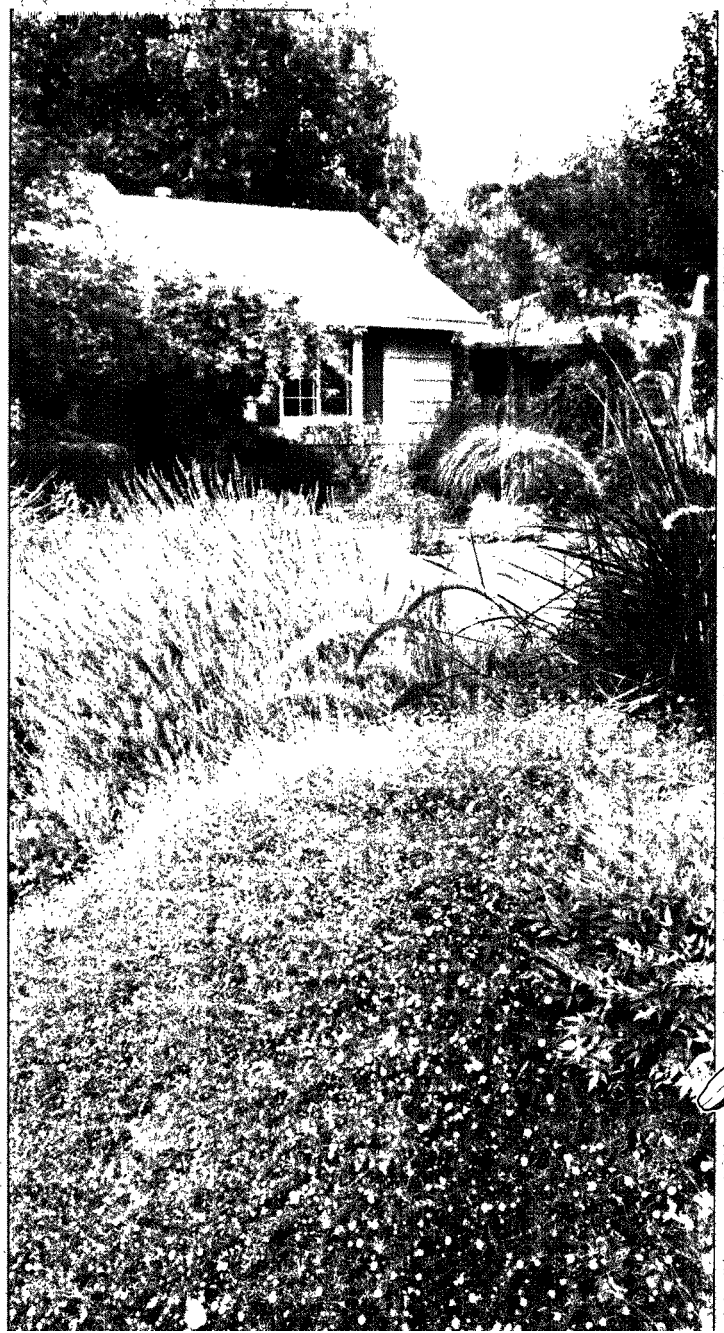
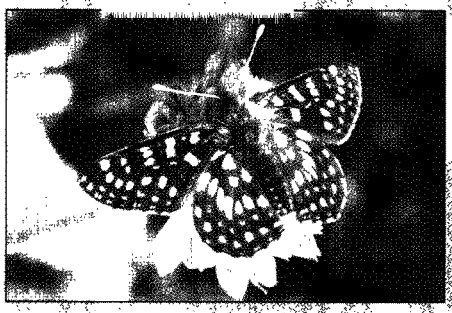
RIVER-FRIENDLY LANDSCAPE GUIDELINES

Sustainable Practices for the Landscape Professional





RIVER-FRIENDLY

LANDSCAPING

RIVER-FRIENDLY LANDSCAPE GUIDELINES

"A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community."

SOURCE: ALDO LEOPOLD, *A SAND COUNTY ALMANAC.*

The *River-Friendly Landscape Guidelines* were created for landscape professionals in the Sacramento region by the Sacramento Stormwater Quality Partnership (SSQP), with permission and assistance from StopWaste.Org in Alameda County. The *River-Friendly Landscape Guidelines* are a Sacramento revision of the *Bay-Friendly Landscape Guidelines*, originally published by StopWaste.Org in 2003.

Disclaimer:
The information in these guidelines is intended for use by professional landscapers in the design, construction, and maintenance of new or existing landscapes. It is provided as a public service by the Sacramento Stormwater Quality Partnership to provide environmental benefits and reduction of costs. The guidelines are not a substitute for the exercise of sound judgment in particular circumstances and are not intended as recommendations for particular products or services.

The *River-Friendly Landscape Guidelines* are intended to aid landscape professionals in the protection and conservation of Sacramento's waterways, in the reuse and reduction of plant debris, and to support an integrated approach to environmentally-friendly landscaping.

The *Guidelines* are organized around seven principles for protecting the environment. By viewing the landscape through the lens of these seven principles we can see, for example, how plant selection can create or decrease waste, or how soil preparation can prevent or increase runoff. There are more than fifty practices under these seven principles. The practices themselves each include many examples of applications. The practices and their applications are meant to be a starting point but are not meant to be comprehensive. It is likely that there are many additional applications for each. Some practices are repeated under different principles because one practice can be integral to more than one principle. In other words, there are a number of critical practices that can protect the environment in more than one way. Using mulch, for example, reduces waste, nurtures the soil, conserves water, and creates wildlife habitat.

The principles and practices included in the original *Bay-Friendly Landscape Guidelines* were selected with guidance from many public and private landscape architects and contractors, representatives from Alameda County public agencies, nonprofit organizations, and the staff of StopWaste.Org. Acknowledgements for the many individuals, businesses, and agencies involved in the development of both the *River-Friendly Landscape Guidelines* and *Bay-Friendly Landscape Guidelines* are listed on page 62.

SACRAMENTO STORMWATER QUALITY PARTNERSHIP

Sacramento Stormwater Quality Partnership
827 7th Street, Room 301
Sacramento, CA 95814
www.sacramentostormwater.org/riverfriendly

BAY-FRIENDLY LANDSCAPING

777 Davis Street, Suite 100
San Leandro, CA 94577
www.BayFriendly.org

COVER PHOTO CREDITS
LEFT: CINDY NELSON
UPPER RIGHT: EMILY GRISWOLD, UC DAVIS ARBORETUM
LOWER RIGHT: JANE HUBER
RIVER-FRIENDLY LOGO: POMEGRANATE DESIGN, SACRAMENTO
COMMERCE PRINTING SERVICES, SACRAMENTO

PRINTED WITH SOY BASED INKS ON 100% RECYCLED CONTENT PAPER (50% POST-CONSUMER)

JANUARY 2007

Table of Contents

Chapter 1

2

Chapter 2

River-Friendly Landsc[illegible]ractices 7

Chapter 3

River-Friendly Landscaping Practices 10

1 Landscape Locally 11
2 Landscape for Less to the Landfill 14
3 Nurture the Soil 21
4 Conserve Water 28
5 Conserve Energy 32
6 Protect Water & Air Quality 35
7 Create & Protect Wildlife Habitat 43

Chapter 4

Summary of River-Friendly Landscaping Benefits 46

Chapter 5

How to Start Landscaping in a River-Friendly Way 51

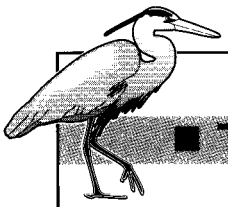


Table of Tips

- Soil Texture by Feel 12
- Fire-Resistant Plants 13
- Using Salvaged Materials in the Landscape 20
- Indicators of Quality Compost 24
- Sheet Mulching 25
- Compost Tea 26
- "All-Star" Plants for Central Valley Gardens 28
- Rebates for Irrigation Upgrades 31
- Shade Effectiveness in Parking Lots 33
- Beneficial Insects and Plants for Controlling Major Pests 38
- Pervious Concrete 41
- Pest Management for Roses 42
- Sources of California Natives 44
- Flowering Periods of Selected Beneficial Insect Plants 45
- Guide Your Clients through a Transition Period 53

INTRODUCTION

1

Introduction

BASIC PRINCIPLES OF NATURAL SYSTEMS

1 Natural systems are inherently beautiful.

2 Nothing goes to waste.

3 Inputs are limited and are primarily defined by the natural resources on site.

4 The more diverse they are, the more stable they are.

ADAPTED FROM: DAVID MCDONALD, DESIGN WITH NATURE: *LANDSCAPE DESIGN AS THOUGH THE ENVIRONMENT MATTERED,* SEATTLE PUBLIC UTILITIES.

MIKE HEACOX, LUCIOLE DESIGN

River-Friendly Landscaping is...

A whole systems approach to the design, construction and maintenance of the landscape to support the integrity of one of California's key ecosystems, the Sacramento River watershed. The River-Friendly landscape professional can create and maintain healthy, beautiful and vibrant landscapes by:

- ✔ Landscaping in harmony with the natural conditions of the Sacramento River watershed.
- ✔ Reducing waste and recycling materials.
- ✔ Nurturing healthy soils while reducing fertilizer use.
- ✔ Conserving water, energy and topsoil.
- ✔ Using integrated pest management to minimize chemical use.
- ✔ Reducing stormwater runoff.
- ✔ Creating wildlife habitat.

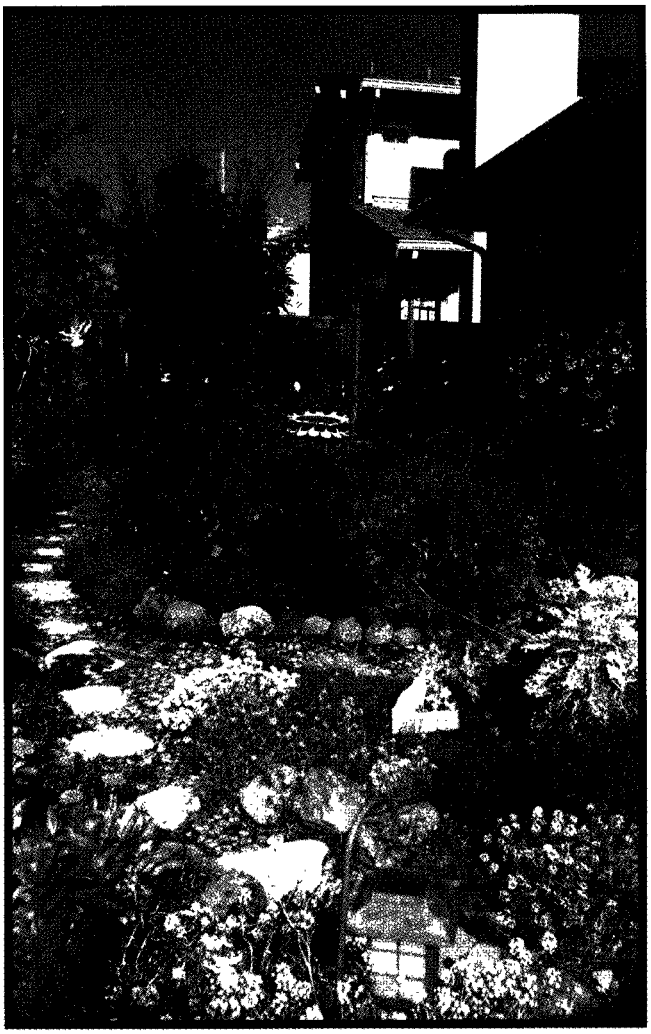


PHOTO: KWAI LAM

A well-designed and maintained River-Friendly landscape can cost less to maintain in the long run by consuming fewer resources. For public spaces, River-Friendly landscapes embody community values for health, wildlife and the environment.

For private property, River-Friendly landscaping addresses issues that your clients care about, such as less maintenance and decreased water usage, as well as increased environmental benefits. It can lead to increased customer satisfaction and referrals to new clients.

As a landscape professional you can be proactive. You can be part of the environmental solution rather than waiting for more severe water conservation and pollution controls that are increasingly likely with our growing population.

Conventional Landscaping

Commercial, public and residential landscapes can benefit the owner and the community through their beauty, the recreation they offer, and their positive environmental effects. Trees, for example, can provide shade and reduce energy consumption, absorb air pollutants, reduce stormwater runoff and add to property values.

On the other hand, landscaping can cause damage to the environment, consuming fossil fuels, contributing to pollution of the soil, air and water, and burdening landfill space.

Conventional landscaping often relies on large lawns, non-native plants, abundant irrigation, and heavy use of fertilizers and pesticides. It frequently requires significant mowing, blowing, trimming and removal of plant debris.

Removing all plant debris from the site is one example of an especially damaging practice. It removes food and habitat for birds, insects and beneficial soil organisms. It mines our local soils of nutrients and degrades soil health. Often, the result is an increased dependency on fertilizers and irrigation, as well as greater stormwater runoff, erosion and pollution of the waterways.

While it may not be possible or practical to keep all plant debris on site, there are more opportunities to reuse plant debris in our landscapes than are commonly practiced. Adding compost and mulch from off-site sources is also important to fostering living soils and sustainable landscapes.

Keeping plant debris on-site can:

- Foster living soils
- Increase the organic matter in the soil
- Improve soil structure and reduce compaction
- Retain topsoil
- Create healthier plants
- Reduce the need for irrigation, fertilizers and pesticides
- Reduce the air pollution from transporting plant debris long distances to be processed or landfilled
- Conserve landfill space
- Restore the soil's ability to absorb and filter water, reducing pollution and stormwater runoff into local creeks and Sacramento's rivers

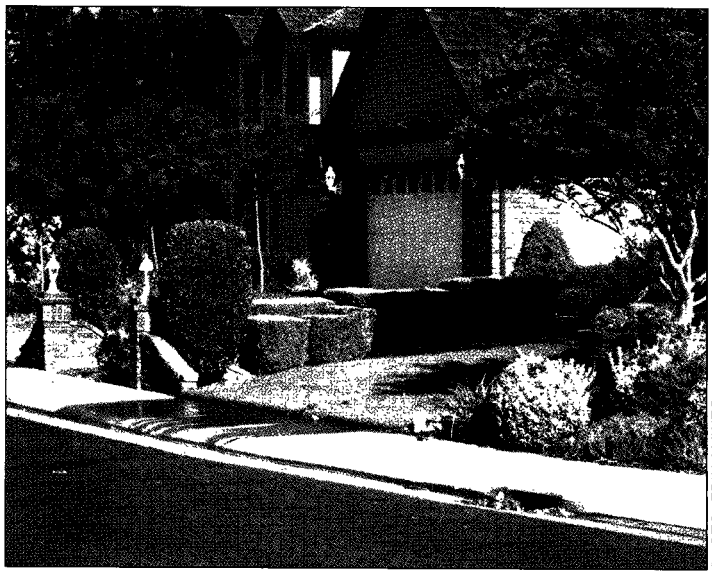


PHOTO: ERIN AMWEG

Water runoff carries sediments, pesticides and other harmful pollutants into the stormdrain, which leads directly to Sacramento's creeks and rivers. Sheared shrubs generate unnecessary yard waste.

***"We need to realize** that we all live in a watershed and that everything we do in our landscapes impacts the waterways and natural ecosystems. Once we make that connection, we have no choice but to re-evaluate our landscape practices and to act in ways that reduce waste, eliminate pollution, and enhance the natural environment."*

— Dave Roberts, Landscape Designer & Contractor, Roberts Landscape, Sacramento

Why is River-Friendly Landscaping Important?

Statewide, 2.7 million tons of plant debris are landfilled each year. Leaves and clippings alone are sixth out of the ten most prevalent material types in California's overall disposal waste system (CIWMB, 2003). Twenty-three states have banned or limited the disposal of plant debris in their landfills; however, California has not.

In the Sacramento region, nearly 200,000 tons of plant debris are diverted annually from landfill disposal through residential green waste collection programs. Unfortunately, much of this plant debris is being hauled out of the county for processing, which results in higher costs, burning of fossil fuel, and negative impacts on traffic and air quality. A significant portion of this plant debris is also used as landfill cover.

The removal of plant debris from the landscape, whether by residents or landscape professionals, leads to depleted soil and the waste of an important resource. As has been proven in a number of areas, the amount of plant debris can be greatly reduced through residential recycling, composting, grasscycling, and mulching.

Other types of waste, including hazardous wastes, are also generated by conventional landscaping practices. For example, annual disposal of leftover pesticides used by residents costs tens of thousands of dollars for each county – and only a fraction of the pesticides are disposed of properly.

River-Friendly landscaping diverts plant debris from the landfill by preventing waste in the first place through careful plant selection, watering and fertilizing, or reusing plant material through grasscycling, mulching, and composting.

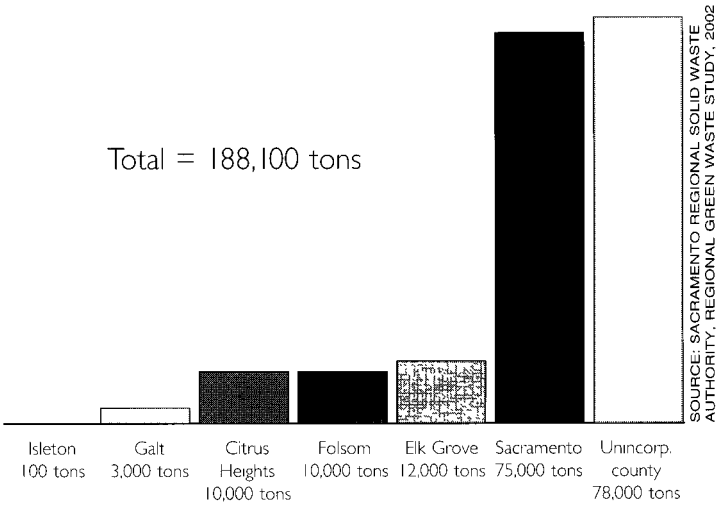
Because generating plant debris is linked to a wide range of landscaping practices – such as watering and fertilizing – this integrated solution is essential.

***"People love** gardens because they connect us with nature and plants. There shouldn't be a high environmental cost to landscaping. There doesn't need to be."*

— Emily Griswold, Horticultural Curator, UC Davis Arboretum

Plant Debris Diversion

Annual Tonnage by Source



***"Since more than half** of the water used by local residents is used outdoors, landscape professionals can have a direct and positive impact on the local watershed by practicing and encouraging water conservation in the landscape."*

— Sarah Foley, Sacramento Region Water Forum

A wasteshed is all the land in a region from which waste is collected and hauled into a common landfill.

A watershed is all the land in a region from which rain collects and drains into a common creek, river, lake or bay.

The Link Between Wastesheds and Watersheds...

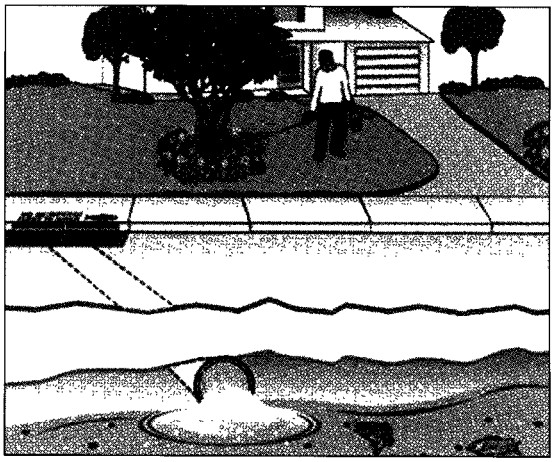


ILLUSTRATION CELESTE RUSCONI, UC IPM

Returning organic matter to the soil, in the form of plant debris, is the link between protecting our watershed and conserving landfill space.

In healthy landscapes, water from rain or irrigation percolates through soil that is rich in organic matter and alive with organisms. Living soils absorb and retain much of the water while also filtering out pollutants before the water reaches the aquifer or watershed.

For the most part, conventional landscapes no longer provide this cleansing function because...

1. Rooftops, asphalt, cement, and other impervious surfaces, on the one hand, prevent much of the water from ever reaching the soil.
2. On the other hand, urban soils that have been mined of organic matter, compacted, eroded, and treated with chemicals are often lifeless and no longer able to function naturally – they have lost their ability to absorb much water or to filter pollutants out of the water.
3. Water from irrigation and rainfall then washes pesticides, fertilizers, plant debris, pet waste, heavy metals, spilled motor oil and other contaminants from lawns, gardens, roads and parking lots into gutters and stormdrains.
4. And once in the stormdrain, the water is not treated!
5. From stormdrains, the polluted runoff flows directly into creeks and rivers, which are themselves important resources for supporting the diverse and complex array of Sacramento's natural ecosystems.
6. And, all creeks in our watershed flow to the wetlands and the Sacramento River where the contaminated water again harms fish and other wildlife and can cause illness in humans.

"Virtually everywhere we've looked,

we've found Sacramento's urban creeks to be contaminated with pesticides. Environmentally-friendly landscaping practices would go a long way to help reduce the amount of pesticides and other pollutants in our local waterways."

— Dave Tamayo, Environmental Specialist, Sacramento County Stormwater Program

---

RIVER-FRIENDLY LANDSCAPING

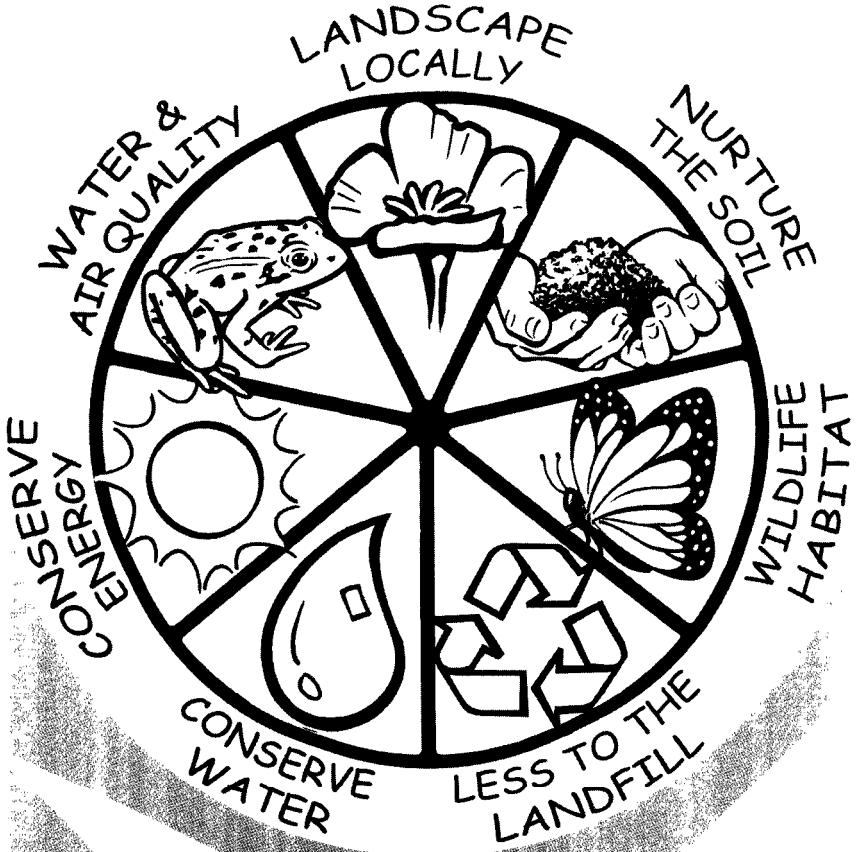
The 27,000 square-mile Sacramento River Watershed drains the Sacramento Valley, the Modoc Plateau, and parts of the Cascade Range and Sierra Nevada Range. This watershed is one of the largest in the United States and covers most of northern California.[1]

Whether your client's site is next to a creek or miles away, your landscaping activities impact the quality of water in the Sacramento River watershed.

The landscape you design, construct or maintain can be the first line of defense.

[1] SOURCE: SACRAMENTO RIVER WATERSHED PROGRAM

CHAPTER TWO


LANDSCAPE LOCALLY
NURTURE THE SOIL
WILDLIFE HABITAT
LESS TO THE LANDFILL
CONSERVE WATER
CONSERVE ENERGY
WATER & AIR QUALITY

Landscape Locally

- ❑ 1. Evaluate climate, exposure and topography
- ❑ 2. Assess the soil and test drainage
- ❑ 3. Survey and protect flora & fauna
- ❑ 4. Consider the potential for fire
- ❑ 5. Use local, natural plant communities as models

2 Landscape for Less to the Landfill

1. Select appropriate plants:
   - ❑ A. Choose plants to match the microclimate & soil conditions
   - ❑ B. Choose plants that can grow to their natural size in the space allotted them
   - ❑ C. Replace sheared hedges with plants that can grow to their natural shape & size
   - ❑ D. Do not plant invasive species
2. Keep plant debris on site:
   - ❑ A. Grasscycle
   - ❑ B. Produce mulch from plant debris
   - ❑ C. Compost plant debris
- ❑ 3. Prune selectively and properly
- ❑ 4. Water and fertilize judiciously
- ❑ 5. Use goats for controlling weeds and creating firebreaks
- ❑ 6. Use salvaged items & recycled content materials
- ❑ 7. Reduce and recycle construction waste
- ❑ 8. Separate plant debris for recycling

3 Nurture the Soil

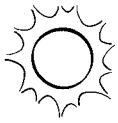
- ❑ 1. Remove and store topsoil before grading
- ❑ 2. Protect soil from compaction
- ❑ 3. Defend against erosion
- ❑ 4. Amend the soil with compost before planting
- ❑ 5. Grasscycle
- ❑ 6. Mulch regularly
- ❑ 7. Aerate compacted soils
- ❑ 8. Feed soils naturally
- ❑ 9. Avoid synthetic, quick release fertilizers
- ❑ 10. Minimize the use of chemical pesticides

• See chapter 4, Summary of River-Friendly Landscaping Benefits to view list of practices categorized by design, construction and maintenance.

4 Conserve Water

- ❑ 1. Create drought resistant soils with compost & mulch
- ❑ 2. Grow California natives or Mediterranean plants
- ❑ 3. Minimize the lawn
- ❑ 4. Implement hydrozoning - group plants by water needs
- ❑ 5. Design for on-site rainwater collection, recycled water and/or graywater use
- ❑ 6. Design and install high efficiency irrigation systems
- ❑ 7. Install a dedicated meter to monitor landscape water use
- ❑ 8. Manage irrigation according to need
- ❑ 9. Maintain the irrigation system so every drop counts
- ❑ 10. Request an irrigation audit

5 Conserve Energy



- ❑ 1. Plant and protect trees to moderate building temperatures
- ❑ 2. Reduce the heat island effect: shade paved areas
- ❑ 3. Shade air conditioners
- ❑ 4. Design lighting carefully
- ❑ 5. Choose and maintain equipment for fuel conservation
- ❑ 6. Specify local products & suppliers

6 Protect Water & Air Quality

1. Use Integrated Pest Management:
   - ❑ A. Prevent pest problems
   - ❑ B. Train your staff to identify and monitor pest & beneficial populations
   - ❑ C. Educate your clients
   - ❑ D. Control pest problems with physical & mechanical methods
   - ❑ E. Control pest problems with biological controls
   - ❑ F. Control pest problems with the least toxic pesticide as a last resort
- ❑ 2. Eliminate high input decorative lawns
- ❑ 3. Keep soil covered
- ❑ 4. Choose and maintain your materials, equipment & vehicles carefully
- ❑ 5. Keep organic matter where it belongs
- ❑ 6. Minimize impervious surfaces
- ❑ 7. Plant trees
- ❑ 8. Maintain and manage the irrigation system carefully
- ❑ 9. Design a system to capture and treat water

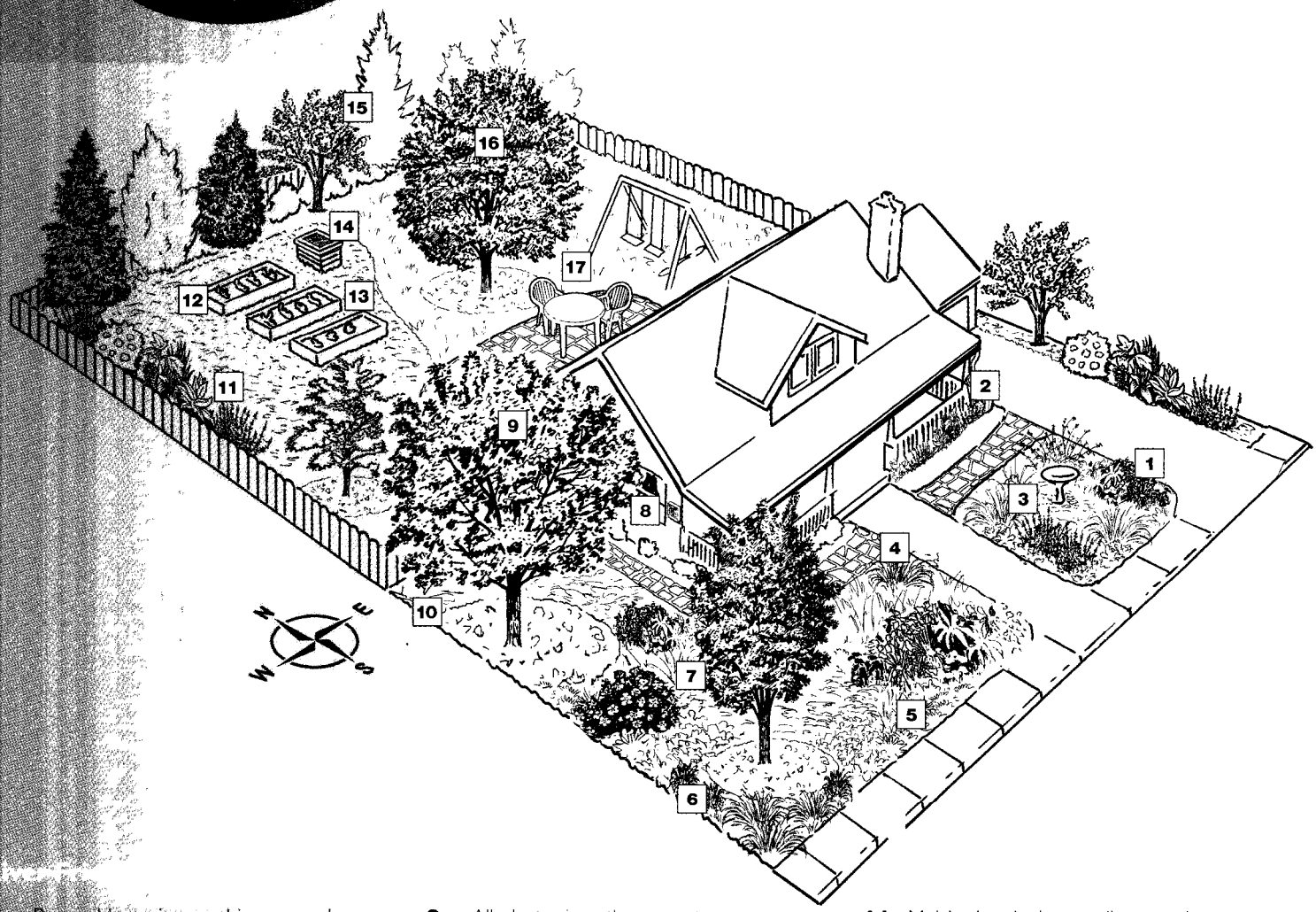
7 Create & Protect Wildlife Habitat

- ❑ 1. Diversify
- ❑ 2. Choose California natives first
- ❑ 3. Provide water & shelter
- ❑ 4. Eliminate the use of pesticides
- ❑ 5. Conserve or restore natural areas & wildlife corridors

CHAPTER THREE

3

River-Friendly



River-Friendly

1. Permeable paving on driveway and walkway to front door
2. Water from roof channeled to cistern
3. Water for wildlife habitat
4. Pavers with spaces and low water use plants between
5. Front lawn replaced by diverse plantings with many California native groundcovers, shrubs and trees, but no invasive species
6. All plants given the space to grow to their natural size
7. Plants selected to match the microclimates
8. Irrigation controller waters hydrozones according to plant needs, soil moisture and weather
9. Deciduous trees placed to the west & southwest of the house & patio for summer cooling
10. Repository for leaves to collect under trees as mulch
11. Mulched paths keep soil covered
12. Drip irrigation for vegetable beds, shrubs, trees and elsewhere where feasible
13. Raised beds are constructed from plastic or composite lumber
14. Compost bin recycles plant and kitchen debris
15. Evergreen windbreak blocks north winter winds
16. Trees not topped but pruned properly
17. Small lawn in backyard where family will use it

iver-Friendly landscaping recognizes that our landscapes, whether they are commercial, institutional, residential or open space, are part of the larger ecosystem of the Sacramento River watershed. It does not mean that the landscape must be wild and uncontrolled, but rather on the whole, it respects the natural attributes of our region and contributes to the health, diversity and sustainability of the Sacramento River ecosystem.

In return, many of the natural processes of a well functioning ecosystem, like nutrient cycling, can then benefit the landscape you design, construct or maintain. In addition, your clients are re-connected to nature through their landscapes.

1. Evaluate climate, exposure and topography

Description

Careful evaluation will reveal both the opportunities and the limits of the site. Start by determining the Sunset climate zones but also consider the unique features of smaller zones within the site, which could mean the difference between life and death for some plants.

Applications

Visit the site and among other features, identify on a site map the:

- Sunny, shady and partly shady areas
- Hot spots along south facing walls and fences
- Wet or dry spots
- Windy or exposed areas and the direction of prevailing winds
- Slopes
- Frost pockets
- Shape & size of planting areas
- Zones with difficult access
- Water flow onto and/or through the site
- Neighbors' trees
- Potential natural hazards such as flooding

Benefits

This knowledge is critical to all other River-Friendly landscaping practices – particularly being able to select plant materials that match the site. It places the landscape in the context of the Sacramento River watershed. In the long run, it can save your business time and money as it allows you to collaborate with nature, thus avoiding problems and reducing callbacks.

PHOTO: ELLEN ZAGORY

"The closer we come to comprehending that we are an integral part of nature, the better we understand the consequences of our actions in nature."

— Excerpt from *California's Changing Landscapes,* by Michael-Barbour et al.

2. Assess the soil and test drainage

Description

Know the soil: its organic matter, fertility, texture, and structure. Identify problems such as compaction layers, poor drainage, or contamination with heavy metals, salts or toxic compounds. This knowledge will help you determine the soil quality, the types of plants it can best support and any need for supplements.

Applications

- Soil surveys can be found at your local library, or local cooperative extension or agricultural commissioner's offices. Useful soil information (hardpans, soil texture, clay content, drainage, geology) is at: http://websoilsurvey.nrcs.usda.gov/app/. Landscape professionals that need additional soils information for Sacramento County properties can contact USDA-NRCS, Elk Grove Service Center, at (916) 714-1104, x3.
- Review site grading specifications.
- Visit the site and take handfuls of the soil to determine the texture by "feel."
- Check for compaction zones with probes, augers or shovels. Test drainage in several spots.
- Sample the soil from different zones in the landscape - and remember that different plants have different nutrient requirements. Send soil samples for an analysis of the soil pH, organic matter, nutrients and potential contaminants.
- Identify soil characteristics on a site map.
- Do an initial soil analysis, and then annually during the transition to a River-Friendly landscape, and also:
  - When planning a renovation
  - When experiencing ongoing problems

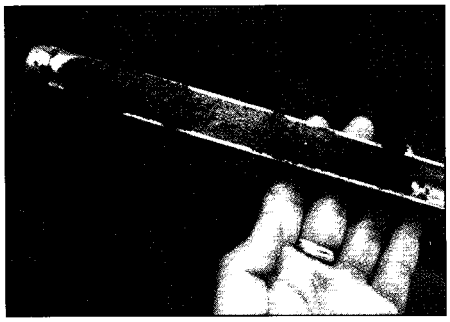


PHOTO: MUNICIPAL WATER DISTRICT OF ORANGE COUNTY, *LANDSCAPE MANAGEMENT FOR WATER SAVINGS* BY TOM ASH.

Benefits

Understanding the soil is also critical to landscaping in an environmentally friendly manner. Plants are more likely to be placed appropriately and fertilizers used only as needed.

3. Survey and protect flora & fauna

Description

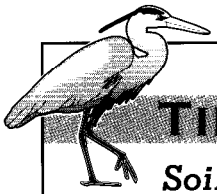
Existing flora and fauna provide insight into the ecosystem health and the landscape possibilities. Native vegetation, wildlife habitat & sensitive areas such as wetlands may need protection. Invasive species will need active control.

Applications

- Identify plant species and communities, especially California natives, invasive or endangered species and wetlands.
- Learn what wildlife inhabit or move through the site or have historically inhabited the site. Consider what they used for food and shelter. Plan for restoration.
- Ask your clients to identify plants that are of value to them.
- Become familiar with local tree ordinances and wetland or endangered species regulations.
- Develop a plan for preserving existing trees and shrubs or engage the services of a certified arborist to help you create the plan.

Benefits

Conserving or restoring local flora, fauna and habitat provides your clients with a sense of place. Native plants can make the job easier for the landscape professional.



TIPS FOR SUCCESS

Soil Texture by Feel

Take a 1or 2-tablespoon sample of soil into your hand. Slowly add water and knead the sample until moist. Try to form the sample into a ball. Squeeze it to see if you can make a cast (an impression of your fingers). Gently stretch the soil out between your thumb and forefinger and try and make a ribbon. Note the feel of the soil as you are working it and use the table below to determine its texture:

Characteristics of Soil Sample	Soil Texture
Soil will not stay in a ball. Loose and single-grained with a gritty feeling when moistened.	Sand
A cast will form but it can't be handled without breaking and will not form into a ribbon. Soil feels slightly gritty.	Loamy sand
A short ribbon can be formed but breaks when about 1/2 inch long.	Loam
A ribbon can be formed. The ribbon is moderately strong until it breaks at about 3/4 inch length. Soil feels slightly sticky.	Clay loam
The soil can easily be formed into a ribbon 1 inch or longer. Soil feels very sticky.	Clay

ADAPTED FROM: S.J. THEIN, *A FLOW DIAGRAM FOR TEACHING TEXTURE BY FEEL ANALYSIS*, JOURNAL OF AGRON. EDU.

4. Consider the potential for fire

Description

The potential for fire in the Sacramento region can be great, and landscaping is a critical factor. Understanding the topography, fuel and local weather are critical to designing and maintaining a landscape that reduces the potential for loss to fire. Plant selection is also very important to reducing the fuel load and avoiding fire ladders. Some species – "pyrophites" - ignite readily and burn intensely. Dense vegetation in hedges, screens or espaliers can be a fire hazard because the competition for limited water, nutrients and space results in a large amount of dry twiggy material.

Applications

- For sites adjacent to fire-sensitive open space or wildland: Create a Fire Mitigation Plan that identifies adjacent fire-sensitive wildland or open space or developments, exposure to prevailing winds during the dry season, steep slopes (especially south and west facing that can increase wind speed and convey heat), and vegetation type (particularly species that burn readily). Specify mitigations to these fire vectors, including the establishment of a "defensible zone" immediately surrounding the structure, that use one or more strategies for firescaping, such as:
  - Emphasize plants with low fuel volume and/or high moisture content in planting plans.
  - Avoid plants with high oil content or that tend to accumulate excessive dead wood or debris (pyrophites).
  - Assure that trees are well-spaced and pruned to 6 feet minimum above ground, and that dense shrub plantings are separate from trees, to minimize fuel ladders.
  - Assure that trees and tall shrubs are planted where limbs and branches will not reach the building or grow under overhangs as they mature.
  - Avoid fine shredded bark mulch.
  - Face and construct decks out of fire-resistant materials.
- Contact the local fire department for assistance in understanding the fire risk at a particular site and for additional guidance in reducing that risk, particularly for sites at the urban-wildland interface.

Benefits

Landscapes can be designed to reduce the fire hazard, with a clearer understanding of the risks, proper design and choice of plants.

5. Use local, natural plant communities as models

Description

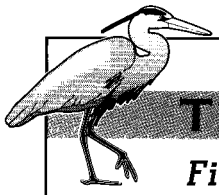
A plant community is a relatively distinct pattern of vegetation that is found in different regions of the county. Five of these local plant communities are briefly described in the last section of these guidelines (pages 55-58). It is important to also consider that species of plants within these communities overlap and that they change over time.

Applications

- Learn about local plant communities.
- Train yourself and your staff to recognize local plant communities and to evaluate the conditions under which the plants are succeeding.
- Use these communities to guide your choice in plant selection. Be careful with the Chaparral community, as it is prone to fire.
- Plant seeds of annuals to fill in with color and greenery while slower growing perennials get established.

Benefits

Using the local, natural plant communities as a model allows you to work with nature to create spectacular landscapes that can help replace what's so often been degraded or lost.



TIPS FOR SUCCESS

*Fire-Resistant Plants**

- Most are broadleaf deciduous trees but some thick-leaf evergreens are also fire-resistant.
- Leaves tend to be supple, moist and easily crushed.
- Trees tend to be clean, not bushy, and have little deadwood.
- Shrubs are low-growing (2') with minimal dead material.
- Tall shrubs are clean, not bushy.
- Sap is water-like and typically does not have a strong odor.

* Fire-resistant plants tend to have certain typical characteristics – much of the information about fire resistant plants is anecdotal and has not been scientifically tested.

SOURCE: R. MORITZ AND P. SVIHRA, *PYROPHYTIC VS FIRE RESISTANT PLANTS*, UCCE.

"We need to minimize the inputs and outputs so that our landscapes become a closed system."

— Bernadette Balics, Landscape Designer, Ecological Landscape Design, Davis

educing waste starts with not generating it in the first place. Selecting the right plants for the right place, as well as watering and fertilizing judiciously are important ways to reduce the tons of plant debris that are generated annually.

Reusing plant trimmings as mulch, grasscycling, and using compost improves soils, creates healthier landscapes and, in addition, keeps materials out of local landfills.

Material use is an important factor in the landscape. Using recycled content, salvaged, durable or local materials conserves resources and can reduce the amount of embodied energy that is consumed by the landscape.

Landscaping for less to the landfill will help you create a beautiful, relatively trouble free landscape that yields years of benefits for you, your client and Sacramento's rivers.

1. Select appropriate plants

A. Choose plants to match the microclimate & soil conditions

Description

Selecting the right plants is linked to understanding the site-specific conditions of the landscape. Plant selection is the foundation of environmentally sound landscaping and thus an important practice for meeting many of the other principles of River-Friendly landscaping.

Applications

- Select flora that is compatible with the exposure, temperature, moisture, and soil in microsites within each particular landscape site.
- Consider appropriate plant communities and how one community may succeed another with time.

PHOTO: CINDY NELSON

Benefits

Plants are more likely to thrive, which reduces their susceptibility to disease and other pests and their need for fertilizers and pesticides. Water can be conserved. Callbacks and plant replacement are often reduced. Debris is not generated in the first place.

"We are trying to recycle more of our green waste on our sites. One major benefit is that we don't have to haul it off site to a dump. Second, it helps to cut down on worker's compensation claims from back injuries due to heavy tarps of material being picked up for disposal."

— Manuel L. Gonzales, Director of Training, Cagwin & Dorward

1. Select appropriate plants

B. Choose plants that can grow to their natural size in the space allotted them

Description

Selecting a plant or plants to grow in too small a space starts a lifelong battle with the plant's genetics, thereby inviting disease and insects, generating unnecessary waste or increasing the fuel load.

Applications

- Consider the mature size and shape of the plants you choose and place them in areas that will allow them to assume their natural form.
- Avoid over-planting for instant effect.
- Select trees with a mature height of less than 20 feet for planting near power lines.

Benefits

Labor, fuel and waste are likely to be reduced, cutting your costs. Plant health and resistance to disease is fostered.

C. Replace sheared hedges with plants that can grow to their natural shape & size

Description

Shearing is a horticulturally unsound practice that is labor intensive and that encourages excessive new growth that can lead to unhealthy plants and increased waste. What's more, sheared hedges and screens have lots of deadwood under the dense green crown because of the lack of light reaching into the hedge. This dieback in the center of the plant increases its flammability.

Applications

- If hedges are desired, select dense species that will be able to grow to their natural shapes and sizes.
- Reduce the number of plants in the existing hedges and allow the remaining plants to grow into their natural form, if their size is appropriate to the space.
- Or recommend to your customers that the sheared hedges be removed and replaced with plants that can grow to their natural form.

Benefits

Your cost for the labor to regularly shear the hedges is lowered and at the same time, fuel load can be decreased, waste will likely be reduced and your disposal bills lowered.

D. Do not plant invasive species

Description

Invasive plants used in landscaping often escape into our natural areas, where they can spread rapidly and out-compete natives, degrade wildlife habitat and increase the fuel load.

Applications

Familiarize yourself with locally important invasive species, some of which are listed on the following page, and eliminate them from the site. Sheet mulch can be very effective for weed control. Do not plant invasive species. For more information contact www.cal-ipc.org.

Benefits

The cost of later pulling these species out of the landscape, neighboring sites and wild lands is avoided. Waste is reduced and ecosystem diversity is protected.

"You see a lot more unique architectural design in today's commercial and retail projects. A plant palette that uses non-standard, not-so-typical plants adds interest and accent to the architecture, complementing the building."

— Cheryl H. Sullivan, Landscape Architect, Cunningham Engineering, Davis

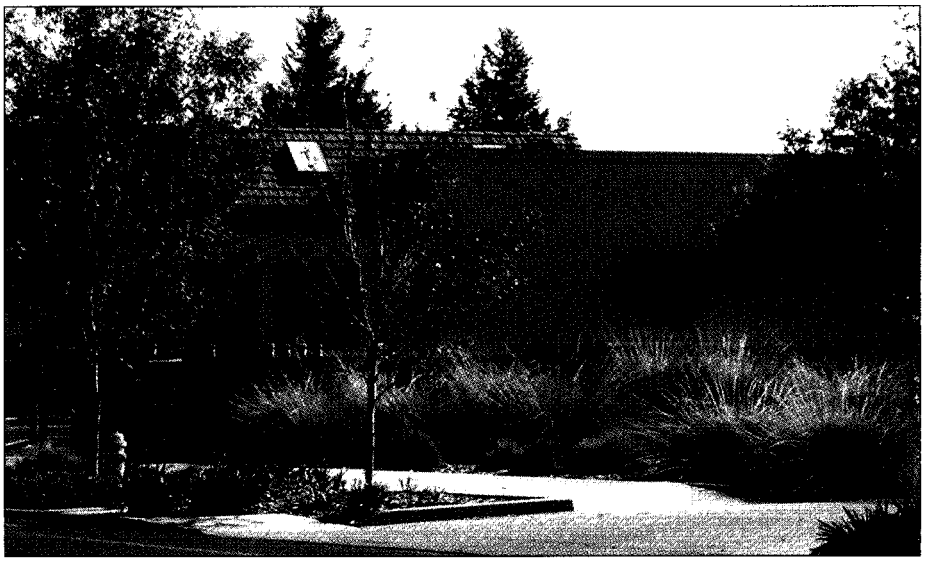


PHOTO: CHERYL H. SULLIVAN

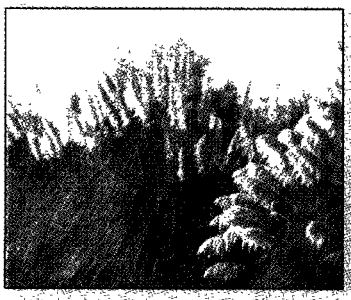
Avoid Invasive Garden Plants of the Central Valley

Invasive Plants		Non-Invasive Plants
Cortaderia selloana *C. jubata*	Pampasgrass Jubatagrass	***Leymus condensatus* (Giant wildrye 'Canyon Prince')** or *Muhlenbergia lindheimeri* (Lindheimer's Muhly) or ***Muhlenbergia rigens* (Deergrass)** or *Phormium tenax* (New Zealand Flax)
Cytisus scoparius *C. striatus* *Genista monspessulana* *Spartium junceum* *Sesbania punicea*	Scotch Broom Portuguese Broom French Broom Spanish Broom Scarlet Wisteria	*Forsythia x intermedia* (Forsythia) or ***Heteromeles arbutifolia* (Toyon)** or *Phlomis fruticosa* (Jerusalem Sage) or ***Ribes aureum* (Golden Currant)** or ***Salvia clevelandii* (Cleveland Sage)**
Eucalyptus camaldulensis *E. globulus* *Tamarisk* species	Red Gum Eucalyptus Blue Gum Eucalyptus Saltcedar	***Populus fremontii* (Fremont Cottonwood)** or ***Quercus lobata* (Valley Oak)** or Quercus suber (Cork Oak)
Sapium sebiferum	Chinese Tallowtree	*Arbutus unedo* 'Marina' (Marina Strawberry Tree) or *Cercis canadensis*, ***C. occidentalis*** (Eastern Redbud, **Western Redbud**) or *Lagerstroemia* hybrids (Crape Myrtle) or *Nyssa sylvatica* (Tupelo) or *Podocarpus gracilor* (Fern Pine)
Hedera canariensis *H. helix* *H. hibernica* *Vinca major*	Algerian Ivy English Ivy Irish Ivy Big Periwinkle	***Achillea millefolium* (Common Yarrow)** or *Bergenia cordifolia* and hybrids (Heartleaf Bergenia) or ***Ceanothus* species (California Wild Lilac)** or ***Heuchera maxima*** and hybrids **(Giant Alumroot/Coral Bells)** or *Pachysandra terminalis* (Pachysandra) or *Trachelospermum asiaticum, T. jasminoides* (*Asian Star Jasmine*, Star Jasmine)
Pennisetum setaceum	Fountaingrass	*Lavendula* species (Lavender species)

ADAPTED FROM: *DON'T PLANT A PESTI GIVE THEM AN INCH AND THEY'LL TAKE AN ACRE...*, CENTRAL VALLEY VERSION, CALIFORNIA INVASIVE PLANT COUNCIL, WWW.CAL-IPC.ORG

SUGGESTED ALTERNATIVES IN BOLD ARE CALIFORNIA NATIVE SPECIES

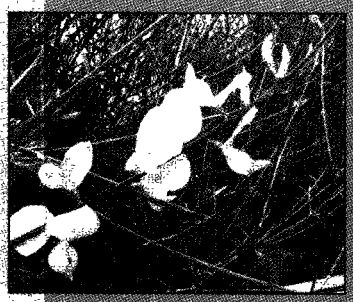
Invasive



Cortaderia selloana
(Pampasgrass)
PHOTO: C. MARTUS

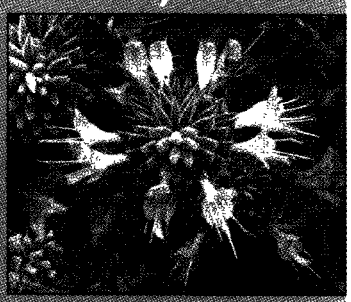
Muhlenbergia rigens
(Deergrass)
PHOTO: C. MARTUS

Invasive



Spartium junceum
(Spanish Broom)
PHOTO: C. MARTUS

Instead Try



Salvia clevelandii
(Cleveland Sage)
PHOTO: C. MARTUS

2. Keep plant debris on site

A. Grasscycle

Description:

Grasscycling means leaving the clippings on the lawn after mowing, so they decompose and release their nutrients into the soil.

Applications

- Mow often and mow when the grass is dry for the best results.
- Look for more details on how to grasscycle in *A Bay-Friendly Landscaping Guide to Grasscycling.* Go to www.BayFriendly.org to download a free copy.

Benefits

Leaving the clippings on the lawn after mowing reduces green waste, saves time and money, and contributes to a healthy lawn.

"Based on a recent survey of Sacramento area residents, we estimate that roughly 9,000 tons of plant debris and food scraps will be diverted from the landfill this year through backyard composting efforts."

— Doug Eubanks, Recycling Coordinator, Sacramento County Department of Waste Management & Recycling

B. Produce mulch from plant debris

Description

Plant debris left on the soil or chipped and then spread evenly over the surface of the soil nurtures soil organisms, and recycles organic matter and nutrients.

PHOTO: CINDY NELSON

Leaf litter in this commercial landscape in Sacramento provides an interesting landscape element and a natural mulch layer for the oak trees.

Applications

- Avoid removing leaves as they drop from the tree - designate areas under the tree & shrub canopy, and away from hard surfaces, as a natural leaf repository. Leaves should be picked up if they carry disease that can infect other plants, if they are preventing low growing plants from receiving light, or if they are where they can clog stormdrains.
- Regularly chip plant debris and spread evenly over all exposed soil surfaces.
- Refer to the section *Nurture the Soil* or visit www.BayFriendly.org to download a free copy of *A Bay Friendly Landscaping Guide to Mulch* and *A Case Study: Mulch.*

Benefits

Nutrients are recycled, habitat is created, waste is reduced, and the beneficial soil life that feeds on the organic matter jumpstarts other natural processes.

C. Compost plant debris

Description

Composting is the controlled decomposition of organic material. It turns plant debris into a beneficial soil amendment.

Applications

- Enroll yourself or your staff in a composting training program offered by many local governments.
- Encourage your residential clients to purchase a compost bin and offer to manage it for them.
- Design a site for composting client plant material.
- Go to www.sacgreenteam.com, or call (916) 875-7165, to order a copy of the Backyard Composting Guide.

Benefits

Composting on-site returns valuable nutrients and organic matter to the soil & reduces pollution associated with transporting waste, as well as disposal costs.

3. Prune selectively and properly

Description

Pruning should complement the natural form and strengthen the structural integrity of the plant. It should not be used to dominate plants. The labor for this type of pruning is not a cost well spent; it never ends, weakens the plant and generates unnecessary plant debris.

Applications

- Use the ANSI A300-(Part 1)-2001 standards from the American National Standards Institute for proper tree pruning and maintenance, including pruning at the proper time of year. Do not top trees but rather remove branches at their point of origin or shorten branches back to a lateral.
- Prune when the plant is not under stress or is dormant.
- Ask your client to consider replacing a tree or shrub that requires frequent pruning because it has grown too large for its space with a species that will require little or no pruning.

Benefits

Trees and shrubs are stronger and more likely to resist pests. Waste is minimized.

4. Water and fertilize judiciously

Description

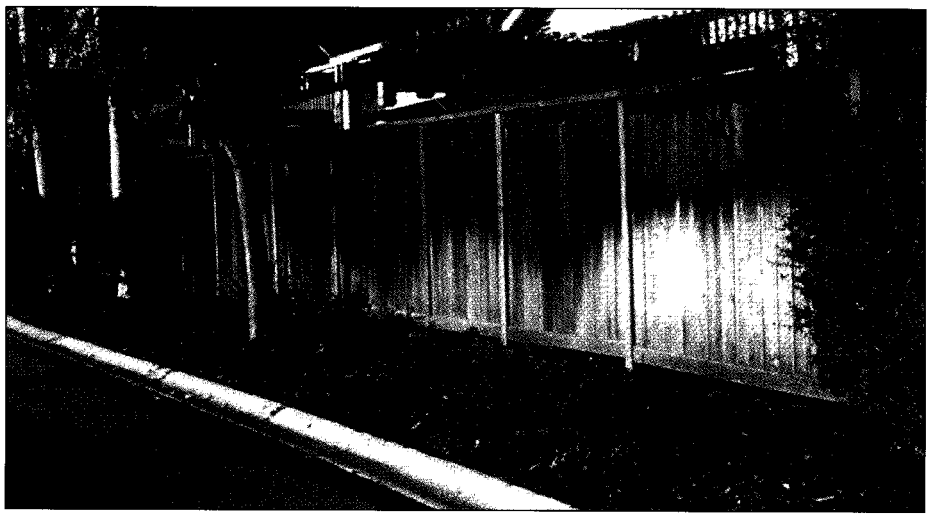
Watering and fertilizing wisely prevents rampant plant growth that weakens the plants and generates plant debris.

Applications

There are many applications. Refer to *Nurture the Soil* and *Conserve Water* for more info.

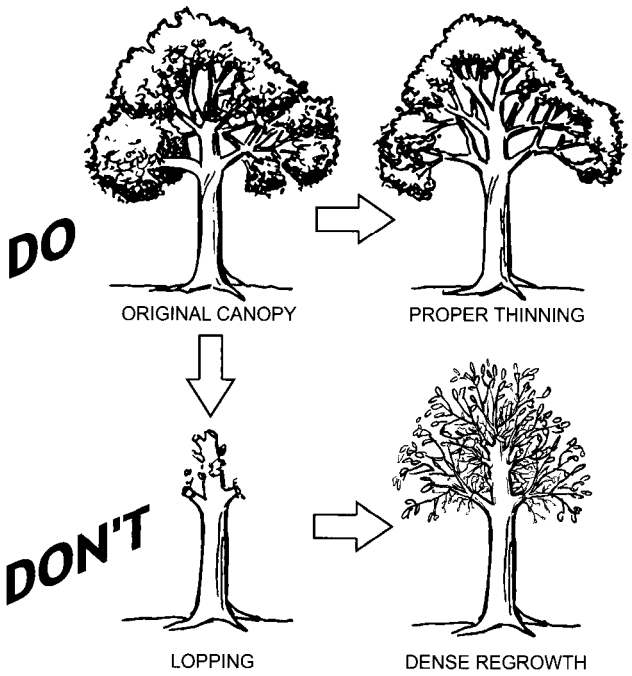
Benefits

Plants are not pushed into growth overdrive. Water damage to fences and hardscapes is minimized. Waste is prevented and disposal bills are decreased.



Damage to fencing from sprinkler irrigation.

PHOTO: THE MUNICIPAL WATER DISTRICT OF ORANGE COUNTY, *LANDSCAPE MANAGEMENT FOR WATER SAVINGS* BY TOM ASH



Prune selectively and avoid lopping. Adapted from illustration by Craig Farnsworth in *Sustainable Landscape Construction.*

Sample Contract Specifications for Pruning:

1. **Trees and shrubs** shall be pruned selectively only as necessary to enhance their natural shape. Topping of trees is prohibited except for safety or liability issues.
2. **Hedges**
   a. Shearing new hedges into formal shapes is prohibited. Plants shall instead be selectively pruned by cutting individual branches or stems to interior lateral branches at appropriate locations, on an as needed basis.
   b. Existing hedges that have been maintained by shearing in the past, and that do not have adequate space to grow to mature plant size, can continue to be maintained by shearing. Recommend to client alternative plantings (to these existing hedges) that can be maintained in their natural shape for future renovations.
3. **Trimmings generated by pruning** shall either be chipped and used as mulch on the site, or separated for plant debris recycling.

ADAPTED FROM *BAY-FRIENDLY LANDSCAPING MODEL MAINTENANCE SPECIFICATIONS.* WWW.BAYFRIENDLY.ORG

5. Use goats for controlling weeds and creating firebreaks

Description

Goats will eat many weeds that are otherwise very difficult to control like poison oak, for example. Goats can work in areas that are too steep for human crews. They don't start fires with sparks, nor require fossil fuels to get the job done, and goats can reduce the fuel load in a short period of time. The costs of renting a herd may be lower than the costs of the labor for weeding and disposing of the plant debris.

Applications

- Consider renting a herd of goats. Ask for references of local landscapers who have used goats for controlling weeds or creating firebreaks in our area.
- Use them with care as they eat desirable vegetation along with weeds: identify California natives and other vegetation that will need to be protected from the goats with temporary fences. Remove them from the area before they have a chance to overgraze.

Benefits

As the goats graze they reduce the fuel load, return nutrients to the soil and eliminate the need to haul off plant debris.

6. Use salvaged items & recycled content materials

Description

Salvaged materials are not remanufactured between uses. Finding and using them takes time and ingenuity but in the long run, salvaging conserves resources, can save money and adds interesting elements to the design. Recycled content materials such as plastic or composite lumber make very durable decks or raised garden beds that do not rot, crack or splinter.

Applications

- Get creative and specify that hardscapes and other landscape structures be constructed with salvaged items. For example, use broken concrete for very attractive retaining walls and ground glass cullet for beautiful walkways.
- Find materials for reuse by contacting the CalMax website at www.ciwmb.ca.gov/CalMAX.
- Specify the use of recycled content materials or those made from rapidly renewable resources.
- Use sustainably harvested wood (FSC Certified) if plastic or composite lumber is not appropriate. Use treated wood that does not contain chromium or arsenic for any application that specifies treated lumber.

Benefits

Lower maintenance costs can recover the added cost of plastic or composite lumber within a year. Waste can be reduced, natural resources conserved, markets for recycled products strengthened.

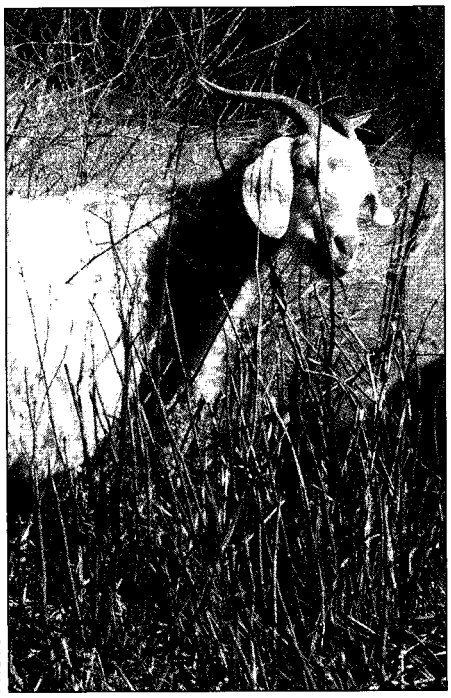


PHOTO: CINDY NELSON

PHOTO: TARA L. GEE

Above: Salvaged driveway concrete is used for a pathway in this Roseville landscape. Left: Goats are used to clear vegetation along the land-based side of a levee along the Sacramento River.

7. Reduce and recycle construction waste

Description

Recycling and donating unused items reduces pressure on landfills, saves money by reducing landfill fees and provides raw materials for future projects. Donations may be tax deductible.

Applications

- List the types and estimated quantities of materials that will be generated at the job site.
- Develop and implement a plan to reduce construction waste including plastic plant containers, land clearing waste and other landscape construction materials.
- Specify the recycling or donating of unused materials to reach a goal of reducing waste by at least 50%.
- Contact local recycling facilities and haulers to identify terms and conditions required for recycling materials.
- Select suppliers that allow returns of unused items.
- Allocate space for recycling bins and containers.
- Ask the nursery(s) where plant materials are purchased if they will accept used containers for reuse or recycling.
- Offer materials for reuse by contacting the Cal Max website at www.ciwmb.ca.gov/CalMAX.
- Offer incentives to contractors or employees who reduce waste.
- Return wooden pallets to suppliers or take apart non-returnable wood pallets to chip for mulch.
- Donate healthy plants to local nonprofits or school gardens.

Benefits

Waste can be reduced and disposal fees minimized.

8. Separate plant debris for recycling

Description

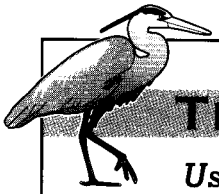
Approximately 20 percent of the waste generated in the Sacramento region consists of garden refuse and wood waste. Plant debris can be diverted from the waste stream by recycling it through residential collection programs, or separation from other types of waste at local landfills and transfer stations.

Applications

If reusing and recycling on site is not feasible, take the time to separate yard trimmings from other waste. At larger sites, dedicate a bin to plant trimmings only and ask the hauler for a reduction in the collection fee.

Benefits

The material is processed into mulch or compost.

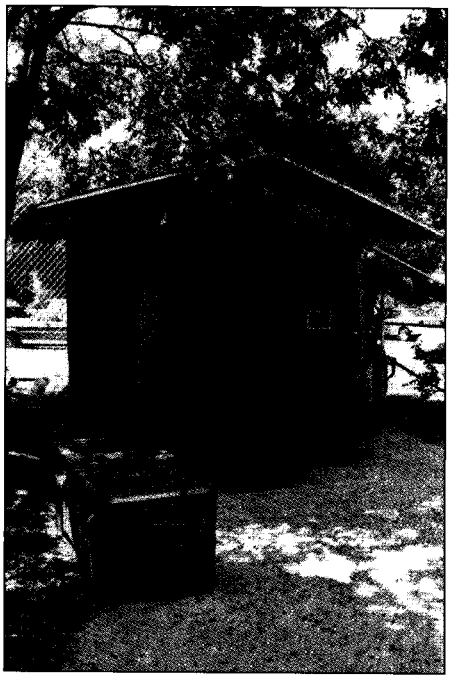


TIPS FOR SUCCESS

Using Salvaged Materials in the Landscape

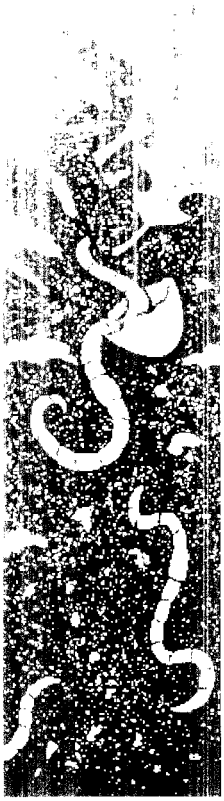
1. Let the materials inspire the design.
2. Locate materials early in the design process to avoid major design revisions when materials are found.
3. Maintain flexibility in the design until materials are found.
4. Use materials with interesting "stories" or cultural significance to the project.
5. At the start of a project, evaluate project sites and old buildings for materials to reuse.
6. Hire demo contractors with experience in deconstruction and salvage.
7. Require contractors to provide a plan for construction and demolition salvage and recycling.
8. Use materials for the highest use – avoid "down-cycling."
9. Include appearance and environmental performance standards in the specifications.
10. Get the contractor on board with using salvage early in the process.

SOURCE: MEG CALKINS, *CLOSING THE LOOP: PART II*, LANDSCAPE ARCHITECTURE, DECEMBER 2002.



Garden shed made with salvaged lumber from deconstructed warehouses at Oakland Army Base.

oil is a complex, dynamic combination of minerals, air, water and organic matter. And although organic matter is a small fraction of the soil, it is a vital component. It includes plant and animal debris in various stages of decay as well as many living organisms one teaspoon of a healthy soil can contain billions of beneficial bacteria and fungi.



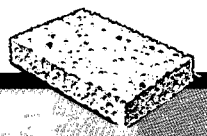
A cornerstone of River-Friendly landscaping is creating and protecting conditions for a diversity of beneficial soil organisms. It is based on the principle of feeding the soil, not the plant, to encourage a thriving community a foodweb of microorganisms, worms and other beneficial creatures. Healthy soil is alive!

Why Does Soil Life Matter?

Living soil is teeming with bacteria, fungi, worms and other beneficial organisms – amazing workhorses that will carry out the following valuable processes:

- ✔ Creating soil structure
- ✔ Storing and cycling nutrients
- ✔ Protecting plants from pests
- ✔ Improving water infiltration and storage
- ✔ Filtering out urban pollutants

Functions of a Healthy Living Soil



Store water and nutrients

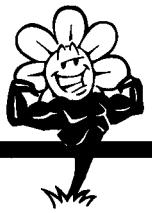
Much like a giant sponge, healthy soil acts as a storehouse for water and nutrients. The slow release helps plants absorb the correct amount. As a storage reservoir for both water and nutrients, healthy soil has a greater holding capacity than soils that lack sufficient organisms, organic matter and pore spaces.

Water flow and regulation

Like the on/off function of a faucet, healthy soil regulates and partitions water flow, naturally maintaining the water cycle by slowly discharging to streams, lakes and recharging aquifers.

Neutralization of pollutants

Healthy soil is the site of intensive physical, chemical and biological activity, thus it can prevent water and air pollution. Soil rich in organic matter contains microorganisms that can immobilize or degrade pollutants.



Resists pests

Living soil has an incredible array of organisms, most of which are beneficial. The beneficial organisms protect plants from disease through predation, parasitization, competition and antibiosis. Bacteria, for example, cover leaf surfaces and block infection. Beneficial nematodes prey on harmful nematodes.

ADAPTED FROM: *THE RELATIONSHIP BETWEEN SOIL AND WATER*, KING COUNTY DEPARTMENT OF NATURAL RESOURCES.

1. Remove and store topsoil before grading

Description

Topsoil is a valuable resource, yet it is often removed or mixed with subsoil when sites are graded, beginning a cycle of high water and chemical dependency.

Applications

Reduce the need to move and store topsoil by designing for minimum building & hardscape footprints. When grading the soil is unavoidable:

- Identify areas that are to be paved as a place to store topsoil during construction.
- Remove the topsoil (at least the top 6 inches if the topsoil is deep) before other grading and store for future use.
- Do not store in piles larger than 6 feet high.
- Protect from erosion.
- Send samples for analysis.
- Amend with 20-35% compost, depending on soil type and analysis, compost quality and plant selection.
- Re-spread after grading and construction.

Benefits

Conserving topsoil can reduce the likelihood of many problems over the long run, including stormwater runoff. It can minimize fertilizer and irrigation requirements and topsoil replacement costs.

2. Protect soil from compaction

Description

Heavy equipment can compact soil as deep as two feet below the surface of the soil. Compacted soils do not have adequate space for air or water.

Application

- Before construction begins, specify a limited construction area. Install temporary fences to restrict heavy equipment, including cars. Areas that will be paved or built over are good sites for parking equipment.
- Don't assume you need the biggest, heaviest equipment.
- If using heavy equipment, select those with flotation tires or wide tracks to distribute the load.
- On a longer-term basis, limit foot traffic, especially during the wet season.
- Do not work soil when it is too wet or too dry. Till as little as possible, and only with a clearly identified goal, such as incorporating organic matter. Loosen the soil with a fork instead of turning it over whenever possible.

Benefits

Soil structure and the soil's ability to support the microbes that cycle nutrients and filter pollutants are protected. The soil is easier to work.

Why Use Compost for Erosion Control?

Compost blankets and compost filter berms are less expensive when construction, maintenance, removal and disposal costs are considered.

Compost blankets and filter berms provide chemical, biological and physical filtration.

They work better than standard BMP's like silt fences or straw bales.

Berms offer more actual filtration than coir rolls, silt fences or straw bales.

Compost is annually renewable.

Compost is 100% recycled.

Compost is all organic and natural.

It strengthens the market for compost.

Aquatic wildlife can negotiate berms but not silt fences.

It avoids the use of petroleum based products like silt fences.

Construction equipment can run over it and it still works – and it is easy to fix.

The materials can be re-used in landscaping or seeding after their use for erosion control.

SOURCE: ROD TYLER, *WAKE UP AND SMELL THE COMPOST!* PRESENTED AT INNOVATIONS IN EROSION CONTROL, WA.

***"We need to add life** to scraped, compacted and denuded urban landscapes so that they* can *become sustainable. For this reason, we see the entire process of designing, implementing, and maintaining a landscape foremost as regenerative landscaping."*

— Annette & Mike Heacox, Landscape Architects, Luciole Design, Sacramento

3. Defend against erosion

Description

A sediment and erosion control plan that conforms to local sedimentation and erosion standards or the best management practices in the EPA's Stormwater Management for Construction Activities (whichever is more stringent) should have the following objectives:

a. Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.

b. Also prevent longer term sedimentation of streams, stormwater drains and/or air pollution with dust and particulate matter.

Applications

- Do not remove valuable trees and shrubs, especially near waterways. Protect them with fencing.
- Schedule grading for the dry season.
- Use compost berms, blankets, or socks. The EPA specifies that, depending on the length and height of a particular slope, a 1/2-inch to 4-inch layer of mature, screened compost, placed directly on top of the soil, controls erosion by enhancing planted or volunteer vegetation growth.
- Construct earth dikes or install silt fencing, sediment traps, and sediment basins.
- Terrace steep slopes.
- Hydroseed or otherwise plant to reduce bare soil. Annuals and short-lived perennials can be used to fill in areas while larger trees and shrubs become established.
- Cover crops provide excellent short-term cover that also adds nitrogen and/or organic matter when it is later tilled into the soil.
- Mulch regularly.
- Minimize the use of blowers.

Benefits

The likelihood of erosion is lessened, thereby conserving topsoil and protecting aquatic habitat.

4. Amend the soil with compost before planting

Description

Compost is thriving with microorganisms – one teaspoon can have more than one billion beneficial microbes. Adding good quality compost before planting turf, annuals, perennials, trees and shrubs brings life to the soil and feeds existing soil organisms. Compost is effective in improving problem soils – in particular those that are compacted, heavy clay or sandy, poor in nutrients, or lead contaminated. It is one of the most important practices for a healthy, thriving, River-Friendly landscape.

Applications

It is important to first assess the soil for physical and chemical problems. Refer to the section *Landscape Locally* in these guidelines.

- If topsoil has been removed and stored during building construction, mix one cubic yard of compost into 3-5 cubic yards of soil before re-spreading.
- If the topsoil has not been removed then sheet mulching is an efficient means of adding compost & other organic matter while controlling weeds. Refer to the tip on sheet-mulching on page 25 for more information.
- For turf installations: Incorporate 1-2 inches (3 1/3 – 6 2/3 cubic yards) of compost into 1000 square feet. Mix it with the top 5-7 inches of soil.
- For preparing planting beds: Spread 2-4 inches of compost over the surface of the soil and incorporate it into the top 6-12 inches of the planting bed.
- Mixing compost into the backfill of a planting hole for trees and shrubs may not yield significant benefits. Some research indicates that young plants benefit more than mature plants. Some specialists also believe that amending backfill can create such a difference between the soil in the hole and the surrounding soil that the roots don't grow outwards – it is as if they are growing in a pot. To prevent this problem, amend the entire bed or create planting holes that are no deeper than the root ball and a minimum of 3 times the size of the transplant's root ball. Rough up the sides of the hole. Mix soil from the hole with compost at a rate of 1 part compost to 3-5 parts soil (by volume) and backfill. Make the hole shallower and create a mound in heavy clay soils.
- And, consider the conditions under which the plant grows naturally. Some California natives require less fertile soils and compost may not be necessary.
- Finally, quality compost is important. Use compost made from local green and food waste to maximum feasible. Specify compost from a producer that is enrolled in the US Composting Council's STA program.

Benefits

Compost fosters a diverse, fertile, and disease suppressive soil. It can improve structure, aeration and water holding capacity, and offset degradation due to typical construction activities. You and your clients may see both long and short-term benefits, including faster plant establishment, decreased fertilizer & pesticide use and lower water usage.

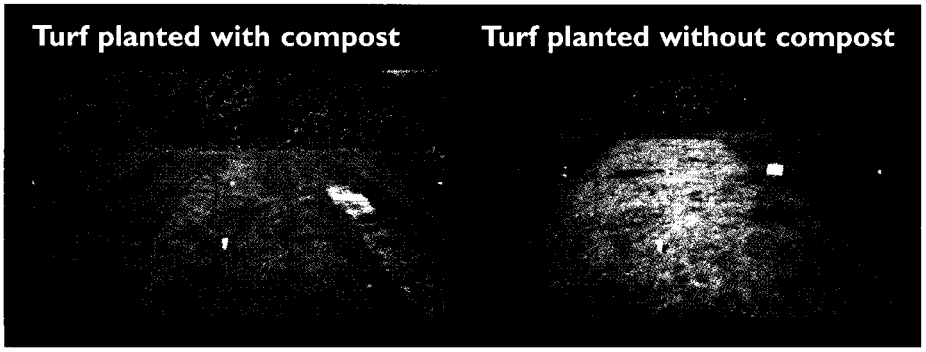


PHOTO: SEATTLE PUBLIC UTILITIES

5. Grasscycle

Description

Grass clippings have about 4% nitrogen in them. When they are left on the lawn, they can meet some of the lawn's nitrogen needs, as well as supply an array of other nutrients.

Applications

- Leave the clippings on the lawn after mowing, except during the limited time of the year when the grass is too wet or too long.
- Look for more detailed information in *A Bay-Friendly Landscaping Guide to Grasscycling*. Go to www.BayFriendly.org to download a free copy.

Benefits

Nutrients in the grass clippings are made available to plants. Fertilizer requirements can be reduced by as much as 50%, thereby lowering your costs and protecting water quality.

6. Mulch regularly

Description

Mulch is any material spread evenly over the surface of the soil. Organic materials, including chipped landscape debris, are preferable over inorganic materials because they supply nutrients over time. Nitrogen 'drag' is usually not a problem, even when woody materials are used.

Applications

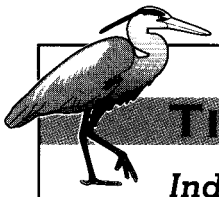
- Keep 2-4 inches of an organic mulch over the surface of the soil at all times, or at least until plants grow to cover the soil. Typically, larger particle size mulches are better for weed control.
- Designate less visible areas, away from stormdrains, for leaves to remain as mulch after they fall.
- Look for more detailed how-to information in *A Bay-Friendly Landscaping Guide to Mulch*. Go to www.BayFriendly.org to download a free copy.

Benefits

Mulch conserves water, enhances the growth of plants and the appearance of the landscape. It can also simplify your operations thereby lowering your costs by suppressing annual weed growth and reducing the need for trimming around trees and poles.

PHOTO: DAVID GILMORE

Grasscycling – leaving the clippings on the lawn after mowing – recycles nutrients and saves time & money.



TIPS FOR SUCCESS

Indicators of Quality Compost:

- Dark brown color.
- Sweet, earthy smell.
- Small, fairly uniform particle size.
- No weed sprouts.
- Feedstock is no longer recognizable.
- The producer can tell you the peak temperatures (and how long the compost stayed at those temperatures).
- A nutrient analysis is available from the producer upon request.
- Compost is listed in the US Composting Council's Standard Testing Assurance (STA) program.

"We are encouraging

the use of mulch made from landscape trimmings. Not only does mulching keep green material out of landfills, it also controls weeds, reduces erosion, conserves water, adds organic matter to the soil, and reduces the need for chemical fertilizers and pesticides."

— Ken Decio, California Integrated Waste Management Board

Tips for Success

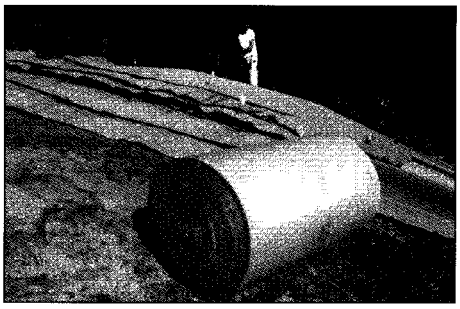
Sheet Mulching is...

...a layered mulch system. It is a simple and underutilized technique for optimizing the benefits of mulch. Sheet mulch can:

- Suppress weed growth
- Reduce labor and maintenance costs: weeds are composted in place
- Improve nutrient and water retention in the soil
- Encourage favorable soil microbial activity and worms
- Enhance soil structure
- Improve plant vigor and health, often leading to improved resistance to pests and diseases

Sheet mulching can be used either in establishing a landscape, or to enrich existing plantings. In both cases, mulch is applied to bare soil or on top of cut or flattened weeds. Trees, shrubs, herbaceous perennials and annuals are planted through the mulch, or a small area is left open to accommodate established plants.

Step 1: Prepare the site. Knock down or mow existing vegetation so that it lies flat. Remove only woody or bulky plant material. The organic matter left will decay and add nutrients to the soil. Add fertilizers and amendments to this layer if a soil analysis indicates the need. Optional: "jump start" the decay of weeds and grass by adding compost or manure at the rate of about 50 lbs/100 square feet. Soak with water to start the natural process of decomposition. It is much easier to soak the ground now, before the remaining layers of mulch are applied.



Recycled cardboard is a good weed barrier.

Step 2: Plant 5-gallon and larger plants.

Step 3: Add a weed barrier. The next layer is an organic weed barrier that breaks down with time. It is essential that the barrier is permeable to water and air. Do not use plastic. Recycled cardboard, a thick layer of newspaper, burlap bags or old carpets of natural fiber work well. Many paper companies offer recycled cardboard or paper in rolls of varying widths. Two or three layers may be required to achieve an adequate thickness. But, if the weed barrier is applied too thickly, the soil can become anaerobic. Overlap pieces 6-8 inches to completely cover the ground without any breaks, except where there are established plants you want to save. Leave a generous opening for air circulation around the root crown. Wet down the cardboard or paper barrier to keep it in place.

Sheet mulched site is ready for planting.

PHOTO: KAMALA BENNETT, SUSTAINABLE LIVING DESIGN, INC. PHOTO: KAMALA BENNETT, SENTIENT LANDSCAPE, INC.

Step 4: Layer compost and mulch. The top layer mimics the newly fallen organic matter of the forest. Good materials for this layer include chipped plant debris, tree prunings, leaves or straw. They must be free of weed seeds. Well decomposed, weed-free compost is also a good material but it should be spread directly over the weed barrier and covered with bulkier materials such as chipped tree prunings, to optimize weed control. In total, the compost/mulch layer should be 2-5 inches deep. Many materials suitable for the top layer often have an attractive appearance, making sheet mulch a versatile practice.

Step 5: Plant. Punch a hole in the cardboard and place plants in the soil under the sheet mulch. Smaller plants can often be planted right into the mulch/compost layer. Add a small amount of compost around the rootball if compost has not been included in the top layer.

In most cases, the benefits of sheet mulching outweigh the costs. However, take care to prevent these potential problems:

- As with any mulch, do not pile materials up against the trunks or stems of plants to prevent disease.
- Especially during the dry season, small seedlings will need protection from snails and slugs that will seek cover under the mulch.
- Protect young trees from rodents with physical guards.

ADAPTED FROM: C.R. ELEVITCH AND K.M. WILKINSON, SHEET MULCHING: GREATER PLANT AND SOIL HEALTH FOR LESS WORK, PERMANENT AGRICULTURE RESOURCES AND GEOFF HALL, SHEET MULCH, SENTIENT LANDSCAPE, INC.

7. Aerate compacted soils

Description

Turf on heavy soils and those subject to lots of use become compacted, which can increase their susceptibility to weeds, drought, disease & insect damage.

Applications

- Mechanically aerate soil under turf at least once each year: the number of times will depend on use and soil type. Aerating in the spring is best. Avoid doing so in summer. Topdress with compost following aeration.
- Deep-rooted plants can be seeded as a cover crop to break up compacted soils in non-turf areas. Mow before plants have gone to seed, leaving organic matter on the soil surface as mulch.
- Use power augers or water jets to create holes in compacted soil around trees and shrubs. Fill with compost.
- If it is not possible to remove topsoil or otherwise protect it during construction, specify that the soil be mechanically aerated before amending and planting.

Benefits

Aerating and then topdressing with compost relieves compaction, stimulates root growth and disease resistance. Plants are more easily established. Water and fertilizer requirements may be lessened.

8. Feed soils naturally

Description

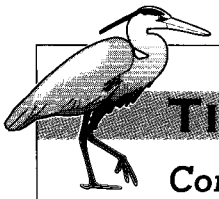
There are important benefits to regularly adding a thin layer of good compost to the surface of the soil under turf, perennials, shrubs or trees, or drenching the soil with compost tea.

Applications

- Feed turf, especially after aeration, by topdressing with finely screened compost: one-fourth of an inch applied 2-4 times per year will show good results.
- Apply compost once or twice each year to the base of the plant or under the dripline. Be sure the compost is free of weed seeds and the plant is also mulched at an optimum thickness. You can scatter the compost over the mulch and it will settle to the surface of the soil.
- As an alternative, feed the soil around trees and shrubs with compost tea. Refer to the tip on *Compost Tea.*

Benefits

A strong soil foodweb, which makes nutrients available to the plants and protects water quality, is nurtured.



Tips for Success

Compost Tea is...

... a water extract of mature compost. Nutrients, including a wide variety of macro and micronutrients, and beneficial microorganisms diffuse into the extract from the compost during the 'brewing' process.

Using compost tea can help re-establish a healthy soil foodweb that:

- Suppresses disease
- Cycles and retains nutrients
- Improves soil structure
- Decreases the need for pesticide & fertilizer use

Starting with a quality, fully mature, microbially diverse compost is important. Brewing includes aeration to keep the medium flushed with oxygen and the aerobic organisms alive and reproducing. Often times molasses, kelp, rock dust or other ingredients are added to enhance microbial growth. Different recipes can be effective in encouraging bacterial growth for use of the tea on vegetable crops, or fungal growth for use on fruit trees. But a diversity of organisms in the tea optimizes overall disease suppression, nutrient retention and cycling.

Compost tea is best used soon – within hours and no later than 1 day - after it is produced. It can be sprayed onto lawns, the foliage of trees and ornamentals or to the soil under them. Thorough coverage of leaf surfaces is important and the best time of day for applying to foliage is in the evening.

For more information:

www.composttea.org
www.attra.org
Compost Tea Brewing Manual, www.soilfoodweb.com

Equipment for Brewing Compost Tea:

EPM, Inc., www.composttea.com
Growing Solutions, www.growingsolutions.com
SoilSoup, www.soilsoup.com

"Part of our organic maintenance package includes using compost tea, a liquid extract of high-grade compost. Foliar application replaces fungicide. The high beneficial microbe content excludes disease. We also apply it to soil for plant fertility. We are currently using compost tea on our residential construction and maintenance contracts."

— Jake Cacciato, Superintendent, Jensen Corporation Landscape Contractors, Cupertino

9. Avoid synthetic, quick release fertilizers

Description

Synthetic, quick release fertilizers frequently wash through the soil before they are even taken up by the plants. They can also damage soil microbial populations or cause a flush of tender new plant growth that is very attractive to sucking insects. Furthermore, many well-chosen California native plants thrive without fertilizers. Most other plants do not need the quick release fertilizers that are often applied on a scheduled basis. Plant nutrient requirements can be met with compost, naturally derived fertilizers or slow-release synthetic fertilizers as a last resort.

Applications

- Kick the chemical habit: base feedings on a soil analysis or other clear indications of need, not on a calendar.
- Use compost to establish beneficial soil organisms and release nutrients over the long term.
- Sow nitrogen fixing or deep rooted cover crops, then till them in before they go to seed.
- Use blood and bone meal, fishmeal or kelp, examples of naturally derived fertilizers that release nutrients in a 1-4 month time frame.
- Use synthetic fertilizers as a last resort and select slow release fertilizers.
- Do not use weed and feed formulations.

Benefits

Slow release fertilizers make nutrients available to the plants when they are needed, and are therefore often a better value. Flushes of growth that result in pest infestations or plant waste are less likely.

10. Minimize the use of chemical pesticides

Description

Many pesticides are toxic to microbes and other soil dwelling creatures such as earthworms. These toxins can reduce the diversity of soil life, select for resistant organisms or even increase soil pathogen density.

Applications

Learn and offer integrated pest management to your clients. If pesticides are absolutely necessary – choose the least toxic alternative. Refer to the description of Integrated Pest Management in the section *Protecting Water and Air Quality* and visit the websites: www.ipm.ucdavis.edu or www.birc.org or www.ourwaterourworld.org.

Benefits

Minimizing pesticides reduces water pollution and helps support soil life, which cycles nutrients and promotes resistance to plant disease. Your costs may then be reduced in the long run.

"A sustainable landscape starts with the soil. Synthetic fertilizers and pesticides are damaging to beneficial soil organisms and are major sources of waterway pollution."

— Steven Zien, President, Living Resources Company, Citrus Heights

Sample Contract Specifications for Nurturing Soil Health:

1. Initial soil analysis shall be performed to determine drainage and nutrient status and shall be repeated annually during the transition to a River-Friendly landscape when planning a renovation, or when experiencing ongoing problems.
2. A soil probe shall be used at every visit to assess water content.
3. Leaf drop shall become part of the mulch layer in the tree, shrub or groundcover areas, in an attractive manner and away from high traffic areas. Leaf drop shall not be allowed to enter the stormdrain.
4. Mulch shall be maintained under all trees and shrubs and on bare soil with a minimum 2-inch layer of organic material. To the greatest extent practicable, [company name] shall not procure mulch products that originate from forest products. When possible, [company name] shall give preference to mulch products that are produced on-site or from regionally generated plant debris.
5. Fertilizing shall be done on an as needed basis, as indicated by a soil analysis or other clear indications of need, not on a calendar basis. Naturally derived and/or slow release fertilizers are preferred.

ADAPTED FROM: *LANDSCAPE MAINTENANCE PRACTICE FOR WATER AND GREEN WASTE EFFICIENCY*, MUNICIPAL WATER DISTRICT OF ORANGE COUNTY.

alifornia's climate includes long dry summers and the periodic failure of winter rains water is a precious and often scarce resource. And, with projected population growth, it is estimated that by 2020 the state will face annual water shortages, even during years of regular rainfall.

Yet irrigation of residential landscape accounts for more than one-half of all suburban water use. What's more, much of this water is used in excess or at the wrong time of year: residential properties are regularly over watered by 30-40%.

Water-wise landscaping is, however, more than just controlling irrigation and planting xeriscapes. Water-wise landscaping also means increasing the water holding capacity of the soil, fostering healthier plants that thrive with less water and planning for the use of alternatives to potable water such as graywater, and recycled or captured stormwater. The professional landscaper can offer the following critical expertise in conserving water:

1. Create drought resistant soils with compost & mulch

Description

A robust, living soil, with sufficient organic content, is the foundation of a water conserving landscape: 1 cubic foot of soil holds roughly 1.5 quarts of water for each 1% of organic matter. The amount of irrigation water required for a healthy landscape thus varies significantly with soil quality.

Applications

- Know the soil texture.
- Incorporate 2-4 inches of compost into the top 6-12 inches of soil to reach a target soil organic matter of 3.5% under turf and 5% in planting beds.
- Topdress with compost around shrubs and trees, and on turf.
- Regularly apply mulch to all exposed surfaces to encourage living soils and reduce evaporation.
- For additional practices see *Nurture the Soil* in these guidelines.
- Finally, consider applying high quality mycorrhizal innoculants, available as root dips, mixes, tablets and solutions.

Benefits

Compost can increase permeability and water-holding capacity, thereby reducing the need for irrigation.

2. Grow California natives or Mediterranean plants

Description

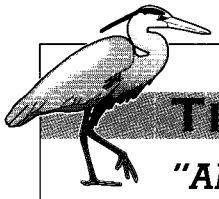
California native plants have evolved with local ecosystems and adapted to our soils, wildlife and climate including no rain for 6 months of the year. Many natives, as well as many Mediterranean species, tolerate dry summers with little or no water once they are established.

Applications

- Keep in mind that California's climate and soil can vary significantly, as can native plant species. Not every native is drought tolerant: some, like *Salix* spp. (Willows) and *Populus fremontii* (Cottonwood), need moist soil. Select the native species that match the site soil and microclimate and if possible, choose local ecotypes.
- Or select plants from Mediterranean climates that also thrive with little irrigation.
- Plant in fall so the plants can establish their root system during the rainy season and require less water their first dry season.
- Water drought tolerant species for their first one or two summers, until they are established.
- Minimize high water use ornamentals.

Benefits

Appropriately sited native or Mediterranean type plants often require less soil preparation, watering, mowing, fertilizing and spraying, which can reduce your operating costs. CA native species are relatively easy and inexpensive to implement on a trial basis. Using local natives reduces the risk of spreading non-local plant species.



TIPS FOR SUCCESS

"All-Star" Plants for Central Valley Gardens

UC Davis Arboretum "All-Stars" are a selection of top recommended plants for Central Valley gardens. The "All-Stars" were chosen because they are attractive for most of the year, thrive in our valley conditions, and have been tried and tested by the Arboretum's horticultural experts. Many "All-Stars" are low maintenance, drought tolerant, and/or attract beneficial wildlife. You can find the "All-Stars" growing in the UC Davis Arboretum, or search the online database at http://arboretum.ucdavis.edu. More information is available at (530) 752-4880.

3. Minimize the lawn

Description

Lawns are useful for recreation or places where family members and employees can relax. But turf requires frequent watering to stay green during our long dry season.

Applications

- Recommend to your clients that they replace decorative lawns with water conserving California native groundcovers or perennial grasses, shrubs and trees.
- If lawns are desired, plant small, practical lawns with turf species that require less water than tall fescue. For residential clients, suggest the lawn be limited to a small patch in the backyard where it is more likely to be used for play and relaxation.
- Avoid planting turf on slopes greater than 10%, in strips less than 8 feet wide, or in irregular shapes.
- Where appropriate, specify grasses that can go summer dormant and require minimal mowing. Visit California Native Grasslands Association website at www.cnga.org.

Benefits

Water and energy can be conserved. For example, reducing the size of a 1,000 square foot lawn that gets 1 inch of water per week to 500 square feet can save approximately 10,000 gallons of water per dry season. Your labor for mowing may also be reduced. Chemical use may be decreased and water quality protected.

4. Implement hydrozoning - group plants by water needs

Description

Different plants have different water requirements. Dividing the landscape into low, medium and high water use zones prevents over-watering.

Applications

- Group plants by water and light needs (dry shade, dry sun, wet sun, wet shade).
- Place thirstier plants in relatively small, highly visible areas and if possible, in spots that naturally collect water.
- Plant a large perimeter area with drought adapted species.
- Plan to discontinue irrigating those California natives that do not need water in the summer after they are established and be sure to separate them from plants that will need ongoing irrigation.
- Identify irrigation zones on plans, based on the plants' water requirements, exposure, and soil water holding capacity. Include a summary table of the square footage of each hydrozone in construction documents.
- Install separate irrigation valves for different zones (e.g. sunny vs shady areas or heavy vs light soils).

Benefits

Water use can be more easily matched to the plant requirements. This fosters resistance to pests as well as conserves water. Plant mortality is reduced, saving time and money.

PHOTO: MIKE HEACOX, LUCIOLE DESIGN

Minimizing the lawn can greatly decrease water usage and reduce maintenance costs.

5. Design for on-site rainwater collection, recycled water and/or graywater use

Description

Rainwater can be channeled through gutters and downspouts to a storage unit. During a 1-inch rain, 625 gallons of water can be collected from 1,000 square feet of roof. Stored water can then be used for irrigation.

Recycled water refers to treated wastewater of a quality suitable for landscape irrigation but not human consumption. It is becoming increasingly common in California. Graywater is wastewater from sinks, showers, bathtubs and washing machines that is not contaminated by human waste. Not suitable for drinking, it is an intelligent resource when used for subsurface irrigation of the roots of trees and shrubs.

Applications

- Encourage the building architect, if possible, to channel rainwater from the roof to tanks or ponds or to pre-plumb for graywater conversion.
- Conserve rainfall by carefully constructing swales or ponds.
- Another option is to dig trenches 18 inches deep, layer in woody debris, then backfill with all the soil. Many plants will grow well on these buried wood swales, which hold a large amount of water as the wood decomposes.
- Design, install and operate recycled water irrigation systems (dual distribution systems) to allow for the current and future use of recycled water.
- Learn to use recycled water appropriately: poor drainage and incorrect watering can cause problems, just as is true for non-recycled water.
- Check with local building code for graywater policies and requirements.
- Use graywater for subsurface irrigation only. Educate your clients to use biodegradable soaps.

Benefits

The use of treated, drinkable water to irrigate lawns and gardens can be reduced. Groundwater is recharged.

6. Design and install high efficiency irrigation systems

Description

Drip and bubbler irrigation technologies apply water accurately, to the plant root zones, at the rate that it can infiltrate. Low flow sprinkler heads apply water uniformly and slowly and improve the efficiency of turf and groundcover irrigation. Both minimize overspray and evaporation and reduce runoff. Drip is often more appropriate than overhead in areas that are narrow, odd shaped, densely planted, or in parking lots and medians.

Applications

- Be pro-active, not reactive with clients. Provide them with recommendations to improve their irrigation efficiency to achieve 70% or greater distribution uniformity in turf areas and 80% in all other landscaped areas.
- Rediscover drip. Several types of drip systems exist: select the right system for each specific job. Using "in-line" emitters improves efficiency.
- Install an automatic irrigation controller that has, at a minimum, the following capabilities: water budgeting feature (percent adjustment); automatic periodic adjustments to the irrigation program, accomplished through external sensors, internally stored historical weather data or a provider supplied signal; multiple start time capability; runtimes able to support low volume applications; irrigation intervals for days of the week or same day intervals; and more than one operating program.
- Select controllers that can detect and respond to problems like a broken sprinkler head.
- Irrigate turf in isolated areas (i.e. driveway strips) or areas less than 8 feet wide on the shortest side with subsurface irrigation or micro spray heads to avoid overspray. Irrigate other turf areas with equipment that has a precipitation rate of 1 inch or less per hour as specified by the manufacturer and avoid the use of standard spray heads (stream rotator heads are preferred).

Benefits

High efficiency systems not only limit evaporation and runoff, but also prevent disease and minimize weed growth. Water quality can also be protected.

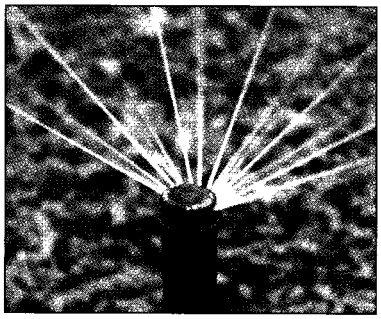


PHOTO: CINDY NELSON

High efficiency irrigation conserves water.

7. Install a dedicated meter to monitor landscape water use

Description

Separate irrigation meters, although they can be expensive, allow for the monitoring and evaluation of water use in the landscape.

Applications

- Specify the addition of a separate water meter for landscapes larger than 5000 square feet.
- Combine with irrigation controllers for a sophisticated understanding of water use.
- Read the irrigation meter to check for leaks and maintain a water budget.
- Provide detailed feedback to your customers about their water use or conservation achievements.
- Develop water use budgets based on reference ET.
- If a dedicated water meter is not possible, install a submeter to track the irrigation portion of a mixed use water meter.

Benefits

Monitoring the landscape water use more precisely can demonstrate and support water conservation.

8. Manage irrigation according to need

Description

Watering requirements will vary with soil type, exposure, climate and season.

Applications

Become familiar with CIMIS (California Irrigation Management Information System) to help train landscape management staff. Learn how much water the landscape requires for a week, month, or year. To schedule the appropriate irrigation run times:

- Know the watering needs of the plant material that is being irrigated, in inches per week.
- Know how fast the water is being applied. Sprinklers apply water in gallons or inches per hour, drip in gallons per hour.
- Know soil types, slope and how they affect drainage and water infiltration.
- If the system does not include a soil moisture sensing device, use a soil probe to check soil moisture before irrigating and watch the plants for signs that they need water.
- Adjust the watering schedule to match existing weather conditions as often as possible and keep the rain shut-off device in working condition.
- Set timers to water early in the day when the wind is calm.
- Apply water slowly or intermittently (select controllers with multiple start times), especially on steep slopes or clay soils, so it can soak into the soil.
- Water deeply – wetting the soil surface without penetrating the root zone will not provide adequate water for your plants.

Benefits

Appropriate watering moderates plant growth, promotes plant health and reduces replacement costs, as well as the need for pesticides and pruning.

***It is estimated* that overwatering causes 85% of all landscape problems.**

SOURCE: *A CONSUMER'S GUIDE TO WATER CONSERVATION*, AMERICAN WATER WORKS ASSOCIATION

9. Maintain the irrigation system so every drop counts

Description

Every drop of water that is supplied to the landscape by irrigation should be protected from loss due to evaporation, overspray or runoff. Irrigation systems that do not leak, overspray or gush water are critical to conserving water.

Applications

- Mulch to reduce evaporation.
- Reset automatic controllers in response to weather changes.
- For overhead spray systems, check and adjust the system regularly for:
  - Matched precipitation rate (MPR) nozzles
  - Low, buried sprinklers
  - Incorrect nozzles
  - Overspray
  - Head to head coverage
  - Improper pressure
  - Leaks near unusually tall, green vegetation, muddy or eroding spots
- Repair leaks and broken sprinklers immediately. Use originally specified materials or materials of superior quality and efficiency.
- Keep in mind that it may take more diligence with drip systems to notice leaks and troubleshoot other problems.
- Become IA certified. Contact the Irrigation Association at www.irrigation.org.

Benefits

Evaporation or overspray is decreased or eliminated all together. Properly maintained irrigation systems can avoid unnecessary plant, fencing and asphalt replacement costs, and increase property values.

10. Request an irrigation audit

Description

FREE water use surveys for landscapes offered by many local water suppliers provide your residential, commercial or homeowners association customers with practical information for improving landscape quality and reducing water use.

Applications

Your local water supplier is often a good source for information on water conservation. Many offer free irrigation audits of existing landscapes. A Landscape Irrigation Review usually includes: inspection of the irrigation system to identify needed repairs, suggestions for water efficiency irrigation systems, instructions on how to use the irrigation controller, and an irrigation schedule appropriate for your plants and soils.

Benefits

Additional practices for conserving water may be identified. You can then demonstrate to the clients how your skills can reduce their water use. Customer satisfaction will be increased.

PHOTO: CALIFORNIA INTEGRATED WASTE MANAGEMENT BOARD

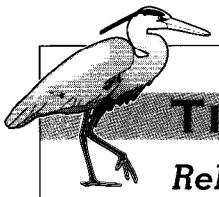
Irrigation water running into the street is a wasteful – and preventable — misuse of a precious resource.

"Once Sacramento is on water meters, I think we'll see a lot of plant choices change in the landscape."

— Lynn Scholl, Owner, Red Studio Design, Sacramento

"I believe we can reduce urban landscape water use by 50%. Irvine has seen water use decline from 4.4 acre-feet per acre in 1990 to 1.9 acre-feet per acre in 2003."

SOURCE: TOM ASH, LANDSCAPE WATER USE *WHAT TO KNOW & WHAT TO DO NOW.* ECO LANDSCAPING: PROFITING FROM A GREEN FUTURE, 2004



TIPS FOR SUCCESS

Rebates for Irrigation Upgrades

Many water suppliers offer free residential and commercial landscape irrigation audits, and irrigation upgrade programs.

Contact your local water service provider, or visit the website for the Regional Water Authority at www.rwah2o.org, for current information on free services and rebate incentive programs.

A listing of some of the water suppliers in the Sacramento Region is at www.rwah2o.org/rwa/about/members.

5. C

The need to conserve energy is as important to River-Friendly landscaping as the need to conserve water. Both are increasing concerns in California as energy shortfalls and droughts continue to occur throughout the West.

Conventional landscapes are very fossil fuel consumptive. Nationally, forty million lawnmowers consume 200 million gallons of gasoline per year, representing a huge investment of energy for this one landscape maintenance task. What's more, the US EPA estimates that the few ounces spilled during each refueling of lawn and other garden equipment during the summer only totals 17 million gallons of gasoline nationwide.

Landscape designers, installers and professional maintenance staff can play an important role in conserving energy. Include these River-Friendly energy conserving practices in your design or service program:

1. Plant and protect trees to moderate building temperatures

Description

Trees conserve energy by shading, cooling the air through evapo-transpiration and reducing the velocity of wind. Selecting and placing trees to shade adjacent buildings in the summer or protect them from the prevailing winter winds can moderate building temperatures.

Applications

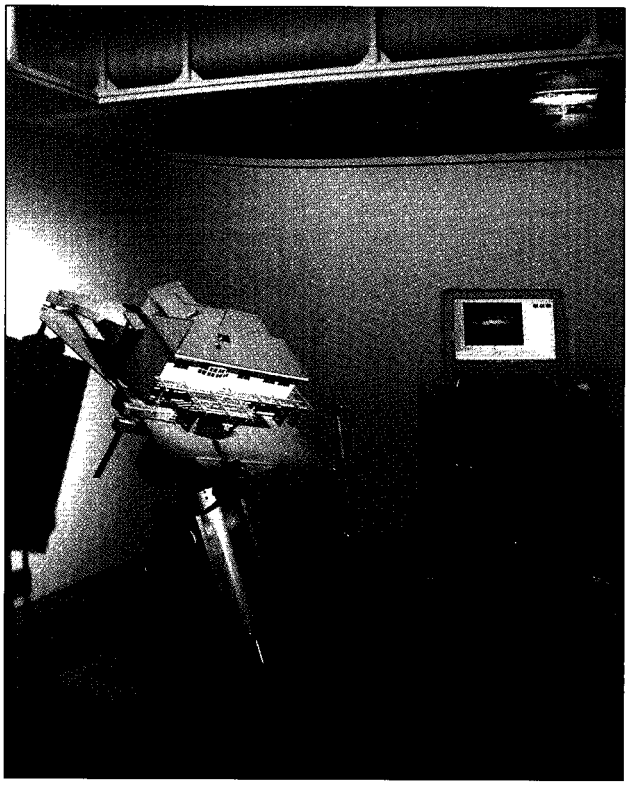
- Plant trees to the west of a building for maximum shading benefits. Avoid planting trees that block solar collectors or in front of south facing windows that allow the low winter sun to warm a building.
- Large deciduous trees will be of greater value for summer cooling and winter solar gain.
- Select evergreen trees for windbreaks.
- Select trees that are appropriate for the soil type, water use and exposure. If possible, select trees that have low water requirements.
- Plant larger trees at least 20 feet from the foundation. Plant smaller trees a minimum of 10 feet from the foundation.
- For more info go to the following websites: http://cufr.ucdavis.edu and www.pge.com.
- Call SMUD's shade tree program at 1-888-742-7683 or go to www.smud.org/residential/saving/trees for free shade trees and eligibility requirements.

Benefits

When properly placed, mature trees can reduce the interior temperature of a building by as much as 20 degrees, reducing summer cooling costs by 25-40%.

Since 1990, SMUD, in collaboration with the Sacramento Tree Foundation, has planted more than 350,000 trees in the Sacramento area.

SOURCE. SACRAMENTO MUNICIPAL UTILITY DISTRICT



COPYRIGHTED BY PACIFIC GAS AND ELECTRIC COMPANY
PHOTO PROVIDED BY PACIFIC ENERGY CENTER STAFF

This model demonstrates the shading effects of design, landscape, and orientation during three seasons of the year. To schedule use of the heliodon contact www.pge.com/pec/heliodon.

2. Reduce the heat island effect: shade paved areas

Description

Parking lots and streets are significant sources of heat and pollutants (parked cars emit hydrocarbons that contribute to the formation of ground level ozone), as well as often being unattractive. Trees reduce the amount of heat stored in, or reflected from, paved surfaces which can contribute to increased building and car temperatures.

PHOTO: CHERYL H. SULLIVAN, CUNNINGHAM ENGINEERING

Light-colored pervious concrete, in lieu of asphalt, was used to surface this parking lot in Davis, greatly reducing the heat island gradients.

Applications

- Check with your local municipality for minimum tree requirements in parking lots: then specify more.
- Select and plant trees that are appropriate for the site in terms of soil type, water use and exposure.
- Choose as large a tree as possible but be sure it will be allowed to grow to its natural shape and size in the allotted space.
- Choose trees with root systems that do not sucker or damage the pavement.
- Also, select light colored, reflective paving materials.
- And consider shading paved areas with photovoltaic arrays.

Benefits

Patios & cars can be much more comfortable in the summer. Air quality can be improved. Costs of cooling adjacent buildings may be lowered.

3. Shade air conditioners

Description

Limiting the sun that shines directly on an air conditioner will keep it cooler and running more efficiently.

Applications

- Choose a shrub or tree that will match the soil and microclimate.
- Or build a freestanding arbor with deciduous vines to provide shade.
- Do not obstruct airflow around the unit.

Benefits

The air conditioner runs more efficiently, which will reduce your client's utility bill.

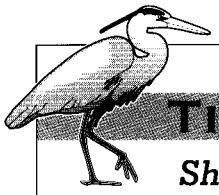
What Large Trees Mean:

More shade = More energy savings.
Cleaner air = Better health and fewer hospital visits.
More stormwater management = Lower costs for stormwater controls.
More shaded streets = Longer time between resurfacing.

SOURCE: CENTER FOR URBAN FOREST RESEARCH, DAVIS, CA, 2003

"Compared to a small-stature tree, a strategically located large stature tree has a bigger impact on conserving energy, mitigating an urban heat island and cooling a parking lot."

— James Geiger, Center for Urban Forest Research, Davis



TIPS FOR SUCCESS

Shade Effectiveness in Parking Lots

Parking lots are thermal hot spots. Many cities in California have ordinances that require shading of paved area by trees. Implement the suggestions below to ensure that you maximize shading:

- Become familiar with local ordinances and their recommended tree lists.
- Include only trees that are on the local ordinance's recommended tree list.
- Be sure crown diameters on parking lot plans are not overstated.
- Do not allow smaller-size substitutions after the plans have been approved.
- Follow-up to ensure trees are actually planted, as well as not removed after planting, especially at sites near store fronts where trees could obstruct signs.

ADAPTED FROM: *FACT SHEET #3: MAKING PARKING LOTS MORE TREE FRIENDLY*, CENTER FOR URBAN FOREST RESEARCH, PACIFIC SOUTHWEST RESEARCH STATION, USDA FOREST SERVICE, DAVIS, CA, 2002.

4. Design lighting carefully

Description

Outdoor lighting consumes a large fraction of the electricity used in the United States. Site lighting can be designed to use less energy and minimize "light pollution."

Applications

- Identify lighting goals and determine lowest acceptable levels.
- For security, use motion sensor lights instead of all night illumination. And specify full cut off luminaries (no horizontal light leaves the site) for all exterior light to prevent casting beams onto adjacent properties, right of ways or the night sky. Visit www.darksky.org for a list of fixtures approved by the International Dark Sky Association.
- Use only fluorescent and high pressure sodium for outdoor building lights.
- Specify photovoltaic or 12-volt lighting for a percentage of outdoor building and site lighting.

Benefits

Power and energy use can be decreased. Lower operating costs can often recover higher initial purchase costs of newer more efficient lamps.

5. Choose and maintain equipment for fuel conservation

Description

Equipment is most often selected for its speed, cost and ease of use. However, reducing fossil fuel consumption is one of the most important practices the landscape professional can do to protect the environment, while lowering the cost of operating the equipment.

Applications

- Use hand powered equipment when possible and take pride in the quality of the work.
- Minimize the use of gas-powered blowers.
- When using machinery, choose the smallest, most fuel efficient, lowest emission machinery required to get the job done.
- As you upgrade your equipment & vehicles, select for fuel economy and low emissions. Select vehicles that operate on natural gas or biodiesel or convert existing vehicles.
- Keep every piece of equipment and vehicle tuned.
- Recycle plant debris on site to minimize fuel consumption for hauling.
- Emphasize employee carpooling to sites.

Benefits

Manual labor may make the most economic sense for many landscape operations. You can cut the cost of fuel while protecting the health of your staff, and local air and water quality.

6. Specify local products & suppliers

Description

Transporting items the least distance reduces fuel consumption and air pollution and supports local economies.

Applications

- Consider the source and embodied energy of all materials in the landscape, including stone, gravel, plants, lumber, furniture, etc. Use local stone, for example, rather than limestone shipped from the Midwest.
- Select smaller container stock to increase the number of plants per delivery. Smaller plants also transplant better.
- Use recycled and less highly processed materials, and avoid petroleum-based products, including synthetic fertilizers.

Benefits

Buying locally produced and low embodied energy products often reduces the cost of an item, as well as the hidden environmental costs of transporting materials, such as pollution.

"We use so much fossil fuel that the energy that is used consumes more oxygen from the atmosphere than the landscapes actually provide."

— Bob Perry, Landscape Architect, Professor Emeritus, Cal Poly, Pomona

River-Friendly landscaping can help protect our from pollution by:

- ✔ Increasing on site infiltration and reducing runoff
- ✔ Reducing contaminants in runoff
- ✔ Increasing the soil's ability to remove pollutants from runoff

In an undisturbed landscape, only 15% of the rainwater leaves the system through surface water runoff. More than one-third moves into the soil where living, biologically diverse organisms break down and naturally filter out pollutants, before it reaches groundwater or our waterways.

As land is developed into residential or commercial landscapes, roads and parking lots, major changes occur.

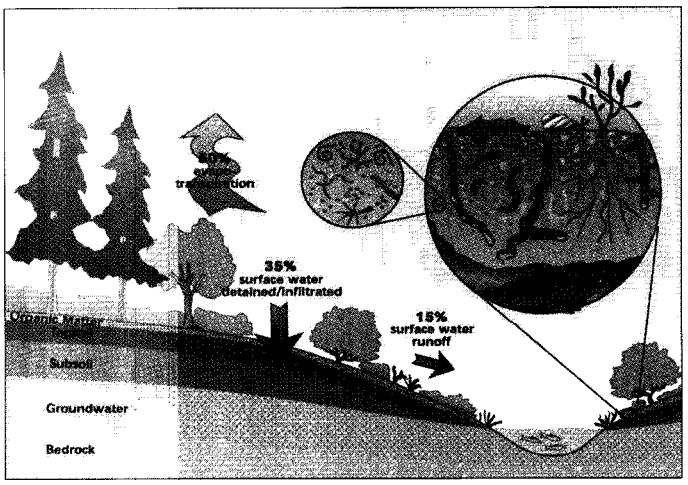
- More water runs off the surfaces – as much as 70% of all rain and irrigation water runs into waterways without moving through soil.
- The soil supports less microbial life and is less able to filter harmful chemicals out of the little water that infiltrates and moves through soil.

What happens next? Flash floods scour creek banks. Erosion of channels is greatly accelerated. As little as 10% impervious surface causes significant degradation of streams.

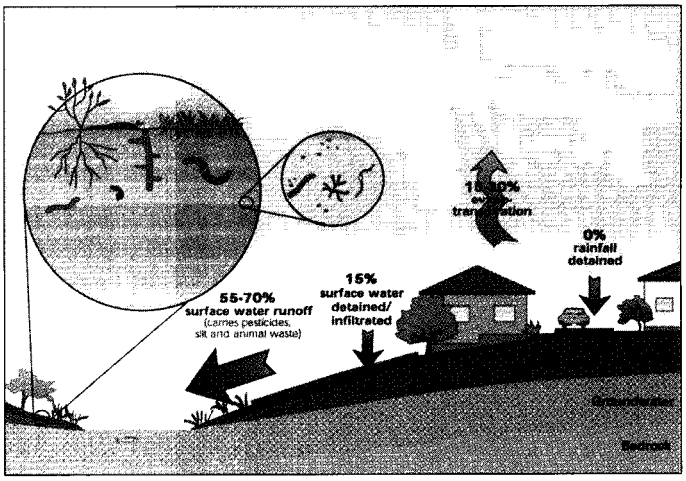
Pollutant load also increases. An acre of parking lot collects as much as 4 gallons of oil, gasoline and diesel fuel each year. When it rains and water runs off the parking lot, these toxic compounds are discharged into local creeks where they eventually enter Sacramento's rivers. Other pollutants include trace metals, pesticides, nutrients from fertilizers and pet waste, trash and suspended soil particles from poorly vegetated ground.

Stormwater runoff, from both residential and commercial sites, thus becomes a large source of pollution.

At the same time, air pollution from power equipment used in conventional landscaping takes an enormous toll on our environment. Gas powered garden tools emit 5 percent of the nation's air pollution. Plant debris is hauled to the landfill in vehicles that pollute the air, and once there, the materials decompose without oxygen and in the process emit greenhouse gases.



Heathy, Undisturbed Soils. A healthy vibrant soil structure teeming with micro and macro organisms. The presence of abundant organic material allows the soil to hold and retain water, and bind and degrade pollutants.



Unhealthy, Disturbed and Paved Soils. A soil structure impacted by human activity with limited organic life. Erosion and surface water run-off are high.

SOURCE. *THE RELATIONSHIP BETWEEN SOIL AND WATER*, KING COUNTY DEPARTMENT OF NATURAL RESOURCES.

River-Friendly landscaping can help protect our air from pollution by:

- ✔ Reducing fossil fuel consumption
- ✔ Recycling plant debris on site
- ✔ Planting trees to remove CO_2 and absorb air pollutants

Integrated Pest Management (IPM) is a holistic approach to controlling insects, plant diseases, weeds, and other pests. IPM programs integrate the use of many environmentally sound strategies for managing, but not necessarily eliminating, pests. First and foremost, IPM seeks to prevent pests by fostering a healthy environment in which plants have the strength to resist disease and insect infestations and to out-compete weeds. An IPM approach requires an understanding of the life cycles of pests and beneficial organisms and regular monitoring of their populations. If a pest problem is identified, IPM then considers all viable solutions and uses a variety of techniques to control pests, rather than turning only to pesticides. The least toxic pesticides are used as a last resort only. IPM offers a great opportunity to market your skills to your clients by providing the following services:

1. Use Integrated Pest Management

A. Prevent pest problems

Description

Applying the best landscape design, construction and management practices to prevent pests is always preferable to trying to control them after they become established.

Applications

Design to prevent pests by:

- Choosing a diversity of plant species that are well suited to the site.
- Selecting resistant varieties and local native species, including species that attract beneficial insects.
- Placing plants at proper distances from buildings, giving them space for adequate air circulation and room to reach their natural size and shape.
- Avoiding over-planting for instant color.
- Including compost in the soil specifications.

Prevent pests during landscape construction and maintenance by:

- Selecting plant material that is free from disease and insects.
- Planting at the right depth.
- Watering thoroughly but not over-watering.
- Keeping mulch on the surface of the soil at all times.
- Using slow release fertilizers if soil tests indicate their need, and not over-fertilizing.
- Pruning judiciously – severe pruning stimulates new growth, stresses plants and encourages pests and disease.
- Eliminating noxious weeds before they go to seed or spread uncontrollably.
- Cleaning equipment after use.
- Inspecting and removing invasive plant parts or seeds from your clothing, tools and vehicle before leaving an infested site.
- Cleaning up wood, fruit and other plant material that is infected with persistent diseases – compost the debris only if you have the experience to get the compost pile to temperatures over 135°F degrees for an extended period.

Benefits

A healthy, diverse landscape that prevents pests in the first place is critical to eliminating the need for pesticides, thereby reducing pollution and protecting the health of Sacramento's rivers.

Why learn IPM?

1. Using pesticides exposes humans and pets to toxic chemicals.
2. Increasing pesticide and soluble fertilizer use is correlated with increasing soil compaction, acidification and thatch buildup in lawns.
3. Using pesticides decreases the numbers and diversity of beneficial soil life, from earthworms to fungi to bacteria, which limits its ability to filter out pollutants and suppress disease.
4. The regular use of pesticides wastes money. Millions of pounds of pesticides are applied annually, yet an increasing number are losing their effectiveness as insects, disease causing organisms, as well as some weeds, are developing resistance to them.
5. Pesticides can kill beneficial insets – the natural enemies of the pests you want to control. The pest then comes back in stronger force than before spraying.
6. Common pesticides are showing up in local creeks and rivers, many at levels toxic to aquatic life.
7. Using pesticides may also kill the natural enemies of pests that are not at problem levels before spraying. This can cause secondary pest outbreaks.
8. Liability for employees that apply pesticides is increasing.
9. Regulations regarding pesticide use are growing, increasing the labor for oversight and paperwork.

ADAPTED FROM: *WHAT IS INTEGRATED PEST MANAGEMENT*, THE IPM PRACTITIONER, 1991.

B. Train your staff to identify and monitor pest & beneficial populations

Description

A critical part of an integrated pest management program is "watchful waiting"– observing the site at regular intervals in order to understand whether populations are increasing or decreasing and what harm pests are doing. It is likely that most organisms in the landscape are actually beneficial. Living soils, for example, can support billions of beneficial organisms, which suppress the fewer disease causing organisms. Many insects naturally feed on other pest insects – some even feed on weeds. Insects provide food for birds, reptiles and amphibians. Raptors and snakes eat rodents. Immediately pulling out the big guns in the form of pesticides will kill the beneficial organisms along with the pests, which can lead to more problems as the balance between the two is disrupted.

Applications

- Provide your staff with the time and resources to learn to identify both pest and beneficial organisms.
- Check plants often for vigor and signs of pests.
- Train your residential clients to monitor and record pest populations.
- Clarify which problems are the result of pests and not other environmental factors.
- Evaluate the results of any treatments.
- Check regularly with the Bio-Integral Resource Center (www.birc.org) or the University of California (www.ipm.ucdavis.edu) for up to date resources and information.

Benefits

Your staff enjoys greater job satisfaction as they learn additional, valuable skills. Beneficial organisms are given the opportunity to control pests. If a problem does develop, you can catch it just as it is reaching a level that needs control.

C. Educate your clients

Description

Many clients have unrealistic standards of absolute pest control and will require education. Landscapes can tolerate certain levels of pests without causing significant or even noticeable damage. Small populations of pest organisms are necessary to establish healthy populations of predators.

Applications

- Educate your clients about the role of beneficial organisms and ask them to consider some damage as a sign of a balanced, thriving ecosystem. Encourage them to raise their threshold of acceptable damage.
- Ask yourself and your clients if treatment is even necessary before developing a strategy for managing a pest problem.
- Refer your clients to Sacramento UC Cooperative Extension Master Gardeners at (916) 875-6913. Fact sheets and information on alternative pest control strategies are also available at www.ourwaterourworld.org or from the UC Statewide IPM Program at www.ipm.ucdavis.edu.
- In the case of ongoing pests, advise your clients that removing a particular problem plant may be the best solution.

Benefits

Insects and other pests can be accepted as an integral component of any ecosystem, in which case they are not controlled until they cause an unacceptable level of damage. The need for pesticides may be reduced or eliminated.

D. Control pest problems with physical & mechanical controls

Description

When pests are identified as the source of unacceptable levels of damage, physical barriers or mechanical techniques for excluding or removing pests should be implemented as a first line of control.

Applications

- Learn about and specify sheet mulching to prepare the soil and control weeds.
- Weeds can also be controlled by using drip irrigation and a minimum 2-inch layer of coarse mulch.
- Flame seedlings.
- Hoe or pull established weeds.
- Spray aphids with a strong jet of water.
- Use sticky traps around tree trunks to keep ants and other insects away.
- Hand-pick large adult insect pests and larvae as they appear.
- Remove dead or diseased plants or plant parts hot composting the debris will kill disease-causing organisms.

Benefits

Pests can be kept at acceptable levels thereby reducing the need for pesticides. Pollutants are kept out of stormwater in the first place.

"Pests are not the problem, they are a symptom of the problem. If you only treat the pest, the conditions that favored the pest outbreak remain and the pest will eventually return. Change your management practices to eliminate the cause of the problem and you can eliminate the pest without the use of toxic materials."

— Steven Zien, President, Living Resources Company, Citrus Heights

I.E. Control pest problems with biological controls

Description

Biological control is the use of living organisms to control pests. Knowing the life cycles of the pest and its enemies is important to maximizing the efficiency of any biological control.

Applications

- Encourage beneficial insects by planting a wide variety of plants that flower throughout the year.
- Introduce natural predators, parasites and beneficial microbes. Parasitic nematodes are effective for control of some turf pests. *Bacillus thuringiensis* (Bt) is a bacterium that kills caterpillars, including those of non-pest moths and butterflies. (Do not use Bt in a butterfly garden). Compost tea introduces large and diverse populations of microbes that can suppress some leaf and root diseases.
- Buy all biological controls from a reputable source.
- Do not use chemical pesticides, especially those that target a broad spectrum of pests, when using beneficial organisms.
- Goats, used with care, can be an excellent means of controlling poison oak, blackberries and other vegetation and in the process, returning nutrients to the soil.

Benefits

Beneficial organisms feed on or parasitize pests, potentially reducing the cost of purchasing and applying pesticides.

Pesticides to Avoid:

- Pyrethroids
  - Bifenthrin
  - Cyfluthrin
  - Cypermethrin
  - Permethrin
- Metaldehyde
- Disulfoton
- Carbaryl
- Malathion

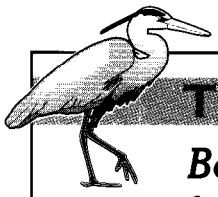
Use with Caution:

- Pyrethrins
- Imidacloprid
- Fipronil

SOURCE: KELLY MORAN & MARY LOUISE FLINT

***"Eighty-five** to ninety percent of tree health issues that I see are water related — either too much, too little, too frequently watered, or just not watered correctly."*

— Ken Menzer, Folsom City Arborist



TIPS FOR SUCCESS

Beneficial Insects and Plants for Controlling Major Pests

Attract These Beneficial Insects	To Attack These Major Pests	By Planting These Species
Bigeyed Bug	Caterpillars Lygus Mites Whitefly	native grasses *Polygonum* sp.
Hoverflies	Aphids Mealybugs	*Achillea* sp. *Asclepias fascicularis* *Baccharis* sp. *Ceanothus* sp. *Eriogonum* sp. *Prunus ilicifolia*
Lacewings	Aphids Leafhoppers Mealybugs Mites Thrips Whitefly	*Ceanothus* sp. *Prunus ilicifolia* *Quillaja saponaria*
Lady Beetles	Aphids Leafhoppers Mealybugs Mites Scales	*Achillea* sp. *Asclepias fasciculans* *Atriplex* sp. *Ceanothus* sp. native grasses *Rhamnus californica* *Salix* sp.
Minute Pirate Bug	Corn Earworm Leafhoppers Mites Whitefly	*Achillea* sp. *Baccharis* sp. *Eriogonum* sp.
Parasitic & Predatory Wasps	Aphids Caterpillars Leafhoppers Mealybugs	*Achillea* sp. *Asclepias fascicularis* *Eriogonum* sp. *Foeniculum vulgare* *Myoporum* sp.
Tachinid Flies	Caterpillars Squash Bugs Stink Bugs	*Achillea* sp. *Eriogonum* sp. *Heteromeles arbutifolia* *Myoporum* sp. *Rhamnus californica*

ADAPTED FROM CORNFLOWER FARMS WILDLAND CATALOG, 2006

1.F. Control pest problems with the least toxic pesticide as a last resort

Description

The least toxic and least persistent pesticide is used only when monitoring indicates that preventative and non-chemical methods are not keeping pests below acceptable levels. The goal is to reduce the population of the pest organisms with the least toxic pesticide that will control the pest but not harm other organisms or the environment.

Applications

- Do not use pesticides on a prescheduled basis.
- Learn the life cycle of the pest to maximize pesticide efficiency.
- Consider naturally occurring pesticides before synthetic. For example, soaps and oils can be used for control of aphids and other insect species. Sulfur controls fungal diseases. Corn gluten is available as a pre-emergent weed control. Acetic acid based sprays are becoming available for use on weed seedlings.
- If synthetic pesticides are identified as the last resort: choose the least toxic and the least persistent.
- Do not assume a high percentage of inert ingredients means the product is not hazardous.
- Do not use broad-spectrum, synthetic chemical pesticides.
- Spot spray weeds or use an ultra low volume sprayer to apply the absolute minimum amount.
- For information on toxicity of commonly applied pesticides, refer to *Grow Smart, Grow Safe - A Consumer Guide to Lawn and Garden Products*, available from www.watoxics.org or www.pesticideinfo.org.
- Keep pesticides out of gutters, storm drains, and off sidewalks, driveways and other hard surfaces, and dispose of leftover product properly.

Benefits

Using the least amount of the least toxic pesticide helps to protect water quality and demonstrates your commitment to the health of your staff, the community and Sacramento's creeks and rivers.

2. Eliminate high input decorative lawns

Description

Installing large turf areas solely for their looks is resource inefficient. One study estimated that over a 20 year period, the cumulative cost of maintaining a prairie or a wetland totals $3,000 per acre versus $20,000 per acre for non-native turf grasses.

Applications

- Plant groundcovers, shrubs, or trees, instead of turf.
- Replace lawns, especially those on steep slopes, in shady areas or near creeks and wetlands with native plant meadows or grassy swales that treat stormwater and resemble native grasslands.

Benefits

The need for irrigation, synthetic fertilizers and pesticides can be reduced or eliminated, thus protecting water quality.

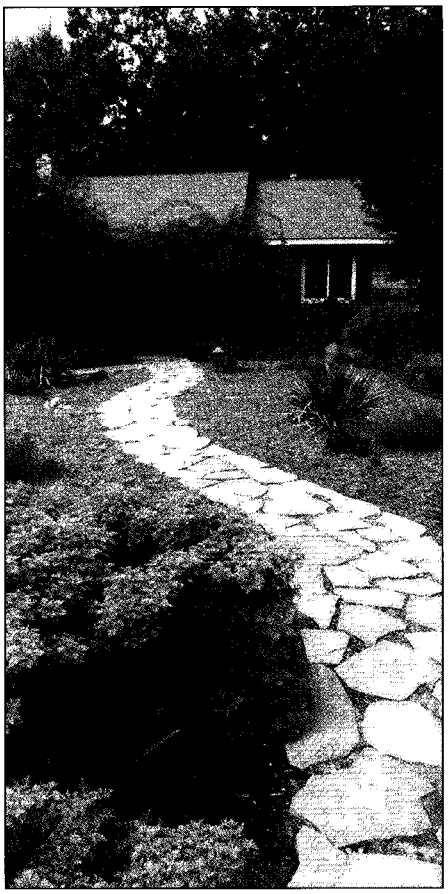


PHOTO: CINDY NELSON

***"My emphasis** has been guiding people toward drought-tolerant landscapes. Many of my clients don't want to mow or maintain a lawn anymore."*

— Roberta Walker, Landscape Designer, Roberta Walker Landscape Design, Sacramento

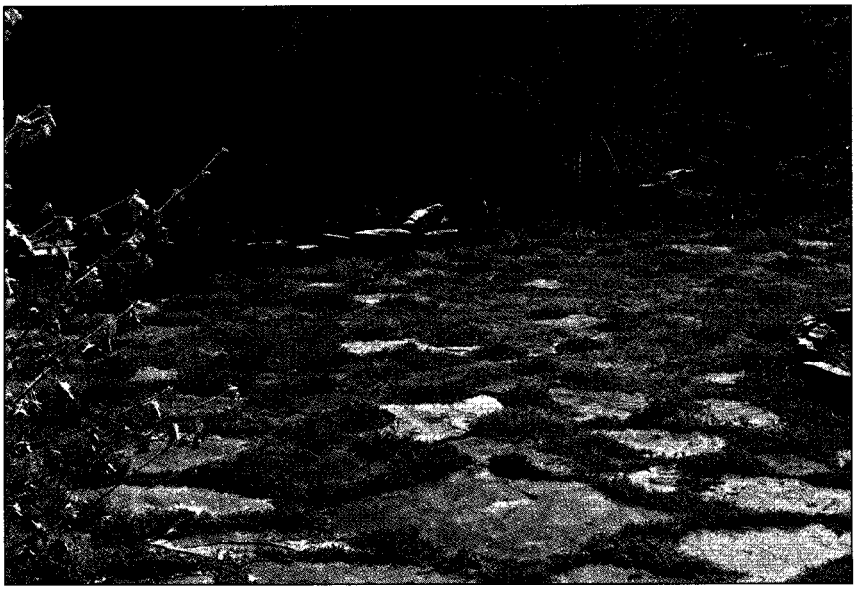


PHOTO: LYNN SCHOLL, RED STUDIO DESIGN

This Elk Grove backyard uses California natives and walkway pavers as a replacement for lawn.

3. Keep soil covered

Description

In general, soil should have 100% plant or mulch cover, since exposed soil surfaces are highly susceptible to runoff and erosion, especially along slopes and waterways. With the exception of a few large trees, native vegetation is typically removed from a site before building or landscaping. Doing so exposes the soil to erosion, and the resulting loss of topsoil depletes the soil of its organic, living component and clogs waterways. It turns nature on its head by turning a valuable resource into a pollutant.

Applications

- Design and implement a plan to defend against erosion, as described in *Nurture the Soil.*
- Use mulch regularly. Place it in a way that keeps it out of stormwater.

Benefits

Erosion is prevented. Sediment does not clog waterways.

PHOTO: CINDY NELSON

Covering bare soil with mulch adds organic matter to the soil and helps to control weeds, conserve water, and reduce erosion.

4. Choose and maintain your materials, equipment & vehicles carefully

Description

Lawn mowers, chain saws and leaf blowers emit significant amounts of pollutants. According to the US EPA, a gas-powered lawn mower emits 11 times the air pollution of a new car, per hour of use. In addition, operators are typically positioned where exposure to toxic emissions is greatest.

Applications

- Upgrade to low emission equipment.
- Inspect and maintain all equipment to keep it performing optimally. Repair oil leaks immediately.
- Don't repair equipment on site.
- Dispose of spent oil properly.
- Refuel carefully. Do not refuel near a creek or drainage area.
- Consider your routes and always carpool to sites.
- Specify low or zero VOC paints, sealants, and solvents.
- Use sustainably harvested wood (FSC Certified) if plastic or composite lumber is not appropriate. Use treated wood that does not contain chromium or arsenic for any application that specifies treated lumber.

Benefits

Fuel consumption is minimized. Air, water and noise pollution can often be reduced. Worker and community health will be protected.

5. Keep organic matter where it belongs

Description

Organic matter, added to the landscape in the form of mulch or compost, supports soil microbial life, which filters out pollutants. But it can become a pollutant when it enters the stormdrain.

Applications

Amend soil with compost as described in the section *Nurture the Soil.* But be sure to keep organic matter from being washed or blown into the gutter or stormdrain where it could become a pollutant by:

- Using berms or wattles around stockpiled organic matter.
- Storing it away from creeks and stormdrains.
- Sweeping every day during construction.
- Minimizing the use of blowers and using them carefully so you are not removing topsoil.
- Switching to gravel or cobblestone mulch in areas of high surface water flow.

Benefits

Organic matter does not become a pollutant but rather, increases the soil's ability to remove pollutants, thereby protecting our watershed.

Why calendar-based spraying doesn't work:

1. Over 2/3 of plant problems are not caused by any living pathogen. More often than not, the problem is from improper soil conditions, watering or fertilizing practices and other cultural problems.
2. If a pathogen or other pest is present, it must be treated at the correct point in its life cycle. Pest organisms do not grow on a regular calendar basis. It is likely the timing of spraying based on the calendar would be too early or too late to be effective.
3. Timed sprays endanger the beneficial organisms. Healthy landscapes with a diversity of birds, insects, microbes and other organisms can often keep pest populations under threshold levels, making chemical treatment unnecessary.

ADAPTED FROM: *PROIPM FACT SHEET*, GREEN GARDENING PROGRAM, SEATTLE, WA

6. Minimize impervious surfaces

Description

Watershed quality decreases rapidly when the total impervious area exceeds 10%. Yet typical single-family housing projects have 25-50% impervious surfaces. Asphalt and concrete for parking lots and driveways can be formulated to be porous. Crushed rock and mulch add a striking element to the design while allowing water infiltration. Pervious pavers which can include low growing groundcovers or gravel also facilitate water infiltration into the soil.

Applications

- Keep impervious surfaces to a minimum: Use porous surfaces, including permeable paving, and maximize landscaped area to encourage infiltration.
- Avoid contiguous impervious surfaces. Do not directly connect impervious areas to the stormdrain.
- Decrease parking lot sizes by narrowing the aisles between rows and increasing the ratio of compact to full size spaces. For more information contact the Center for Watershed Protection at www.cwp.org.
- Remove all unnecessary impervious paving. Check with your local hauler for more information on where to recycle asphalt & concrete.

Benefits

Increasing porous surfaces decreases runoff, protects the biology of the Sacramento River watershed and contributes to the restoration of our local streams, creeks and wetlands.

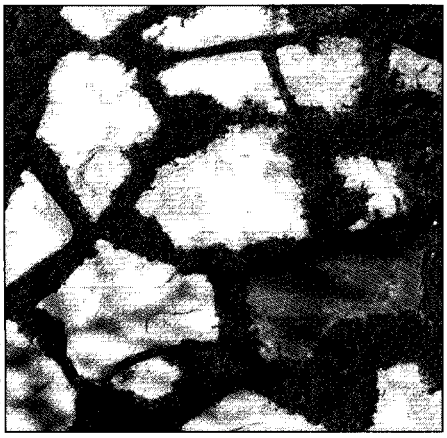


PHOTO: MIKE HEACOX, LUCIOLE DESIGN

Use of open-grid pavers and low-growing groundcover allows for good water filtration.

7. Plant trees

Description

Sacramento has some of the worst air quality in the US. Trees help clean and cool the air by absorbing dirty air and removing pollutants. The Center for Urban Forest Research estimates that the 6 million existing trees in the Sacramento region remove approximately 1,600 tons of air pollutants annually. Trees also intercept significant amounts of rainfall each year, thus helping to control stormwater runoff.

Applications

- Select trees that match the microclimate and soil characteristics.
- Select California natives or other low water use species.
- Specify large stature trees in as many appropriate places as possible.
- Plant in groves and hydrozones.
- Provide adequate soil volume, amended as per a soil analysis.
- Inspect tree health regularly.
- Maintain and prune appropriately.
- Call SMUD's shade tree program at 1-888-742-7683 or go to www.smud.org/residential/saving/trees for free shade trees and eligibility requirements.

Benefits

Appropriately planting more trees decreases runoff and protects water quality. Trees also absorb air pollutants, thus protecting air quality. Dollar for dollar, larger trees deliver 8 times the benefits of smaller trees.

PHOTO: CINDY NELSON

This pervious concrete parking lot at Miller Park in Fair Oaks allows for good water infiltration and an even distribution of vehicle weight, which benefits the olive trees planted for shade.

TIPS FOR SUCCESS

Pervious Concrete

Pervious concrete is a high cement content mix manufactured with a low water-cement ratio and without fine aggregate that:

- Meets NPDES regulations
- Provides for groundwater recharge
- Has the same structural integrity as conventional concrete

When compared to a conventional asphalt parking lot requiring stormwater system tie-in and first flush pollution measures, pervious concrete parking lots are by far the lower initial cost solution.

SOURCE: *PERVIOUS CONCRETE*, CONCRETE PROMOTION COUNCIL OF NORTHERN CALIFORNIA, WWW.CPCNC.ORG.

8. Manage and maintain the irrigation system carefully

Description

A poorly maintained irrigation system wastes water, adds to surface runoff, and damages property.

Applications

- Match watering schedule to plant needs, soil type, slope and season.
- Eliminate leaks and spraying onto sidewalks immediately.
- Install rain shut-off devices.
- Upgrade to new technology irrigation controllers that adjust watering schedules to reflect weather conditions or soil moisture and include a rain shut-off device.
- Refer to applications in the section *Conserve Water.*

Benefits

Water will be conserved and runoff reduced while protecting Sacramento's rivers.

9. Design a system to capture and treat water

Description

Catching, slowing and retaining water will promote infiltration and removal of pollutants, and minimize stormwater runoff.

Applications

- Protect existing patterns of drainage.
- Restore or create new wetlands.
- Design and construct stormwater:
  - Wet or dry detention ponds
  - Infiltration basins, trenches drainfields or drywells
  - Bioretention systems
  - Bioswales
- Consider additional treatment with products such as oil/grit separators or oil/water separators for improved removal of pollutants from stormwater.
- Include a mosquito abatement plan for landscapes that retain rainwater.

Benefits

Stormwater runoff is reduced while water recycled on site fosters the removal of pollutants and encourages biodiversity. Downstream engineering costs are decreased. Property values can be increased.

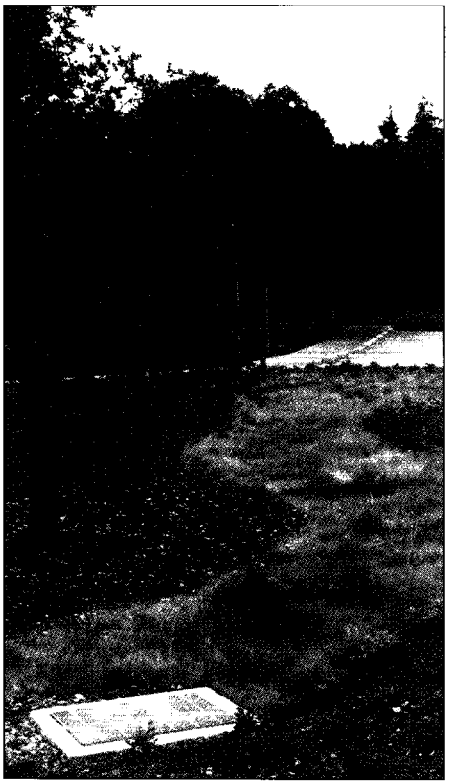
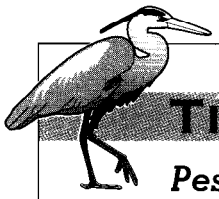


PHOTO: THE OFFICE OF CHERYL BARTON

Water, unimpeded by curbs, flows to grass planting in bioswale together with storm drain filters, enhances on-site infiltration and reduces contaminants.

***"We are designing** a project with a vegetative swale to capture and filter water run-off, and we are specifying native plants. I wanted to show that vegetative swales can look nice, address water quality concerns, capture run-off, and can be low in maintenance."*

—Tara L. Gee, Landscape Architect, City of Roseville-Parks & Recreation



TIPS FOR SUCCESS

Pest Management for Roses

Many rose enthusiasts are able to maintain vigorous plants and produce high quality blooms with little or no use of insecticides, especially in California's dry interior valleys. The key is careful selection of varieties, which vary significantly in susceptibility to insect and disease problems, good attention to appropriate cultural practices, and occasional handpicking or using water to spray away pests.

SOURCE. *ROSES: INSECT AND MITE PESTS AND BENEFICIALS*, UC PEST MANAGEMENT GUIDELINES. WWW.IPM.UCDAVIS.EDU

lant and animal diversity is one of the many factors that make the Sacramento River watershed unique and beautiful. More than 1,000 local plant species bloom during the year, supporting hundreds of native pollinators, beneficial insects and other organisms that can reduce the need for pesticides. Birds & butterflies are attracted, bringing with them beauty, song and interest to a landscape.

Biodiversity is crucial to the health and resiliency of the local landscape, the River area ecosystem and its inhabitants. Yet the loss of habitat is threatening local biodiversity. The population of the Sacramento area is growing and expected to continue to do so. With increased population comes development, which is too often done without regard for wildlife habitat.

And although we tend to rely on parks and open space for preserving wildlife habitat, both residential and commercial landscapes can also play an important role. Developed landscapes can provide food, water, shelter and nesting sites for birds, butterflies, beneficial insects and other creatures, thus helping to conserve valuable wildlife resources and restore damaged ecosystems. Small spaces or corridors, patched together over the entire Sacramento region, add up to a great opportunity for encouraging and protecting wildlife.

Offer your skill and expertise to your customers through the following practices for creating wildlife habitat:

1. Diversify

Description

A diverse landscape includes annuals, biennials and perennials of many different sizes, shapes, colors and textures. It includes evergreens and deciduous plants, species that bloom at different times of the year and those that bear fruit or berries. And it includes plants that occupy different canopy levels and root zones.

Applications

- Educate your customers and encourage them to embrace diversity.
- Start with a trial zone: the entire landscape doesn't have to be converted at once.
- Recommend to your clients that they convert a lawn that no one uses, or that they replace part of it with a diverse border.
- Select a rich array of plant species that includes many, if not all, California natives.
- Select groundcovers, shrubs and trees that provide a variety of nesting sites or flower and bear fruit at different times of the year. Refer to the *Tips for Success: Flowering Periods of Selected Beneficial Insects Plants* in this section.
- Do not plant invasive species as they often damage or destroy habitat.

PHOTOS: KWAI LAM

- Remove weeds: extra effort to clear invasive species now will save labor later.
- Plan for increasing the diversity throughout the landscape over time.

Benefits

Biodiversity is fostered. A diverse landscape may resist disease and insect pests better than those with little variety. A single insect or disease infestation is less likely to be devastating.

"The landscape is dynamic and ever-changing. A diverse landscape is a more sustainable landscape."

— Cheryl H. Sullivan, Landscape Architect, Cunningham Engineering, Davis

2. Choose California natives first

Description

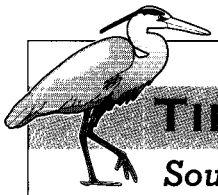
California native plant species are critical to creating wildlife habitat because local fauna are adapted to them. Research indicates, for example, that indigenous bees prefer native plants over exotic species. The best natives for Sacramento landscapes are local and they are especially important to consider for sites that interface with wild lands. Other California native plants that match the microclimate can also be good choices.

Applications

- Select a variety of appropriate California native species that match the microsites of the landscape.
- Group flowering species in dense stands of at least 16 square feet, rather than planting isolated single plants, to attract native pollinators.
- Let some plants go to seed for food for wildlife – don't immediately deadhead everything in the garden.

Benefits

Many natives flourish in the Central Valley, often with less water, fertilizers and maintenance. Local wildlife is fostered.



TIPS FOR SUCCESS

Sources of California Natives

Look for California natives at your local nursery, or from the following growers and nurseries listed on the website of the California Native Plant Society (go to www.cnps.org/links/native_plant_nurseries for a complete listing):

Albright Seed Company
Martinez, (925) 372-8245
www.albrightseed.com

Bitterroot Restoration, Inc.
Lincoln, (916) 434-9571
www.bitterrootrestoration.com

Calaveras Nursery
Valley Springs, (209) 772-1823

California Flora Nursery
Fulton, (707) 528-8813
www.calfloranursery.com

Central Coast Wilds
Santa Cruz, (831) 459-0655
www.centralcoastwilds.com

Clyde Robin Seed Company
Castro Valley, (510) 785-0425
www.clyderobin.com

ConservaSeed
Rio Vista, (916) 775-1676
www.conservaseed.com

Cornflower Farms
Elk Grove, (916) 689-1015
www.cornflowerfarms.com

Elkhorn Native Plant Nursery
Moss Landing, (831) 763-1207
www.elkhornnursery.com

Far West Bulb Farm
Grass Valley, (530) 272-4775
www.californianativebulbs.com

Floral Native Nursery
Chico, (530) 892-2511
www.floralnativenursery.com

Hartland Nursery
Walnut Grove, (916) 775-4021
www.hartlandnursery.com

Hedgerow Farms
Winters, (530) 662-6847
www.hedgerowfarms.com

Native Revival Nursery
Aptos, (831) 684-1811
www.nativerevival.com

Pacific Coast Seed
Livermore, (925) 373-4417
www.pcseed.com

Park Place Gardens & Nursery
Loomis, (916) 276-8225
www.ppgn.com

Rana Creek Habitat Restoration
Carmel Valley, (831) 659-3820
www.ranacreek.com

Seedhunt
Freedom
www.seedhunt.com

The Watershed Nursery
Berkeley, (510) 548 4714
www.TheWatershedNursery.com

Also ask your current nursery – they'll supply more local CA natives if they know of the interest.

PHOTO: KAMALA BENNETT, SENTIENT LANDSCAPE, INC.

Logs and large stones provide shelter for beneficial soil organisms and small reptiles while adding an interesting element to the landscape.

3. Provide water & shelter

Description

Providing nesting sites, shelter and clean, fresh water is also essential for encouraging wildlife. But care must be taken not to create breeding sites for mosquitoes.

Applications

- Place a birdbath in the garden. Remind your customers to change the water every few days.
- Include a pond, with circulating water and/or fish, in the landscape design. Install solar powered pumps to reduce energy consumption.
- Select groundcovers, shrubs, and trees that provide a variety of nesting sites.
- Specify rockwalls and boulders as design elements that also provide habitat.
- Install birdhouses in locations that are secure and away from a lot of activity.
- Snags are dead trees left in place. Consider leaving wood materials or downed trees if they don't threaten structures or parking areas or create a fire hazard.

Benefits

Water and shelter supports wildlife and adds interesting elements to the landscape.

4. Eliminate the use of pesticides

Description

Pesticides do not kill only the target pest species. Birds, bees, butterflies and other creatures are also vulnerable in many cases they are more sensitive to the toxins than the pests. Eliminating or at least using them only as a last resort is one of the most important practices for nurturing wildlife.

Applications

- Refer to the integrated pest management practices in the section: *Protect Water & Air Quality.*
- Read the label on every pesticide (including naturally derived pesticides) that you use for toxicity to non-target organisms.

Benefits

Beneficial organisms, which can keep pests under control, are not harmed. The need for pesticides is thereby reduced.

Contact the Wildlife Habitat Council for information on how both private and corporate landscapes can be managed for wildlife habitat at www.wildlifehc.org.

5. Conserve or restore natural areas & wildlife corridors

Description

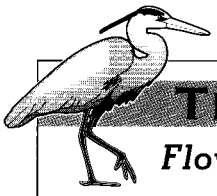
Careful site planning, especially for new development along the urban-wild interface is important for protecting biodiversity. Natural areas and corridors increase habitat and range, supporting a diversity of organisms and allowing them to travel safely between sites.

Applications

- Become familiar with local open space requirements.
- Limit earthwork and clearing of vegetation.
- Specify, in the construction contract, penalties for destruction of protected soil, trees and other vegetation.
- On previously developed sites, restore open space by planting native vegetation.
- Build in wildlife corridors adjacent to open spaces, wild lands, and creeks.
- Consider corridors when designing roads and fencing.

Benefits

The Central Valley's open space, and plant and animal diversity, is protected.



TIPS FOR SUCCESS

Flowering Periods of Selected Beneficial Insect Plants

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Salix sp. (Willow sp.)	■	■	■	■								
Ceanothus sp.		■	■	■	■							
Baccharis viminea (Mule Fat)			■	■	■							
Achillea sp. (Yarrow sp.)				■	■	■	■					
Rhamnus californica (Coffeeberry)				■	■							
Prunus ilicifolia (Holly-Leaf Cherry)				■	■							
Eriogonum sp. (Buckwheat sp.)					■	■	■	■	■	■	■	■
Sambucus sp. (Elderberry sp.)					■	■	■	■	■			
Heteromeles arbutifolia (Toyon)					■	■						
Myoporum parvifolium (Creeping Boobialla)						■	■	■	■	■		
Asclepias fascicularis (Narrowleaf Milkweed)							■	■	■	■		
Baccharis pilularis (Coyote Brush)	■									■	■	■

ADAPTED FROM CORNFLOWER FARMS WILDLAND CATALOG, 2006

CHAPTER FOUR

"The challenges of sustaining a landscape business in the 21st century will require that professionals learn the latest trends and techniques in water conservation, stormwater quality, resource conservation, and reduction of pesticide and fertilizer use. Adopting ecologically sustainable practices makes good business sense and also benefits landscapers, employees, clients, communities, and the environment."

THE ECOLANDSCAPE WORKING GROUP, SACRAMENTO. WWW.ECOLANDSCAPE.ORG

Summary of River-Friendly Landscaping Benefits

1. LANDSCAPE LOCALLY: CONSIDER THE CONTEXT OF THE SACRAMENTO RIVER WATERSHED	Design	Construct	Maintain	Benefits
1. Evaluate climate, exposure and topography	■	■	■	This knowledge is critical to all other River-Friendly landscaping practices particularly being able to select plant materials that match the site. It places the landscape in the context of the Sacramento River watershed. In the long run, it can save your business time and money as it allows you to collaborate with nature, thus avoiding problems and reducing callbacks.
2. Assess the soil and test drainage	■	■	■	Understanding the soil is also critical to landscaping in an environmentally friendly manner. Plants are more likely to be placed appropriately and fertilizers used only as needed.
3. Survey and protect flora & fauna	■	■	■	Conserving or restoring local flora, fauna and habitat provides your clients with a sense of place. Native plants can make the job easier for the landscape professional.
4. Consider the potential for fire	■	□	■	Landscapes can be designed and maintained to reduce the fire hazard, with a clearer understanding of the risks, proper design and choice of plants.
5. Use local, natural plant communities as models	■	□	▒	Using the local, natural plant communities as a model allows you to work with nature to create spectacular landscapes that can help replace what's so often been degraded or lost.

2. LANDSCAPE FOR LESS TO THE LANDFILL	Design	Construct	Maintain	Benefits
1A. Select appropriate plants: Choose plants to match the microclimate & soil conditions	■	□	▒	Plants are more likely to thrive, which reduces their susceptibility to disease and other pests and their need for fertilizers and pesticides. Water can be conserved. Callbacks and plant replacements are often reduced. Debris is not generated in the first place.
1B. Select appropriate plants: Choose plants that can grow to their natural size in the space allotted them	■	□	▒	Labor, fuel and waste are likely to be reduced, cutting your costs. Plant health and resistance to disease is fostered.
1C. Select appropriate plants: Replace sheared hedges with plants that can grow to their natural shape & size	■	□	▒	Your cost for the labor to regularly shear the hedges is lowered and at the same time, fuel load can be decreased, waste will likely be reduced and your disposal bills lowered.
1D. Select appropriate plants: Do not plant invasive species	■	□	▒	The cost of later pulling these species out of the landscape, neighboring sites and wild lands is avoided. Waste is reduced and ecosystem diversity is protected.
2A. Keep plant debris on site: Grasscycle	▒	□	■	Leaving the clippings on the lawn after mowing reduces green waste, saves time and money, and contributes to a vigorous lawn.
2B. Keep plant debris on site: Produce mulch from plant debris	▒	□	■	Nutrients are recycled, habitat is created, waste is reduced and the beneficial soil life that feeds on the organic matter jumpstarts other natural processes.
2C. Keep plant debris on site: Compost plant debris	▒	□	■	Composting on site returns valuable nutrients and organic matter to the soil and reduces pollution associated with transporting waste, as well as disposal costs.
3. Prune selectively and properly	▒	▒	■	Trees and shrubs are stronger and more likely to resist pests. Waste is minimized.
4. Water and fertilize judiciously	▒	▒	■	Plants are not pushed into growth over drive. Water damage to fences and hardscapes is minimized. Waste is prevented and disposal bills are decreased.
5. Use goats for controlling weeds and creating firebreaks	▒	□	■	As the goats graze they reduce the fuel load, return nutrients to the soil and eliminate the need to haul off plant debris.
6. Use salvaged items & recycled content materials	■	▒	▒	Lower maintenance costs can recover the added cost of plastic or composite lumber within a year. Waste can be reduced, natural resources conserved, markets for recycled products strengthened.
7. Reduce and recycle construction waste	▒	■	□	Waste can be reduced and disposal fees minimized.
8. Separate plant debris for recycling	▒	□	■	In most cases, the material is processed into mulch or compost.

■ Indicates a practice that is a primary issue in the design, construction or maintenance phase.
▒ Indicates a practice that is a secondary issue in the design, construction, or maintenance phase.
□ Indicates that a practice is not often as relevant in the design, construction or maintenance phase.

3. NURTURE THE SOIL	Design	Construct	Maintain	BENEFITS
1. Remove and store topsoil before grading				Conserving topsoil can reduce the likelihood of many problems over the long run, including stormwater runoff. It can minimize fertilizer and irrigation requirements and topsoil replacement costs.
2. Protect soil from compaction				Soil structure and the soil's ability to support the microbes that cycle nutrients and filter pollutants are protected. The soil is easier to work.
3. Defend against erosion				The likelihood of erosion is lessened, thereby conserving topsoil and protecting aquatic habitat.
4. Amend the soil with compost before planting				Compost fosters a diverse, fertile, and disease suppressive soil. It can improve structure, aeration and water holding capacity. You and your clients may see both long and short term benefits, including faster plant establishment, and decreased fertilizer & pesticide use.
5. Grasscycle				Nutrients in the grass clippings are made available to plants. Fertilizer requirements can be reduced by as much as 50%, thereby lowering your costs and protecting water quality.
6. Mulch regularly				Mulch conserves water, enhances the growth of plants and the appearance of the landscape. It can also simplify your operations- thereby possibly lowering your costs - by suppressing weed growth and reducing the need for trimming around trees and poles.
7. Aerate compacted soils				Aerating and then topdressing with compost relieves compaction, stimulates root growth and disease resistance. Plants are more easily established. Water and fertilizer requirements may be lessened.
8. Feed soils naturally				A strong soil foodweb, which makes nutrients available to the plants and protects water quality, is nurtured.
9. Avoid synthetic, quick release fertilizers				Slow release fertilizers make nutrients available to the plants when they are needed, so their efficiency increases and they are therefore often a better value. Flushes of growth that results in pest infestations or plant waste are less likely.
10. Minimize the use of chemical pesticides				Minimizing pesticides reduces water pollution and helps support soil life, which cycles nutrients and promotes resistance to plant disease. Your costs may then be reduced in the long run.

4. CONSERVE WATER	Design	Construct	Maintain	BENEFITS
1. Create drought resistant soils with compost & mulch				Compost can increase permeability and water-holding capacity, thereby reducing the need for irrigation.
2. Grow California natives or Mediterranean plants				Appropriately sited native or Mediterranean type plants often require less soil preparation, watering, mowing, fertilizing and spraying, which can reduce your operating costs. CA native species are relatively easy and inexpensive to implement on a trial basis. Using local natives reduces the risk of spreading non-local species.
3. Minimize the lawn				Water and energy can be conserved. For example, reducing a 1,000 square foot lawn that gets 1 inch of water per week to 500 square feet can save approximately 10,000 gallons of water per dry season. Your labor for mowing may also be reduced. Chemical use may be decreased and water quality protected.
4. Implement hydrozoning: group plants by water needs				Water use can be more easily matched to the plant requirements. This fosters resistance to pests as well as conserves water. Plant mortality is reduced, saving time and money.
5. Design for on-site rainwater collection, recycled water and/or graywater use				The use of treated, drinkable water to irrigate lawns and gardens can be reduced. Groundwater is recharged.

Conserve Water (cont'd.)

6. Design and install high efficiency irrigation systems	■			High efficiency systems not only limit evaporation and runoff, but also prevent disease and minimize weed growth. Runoff can be reduced and water quality protected.
7. Install a dedicated meter to monitor landscape water use	■	▒	▒	Monitoring the landscape water use more precisely can demonstrate and support water conservation.
8. Manage irrigation according to need		▒	■	Appropriate watering moderates plant growth, promotes plant health and reduces replacement costs, as well as the need for pesticides and pruning.
9. Maintain the irrigation system so every drop counts		▒	■	Evaporation or over spray is decreased or eliminated all together. Properly maintained irrigation systems can avoid unnecessary plant, fencing and asphalt replacement costs, and increase property values.
10. Request an irrigation audit			■	Additional practices for conserving water may be identified. Customer satisfaction will be increased.

5. CONSERVE ENERGY	**Design**	**Construct**	**Maintain**	**BENEFITS**
1. Plant and protect trees to moderate building temperatures	■	■	■	When properly placed, mature trees can reduce the interior temperature of a building by as much as 20 degrees, reducing summer cooling costs by 25-40%.
2. Reduce the heat island effect: shade paved areas	■			Patios & cars can be much more comfortable in the summer. Air quality can be improved. Costs of cooling adjacent buildings may be lowered.
3. Shade air conditioners	■			The air conditioner runs more efficiently, which will reduce your client's utility bill.
4. Design lighting carefully	■			Power and energy use can be decreased. Lower operating costs can often recover higher initial purchase costs of newer more efficient lamps.
5. Choose and maintain equipment for fuel conservation		■	■	Manual labor may make the most economic sense for many landscape operations. You can cut the cost of fuel while protecting the health of your staff, and local air and water quality.
6. Specify local products & suppliers	■	■	■	Buying locally produced and low embodied energy products often reduces the cost of an item, as well as the hidden environmental costs –such as pollution- of transporting materials.

6. PROTECT WATER & AIR QUALITY	**Design**	**Construct**	**Maintain**	**BENEFITS**
1A. Use Integrated Pest Management (IPM): Prevent pest problems	■	■	■	A healthy, diverse landscape that prevents pests in the first place is critical to eliminating the need for pesticides, thereby reducing pollution and protecting the health of Sacramento's rivers.
1B. Use IPM: Train your staff to identify and monitor pest & beneficial populations	▒	▒	■	Your staff enjoys greater job satisfaction as they learn additional, valuable skills. Beneficial organisms are given the opportunity to control pests. If a problem does develop, you can catch it just as it is reaching a level that needs control.
1C. Use IPM: Educate your clients	■	▒	■	Insects and other pests can be accepted as an integral component of any ecosystem, in which case they are not controlled until they cause an unacceptable level of damage. The need for pesticides may be reduced or eliminated.
1D. Use IPM: Control pest problems with physical & mechanical methods	▒	▒	■	Pests can be kept at acceptable levels thereby reducing the need for pesticides. Pollutants are kept out of stormwater in the first place.
1E. Use IPM: Control pests problems with biological controls	▒	▒	■	Beneficial organisms feed on or parasitize pests, potentially reducing the cost of purchasing and applying pesticides.
1F. Use IPM: Control pest problems with the least toxic pesticide as a last resort	▒	▒	■	Using the least amount of the least toxic pesticide helps to protect water quality and demonstrates your commitment to the health of your staff, the community and Sacramento's rivers.

■ Indicates a practice that is a primary issue in the design, construction or maintenance phase.
▒ Indicates a practice that is a secondary issue in the design, construction, or maintenance phase.
□ Indicates that a practice is not often as relevant in the design, construction or maintenance phase.

Protect Water & Air Quality (cont'd.)

2. Eliminate high input decorative lawns	■			The need for irrigation, synthetic fertilizers and pesticides can be reduced or eliminated, thus protecting water quality.
3. Keep soil covered	■	■	■	Erosion is prevented. Sediment does not clog our waterways.
4. Choose and maintain your materials, equipment & vehicles carefully		■	■	Fuel consumption is minimized. Air, water and noise pollution can often be reduced. Worker and community health will be protected.
5. Keep organic matter where it belongs	▒	▒	■	Organic matter does not become a pollutant but rather, increases the soil's ability to remove pollutants, thereby protecting our watershed.
6. Minimize impervious surfaces	■			Increasing porous surfaces decreases runoff, protects the biology of our Sacramento River watershed and contributes to the restoration of our streams, creeks and wetlands.
7. Plant trees	■		▒	Appropriately planting trees decreases runoff and protects water quality. Trees also absorb air pollutants, thus protecting air quality. Dollar for dollar, larger trees deliver eight times the benefits of smaller trees.
8. Manage and maintain the irrigation system carefully		▒	■	Water will be conserved, and runoff reduced while protecting the Sacramento River watershed.
9. Design a system to capture and treat water	■			Stormwater runoff is reduced while water recycled on site fosters the removal of pollutants and encourages biodiversity. Downstream engineering costs are decreased. Property values can be increased.
7. CREATE & PROTECT WILDLIFE HABITAT	**Design**	**Construct**	**Maintain**	**BENEFITS**
1. Diversify	■		▒	Biodiversity is fostered. A diverse landscape may resist disease and insect pests better than those with little variety. A single insect or disease infestation is less likely to be devastating.
2. Choose California natives first	■		▒	Many natives flourish in the Central Valley, often with less water, fertilizers and maintenance. Local wildlife is fostered.
3. Provide water & shelter	■		■	Water and shelter supports wildlife and adds interesting elements to the landscape.
4. Eliminate the use of pesticides	■	■	■	Beneficial organisms, which can keep pests under control, are not harmed. The need for pesticides is thereby reduced.
5. Conserve or restore natural areas & wildlife corridors	■			The Sacramento area's open space, plant and animal diversity are protected.

■ Indicates a practice that is a primary issue in the design, construction or maintenance phase.
▒ Indicates a practice that is a secondary issue in the design, construction, or maintenance phase.
□ Indicates that a practice is not often as relevant in the design, construction or maintenance phase.

Chapter Five

KAMALA BENNETT, SUSTAINABLE LIVING DESIGNS

Conventional landscape

A conventional landscape is transitioned to a River-Friendly landscape.

Lawn sheet mulched in place

One year later

Sacramento area residents are already thinking about the connection between their landscapes and the environment and they want to make a difference. Yet River-Friendly landscaping practices require skill and expertise. Communicate your expertise to earn new clients and strengthen your existing customer loyalty, then expand to include more practices, marketing yourself as a River-Friendly landscaper.

STEP 1: **Start with the River-Friendly practices that you already do... and explain the benefits to your customers**

STEP 2: **Plan to offer more River-Friendly landscaping practices**

STEP 3: **Market "River-Friendly Landscaping Packages"**

STEP 4: **Learn more**

STEP 5: **Start your River-Friendly Reference Library**

STEP 1:

Start with the River-Friendly practices that you already do...and explain the benefits to your customers

The best strategy for offering River-Friendly landscaping to your clients is to **start by identifying those practices that you already do.**

Then: train yourself and your staff on the benefits. Learn how these practices can protect your client's health or that of the environment, save landfill space, provide wildlife habitat or increase the value of their property.

Communicate your skills and the benefits of River-Friendly landscaping to your customers or potential new customers. Feel free to share the information in these guidelines with them. Let them know you can help them landscape in an environmentally friendly manner with these River-Friendly services. Emphasize that many of these services can increase their property's value. Detail your skill in providing these benefits in periodic quality control reports mailed to your clients.

Include the practices and their benefits in your contracts. You may even want to request that your clients sign an agreement on the goals of their River-Friendly Landscape program.

***"In the past,** lawns represented affluence and maybe that is still in our subconscious. The challenge is to have people try something new."*

— Roberta Walker, Landscape Designer, Roberta Walker Landscape Design, Sacramento

PHOTO: DAVE ROBERTS, ROBERTS LANDSCAPE

***"Educating** your clients about environmentally friendly landscape practices will help you get them to buy into your ideas."*

— Dave Roberts, Landscape Designer & Contractor, Roberts Landscape, Sacramento

STEP 2:

Plan to offer more River-Friendly landscaping practices

The ideal River-Friendly landscape is designed, constructed and maintained with most, if not all, the practices listed in this guide. It is a holistic, integrated approach that yields the most benefits to your clients, your business, the environment and our community. It is more likely, though, that you will need to evolve towards that goal rather than instantly switch over.

Sit down with your staff and ask yourselves:

- Do we currently offer more practices from one principle than others? Why?
- What other River-Friendly practices from the *Menu of Best Practices* (pages 8-9) might our clients also value?
- What additional practices would be relatively easy to learn about and implement in the near future?

Look through the table of benefits in Chapter 4 from the perspective of the primary nature of your business (design, construction or maintenance):

- But consider the practices identified for your type of business as a starting point, not the entirety of what you can offer your customers.
- For example, "Choose plants that can grow to their natural size in the space allotted them" from *Landscape for Less to the Landfill* is identified as a primary practice for the design phase. Yet it is likely to be important in maintenance, too. Which means you can offer this River-Friendly practice so selected plants do not generate waste over the long term even if you provide only landscape maintenance services.

Consider how to adopt more of the practices over time:

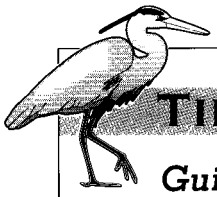
- Under the principle(s) at which your company is already strong, (such as *Conserve Water*) what would it take to offer all or most of the practices?
- What additional practices can you offer in the next fiscal year, or the next 2 years?
- What training and equipment do you need to offer more River-Friendly services?

"An ecologically-based planting design is inherently complex. The maintenance needs to change over time. A trained maintenance presence is needed."

— Michael Thilgen, Landscape Architect and Contractor, Four Dimensions Landscape Company, Oakland

"Maintenance people never get to be part of the early planning and design, and designers really don't have the opportunity to look at a project – or to experience it – a year later when it's in the hands of the maintenance people. Bridging the gap between design and maintenance is so important – and often very difficult."

— Tara L. Gee, Landscape Architect, City of Roseville-Parks & Recreation



TIPS FOR SUCCESS

Guide your Clients through a Transition Period

Transitioning a landscape that has been managed with few chemical inputs and some additions of organic amendments to a River-Friendly landscaping maintenance program can be a relatively simple and short process. Landscapes that have been intensively treated with pesticides, over-watered and over-fertilized will require greater skill and time to transition.

- Let your customers know that it may take 2 years or more to make the change, that it will require skill, frequent monitoring and increased communication, and that their expenses could be greater during that period.
- Agree upon an acceptable period and include this in your contract.
- Start by assessing the soil and testing drainage.

STEP 3:

Market "River-Friendly Landscaping Packages"

Another important question to ask yourself as you expand your River-Friendly services is how to market them to your clients. Here are some suggestions for "River-Friendly Landscaping Packages" that could be developed to both respond to and encourage customer demand:

"River-Friendly Soil Health Care Program"

Soil is the foundation of a healthy, beautiful landscape. Offer the following practices:

- Assessing the soil and testing drainage
- Removing and storing topsoil during construction
- Protecting soil from compaction and erosion
- Amending the soil with compost
- Mulching regularly
- Feeding soils naturally with compost or compost tea
- Avoiding synthetic fertilizers
- Minimizing chemicals with a goal of eliminating them altogether

"River-Friendly Lawn Care Program"

Lawns continue to be a part of our culture. But maybe it is time to rethink what we mean by a lawn. River-Friendly landscaping emphasizes that high input lawns are not included solely for their looks. Small functional lawns – those that are used for play and relaxation - can be managed to minimize environmental impacts and provide your clients with a safer lawn by including:

- Grasscycling
- Aerating, then topdressing with compost
- Phasing out the scheduled application of synthetic fertilizers and pesticides
- Feeding with compost or other natural or slow release fertilizers after analysis or demonstrated need
- Integrated pest management that includes:
  - Hand pulling weeds
  - Use of natural herbicides
  - Use of beneficial nematodes
  - Use of compost tea for disease management and nutrient cycling
- State of the art irrigation management to prevent overwatering

"River-Friendly Wildlife Gardening"

Specializing in designing, constructing or maintaining wildlife gardens is another opportunity for your business to grow and flourish. Develop expertise in the following practices and offer them to new and existing clients:

- Survey flora and fauna
- Learn about local, natural plant communities and use them as models
- Conserve or restore natural areas
- Diversify and include many California native plant species
- Provide water and shelter
- Eliminate the use of pesticides

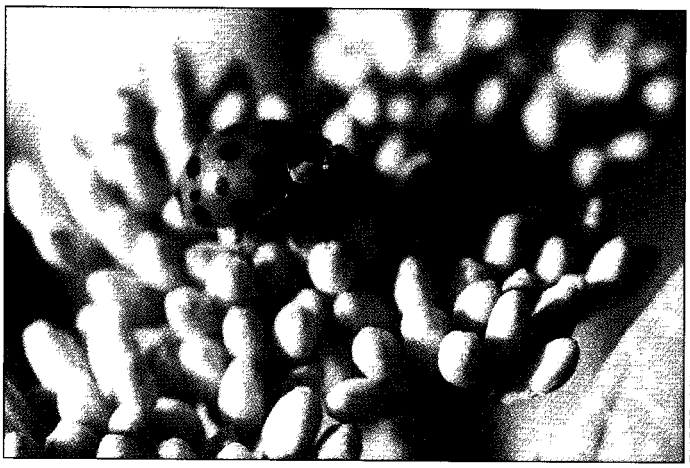


PHOTO: MIKE HEACOX, LUCIOLE DESIGN

"Our 2002 survey of Sacramento residents indicated that 40% of those who use professional services would be interested in hiring an environmentally friendly company, and 34% of those were willing to pay more for this service."

— Dr. Mary Louise Flint, University of California Statewide IPM Program

"Ecological design has a lot to do with how we present it to the client. It's in our hands. We need to describe our work in language that appeals to people, that they can relate to and sign on to."

— Rebecca Coffman, Landscape Architect, Berkeley

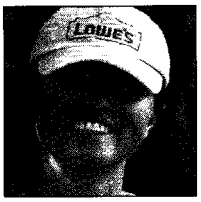
Amending the soil with compost may be one of the easiest selling points for your customers:

It may cost more to purchase and apply compost in the short term, but it pays for itself over the longer term as you and your clients benefit from:

- Bringing life to the soil
  - Reduces the need for fertilizers
  - Improves plant resistance to disease
  - Reduces need for pesticides
  - Degrades pollutants
- Healthier plants with an improved appearance
  - Increased customer satisfaction
- Faster planting in amended soils
- Reducing plant loss
  - Fewer callbacks
  - Improved profits
- Increasing water holding capacity
  - Decreased stormwater runoff
  - Reduced irrigation needs
- Paying back the cost of amending soil in 5-7 years
- Protecting the environment and the health of their families.

ADAPTED FROM: *FIELD GUIDE TO COMPOST USE*, US COMPOSTING COUNCIL AND *SOILS FOR SALMON: A LANDSCAPERS GUIDE TO BUILDING HEALTHY SOILS AND STREAMS*, 2000.

***"I like to use plants** that provide wildlife habitat for all the bees, butterflies, lizards, and birds. I saw a Pipevine Swallowtail butterfly earlier this year on the Pipevine I planted. That's part of the charm of these gardens: you start connecting to your environment."*

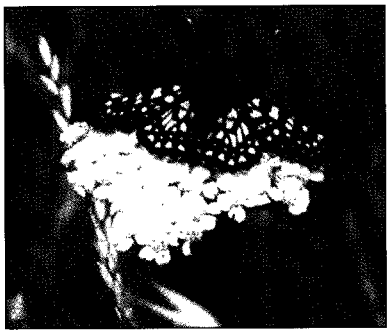


— Daisy Mah, Parks Employee, Sacramento City Parks & Recreation

STEP 4:

Learn more about natural plant communities in the Sacramento region

Many local native species are excellent landscape plants. You can imitate natural processes by using the plant community concept to organize plantings. Blending the science of ecology with the practice of horticulture, you can create landscape projects that assume some of the beautiful natural qualities of our area.



If you choose plants in response to the site conditions, the new planting will probably become established easily. There will be no need for the special fertilizing, pest control, and heavy irrigation that have been so common in the past. The plants grow easily because they're adapted to this place - they've lived here for thousands of years! If you visit our Central Valley wildlands, you will notice that a particular species might be abundant in a given area, only occasionally present in an adjacent space, and completely absent elsewhere. You may also recognize, as you move from south facing to north facing slopes or from exposed grasslands to wet stream corridors that certain groups of plants tend to grow together. This is because native plants have adapted over many generations to specific environmental conditions

Ecologists classify these groups of plants with terms like "biotic province," "vegetation type," "plant community," "plant association," and "series." The natural distribution of plants is very complex, with much overlapping of species, and experts disagree about the fine points of grouping and nomenclature.

Here we use the term "plant community" to describe a group of plants that recurs with relative consistency, often dominated by a single species. The Central Valley consists of many different places, from the cool, moist meandering rivers, creeks and streams to the summer dry hills and grasslands. These places support distinctive plant communities primarily the Riparian Woodland, Valley Grassland, Foothill Woodland, Chaparral, and Freshwater Marsh.

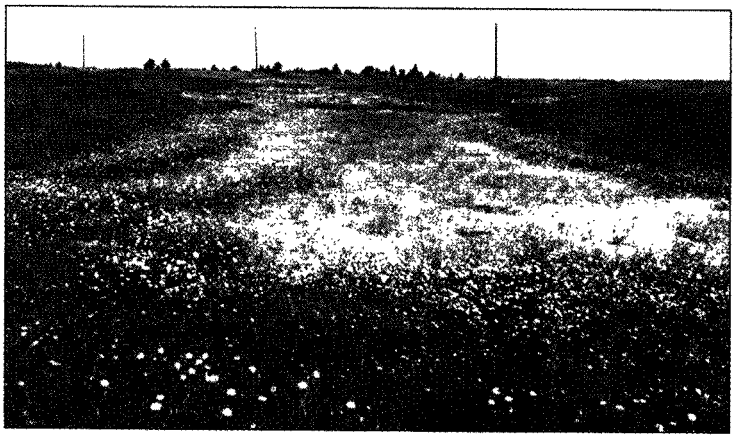
Following is a short list of representative species and a brief description of the most common plant communities of the Sacramento region.

Common Plant Communities

Valley Grassland

Although once occupying most of the floor of the Central Valley, California's prairie has suffered from agricultural development, introduction of invasive weeds, and urbanization. Valley Grassland was originally made up of perennial bunch grasses and wildflowers. Seasonal displays of wildflowers, sometimes stretching for miles, can still be seen in years with abundant rainfall. The native grasses have completely disappeared in large areas and have been replaced by weedy annual grasses. Valley Grassland still survives in scattered remnants even though 99 percent of native grasslands are gone.

PHOTO: GLEN HOLSTEIN



MATHER FIELD VERNAL POOL, DAVID KING

Vernal Pool is a temporary wetland in the **Valley Grassland,** occupying depressions that fill with water during the rainy season. In spring, the pools begin to dry up and various annual plant species begin to flower. More than 200 plant species grow in Vernal Pools and half of these are rarely found outside this unique habitat. Nearly 90 percent of California's Vernal Pools have been destroyed or damaged due to urban growth and vineyard expansion. Ecologically, vernal pools are unique and important elements of the Valley flora. Horticulturally, however, they are very difficult to imitate or reproduce.

Riparian Woodland

Riparian areas are the green, vegetated areas on each side of streams and rivers. These lush, tree-lined corridors stand in strong contrast to the surrounding summer-dry grasslands. Riparian plants are highly adapted to flooding, and riparian areas support a diversity of plant and wildlife species. Riparian ecosystems are used by more bird species than any other community in California. Riparian Woodland is a dwindling treasure in the Central Valley; between 89 and 96 percent of riparian areas have been lost due to farming, urban development, gravel mining, dams, and levees.

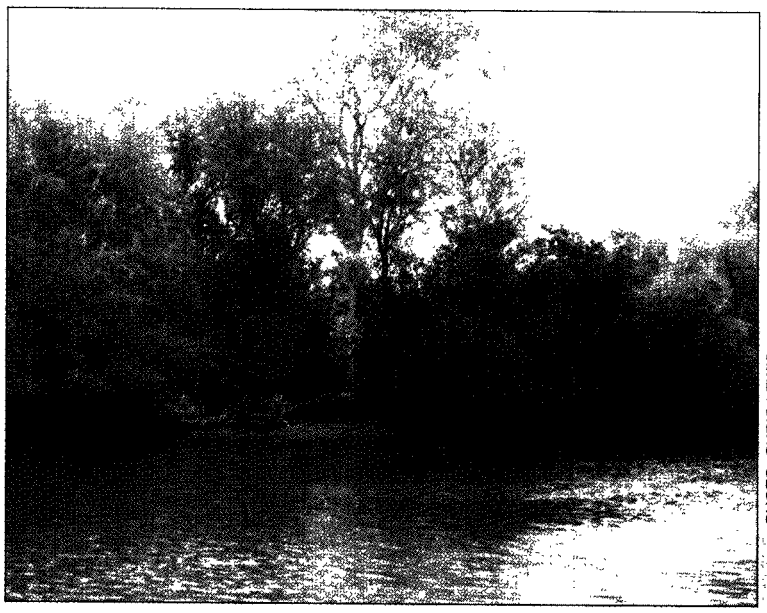


PHOTO: CHRIS LEWIS

of the Sacramento Region

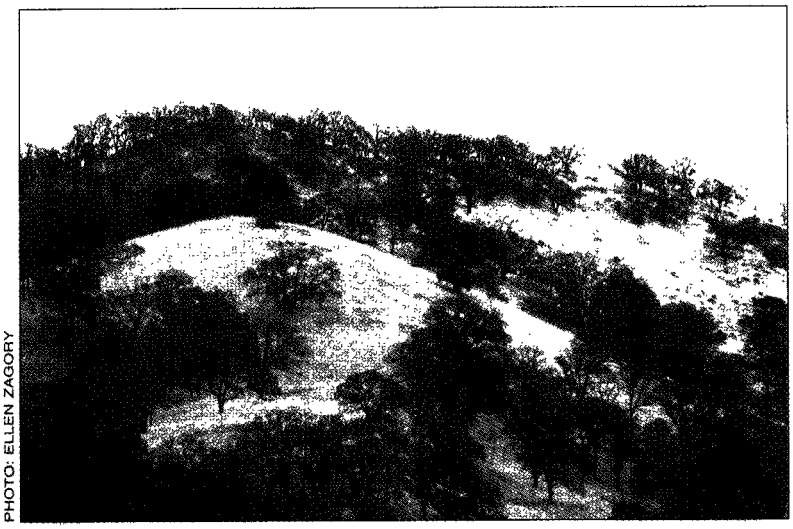


PHOTO: ELLEN ZAGORY

Foothill Woodland

Covering the slopes east of Sacramento, Foothill Woodland is characterized by scattered trees -- predominantly oak (valley oak, blue oak, and interior live oak) -- with an undergrowth of herbaceous plants and low shrubs. Valley Oak Woodland on the floor of the Sacramento Valley has been almost entirely eliminated because it occurred on valuable agricultural land. Blue Oak Woodland is still common in foothill areas. Nearly 80 percent of remaining woodlands are in private ownership, and low oak regeneration is a major concern.

Chaparral

Chaparral occurs in the foothills ringing the Central Valley and is one of the most characteristic vegetation types of California. It is a community of mostly short, evergreen shrubs with thick, leathery leaves. Grasses, herbaceous plants, and trees are sparse or rare, except after a fire when grasses and wildflowers briefly flourish. Chaparral is fire-prone and typically burns every 10 to 40 years. Development is a major threat to Chaparral in the foothill areas of the Sacramento region, and those who build in Chaparral also expose themselves to the threat of fire.

PHOTO: GLEN HOLSTEIN

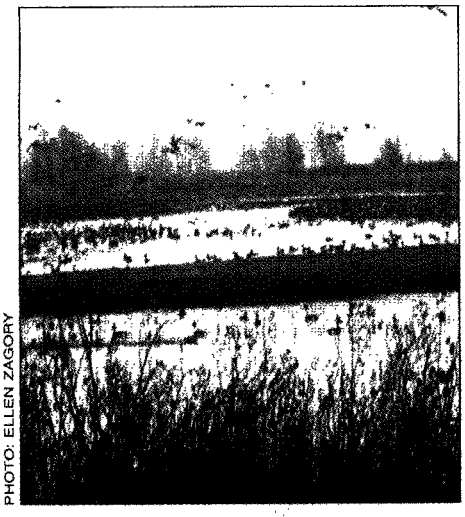


PHOTO: ELLEN ZAGORY

Freshwater Marsh

Extensively found in the Central Valley along rivers, creeks, sloughs, and in the Sacramento-San Joaquin Delta, Freshwater Marsh occurs wherever there are fairly large expanses of standing or very sluggish water. This community is dominated by emergent perennial and floating plants. Freshwater Marsh provides important nesting, feeding, and resting habitat for waterfowl, and also critical staging areas for some of the most threatened native and migratory fish species in California. Freshwater Marsh plants protect levees from erosion and improve water quality by trapping sediments. Intensive farming, levee construction, and water diversion have reduced Freshwater Marsh to less than 6 percent of its original extent in California.

FOR MORE INFORMATION ON CALIFORNIA PLANT COMMUNITIES, SEE: GRINDUFF, 1974, *INTRODUCTION TO CALIFORNIA PLANT LIFE*; SAWYER AND KEELER-WOLFE, 1995, *A MANUAL OF CALIFORNIA VEGETATION*; AND BARBOUR, PAVLIK ET AL., 1993, *CALIFORNIA'S CHANGING LANDSCAPES: DIVERSITY & CONSERVATION OF CALIFORNIA VEGETATION*

Common P

Valley Gra

Trees
Quercus lobata (Valley Oak)

Herbaceous Perennials & Annuals
Achillea millefolium (Yarrow)
Asclepias fascicularis (Narrow-Leaf Milkweed)
Asclepias speciosa (Showy Milkweed)
Chlorogalum pomeridianum (Soap Root)
Dichelostemma capitatum (Bluedicks)
Elymus glaucus (Blue Wildrye)
Eschscholzia californica (California Poppy)
Lasthenia californica (Goldfields)
Layia fremontii (Tidy Tips)
Lupinus microcarpus var. densiflorus (Golden Lupine)
Lupinus nanus (Sky Lupine)
Melica californica (California Melic)
Nasella pulchra (Purple Needlegrass)
Sisyrinchium bellum (Blue-Eyed Grass)
Sporobolus airoides (Alkali Sacaton)

Riparian

Trees
Acer negundo var. californicum (Box Elder)
Fraxinus latifolia (Oregon Ash)
Juglans californica var. hindsii (California Black Walnut)
Platanus racemosa (California Sycamore)
Populus fremontii (Fremont Cottonwood)
Quercus lobata (Valley Oak)
Salix laevigata (Red Willow)
Salix lasiolepis (Arroyo Willow)
Salix goodingii (Black Willow)

Shrubs
Cephalanthus occidentalis (Button Bush)
Cornus sericea (Red Twig Dogwood)
Rosa californica (Wild Rose)
Sambucus mexicana (Blue Elderberry)

Herbaceous Perennials
Artemisia douglasiana (California Mugwort)
Carex barbarae (Santa Barbara Sedge)
Juncus effusus (Common Rush)
Muhlenbergia rigens (Deergrass)
Leymus triticoides (Creeping Wildrye)

Vines
Aristolochia californica (Dutchman's Pipe)
Rubus ursinus (California Blackberry)
Vitis californica (California Wild Grape)

Foothill W

Trees
Aesculus californica (California Buckeye)
Acer macrophyllum (Big-Leaf Maple)
Pinus sabiniana (Gray Pine)
Quercus douglasii (Blue Oak)
Quercus lobata (Valley Oak)

Foothill Woodland continued...

Quercus wislizeni (Interior Live Oak)
Umbellularia californica (California Bay)

Shrubs
Baccharis pilularis (Coyote Brush)
Calycanthus occidentalis (Spicebush)
Cercis occidentalis (Western Redbud)
Heteromeles arbutifolia (Toyon)
Mimulus aurantiacus (Bush Monkeyflower)
Ribes malvaceum (Chaparral Currant)
Sambucus mexicana (Blue Elderberry)
Styrax officinalis var. redivivus (Snowdrop Bush)
Symphoricarpos albus var. laevigatus (Snowberry)

Herbaceous Perennials & Annuals
Collinisia heterophylla (Chinese Houses)
Epilobium canum (California Fuchsia)
Eschscholzia californica (California Poppy)
Festuca californica (California Fescue)
Gilia tricolor (Bird's Eyes)
Lupinus microcarpus (White-Whorled Lupine)
Melica imperfecta (Oniongrass)
Muhlenbergia rigens (Deergrass)
Nassella lepida (Foothill Needlegrass)
Penstemon heterophyllus (Foothill Penstemon)
Sisyrinchium bellum (Blue-Eyed Grass)
Solidago californica (California Goldenrod)
Triteleia laxa (Ithuriel's Spear)

Shrubs
Adenostoma fasciculatum (Chamise)
Arctostaphylos manzanita (Common Manzanita)
Arctostaphylos viscida (Whiteleaf Manzanita)
Ceanothus cuneatus (Buckbrush)
Cercis occidentalis (Western Redbud)
Cercocarpus betuloides (Birch-Leaf Mountain Mahogany)
Fremontodendron californicum (Flannelbush)
Heteromeles arbutifolia (Toyon)
Rhamnus ilicifolia (Holly-Leaf Redberry)
Rhamnus tomentella (Hoary Coffeeberry)

Trees
Salix lasiolepis (Arroyo Willow)

Herbaceous Perennials
Anemopsis californica (Yerba Mansa)
Carex barbarae (Santa Barbara Sedge)
Carex praegracilis (Slender Sedge)
Eleocharis macrostachya (Spikerush)
Hibiscus lasiocarpus (California Hibiscus)
Sagittaria latifolia (Arrowhead)
Scirpus acutus var. occidentalis (Tule)
Typha latifolia (Common Cattail)

Learn more about Legislation

More and more legislation at the local, state and national level encourages resource conservation and pollution prevention. Many regulations directly impact the design, construction and management of landscapes. Be proactive, be ahead of legislation.

CA Healthy Schools Act of 2000, AB2260: Requires schools to notify parents, guardians and employees about pesticide use and promotes the voluntary adoption of IPM in schools.

CA Integrated Waste Management Act, AB939: Waste reduction law that prioritizes recycling or landfilling and sets statewide recycling goal of 50%.

CA Urban Water Management Plan, AB797: Best management practices for water use to address limited water supply.

CA Water Conservation in Landscaping Act, AB325: Requires adoption of a water efficient landscape ordinance by each local agency unless the agency adopts findings that one is unnecessary.

CA Water Conservation in Landscaping Act, AB1881: Implements a number of the statewide recommendations of the AB 2717 Landscape Task Force, including the requirement that the architectural guidelines of a common interest development shall not prohibit or include conditions that have the effect of prohibiting the use of low water-using plants as a group.

Federal Clean Water Act: (1972) Section 402 of the Clean Water Act established the National Pollutant Discharge Elimination System (NPDES) permit program, setting nationwide permitting requirements for discharging pollutants into waterways. The 1987 amendments to the CWA required that municipal stormwater discharges obtain NPDES permit coverage, effectively prohibiting non-stormwater discharges to their stormdrains and controlling pollutants in stormwater to the maximum extent practical.

Learn more about Green Building

Extend the whole-systems approach of River-Friendly landscaping into the construction of buildings. Resources available include:

- *Green Building Guidelines* for building or remodeling green homes and multifamily projects, www.BuildItGreen.org
- "Ask an Expert" hotline (1-888-40-GREEN) for free, customized responses to green building questions

"GreenPoint Rated" is a voluntary California home rating program that allows home buyers to compare newly built homes on a level playing field. It rewards building professionals who create green homes by providing a trustworthy consumer label. Ratings are available for residential new construction, including single-family homes, multifamily housing and mixed-use projects (www.GreenPointRated.org).

The LEED™ (Leadership in Energy and Environmental Design) rating system is a voluntary national standard that provides a framework for assessing building performance and meeting sustainability goals. LEED™ standards are currently available for new commercial construction and major renovation projects (www.usgbc.org/LEED).

STEP 5:

Start your River-Friendly Reference Library with these titles:

Barbour, Michael and Bruce Pavlik et al., *California's Changing Landscapes: Diversity and Conservation of California Vegetation,* California Native Plant Society, 1993.

Bornstein, Carol and David Fross et al., *California Native Plants for the Garden,* Cachuma Press, 2005.

Bossard, Carla, John Randall and Marc Hoshovsky, *Invasive Plants of California Wildlands,* University of California Press, 2000.

Dreistadt, Steve, *Pests of Landscape Trees and Shrubs: An Integrated Pest Management Guide,* University of California Press, 2004.

Flint, Mary Louise and Steve Dreistadt, *Natural Enemies Handbook: The Illustrated Guide to Biological Pest Control,* University of California Press, 1998.

Francis, Mark and Andreas Reimann, *The California Landscape Garden: Ecology, Culture and Design,* University of California Press, 1999.

Gilmer, Maureen, *California Wildfire Landscaping,* Taylor Publishing Company, 1994.

Hemenway, Toby and John Todd, *Gaia's Garden: A Guide to Home-Scale Permaculture,* Chelsea Green Publishing Co., 2001.

James, Sara and Torbjörn Lahti, *The Natural Step for Communities: How Cities and Towns can Change to Sustainable Practices,* New Society Publishers, 2004.

Lowry, Judith Larner, *Gardening With a Wild Heart: Restoring California's Native Landscapes at Home,* University of California Press, 1999.

Ondra, Nancy J. and Saxon Holt, *Grasses: Versatile Partners for Uncommon Garden Design,* Storey Publishing, 2002.

Thompson, J. William and Kim Sorvig, *Sustainable Landscape Construction: A Guide to Green Building Outdoors,* Island Press, 2000.

Wasowski, Andy and Sally Wasowski, *The Landscaping Revolution: Garden with Mother Nature, Not Against Her,* Contemporary Books, 2000.

Resources

Introduction

- Information on the Sacramento River Watershed and a list of watershed organizations are at www.sacriver.org
- The 2002 Regional Green Waste Study from the Sacramento Regional SWA is at www.sacgreencycle.com
- Soils for Salmon has an excellent guide titled *The Relationship Between Soil & Water* available at http://compostwashington.org
- Learn more about GreenScapes, or become a participant in the GreenScapes Alliance at: www.epa.gov/epaoswer/non-hw/green

Landscape Locally

- Look for useful soil information at http://websoilsurvey.nrcs.usda.gov/app/ Landscape professionals can contact USDA NRCS, Elk Grove Service Center, at (916) 714-1104 x 3 for soils information for Sacramento County properties.
- Contact soil and compost testing laboratories:
  - ABC Organics at www.abcorganics.com
  - A&L Western Agricultural Labs at www.al-labs-west.com
  - Harmony Farm Supply & Nursery at www.harmonyfarm.com
  - Peaceful Valley Farm Supply at www.groworganic.com
  - Soil Control Lab at www.controllabs.com
  - Soil Foodweb at www.soilfoodweb.com
  - Soil & Plant Lab at www.soilandplantlaboratory.com
  - Sunland Analytical Lab at www.sunland-analytical.com
  - Living Resources Company at www.organiclandscape.com for soil analysis and organic recommendations
- Fire Prevention: *Options for Managing Fire Fuel Load* can be found at the California Forest Stewardship website: http://ceres.ca.gov/foreststeward/html/fuelsoption.html.

Landscape for Less to the Landfill

- Invasive plant species websites: www.cal-ipc.org and http://tncweeds.ucdavis.edu and www.invasivespecies.org
- *A Bay-Friendly Landscaping Guide to Mulch* and *A Bay-Friendly Landscaping Guide to Grasscycling* are available to download at www.StopWaste.Org
- The *Backyard Composting Guide* is available at www.sacgreenteam.com or by calling (916) 875-7165
- The ANSI A300-(Part 1)-2001 document, *Tree Care Operations*, can be purchased from the American National Standards Institute at www.ansi.org
- For more information on using goats for controlling weeds and creating firebreaks, contact: www.goatsrus.com, www.thegoatworks.net or www.goatgrazers.com
- To find or offer salvaged materials visit California Integrated Waste Management Board's CalMax website at www.ciwmb.ca.gov/CalMAX/
- Salvaged material can be found at Sacramento Habitat for Humanity's ReStore, www.shfh.org or (916) 440-1215

Nurture the Soil

- Guidelines on creating and implementing a Soil Management Plan can be downloaded from Western Washington at www.puyallup.wsu.edu
- The EPA document, *Innovative Uses of Compost: Erosion Control, Turf Remediation, and Landscaping*, is at www.epa.gov/epaoswer/non-hw/compost/erosion.pdf
- For listings of compost and mulch producers and publications on how to choose appropriate composts visit the California Integrated Waste Management Board website, at www.ciwmb.ca.gov/organics
- The Composting Council Research & Educational Foundation describes its 'Standard Testing Assurance' program for ensuring quality compost at http://tmecc.org/sta/index.html
- Notes on compost tea can be downloaded from: www.attra.org or www.composttea.org
- For a copy of the *Compost Tea Brewing Manual*, contact www.soilfoodweb.com
- For equipment to brew compost tea contact: EPM, Inc., www.composttea.com, *Growing Solutions*, www.growingsolutions.com, or *SoilSoup*, www.soilsoup.com

Conserve Water

- The "Water Forum Agreement" includes best management practices related to landscaping; go to www.waterforum.org for more information
- The California Department of Water Resources has information on water supply and demand, at www.waterplan.water.ca.gov
- California Urban Water Agencies offer information on water conservation, including costs at www.cuwa.org
- The California Urban Water Conservation Council offers a variety of services and information, including product news and technical resources at www.cuwcc.org
- *Graywater Guide: Using Graywater in Your Home Landscape* is at www.owue.water.ca.gov/docs/graywater_guide_book.pdf
- The Irrigation Training & Research Center at Cal Poly, San Luis Obispo offers Irrigation Auditor and Landscape Water Budget classes. Information at www.itrc.org
- The *Rules of Thumb for Water-Wise Gardening* booklet is available from the Regional Water Authority at www.rwah2o.org
- Information on the California Irrigation Management Information System (CIMIS) is at www.cimis.water.ca.gov
- Search the UC Davis Arboretum's "All-Stars" plant database at www.arboretum.ucdavis.edu to find recommended plants for Central Valley gardens
- California Native Grasslands Association (www.cnga.org) is an excellent resource for landscaping with native grasses
- Local water providers often offer information on water conservation or landscape audits. Contact the Regional Water Authority at www.rwah2o.org or check with your local water supplier (a list of some of the Sacramento area water providers is at www.rwah2o.org/rwa/about/members)

Conserve Energy

- Call SMUD's shade tree program at 1-888-742-7683 or go to www.smud.org/residential/saving/trees for free shade trees and eligibility requirements
- The Center for Urban Forest Research of the USDA Forest Service offers free fact sheets on maximizing the benefits of the urban forest, as well as many reports on their costs and benefits. Visit http://cufr.ucdavis.edu
- The International Dark Sky Association has a list of approved light fixtures at www.darksky.org

Protect Water & Air Quality

- Information on IPM-based landscape design is at www.ipmaccess.com
- Learn more about the EPA Pesticide Environmental Stewardship Program at www.pesp.org
- Bio-Integral Resource Center (www.birc.org) offers the *IPM Practitioner* and *Common Sense Pest Control Quarterly*
- Environmentally-friendly pest management solutions for hundreds of pests of garden and landscape plants, including an interactive guide for healthy lawns, is available from the UC Statewide IPM Program, www.ipm.ucdavis.edu
- Information on alternative pest control strategies is available from UCCE Sacramento Master Gardeners, at http://groups.ucanr.org/sactomg or (916) 875-6913
- Seattle Green Gardening program offers free Pro IPM Fact Sheets at www.ci.seattle.wa.us/util/proipm/default.htm
- A Porous Pavement fact sheet is at www.epa.gov/owmitnet/mtb/porouspa.pdf; information is also available from the Concrete Promotion Council of Northern California at www.cpcnc.org
- Washington Toxics Coalition, Local Hazardous Waste Management Program in King County has published: *Grow smart, grow safe - A Consumer Guide to Lawn and Garden Products* - 450 products reviewed, pest controls and fertilizers, where to buy least-hazardous products by Philip Dickey. Contact www.watoxics.org
- For information on pesticides, water quality, and less toxic alternatives, visit www.ourwaterourworld.org
- Lawn Fact Sheet for least toxic approaches to lawn care visit www.ourwaterourworld.org/factsheets.cfm
- To look up impacts of active ingredients in pesticides visit www.pesticideinfo.org
- The Sacramento Tree Foundation (www.sactree.com) offers information on the benefits of building an urban forest
- Information on the hazards of lawn chemicals are at www.beyondpesticides.org/pesticidefreelawns

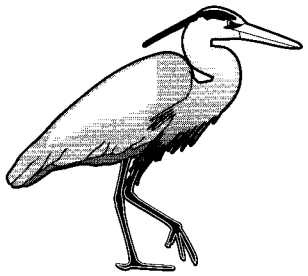
Create & Protect Wildlife Habitat

- California native plants are described at www.calflora.org
- The Sacramento Valley Chapter of CNPS (www.sacvalleycnps.org) has good information on local native plant species
- An updated list of native plant nurseries is at www.cnps.org/links/native_plant_nurseries.htm
- Information on California Oaks is available from the California Oak Foundation at www.californiaoaks.org
- California Native Grasslands Association (www.cnga.org) is an excellent resource for landscaping with native grasses
- Wildlife Habitat Council (www.wildlifehc.org) provides information on how landscapes can provide habitat
- To foster wildlife habitat for pest control visit www.hungryowl.com and www.californiabats.com

Training Opportunities

- Home composting programs are offered by the Cities of Sacramento at (916) 808-4800 or www.cityofsacramento.org/utilities, Elk Grove at (916) 478-2289 or www.egtrashrecycleservices.org, and Folsom at (916) 355-8393 or www.folsom.ca.us/depts/utilities
- The UC Master Gardener Program provides educational programs to Sacramento County residents, (916) 875-6913 or http://groups.ucanr.org/sactomg
- Other professional groups that offer conferences, trainings, workshops, or certification programs include:
  - EcoLandscape Working Group, www.ecolandscape.org
  - Irrigation Association, www.irrigation.org
  - Pesticide Applicators Professional Association, www.papaseminars.com
  - American Society of Consulting Arborists, www.asca-consultants.org
  - American Society of Landscape Architects, www.asla-sierra.org
  - Association of Professional Landscape Designers, www.apldca.org
  - California Landscape Contractors Association, www.clca.org
  - Ecological Landscape Association, www.ecolandscaping.org

A comprehensive and up-to-date list of local River-Friendly landscaping and gardening resources is available at: www.sacramentostormwater.org/riverfriendly



ACKNOWLEDGEMENTS

The goal of the **Sacramento Stormwater Quality Partnership (SSQP)** is to reduce pollution in local waterways. It educates and informs the public about urban runoff pollution and works with industries and businesses to encourage pollution prevention and reduce erosion. It is a partnership among Sacramento area public agencies, including the County of Sacramento and the Cities of Citrus Heights, Elk Grove, Folsom, Galt, Rancho Cordova, and Sacramento.

River-Friendly Development Team

Dave Tamayo, Project Manager
County of Sacramento
tamayod@saccounty.net

Cynthia Havstad
StopWaste.Org
chavstad@stopwaste.org

Cindy Nelson
Writer, Researcher, Photographer
riverfriendly@sbcglobal.net

David Gilmore
Graphic Design & Layout
david@outrightradio.org

Special thanks go to the following for their input and contributions, and for sharing their expertise in the development of the *River-Friendly Landscape Guidelines:*

Bernadette Balics
Ecological Landscape Design

Barney Baty
John Deere Landscapes

Gregory Berger
Pomegranate Design

Ken Decio
CIWMB

Doug Eubanks & Pat Quinn
Sacramento County

Dr. Mary Louise Flint
UC Statewide IPM Program

Sarah Foley
The Water Forum

Tara L. Gee
City of Roseville

Emily Griswold & Ellen Zagory
UC Davis Arboretum

Annette & Mike Heacox
Luciole Design

Jessica Hess, Connie Perkins & Tyler Stratton
City of Sacramento

Chuck Ingels & Judy McClure
UCCE-Sacramento County

Chris Lewis & Mary Maret
CA Native Plant Society
Sacramento Valley Chapter

Lisa Maddaus
Regional Water Authority

Daisy Mah
City of Sacramento

Ken Menzer & Don Smith
City of Folsom

Dave Roberts
Roberts Landscape

Lynn Scholl
Red Studio Design

Cheryl H. Sullivan
Cunningham Engineering Corp.

Roberta Walker
Roberta Walker Landscape Design

Steven Zien
Living Resources Company

The **Bay-Friendly Landscaping** logo is a trademark of StopWaste.Org, which is the Alameda County Waste Management Authority and Recycling Board acting as one public agency. Its mission is to plan and implement the most environmentally sound waste management program for the residents, businesses and institutions of Alameda County. The **Bay-Friendly Landscaping & Gardening Program** offers a wide range of resources for landscape professionals in the public and private sector, model policies and technical assistance for local governments, as well as sustainable gardening education for the home gardener in Alameda County.

Bay-Friendly Development Team

Teresa Eade
Program Manager
StopWaste.Org
teade@stopwaste.org

Cynthia Havstad
Program Manager
StopWaste.Org
chavstad@stopwaste.org

David Gilmore
Graphic Design
david@outrightradio.org

Joal Morris
Illustrations
joalmorris@charter.net

Special thanks go to the following for their input, review and commitment to the completion of the *Bay-Friendly Landscape Guidelines:*

Michael Baefsky
Baefsky & Associates

Katrine Benninger
Katrine Benninger Landscape Design

Michael Boland
Presidio Trust

Jake Cacciato
Jensen Corporation Landscape Contractors

Rebecca Coffman
Design Works

Shauna Cozad & Karen Wikler
UCCE, Alameda County

Tanya Drlik
Bio-Integral Resource Center

Sharon Farrell & Tamara Shulman
The Watershed Project

Christine Finch, Susan Handjian & David Langridge, East Bay Municipal Utility District

Geoff Hall
Sentient Landscape, Inc.

Doug Johnson
California Invasive Plant Council

Manual Gonzales
Cagwin & Dorwood

Greg Harrington
UC Berkeley

Jerry Koch
City of Berkeley

George Pacheco
Pacheco Brothers Gardening

Bob Perry, Professor Emeritus
Cal Poly, Pomona

Jim Scanlin
Alameda Countywide Clean Water Program

Glen Schneider
Glen Schneider Landscape

Chris Shein
Wildheart Gardens

Nate Silin
New Growth Landscape

Mr. Burt Tanoue
Office of Cheryl Barton

Michael Thilgen
Four Dimensions Landscape Co.

Sacramento Stormwater Quality Partnership
827 7th Street, Room 301
Sacramento, CA 95814