

“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



Part 1: Fundamentals of Sustainable Gardening

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?



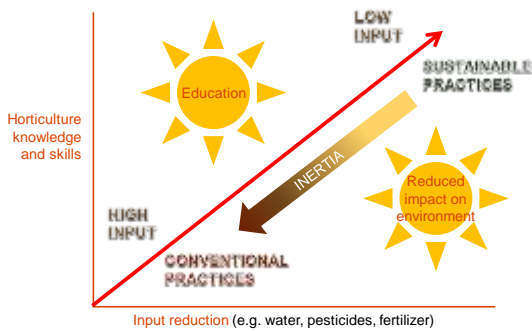
What is Sustainable Gardening?

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:

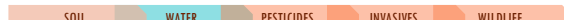
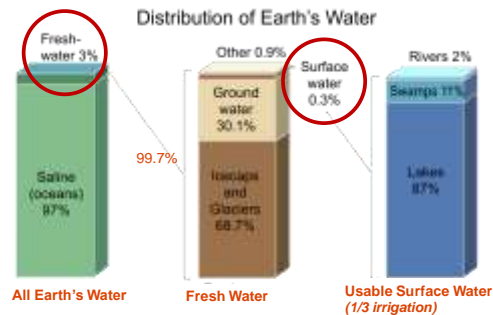
- Contains organic matter (OM)
- Retains enough (but not too much) water
- Slowly releases minerals and nutrients
- Buffers pH changes
- Is full of life – biologically active
- **Is critical for healthy plants**

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

SOIL WATER PESTICIDES INVASIVES WILDLIFE

Pervious Pavers

SOIL WATER PESTICIDES INVASIVES WILDLIFE

Keep Water on Site: Rain Garden

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



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



SOIL WATER PESTICIDES INVASIVES WILDLIFE

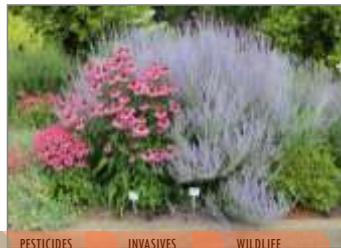
Appropriate choice of plants

- 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)

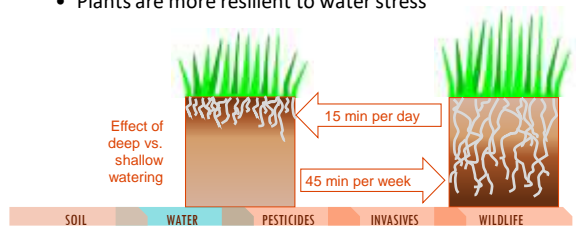


SOIL WATER PESTICIDES INVASIVES WILDLIFE

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")	F. Wet (15-30")	E. Moist (5-15")	D. Damp (1-5")	C. Dry (0-1")	B. Moderate (0-1")	A. Extreme (0-1")	
4. Temperate (40-60°F)	4A. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	4B. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	4C. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	4D. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	4E. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	4F. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	4G. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	4H. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida
3. Cool (30-40°F)	3A. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	3B. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	3C. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	3D. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	3E. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	3F. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	3G. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	3H. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida
2. Cold (20-30°F)	2A. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	2B. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	2C. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	2D. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	2E. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	2F. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	2G. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	2H. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida
1. Frigid (10-20°F)	1A. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	1B. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	1C. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	1D. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	1E. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	1F. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	1G. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida	1H. California, N. Nevada, N. Arizona, N. New Mexico, N. Texas, N. Florida

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

SOIL WATER PESTICIDES INVASIVES WILDLIFE

Watering zones

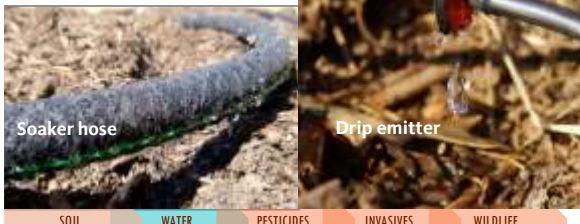
- Group plants by water needs
- Match water application to plant needs



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*)

SOIL WATER PESTICIDES INVASIVES WILDLIFE



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

SOIL WATER PESTICIDES INVASIVES WILDLIFE



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

SOIL WATER PESTICIDES INVASIVES WILDLIFE

Alternatives: Plant this, not that

- Don't grow listed invasive plants in regions they are invasive in.
- Question? Visit 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...

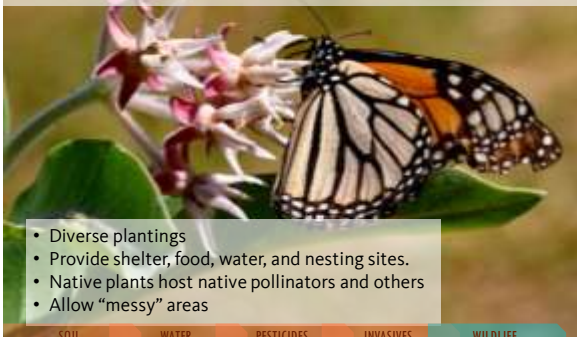


SOIL WATER PESTICIDES INVASIVES WILDLIFE

Garden Smart Oregon



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

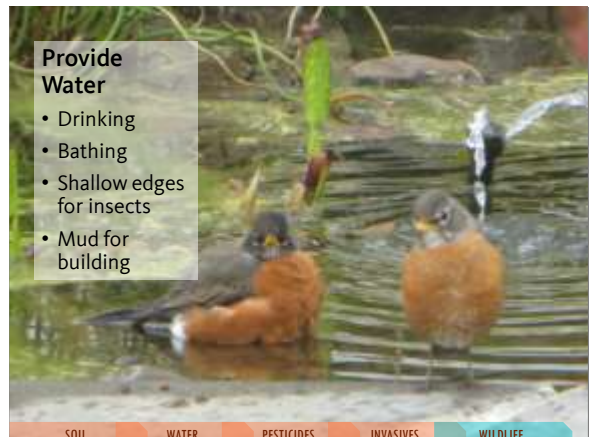


Provide Shelter

- 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



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