together with an interrelating community of plants including soil fixers. Alongside these, Olive trees can thrive along the road with northern exposure.

In Zone IV, the cleared area (southwest) across the road from the kitchen garden and up to the wetlands, was dedicated to easy care trees and alternating winter and summer plants. These plantings provide edibles, construction wood, soil enrichment, and pollinators. Since this area is a wildlife corridor, the PDC also recommends planting animal forage to keep the wildlife away from other plantings and house gardens. This area can also host large scale composting near the edge of the road.

What follows is a descriptive narrative, an illustrated plan, and listings of plants and their purpose which together will present the design in greater detail.

Design Narrative

As you stroll out the main entrance of the home, towards the left, you are greeted by a kitchen garden overflowing with herbs - mint and fennel, parsley, sage, rosemary and thyme interspersed with vegetables, namely lettuce, kale, carrots and onions, blue bush beans and summer spinach as well as marigolds and dandelions, nasturtiums and other flowers stacked between. The diversity of plants lends not only to beauty and edibility, but helps distract, confuse and deter the insects you don't want, all while attracting pollinators such as butterflies and bees.

Go ahead and pluck a nasturtium flower and taste it. Kind of peppery, isn't it? Not only is this plant edible, but it also repels or traps several types of insects that munch on the tastier crops surrounding them such as caterpillars and black fly aphids. This beautiful flower embodies the philosophy of permaculture that impregnates the rest of the kitchen garden, which becomes a microcosm itself for the entire design. We will see more manifestations of this as we wander the property.

Is that a chicken coop? The chickens not only eat food scraps and insects, but they each provide about an egg a day. Cute clucking sound, eh? Let's head southwest, down the shell road.

The Calusa, the original inhabitants of Southwest Florida, were known as shell collectors. They used shell for tools and jewelry, as well as decoration. Shell mounds are still existent throughout Southwestern Florida and it's fitting that the drive way is made of shell.

Walking into the southwest corner of the property, we find ourselves in the Three Sisters Orchard. This is a circular orchard bordered by blackberry, bamboo and blueberry to keep deer and other critters from foraging on the crops. The bamboo is also harvestable for a multiplicity of uses such as food and building materials. As the circle radiates towards the center, we find jujube fruit and bananas with comfrey as a ground cover that can also be used as a medicine or as a fertilizer.

The name of the Three Sisters Orchard originates from its fall and winter crop, a trio of corn, beans and squash or pumpkin. These three plants create a guild, a group of organisms that live particularly well together and benefit each other. In this example, the corn becomes a structure for the beans to climb, the beans fix nitrogen in the soil, and the squash or pumpkin provides a living mulch that helps retain moisture and deters insects with prickly hairs on its stems. As you can see, nature takes care of itself when carefully planned with functions in mind. The three sisters fill in the center of the orchard during the winter and fall, while watermelon cover the ground during the summer. This rotation of one crop for another throughout the seasons is called successive planting. This is utilized with all of the other annuals around the gardens.

As we exit the Three Sisters Orchard, if we pause for a few minutes, the rustle of leaves under an oak tree will reveal a lizard or two slithering like a snake among the fallen leaves and fronds. These odd reptiles, called skink, are nibbling up pesky pill bugs and caterpillars, and snails as well as slugs: a free form of pest control supplied by the land.

Continuing along the road, to the north, we find a short path of fruit trees: papaya, banana, avocado, mango. As we follow the shells around the bend, we might see a black snake amongst the

palmettos and pine. But don't worry, it's only a Black Racer, a friendly non-venemous snake that eats rodents such as mice. And if you look on either side of the path, before we enter the parking area on the north side of the house, you will find a line of long leaf pine trees. These trees are native to Florida and have a number of uses, including the steeping of its green needles for a tea, which has more vitamin C than a lemon.

Now we find ourselves on the north side of the house where we can take a short break on the patio. Go ahead and sit down for a moment. I'm sure you've noticed the shading arbor above our head, covered with grapevine. Feel free to pluck a sweet snack.

As we sit here, look towards the East: a sprinkling of dwarf fruit trees circled with vegetables and flowers. Not only do the little trees produce tasty fruit, they provide some shade to the vegetables during the hotter part of the day. If you feel like it, we can go sit in the middle of the fruit trees on that bench. Yeah? Let's take a closer look then.

If you recall, bamboo has many uses, and here is one: a tee-pee type trellis for peas to climb. Peas are in the legume family, which also includes the bean plant. This means that peas also fix nitrogen in the soil, just like the second sister we found in the orchard.

How much is the watering bill? Well, it's zero. We collect the rainwater from the domes of the house and use this to shower and wash dishes. Once the dirty water, or grey water goes down the sink, it's captured and used to flush the toilets, then drains into a filtering wetland on the south side of the house. This allows aquatic plants to filter the nutrients out of the black water. Once it's filtered, we can safely use it to feed our plants.

Come along now, we aren't going back inside just yet. I know you are eager to cook up some of this food, but I've got just a little more to show you.

Let's walk east towards the pond, I've got a surprise for you: a secret garden, shaded by live oaks and mulberries. No, we aren't going to rest here, but you're right, the picnic table would be a great place for lunch with all these wildflowers popping up everywhere. Ok. Let's saunter around the lake and check out the view.

As we pass this weeping willow and bamboo on the edge of the pond, you will see our next stop, the palm pavilion, which is constructed in a manner similar to the chickee, the main structure built by the Calusa tribe. The frame is constructed from trees found on site, and the roof is made from palmettos, which are also found all over the property. To make the roof, the palmetto leaves are thatched to thin sticks that span the frame. The thatching of palm leaves can be used not only for roofs but for walls as well.

Across the lake, you will spot a row of wax myrtles which grow naturally at the edge of ponds and lakes. In the pond itself is water celery, duck potato, taro and lotus--all edible--as well as pickerel weed, water lilies and soft rush.

I know the view is beautiful, but if you turn around you will see something even more amazing: a food forest. This forest keeps itself alive through a great diversity of plants, both fruits and legumes, and everything from plants that end up becoming mulch to smaller shrub type plants that like shade. We've got olives, comfrey, atemoya, barbados cherries, blueberries, star-fruit, kumquat, lychee, peach, persimmon, pomegranate. A lot to take in, I know. Beautiful, without question. Functional, without doubt. It makes you think a bit. It also makes you hungry. Let's head back to the house and fix something to eat. If we take the southern side of the pond back, we can grab a couple Jaboticaba fruit as we head back, and don't forget to pick a few herbs on the way into the kitchen.

Zone Plantings and Structures for the Earthship Grounds

Zone 1

1	Berms on the Earthship	
	<p>Beach Sunflower, railroad vine, Moon Flower (Around the base or grow vertically). Perennial Peanut Native Grasses along perimeter</p>	<p>Erosion control, ground cover, and beauty.</p> <p>Cover Erosion control and mulch.</p>
2	Kitchen Gardens (west by kitchen & north garage side)	Daily harvested plants can be planted near the kitchen side of the entrance, less visited plants in north side garden.
	<p>Winter: cherry tomatoes, dill, oregano carrots, lettuce, arugula, red mustard, dandelion, kale, bush beans, radishes, broccoli, cabbages, calendula, violets, borage, cauliflower, eggplant.</p> <p>Summer: okra, black-eyed peas and sweet potato as a ground cover.</p> <p>All year: peppers</p> <p>Grasses: Florida Gamma, Fakahatchee, Sand Cord Grass, Muhly Grass</p> <p>Ground Covers: Beach Sunflower, Sunshine Mimosa, Railroad Vine, Purslane New Zealand Spinach</p> <p>Chickasaw Plum(put near herb spiral)</p>	<p>Annual and perennial vegetables outside kitchen door, convenient source of staple crops for homeowners, gets year-round sun. Peppers are perennials in Florida's sunny climate. Violets, calendula and borage are edible flowers that are both beautiful and nutritious. Sweet potato flourishes in summer as a cover crop, protecting the soil and providing a bounty of edible leaves as well as tubers. Dill and oregano are companion plants for tomatoes, providing ladybugs to consume aphids and pollinators, respectively. Black-eyed peas and bush beans both restore nitrogen to the soil, ensuring healthy soil year-round.</p> <p>Grasses provide erosion control, beauty, and plentiful compost material</p> <p>Flowering ground covers provide beauty, sunshine mimosa fixes nitrogen, and Purslane and New Zealand Spinach are edible.</p>
3	Herb spiral	
	<p>Parsley, rosemary, thyme, dill, cilantro, chives, lavender, lemon balm, fennel, Mexican tarragon, chamomile, sage, salad burnet, violets, nasturtiums, African and Italian basil, oregano, dianthus, scented geraniums, strawberries, lemon verbena</p>	<p>Provides a decorative central source of culinary and medicinal herbs, edible flowers for color, pollinators and taste, and strawberries for snacking. The shape of the herb spiral also conserves space and provides many microclimates for each plant to truly flourish. Mexican tarragon is adapted to the hot, sunny climate. Italian basil is common for cooking, while African basil can be used as a seasoning, but also attracts pollinators (and humans) with pretty purple flowers.</p>
4	Worm Bin	Best placed nearest the kitchen for ease of use.
5	Eastern face of existing Woody Berm on the West side of the house	
	Multiple Carolina Yellow Jessamine	Ornamental (alkaloid, do not eat), ground cover and

	Multiple Blue Sage Bushes	vibrantly flowering Excellent formal or informal flowering border plant
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6	Entertainment Garden (near main entrance, garage side)	
	Horsemint, citronella, catnip, lemongrass, muscadine grapes, climbing roses	Citronella is aromatic and mosquito-repellant, and is native to this climate. Catnip has edible leaves and is deer-resistant as well as mosquito-repellent. Horsemint, which favors sandy soils, is a strikingly beautiful and aromatic large purple flower, with leaves that have medicinal applications to treat colds, flu and fungus. Lemongrass aids digestion, provides seasoning in cooking, and a pleasant aroma. As a high grass, it also helps to seclude the area, and make it more attractive. Rose petals are edible and the leaves are medicinal.
7	Arbor (native wood)	The arbor of the outdoor kitchen and seating area is covered with Muscadine grapes, which are edible, tasty and native, with edible leaves. They are also deciduous, so they allow sunlight in winter, but provide a shady refuge in summer. In summer, this space doubles as a shade house for germinating seeds. Grape leaves are edible and when they fall they can be composted.
8	Chicken Feed Garden	
	Lamb's Quarters, Amaranth, plantain	Food for humans and chickens that can be simply cut and deposited in chicken coop.
9	Chicken Coup	
	3 chickens produce about 2 eggs per day. If more eggs/chickens are desired or planned in the future, add # of chickens and square footage accordingly to build proper sized coup.	Coup Size: three birds need 12 square feet (4 square feet of floor space for each bird) Inside the coop, chickens will need 9" of perch space each and a couple of nest boxes. The chickens will also need a run...or a fenced space to be out in during the day.
10	Garage	
	Confederate jasmine or allemande	Beautify and disguise the container garage and attract pollinators.
11	East Side Garden	
	Curved raised garden planted with dill, oregano, carrots, lettuce, arugula, red mustard, dandelion, kale, violets, and calendula Garden Tipi planted with pole beans & peas Witch Hazel Tree	Bed can be made of natural onsite materials (cobb). Provides built in seating, easy no bending access to plants and is aesthetically pleasing. Tipi are made of onsite materials Witch Hazel is medicinal and is beautiful

	Loquat Tree	Loquat provides and abundance of edible fruits
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12	North Side Garden Area	
	<p>Gardenias Dwarf Citrus Trees 1 lemon tree 1 orange tree 1 lime tree 1 grapefruit</p> <p>Citrus Tree Guild: Pumpkins Broad beans (Alternative guild: nasturtiums, chives, and garlic)</p>	<p>Food, medicine, pleasing scents, habitat for birds, attract pollinators. (Lemon leaves make good and healing tea)</p> <p>Pumpkins can be planted in April, beans can be planted in September and maintain a constant green bed. (Alternative guild for greater pest control)</p>

Zone 2

13	Secret Garden (East Past House Gardens)	
	<p>Jaboticaba 4 Citrus Trees Free seeding wild flowers 2 Mulberry trees 6 Comfry</p>	<p>Food and beauty Food and beauty Beauty, butterflies and pollinators Food, birds also eat Accumulator of minerals, food for chickens, good mulch material, medicinal</p>
14	Pond	
	<p>6 Walter's Viburnum 12 Muhly grasses 6 Bamboo 3 on each side of Viburnums 1 Pecan North east 1 Weeping Willow South east Pond Water Lillies Water Celery Taro Lotus Duck potato Pickeral Weed Soft Rush</p>	<p>Large, nice backdrop to the shelter, beautiful flowers in the Spring, good fruit and nesting for the birds. Showy in fall upright bunch grasses that bloom in Fall (Used by basketmakers). Highly ornamental, timber, visual barrier.</p> <p>Nuts and shade in summer. Ornamental and basket making. Beauty. Edible leaves. Tuber is edible. Tubers are edible. White flowers and edible tubers. Edible leaves and blue flowers for butterflies and pollinators. Bold form for design, good texture.</p>
15	Pond Pavilion	Made of native wood and palmetto roof
16	West End	
	<p>2 varieties of Mango 2 Avocados</p>	Food

1 Bananas 2 Papayas	
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Zone 3

17	Super Guild Orchard (Swales need to be filled first)	Several different "tree centered" guilds boost food choice and biodiversity. With added herbs and low lying plant species, it becomes beautiful and low maintenance.
	Assorted Fruit & Nut Trees w/guild TBD, i.e.: Atemoya Barbados Cherries Blubberies Starfruit Kumquat Lychee Peach Persimmon Pomegranate Comfrey at bottom Add a couple more herbs and low lying plant species Grove of Olive Trees along dirt road, need northern exposure!	Edibles, enrich the soil, provide mulch, provide shade or a mix of these. Low maintenance. Protects bottom, accumulator of minerals. Edible, olive oil, typically not grown in the area but could thrive here.

Zone 4

18	The Three Sisters Orchard	
	Blackberry hedge Clumping Bamboo Three sisters guild: corn, beans, squash, or pumpkins. Jujubes Bananas Comfrey around jujubes High Bush Blueberries	Provides barrier, Feeds the wildlife from outside, can be transplanted from site, attracts bees. Building material, filters water, tubers are edible. Edible, self seeding and low maintenance. 3 or 4, provide shade, edible, leaf mulch. Edible. Edible, medicinal, nitrogen fixing. Edible, hedge, adds to stacking.

Zones 1 through 4

Ground Cover	
Perennial Peanut	No mow ground cover

Crowley's Nursery – local nursery resource with good variety of plants.

Native Plants

Dahoon Holly	Leaves can be dried and made into tea
Thistle	Stalk can be cut and eaten
Saw Palmetto	The terminal bud in the center can be cut and eaten; mesh at base can be used to make rope; will light easy to make fire; weave the leaves together to make a mat to cook food over a fire.
Grape vines	Can cut at base and position the end over a container to catch 2 to 4 gallons of water.
Polk	Eat fresh shoots; squeeze berries to make dark purple red tatoos; kills chiggers;
Queen Ann's Lace	Wild carrot seed tastes like salt; used to color soap a nice yellow
Golden Rod	Made into tea, has a licorice flavor; flower helpful for allergies.
Elderberry	Fruit made into wine, jams, jellies, cold medicine; can make fritters from flowers; can make tea from flowers.
Wax Myrtle	Berries have wax that can be boiled and skimmed to make candles; can make soap; wet crushed leaves make an excellent mosquito repellent.
Fern	Fiddle head (coiled unopened frond) can be cooked and eaten.
Virginia (vine) Creeper	Leaves can be boiled and eaten; can make baskets with leaves.
Blackberries	Can make tea; good for diarrhea.
Red Bay	Leaves good for flavoring cooking; substitute for bay leaf.
Pine	Needles can be used to make tea; nuts are edible.

Blueberries	Edible
Dandelion	Leaves and flowers are edible; the roots can be ground and used as substitute for coffee.