Learning Objectives

1. Understanding of foundations of Permaculture
2. Examples of Permaculture design techniques for backyard gardens
   a. Including some controversial ideas in Permaculture
3. Familiarity with at least one Permaculture design principle
4. Practice at designing / applying principles
What is Permaculture?
What is Permaculture?

Permaculture is most often used for creating efficient and productive landscapes that sustain themselves into the future by regenerating biodiversity and lost fertility.
Permaculture Ethics

Care for the Earth

Redistribute the Surplus

Care for People
Philosophy + Design

Images adapted from:
GRAHAM BURNETT ‘PERMACULTURE: A BEGINNER’S GUIDE’

THE PERMACULTURE CUP OF TEA

SUN
WIND
ELECTRICITY
WATER
HEAT

COMPOST BIN
SEEDS
USED LEAVES
URINE
TEA
THE PERMACULTURE CUP OF TEA
What is an Ecosystem?

A system, or a group of interconnected elements, formed by the interaction of a community of organisms with their environment.
Philosophy + Design

- Applied Ecology
- Edible Restoration
- Regenerative Design
- Cultivated Ecosystems

Permaculture
“Permaculture Design is not the rain, the roof, or the garden. Permaculture Design is the connections between these things. Permaculture brings cohesion where there was once isolation.”

-Bill Mollison
Inputs and Outputs Activity

Needs & Yields: The Permaculture Chicken

What does each element need in order to live or be maintained?
What products or services does it naturally provide?
“You don’t have a snail problem… you have a duck deficiency!"
- Bill Mollison
The problem is the solution!
Design Principles

• Make connections.

• Catch and store energy and materials.

• Stack functions.

• Make the least change for the greatest effect.

• Use small-scale, intensive systems.
Design Examples
Design Aims:

• Grow as much food as possible
• Provide food and habitat for beneficial critter friends
• Waste is put back into the system
• Build soil and store water
• Go with the flow (the problem is the solution!)

• Soil, sun, water, plants, wildlife...
Food Forests

- Vertical stacking of trees and plants
- Creates microclimates
- High biodiversity
Layers of a Food Forest

1. Canopy Layer
   - Papaya Tree

2. Low tree layer
   - Orange Tree

3. Shrub Layer
   - Berries

4. Herbaceous Layer
   - Basil

5. Rhizosphere Layer
   - Sweet Potato

6. Soil Layer
   - Strawberries

7. Vertical Layer
   - Vines
Hedgerows / Living Fences

• Defines boundaries / edges
• Water stored in biomass
• Edible possibilities (Fedge!)
• Noise reduction
• Windbreak
• Soil Stabilization
• Wildlife Corridor
• Attract beneficial insects
Guilds

Group of plants chosen to help each other:
• attract beneficial insects
• deter wildlife
• fertilize
• mulch
• produce nectar to attract pollinators
• repel pests
• suppress grass
Fruit Tree Guild
Grow more ~ Work less
theresiliencyinstitute.net

- Fruit Tree
- Nitrogen Fixer-Shrub layer
- Nitrogen Fixer-Herbaceous layer
- Pollinator/Insectary
- Food
- Dynamic Accumulator-Herbaceous layer
- Pest Deterrent
- Mulch/Groundcover
Dynamic Accumulators

Fact or Fiction?

What we do know:

• Phytoaccumulation does happen

What we don’t know:

• If the plant will make those minerals available to the soil and if they do, how long will it take?
Three Sisters

North American Traditional

- Corn
- Beans
- Squash
Hugelkultur
Fact or fiction?

The Science Behind Hügelkultur

There are no peer-reviewed, scientific studies on Hügelkultur. A few university students have conducted projects (Adams 2013; Laffoon 2016), but these have not been published in scientific journals. Thus, gardeners rely on popular books and websites for Hügelkultur information. In this section, we will review the evidence for Hügelkultur methods.

Scientific principles

Both Andrit and Beba promoted Hügelkultur as a “method based on biological principles.” It seems clear, however, what these biological principles are. None are described in the brochure and there are no references. In fact, this method is at odds with the ecological principles behind soil building through litterfall. The guiding principles appear to be derived from the authors’ personal observations and Rudolf Steiner’s biodynamics lectures (which can be found online). The science behind the biodynamics approach has been previously reviewed (Chalkley-Scott 2013).

Excessive use of rich organic material

The authors seem unaware that nutrient-rich organic material can be overused. Directions for building Hügelkultur mounds include the addition of a foot of dead leaves, a few inches of compost manure, and three to four inches of compost (Beba and Andrit n.d.). Decomposing organic material can release excessive nutrients, creating a feeding soil and water hysteresis.

Practicality of mound structures

Fig. 2. The original German booklet published by Andrit and Beba. This copy was printed through an instructional bookmaker.

This is why commercial compost piles are managed on concrete pads with contained drainage (Harrison et al. 2004-2005).

Hügelkultur: the mound method for home gardeners

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OVERTON — A bedding system new to Texas — hügelkultur — is trending among home gardeners looking for low-maintenance ways to grow flowers, fruits and vegetables, said Texas A&M AgriLife Extension Service horticulturist Dr. Joe Masabin.

Hügelkultur, German for “hill culture,” is the practice of composting large woody material, such as tree logs, to create a raised garden bed, said Masabin, who is based in Overton. Other excess garden waste, including prunings, hedge clippings and brushwood can be utilized to create the no-till bed for plants.

Masabin said hügelkultur is a good way to compost without the hard work of tilling and bed preparation every year. He collaborated with Bridget Corbett, a Master Gardener in Denton, on a hügelkultur project to provide valuable information about the method for growers.

“I joke when I call it the lazy man’s composting,” he said. “As time goes by and the log rots, the deep soil of the bed becomes rich with soil microorganisms, earthworms and microbes. It’s a great way to employ a low-maintenance, no-till strategy for your home garden.”

Masabin said the microorganisms that thrive in the rotting material release nutrients to plants. Rotting wood will also hold moisture longer in dry periods.
Bioswales

• Farm-scale

• Sunken

• Flat bottom – on contour

• **Designed to:** capture and slow water
Urban Bioswales

• Sunken

• Flat bottom – on contour

• Designed to:
  • capture and slow water
  • filter urban pollutants
Impervious Surfaces

• Do not allow rainwater to infiltrate or soak into soil

• Concrete, roofs, driveways, sidewalks, roads, etc.

• Severe compaction from heavy equipment or foot traffic
Rain falls on impervious surfaces and accumulates surface pollutants as it flows to storm sewer inlet.

Instead of soaking into the ground, storm water is collected in large piles which flow directly to streams and rivers. Soil remains dry, magnifying droughts.

High volume of storm water runoff increases number of floods and heightens their severity. More pollutants flow directly into the river.
Rain Gardens

• Sunken, flat-bottomed garden bed

• Collects and treats stormwater runoff from rooftops, driveways, sidewalks, parking lots, and streets

• mimic natural forest, meadow, or prairie conditions

• Filters out urban pollutants
Downspout connected to standpipe.

Standpipe cap

Elbow and extension attached to downspout.
curbside rain garden

overflow control structure

gravel pipe bed

perforated pipe connecting to basin or stream outlet

prepared soil mixture (if needed):
50-60% sand
20-30% compost
20-30% topsoil

curb cut

curb and gutter

native plants with deep root systems that absorb runoff and pollutants
African Keyhole Design
Herb Spiral

- Many microclimates
- Hot on south side, cool on north side
- Drier at the top, moist at the bottom
- Vertical design
Observation

The HEART of Permaculture design!
Observation

• What kind of soil do I have? Is it all the same?
• Where in my yard gets the most sun? The least?
• Where does water flow in my yard? Where does it puddle?
• Which direction does the wind come from?
• Which plant species are growing naturally here?
• Which wildlife friends visit my yard?

...through the day and through the seasons
Site Analysis + Design Aims
Design Aims:

• Grow as much food as possible

• Provide food and habitat for beneficial critter friends

• Waste is put back into the system

• Go with the flow (the problem is the solution)

• Soil, sun, water, plants, wildlife…