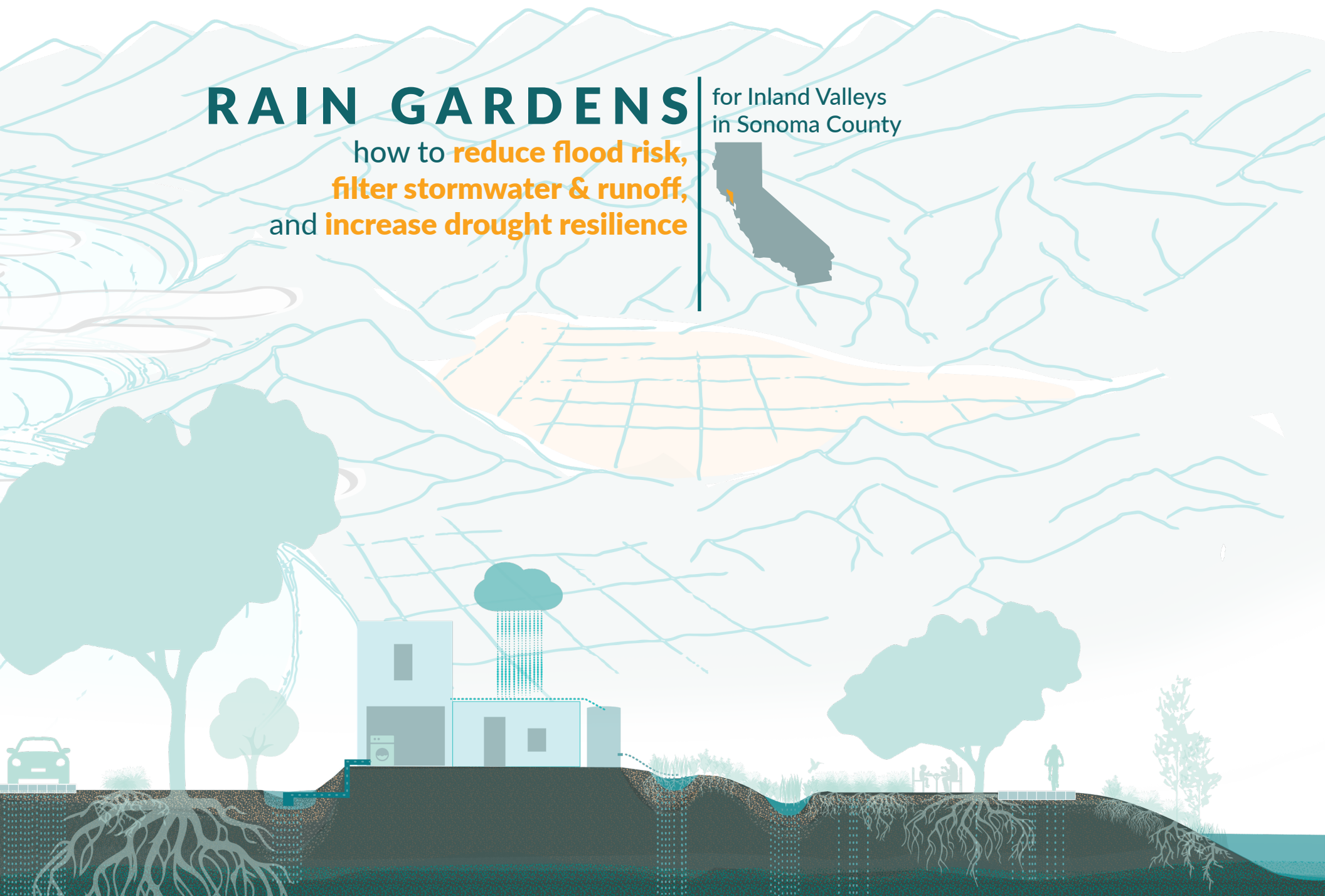




RAIN GARDENS

how to **reduce flood risk,**
filter stormwater & runoff,
and **increase drought resilience**

for Inland Valleys
in Sonoma County



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RAIN GARDENS

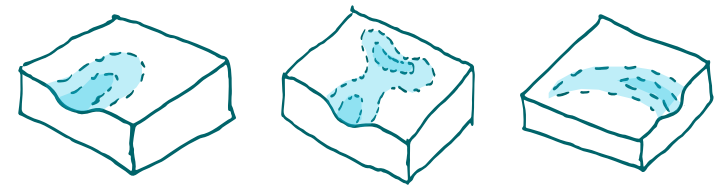
What is a **rain garden**?

What makes it a critical drought-resilient tool?



Rain gardens slow, spread, and sink rain water by pooling water in landscape depressions, thereby allowing water to collect, stop, and sink into the earth. In turn, this can save you money, irrigate your landscape, and recharge your local aquifer!

At their simplest, rain gardens are planted depressions in the landscape that can take on many forms. Some large, some small, some linear, some rotund. Linear rain gardens can convey water and are called *bioswales*.



Rain gardens are critical features in a drought resilient landscape. The diagram below shows how they function and interact with other drought resilient tools to bring about local and regional water benefits.

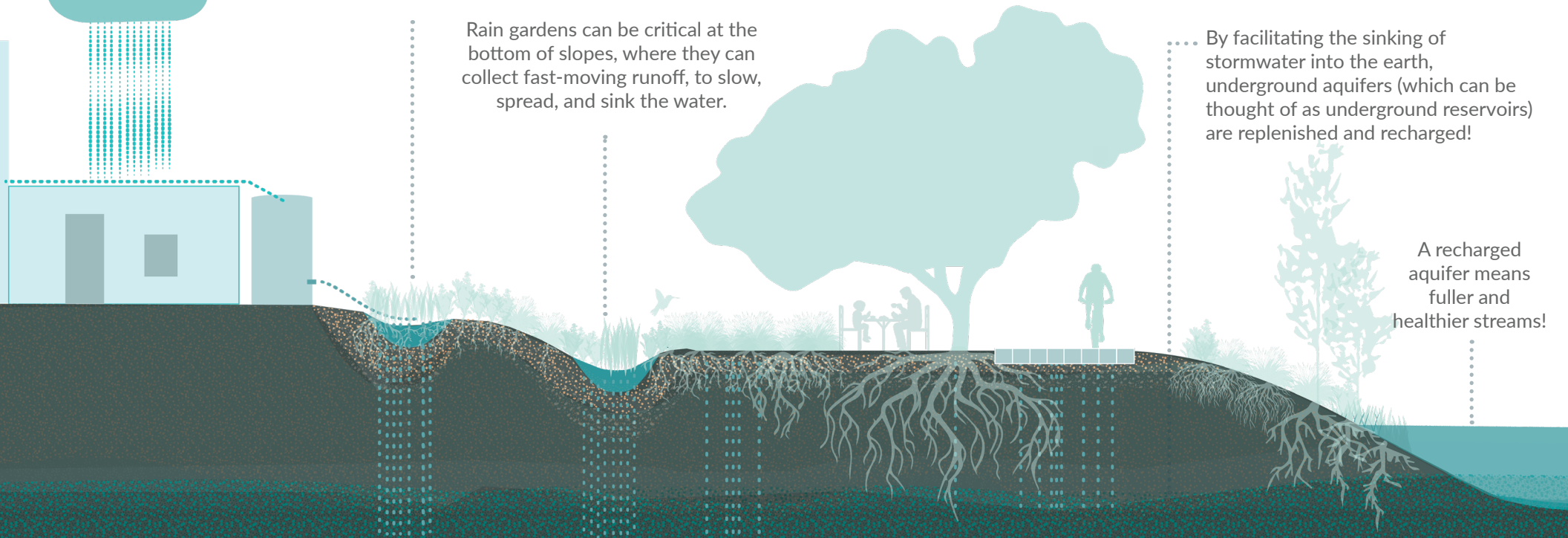


Rain gardens can catch overflows from roofs via [rainwater harvesting](#)!

Rain gardens can be critical at the bottom of slopes, where they can collect fast-moving runoff, to slow, spread, and sink the water.

By facilitating the sinking of stormwater into the earth, underground aquifers (which can be thought of as underground reservoirs) are replenished and recharged!

A recharged aquifer means fuller and healthier streams!



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RAIN GARDENS

What are the zones of a **rain garden**, best design practices, and other resources



ZONES OF A RAIN GARDEN

ZONE 3

These are the outer edges of the rain garden. As the plantings here have the lowest water needs of the garden, use [Climate Appropriate Plantings](#).

ZONE 2

These are the slopes of the rain garden (at no more than 3:1). Plants here have intermediate water needs.

ZONE 1

This is the basin of the rain garden. This is where water collects and is held, slowly infiltrating into the ground and recharging the aquifer. Because water will pool here during rain events, the plantings in Zone 1 must have the capacity to tolerate periods of inundation and drought, or receive supplemental irrigation.

ADDITIONAL RAIN GARDEN DESIGN REOUSRCES

[Daily Acts: Rain Gardens 101](#)

[Get Busy Gardening](#)

[Gardening Know How](#)

[Sonoma-Marin Saving Water Partnership](#)

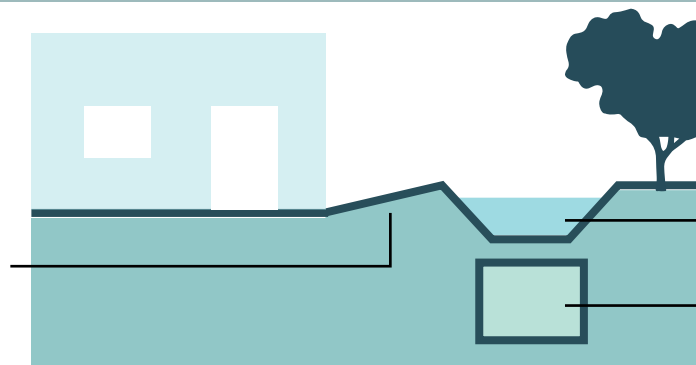
✓ DO make 6" to 18" deep



✓ DO slope sides at a 3:1 slope

RAIN GARDEN DO NOT'S

✗ DO NOT slope rain garden toward building or place within 10' of foundation



✗ DO NOT put rain garden within drip line of exiting trees

✗ DO NOT make rain garden too deep

✗ DO NOT put rain garden over septic

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RAIN GARDENS

How to construct a rain garden for a DIY design-build

1. Feasibility

- ✓ Identify/measure stormwater runoff sources such as:
 - a. Rooftop downspouts
 - b. Hard/paved surfaces
 - c. Uphill landscapes
- ✓ Identify a landscape area on your site for the rain garden that is:
 - a. A gentle down slope from one or more runoff source
 - b. A minimum of 10' away from buildings and property lines
- ✓ Understand your site's soils:
 - a. Determine your site's soil types and characteristics using: <https://websoilsurvey.sc.egov.usda.gov>
 - b. The best soils for rain gardens are well draining (not clayey).
- ✓ Perform a percolation test:
 - a. Follow steps at: <https://greywateraction.org/how-do-percolation-test/>
 - b. Ideal percolation rate is greater than 0.5 inches/hour.

2. Design

- ✓ Calculate potential runoff volume:
 - a. How many square feet is your rooftop or other source catchment area?
 - b. Use 0.22 ft for a 24-hour storm for Sonoma County
 - c. $[\text{Runoff source sq. ft.}] \times [0.22 \text{ ft./storm}] \times [7.48 \text{ gal./cubic ft.}] = \text{Design Runoff Volume (gal.)}$
- ✓ Determine the size and shape of your rain garden to match Design Runoff Volume: Minimum depth of 6" and maximum of 18".
- ✓ Plan bioswales to convey stormwater to the rain garden.
- ✓ Determine path for overflow of rain garden in large storms: An overflow drain pipe, a perforated underdrain, or a reinforced low point to an existing drainage path.

3. Planting

- ✓ Use climate appropriate plants that don't need irrigation after establishment. Species that grow natively in dry creeks are well-suited to rain gardens.
- ✓ Place plants that prefer more moisture at the bottom of the rain garden basin: Plant species with a lower water demand but that can tolerate occasional saturation along edges of rain garden slopes. Group plants according to their size/space and sun/shade requirements.
- ✓ Minimize soil compaction from walking: Consider pathway locations you will use to weed and maintain the garden.
- ✓ Use mostly evergreen plant materials: Make sure that the majority of your plants are active all year rather than deciduous/dormant.
- ✓ Arrange to cover at least 80% of the rain garden in the first year of growth: This will help stabilize soil during storm flows.

4. Build It!

- ✓ Call 811: Always call first to identify underground utilities before you dig. Avoid existing tanks, pipes, and other utilities during construction.
- ✓ Dig bioswales: Start from downspout or other water source to rain garden, maintaining a minimum 2% slope away from all buildings.
- ✓ Dig rain garden basin: Designed depth (6-18" at lowest point), accounting for a minimum of 3" of mulch on top of soil at finished grade.
- ✓ Dig a deeper basin: In areas with space constraints, lower infiltration rates, or where additional volume is needed, deepen basin depth and backfill with gravel.
- ✓ Grade at a maximum of 3:1 slope (3 foot horizontal to 1 foot vertical angle) to reduce erosion unless side slopes are retained with rock. See Detail on next page for more information.
- ✓ Layer the rain garden with 4-6 inches of coarse, woody mulch: This prevents standing water and mosquitoes, as well as encourages healthy soil and reduce weeds. River rock or gravel may also be used to cover the base of the rain garden but has less soil and plant benefit.
- ✓ Include a compacted, raised berm: This "wall" must be constructed around the low side of the rain garden to prevent uncontrolled overflow on a sloped site. See photos for example.



Photo 1: 'Before' conditions.



Photo 2: Trench dug.



Photo 3: Gravel layers placed in trench.



Photo 4: Plants installed



Photo 5: Success!

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RAIN GARDEN RAIN GARDEN PLANTS



SOIL DRAINAGE

- ↓↓↓ fast (sandy-silty)
- ↓↓ medium (loam)
- ↓ slow (clay)
- ↑ adaptable

POLLINATOR

- butterfly / moth
- bird
- bee

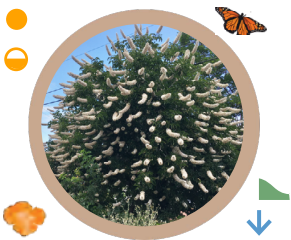
SUN/SHADE

- full sun
- partial sun / shade
- full shade

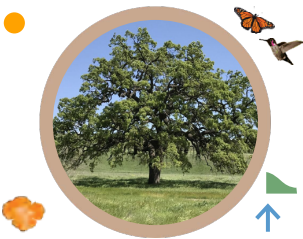
OTHER CONSIDERATIONS

- erosion control
- allelopathic: consult [Calscape](#) for context and companion plants
- CA native
- Clay Tolerant

TREES



Aesculus californica
California Buckeye



Quercus lobata
Valley Oak



Quercus agrifolia
Coast Live Oak

SHRUBS



Carpinteria californica
Bush Anemone



Cercis occidentalis
Western Redbud



Salvia clevelandii
Cleveland Sage



Heteromeles arbutifolia
Toyon



Rhamnus californica
Coffeeberry



Eriogonum fasciculatum
California Buckwheat



*Ceanothus spp.**
California Lilac



Diplacus aurantiacus
Bush Monkeyflower



Berberis nervosa
Oregon Grape

GRASSES



Muhlenbergia rigens
Deergrass



Festuca idahoensis
Idaho Fescue



Stipa pulchra
Purple Needle Grass

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RAIN GARDEN

RAIN GARDEN PLANTS



MEDIUM WATER USE

ZONE 2



SOIL DRAINAGE

- ⚡ fast (sandy-silty)
- ⚡ medium (loam)
- ↓ slow (clay)
- ↑ adaptable

POLLINATOR

- 🦋 butterfly / moth
- 🐦 bird
- 🐝 bee

SUN/SHADE

- full sun
- ◐ partial sun / shade
- full shade

OTHER CONSIDERATIONS

- ▴ erosion control
- ⚠ allelopathic: consult [CalScape](#) for context and companion plants
- 🌸 CA native
- Clay Tolerant

SHRUBS



Rosa californica
California Wild Rose



Sambucus mexicana
Blue Elderberry



Morelia californica
Wax Myrtle

PERRENNIALS



Polystichum munitum
Western Sword Fern



Clinopodium douglasii
Yerba Buena



Heuchera maxima
Coral Bells



Achillea millefolium
Yarrow



Artemesia douglasiana
Mugwort



Solidago velutina ssp. *californica*
California Goldenrod



Iris douglasiana
Douglas Iris



Rudbeckia spp.
Cone Flowers



Calamagrostis foliosa
Leafy Reed Grass



Festuca californica
California Fescue



Leymus condensatus 'Canyon Prince'
Canyon Prince Wild Rye

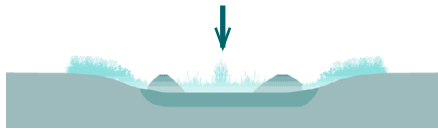
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RAIN GARDEN RAIN GARDEN PLANTS



HIGHER WATER USE*

ZONE 1



SOIL DRAINAGE

- ↓↓↓ *fast* (sandy-silty)
- ↓↓ *medium* (loam)
- ↓ *slow* (clay)
- ↑ *adaptable*

POLLINATOR

- butterfly / moth
- bird
- bee

SUN/SHADE

- full sun
- ◐ partial sun / shade
- full shade

OTHER CONSIDERATIONS

- erosion control
- allelopathic: consult [Calscape](#) for context and companion plants
- CA native
- Clay Tolerant

TREES**



Fraxinus latifolia
Oregon Ash



Salix laevigata
Red Willow



Salix lasiolepis
Arroyo Willow

SHRUBS

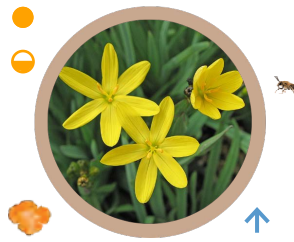


Cornus sericea
Red Osier Dogwood



Calycanthus occidentalis
Spice Bush

PERRENIALS



Sisyrinchium californicum
Yellow Eyed Grass



Sisyrinchium bellum
Blue Eyed Grass



Erythranthe guttata
Seep Monkey Flower



Anemopsis californica
Yerba Mansa

GRASSES



Juncus textilis
Basket Rush

GRASSES



Juncus patens
California Gray Rush



Carex praegracilis
California Field Sedge



Deschampsia cespitosa
Tufted Hair Grass

*Plants may require supplemental irrigation

**Trees only appropriate for very large rain gardens