

“The front lines of the battle for nature are not in the Amazon rain forest or the Alaskan wilderness; the front lines are our backyards, medians, parking lots, and elementary schools. The ecological warriors of the future (will be)... anyone who can influence a small patch of land.”

*Thomas Rainer and Claudia West, "Planting in a Post-wild World"*

## What is a Sustainable Landscape?

*In garden terms*, A landscape that **thrives with minimal inputs** (e.g., water, pesticides, fertilizers) and that

**conserves natural resources** (e.g., soil, water, wildlife), while still

**meeting human needs** and expectations, is truly sustainable.

*(Adapted from the UN definition of sustainability)*



## A sustainable landscape is...

### THIS

- Diverse, densely planted
- Adaptable and ever-changing
- Adapted to natural water cycles
- Human/nature partnership
- Shelter, food, and water for wildlife
- Persists with little human maintenance
- Minimal organic inputs

### NOTTHIS

- Monoculture
- Static, unchanging
- Water-thirsty
- Totally human-controlled
- Few benefits for wildlife
- Fails without constant maintenance
- Regular chemical inputs



## Garden/garden Project

Santa Monica, California, 2004

Substantial reduced inputs



Two adjacent residential front yards, 9-year study.

**Conventional**, lawn and exotic shrubs, standard irrigation system.

**Sustainable**, native plants needing minimum water, water infiltration pit, moisture-sensitive drip system.

Results were stunning

- The sustainable garden averaged 83% less water...
- Produced 56% less waste...
- Required 68% less labor...
- Cost \$2200/year less to maintain...

.... than the conventional garden... and looked more lush and inviting

**Interested?**



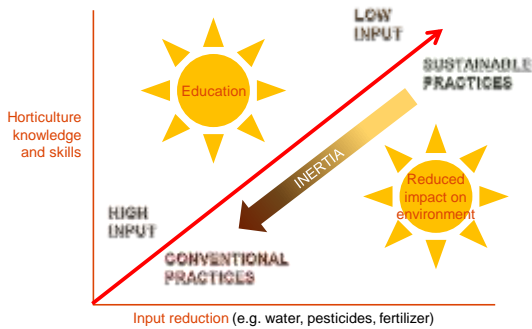
What is Sustainable Gardening?

Not just “doing less bad things”...

Learning to incorporate positive, regenerative methods that create benefits beyond an attractive landscape.



Requires Increased Knowledge and Skills



*You can influence the health and ecology of your patch of ground.*



## Topics we'll cover

### Part 1

- Maintaining healthy SOIL
- WATER management and conservation
- Reduce PESTICIDE use
- Avoid INVASIVE PLANTS
- Provide WILDLIFE habitat

### Part 2 - Basic landscape design principles

## Maintaining Healthy Soil

- Mulch regularly - "Leave the leaves"
- Avoid compaction
  - Paths or stepping stones
- Minimize disturbance
- Add organic nutrients *if needed*
- Avoid runoff/erosion



## Fundamentals of Sustainable Gardening HEALTHY SOIL

### Healthy soil:

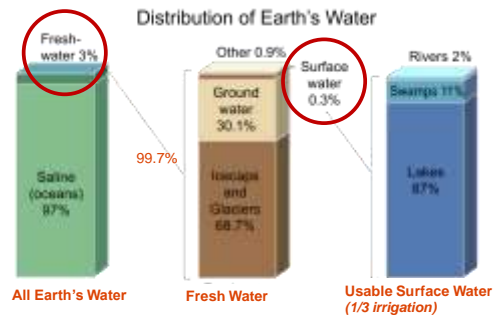
- Contains organic matter (OM)
- Retains enough (but not too much) water
- Slowly releases minerals and nutrients
- Buffers pH changes
- Is full of life – biologically active
- **Is critical for healthy plants**

### Healthy plants are:

- Resilient to stresses - pests, diseases, extreme weather



## Fundamentals of Sustainable Gardening MANAGE AND CONSERVE WATER



## Eaters and decomposers cycle nutrients



One cup of healthy soil can contain:  
 Bacteria ..... 200 billion  
 Fungi ..... 100,000 meters  
 Protozoa ..... 20 million  
 Nematodes ..... 100,000  
 Arthropods ..... 50,000  
 Earthworms ..... <1



## Oregon's Water Future

### Current scientific understanding:

- PNW will get about same precipitation as historically
- Higher temps will cause more rain, less snow
- Less snow in mountains = lower stream flows in summer.
- Mountain temps are rising faster than lowlands
- Winter low temps are rising faster and farther than summer high temps
- **Result: more summer drought**







SOIL WATER PESTICIDES INVASIVES WILDLIFE



SOIL WATER PESTICIDES INVASIVES WILDLIFE

## Reducing Water Use: Waterwise Gardening

- Keep water on site
- Appropriate choice of plants
- Mulch
- Smart watering

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SOIL WATER PESTICIDES INVASIVES WILDLIFE

## Rainwater Collection

- Less practical in summer-dry climate
- Need approx. 50 gal per week per 30sf garden space
- Illegal in some places

SOIL WATER PESTICIDES INVASIVES WILDLIFE

## Green Roofs

- Structurally complex
- May need a permit



Garden shed



2.5 acres on California Academy of Science

SOIL WATER PESTICIDES INVASIVES WILDLIFE

## Mulch

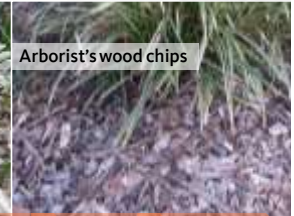
- Reduces evaporation
- Improves soil water retention
- Adds OM
- Alternatives to bark



Mint straw



Gravel



Arborist's wood chips

SOIL WATER PESTICIDES INVASIVES WILDLIFE

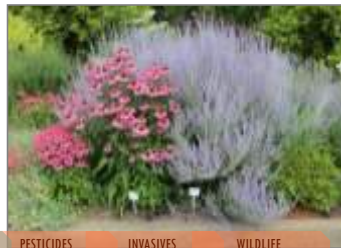
## Appropriate choice of plants

- Match plants to site
- Group plants by water needs
- Embrace seasonal change

*Echinacea* and *Perovskia* look great in the summer with little water



*Sempervivum* turns red in summer (or winter)

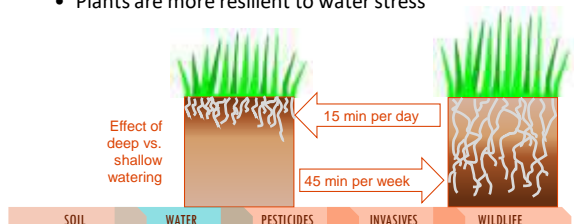


SOIL WATER PESTICIDES INVASIVES WILDLIFE

## Smart Watering

Water infrequently but deeply

- Slowly so water sinks in
- Roots grow deep into soil
- Plants are more resilient to water stress



SOIL WATER PESTICIDES INVASIVES WILDLIFE

## Dry Summer Climates Chart

by Michael Mace, San Jose, CA for Pacific Bulb Society

Cooler Winter Months	Summer Rainfall							
	G. Wetter (30-60 in)	F. Wet (15-30 in)	E. Moist (5-15 in)	D. Damp (1-5 in)	C. Dry (0-1 in)	B. Moderate (0-1 in)	A. Extreme (0-1 in)	
4. Temperate (40-60 in)	44	44	44	44	44	44	44	
3. Cool (30-40 in)	44	44	44	44	44	44	44	
2. Cold (20-30 in)	44	44	44	44	44	44	44	
1. Frigid (10-20 in)	44	44	44	44	44	44	44	

<http://pacificbulbsociety.org/pbswiki/index.php/DrySummerClimates>

SOIL WATER PESTICIDES INVASIVES WILDLIFE

## Watering zones

- Group plants by water needs
- Match water application to plant needs



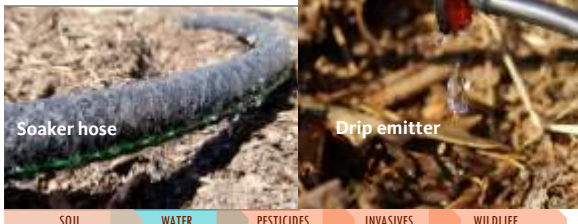
Water-lovers in boggy area

SOIL WATER PESTICIDES INVASIVES WILDLIFE



## Smart irrigation design considerations

- Drip, soaker or sprinkler?
- Permanent or movable? Timer?
- Allow for future growth of plants



## Fundamentals of Sustainable Gardening AVOID INVASIVE PLANTS

**Invasive species are defined as “a species that is not native to a specific location, and which has a tendency to spread to a degree believed to cause damage to the environment, human economy or human health.”**

Typically provide little or no food value for native fauna; many are actively toxic.



## Movable systems

- Water in morning
- Not when windy
- Water droplet size

## Invasive plants are...

- ... #1 threat to native plant biodiversity
- ... Consuming nearly 2 million acres/year in U.S. *despite control measures*
- ... Cost billions of dollars/year in damages/treatment
- ... Deliberately or accidentally introduced... often from gardens



## Fundamentals of Sustainable Gardening REDUCE PESTICIDE USE

- Non-selective pesticides can harm non-target organisms and environment
- Reduce pesticide use by:
  - Keeping plants healthy but not pampered
  - Maintaining healthy soils
  - Using locally adapted and pest resistant plants
  - Allowing some “weeds”

**More in the IPM class**



## Garden escapees

- **If it has the potential to become invasive it probably will do so**
- Lack of natural enemies in new location
- Adaptable, fast-spreading, pest resistant
- Illegal to sell or trade noxious/invasive plants





Yellow flag iris (*Iris pseudacorus*) invading wetlands in Southern Washington

SOIL WATER PESTICIDES INVASIVES WILDLIFE



English holly (*Ilex aquifolium*) invades forest understories and is spread by birds

SOIL WATER PESTICIDES INVASIVES WILDLIFE



Butterfly bush (*Buddleia davidii*) by an Oregon stream

SOIL WATER PESTICIDES INVASIVES WILDLIFE



Bachelor's button, cornflower (*Centaurea cyanus*)

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English Ivy (*Hedera helix*) invades an urban park in Portland, Oregon

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Porcelain-berry (*Ampelopsis brevipedunculata* 'Elegans')

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## Alternatives: Plant this, not that

- Don't grow listed invasive plants in regions they are invasive in.
- Question? Visit [www.invasive.org](http://www.invasive.org)
- For non-invasive, see **"GardenSmart Oregon, A Guide to Non-Invasive Plants"**



SOIL WATER PESTICIDES INVASIVES WILDLIFE



### Provide Food

- Berries and seeds
- Nectar and pollen
- Leaves
- Each other . . .

SOIL WATER PESTICIDES INVASIVES WILDLIFE

## Garden Smart Oregon



SOIL WATER PESTICIDES INVASIVES WILDLIFE



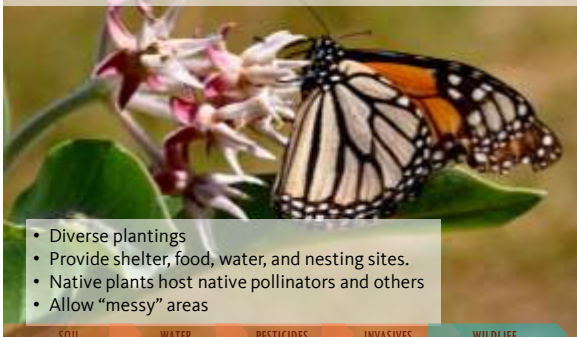
### Provide Shelter

- Vegetation for salamanders, tree frogs to hide in
- Bird/bat/butterfly houses
- Insect hotels
- Beetle banks (or bumps)
- Brush piles
- *Problem wildlife?*

Insect hotel

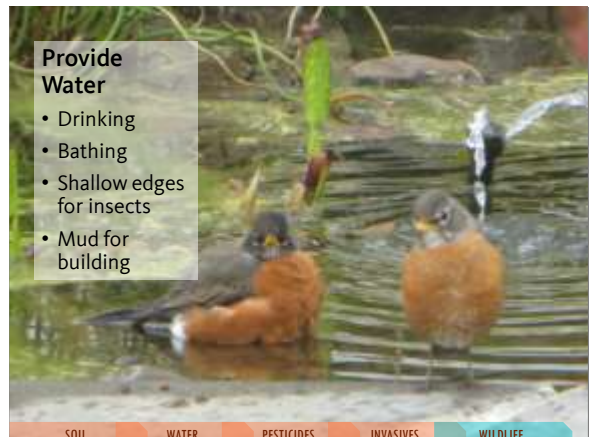
SOIL WATER PESTICIDES INVASIVES WILDLIFE

## Fundamentals of Sustainable Gardening PROVIDE WILDLIFE HABITAT



- Diverse plantings
- Provide shelter, food, water, and nesting sites.
- Native plants host native pollinators and others
- Allow "messy" areas

SOIL WATER PESTICIDES INVASIVES WILDLIFE



### Provide Water

- Drinking
- Bathing
- Shallow edges for insects
- Mud for building

SOIL WATER PESTICIDES INVASIVES WILDLIFE





Use native plants  
along with adapted  
exotics

Goatsbeard (*Aruncus*), *Rhododendron*,  
*Oxalis*



Garden  
visitors