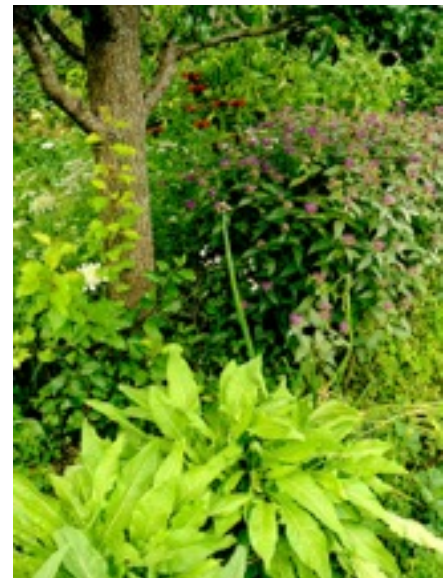




Selected Construction Portfolio
Overview 2010-2017



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Water Management

Water is a critical limiting factor when designing resilient systems.

In Permaculture Design one of the design principles we use is “Catch and Store Energy.”

Water is one of the most important environmental factors we pay attention to when analyzing landscapes, designing them or building out components.

With regard to water management, we talk about “slow it, spread it, sink it.” We look to slow water down in landscapes and soak it deep in the soil to recharge groundwater sources.

Water can be stored in landscapes in a number of ways including earthworks like ponds and swales.



Water can also be stored for later use in rain barrels or some other kind of storage tank.

These tanks catch water from the roof and store it in tanks that are connected by an overflow pipe.



These tanks were elevated off the ground and fitted with garden hose bibs for easy garden irrigation. Rainwater tanks can even be used to charge a drip irrigation system with the right ratio of volume and elevation off the ground.

Earthworks



The earthworks we often design in permaculture have the goal of catching and storing water. These modifications to the structure of the earth can be built by hand or by machine. When digging swales, it's much more fun to work as a team and sing songs!



Part of the trick when digging swales is knowing when to stop. It's nice to have someone with an eye that knows when it's deep and wide enough. And that can vary based on steepness of slope.



Of course larger earthworks like terraces are better constructed with the use of heavy equipment. Different types of equipment do different types of work, which are more or less appropriate depending on site conditions.

It's important to make sure you have a plan and the necessary materials for repairing the soil immediately after you've disturbed it with heavy equipment. We like to have seed mixes on hand before construction starts so that rehabilitation can begin as soon as the machines are gone.



This equipment operator is breaking ground for the terraces at the Maine Heritage Orchard site.

We facilitated the layout of those terraces by training a group of volunteers on how to use simple layout tools to find contour lines in the landscape.

When working collaboratively with equipment operators it's important to make the shape of your earthworks obvious and easy to follow. We alternated different colors of flagging tape so the operator could easily cut these terraces on contour.



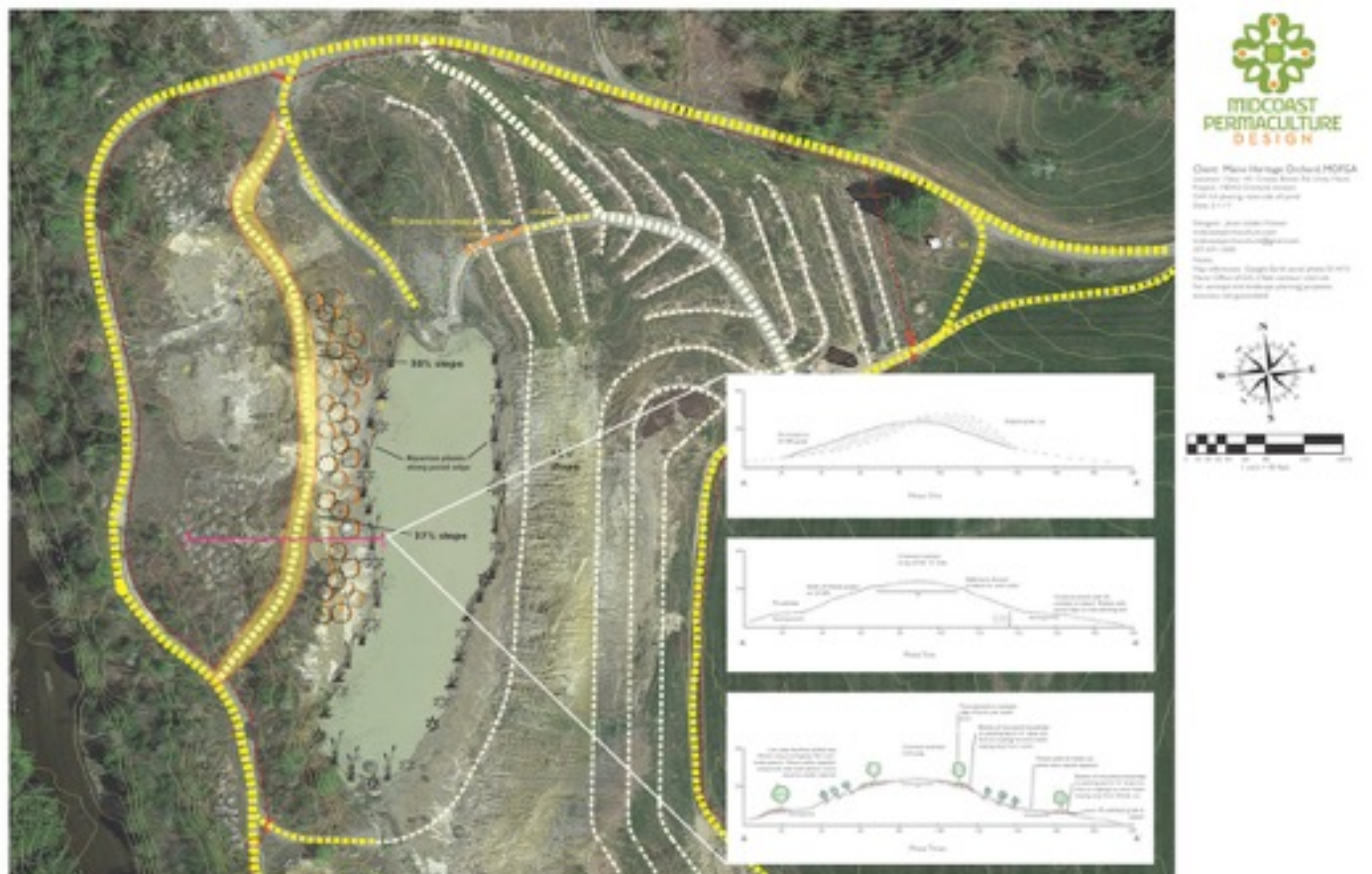
The excavator dug ditches on the inside of each of these terraces which were then filled with wood chips. The soils for this site were very sandy and low in organic matter, and the wood chips acted like a giant carbon-based sponge.

The earthworks are completed now, the ditches are filled with wood chips, the planting areas are mulched, and the apple planting holes have been filled with compost.





Above is an aerial photo of the MEHO orchard site from Spring of 2014. In 2016 we were commissioned to create some design plans for the next phase of the orchard which included access and circulation considerations, new earth shaping, and planting plans.



Here you can see the regeneration of the landscape is well underway. This was an exciting project because this used to be a gravel pit, and was very low in organic matter. It was like a moonscape after the machines finished sculpting the terraces.

These photos from the fall of 2014 and 2016 show the the landscape is now more of a grassland or savanna with young fruit trees and shrubs planted throughout. You can't see the trees very well because they're so young.

The earthworks help to hold water in the landscape for longer periods of time.





These are the preliminary earthworks for a future chestnut orchard. We were hired to design and manage the construction of these terraces in an existing forest. It was a bit challenging working around stumps and big rocks, but now these earthen shapes will catch and store water in the soil for generations to come.



Gardens

In permaculture, we mimic patterns observed in nature. These keyhole beds maximize garden space while minimizing space devoted to paths. You can see we are using the sheet mulching technique using old newspapers to mat out weeds. Hay, straw or wood chips are used as a top dressing.



This is one of the best ways to establish new gardens. You work with nature by leveraging the existing soil biota to digest the composting weed vegetation under the sheet mulch. Once this digestion is complete you have fantastic soil that you didn't need to till! Then you can use soil blocks or small transplants and put them directly in the beds. Minimal weeding and irrigation are all that is needed now.





These are all examples of sheet mulched beds and the happy plants that grow together there.

Polycultures (or companion planting) is a design and gardening technique that emphasizes synergistic relationships between the plants and animals you put together in your composition. We like perennial vegetables especially in the spring when they are offering harvests long before annual vegetables.



Polycultures are designed to inhabit many different niches, in accordance to your goals. Polycultures can be designed as groundcovers, as flower gardens, meadows, as fruit and shrub orchards and many other types of habitat.

Often we are designing for multiple goals when we design for resilience. Multiple layers of plants can offer many benefits including food, medicine, pollinator habitat, fuel, fiber, livestock fodder and more.



Perennial meadow polycultures can be designed for beauty, food, medicine and habitat for the “wee beasties.”

While there’s nothing quite like a tree-ripened peach, we only seem to get a bumper crop every few years. In the meantime it’s nice to have an edible understory that offers yields year in and year out.



Grafting onto established trees can give you fruit in less time than if you planted a young tree. Here is an example of Asian Pear fruits grafted onto an ornamental Bradford pear tree.

Alley cropping is the technique of growing an annual crop in between rows of perennial crops. For farmers, alley cropping is a sound way to cash flow the transition to perennial forms of production like fruit or nut trees.

Good King Henry (*B. bonus-henricus*) is pictured below. It makes a great groundcover and is a delicious perennial vegetable. Cook it as you would spinach, since it's in the same family.



Here is an example the famous Three Sisters polyculture of corn, beans and squash growing wild on a hillside.



Woodworks

We work with soil, stone and wood. This is an example of a dry stacked garden bed that snakes across the space in sympathy with contour.

Below is an arbor for a perennial wisteria vine that also serves as entry into the family garden plot.



These wooden garden beds are irregularly shaped in order to fit the space on a sloping hillside. The design challenge of working on a small ridge resulted in trapezoidal garden bed spaces.



This chicken coop was designed to fit multiple parameters within the space it occupies now. Most of the materials used here were salvaged. The sheathing used to be a mural.



This wooden framed greenhouse straddles two hillside terraces and so has two levels inside. The peaked ridge will shed snow better than a curved high tunnel.





Both outside and inside spaces are important considerations. Decks create inviting spaces that offer transitions between inside and outside.

Bookshelves help to nourish the mind and are important components to a system designed for resilience.

Beautiful interior spaces are also important for a well-balanced mind, and sometimes a new floor helps with that.



Here we have another series of raised beds situated on a hillside. We used a combination of rough sawn hemlock and white cedar.

Below is a writing desk that folds down flat against the wall and another book case.

