

UCCE

El Dorado Master Gardeners



Contact us:

530-621-5512 (Tues-Fri 9:00AM-Noon)

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Visit us at 311 Fair Lane, Placerville

UCCE Master Gardening Program Mission Statement

- “To extend research based knowledge and information on home horticulture, pest management, and sustainable landscape practices to the residents of California and be guided by our core values and strategic initiatives.”





Sustainable Gardening

Deborah Nicolls

March 2017

Today's Topic

- Definition of sustainable gardening
- Why you should practice sustainable gardening
- How you can practice sustainable gardening

Sustainable Gardening is...

- Design and maintenance practices that
 - reduce demand for all types of resource inputs
 - makes use of renewable resources
 - protects environmental quality

Sustainable Gardening is ...

- Resource efficient using reduced amounts of
 - water
 - fertilizer
 - pesticides
 - labor
 - energy
- Has minimal negative impacts on the environment.

Sustainable Gardening

Ideally -

- Uses resources at the rate and quantity they are generated
- Ensures that the ecological functions of a site are not adversely affected
- Plantings can be maintained in perpetuity
- Uses local resources

Why Practice Sustainable Gardening?

- To preserve and conserve:
 - Water – availability and quality
 - Soil – including biodiversity
 - Energy (of all types)
 - Air quality
 - Beneficial animals, plants



U.S. Drought Monitor California

July 26, 2016

(Released Thursday, Jul. 28, 2016)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	83.59	59.02	42.80	21.04
Last Week <i>7/19/2016</i>	0.00	100.00	83.59	59.02	42.80	21.04
3 Months Ago <i>4/26/2016</i>	4.24	95.76	90.09	74.37	49.15	21.04
Start of Calendar Year <i>12/29/2015</i>	0.00	100.00	97.33	87.55	69.07	44.84
Start of Water Year <i>9/29/2015</i>	0.14	99.86	97.33	92.36	71.08	46.00
One Year Ago <i>7/28/2015</i>	0.14	99.86	97.35	94.59	71.08	46.00

Intensity:

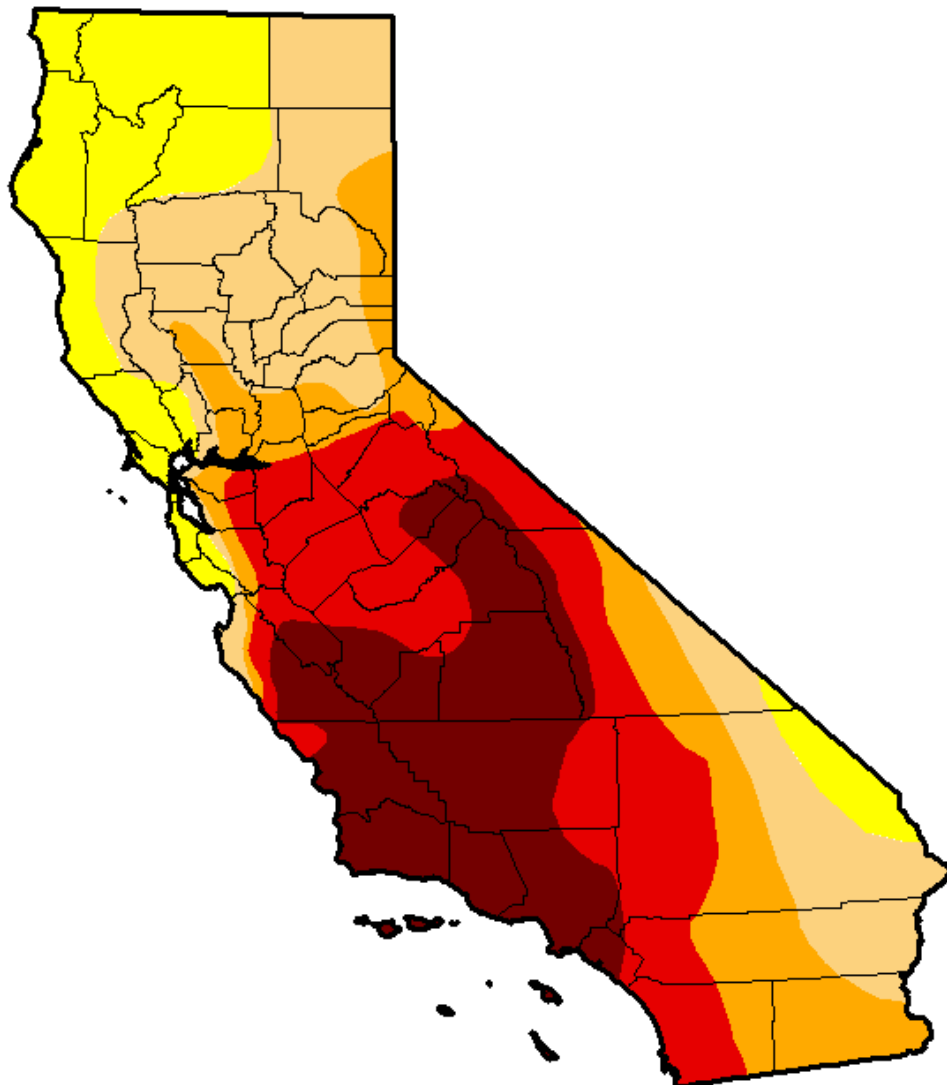


The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

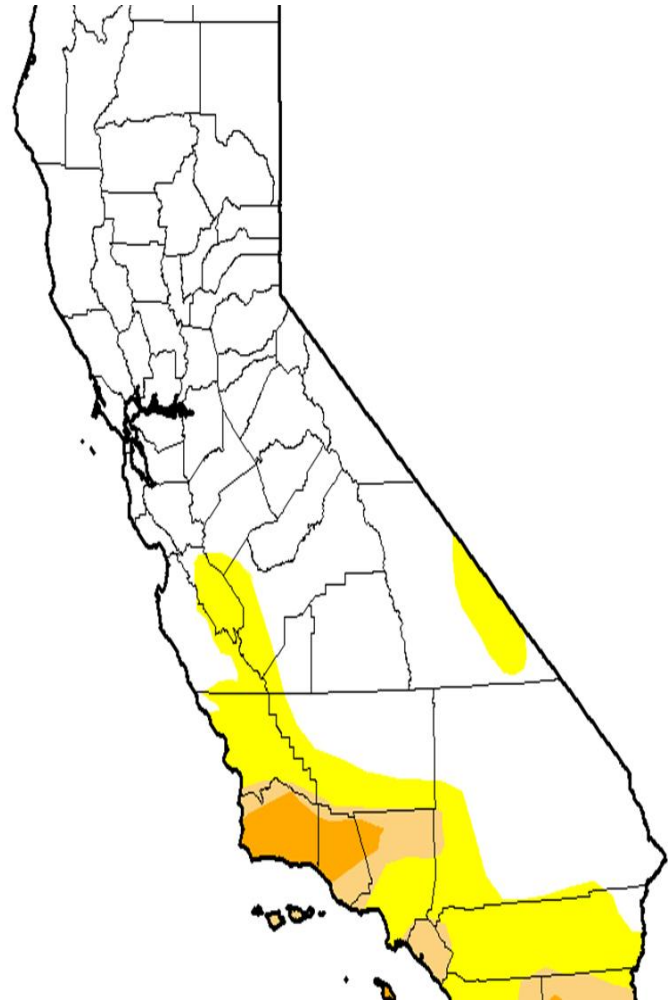
Brad Rippey

U.S. Department of Agriculture



But – Don't be complacent

- There will be more droughts
- Mankind has been relentlessly polluting both fresh water and the seas
- Population of the planet just keeps growing, with literally no end in sight.
- Earth is a closed system. No new water is ever going to show up.



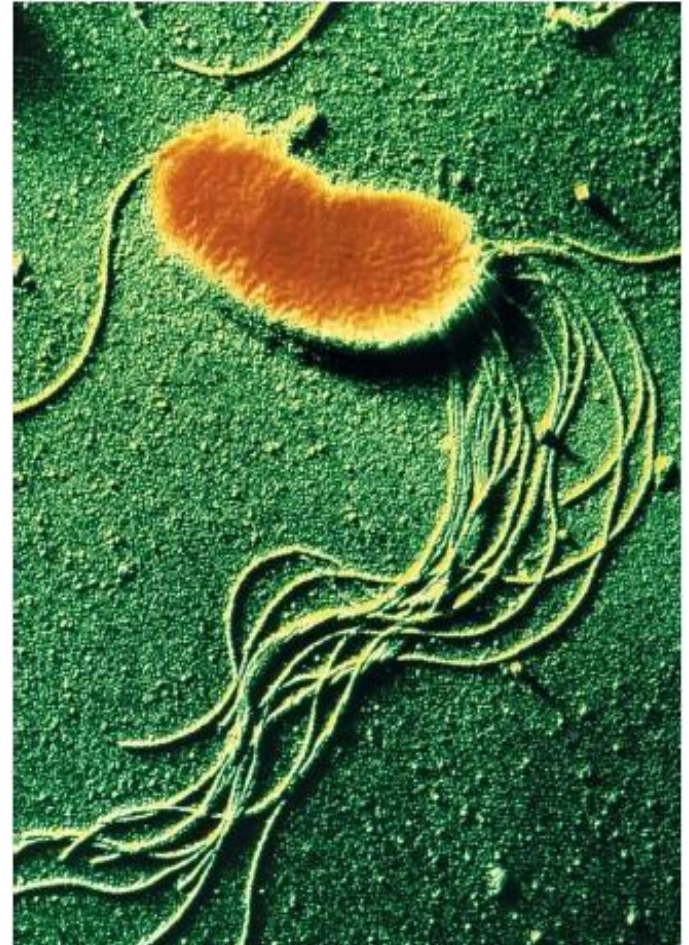
Preserving Soil and Soil Biodiversity

- 75 billion tons of soil lost to erosion each year.
- Soil biodiversity represents the variety of life belowground whose interaction with plants and small animals forms a web of biological activity.
- Soil is the most biologically diverse part of Earth.
- Plants cannot live without the life in the soil.

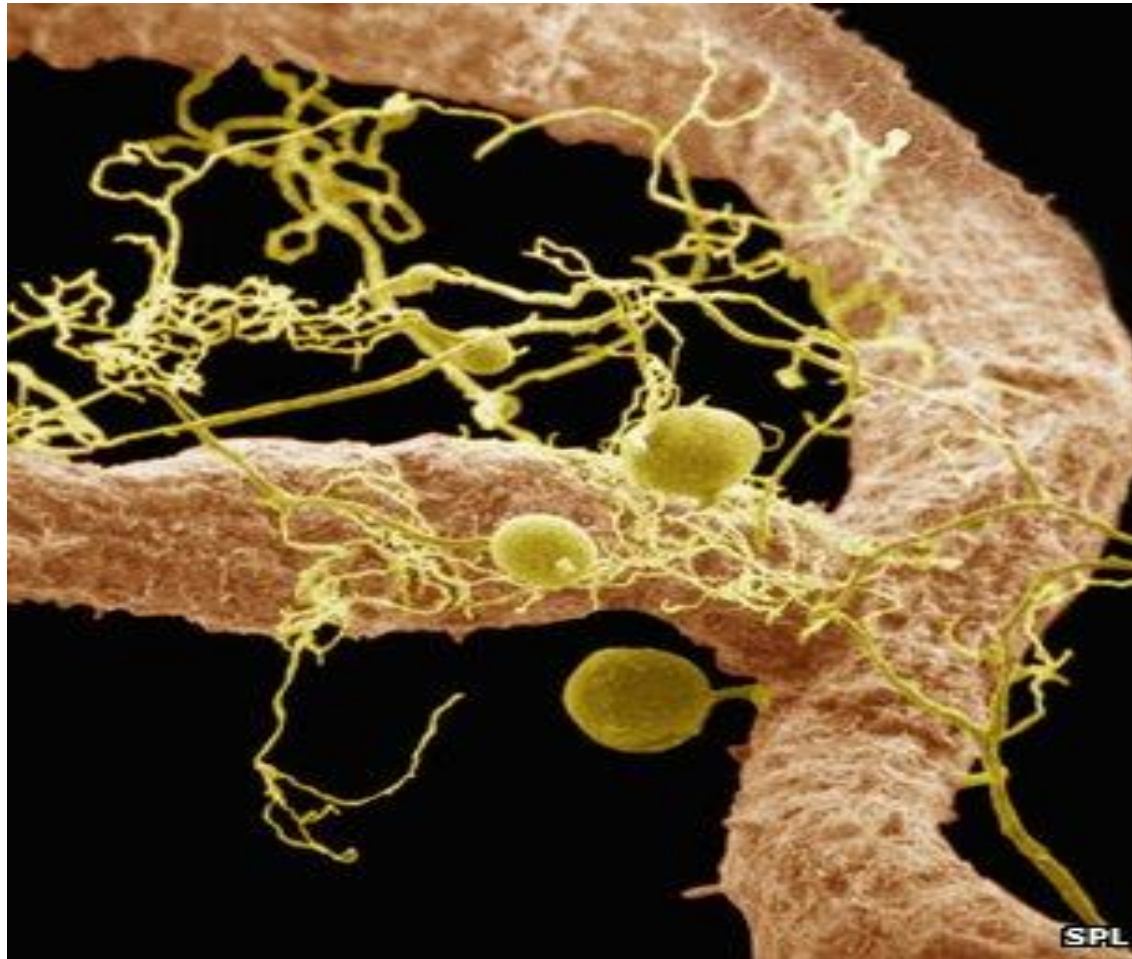
Soil Biodiversity

- Under 1 acre of soil - 7240+ pounds of life
 - Several pounds of mammals
 - 133 pounds of protozoa
 - 900 pounds of earthworms
 - 900 pounds of arthropods
 - 900 pounds of algae
 - 2000 pounds of bacteria
 - 2400 pounds of fungi

Source: *Teaming with Microbes*, Lowenfels and Lewis, from Elaine Ingham's research.
7240+ pounds



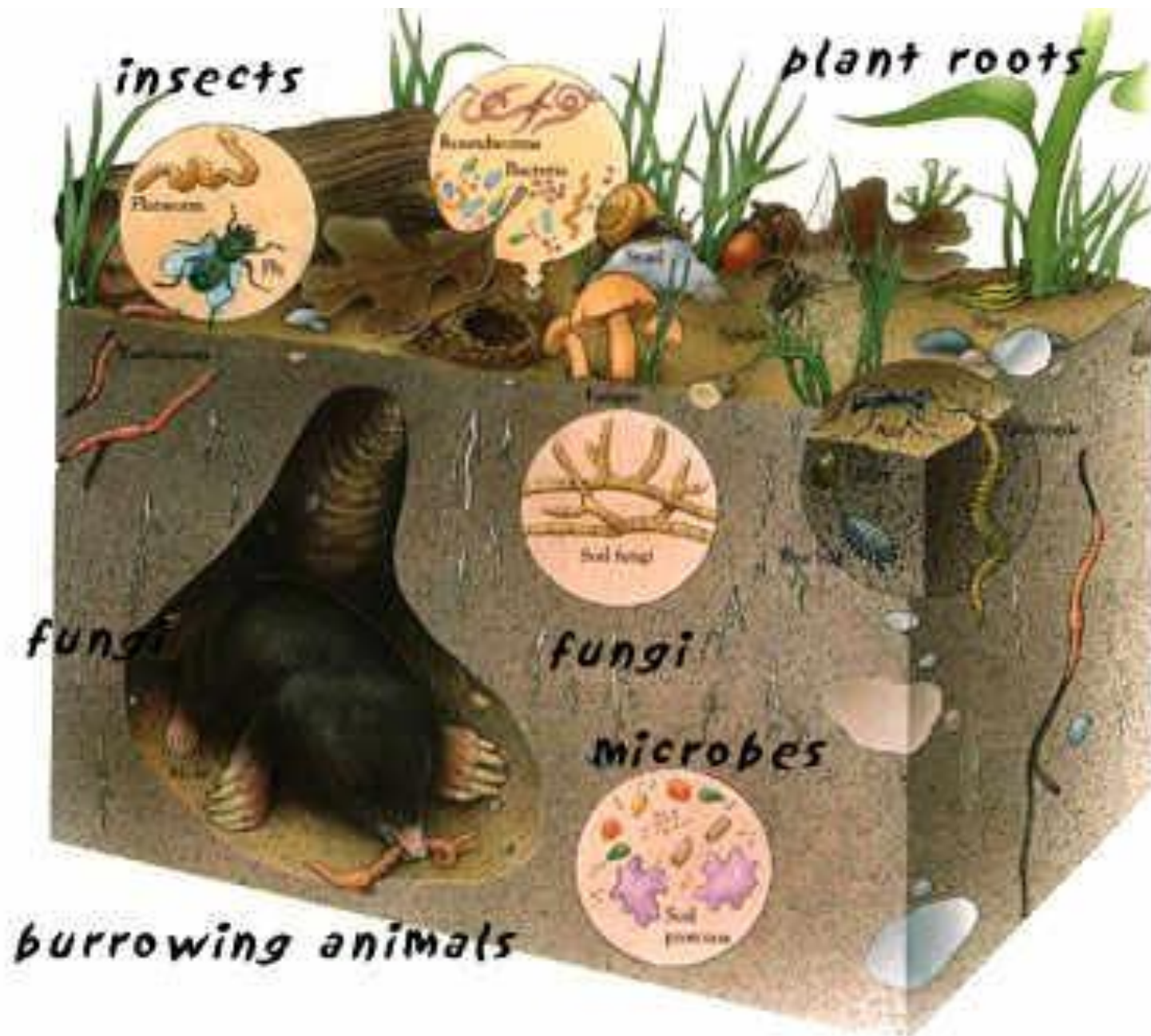
Mycorrhizae (on a soybean root)



Soil Biodiversity

- Improves the entry and storage of water.
- Improves resistance to soil erosion.
- Improves plant nutrition.
- Controls soil pests and disease.
- Facilitates recycling of organic matter in the soil.
- Soil biodiversity is therefore the driver of healthy soil for sustainable crop production

- **Tend to your soil first!**



Other reasons?

- Save **your** money, time and energy.
- To not fill up our landfills – reduce/reuse/recycle!
- Because planetary resources are limited.



How to Practice Sustainable Gardening

- First step
 - Change your attitude away from a desire for perfection.
 - Learn to tolerate loss and damage.
 - Relax

“Out of perfection, nothing can be made” (J. Campbell)

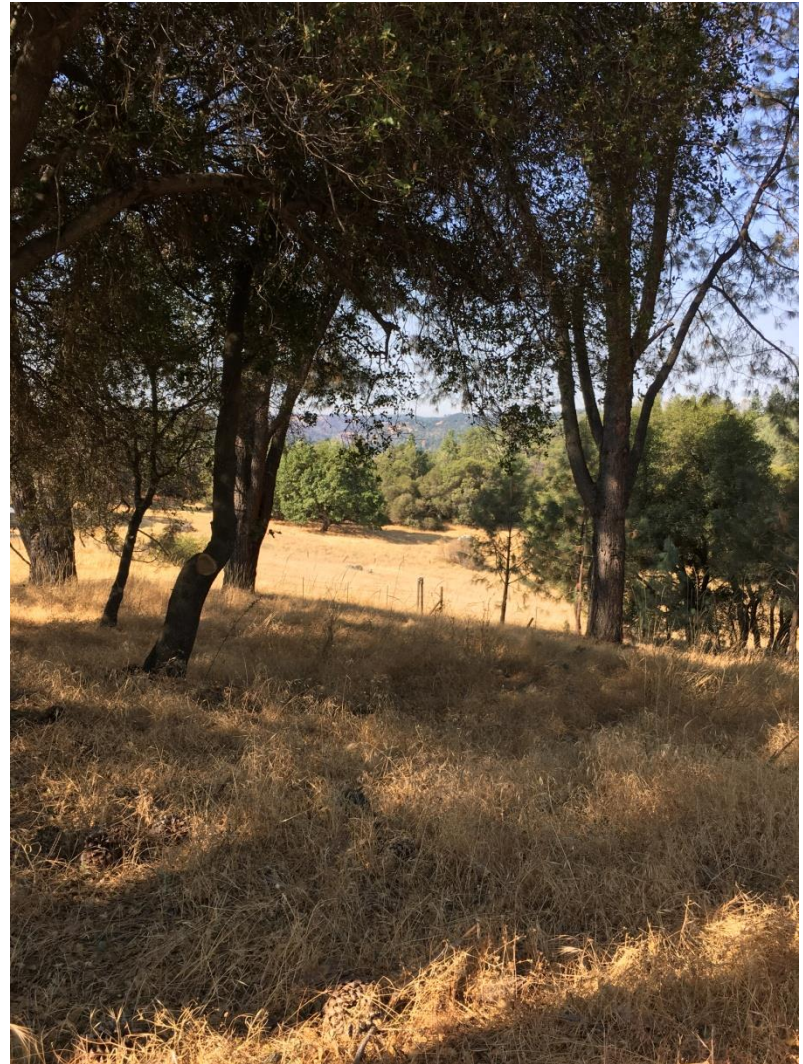
Know Your Climate

Central California Climate
is

Mediterranean

- long, hot, dry summers
- wet winters

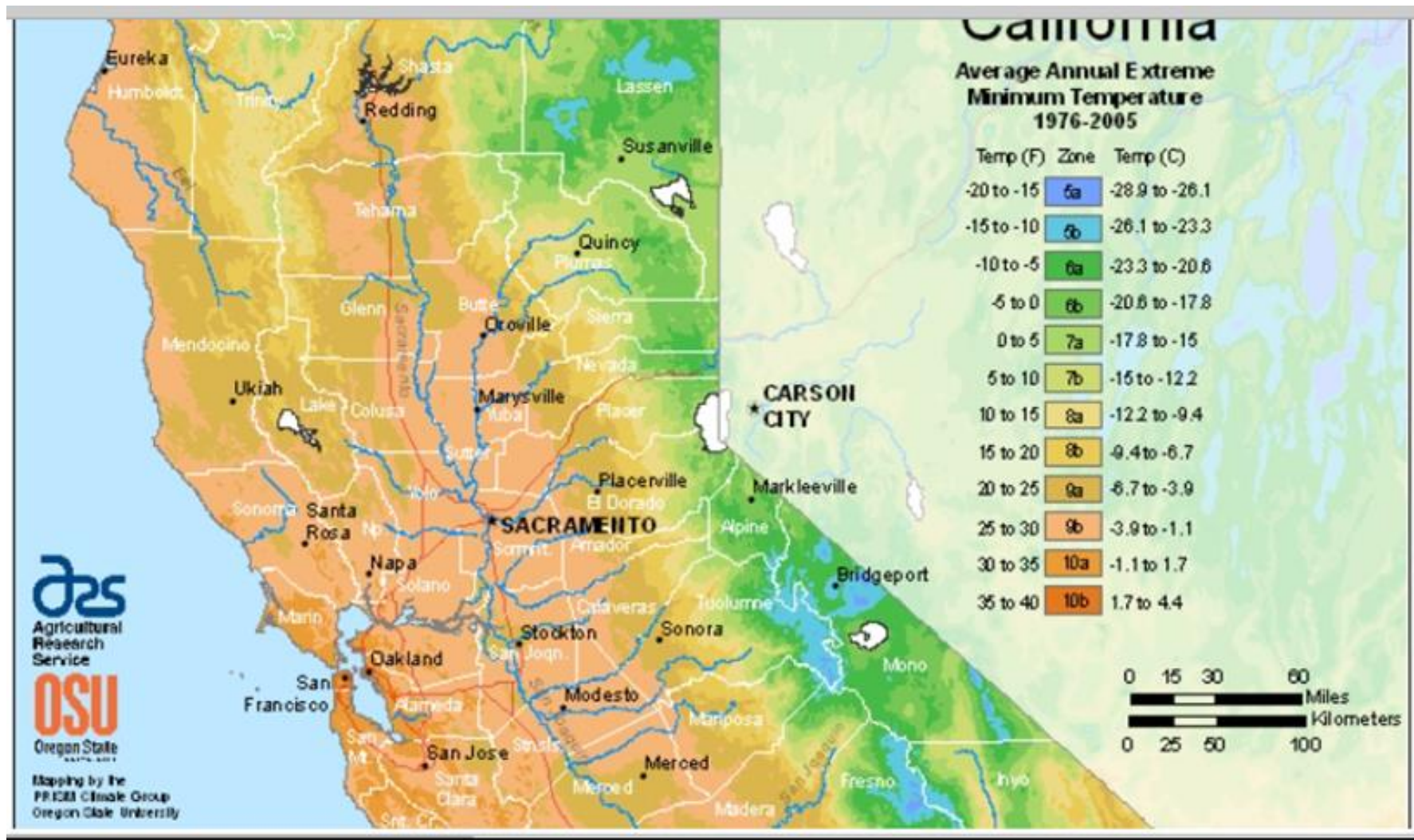
Plants that are not
suited to this climate
need life support.



Know your climate zone

- USDA Cold Hardiness Zone – Based only on coldest average temperature
 - EDH is 9b (25-30 deg); CP, Placerville, Camino is 9a (20-25); GF is 8b (15-20)
- Sunset Zone –
 - EDH and CP zone 9; Rescue and up is zone 7

px



Know your micro climates

A small, specific place within an area as contrasted with the climate of the entire area.

- Sunny or shady? Sun exposure?
- Sloped, flat, windy, exposed, etc?
- How much hard surface is there, and how exposed to the sun?

Know your soil

- Clay – dense and drains slowly. Nutritious. Easy to overwater in clay soil.
- Sandy – loose and drains quickly. Fewer nutrients and must be watered in pulses.
- Loam – between clay and sand. Ideal.

Why do you need all this information?

- Ultimate goal is to plant the right plant, in the right place
- Your plants will be healthier and require less energy, water, fertilizer, herbicides and pesticides to keep alive

How to get the right plant?

Read the plant label

- It should include information on cold hardiness and whether it needs sun or shade, how often to water, and how large the plant will get.



For more information scan the code with our free app **OR** visit [lowes.com/plants](https://www.lowes.com/plants) and enter the plant code: **L9636**

CARE & MAINTENANCE

WATER Low, once established		AGUA Poca, ya establecidos
AVERAGE SIZE 20" H x 18" W		TAMAÑO PROMEDIO 51cm Al x 46cm An
SPACING 15-18"		ESPACIAMIENTO 38-45cm
GROWTH RATE Medium		CRECIMIENTO Medio
COLD HARDINESS -30 to -40°F Non-hardy in zones 1-2	ZONE 3	TOLERANCIA AL FRÍO -35 a -40°C No resisten en las zonas 1-2
PRUNING Little pruning required		PODA Poca poda requerida
FERTILIZATION Monthly		FERTILIZACION Mensualmente

Performs better with regular water during hot summer months.

Water well until established

maturity late fall to winter

madurez finales de otoño y invierno

care remove shoots below the graft

cultivo remueva los brotes que salgan por debajo de la zona del injerto

size 8-10' t x 8-10' w

tamaño 2.5-3 m al x 2.5-3 m an

space 8-10'

espaciado 2.5-3 m

habit rounded

hábito redondo

water weekly during dry spells; more often until roots established

riego cada semana durante los periodos de sequía; con más frecuencia hasta que se establezcan las raíces

hardiness 30°F

resistencia -1°C

- Dig hole twice as wide and as deep as the pot.
- Remove root ball and place in hole so that the top is even with the ground surface.
- Refill with half soil amendment and half native soil; water thoroughly. Fertilize upon planting.

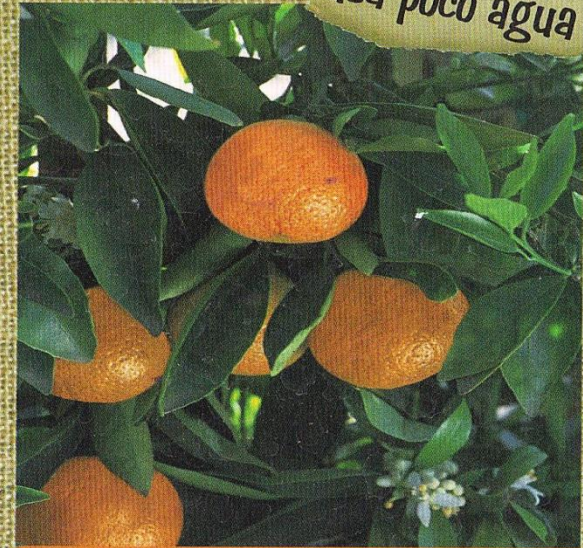
Pollination Requirements:

- Self-pollinating; this plant will bear fruit without another variety nearby.

sun / sol

FRUIT
TREE

low water use
usa poco agua



DWARF MANDARIN
'CLEMENTINE'
Citrus reticulata



**GARDEN
CLUB**

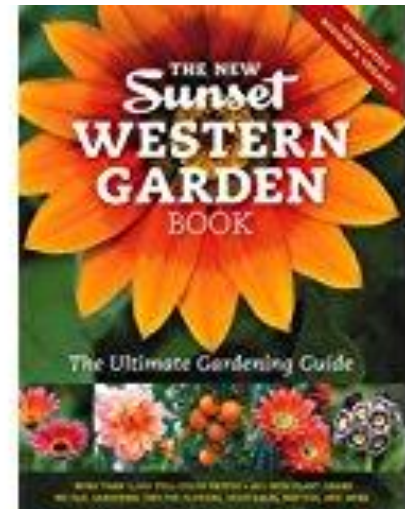
Get over \$300 in annual email exclusive savings, project ideas and more! Sign up for FREE at HomeDepot.com/GardenClub
GET TIPS ONLINE USE PLANT CODE THDD9589

Do Your Research

- Sunset Western Garden Book
 - Most nurseries have a copy

Online -

- Water Use Classification of Landscape Species
 - <http://ucanr.edu/sites/WUCOLS/>
- For natives –
 - <http://www.cnps.org/>



Right plant, right place

- Suitable to our environment and the conditions it will be living in.
- Natives and Mediterraneans do best.
- Avoid exotic plants, annuals, or anything that needs heavy inputs of water and fertilizer.
- Avoid invasive plants.



Right plant, right place

- Know mature plant size
- Avoid planting in the summer
 - Stresses plants
 - Calls for greater input of water
- Plant in fall if possible
 - ground is still warm so roots grow
 - rain is expected

If you plant the right plant in the right place

- It will require less time, energy and resources than something that does not belong.
- You will avoid spending money on a plant that will either die or cost more money for water, fertilizer or pesticide to keep alive.

Always consider native and Mediterranean plants first!

- Need little in the way of soil amendments or fertilizers.
- Need little supplemental water once established
- Natives need very little pruning, except for shape.
- Natives encourage beneficial insects and spiders and critters such as bird, frogs, lizards.
- Mainly natives in your garden will help create a wildlife corridor and provide a habitat for wildlife.

Practice Integrated Pest Management

A strategy that centers on long-term suppression or prevention of pest problems through a combination of techniques including

- cultural practices
- habitat suppression
- use of resistant varieties
- use of biological controls
- use of pesticides **ONLY** when careful monitoring indicates they are needed

Beneficial Insects



Mulch

- 3-4” – on top of soil
 - Keep away from trunks of plants
 - Bark, wood chips, pine needles, straw
-
- Benefits
 - Preserves moisture
 - Attracts beneficial organisms
 - Improves the soil in the long run

Compost

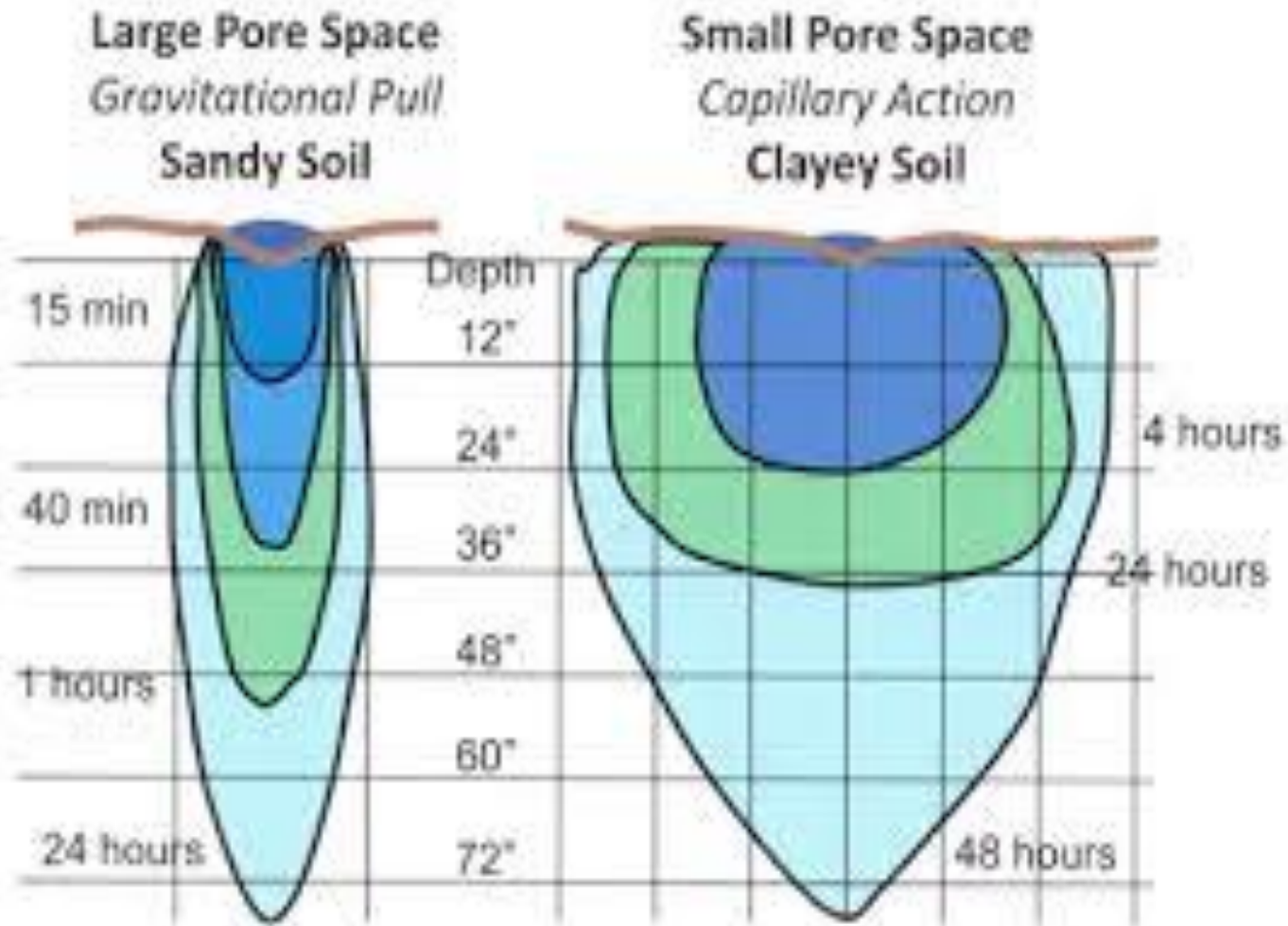
- Benefits

- utilizes waste products
- improves soil structure by adding organic content, increasing the water-holding capacity of your soil and reducing your need to water
- helps keep heavy clay soil from compacting, making it easier to work; root systems develop better
- gives sandy soil better structure
- promotes soil fertility and improves soil biodiversity
- stimulates healthy root development
- aids erosion control

How and When to Water

- Trees and shrubs – deep, infrequent watering, once a month. Save your trees before anything else during a drought.
- Perennials – deeply, once or twice a week
- Lawns – once or twice a week
- Deeply rooted vegetables – no more than twice a week
- Annuals – too much

Watering for Various Soils

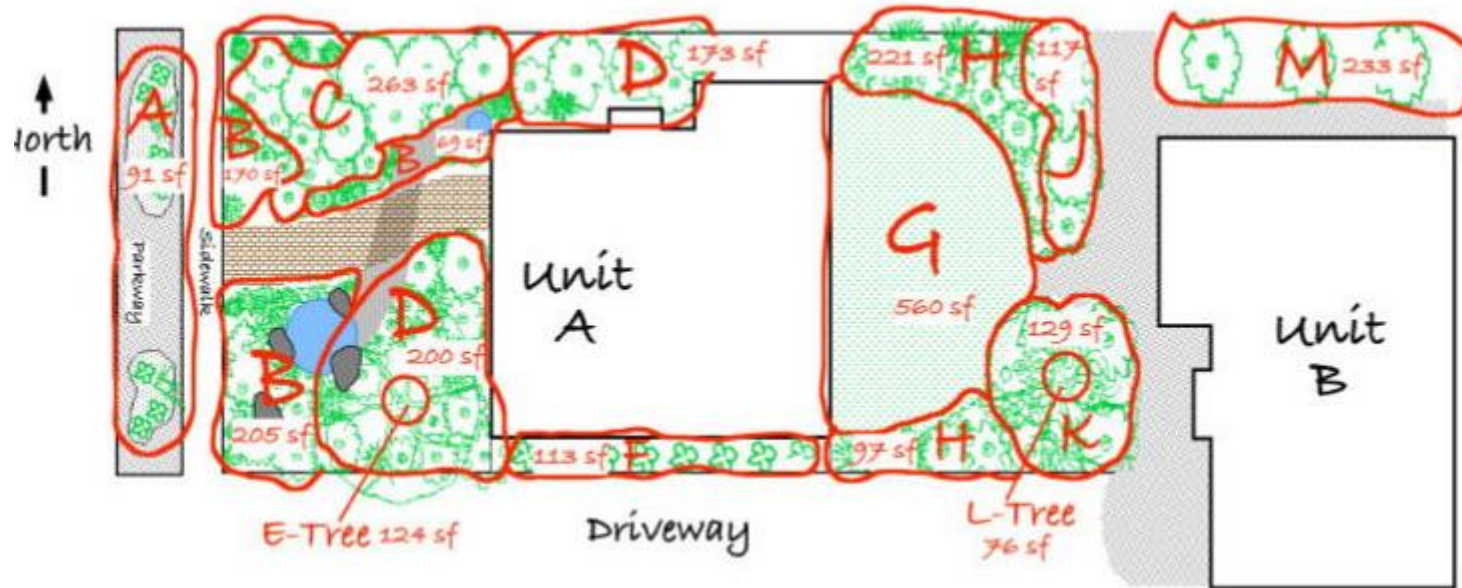


Hydrozones

- Water using hydrozones
 - Group plants with same water needs in same area and/or on same water lines.
- Water for soil structure.
- Drip irrigation is wonderful – if used properly.
- Water deeply and less frequently.

Hydrozones

SAMPLE HYDROZONE PLAN





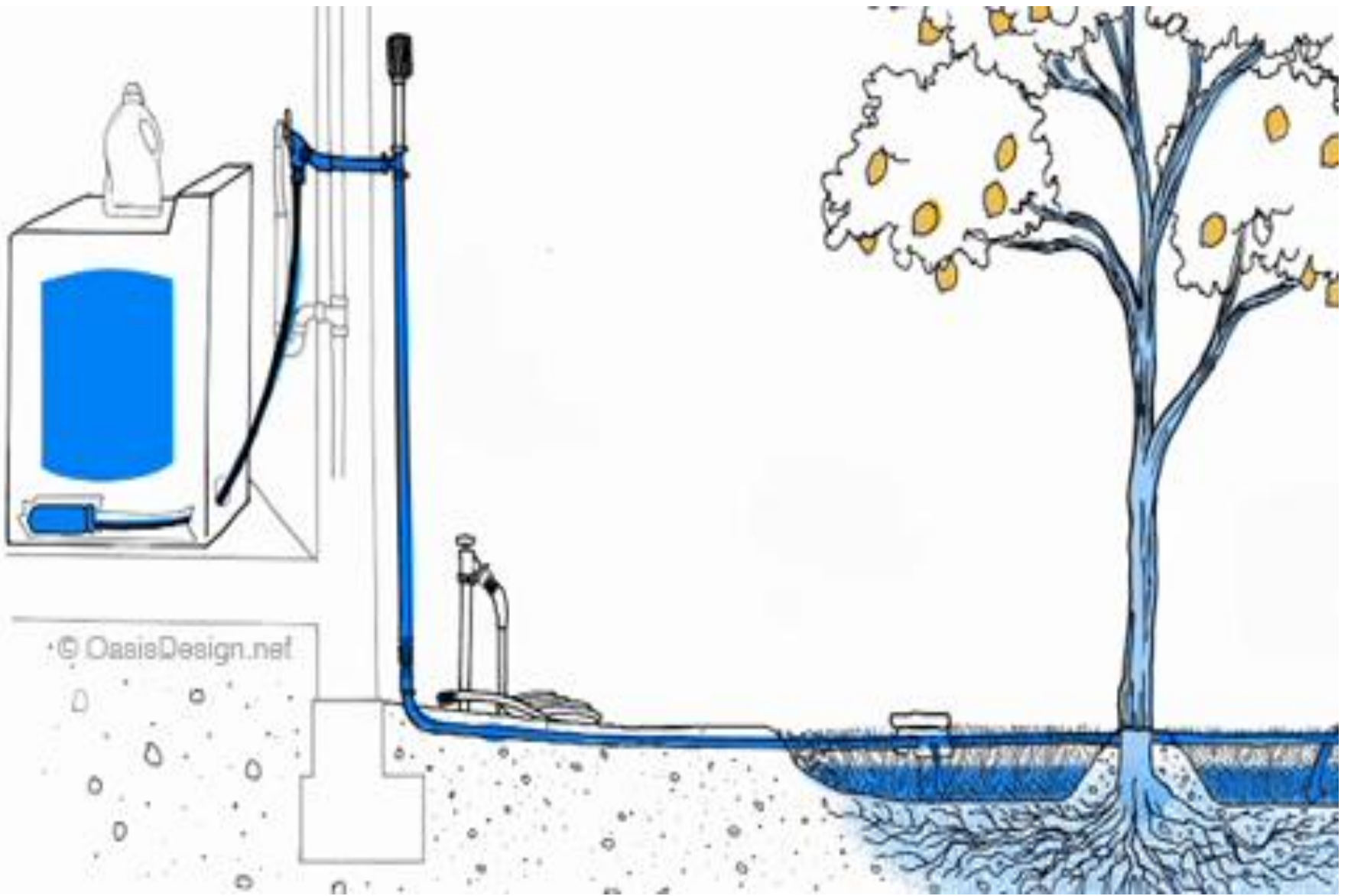
Zone Watering In Rock Garden

Water

- Reuse clean water
 - From shower
 - From washing vegetables in the kitchen or rinsing dishes
- Capture water
 - keep the water that comes on to your property and do not allow it to go into the sewer system and storm drains.
 - Capture water from your roof, using rain barrels

Gray water

- Legal without a permit in El Dorado County if it is from your washing machine. Must not have any toilet contaminants.
- Must be directed to an area under mulch.
- Not for use in vegetable gardening, so best for landscape trees and shrubs.



Water Laws in the State

New homes – can only utilize drip or micro spray irrigation

New homes – lawns can only be 25% of landscapin

2015 Turf Replacement Initiative – rebate

Up to \$2,000

SB992 – Prohibits HOAs from fining members for reducing watering of lawns and landscaping during drought emergency, *UNLESS* HOA has access to recycled water

Ditch the Lawn

Why?

- Uses more water than any other crop in U.S. and the crop is usually thrown away.
- Requires fertilizers and herbicides to look good.
- Require frequent mowing, which pollutes.
- Time and energy are required to maintain the looks of the lawn
- Costs money to maintain.

Water usage recommended by UC – 1.5” per week.

Lawns

If you must keep your lawn –

- Water less frequently and more deeply
- Leave grass clippings as mulch.
- Mow less frequently. Shorter grass burns more easily. Taller grass keeps weeds at bay.
- Fertilize less frequently, so grass grows slower.
- Shrink your lawn

Use Lawn Substitutes

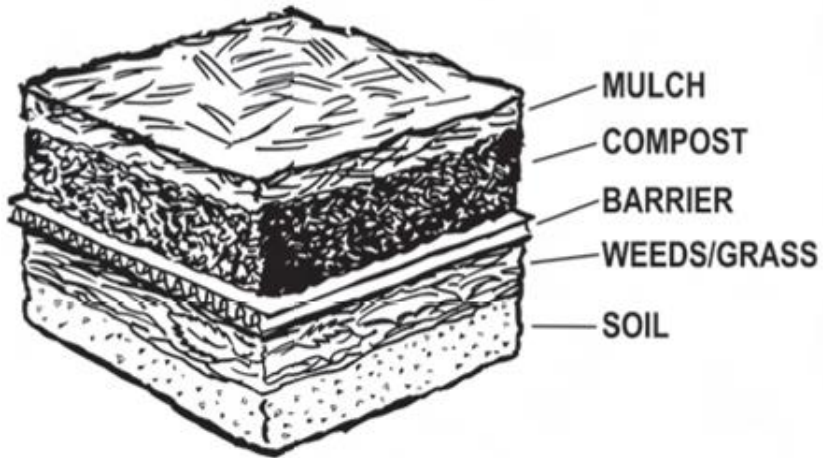
- Native grasses, drought tolerant grasses, low-growing herbs or shrubs
- Gravel or water-permeable pavers
- Native plants and
Mediterraneans







Get rid of lawn by sheet mulching



- Attracts beneficial organisms
- Keeps soil moist
- Suppresses weeds
- Enriches soil
- Best done in fall or winter

Sustainable Fruit and Vegetables

- Plant disease resistant varieties.
- Rotate crops to avoid disease.
- Don't till
 - allows weed seeds to germinate
 - destroys soil texture
- Plant only what you will use.
- Water properly.
- Companion plant – for beneficials

- Plant only winter vegetables or those that don't need a lot of water.
 - Most beans, some tomatoes, corn, squash and melons, okra, and grains such as quinoa, amaranth, winter wheat are lower water using.
 - Winter veggies rely on rain, instead of irrigation
- Plant the 3 Sisters
 - Beans provide nitrogen
 - Squash provide shade
 - Corn provides a pole to climb

- Plant perennial vegetables or fruit.
- Plant only as much as your family will eat fresh.
- Browse catalogs for veggie seeds that say they are drought tolerant.
- Increase plant spacing so they are not competing for water or nutrients.
- Plant in raised beds – but watch heat buildup

- Use compost – helps retain moisture and invites beneficial organisms to come and work for you.
- Mulch – retains moisture and keeps soil cool.
- Use drip irrigation – check the results! Deep watering on many crops is vital.
- Know the various water needs of your crops. Different veggies need water at different times.
- Plant in straw bales

- Plant cover crops that fix nitrogen, such as alfalfa, beans, mustard. Cut before they seed. Let decay on top of soil.
- Use local seed banks – plants that were grown and harvested locally.
- Use row covers – collects dew, protects plants from birds
- Use shade cloth – prevent overheating
- Use shade and windbreaks to prevent drying out of sensitive plants.

Converting to a Sustainable Garden

1. Assess your plants –
 - Are they water thirsty or unhealthy?
2. Make a plan –
 - Use WUCOLS. If you know what you want, make your list and look up the plants.
 - If you know what type of plants you want, use WUCOLS to generate lists for you.
3. Assess your irrigation –
 - Know where all of your lines are and what station runs them.
 - Repair what is broken or cap unused lines

Converting

4. Remove unwanted hardscape and plants
5. Assess your soil
6. Amend soil with compost, if needed
7. Install/convert irrigation to most efficient method
8. Plant new material
9. Cover bare soil and irrigation lines with organic mulch.

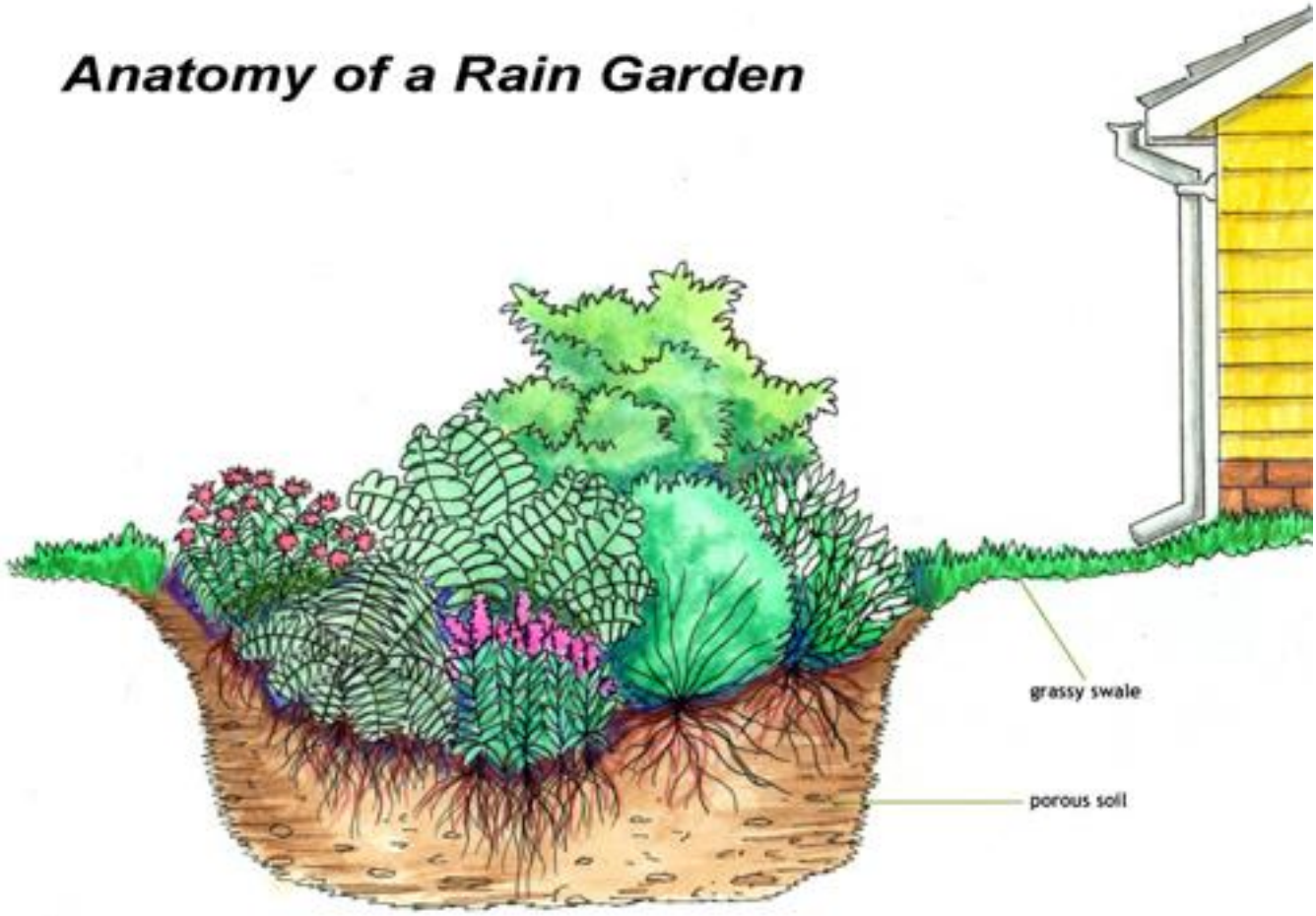
More Extreme Sustainable Gardening - An Introduction



- Capture all water flowing off your property
 - Direct and control water flow, using a system of berms and swales, dry streams and rain gardens.
 - Put in large water containers such as underground cisterns.
 - Create a rain garden
 - Use rain barrels – some drawbacks

Rain Garden

Anatomy of a Rain Garden







The small print

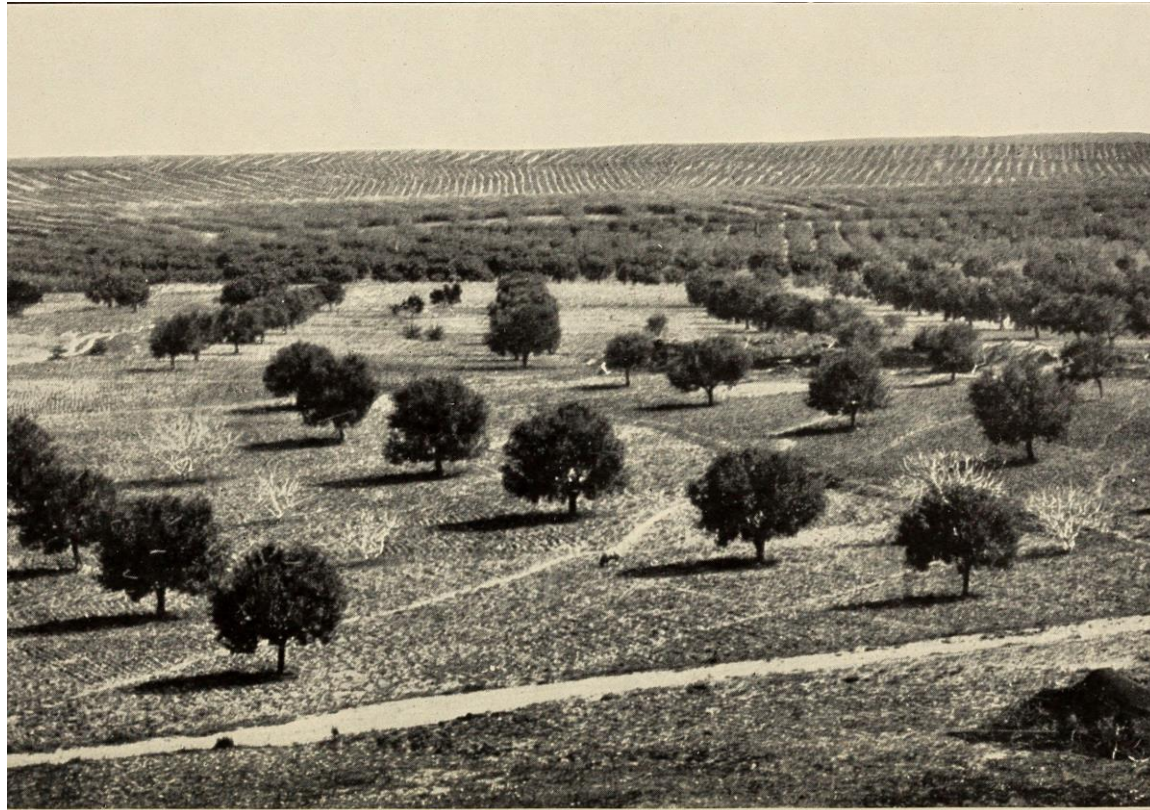
- Using water capturing techniques does not eliminate need to water as summer progresses. Constantly check moisture content in soil.



Dry Farming

A technique that depends on sufficient soil moisture and deep-rooted plants that scavenge to access water without adding much supplemental irrigation.

- Grapes, fruit and nut trees, tomatoes
- Trees and vines need to be spaced properly to allow access to water. Grapes need 50 Sq Ft ea.
- Everything needs to be watered initially!



GENERAL VIEW OF THE OLDER DRY-LAND OLIVE ORCHARDS NEAR SFAX.

Dry Farming Olives in North Africa

Cover Crops and Seed Banks

- Plant cover crops that fix nitrogen, such as alfalfa, beans, mustard. Cut before they seed. Let decay on top of soil.
- Use local seed banks – plants that were grown and harvested locally.

Plant an Edible Landscape

- Integrate fruit and vegetables within your landscape.



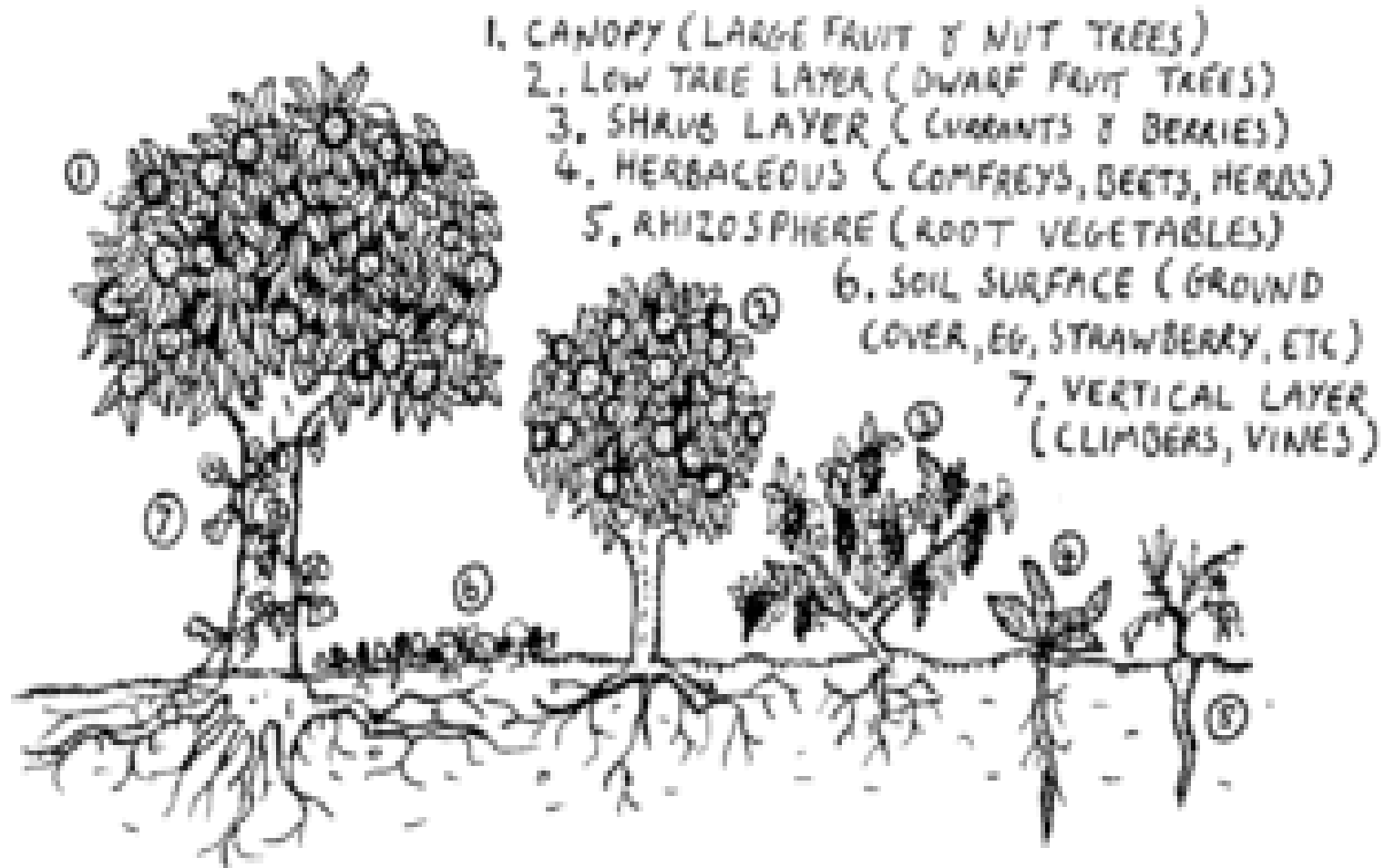
Create a Forest Garden

- “Edible forest gardening is the art and science of putting plants together in woodlandlike patterns that forge mutually beneficial relationships, creating a garden ecosystem that is more than the sum of its parts.”

[ng](http://www.edibleforestgardens.com/about_gardeni) - Dave Jacke with Eric Toensmeier

Create a Food Forest or Forest Garden

- Mimic natural ecosystems.
- Diversity creates a healthier ecosystem.
- Much like edible landscape gardening.
- Addresses 7 levels



THE FOREST GARDEN: A SEVEN LEVEL BENEFICIAL GUILD

Practice Permaculture

- Permanent agriculture is that which can be sustained indefinitely.
- Phrase first used in the 70s in Australia
- Working with nature, not against
- Starts with protracted and thoughtful observation
- Looking at plants and animals in all their functions

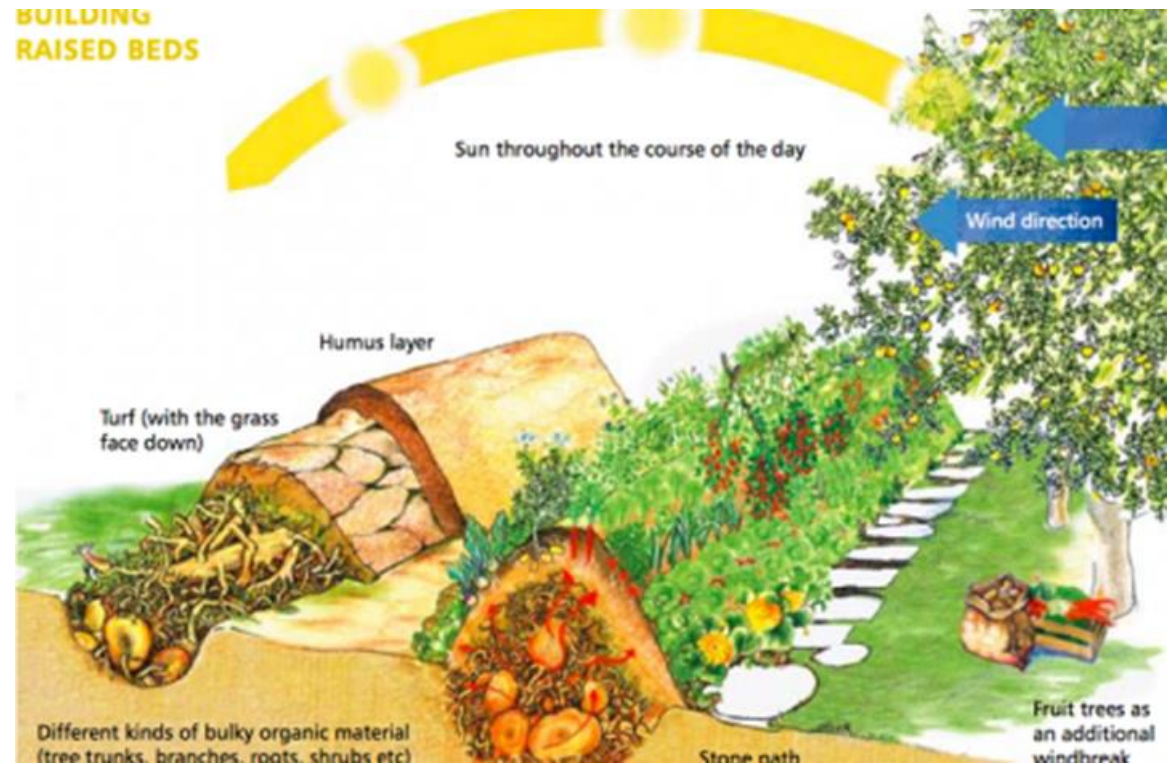
Other Practices

- Harvest from nature instead of growing a garden.
 - Read a book or two first! Take classes if you can find them.
- Practice huglekulture



Other Practices - continued

- Log Swales



Plant a Native Hedgerow

- A narrow strip of mixed native plants
- Provides nesting, forage and shelter for mammals, birds, reptiles, amphibians and native insects.
- Attracts pollinators and predatory insects to your yard.
- Can be part of a wildlife corridor



Native Hedgerow containing
California fuschia and Deergrass.

Other things a hedgerow can do

- Act as a sound barrier
- Act as a privacy screen
- Keep drying winds at bay
- Help preserve moisture by capturing water in roots
- Stabilize soil

Just remember to do your homework (right plant, right place), and water new plants until established.

More sustainable gardening hacks

- Keep small livestock
 - fertilizer
 - eggs, milk, meat
 - weed control, mowing, pest control
 - wool
- Keep worm bins
- **And always obey the local ordinances**

Reduce, Reuse, Recycle

- Compost anything compostable.
- Cut back on purchases of bagged, boxed and bottled products.
- Build things out of leftover lumber.
- Use pruned tree branches and whips to make trellises.
- Use grape vine prunings to make wreaths.
- Use large limbs or logs to define beds or walk ways.

The Take Away

- Every little bit helps
- Do what you can
- Save your own energy, time and money
- What affect will any action have?

Resource List for Sustainable Gardening

Books

- Brad Lancaster, 2009, Rainwater Harvesting, for Drylands and Beyond- Vol 1, 2
- California Native Plants for the Garden – Carol Bornstein, David Fross, Bart O'Brien
- Gaia's Garden: A Guide to Home Scale Permaculture – Toby Hemenway
- Living Wild: Gardening, Cooking and Healing with Native Plants of California – Alicia Funk, Karin Kaufman

IPM -

- Pest Notes -

<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/index.html>

Resource List for Sustainable Gardening

Plant Lists

- Regional Water Authority – Gold Country plant lists -
<http://www.rwa.watersavingplants.com/>
- Lawn Alternatives -
http://ucanr.edu/sites/scmg/Lawn_Replacement/
- Select a tree -
<https://selecttree.calpoly.edu/right-tree-right-place/>
- WUCOLS – Water Use Classification of Landscape Species
[http://ucanr.edu/sites/WUCOLS/Plant_Search/?CFID=111604258
&CFTOKEN=14972583](http://ucanr.edu/sites/WUCOLS/Plant_Search/?CFID=111604258&CFTOKEN=14972583)
- California Native Plant Society -
<http://www.cnps.org>

Resource List for Sustainable Gardening

Drought Recommendations

- Drought tolerant crops -

<http://ucanr.edu/sites/scmg/files/183771.pdf>

- Drought tolerant vegetables for Sacramento area -

<http://www.sacbee.com/news/state/california/water-and-drought/article2595262.html>

- More drought tolerant recommendations -

<http://www.no-dig-vegetablegarden.com/growing-drought-resistant-vegetables-fruit-herbs-and-spices.html>

<https://asonomagarden.wordpress.com/2009/02/05/tips-for-a-drought-friendly-vegetable-garden/>

Resource List for Sustainable Gardening

Alternate Farming Methods

<http://ucanr.org/sites/gardenweb/files/29055.pdf>

- Dry farming –

http://agwaterstewards.org/index.php/practices/dry_farming/

- Food Forest -

http://www.edibleforestgardens.com/about_gardening

- Zack Dowell's Blog –

<http://www.foodforestgarden.org/about/>

Resource List for Sustainable Gardening

Edible Landscape –

<http://www.motherearthnews.com/organic-gardening/vegetables/perennial-vegetables-zm0z12amzkon.aspx>

<http://www.rosalindcreasy.com/edible-landscaping-basics/>

Hugelkultur –

<http://allthingsplants.com/ideas/view/dave/41/Building-a-Hugelkultur-Raised-Bed/>

Resource List for Sustainable Gardening

Climate Zones

- CA Department of Water Resources -
<http://www.water.ca.gov/nav/index.cfm?id=106>
- Sunset Magazine -
<http://www.sunset.com/garden/climate-zones/climate-zones-intro-us-map>
- USDA Plant Hardiness Zones -
<http://planthardiness.ars.usda.gov/PHZMWeb/InteractiveMap.aspx>
- Micro climates
<http://www.gardening.cornell.edu/weather/microcli.htm>
|

Resource List for Sustainable Gardening

- Drought Monitor –
<http://www.californiadrought.org/drought/current-conditions/>
- Lawn water usage costs -
<http://www.todayshomeowner.com/calculating-lawn-irrigation-costs/>
- Soil testing –
<http://soiltest.umass.edu/>
- Population clock -
<http://www.census.gov/popclock/>

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