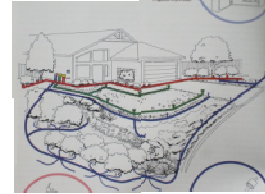


Conserving Water in the Landscape

- Hydro-zoning
- Mulching
- Water Efficient Irrigation
- Plant selection
- Soil improvement
- Minimizing turf in the landscape design

Hydrozoning

- Grouping plants with similar water requirements to reduce unnecessary water
- To irrigate automatically, you must have an irrigation system with multiple program capability
- Simply regrouping your existing plants so that you are not over-watering water thrifty plants will reduce your water use



Benefits of Mulching

A 2-4" layer of mulch...

- Decreases evaporation/ holds moisture in soil
- Minimizes compaction and erosion
- Reduces weeds
- Adds nutrients to the soil



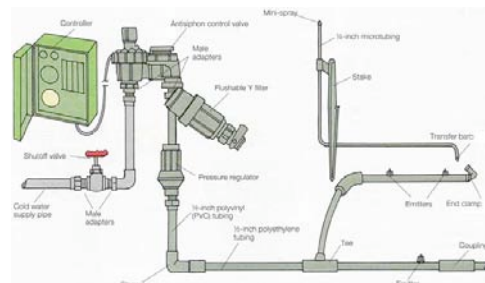
Types of Mulch

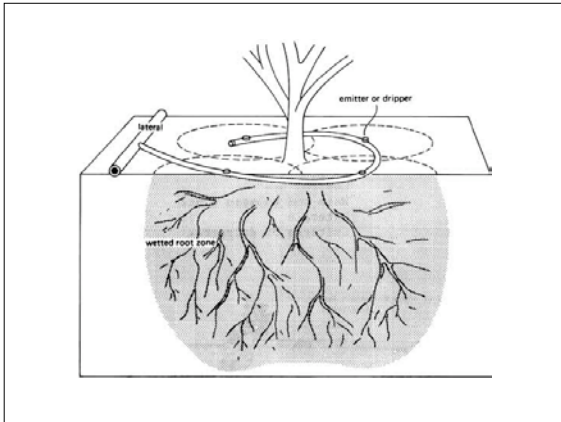
- Wood Bark
- Wood chips (available from tree companies)
- Straw
- Animal Manures (aged)
- Leaves
- Agricultural by-products (apple & grape pomace, nut hulls, mushroom compost)
- Rocks/ gravel

Water Efficient Irrigation

- All irrigation systems must be checked and maintained regularly
- Only irrigate as often as you need to (using moisture meters, rain switches, satellite controlled irrigation, or changing your program with the changing seasons all conserve water)
- Installing drip irrigation for perennials, trees, and shrubs can significantly reduce water use because water is applied directly to the soil/ root zone, so less evaporation occurs.

Drip Irrigation Layout





Easy do-it-yourself drip

- You can easily convert your existing irrigation system to drip or simply attach drip system (pressure reducer, filter, and polyethylene tubing with emitters) to a faucet
- Occasional maintenance includes checking drippers and lines for clogs/ leaks. Check monthly.

 The image shows a box of Rain Bird drip irrigation components, including a pressure reducer, filter, and polyethylene tubing with emitters. Below the box is a close-up photograph of a dripper attached to a faucet.

Water Thrifty Plants

 Two photographs of water-thrifty plants. The left image shows a California native shrub with reddish-brown bark and green foliage. The right image shows a succulent with thick, fleshy leaves in shades of green and red.

- California Native Plants & Plants from other Mediterranean climates are well adapted to survive with minimal irrigation
- Even drought-tolerant plants need regular irrigation until they are established (at least one year or when they are 2-3x the size at planting)

Planting notes...

- Optimally, plant smaller plants (1 gall vs. 5 gall for trees and woody plants, 4 or 6 inch vs. 1 gallon for annuals and perennials)
- The less developed root systems will adapt more quickly to the new environment, and the plants will grow more quickly than larger/ more mature specimens (same size or larger after 2-3 years)
- Become more deeply rooted and drought tolerant

When to plant

- In the Bay Area, Fall is the best time to plant natives and other water-thrifty plants
- Soils are still warm, so roots have a chance to grow and become established before the lush spring growth occurs
- Winter rains help establish plants
- Even drought tolerant plants need regular irrigation for at least first year...less frequent, deep watering encourages deep root systems

Soil Texture and Watering Requirements

- Clay soil (tiny particles) has low percolation...can become waterlogged. High nutrient content, but not easily available to plants
- Loamy soil (mixture of clay, sand, and silt) ideal for most garden plants
- Sandy soil (large particles) well drained, low in nutrients
- Most low water-use plants require well drained soils. Many California native plants are also adapted to nutrient poor soils.

Improving soils

- Soil Tests are advised to determine soil type, pH, fertility, salinity, mineral content, etc. Follow recommendations...
- The addition of organic material (compost, fir-bark, etc) and gypsum to heavy clay soils can increase drainage. Organic matter should be added repeatedly.
- The addition of organic matter to sandy soils will also increase their nutrient content (not necessary with many CA natives)
- Mix soil amendments generously, deeply, and uniformly over planting area (3" layer mixed 8" deep for gallon plants)

Challenging soils...

- For hard-pan (a layer of bedrock beneath the soil surface that is impenetrable by roots and water), break through with shovel when digging planting holes if it is thin enough
- If too thick, create raised beds filled with well percolated soil
- Raised beds may be best option with heavy clay soils as well or selecting plants that tolerate clay

Calculating Soil Amendments

- A 2 cubic foot bag of soil amendment spread 3 inches deep will cover 8 square feet
- A cubic yard of bulk material spread 3 inches deep will cover 108 square feet

Benefits of reducing lawn

- **reduced water consumption** - according to the EPA, 30 to 60% of urban fresh water is used to water lawns each year-- two to three times the water of a sustainable mixed landscape.
- **saves time and energy** on lawn maintenance
- **less yard waste** to be composted or taken to a landfill - a 2000 sq ft lawn produces 600-800 pounds of clippings per summer on average
- reduction in use of herbicides, pesticides and synthetic fertilizers
- **reduction in air and noise pollution** caused by gas mowers- lawns cover 20 million acres of residential land in the US, and lawnmowers account for 5% of the air pollution.
- **enhanced biodiversity**
- **increased property values** - attractive, low-maintenance landscaping adds value to the home

The Water Efficient Lawn

- Studies show that most homeowners over-water lawn by two times what is needed
- Deep watering is best...soak soil, then don't water until top 2" is dry
- Water early in the morning to decrease evapotranspiration (ET)
- See BAWSCA website for local ET rates and amount/ timing recommendations for irrigating

Water Efficient Lawns...

- If runoff occurs when watering lawn, problem could be soil or lawn.
- Dethatching lawn and/ or aerating soil will increase percolation
- Another solution is to divide each watering into shorter intervals with time in between for water to soak in

Drought tolerant lawn



- Eco-lawn (available from Wildflower Seed Co.) is very drought tolerant once established, stays green, requires no mowing, can tolerate sun, part shade, and shade. A mix of fescue varieties.
- Any tall fescue variety will be drought tolerant relative to bluegrass

Kid friendly landscapes....

- Include places to run, climb, jump, hide, slide, play
- Appeal to and stimulate the senses
- Include “loose parts” that children can construct with, look under, move
- Attract wildlife by providing habitat
- Provide healthy snacks from the landscape
- Children have an area of their own and have input into the design

Child Friendly landscape ideas...

- Create a maze with native ornamental grasses
- Hedgerows can provide places to tunnel and hide
- Create a hill to climb up & roll down
- Insert large drain pipe into man-made hill to create a tunnel
- Create a natural fort beneath a weeping tree
- Place a child-sized picnic table in the garden
- Build a living willow structure with willow cuttings
- What are your child’s passions? Reflect that in your design...theme gardens.

More child-friendly ideas

- Plant a vegetable garden or garden for cut flowers
- Espalier fruit trees to make a living, edible fence
- Create a playhouse or tree fort
- Use permeable paving to create places to ride bikes & tricycles
- Leave a little patch of wildness for children to explore and find treasures for a nature museum
- Areas for sand and water play
- Use vertical spaces...climbing handholds on side of house, trellises to grow plants vertically
- Make the most of a hilly yard with a hillside slide

Landscaping for Play

- Squat down to child height to get a child’s view of the garden as you consider design
- Make sure that you can supervise play areas from a deck or inside room- clear obstructions to your view of children
- Screen undesirable views
- Plant a hedge or build a fence for safety, privacy, and/or sound barrier

Plants to Avoid in Kid’s Area

- Cactus (prickly)
- Bougainvillea, Roses (thorny)
- Agave (needle sharp points)
- Poisonous plants: Wisteria, foxglove, Brugmansia, Delphinium, Oleander, Hydrangeas, Holly (berries), Rhubarb (leaves), sweet peas (seeds), Castor Bean*, Rosary Pea*
- * very toxic...even one seed can be fatal

Natural Playspaces

- Research shows that play in nature contributes to cognitive, physical, socio-emotional well being...more creativity shown in play, more concentration, and less aggression.
- Can be more aesthetic than manufactured play equipment
- Much more affordable than manufactured play equipment

Safety Zones for Play Equipment

- Leave 6' clearance between play structure and fences, rocks or other structures
- Slides need 6' clearance as well as height plus 4' at landing
- Swings need a clearance of 2X the height of the swing from the pivot point as well as 30" from posts and 24" between swings in a swing-set

Soft Landings

MATERIAL	COST	CUSHIONING	MAINTENANCE	CONS
 Sand and pea gravel	Low	Good at appropriate depth, but compacts in rain and cold weather.	Requires continuous leveling, sifting, and periodic breakup of compacted sand or gravel.	Sand is easily tracked indoors and attracts animals. Gravel is hard to walk on and becomes compacted.
 Wood chips and wood mulch	Low	Good at appropriate depth, but compacts with use and exposure.	Requires periodic replacement and continuous leveling and sifting to remove dirt.	Decomposes with time, susceptible to microbial growth when wet, and may conceal trash.
 Shredded tires and rubber mulch	Moderate	Superior, does not deteriorate or become compacted.	Requires some leveling and sifting.	Lacks natural appearance. Can be flammable.
 Rubber over foam mats or tiles	High	Good, uniform.	Minimal cleaning required.	Undersurfaces may require professional installation. Tiles may curl, causing tripping.

Creating a Wildlife Friendly Garden....

- Cover- wildlife will need places to hide in order to feel safe...shrubs, native grasses, hedges, and brush piles
- Water- a bird bath, rain garden, pond or fountain can provide places to drink, bathe, and reproduce
- Food- native plants that produce pollen, nectar, seeds, berries, and browse are best. You can also provide commercial feeders
- Make your garden a pesticide free zone

Butterfly Gardens

- Provide food for the entire lifecycle: egg, caterpillar, adult (caterpillars eat leaves while adults sip nectar)
- Provide still water for drinking (bird bath or puddles in gravel work well)
- Passion vines (passiflora) are famous for feeding Gulf Fritillary caterpillars, while Monarch caterpillars will only eat Milkweed
- Easy nectar producing plants for the garden include Erigonum (buckwheat), Ceanothus, Lupine, and Salvia (sage) species

Attracting Hummingbirds

- Lots of flowers that bloom throughout the year
- Red tubular flowers are especially favored
- If providing commercial feeders, change the sugar water every few days so that it doesn't sour, and remove feeder at time of hummingbirds normal migration

Garden Activities for children

- Grow gourds & make gourd birdhouses & moroccos
- Grow your own Halloween pumpkins...let them rot in the garden to learn about decomposition, then watch as they re-sprout
- Plant a pizza garden
- Harvest and dry herbal teas (spearmint, chamomile) & make sun tea
- Cut & dry flowers for wreaths (status, strawflower, lavender all dry well)
- Start a worm-compost bin
- Make fairy houses
- Participate in the great sunflower project to help monitor bee populations
- Build an owl nest box to help predatory bird populations, which decreases the need for rodenticides
- Become a certified wildlife habitat garden www.nwf.org/backyard/
- Make mosaic stepping stones
- Build a scarecrow or garden sculpture from recycled materials

More Kid's Gardening Activities

- Hunt for bugs and lizards
- Have a garden tea party
- Set up an easel in the garden for drawing/ painting
- Plant heirloom vegetables and save the seeds
- Grow medicinal herbs to make natural remedies
- Make a sundial
- Install a small water feature for play and wildlife
- Build an earthen bench or pizza oven
- Cook from the garden
- Start a farm-stand or donate to a soup kitchen
- Make a nature museum

Worms need...

- Ventilation
- Some soil to get things started
- Bedding (shredded newspaper, cardboard, straw, grass clippings, peat moss)
- 1sq. ft. space /lb of worms (bin not > 2ft. Deep)
- Vegetable scraps at least once/ week
- Additional bedding once/ month
- To be kept moist & shaded
- A way to drain off the liquid is a plus (excellent fertilizer)

Gardens & Nutrition

- Kids love to eat what they have grown!
- Select varieties that are familiar and easy to grow (radish are fast, pumpkins, sunflowers, peas have large seeds, tomatoes & herbs for a pizza garden)
- Although veggies are more water intensive, growing them at home connects your child to nature and lowers your carbon foot print

Conserving Water in the Vegetable Garden

- Water early in the morning (best) or in the evening
- Apply organic mulch (straw, leaf litter, aged manure, rice hulls...)
- Use drip irrigation or micro-spray irrigation
- Space plants so that they have adequate room to reach maturity, but so that their leaves will create a continuous canopy shading the soil (bio-intensive method)

Water-wise plants to awaken the senses

- Touch- lambs ears, phlomis, sunflowers, hen & chicks, tibuchina (princess flower)
- Smell- Thyme, oregano, rosemary, scented geraniums, lavender, buddleia, rockrose
- Sight- sunflowers, california poppies, many succulents, cosmos, matilija poppy
- Taste- winter vegetables (fava beans, greens), pomegranate, strawberry tree (arbutus unedo), miner's lettuce, pineapple guava, phlomis (nectar)

Resources

- Books: Plants and Landscapes for Summer Dry Climates, Water Conserving Plants and Landscapes for the Bay Area, Water Wise Gardening (Sunset), Backyards for Kids (Sunset)
- BAWSCA: <http://bawscsca.org/water-conservation/>
- The Urban Farm Store <http://www.urbanfarmerstore.com/> (irrigation supply & information),
- California Native Plant Society – www.cnps.org
- Yerba Buena Demonstration Garden – www.yerbabuenanursery.com
- EarthCare's affordable lawn replacement program – www.naturalfactoryards.com
- A wiki site for Sustainable Landscaping with lists of professionals and pictures – www.landscapistandards.com
- <http://www.kidsgardening.org/> <http://www.hungryvowl.org/>
- <http://www.greatsunflower.org/>