Lawn Conversion and Native Trees and Plants

Presented by
Juanita Salisbury, Ph.D.
CA Landscape Architect #5161

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The gardens are always open:

- Primrose Way Pollinator Garden
- Arcadia Place Pollinator Garden
- Island Drive Pollinator Garden
- Guinda Street Pollinator Garden
- Hopkins Avenue Pollinator Garden
- Embarcadero Road Pollinator Corridor Project (in progress)

Google: “pollinator garden Palo Alto” for locations and virtual tours.
Overview

• Form follows function
• Getting rid of your lawn
• Lawn alternatives
• Trees and native plants
• Maintenance
FORM FOLLOWS FUNCTION

How will you **USE** the area?
Consider where you walk, sit, plant, play, etc.

Do you NEED a lawn?
Leverage Function-Based Decision-Making for Optimizing Water Use Outside

Outdoor Irrigation Accounts for Most of a Home’s Water Use

Lawns can use up to 50% of outdoor water use.

*Consider function when deciding on whether to have a lawn.*

What are lawns used for?

Also: Mowing intensively increases weeds and lawn pests. British Ecological Society, 2019.

Note where people are congregating.
OUTDOOR IRRIGATION ACCOUNTS FOR MOST OF A HOME’S WATER USE


Water budget calculation from an irrigation plan I designed for a client.

Irrigation uses 63,320 gallons of water per year, while the home uses 46,521 (if an average home).

Lawn area uses 28,539 gallons or 45% of the total irrigation water, but is only 19% of the landscape area.

The total water use for this household is potentially about 109,841 gallons per year, with almost 58% going to irrigation.
Getting Rid of your lawn:
Sheet-mulching at home to create a planting bed.

Layers of wet cardboard on top of the grass, topped with compost.
Get Rid of Your Lawn

Resources:
www.lawntogarden.org/residents
When in Drought…. Don’t remove your lawn.

SHEET MULCH IT!
There’s a better way to transform your lawn to a garden.

VS.

- Grass-Killing Chemicals
- Removed Sod is Landfilled
- Beneficial Organisms Harmed
- Compacted Soil
- Soil Nutrients Depleted

- Grass Decomposes
- Beneficial Soil Organisms Thrive
- Compost & Mulch Layers Hold Moisture
- Cardboard Smothers Grass
- Topsoil is Retained
Lawn Alternatives: Mulch

Mulch after sheet mulching with cardboard provides a “clean slate” to plant in and walk through.
Lawn alternatives: Decomposed granite can take the place of grass.
Lawn alternatives: Rugs in outdoor spaces provide soft surfaces for bare feet as well as defining space.
Native Grasses Use Less Water

Available as sod or seeds from various sources.
Lawn Alternatives

Native bunch grasses of various types.

Non-native Thyme “Elfin”
Native California
Ground-Cover
Alternatives for Lawn

• Ceanothus horizontalis 'Yankee Point'
• Evergreen
• About 15” tall and spreading
• Blue blossoms
• Sun/shade
• Very low water
Walkable Native California Alternative Plant

Achillea millefolium
- Semi-evergreen
- Spreads by runners
- Can be mown
- Blossoms of various colors
- Sun/shade
Native California Ground-cover Alternatives

Frageria vesca
- Evergreen, spreads by runners
- Tasty fruit
- Some or mostly shade
Native California Ground-Cover Alternatives

- Salvia 'Bee's Bliss'
- Evergreen
- Lilac bloom
- Fragrant
- About 12” tall
- 8' across in 2 years
Native California Ground-Cover Alternatives

Clinopodium douglasii
- Evergreen
- Minty taste
- Very low and trailing
- Shade to some sun
What to Plant?

The Calscape.org easy to use, searchable database provides information and resources. Find California native plants and research the plants that qualify for rebates. Create a plant palette of trees, shrubs, perennials, bulbs, vines and succulents.
A Better Question: Who to Feed?

• Plant species need insects--pollinators to survive.

• Speciation occurs more rapidly with pollinators.

• Pollinators spread plant species for butterfly and moth larvae, so rank plants by number of species that use the plants to help decide who to feed.

• Biological factors may be more important considerations than abiotic factors like climate, geology, and water for determining what to plant.
Butterflies and Moths Native to Santa Clara County
How Can I find Out How Much Water Plants Use?

WUCOLS – Water Use Classification of Landscape Species is an online searchable database for plant factors of individual plant species and is published by the University of California Cooperative Extension and the California Department of Water Resources.

https://ucanr.edu/sites/WUCOLS/

Plants can be ranked based on the percent of the water use of turfgrass, which is the reference against which their water use is measured. This percentage of the reference is called the “Plant Factor” (PF).

“SLA” refers to “Special Landscape Areas” which includes swimming pools and other open water features.
Basics of Plant Layout

1. In planting areas, if large enough, consider paths for structure and maintenance purposes.
2. Add plants (from your plant palette) as circles at their mature diameter. Most circles should just touch but can overlap for spacing.
3. Plant in masses and accent with larger shrubs and trees. Plant in odd numbers for massing.
4. Place large trees first, then shrubs. Then layer in perennials, vines, bulbs, succulents and annuals.
5. Don’t forget to plan for plants underneath tall trees and shrubs.
Why California Native Plants?

California is a Biodiversity Hotspot

- Almost 8,000 species of plants, some found nowhere else on the planet—more than any other state in the US.
- Many species are drought tolerant.
- Approximately 1,600 species of native bees, more than any other state in the U.S.
- 4,000 bee species across the U.S. (honey bees are not native).
- We have such a huge number of native plant species largely because of:
  a. Our unique ecosystems in California
  b. Our 1,600 species of native bees

Insect species including pollinators are declining worldwide.

In some areas of the world, insect species have declined 70%.
Energy from the sun...

...is converted by plants (first trophic level) into food that is eaten by insects and other animals (second trophic level).

Insects provide the food for baby birds and other animals.

37% of animal species are plant-eating insects, and, as a rule, native insects only eat the native plants they evolved with.

Pollinators play a key role in helping other animals access the sun’s energy by helping to spread the genetic diversity of plants in the environment.
PLANTS ARE NOT DECORATIONS

PLANTS ARE FOOD

This means that native plants in your garden WILL attract many native pollinators and other insects, and in turn, birds.

Native plants are critical parts of sustaining life.
Why is it important to see native plants as food?

Because the native plants **WILL** attract a variety of native pollinators and other insects, it is best to avoid making the garden an “ecological trap.”

An ecological trap is something in the environment that attracts organisms, and because of this attraction, makes it easier for them to be killed through predation or other means.
Native plant gardens enhance connectivity and complexity in the landscape. The more connectivity and complexity, the more the plants will support each other, leading to reduced irrigation needs.

Less water use doesn’t mean less plants.

As you add MORE plants, you will build a community of plants and other organisms that support each other and SHARE water, nutrients and information.

Imagine a machine where you add the right parts (in this case, plants). At a certain point the garden becomes a self-assembling, living machine.

Goal:
Start with a minimum of 20 different native plant species local to your area.
What is a plant community?

From the vegetation glossary on the CNPS website:

“A group of plant species living together and linked together by their effects on one another and their responses to the environment they share (modified from Whittaker 1975). Typically, the plant species that co-occur in a plant community show a definite association or affinity with each other (Kent and Coker 1992).”

Take-away insight:
Such a plant community creates a specific framework for the insects and animals that rely on those plants. As such, these other organisms must be taken into consideration as an integral part of that environment when deciding on what to plant.
California has many plant communities: coastal scrub, oak chapparal, desert, redwood forest, etc.

Plant communities are a function of the pollinators that live in them.

Think of bees as “farmers”, whose function in the environment is to spread genetic diversity of plants for other insects to eat.

Pollinators (bees mostly) move genetic material—pollen—around.

Aim for the majority of native plants in your garden to be local species and appropriate for your plant community.
Pollen contains the male genes of plants for fertilization and seed formation.
Sequence of plant selection
Start with large plants first, then shrubs, then perennials

1. Fit in as many trees as possible.

2. Then, the shrub layer should compose over 60% of all the plants. Focus on evergreen shrubs.

3. In the remaining spaces, fit in as many grasses, perennials, bulbs, succulents, groundcovers and vines as possible. Aim for a mix of herbaceous and woody perennials.

4. Don’t forget annuals! These can provide color and pollinator resources (and fill up the soil seed bank) in the first few years while waiting for larger shrubs to grow.

Yellow Tidy Tips and poppies for easy color
START WITH KEYSTONE TREES
WHAT TO PLANT?
START WITH KEYSTONE PLANT GENERA

Keystone plants form the backbone of habitat resources: food, shelter, nesting sites.

Keystone species help other plant species survive.

Keystone plants provide food for dozens or hundreds types of caterpillar species, upon which countless other animals depend.

Take-away insight: By supporting large numbers of other organisms, keystone species provide critical connections in the environment.

Take-away technique:

Include at least a few keystone plants to provide a resilient native plant garden.
Thirteen Tree Species Native to Santa Clara County
Quercus agrifolia. Long-lived, adding shade and a sense of place.

A landscape without vegetation.

**TREES HELP SAVE WATER**

- Trees absorb water and release it into the air, cooling and cleaning it.
- Trees form *half of the rain cycle*, teaming up with the oceans, they help circulate water across land.
- Without trees, deserts can form.
- Trees improve water quality by filtering rainwater and slow down the impacts of heavy rain.
- Trees reduce flooding and stabilize soil.

California Sister butterfly. Caterpillars feed on Oaks, especially Quercus chrysolepis.
• Clouds form more often over forested areas than non-forested areas.

• Cooling effects of clouds and carbon dioxide capture by trees more than offset the reflection of the sun during times when deciduous trees are bare.

Cloud cooling effects of afforestation and reforestation at midlatitudes
By Sara Cerasoli, Jun Yin, Amilcare Porporato
Proceedings of the National Academy of Sciences
Aug 2021, 118 (33) e2026241118; DOI: 10.1073/pnas.2026241118
QUERCUS LOBATA OR VALLEY OAK

No other trees come close to delivering all the ecosystem services Oaks provide.

- Used to be 61% of the tree cover in the Santa Clara Valley
- As a keystone species, provides critical support to the entire ecosystem
- Deciduous, i.e., drops all leaves each year which need to be left in place underneath to support the health of the tree
- Tap roots seek out water table and then lateral surface roots share water with other plants
- Native plants like Monardella species are best to grow underneath (nonnative plants can adversely affect the health of the tree)
- Are “insect factories”, transforming sunlight into protein to feed countless birds and other species
- Grows quickly and can live up to 600 years
- Adds value to real estate

Quercus lobata is the anchor at the Hopkins Avenue Pollinator Garden
What trees can I fit into my yard—if there are existing trees or not much space?

Here are a dozen examples from my TINY yard. * = top picks for drought tolerance.

Even with **more** plants than last year, I’m using **less** water than last summer.

<table>
<thead>
<tr>
<th>Tree Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acer macrophyllum—</td>
<td>Big Leaf Maple. Shade, deciduous.</td>
</tr>
<tr>
<td>Cercocarpus betuloides—</td>
<td>Mountain Mahogany.</td>
</tr>
<tr>
<td>Salix lasiolepis—</td>
<td>Arroyo Willow. Deciduous.</td>
</tr>
<tr>
<td>Sambus nigra—</td>
<td>Elderberry. Part shade, deciduous.</td>
</tr>
<tr>
<td>*Arctostaphylos glauca—</td>
<td>Big Berry manzanita. Evergreen, sun.</td>
</tr>
<tr>
<td>*Cercis occidentalis—</td>
<td>Redbud. Deciduous, sun or part shade</td>
</tr>
<tr>
<td>*Prunus ilicifolia—</td>
<td>Holly Leaf Cherry. Evergreen, sun.</td>
</tr>
<tr>
<td>Acer negundo—</td>
<td>Box Elder. Deciduous, sun.</td>
</tr>
<tr>
<td>Modesto Ash, existing street</td>
<td></td>
</tr>
<tr>
<td>Corylus cornuta—</td>
<td>Hazelnut, good for shade. Deciduous.</td>
</tr>
<tr>
<td>Prunus virginiana var. demissa</td>
<td>Deciduous, sun or part shade</td>
</tr>
<tr>
<td>*Sambus nigra—</td>
<td>Elderberry. Part shade, deciduous.</td>
</tr>
<tr>
<td>*Heteromeles arbutifolia—</td>
<td>Toyon. Sun or part shade</td>
</tr>
</tbody>
</table>
Pro tip: Choose evergreen shrubs that don’t go dormant to keep your yard looking green.

Search, then rank by number of butterflies and moths are hosted. Choose what will fit in size for your location and water needs. Expand the search area a bit if you don’t see something that works well for your design.

Second: Choose native shrubs. 29 species native to Santa Clara County
Maintenance

Native gardens are less maintenance than a non-native garden with a lawn

- Keep weeds at bay
- Irrigate plants to establish (once a week)
- Irrigation should encourage roots to search for water (deeply just outside the rootball)
- Prune sparingly and to control dried up, dead material for fire safety
- Don't fertilize, amend sparingly
- Mulch to control weeds initially and help establish plants, then mulch with leaves (use a bit of wood bark on top to hold in place)
- Leave areas of bare dirt for nests
- Don't use leaf blowers in planted areas. If using a leaf-blower to clean off hardscape, use an electrically powered blower (reduces fumes and emissions)
- Don't use pesticides, herbicides, or fungicides
Avoid Creating an Ecological Trap

Among the goals for native plant habitats are to optimize reproductive success. A native plant garden, with its abundant blooms with nectar and pollen for bees and host plants for butterfly and moth larvae, will be very attractive to these insects. An ecological trap is an environment, or things in the environment, that lures organisms into a habitat that is unfit to maintain them.

Connecting habitats via habitat corridors to reduce isolation.

Reducing light pollution at night: using black-out curtains in all windows and using motion sensors on other outdoor lighting at night instead of leaving lights on. Many insects are attracted to lights at night, which increases mortality of these insects through predation and exhaustion.

Leaving the leaves: many insects that become larvae or pupa over-winter and shelter in leaf litter. Using leaf blowers around plantings to kills these insects and removes them before they can become adults.

Eliminating use of pesticides, herbicides and fungicides: 70% of native bee species nest in the ground, where they may be negatively affected by these chemicals.

Reducing as much gasoline exhaust as possible by using electric vehicles and other electrical devices. Pollinators use smell and vision to find food, and the fumes from gas-powered devices interferes with this behavior.
Final Thoughts:
Among other ecosystem services and saving money on water and maintenance, the more you understand the interrelationships in nature, you will learn how to optimize productivity of your native plant garden... leading to an abundance of life, as well as the enhancement of your appreciation and role in caring for nature’s complex beauty.