



Permaculture and Food Forests in the Pacific Northwest

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What is Permaculture?

“Permaculture is more than a gardening system.”



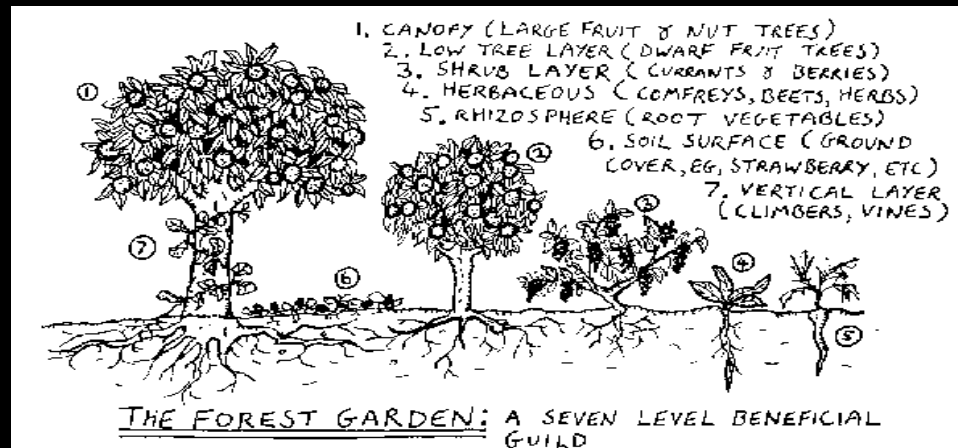
- ~ It is a design science, based in observation, that considers the conditions of a site to meet the needs of the client while restoring ecological functions.
- ~ Informed by the native ecology of our place, we design our built environments for stewardship of our resources and habitat for other beings.
- ~ We begin with a thoughtful site analysis. We determine the unique climatic considerations, resources, limiting factors, to guide meeting the needs of inhabitants onsite.
- ~ Permaculture design strives to reduce our ecological footprint by meeting human needs locally, using local resources while caring for other species, neighboring communities, and the global community.



Resilience is recognizing our interconnection.

What is a Food Forest?

- ~ A food forest is an intentional forest, designed based on the observation of ecology in a native forest.
- ~ In a food forest, native plants may be substituted for cultivated plants to meet local needs. Plant guilds are developed to enhance relationship.



drawing by Graham Burnett

- ~ We are not going into an already existing forest to replace native plants with cultivated plants. A food forest is a strategy for planting more trees and vegetation to enhance ecosystem functions and yield.

**How do we meet our needs
without depleting our resource
base?**



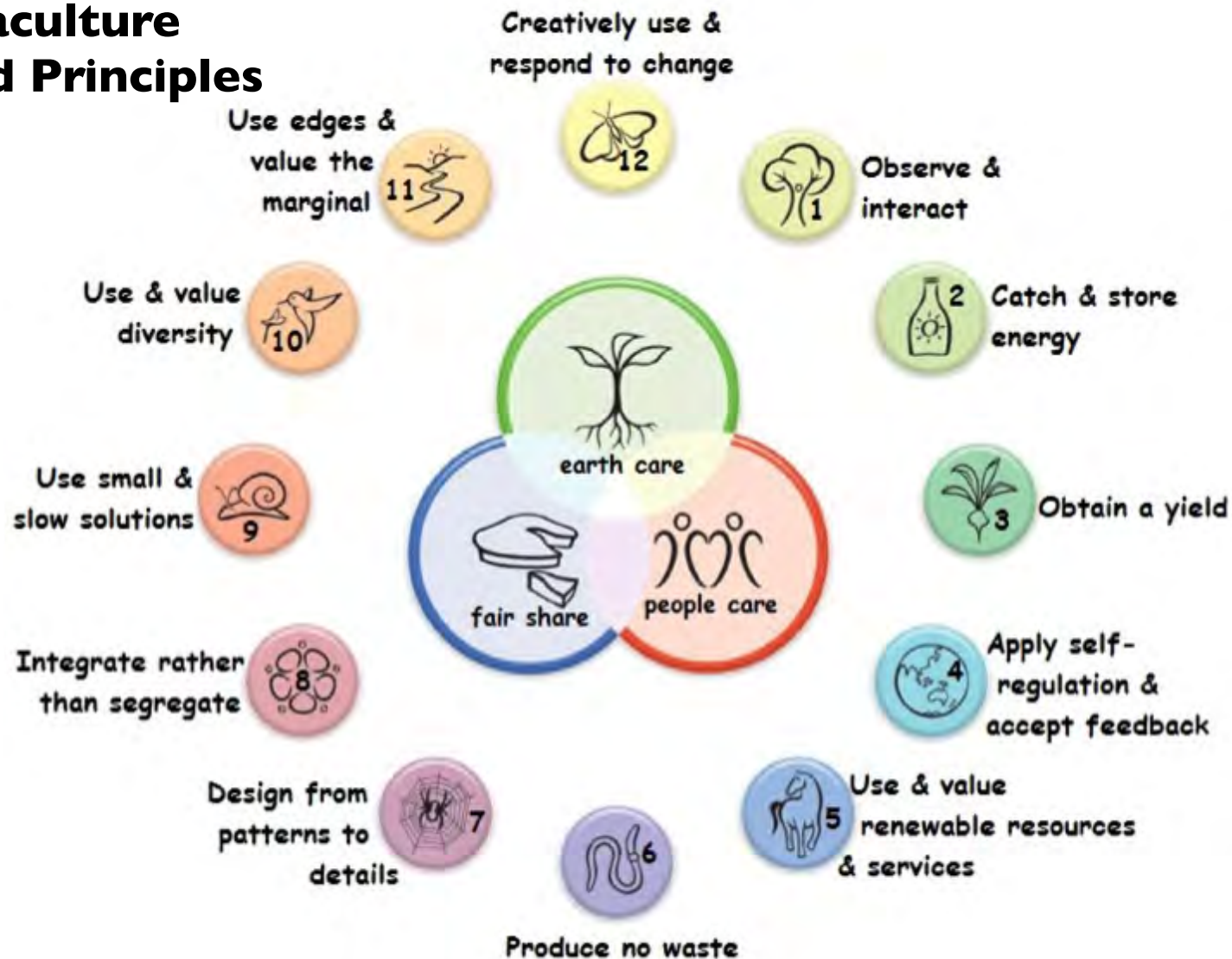
Indigenous cultures around the world express their sense of place through intimate bioregional design strategies.



Permaculture design is a modern term that asks us to come home to inhabit our place and design our lives based in the context of our place.

Permaculture

Ethics and Principles



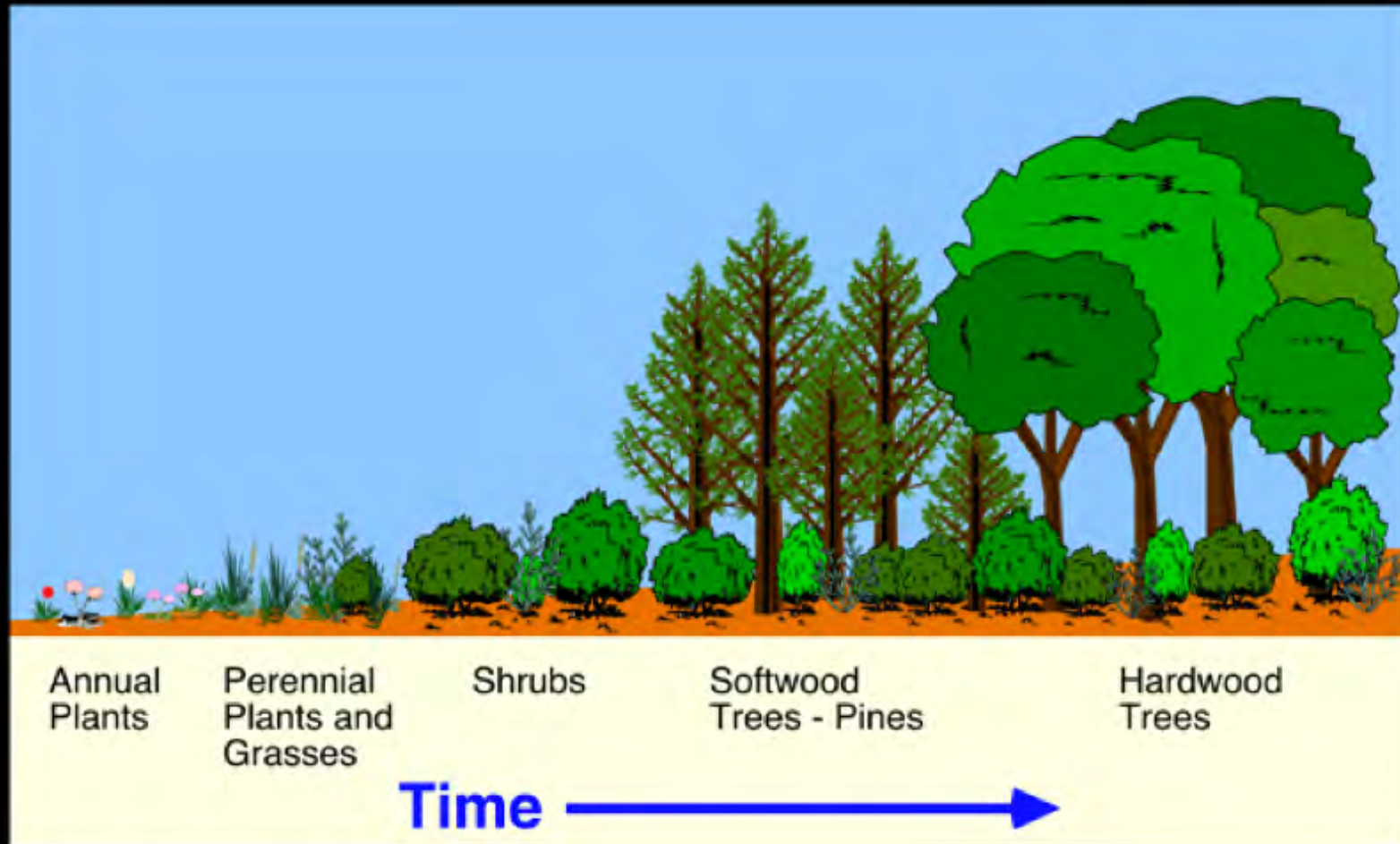
Functions of Healthy Ecosystems

- ~ Create and support life
- ~ Clean air, clean water, and toxins through various filters
- ~ Regulation of the atmosphere by recycling carbon and nitrogen
- ~ Build soil and soil microorganisms
- ~ Support healthy life (regulate pests & diseases)
- ~ Perpetuate themselves
- ~ Create integrated closed loop systems





Design happens within a context. Let's design based on nature.



We can provide for our needs while enhancing ecological functions at home.

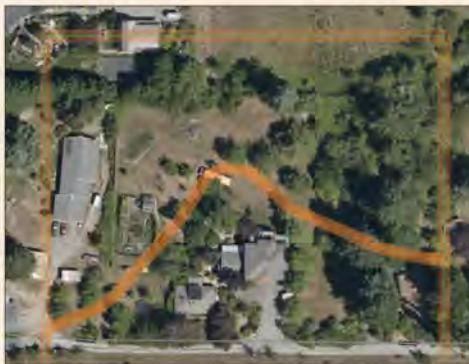
Permaculture Design: How can we grow our fruit ecologically?

~ Pre-planting site analysis

- Sector Assessment
- Microclimates

~ Assessment of Soils

10 SOIL MAPPING



SOIL DESCRIPTIONS: Kapowsin Silt Loam, 0-3% slopes

Farmland classification: farmland of statewide importance

Typical profile: H1 - 0 to 4 inches: silt loam
H2 - 4 to 22 inches: silt loam
H3 - 22 to 30 inches: gravelly loam
H4 - 30 to 34 inches: gravelly loam

Drainage Class: Moderately well-drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to bedrock or restrictive feature: 20 to 40 inches to densic material

Depth to water table: About 12 to 24 inches

Frequency of flooding: None

Available water storage in profile: Moderate (about 6.1 inches)

Hydric soil rating: No

10-01 Soil Map - NRCS

Map Sheet	Map Unit Name	Area (ac)	Percent of Area
50	Kapowsin silt loam, 0 to 3 percent slopes	1.6	42.4%
108	Okaloosa silt loam, 3 to 15 percent slopes	2.2	57.6%
Totals for Area of Interest		3.8	100.0%

08 MICROCLIMATES



MICROCLIMATES:

- Deep Shade
 - Sunny
 - Partial Shade
 - Wet
 - Hot, dry, partial shade
 - Hot, dry, full sun, exposed
 - Dry
 - Windy
 - Sheltered from Wind
- ** Generally, the wind is higher than can be felt on the property. It tends to swirl around in the tree tops.

PLANT SPECIES IDENTIFICATION (OPTIONAL):

- 1 *Ficus carica*
Fig 'Desert King'
- 2 *Prunus domestica*
Plum tree
- 3 *Fagus sylvatica* var. *Purpurea*
Beech Tree
- 4 *Crataegus* spp.

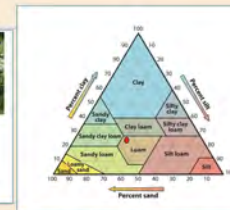
Test site 1: Apple Orchard:
Kapowsin Silt Loam

Microclimate: Sunny, Open, Dry

Reason tested: One of two soil types for the apple orchard



SOIL TEST RESULTS:
Soil texture: Loam
Percolation: 67/hr
Feel: slippery
Ribbon Length: 15 inches
Hand Ribbon Results: Silty Clay



13-03 Jar Test - with results xx

Clay: 25%
Silt: 18%
Sand: 48%



10-04 Soil easily forms a ball



10-05 Soil is slow to drain



10-06 Soil Profile

Add Organic Matter to your Soil!

Soil that has 2% living organic matter in the top foot can reduce the rainfall or irrigation needed by poor soils by as much as 75%.



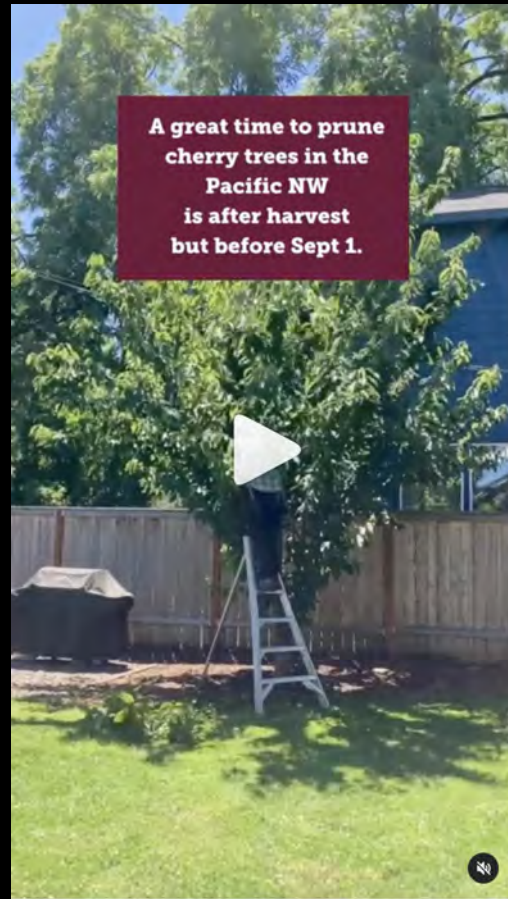
- *Enhances drainage and nutrient availability*
- *Resilience in case of drought*
- *Reduces waste in landfill*
- *Feeds the soil microbes*
- *Aids in the cultivation of a thriving garden!*



- ~ **Understand the anatomy and physiology of your plant**
- ~ **Identify Weaknesses: Pests & Diseases**
- ~ **Seasonal visitation and care**

Top 5 Pruning Don'ts

- 1 Don't make stubs.
- 2 Don't make rips.
- 3 Don't ignore the angle of your cut(s).
- 4 Don't prune when its below 38° F.
- 5 Don't prune with dull and/or dirty tools.



What Plants Provide:

- ~ Stabilize Climate
- ~ Stabilize Soil
- ~ Enhance receptivity of soil
- ~ Nitrogen Fixation
- ~ Infiltrate Water
- ~ Cycle nutrients
- ~ Produce biomass/mulch
- ~ Disperse Seed
- ~ Weed Suppression
- ~ Habitat for Wildlife
- ~ Discourages pests
- ~ Provide shade
- ~ Decompose Waste
- ~ Regulate disease causing organisms
- ~ Pollination Services

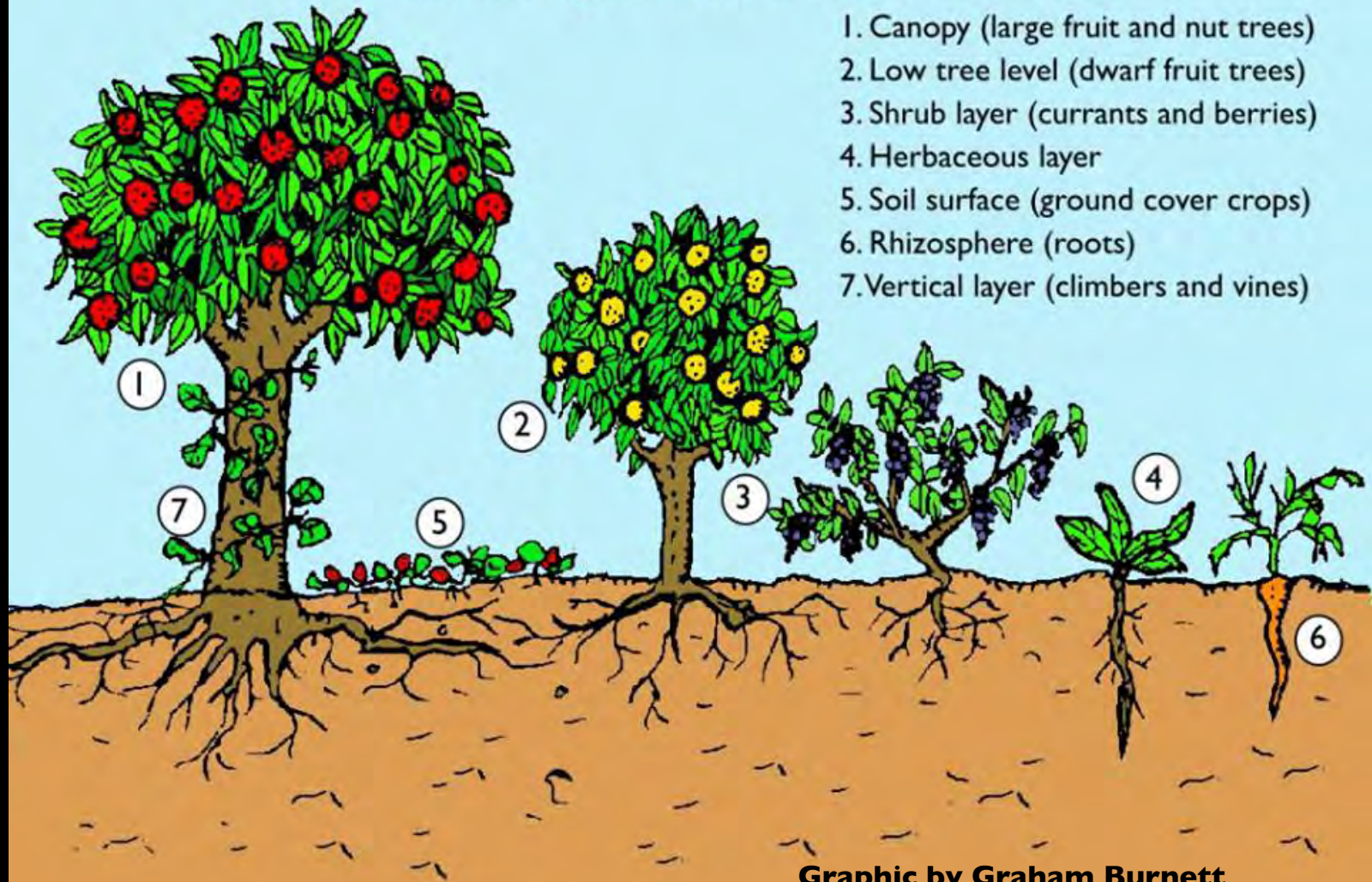
Yields for Humans

- ~ Food
- ~ Medicine
- ~ Cut Flowers
- ~ Fiber
- ~ Fuel
- ~ Building Materials
- ~ Fragrance
- ~ Ornamentation
- ~ Fodder for Animals

Drawing by Andrew Millison

The Seven Layers Of The Forest Garden

1. Canopy (large fruit and nut trees)
2. Low tree level (dwarf fruit trees)
3. Shrub layer (currants and berries)
4. Herbaceous layer
5. Soil surface (ground cover crops)
6. Rhizosphere (roots)
7. Vertical layer (climbers and vines)



Graphic by Graham Burnett



Bonus for us: Trees produce exponential yields!

Trees

Overstory > 40'

Understory 12' - 40'

usually with a single trunk

- ~ Dominate Photosynthesis
- ~ Use the most nutrients & water
- ~ Determines how rain falls on the landscape
- ~ Regulates biomass accumulation, impacting the soil environment (nutrients, pH, etc)
- ~ Impacts the amount of sun that passes through the canopy
- ~ Provide habitat

Fruit Trees!



Mulberry
Cherries
Plums
Peach
Apples
Asian Pears
Pears
Quince
Persimmon
Medlar





Heirloom varieties aid
with reliability and diversity





Shrubs

*@ 6' - 12' tall
many stems, woody*

- ~ Can grow in full sun or part shade
- ~ Provide Habitat
- ~ Offers ground dwelling animals opportunities for food and shelter
- ~ Most have evolved in a forest edge situation
- ~ Many spread by suckers or underground runners

Berries!



Strawberries
Honeyberries
Raspberries
Currants
Gooseberries
Jostaberries
Goumi
Blackberries
Elderberry
Huckleberry
Blueberries
Goji Berry
Ligonberries
Autumn Olive
Seaberry
Aronia

Guild Guide: Food Forest Layers



① Fruit Tree
(Canopy)

② Goumi (Shrub)

③ Winter
Jasmine
(Vines)

④ Oregano
(Herbs)

⑤ Daffodils
(Early pollinators &
Deter/Suppress
grass)

⑥ Comfrey
(Attract beneficials, N-Fixer,
Dynamic Accumulator, Mulch)

⑦ Clover
(Ground Cover, N-Fixer,
& edible)

⑧ Oyster Mushroom
(Edible, Water Retention,
& Nutrient Distribution)

System Establishment Guild





System Establishment Guild

Mutual Support Guild



Resource Partitioning Guild





Herbaceous Plants

0.5' - 6' tall

often dormant in winter

- ~ Conserve & cycle nutrients
- ~ Support insect diversity
- ~ High productivity due to the large amounts of carbon dioxide near the surface of the soil
- ~ Some enhance receptivity of soil
- ~ Some attract beneficial insects & pollinators
- ~ Most diverse layer in a forest ecology



Peas



Lupine

Nitrogen Fixers



Bladder Senna



Goumi

Stinging Nettles



Borage



“Dynamic Accumulator” Herbs

Muskmallow



Comfrey





Plants for Attracting Beneficial Insects

**Cilantro -
Insectary,
Umbelliferae**

**Zinnia -
Insectary,
Compositae**



The background of the slide is a photograph of nasturtium plants. These plants have dark green, rounded leaves and numerous bright yellow flowers with red-orange, trumpet-shaped corollas. The plants are growing densely together, and some stems are visible extending upwards.

Vines

0.5' +

grows along the ground unless support is provided

- ~ Opportunistic
- ~ Can be parasitic and reduce the host's health and productivity
- ~ Provide habitat for wildlife
- ~ Maximize use of the sunlight and provide shelter from the sun for other plants

Rhizosphere Layer/Groundcover

covers the soil surface

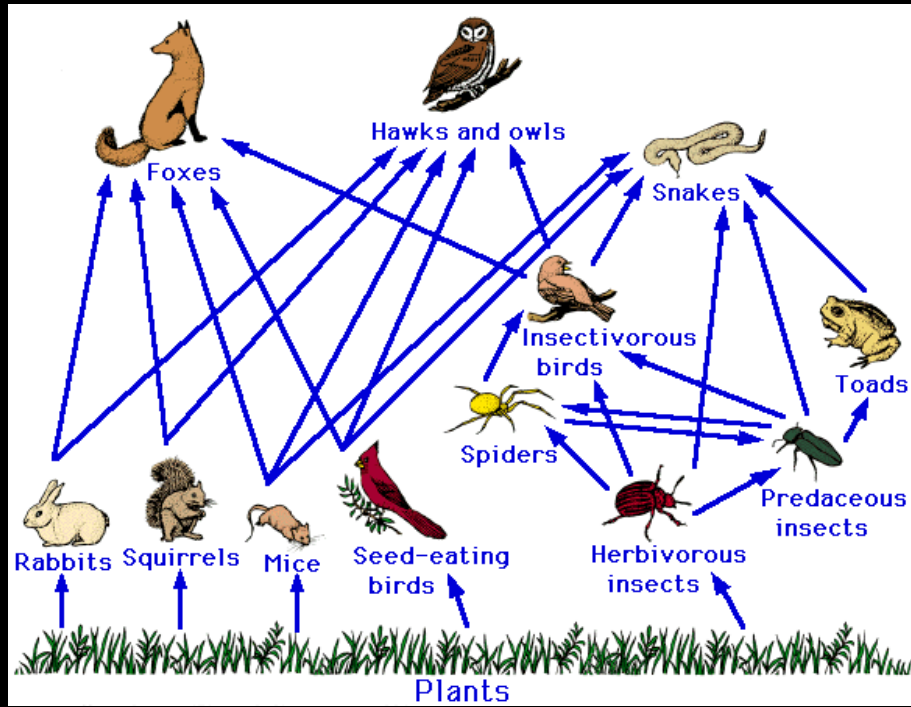
- ~ Prevent erosion
- ~ Enhance water absorption in the soil
- ~ Prevent evaporation
- ~ Cool the soil temperature,
- ~ Provide shade the soil for microorganisms



Fungal relationships

- ~ Enhance the soil structure
- ~ Convert nutrients into available forms for plants
- ~ Aid in water retention
- ~ Exhale carbon dioxide
- ~ Repel saline water
- ~ Counteract disease rot fungi
- ~ Prevent frost damage on roots.

Consider food webs to aid system resilience



Animals for fertility and pest control



“Insect Zoo”



<https://tps.chemeketa.edu/blog/2016/10/19/horticulture-student-saving-our-rhodys/>

Home Scale Food Forest



Home Scale Food Forests can be as diverse as you can manage since it is all about growing in your own landscape/backyard.



Fruit Throughout the Year

May: Strawberries, Honeyberries

June: Strawberries, Honeyberries, Raspberries, Mulberries, Goumi

July: Raspberries, Currants, Gooseberries, Blueberries, Goji Berries, Cherries, Pears, Japanese Plums, Blackberries, Mulberries, Jostaberries

August: Raspberries, Blueberries, Autumn Olives, Apples, Pears, Asian Pears, Plums, Marionberries, Loganberries, Elderberries, Goji Berries, Grapes, Aronia, Fig

September: Raspberries, Apples, Pears, Asian Pears, Paw Paw

October: Apples, Pears, Quince, Grapes

November: Apples, Pears, Quince, Persimmon

Belmac
Apple

Hudson's
Golden Gem
Apple

Suij
Pear

King
Apple

Bella di
Guirno
Pear

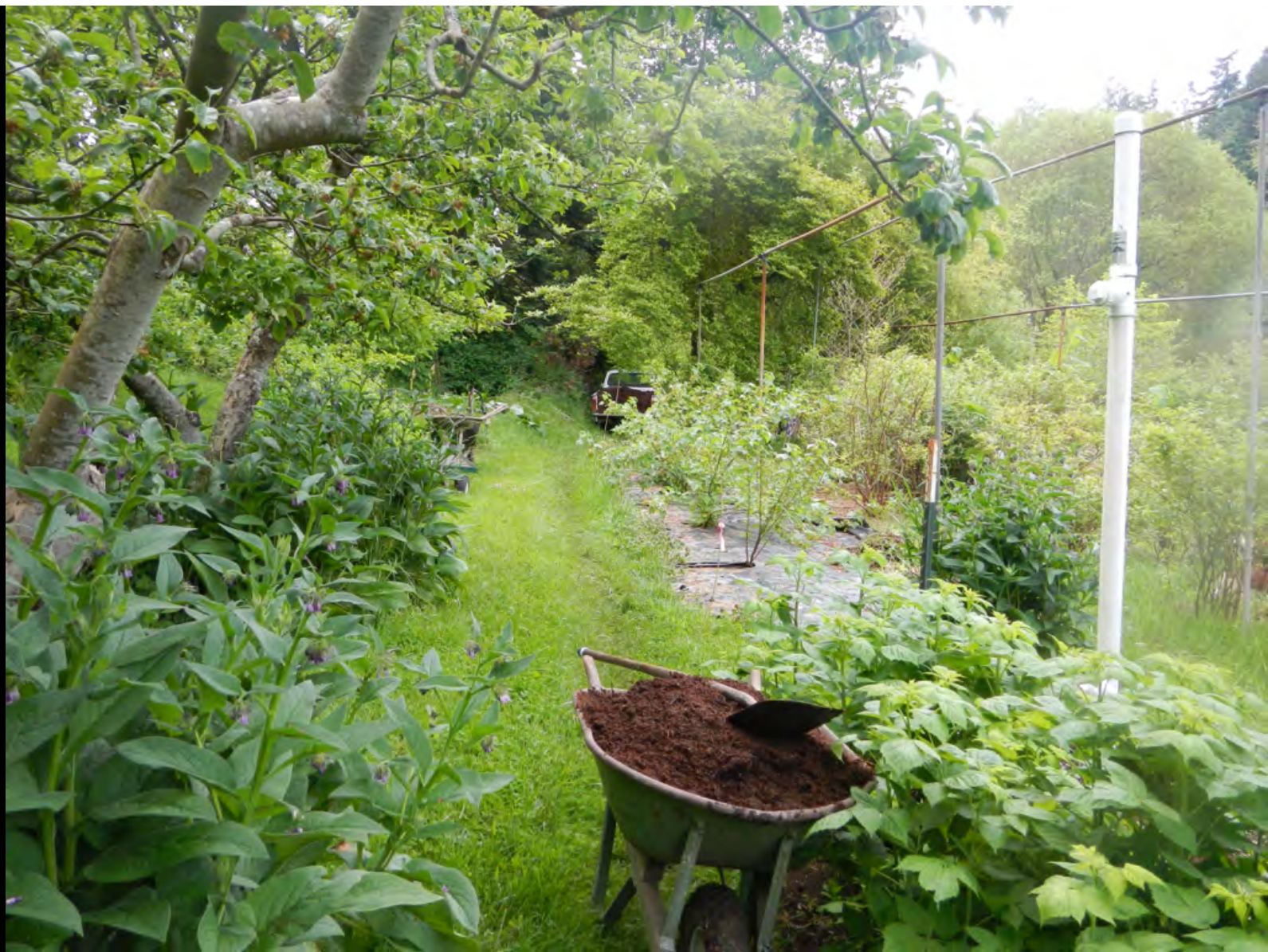
4 in 1
Pear

Methley
Plum

Production Food Forest



Production Food Forests need to be designed for efficiency.
Ease of management is helpful when working with various
people on the land in this larger scale.



Urban Food Forest at an Office



Signage is important in highly trafficked areas. A tidy aesthetic keeps the site approachable for passersby.

Food Forests and good permaculture design provide many functions, including:

- Providing **food** for people
- Providing food, shelter, and **habitat** for other species like birds, insects, butterflies, bats
- Shading the windows of a space, keeping the inside **cool** in summer
- Contributing to a cool outdoor **microclimate** that helps moderate temperatures and reduce the "urban heat island" effect
- Shading** dark balconies and street surfaces, which helps address several climate change problems
- Shading trees to water for **fast winter sun** can come through building windows and warm indoor spaces
- Absorbing **rainwater** could help
- Reducing the urban environmental air quality **oxygen** by all creatures to breathe
- Providing a **beautiful** inspiring place to visit and learn
- Showing what we like to do, and why we like to do it
- And many, many more...



This **Food Forest** installation demonstrates many ideas for food security and the emergence of a sustainable culture. Though there is a **minimal land** area to work with in this case, we are showing how much can be done and produced within such narrow strips of usable land as narrow as two feet wide. A Food Forest can have as many as **seven layers** of elements that contribute to its abundance, including mutually beneficial "**companion plantings**."

Tree

1. Large fruiting trees, the "taller" species of the second design
2. Smaller "dwarf" fruiting trees

Shrub

1. Large shrubs, the "taller" species of the second design
2. Smaller "dwarf" shrubs

Herbaceous

1. Large herbaceous plants, the "taller" species of the second design
2. Smaller "dwarf" herbaceous plants

Herbaceous/Groundcover

1. Large herbaceous plants, the "taller" species of the second design
2. Smaller "dwarf" herbaceous plants

Vine

1. Large vines, the "taller" species of the second design
2. Smaller "dwarf" vines

Groundcover

1. Large groundcover plants, the "taller" species of the second design
2. Smaller "dwarf" groundcover plants

Fungi & Bulb

1. Large fungi and bulb plants, the "taller" species of the second design
2. Smaller "dwarf" fungi and bulb plants



Educational programming is a top priority for Food Forests in schools. At **Manzo Elementary School in Tucson, AZ**, the students learn about heirloom fruit trees & propagation with their participation in the landscape.



Community Food Forest



Photo Credit: Jonathan Lee, subtledream.com



Community Food Forests offer opportunities for learning new skills and working with diverse groups in your neighborhood.



This type of food forest is often reliant fundraisers and donations.





Consider the scales of gathering spaces to promote interaction between community members.

Shared meals build community connection and provide opportunities to connect which can enhance trust.

Photo Credits: Jonathan Lee, subtledream.com



Photo by Alicia Elliot



Venue Food Forests
can provide a space for
community celebration and
memory surrounded by fresh
food and good stewardship.



Source: West Central Park, Olympia: aparkforus.org

Thank you!
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www.permaculturerising.com, www.fertileground.org



Grow Your Own Produce Workshop Series:
Thurs, April 20: *Cole Crops, Greens, & Soil-Building*
Thurs, May 11: *Warm-Season Crops, Edible Flowers, & Attracting Pollinators*
Thurs, June 15: *Maintenance and Harvest*

Our Nursery is taking subscribers for our
Plant Starts CSA Program.

Choose from Perennial Vegetables, Pollinator Plants, Native Plants, Veggie Starts, Salsa Garden, Beginner's Garden, Culinary Herbs, Edible Flowers, and/or the Guild Package



Bareroot Plant Sale

*NW natives, fruit trees, berry bushes, nitrogen fixers,
and plants with ecological functions*



The benefit of buying bareroot is that you get a sizable plant for your landscape at the optimal time for transplanting.

Please plan to plant shortly after receiving your order.

Pick up Dates:

March 25 in Olympia, WA

Please order by March 22

April 1st in SE Portland

April 2nd in Hood River

Please order by March 27

Check out our list on the website.

www.permaculturerising.com

We will begin offering
potted plants for sale on
April 1.