Landscape Design & Hydrozones

Choose the right plants for the varying conditions in different areas of your landscape. This class will focus on selection, placement, and care of California native and low water use plants.

BAWSCA and the City of Mountain View

September 24, 2015

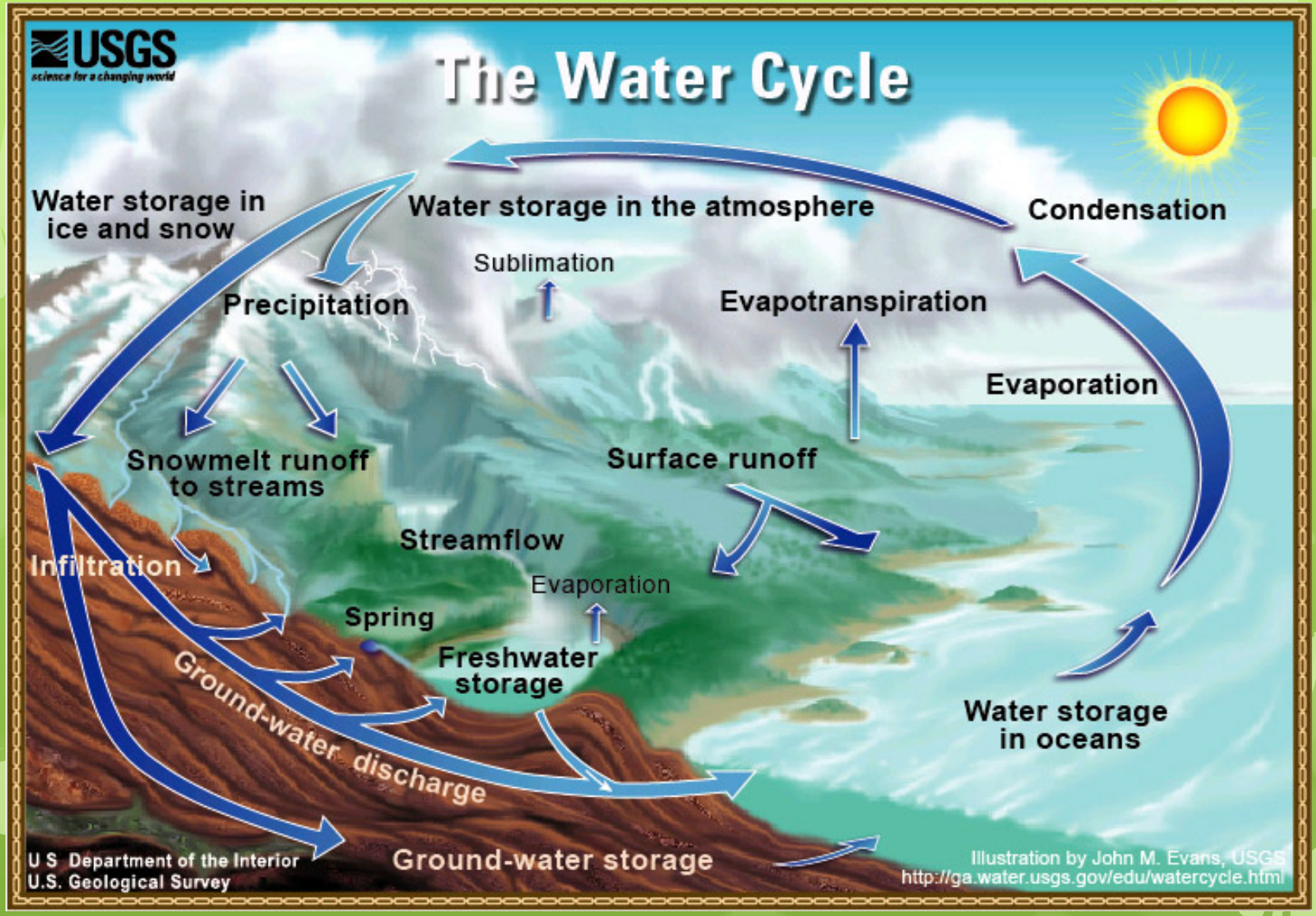
Sherri D. Osaka

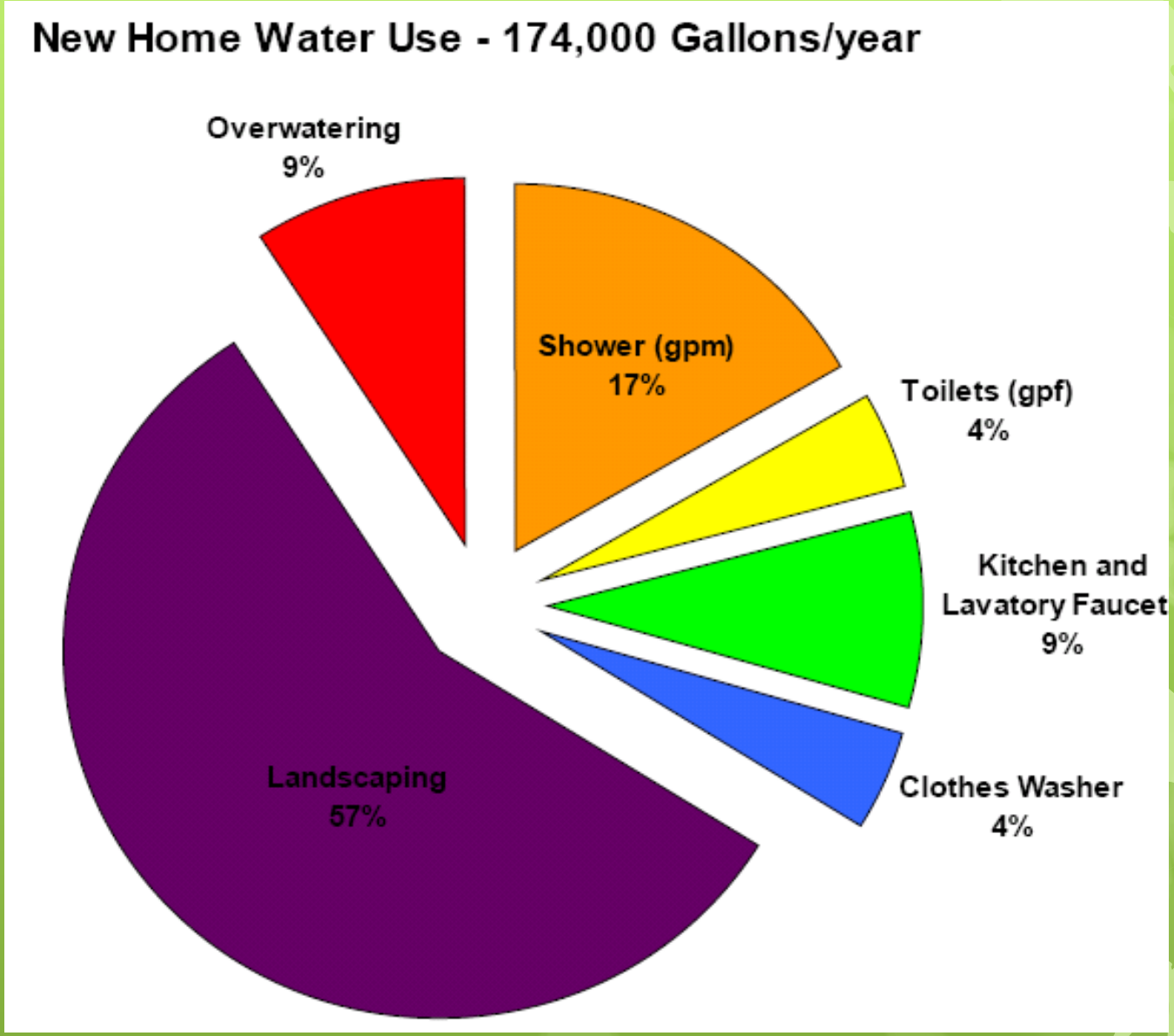
Sustainable Landscape Designs

www.sustainable-landscape.com

Mountain View Water Rates

- **Single-Family Residential Users**
- Hundred Cubic Feet (CCF) Rate Per CCF
- Bi-Monthly
- 0 – 3, $4.33/ ccf
- >3-15, $5.77/ ccf
- >15, $9.23/ ccf


USGS
science for a changing world
The Water Cycle
Water storage in ice and snow
Water storage in the atmosphere
Condensation
Sublimation
Precipitation
Evapotranspiration
Evaporation
Snowmelt runoff to streams
Surface runoff
Streamflow
Infiltration
Evaporation
Spring
Freshwater storage
Ground-water discharge
Water storage in oceans
Ground-water storage
U S Department of the Interior
U.S. Geological Survey
Illustration by John M. Evans, USGS
http://ga.water.usgs.gov/edu/watercycle.html

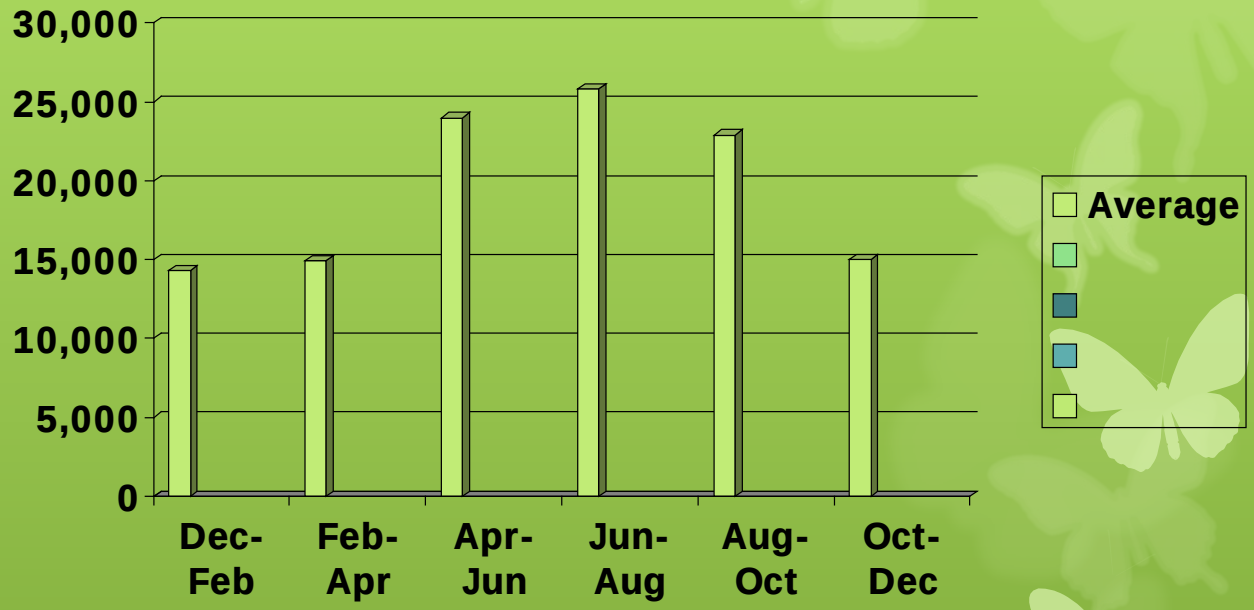


Source: California Building Industry Association report, January 2010

Water Use in Bay Area Home

11,000 square foot lot, pool, low water landscape

- About 120,000 gallons per year
- 90,000 gallons inside house
- 30,000 gallons outside house

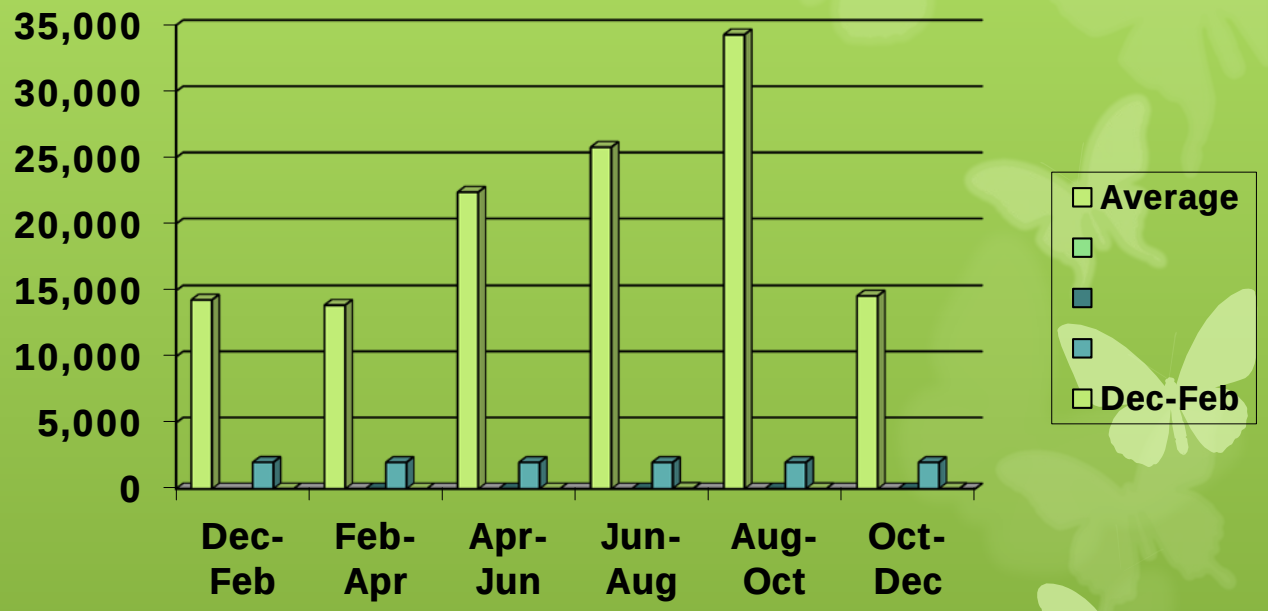


About 30 percent for outdoor use

Water Use in Bay Area Home

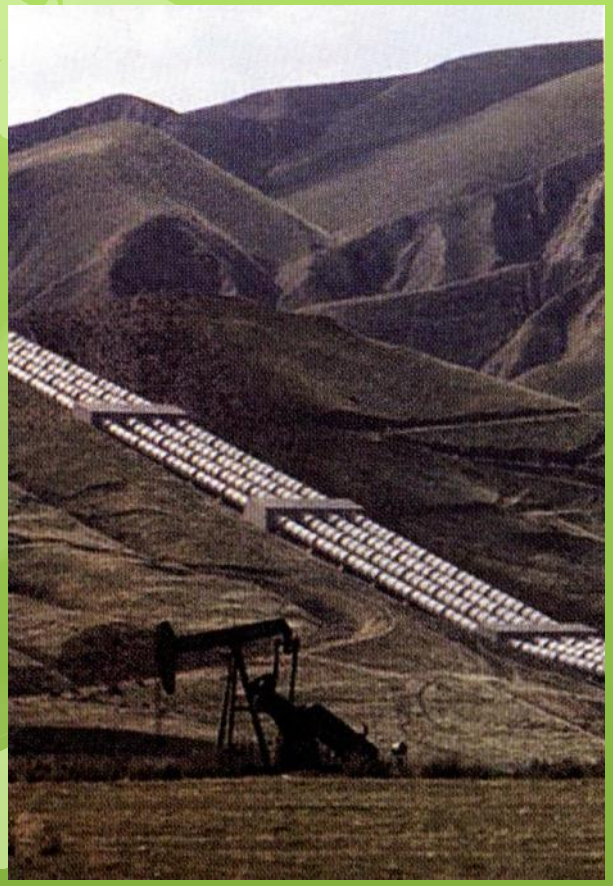
11,000 square foot lot, pool, low water landscape

- About 106,000 gallons per year
- 85,000 gallons inside house
- 21,000 gallons outside house



About 20 percent for outdoor use

Energy Used for Water



The State Water Project

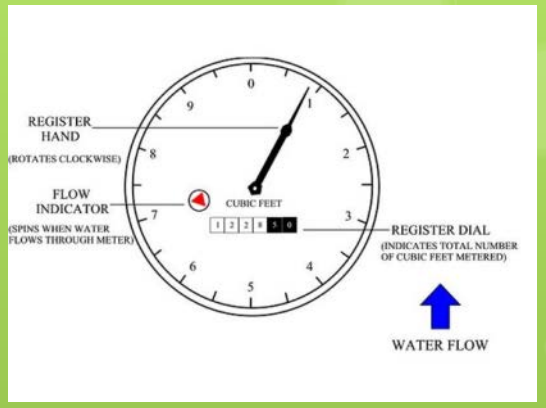
Reservoir high in the Hollywood Hills

15-20% of all energy used in California is water related (cleaning, moving, heating)

Top Tips for Saving Water in the Garden

Fix all Leaks

Read your water meter

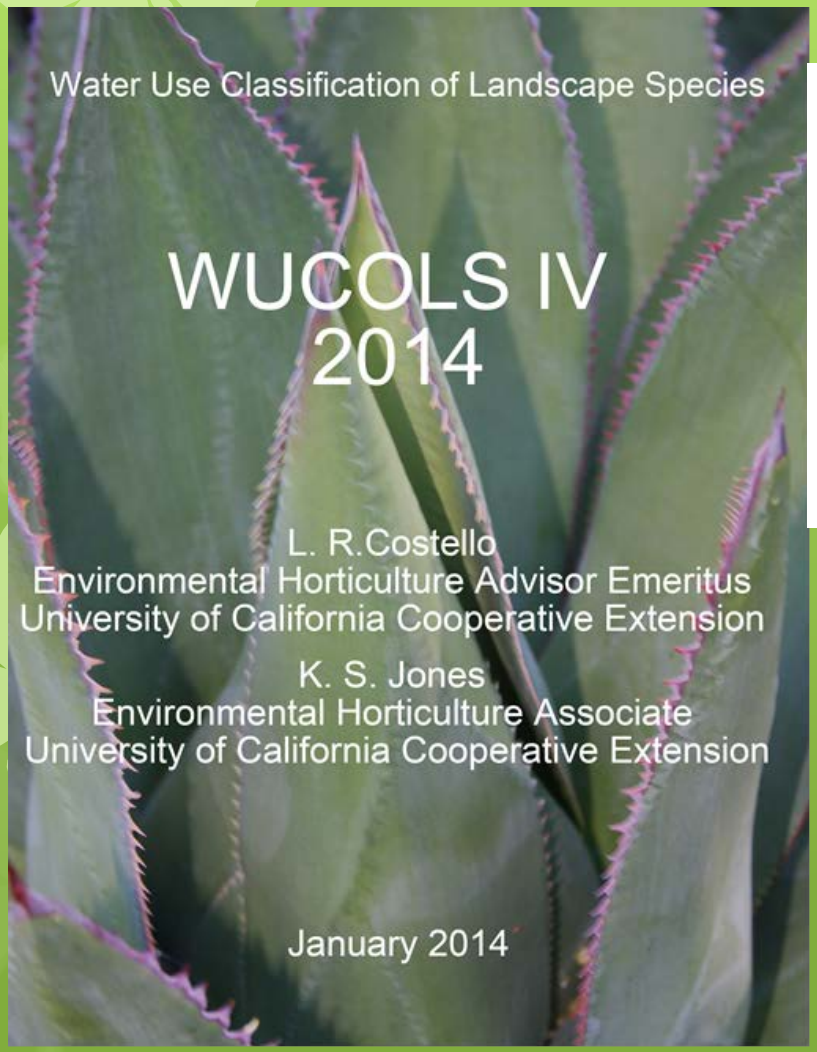


One in every 10 homes has a leak that is wasting at least 90 gallons of water per day.

Hydrozoning

- **Hydrozoning** is the practice of clustering together plants with similar water requirements in an effort to conserve water.[1][2][3] Grouping plants into hydrozones is an approach to irrigation and planting design where plants with similar water needs are grouped together.

Water Use Classifications of Landscape Species (WUCOLS)



Species Evaluation List--1999

			REGIONAL EVALUATIONS						
TYPE	BOTANICAL NAME	COMMON NAME	1	2	3	4	5	6	INVASIVE
S	Brugmansia spp.	angel's trumpet	M	/	M	H	/	/	
S	Brunfelsia pauciflora	yesterday today and tomorrow	M	M	M	H	/	H	
P	Brunnera macrophylla	Siberian bugloss	H	H	H	?	?	?	
S	Buddleja alternifolia	fountain butterfly bush	L	L	M	/	M	M	
S	Buddleja davidii	butterfly bush	L	L	M	M	M	M	
S	Buddleja marrubiifolia	woolly butterfly bush	?	L	?	L	/	L	
P	Bulbine frutescens	stalked bulbine	L	?	L	L	/	L	
P	Bulbinella robusta	bulbinella	L	?	?	?	?	?	
T	Bursera hindsiana	bursera	?	?	/	/	/	M	
T	Butia capitata	pindo palm	L	L	L	L	L	L	
S	Buxus microphylla japonica	Japanese boxwood	M	M	M	M	M	M	
S	Buxus sempervirens	English boxwood	M	M	M	/	M	M	
S	Caesalpinea cacalaco	cascalote	?	?	?	?	/	L	
S	Caesalpinea gilliesii	desert bird of paradise	L	L	L	L	M	M	
S	Caesalpinea mexicana	Mexican bird of paradise	?	/	?	L	/	L	
S	Caesalpinea platyloba		?	?	?	?	?	?	

High Water-Use Plants

- Lawn – Kentucky blue grass
- European birches, Alders
- Maidenhair fern
- Western chain fern – Woodwardia fimbriata

Medium Water-Use Plants

- Fruit trees, Japanese maples
- Vegetable gardens
- Coral bells
- Boxwood

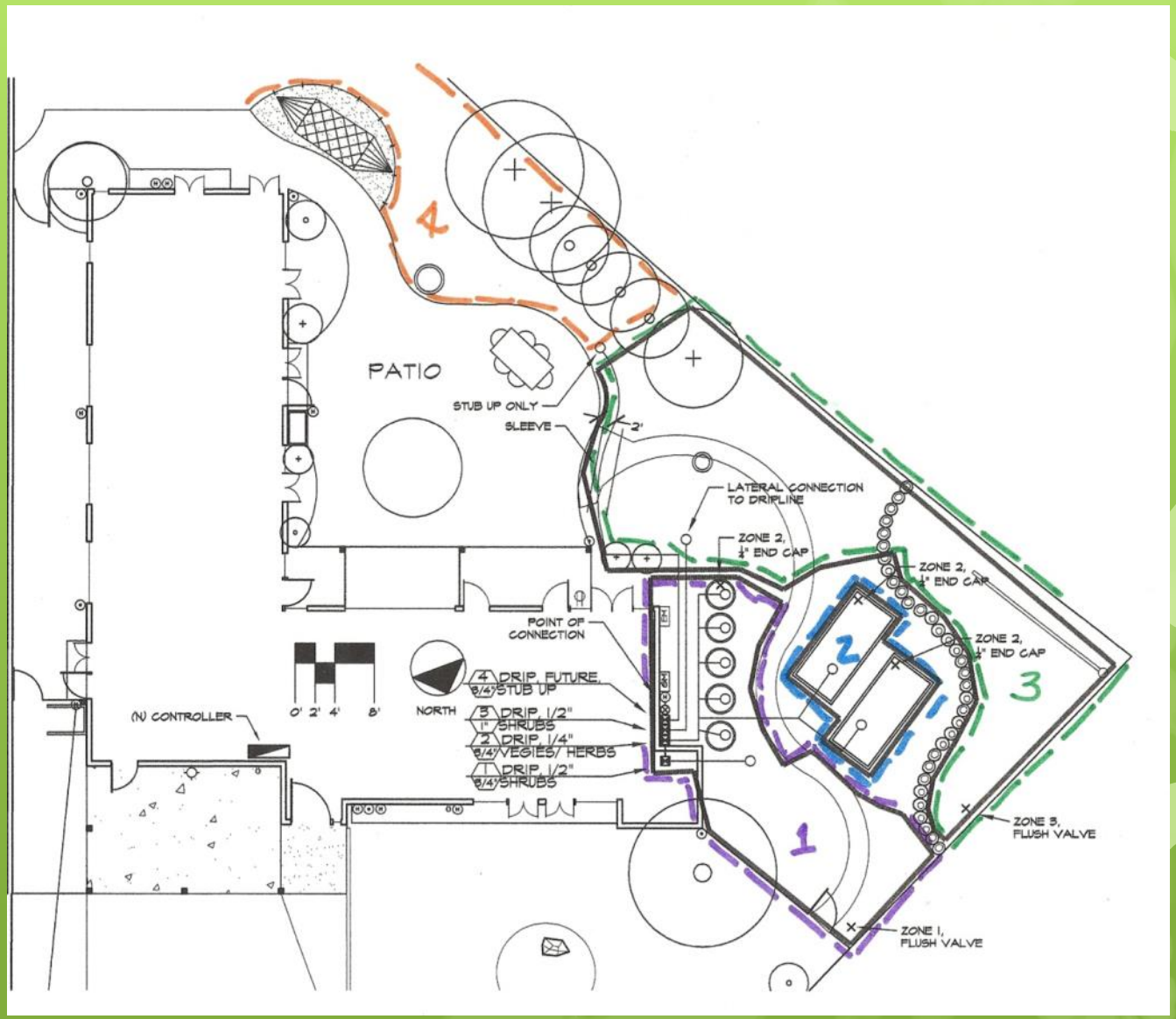
Low Water-Use Plants

- Oak trees
- Sages, Rosemary, Lavendar
- Native iris
- Warm season grasses

Very Low Water-Use Plants

- Oaks, Buckeyes
- Woolly Blue Curls
- Sages, some
- Native bulbs
- Cool season grasses

Hydrozoning



Top Tip for Saving Water in the Garden

Eliminate or Reduce the Lawn

Kentucky Bluegrass – 80% ET

Bermuda grass – 60% ET

Drought-tolerant natives:
Low water -20% ET
Very low water <10% ET

Lawns

- Comprise 32 million acres (larger than size of Pennsylvania) – largest irrigated “crop”
- Require 1-2” of water per week when it’s not raining
- Use fertilizers are made from petrochemicals
- 40-pound bag of lawn fertilizer contains the fossil-fuel equivalent of 2.5 gallons of gasoline, www.safelawns.org
- 65% of fertilizer put on each yard will end up in runoff - Natural Home magazine July/August 2007
- Running a lawn mower one hour emits as much air pollution as driving 20 miles (U.S. EPA)
- Homeowners use 20 times more pesticides per acre than farmers (US EPA)
- Yardwaste comprises 20 percent of landfill waste on average, but can be as much as 50%. U.S. EPA Natural Home

Santa Clara Valley Water District Lawn Rebates

- High Water Using Landscape Conversion
  - $2 /sq. ft.
  - Palo Alto & Morgan Hill, add'l rebates
- 50% covered with plants from approved list
- Drip, microspray emitters or bubblers
- No pop-up sprays
- Mulch, 2" minimum

Lawn Be Gone!

- Rebate program for reducing/ eliminating visible front yard lawns
- $500 maximum rebate
- 200 square feet minimum
- 50% coverage with plants
- BAWSCA-approved or low water plants
- 3” minimum of mulch
- Pervious paving < 50%
- No artificial turf

Water-Efficient Landscape Rebate Program

Photo By Stephanie Penn

Trade in your high-maintenance and water-thirsty lawn for a more natural, low maintenance, and water-efficient landscape, and ACWD will give you money back for doing it!

Get a Rebate of up to $500-$3,000*

Effective July 1, 2012

**Rebate is based on $0.50 per square foot of lawn converted to water-efficient landscape. Single family residential customers are eligible for up to $500, multi-family residential, commercial and industrial customers are eligible for up to $3,000.*

ACWD
ALAMEDA COUNTY WATER DISTRICT

Walkable, Mowable Lawn Alternatives

Red fescue: *Festuca rubra*

Walkable, Mowable Lawn Alternatives

Delta BlueGrass “Native Bentgrass™” (*Agrostis pallens*)

Walkable, Mowable Lawn Alternatives

Delta BlueGrass “Delta Grassland Mix™”
(*Festuca rubra ‘Molate’, Koelaria macrantha, Deschampsia elongata*)

Walkable, Mowable Lawn Alternatives

Photo from Greenlee Nursery, La Jolla, CA

Design/ Photo: Sherri Osaka

Meadow sedge, *Carex pansa*

Walkable, Mowable Lawn Alternatives

Design by Stephanie Morris

Yarrow Lawn, *Achillea millefolium*

Design by Stephanie Morris

Lawn Alternatives – Walkable Perennials

Seathrift, *Armeria maritima* “lawn”

Lawn Alternatives – Walkable Perennials

Seathrift, *Armeria maritima* “lawn” by Agi Kehoe

Lawn Alternatives - Perennials

Silver Carpet

Photo at Sierra Azul Nursery by Deva Luna

Wild Rye – *(Leymus condensatus ‘Canyon Prince’)*

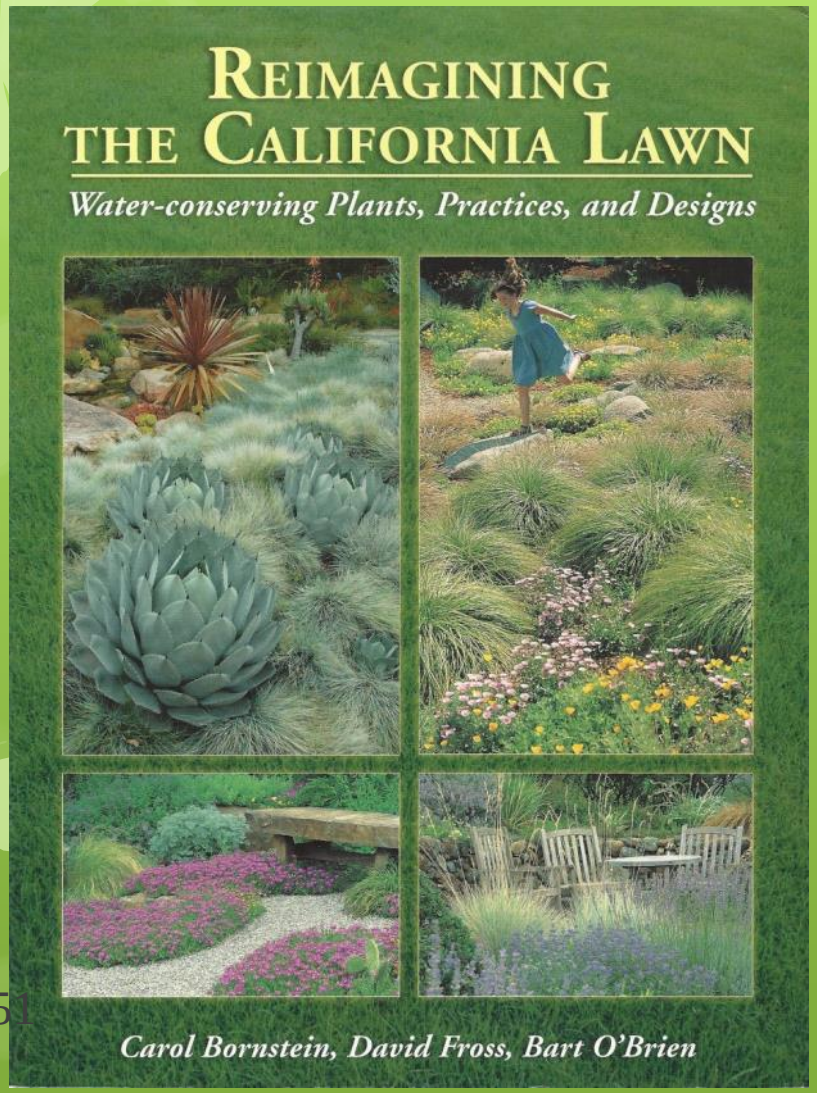
Bunch Grasses

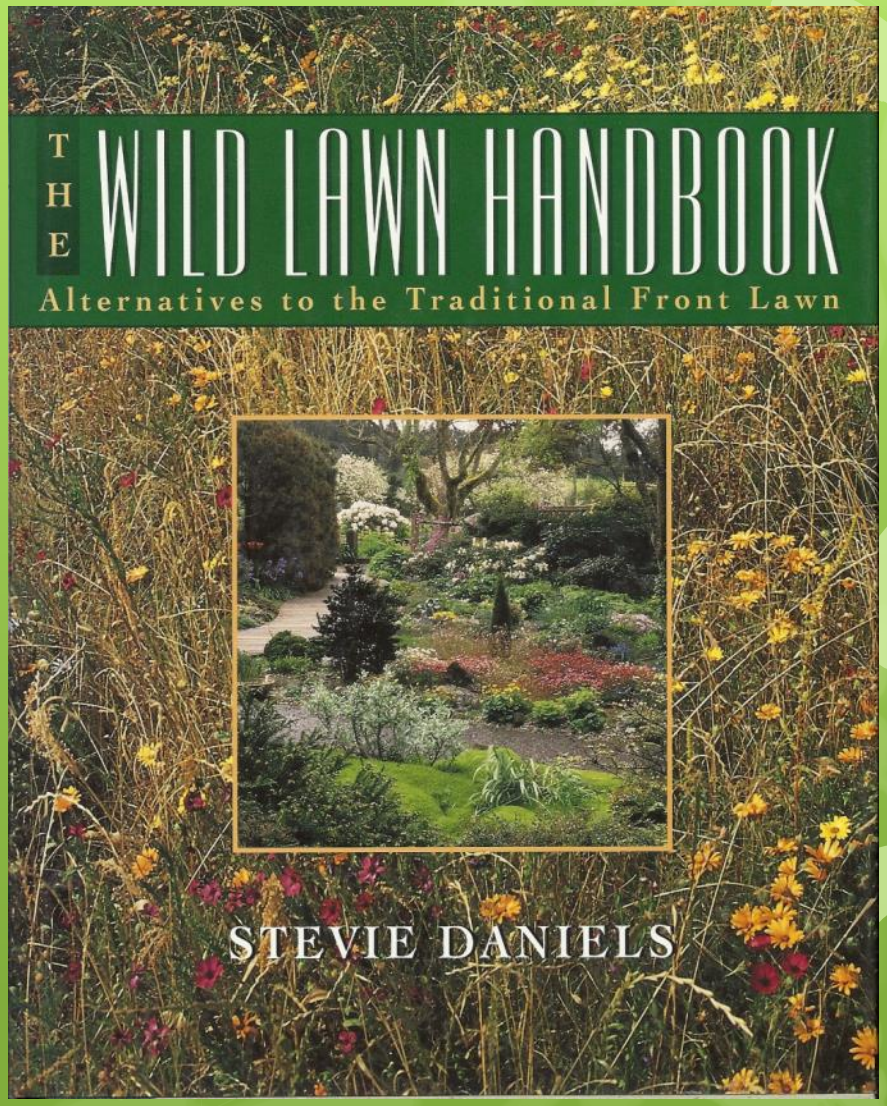
Deer grass *(Muhlenbergia rigens)*

Bunch Grasses

Idaho fescue *(Festuca idahoensis)*

Lawn Alternative Resourse





Top Tips for Saving Water in the Garden

Choose Climate-Appropriate Plants

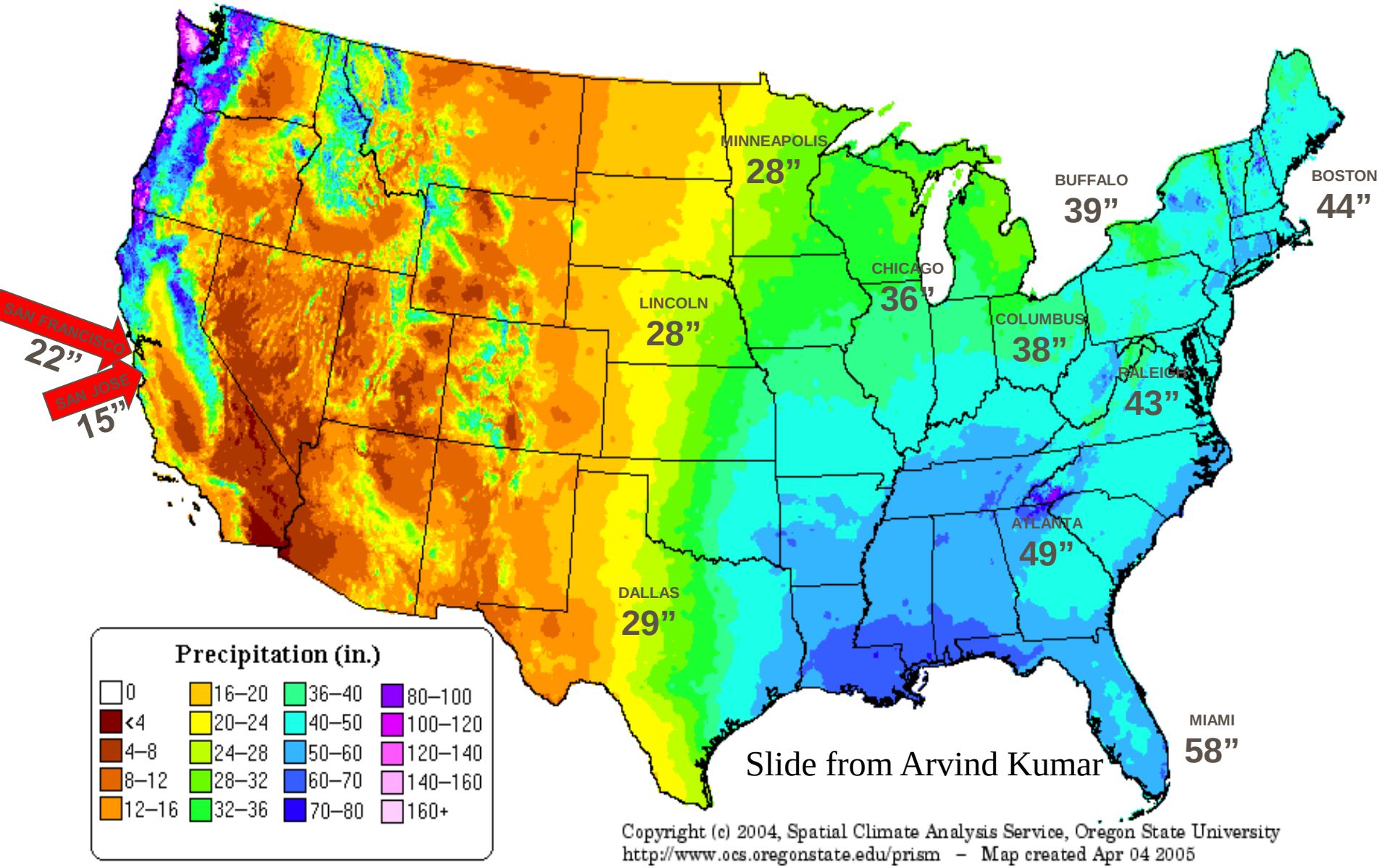
Topics

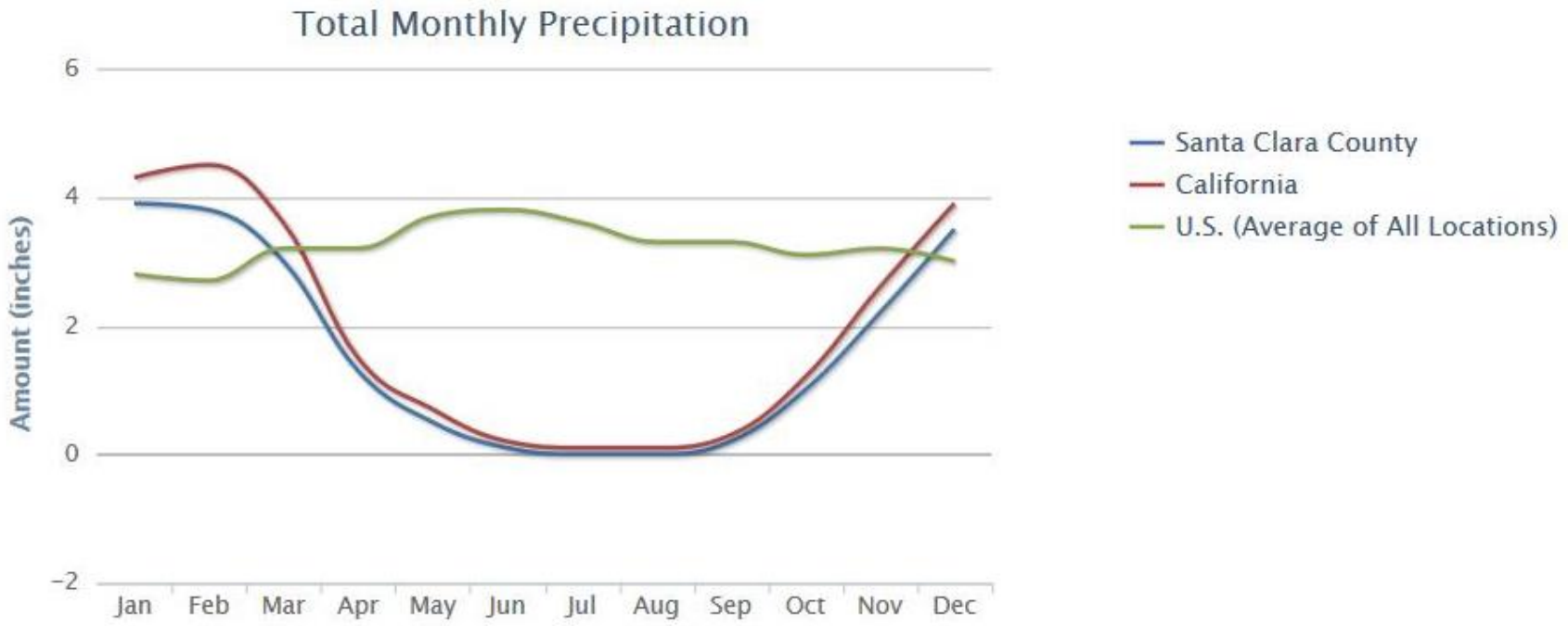
- Why Use California Native Plants?
- How to Select Them
- How to Water Them
- How to Plant Them

Why California Native Plants

- Save Water
- Lower Maintenance
- Reduce Pesticides
- Invite Wildlife
- Support Local Ecology

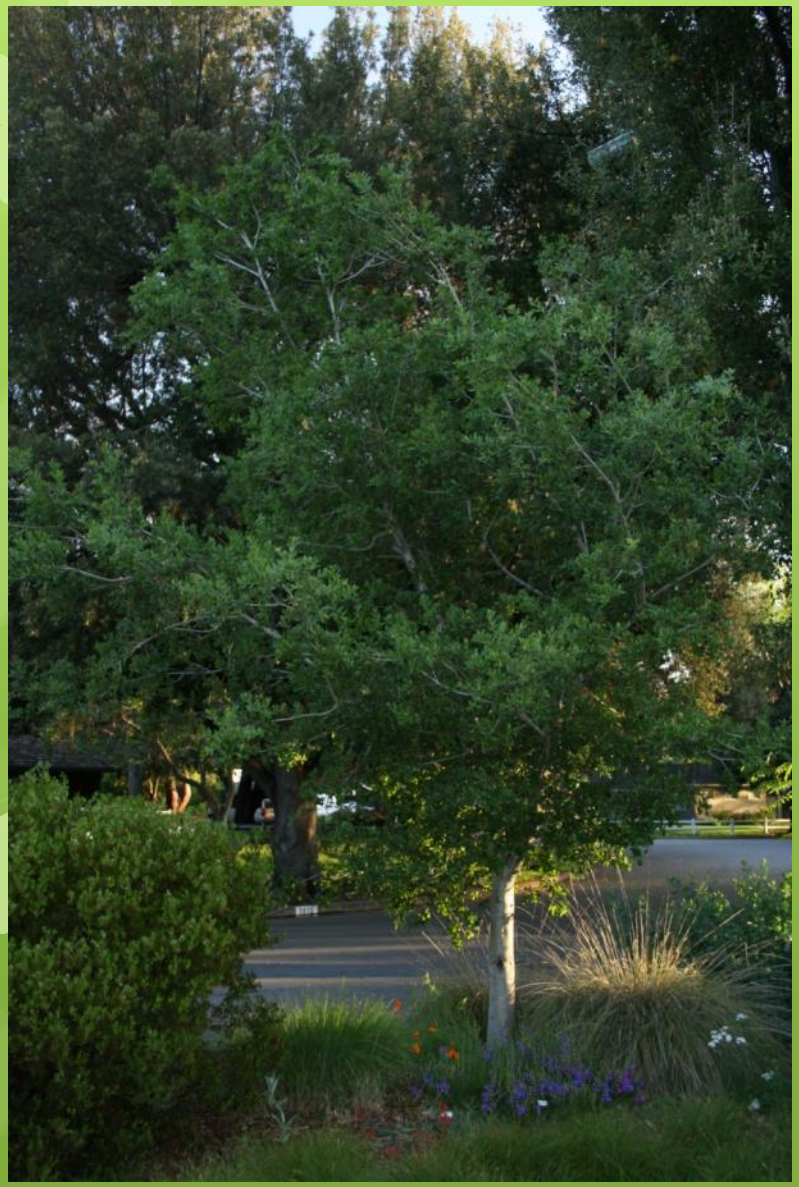
Annual Precipitation





http://www.usa.com/santa-clara-county-ca-weather.htm

Very Low Water – Coast live oak



Quercus agrifolia

Very Low Water - Toyon

Heteromeles arbutifolia

Very Low Water - Buckeye

Aesculus californica

Jean Struther’s Buckeye

Very low water – Western redbud

Cercis occidentalis

Very Low Water – Manzanitas

Very Low Water – Manzanitas

Arctostaphylos densiflorus ‘Howard McMinn’

Very Low Water – Wild Lilac

Ceanothus ‘Ray Hartman’
Photo from “Ceanothus” by Fross and Wilken

Very Low Water – Flannel Bush

Fremontodendron californica

Very Low Water – Bush Poppy

Dendromecon rigida

Very Low Water – Nevin Mahonia

Mahonia nevinii

Very Low Water – Woolly Blue Curls

Trichostema lanatum

Very Low Water – Coyote Mint

Monardella villosa obispoensis

Very Low Water – Grasses

Festuca idahoensis

Nasella pulchra

Very Low Water - Wild Lilacs

Ceanothus thyrsiflorus ‘Snow Flurry’

Very Low Water – Wild Lilac

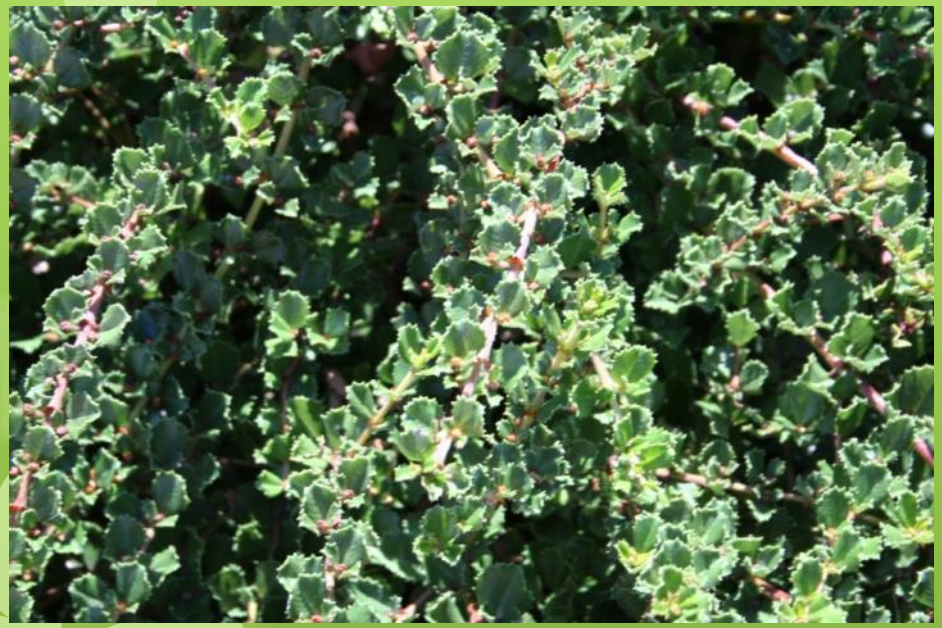
Ceanothus ‘Julia Phelps’ – deer resistant

Very Low Water – Wild lilac

Ceanothus ‘Diamond Heights’

Ceanothus Hearstiorum

Very Low Water – Wild lilac



Ceanothus gloriosus ‘Anchor Bay’

Very Low Water – Bush Mallow

Malacothamnus ‘Jonesii’

Very Low Water – Matilija Poppy

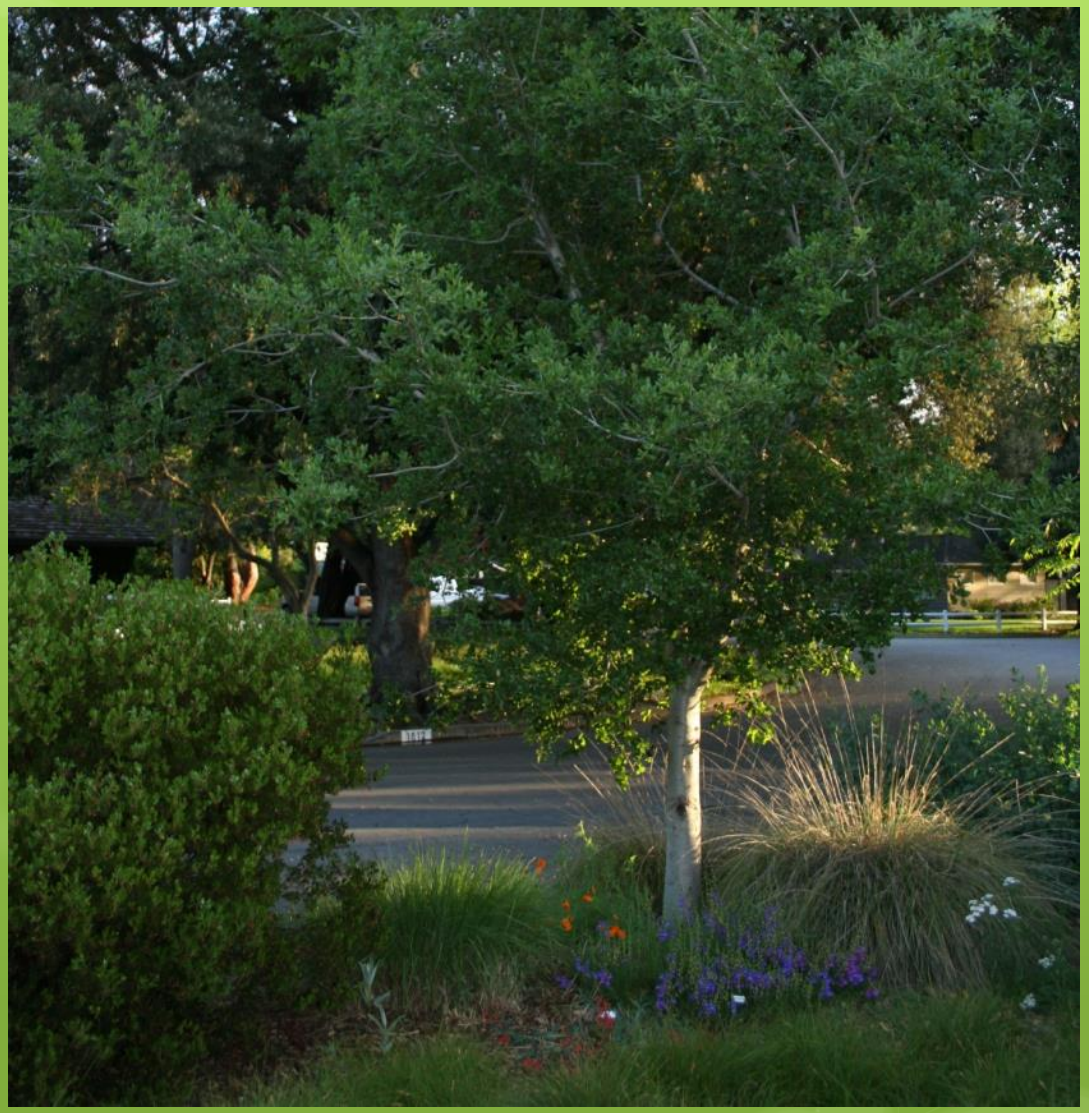
Romneya coulteri

Case Study - Handwatering

Case Study - Handwatering

Case Study - Handwatering

Case Study – No Watering



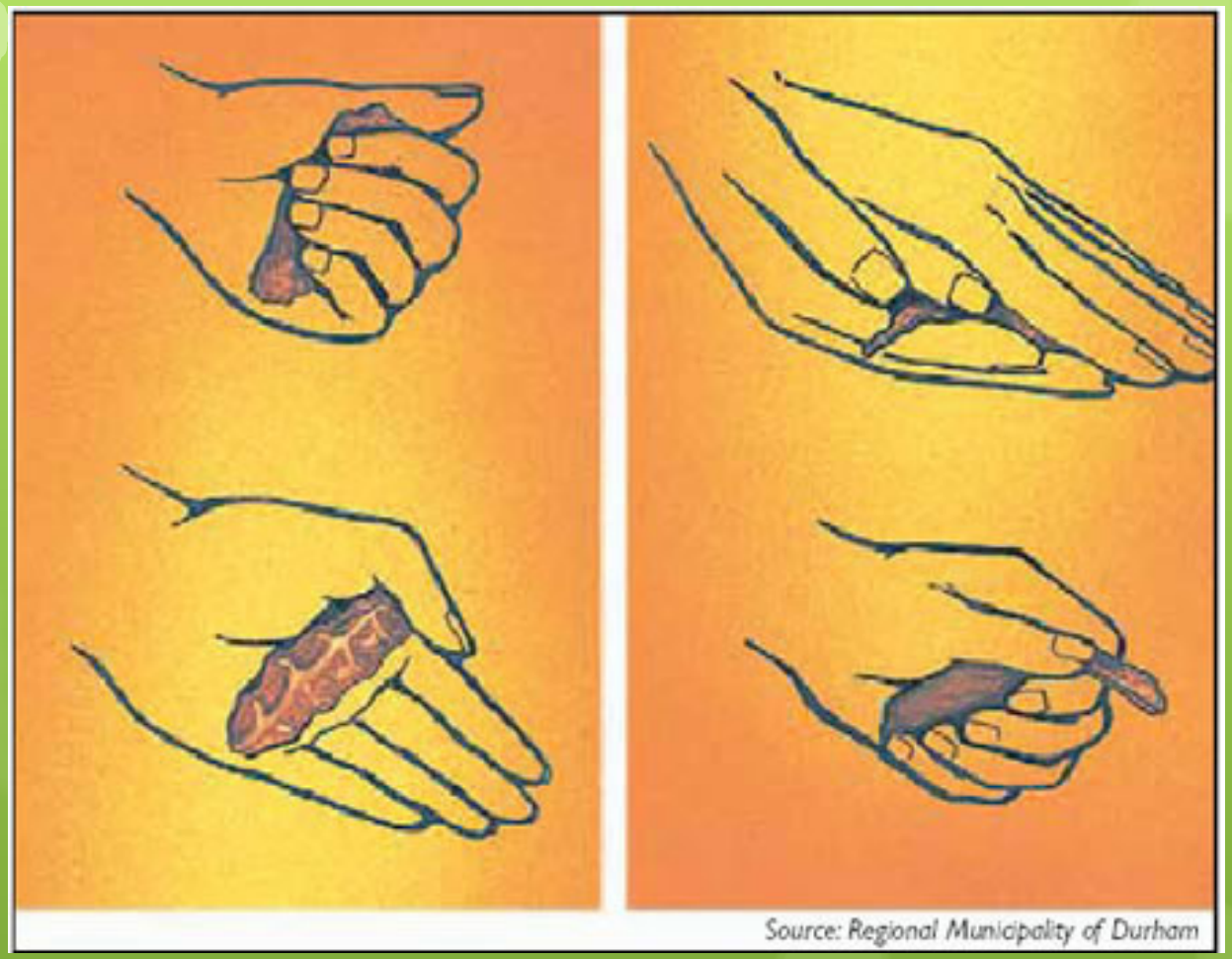
Top Tips for Saving Water in the Garden

Learn When to Water

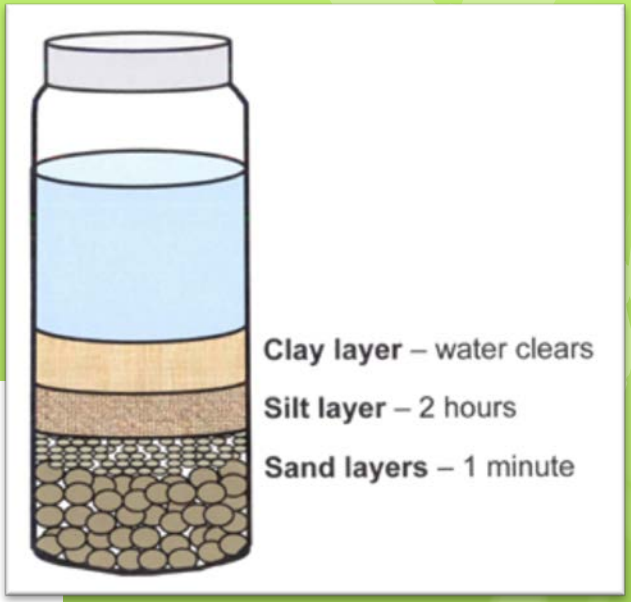
How to Plant Natives

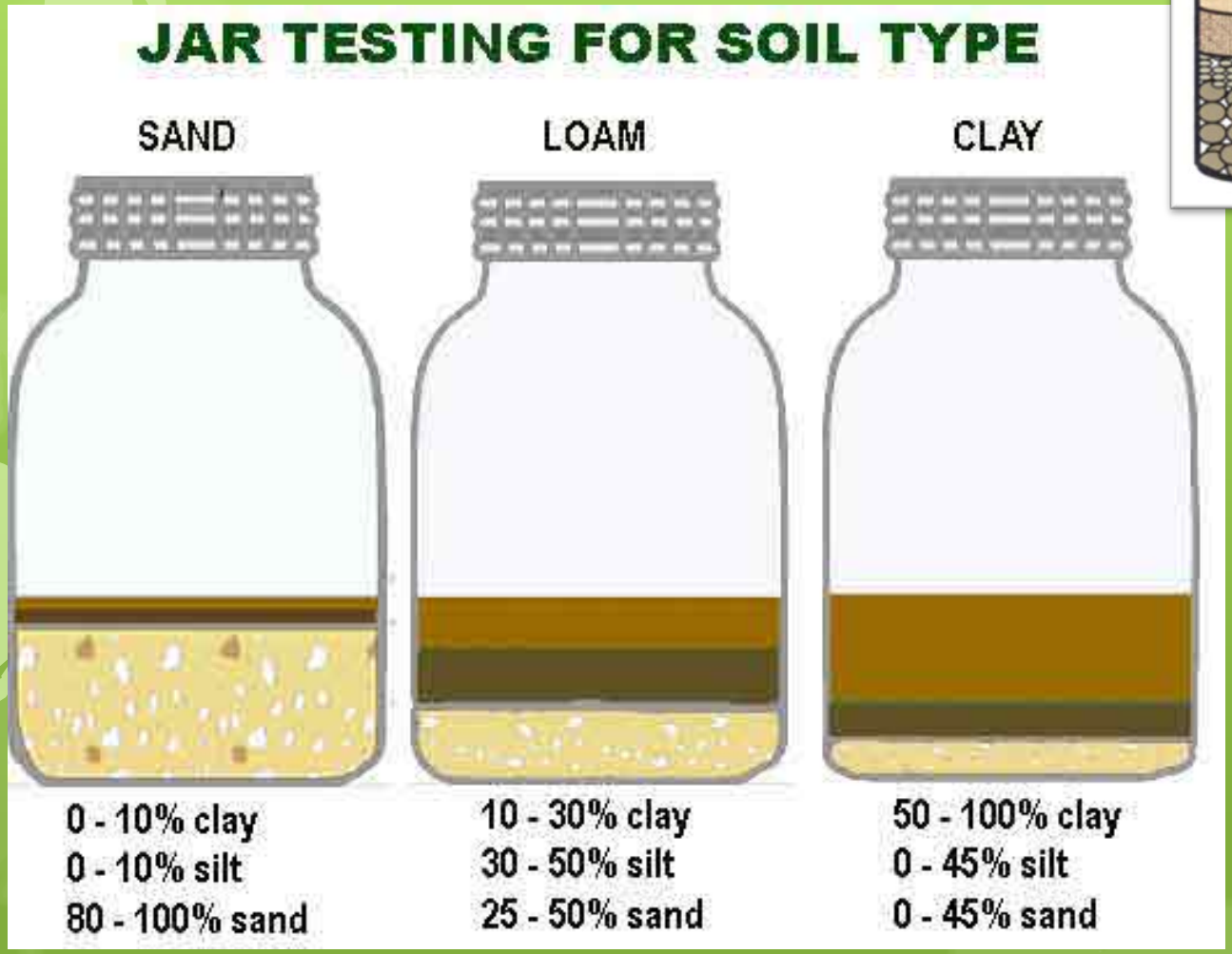
- What type of soil do you have?
  - Ribbon test
  - Canning jar test
- How fast does it drain?
- Mediterranean climate

Ribbon Test



Jar Test


Clay layer – water clears
Silt layer – 2 hours
Sand layers – 1 minute


JAR TESTING FOR SOIL TYPE
SAND
LOAM
CLAY
0 - 10% clay
0 - 10% silt
80 - 100% sand
10 - 30% clay
30 - 50% silt
25 - 50% sand
50 - 100% clay
0 - 45% silt
0 - 45% sand

Measure how fast it drains. This soil drained 2 ½” per hour. < 1”/ hour is poor draining, > 6” per hour is excessive drainage

- Combination of clay soil, plus
- Watering when it's warm
- Can foster crown and root rots

http://erec.ifas.ufl.edu/tomato-scouting-guide/diseases/fulsarium-crown-rot.shtml

http://www.forestryimages.org/browse/detail.cfm?imgnum=1371017

Potential Problems

When to water – test the soil prior to watering

Tips to using a moisture meter

- Test the surrounding soil, AND
- Test the soil the plant was grown in (planting medium)

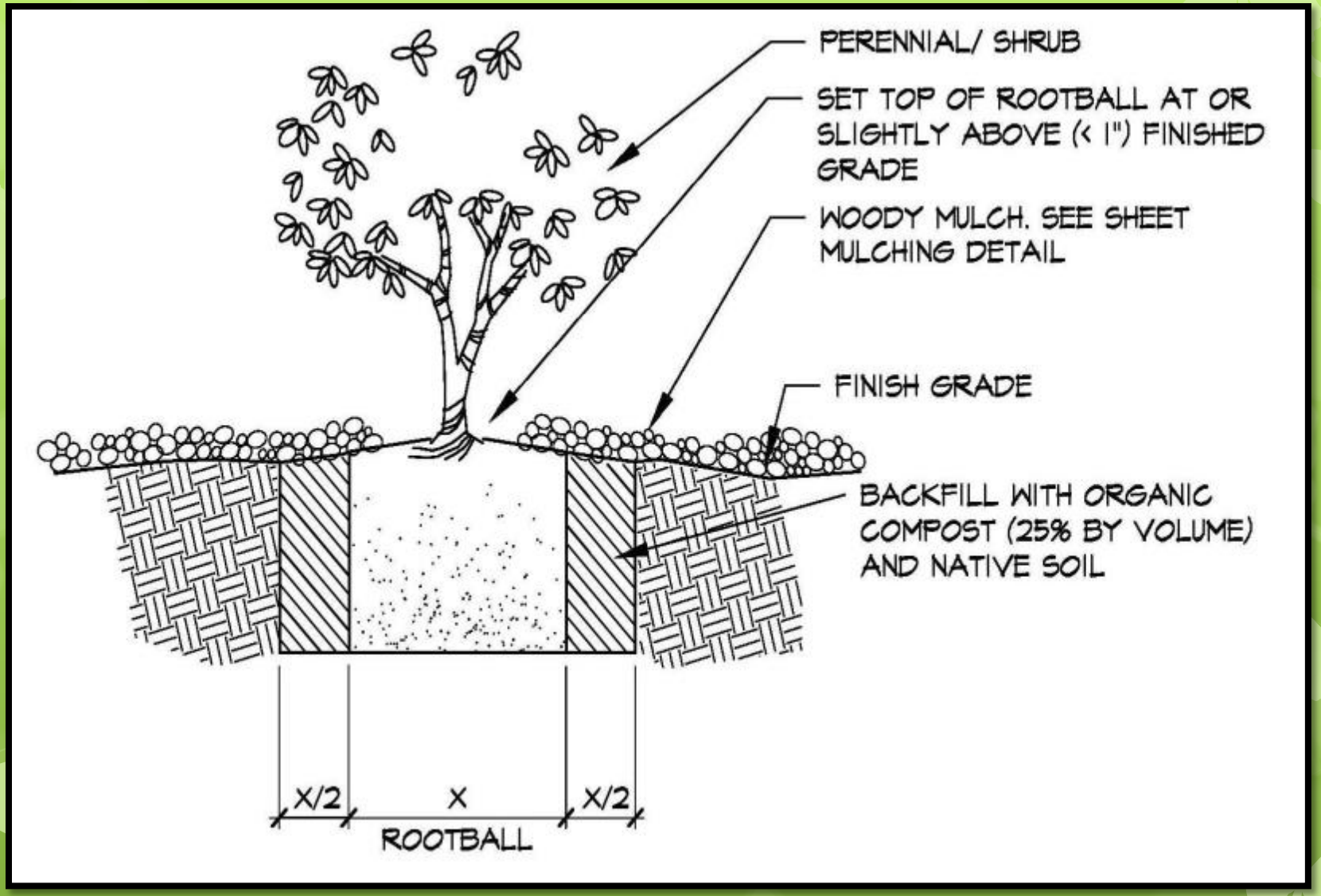
Tips to using a moisture meter

- With drought-tolerant plants, allow the soil to dry out prior to watering
- Water when meter is about 2-4 (on a scale of 10 where 10 is wet)

When to water – test the soil after watering to make sure it got deep water

Water BEFORE we have a heat wave

- A few days prior if the soil is getting dry
- In the early morning, so the soil around the crown can dry out before it gets really hot



Planting technique

Top Tips for Saving Water in the Garden

Improve Your Soil Organically

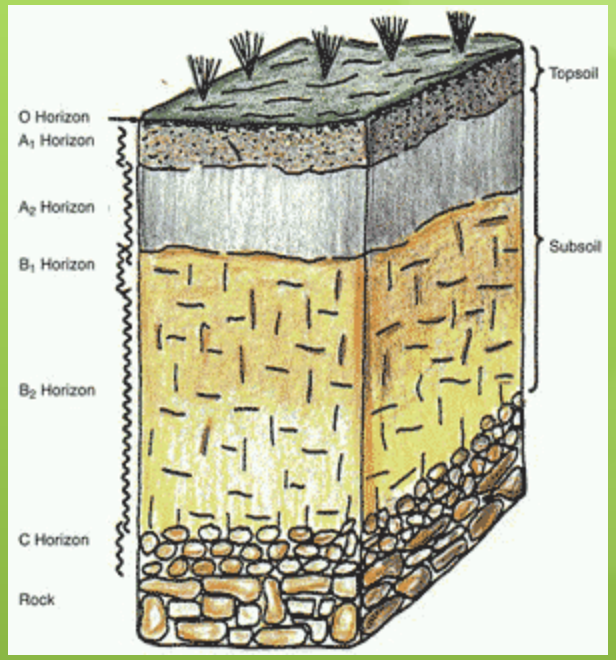
The Soil Problem

Loss of natural capital:

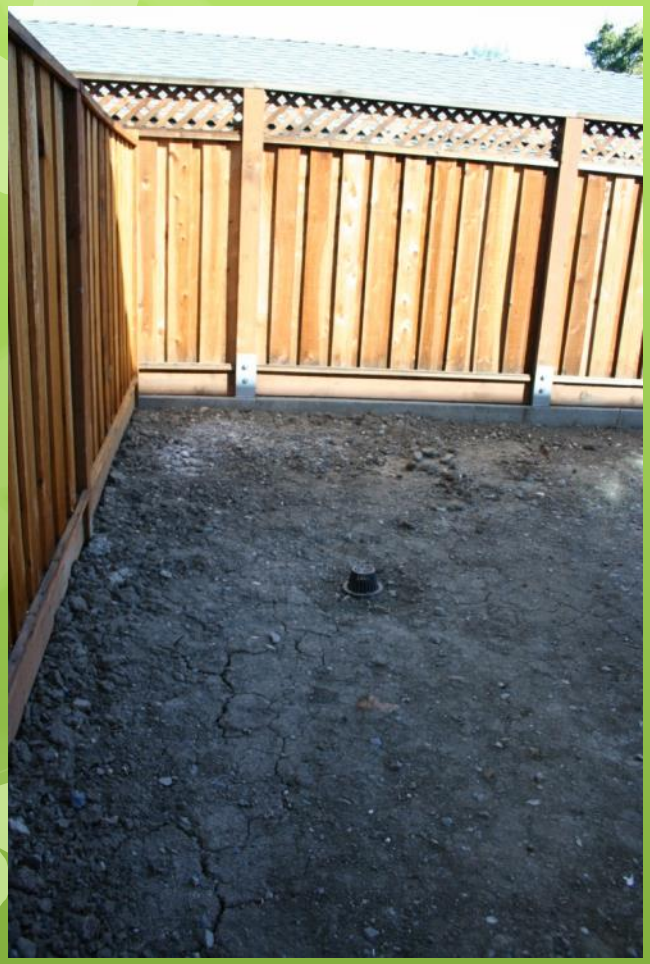
- No top soil
- Lifeless soil

Benefits of healthy soils

- Support plant growth
- Holds water
- Cleans water



Soil protection



No top soil at new housing development,
Water puddles, won’t soak in
Won’t support plant life

Compost Aids Water Retention

- 1 percent additional organic matter equals 1.5 additional quarts of water holding ability per cubic foot of soil
- Choose compost with 50-60 percent organic matter content

http://msue.anr.msu.edu/news/compost_increases_the_water_holding_capacity_of_droughty_soils

Compost aids water retention

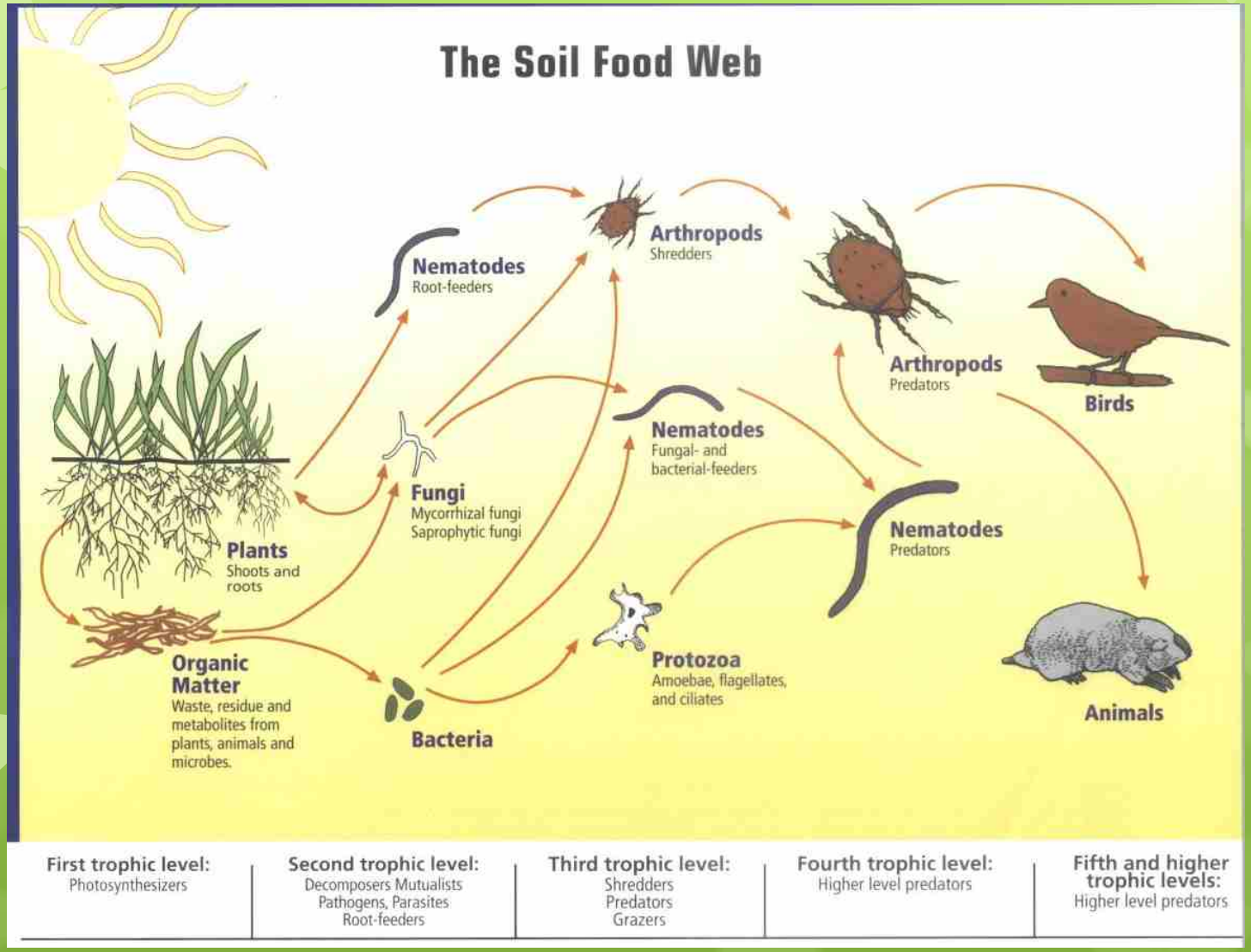
- “Numerous studies have found an increase in the moisture holding capacity and moisture retention capacity of soil as a result of compost applications (Hortenstine and Rothwell, 1972; Bengston and Cornette, 1973; Epstein et al., 1976). Therefore, the incorporation of compost into the soil of turf sites will reduce the need to irrigate.”
- For instance, on a typical site in Redmond with little slope, and little wind, turf grown on compost-amended soil can reduce peak summer irrigation needs by 60% when compared to sites with un-amended topsoil.

- **Guidelines for Landscaping with Compost-Amended Soils by City of Redmond, Washington, September 1998**

Gallion Irrigation in Houston, TX "Instant Deep Watering Microbes"

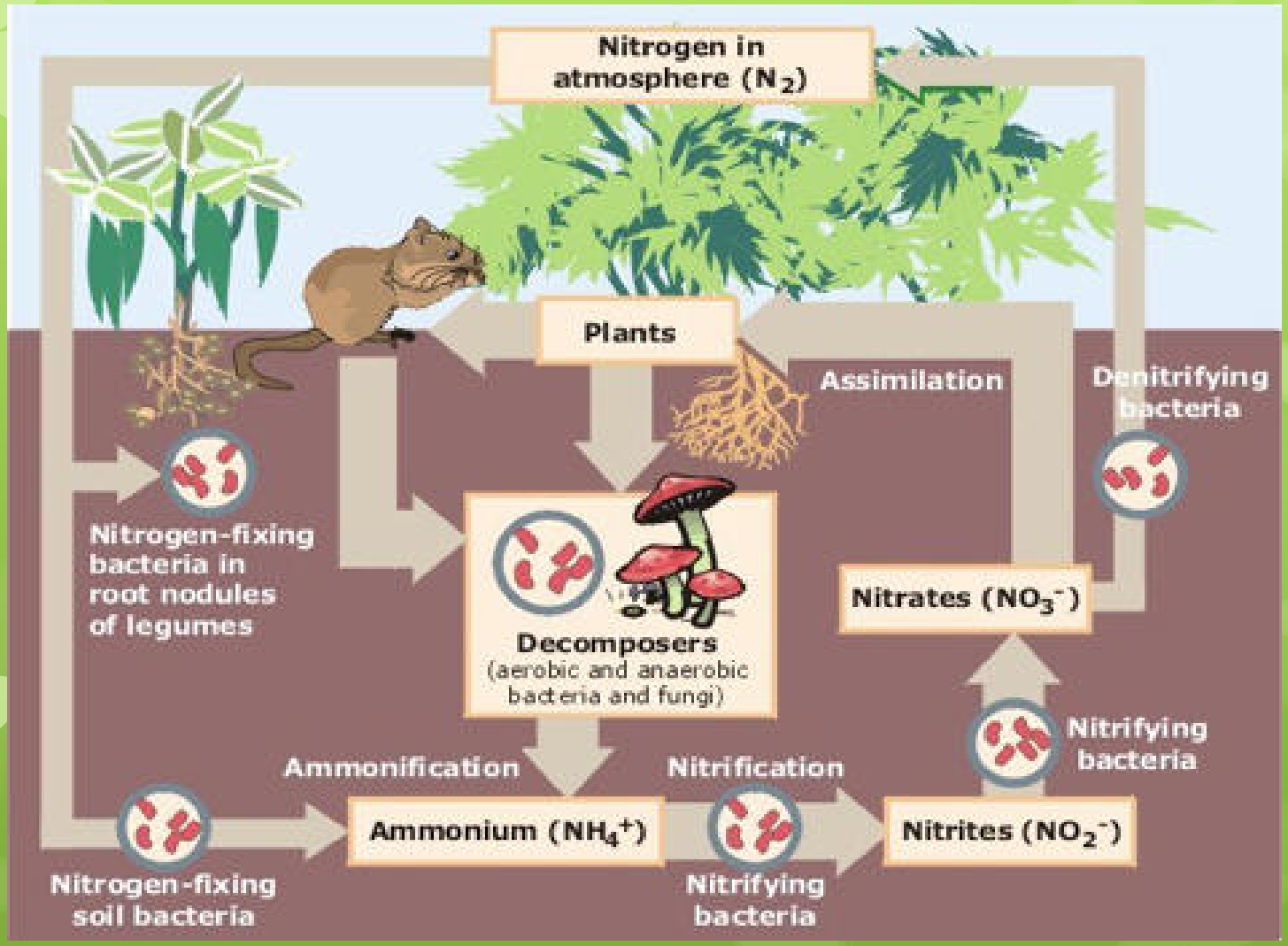
Gene Barnes developed a system that puts water and air deep into the soil.

Soil Biology – It's Alive!



From *Soil Biology Primer* published by Soil and Water Conservation Society

Nitrogen Cycle



Courtesy EPA, Source: http://www.uwsp.edu/geo/faculty/ritter/geog101/textbook/earth_system/biogeochemical_cycles.html

Soil Biology & Plant Health

Two Bugs Are Better Than One

In the experiment depicted here, blue grama grass was grown in sterile soil. Bacteria were added to the soil in some pots. Bacteria and bacteria-eating nematodes were added to other pots.

The plants in soil with both bacteria and nematodes grew fastest. Although this was an artificial environment, the study demonstrated that the interaction between two organisms benefited plants.

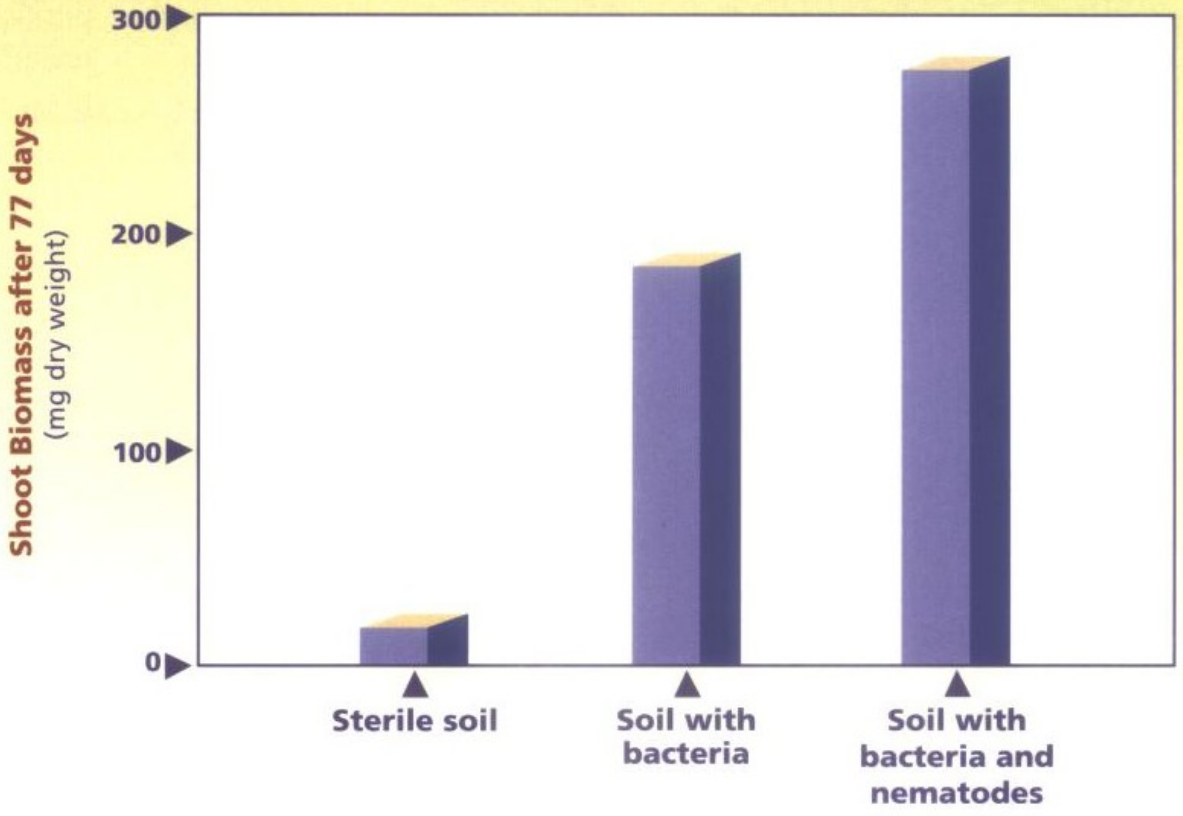


Figure 6

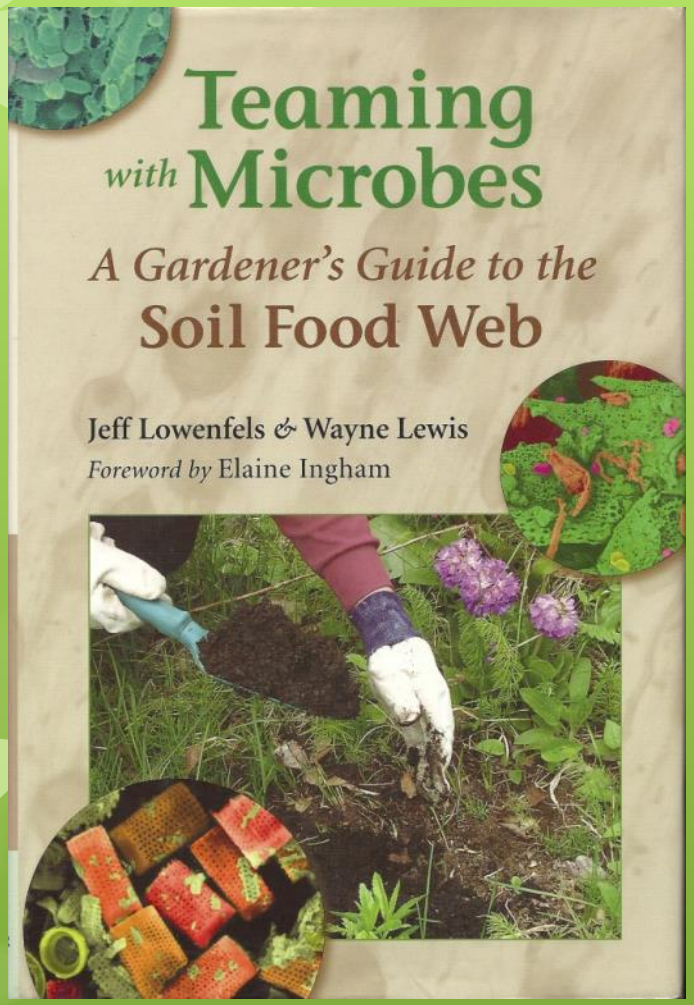
From *Soil Biology Primer* published by Soil and Water Conservation Society

Eliminate Waste and Feed the Soil, Compost!

Steve's Earth Engine – Cedar

Biostack compost bin (made from recycled plastic)

Soil Health References



- Worms Eat my Garbage" by Mary Appelhof
- "Soil Biology Primer" by Soil and Water Conservation Society

Eliminate Petroleum Fertilizers

- Add compost & compost tea
- Grass Cycle
- Test soil
- Use organic amendments only when needed
- Include plants that fix nitrogen – grow your own amendments

Bee and buckwheat blossoms, Vetch blossom
Sustainable Farming Association of Minnesota

Improving Soil Biology

- No tilling
- No chemicals or petrochemicals
- No solarization

Photo: www.denver.gov.org

Top Tips for Saving Water in the Garden

Keep Your Plants Mulched

Mulch Benefits

- Reduces evaporation from water in the soil
- Keeps the soil cooler, encourages soil micro-organisms
- Prevents soil crusting and allows water to penetrate
- Breaks down to enrich the soil
- Woody (carbon-rich) mulch encourages micro-organisms that benefit shrubs and trees

Mulching eliminates Waste

- Mulch prunings and removed plants
- Keep “arbor chips” after professional tree service
- Create own mulch with electric or gas chipper

Mulch Types

- Arbor chips
- Grass trimmings
- Palm Fronds
- Purchased bark mulch
- Purchased recycled mulch from wood pallets

Deer Grass trimmings

Stump grindings

Other Mulch

Palm Frond Mulch

Mulch Amounts

- 3” deep = 0.25 feet or ¼ of the square footage of the area
- 1000 square feet requires 250 cubic feet of mulch
- 250 cubic feet/ 27 = 9.25 cubic yards
- Or almost 10 cubic yards of material!

Resources

- Sunnyvale SmartStation for free arbor chips
- Arborists for free arbor chips
- Lyngso Garden Supply for purchased arbor chips
- Other landscape suppliers for recycled wood and bark mulches

Sheet Mulching

- Several methods
- Types of ‘sheets’
- Types of mulch

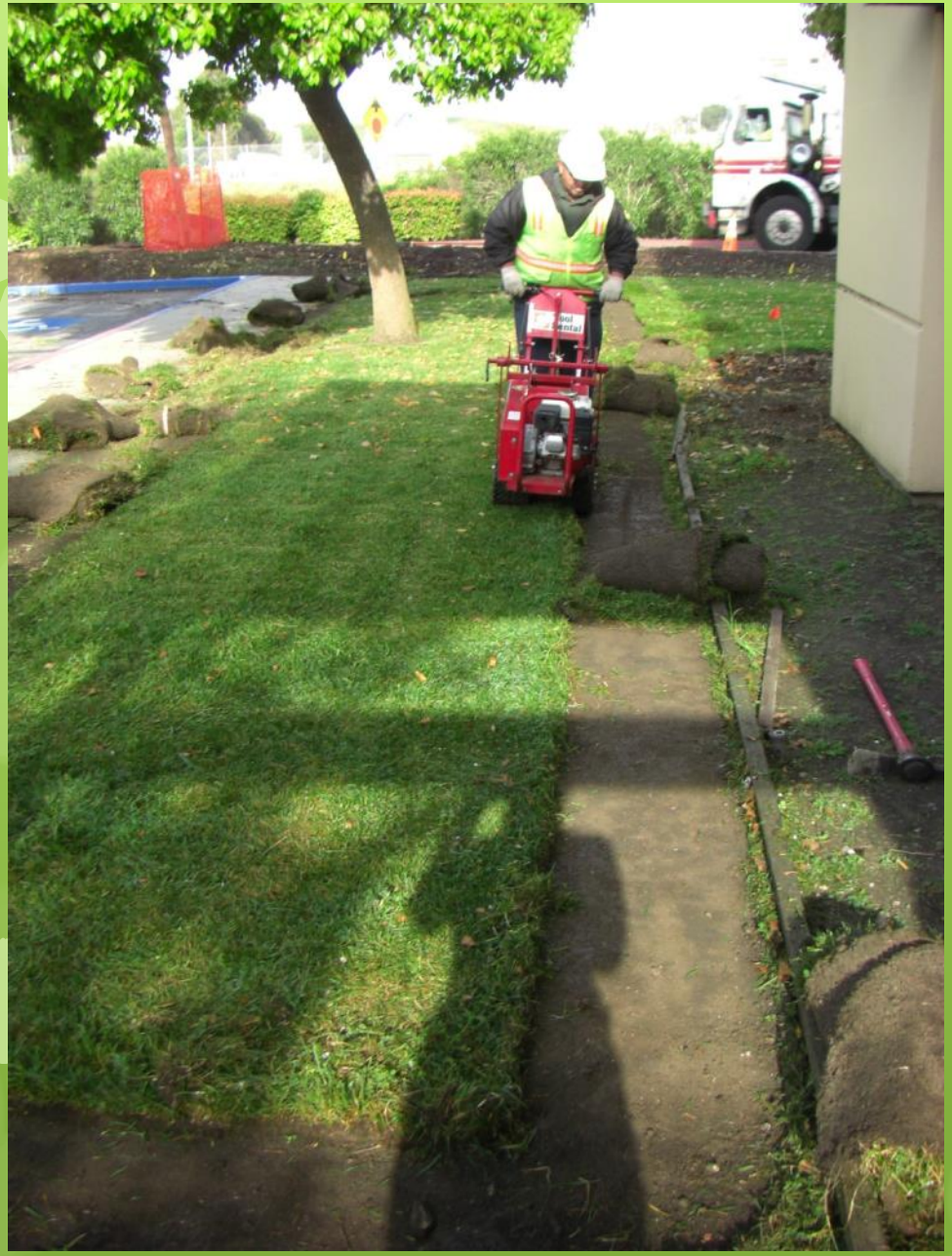
Sheet Mulching
“Plant First” Method

Newspaper Sheet Mulch – 4- layers

Sheet Mulching - “Plant After” Method

Small Areas

Weedy Areas



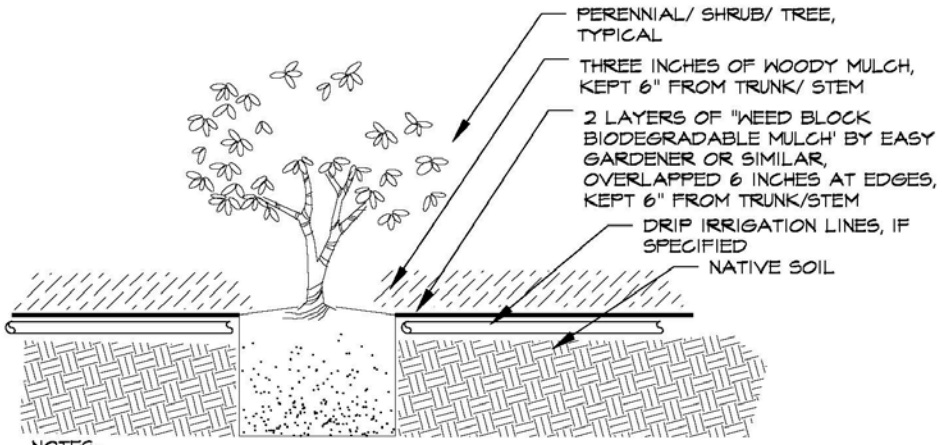
Bermuda Grass Removal

- Two passes of sod cutter
- Rake out all roots
- Sheet mulch
- Plant on top of sheet mulch is best
- Hand weed any strays immediately

Types of “Sheets”

- 4-6 layers of newspaper
- 1 layer of cardboard box material
- 2 layers of recycled content cardboard rolls (4’ x 250’ at Urban Farmer Stores)
- 2 layers of Builder’s Paper (hardware stores in paint department)

Detail of Sheet Mulching



NOTES:

1. CONTRACTOR SHALL GRUB OUT WOODY WEEDS, SUCH AS IVY OR VINCA, PRIOR TO SHEET MULCHING
2. BERMUDA GRASS, OXALIS PES-CAPRAE, AND OTHER PERSISTENT, INVASIVE WEEDS MUST BE REMOVED/ ERADICATED PRIOR TO SHEET MULCHING.
3. 4-6 LAYERS OF NEWSPAPER OR 1-2 LAYERS OF CARDBOARD (DEPENDING ON THICKNESS) MAY BE USED INSTEAD OF WEED BLOCK PAPER.

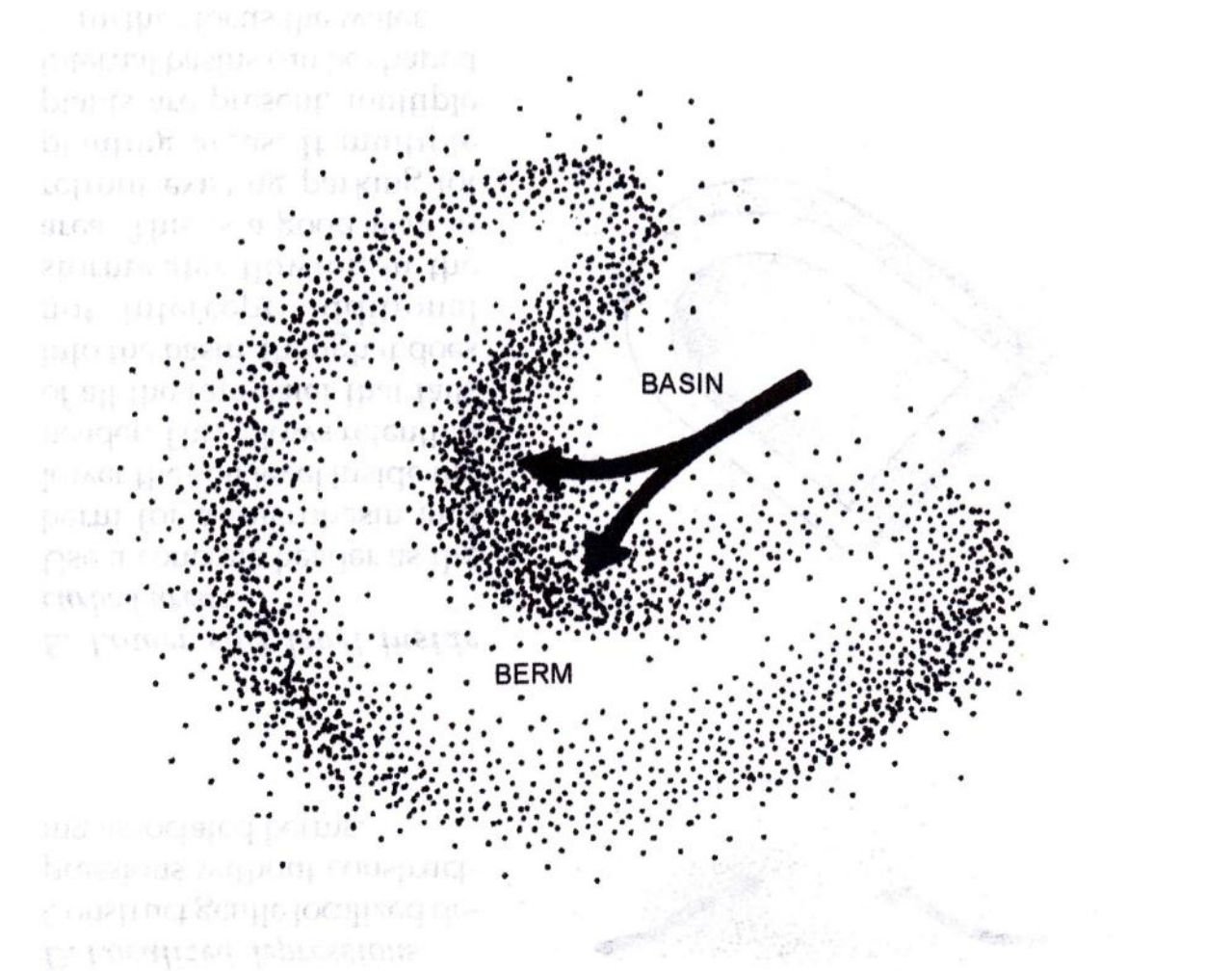
Top Tips for Saving Water in the Garden

Keep Water Onsite

Tankless Ways to Harvest the Rain

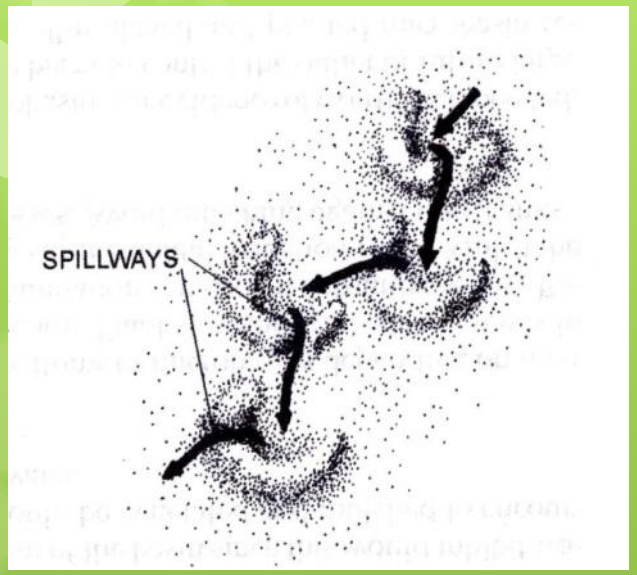
- Microbasins
- Swales/ dry stream beds
- Terraces
- French drains
- Dry wells
- Pervious paving

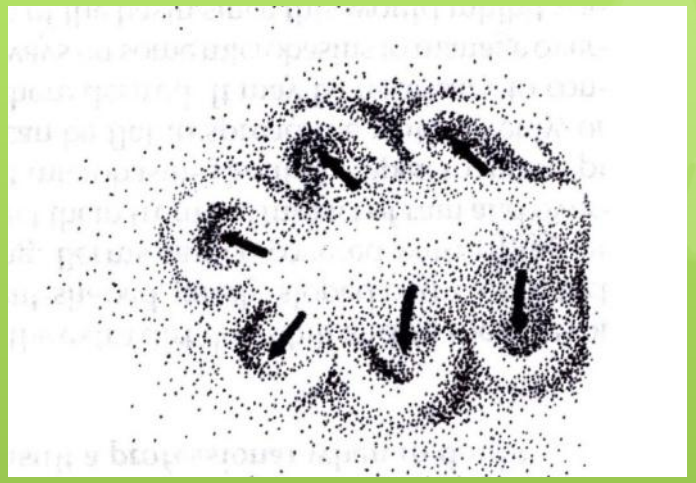
Microbasins



Drawing from “City of Tucson Water Harvesting Guidance Manual”

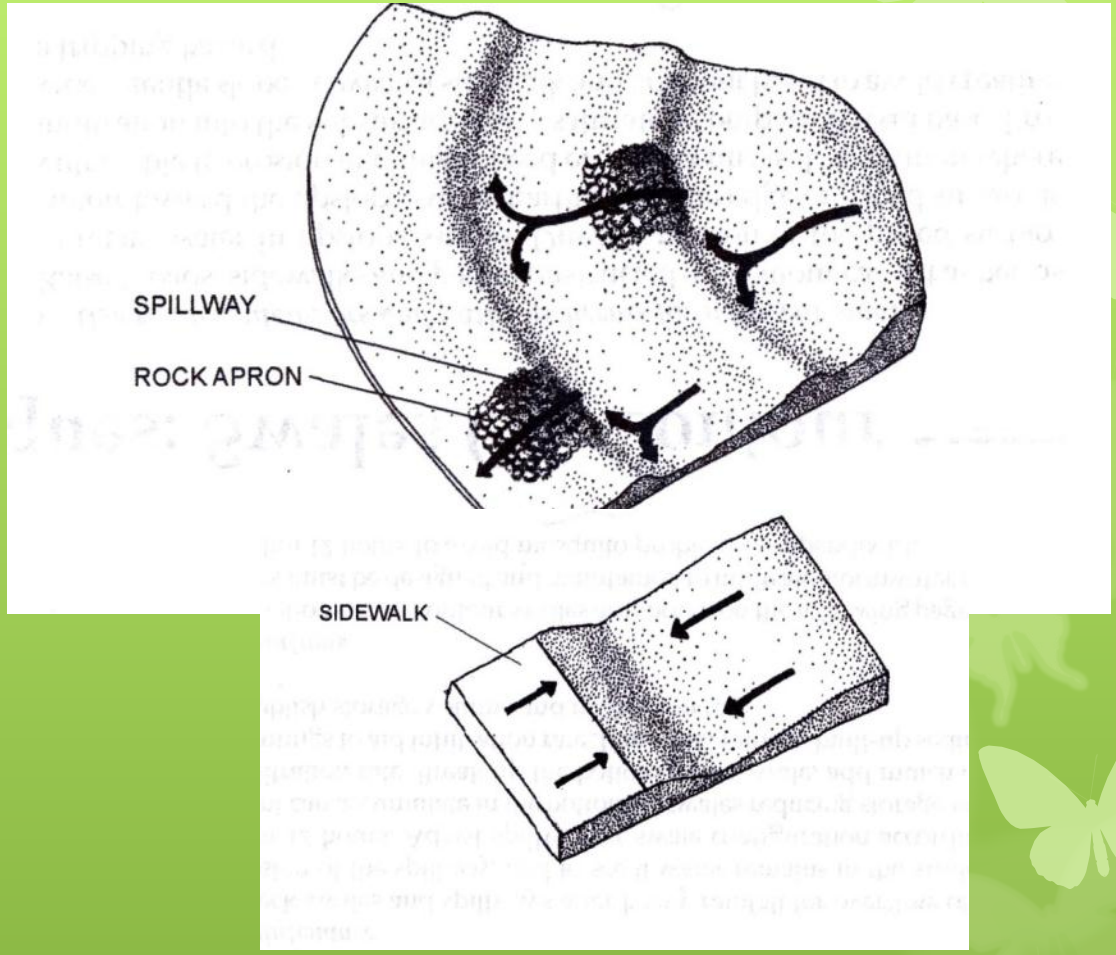
Microbasins





Drawings from “City of Tucson Water Harvesting Guidance Manual”

Swales



Drawings from “City of Tucson Water Harvesting Guidance Manual”

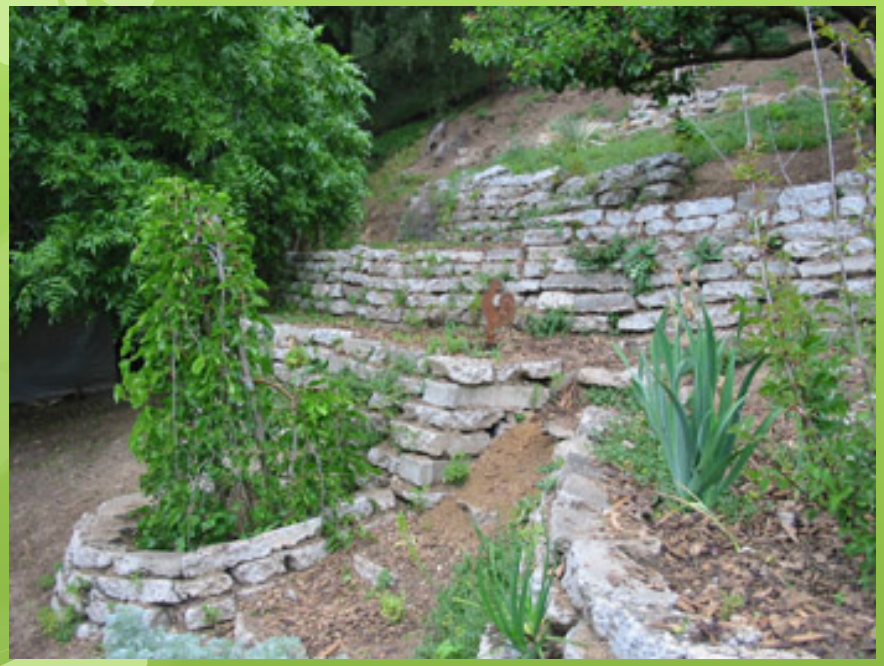
Swales

Bioswale adjacent to parking lot near Diridon CalTrain Station in San Jose

Starbucks off Coleman & 87 Bioswale

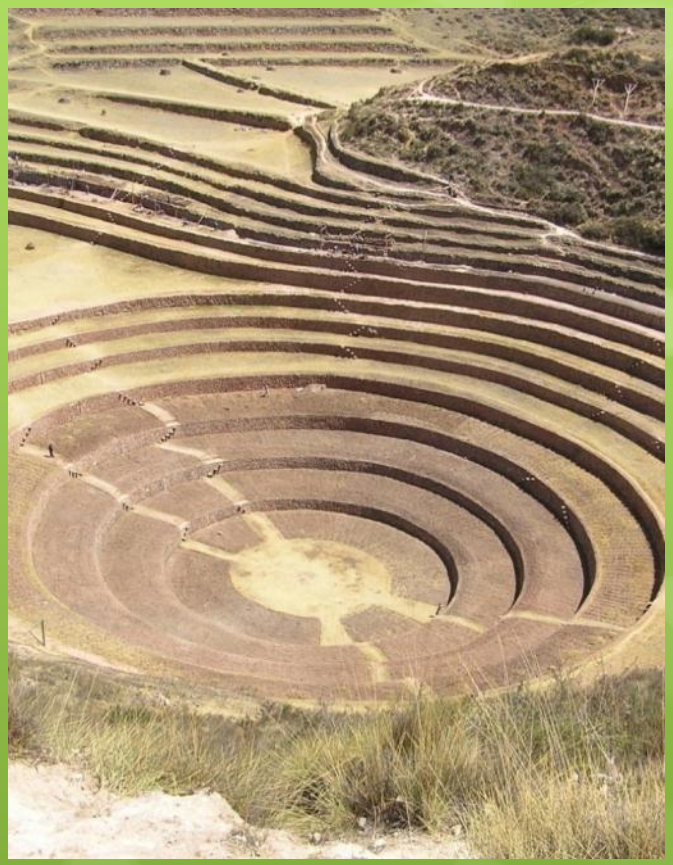
www.treepeople.com

Terraces

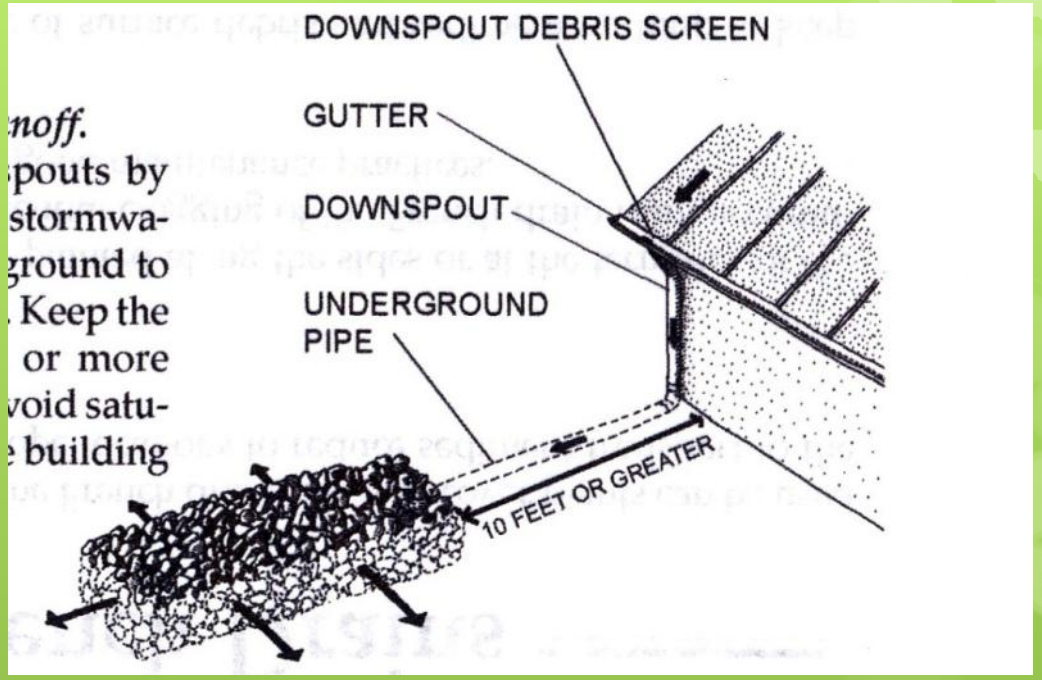


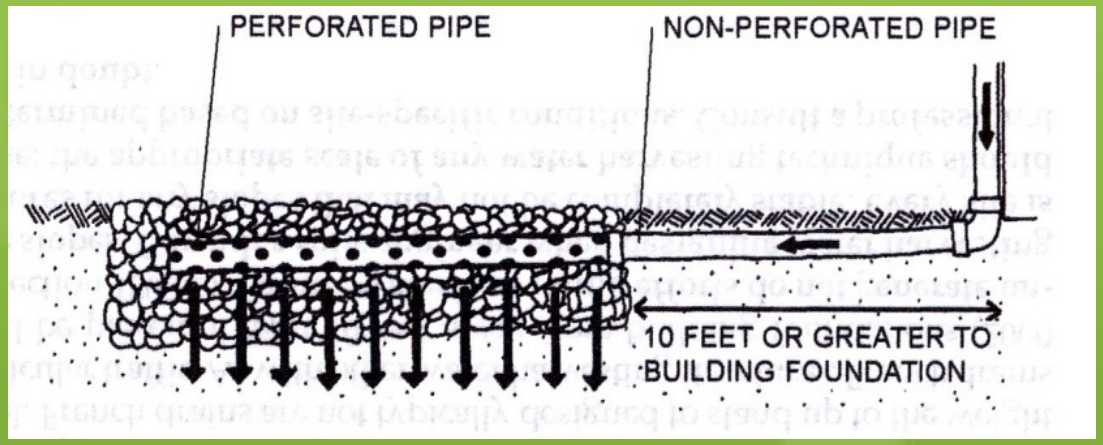
Recycled concrete terrace designed by Deva Luna, EarthCare Landscaping

Terraces in the Andes



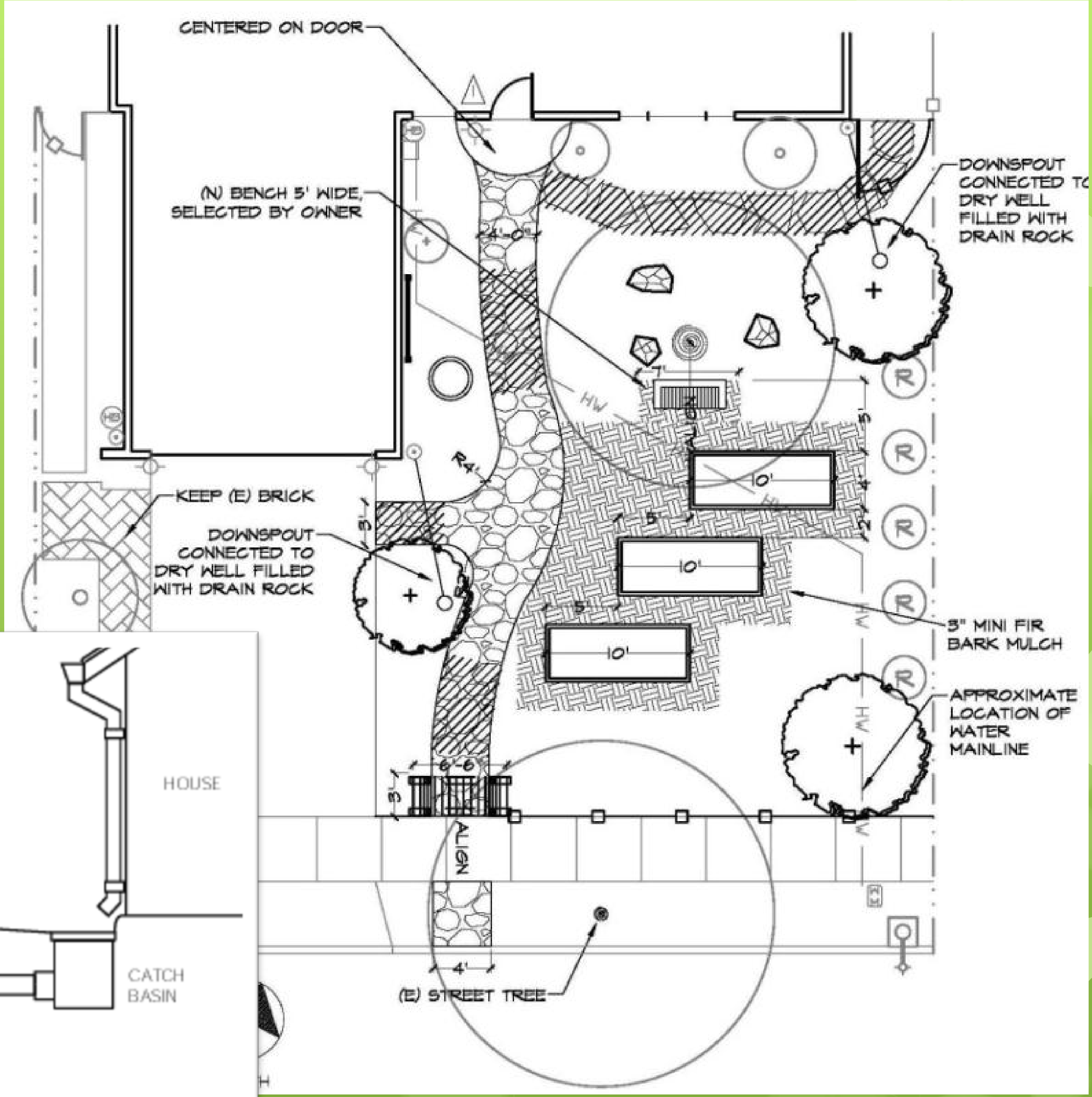
French drains

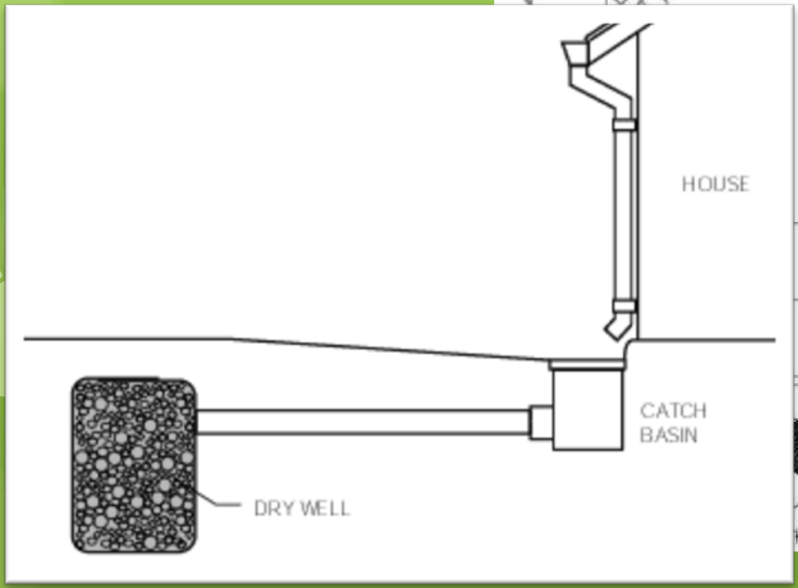




Drawing from "City of Tucson Water Harvesting Guidance Manual"

Dry Wells


CENTERED ON DOOR
(N) BENCH 5' WIDE, SELECTED BY OWNER
DOWNSPOUT CONNECTED TO DRY WELL FILLED WITH DRAIN ROCK
KEEP (E) BRICK
DOWNSPOUT CONNECTED TO DRY WELL FILLED WITH DRAIN ROCK
3" MINI FIR BARK MULCH
APPROXIMATE LOCATION OF WATER MAINLINE
(E) STREET TREE
ALIGN
10'
10'
10'
4'-0"
6'-6"
4'


HOUSE
CATCH BASIN
DRY WELL

Pervious Concrete with Brick Bands

Design by Sherri Osaka, Installation by Earthcare Landscaping

Pervious Concrete with Urbanite Step Stones

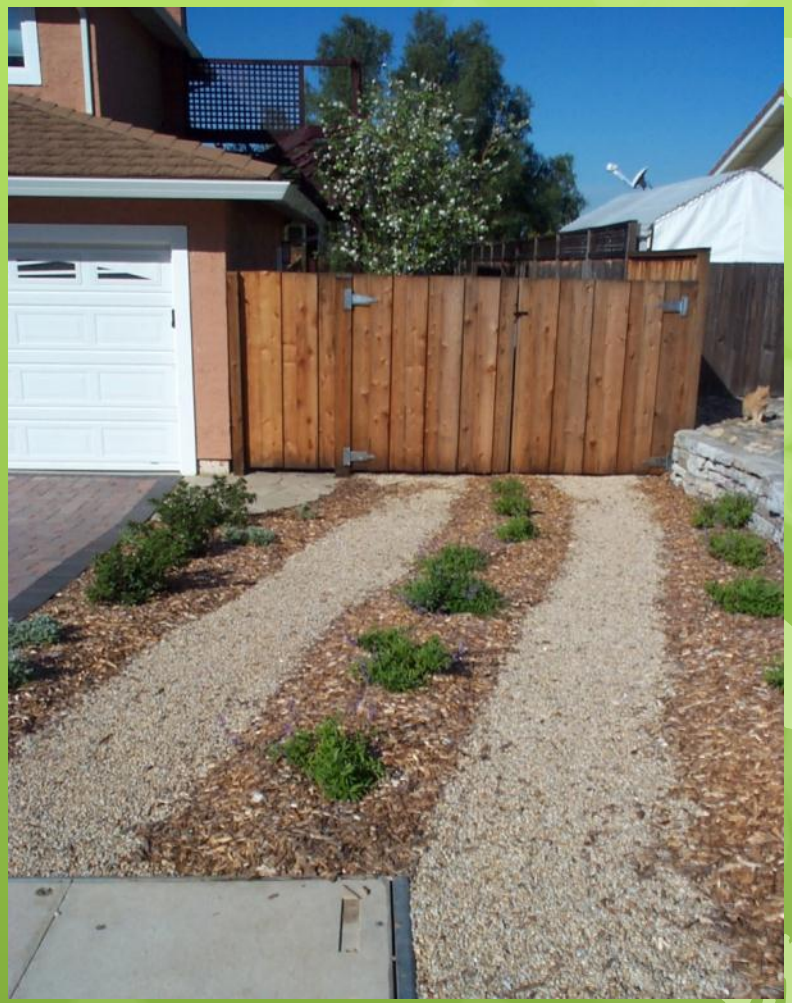
Design: Agi Kehoe, Installation: Earthcare Landscaping

Pervious GravelPave, planting and mulch for trailer access

BEFORE

DURING

AFTER



Design: Sherri Osaka; Installation EarthCare Landscaping

Gravel Pave Driveway - Design Stephanie Morris, Landscape Architect

Guadalupe Gardens in San Jose
Design by Sherri Osaka

Guadalupe Gardens in San Jose
Design by Sherri Osaka

Permeable Paving

Permeable Quarry Stone by Calstone

Flagstone with gravel

Designs by Sherri Osaka, Sustainable Landscape Designs

Case Studies

Case Study – East San Jose

Before

After

Drought tolerant landscapes – Case study bird sanctuary

Before

Pondless waterfall on timer for birds

After

Before

Case Study -- Craftsman Remodel

Drought-tolerant landscape
Case study lawn replacement

Before

After: 18 species of native plants


200

Drought-tolerant landscapes Case study front yard

Case Study – Willow Glen

203

Case Study – Sunnyvale

Case Study – Sunnyvale

Case Study – Sunnyvale

Before circa 1994

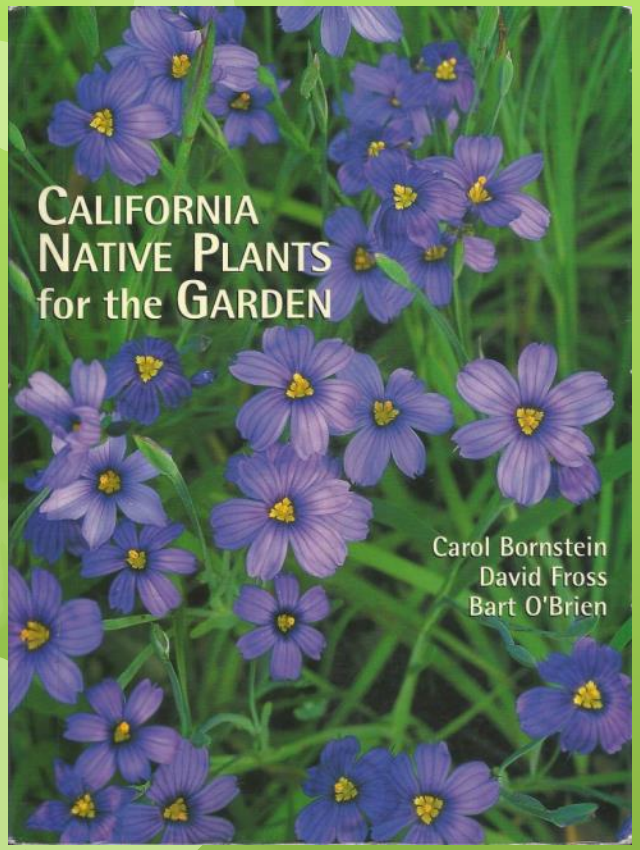
Before circa 2007

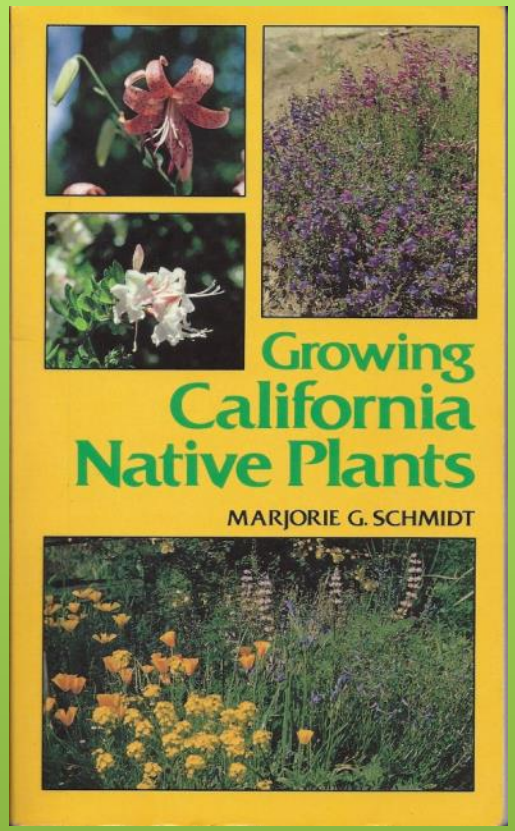

LITHOCHROME
COLOR HARDENER

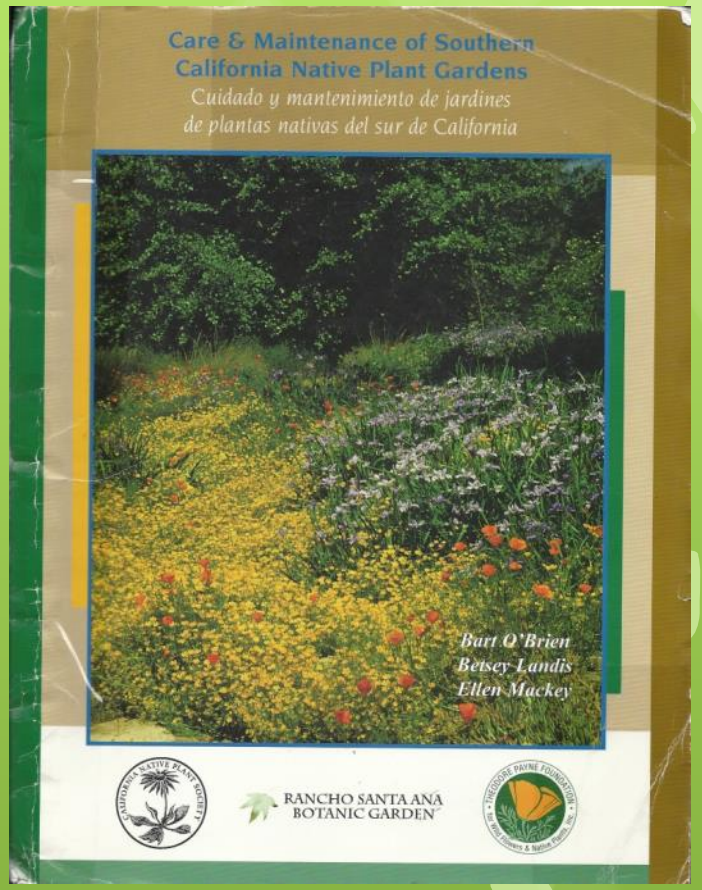
Top Seven Ways to Save Water in the Garden

- Fix all leaks
- Replace the lawn
- Switch to climate-appropriate plants
- Learn when to water
- ~~Change to drip irrigation~~
- Improve your soil
- Store water onsite

Native Plant References







- "Plants and Landscapes for Summer-Dry Climates" by East Bay MUD
- "Landscape Plants for California Gardens" by Bob Perry

Native Nurseries

- Summerwinds, Palo Alto, Campbell, etc
- Payless Rockery, San Jose (S. King Road)
- Yerba Buena Nursery, Half Moon Bay
- Native Revival Nursery, Aptos
- Larner Seeds, mail order seeds
- Annie Annuals, Richmond and online
- Las Pilitas online

THE CALIFORNIA NATIVE PLANT SOCIETY
SANTA CLARA VALLEY CHAPTER and ACTERRA
PRESENT A

FALL NATIVE PLANT SALE

ALSO
BOOKS,
POSTERS
T-SHIRTS

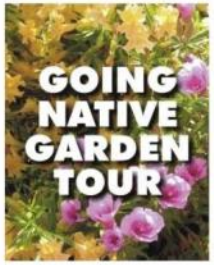
Stream orchid, Epipactis gigantea
'Serpentine Night'

SATURDAY OCT. 17, 2015 10 AM - 3 PM

HIDDEN VILLA RANCH

26870 MOODY ROAD, 2mi WEST OF FOOTHILL COLLEGE
TAKE THE EL MONTE / MOODY EXIT FROM 280

CASH,CHECK OR CHARGE **BRING A BOX FOR PLANTS**
CONTACTS **650-260-3450** or **www.cnps-scv.org**
GARDEN TALK AT 1PM **PARKING IS FREE**



California Native Plant Society

14th Annual

Going Native Garden Tour

GARDENS WANTED

- Are **California native plants** a big part of your garden (50% or more)?
- Is your garden **environmentally friendly** and chemical free?
- Does your garden provide **wildlife habitat** and **support life**?

If so, we invite you to submit your garden for the next **Going Native Garden Tour** scheduled for April 9th & 10th, 2016. Share your enthusiasm for plants that are attractive to humans, birds, and pollinators – and enjoy the compliments from tour visitors. This free tour educates visitors on the value of native plant landscaping – for water conservation, habitat creation, low maintenance, and beauty. We invite you to submit your garden today!

Saturday, April 9, 2016: *Northern Area: San Mateo County, Palo Alto, Los Altos, Mountain View*

Sunday, April 10, 2016: *Southern Area: Sunnyvale, Cupertino, Santa Clara, San Jose & Campbell*

Submit your garden on or before **October 15** *by filling out the submission form at:*

www.GoingNativeGardenTour.org

Photo credit: Agi Keboe

Thank you!