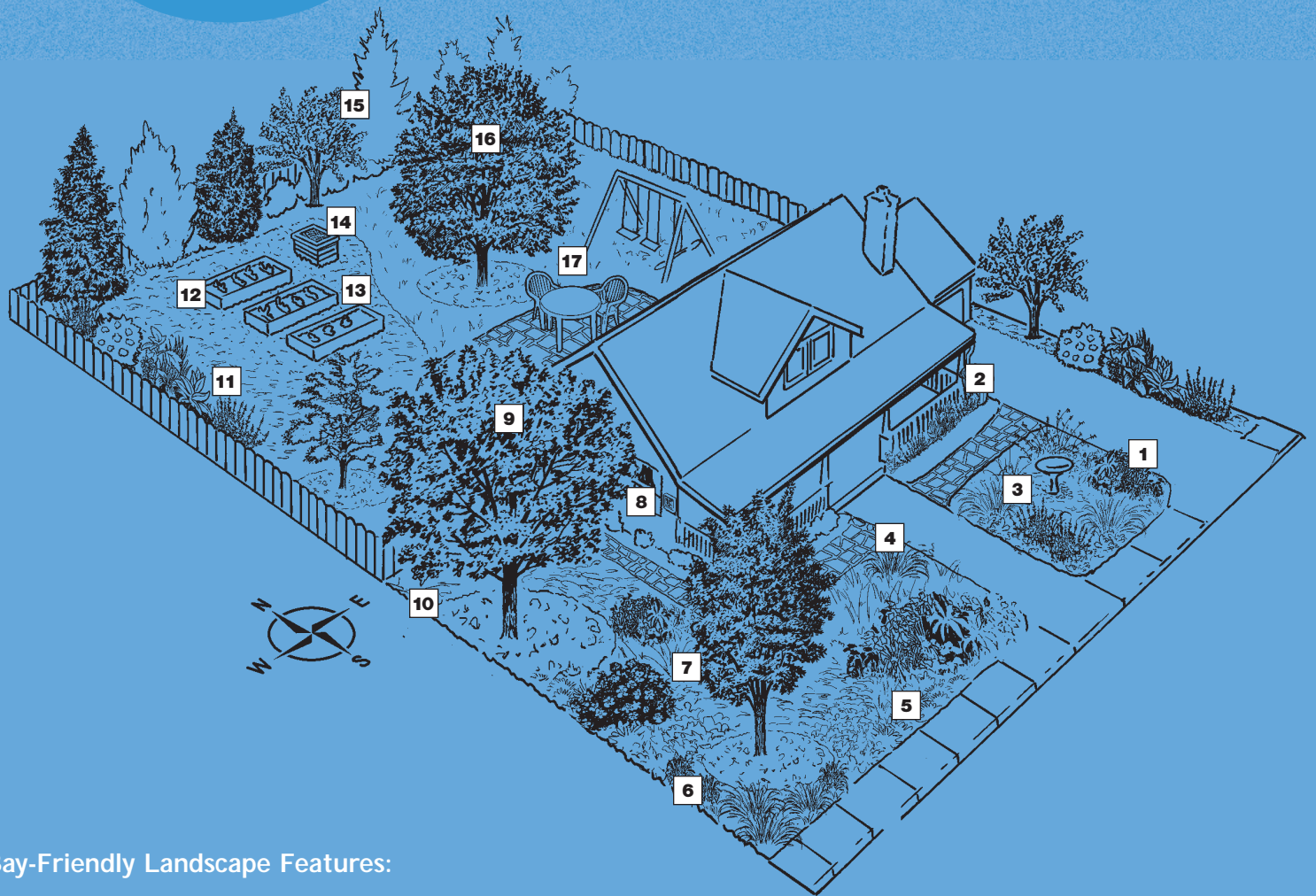


3 Bay-Friendly Landscaping Practices



Bay-Friendly Landscape Features:

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

1. LANDSCAPE LOCALLY



Bay-Friendly landscaping recognizes that our landscapes, whether they are commercial, institutional, residential or open space, are part of the larger ecosystem of the San Francisco Bay Area. 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 San Francisco Bay 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, in one of the world's most renowned environments.

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
- historical or potential natural hazards such as flooding

Benefits

This knowledge is critical to all other Bay-Friendly landscaping practices – particularly being able to select plant materials that match the site. It places the landscape in the context of the San Francisco Bay Area. 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.

“Many wild areas of Yosemite are more beautiful than any garden, and they don’t need regular maintenance. The other extreme is formal hedges, roses and lawns that require lots of attention and resources to maintain. We need to find a middle ground in design and maintenance of the urban landscape.”

— Nate Silin, Owner, New Growth Landscape, Oakland



PHOTO: SUSAN REYNOLDS PHOTOGRAPHY

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, 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

- Locate the landscape site on a soil survey map (available from the local library or the USDA Natural Resource Conservation Service at www.baysavers.org).
- 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.
- In addition to analyzing the soil initially, do a soil analysis annually during the transition to Bay-Friendly landscape and then:
 - 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 1 or 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 to 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

After the Oakland Hills fire of 1991, there is no doubt that the potential for fire in our region can be great and that 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

- Map the direction of the prevailing wind during the dry season, as well as steep slopes that can increase wind speed and convey heat & ashes during a fire. Identify adjacent wildland or open space, south and west facing slopes, and windy areas that stress plants, decreasing their resistance to fire.
- Become familiar with pyrophites and avoid using them, especially in fire prone areas.
- Replace pyrophites with low growing, fire resistant plants or keep them

thinned with cleared space around each plant.

- Do not plant dense hedges and keep large plants isolated in big areas of low plants.
- Create defensible space around buildings – an area where vegetation is modified to reduce fuel load and allow fire fighters to operate.
- Contact the local fire department for additional guidance, particularly for sites at the urban-wildland interface or those with significant fire risk.

Benefits

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



Results of the 1991 Oakland Hills fire.

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. Six 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.
- 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.

“I think of each garden as an organism. That means reducing inputs and not exporting things, keeping as much of the resources — like water, energy, plants, food — on-site as possible.

— Christopher Shein, Owner,
Wildheart Gardens, Oakland



2. LANDSCAPE FOR LESS TO THE LANDFILL

Reducing 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 end up in the landfills in the Bay Area.

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 the San Francisco Bay.

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 Bay-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: MICHAEL THILIGEN, FOUR DIMENSION LANDSCAPE CO.

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.



Survey Says...

75% of single-family households always or almost always recycle their plant waste. Recycling plant debris is important to your current customers – and potential new clients.

“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, Novato

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.



“People are focused

on how the landscape looks right after planting. This means that shrubs are planted so tightly that they can't reach maturity or flower and this leads to higher maintenance costs.”

— George Pacheco, Owner/President, Pacheco Brothers Gardening, Hayward

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, 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.
- Thin existing hedges and allow the fewer plants to grow into their natural form, if their size is appropriate to the space.
- Or recommend to your customers that the 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 mulching can be a very effective 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.

“Using the right plant in the right spot will minimize the level of maintenance required to have a good looking landscape. This means taking into consideration the growth habits, maximum height and breadth, pests, ideal soil conditions, and water requirements associated with the plant.

— Gary Imazumi, Interim Associate Director Grounds, Recycling and Refuse, and Pest Management Services Physical Plant - Campus Services, University of California, Berkeley

Avoid Invasive Garden Plants of the Greater San Francisco Bay Area¹

Invasive Plants

Non-Invasive Plants

Latin Name	Common Name	Instead Try ²
<i>Carpobrotus edulis</i>	Iceplant or Hottentot Fig	<i>Delosperma cooperi</i> (Hardy Iceplant) or <i>Osteospermum fruticosum</i> and hybrids (Freeway Daisy) or <i>Drosanthemum floribundum</i> (Showy Dewflower)
<i>Cortaderia selloana</i>	Pampasgrass	<i>Chondropetalum tectorum</i> (Cape Thatching Reed) or <i>Muhlenbergia lindheimeri</i> (Lindheimer's Muhly Grass) or Carex spissa (San Diego Sedge) or Nolina bigelovii (Bigelow's Bear Grass)
<i>Cotoneaster lacteus</i> , <i>C. pannosus</i>	Cotoneaster	Heteromeles arbutifolia and cultivars (Toyon) or <i>Feijoa sellowiana</i> (Pineapple Guava) or <i>Arbutus unedo</i> (Strawberry Tree) or <i>Viburnum suspensum</i> (Sandankwa Viburnum) or <i>Citrus mitis</i> or <i>x Citrofortunella microcarpa</i> (Calamondin Orange)
<i>Cytisus scoparius</i> , <i>C. striatus</i> , <i>Spartium junceum</i> , <i>Genista monspessulana</i>	Scotch, Portuguese, Spanish or French Broom	<i>Jasminum nudiflorum</i> (Winter Jasmine) or <i>Cornus mas</i> (Cornelian-cherry Dogwood) or <i>Kerria japonica</i> (Japanese Kerria) or Ribes aureum (Golden Currant) or <i>Phlomis fruticosa</i> (Jerusalem Sage) or <i>Hypericum Rowallane'</i> (Shrub Hypericum)
<i>Hedera helix</i> , <i>H. canariensis</i> , <i>Vinca major</i>	English Ivy, Algerian Ivy, Periwinkle	<i>Campanula poscharskyana</i> (Serbian Bellflower) or <i>Trachelospermum asiaticum</i> (Ivory Star Jasmine) or <i>Rubus pentalobus</i> (Taiwan Raspberry) or <i>Heuchera maxima</i> and hybrids (Giant Alumroot) or Asarum caudatum (Wild Ginger) or <i>Helleborus foetidus</i> (Bear's Foot Hellebore) or <i>Bergenia cordifolia</i> and hybrids (Winter Saxifrage)
<i>Helichrysum petiolare</i>	Licorice Plant	Salvia leucophylla (Coast Purple Sage) or <i>Teucrium fruticans</i> and cultivars (Bush Germander) or <i>Phlomis fruticosa</i> (Jerusalem Sage) or <i>Artemisia 'Powis Castle'</i> or Eriogonum giganteum (St. Catherine's Lace)
<i>Sesbania punicea</i>	Scarlet Wisteria	<i>Calliandra tweedii</i> (Brazilian Flame Bush) or <i>Lagerstroemia</i> species (Crape Myrtle) or <i>Cassia leptophylla</i> (Gold Medallion Tree) or Galvezi speciosa (Showy Island Snapdragon)

¹ ADAPTED FROM: DON'T PLANT A PEST! GIVE THEM AN INCH AND THEY'LL TAKE AN ACRE..... CALIFORNIA INVASIVE PEST COUNCIL, WWW.CAL-IPC.ORG

² SUGGESTED ALTERNATIVES IN BOLD ARE CALIFORNIA NATIVE SPECIES.

Invasive



Cortaderia selloana
(Pampasgrass)

PHOTO: BRIANNA RICHARDSON, 2003

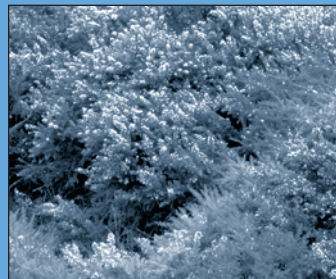
Instead Try



Muhlenbergia lindheimeri
(Lindheimer's Muhly Grass)

PHOTO: BLUESTEM NURSERY,
WWW.BLUESTEM.COM

Invasive



Genista monspessulana
(French Broom)

PHOTO: BARRY RICE, THE
NATURE CONSERVANCY

Instead Try



Cornus mas
(Cornelian-cherry Dogwood)

PHOTO: MISSOURI BOTANICAL
GARDEN

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 Landscaper's 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.



“We’ve had great success with mulching

at Cal. We’re using it as weed control, and we have evidence that it’s saving us money, plus we’re able to cut down on using pesticides.”

— Greg Harrington, Gardener,
University of California, Berkeley

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.



Hewlett Foundation site supports an Oak Savanna landscape. The leaf litter provides an interesting landscape element and a natural mulch layer.

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 dropping in areas that are subject to stormwater runoff.
- 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 Landscaper's 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.

Benefits

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



Survey Says...

Thousands of local residents are considering composting. When a sample of those interested in trying it were asked why they have not started composting yet, more than half said they are too busy... Why not offer on-site composting as one of the services you offer your clients?

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 appropriate pruning techniques 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 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.

“Water use is an issue here in California.

Plus, when you use a lot of water and fertilizer, that translates into green growth, more clippings, and more waste. If you can tell customers, ‘Let’s just fertilize once a year,’ it reduces waste.”

— Glen Schneider, Proprietor, Glen Schneider Gardening, Berkeley

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.

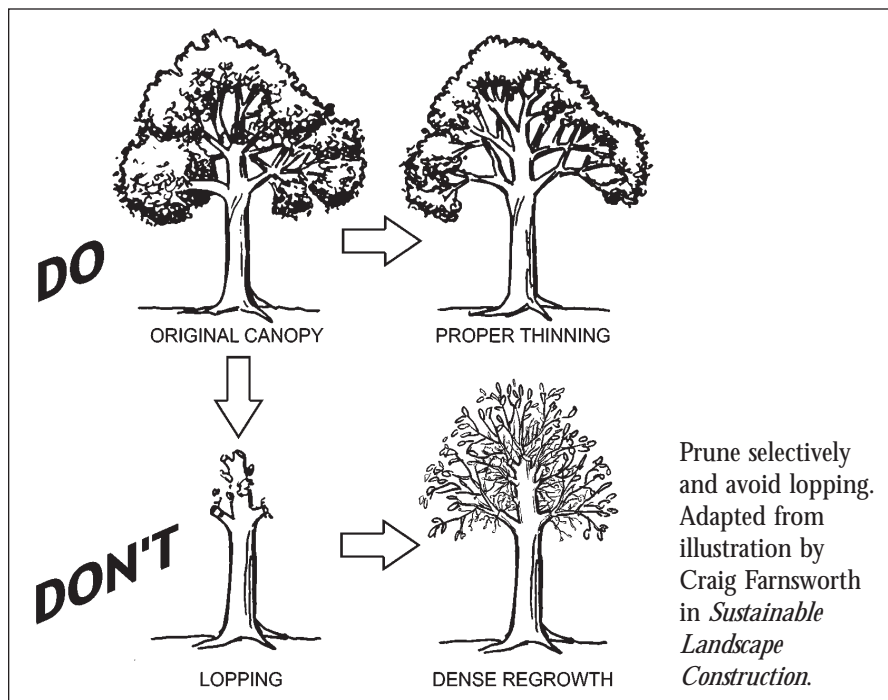
Benefits

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.



Sample Contract Specifications for Pruning:

1. Shrub shearing and tree topping are prohibited except for safety and/or liability issues.
2. Pruning shall be done on an as needed basis to maintain the health and natural appearance of the plant.
3. Plantings on slopes will be allowed to cover the slope and not be pruned, hedged or shaped.
4. Small leafy trimmings from shrubs may be left within the mulch layer in areas that are not near walkways or highly visible.

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

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. They can work in areas that are too steep for human crews, don't start fires with sparks, do not require fossil fuels to get the job done and reduce 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. (The East Bay Park District and the City of Oakland and others employ goats for vegetation control.)
- 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.



Reused concrete makes attractive raised planting beds.

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 or by visiting www.StopWaste.Org.
- Specify the use of recycled content materials or those made from rapidly renewable resources. For more information on sources of these materials, visit www.BayFriendly.org.

- 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.



“You can create recycled hardscapes. To put a positive spin on reused concrete, we call it ‘urbanite.’”

— Christopher Shein, Owner, Wildheart Gardens, Oakland

7. Reduce and recycle construction waste

Description

Recycling and donating unused items reduces pressure on landfills, saves money by reducing tipping 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 CalMax website at www.ciwmb.ca.gov or visit www.StopWaste.Org for additional information on materials reuse facilities and construction site cleanup contractors.
- Offer incentives to contractors or employees who reduce waste.

Benefits

Waste can be reduced and disposal fees minimized.

8. Separate plant debris for clean green discounts

Description

Most local landfills and transfer stations offer a discount for disposing of plant debris if it is kept separate from other types of waste.

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

Your disposal costs are trimmed, and in most cases, the material is processed into mulch or compost.

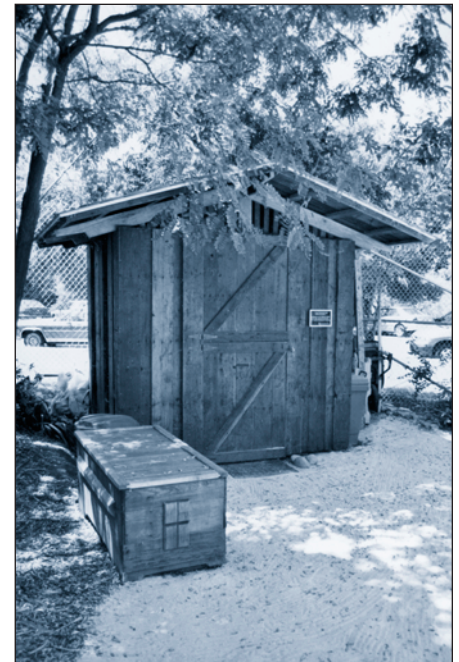


TIPS FOR SUCCESS

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.

3. NURTURE THE SOIL



Soil 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 Bay-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:

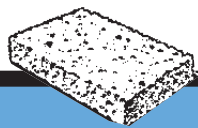
- ✓ Creating soil structure
- ✓ Storing and cycling nutrients
- ✓ Protecting plants from pests
- ✓ Improving water infiltration and storage
- ✓ Filtering out urban pollutants



Survey Says...

80% of single-family households agree with the statement that using compost in the yard is good for the environment.

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 during construction

Description

Topsoil is a valuable resource, yet it is typically removed or mixed with subsoil during construction, beginning a cycle of high water and chemical dependency.

Applications

Design for minimum building & hardscape footprints and little or no grading. When moving 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.

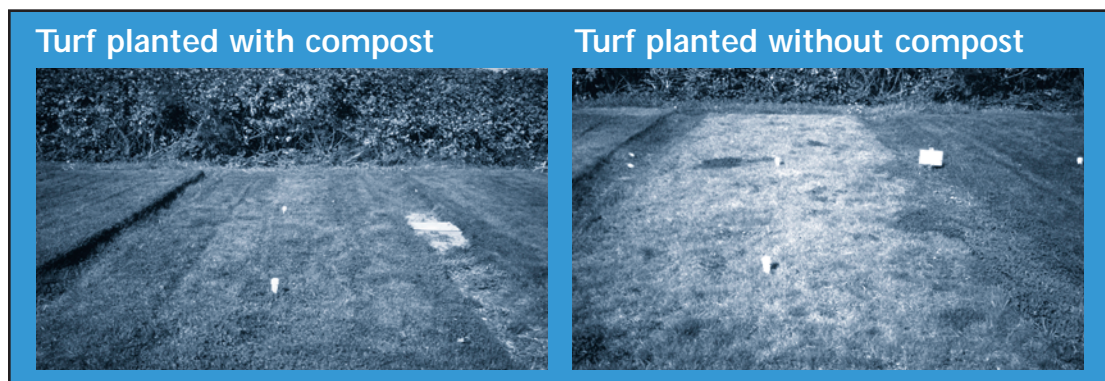


PHOTO: SEATTLE PUBLIC UTILITIES

3. Defend against erosion

Description

With the exception of a few large trees, native vegetation is also typically removed from a site before building or landscaping. Doing so exposes the soil to erosion, especially along slopes and waterways. 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

- Do not remove valuable trees and shrubs, especially near waterways. Protect them with fencing.
- Schedule grading for the dry season.
- Use compost berms, blankets, socks or tubes.
- Construct earth dikes or install silt fencing, sediment traps, and sediment basins.
- Terrace steep slopes.
- Hydroseed or otherwise plant to reduce bare soil, but do not over-plant for instant color. Annuals and short-lived perennials can be used to fill in areas while larger trees & 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, Bay-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 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. Visit www.ciwmb.ca.gov for info on how to choose composts that are appropriate for the intended use.

Benefits

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, decreased fertilizer & pesticide use and lower water bills.



Shredded mulch is placed on miles of freeway hillsides by Caltrans.

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

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 Landscaper's 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 storm drains, for leaves to remain as mulch after they fall.
- Look for more detailed how-to information in *A Landscaper's 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.



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 Certified by the California Compost Quality Council (CCQC Certified).

We'll tolerate a little leaf debris in the beds, as long as it isn't impeding plant health. Resource-efficient landscaping is healthy landscaping

— Nate Silin, Owner, New Growth Landscape, Oakland



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 new garden or tree planting, or to enrich existing plantings. In both cases, mulch is applied to bare soil or on top of cut or flattened weeds. New plantings are planted through the mulch, or a small area is left open to accommodate established plants and trees.

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 amendments to this layer if a soil analysis indicates the need for adjustment of pH or minerals. 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 the area 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.

Step 2: Add a weed barrier. The next step in sheet mulching is to put down an organic weed barrier that breaks down with time. It is essential that the barrier is permeable to water and air. Plastic mulches and geotextile fabrics are not recommended. Recycled cardboard, a thick layer of newspaper, 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. If the weed barrier is applied too thickly, the soil can become anaerobic. Overlap the pieces of weed barrier 6-8" 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.

Step 3: Layer mulch and compost. The top dressing mimics the newly fallen organic matter of the forest. It must be free of weed seeds. Good materials for this layer include chipped plant debris, tree prunings, leaves or straw. 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 tree prunings, to optimize weed control. In total, the compost/mulch layer should be 3-5 inches deep. Many materials suitable for the top layer often have an attractive appearance, making sheet mulch a versatile practice.

Step 4: 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, as with any mulch, do not pile materials up against the trunks or stems of plants, to prevent disease.

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.



Recycled cardboard is a good weed barrier.



Sheet mulched site is ready for planting.

PHOTO: KAMALA BENNETT, SENTIENT LANDSCAPE, INC.

PHOTO: KAMALA BENNETT, SUSTAINABLE LIVING DESIGN, 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 tap-rooted plants can be seeded 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
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.udavis.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.

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 Bay-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 storm drain.
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.



4. CONSERVE WATER

California'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-fourth of all urban 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 to reduce your clients' water bills. 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.
- 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 inoculants, available as root dips, mixes, tablets and solutions.

Benefits

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

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

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

2. Grow California natives or Mediterranean plants

Description

California native plants have evolved with local ecosystem 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 without watering 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.



Landscaping with natives and Mediterranean plants require little or no irrigation once established and provide a sense of the seasons.

PHOTO: MICHAEL THILIGEN
FOUR DIMENSION LANDSCAPE CO.

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. For residential clients, perhaps the lawn can be limited to the backyard where it is more likely to be used for play and relaxation.
- Avoid planting turf on slopes, narrow strips or on 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 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 clients' water bills and 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 needs (including container plants, which will shade each other).
- 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 tolerate water in the summer after they are established – and be sure to separate them from plants that will need ongoing irrigation.
- Create irrigation zones based on the plants' water requirements and their exposure.
- 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.



Landscape before and after an upgrade that reduced lawn size, increased diversity, improved property values, cut water bills by 50% and reduced maintenance costs by 20%.

5. Design for on-site rainwater collection and recycled 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 infiltrated. 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, parking lots and medians.

Applications

- Be pro-active, not reactive with customers. Provide them with recommendations to improve their irrigation efficiency.
- Rediscover drip. Several types of drip systems exist: select the right system for each specific job. Using “in-line” emitters improves efficiency.
- Upgrade to new irrigation controllers that use historical weather and temperature, solar or soil moisture sensors to adjust irrigation schedules. Some of these new controllers are very cost friendly. Also select controllers that can detect and respond to problems like a broken sprinkler head.
- At the least, select controllers with multiple valves to irrigate hydrozones separately and install a rain sensing override device.

Benefits

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

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. A separate meter can also reduce your client’s sewage bill since it is based on water use in buildings.



High efficiency irrigation conserves water.

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. Your costs and your clients’ water bills can be reduced.

“It is a good time to re-discover drip irrigation. New, customer friendly technologies are available.”

— David Langridge, Water Conservation Representative,
East Bay Municipal Utility District

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, over spraying or runoff. Irrigation systems that do not leak, over-spray or gush water are critical to conserving water.

Applications

- Mulch to reduce evaporation.
- Reset automatic controllers in response to weather changes.
- For over-head 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 decrease watering bills, 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 districts provide your commercial or home-owners association customers with practical information for improving landscape quality and reducing water costs. Utility company staff will demonstrate how to use irrigation equipment efficiently.

Applications

Your local water district is often a good source for information on water conservation. Many offer free irrigation audits of existing landscapes. An audit includes landscape area measurements and an analysis of distribution uniformity, irrigation scheduling, and overall system performance.

Benefits

Additional practices for conserving water may be identified. You can then demonstrate to the clients how your skills can save them money on their water bills. Customer satisfaction will be increased.

“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 districts offer free commercial landscape irrigation audits, and irrigation upgrade programs.

Customers of EBMUD, for example, may qualify for rebates of 50-100% of the material costs of installing water-efficient irrigation equipment, up to \$20,000 per site.

Contact your local water supplier or East Bay Municipal Utility District at wfcreserv@ebmud.com or visit their website: www.ebmud.com for information on how to apply for rebates.

See *Conserve Water* in the Resource Section of this book for a listing of water districts in the Bay Area.

“We ask to see our clients’ water bills, and show them what we can do to save them money.”

— George Pacheco, Owner/President, Pacheco Brothers Gardening, Hayward



Irrigation water running into the street contributes to excessive water bills and damage to pavement.

PHOTO: DAVE LANGRIDGE, EBMUD

5. CONSERVE ENERGY

The need to conserve energy is as important to Bay-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 Bay-Friendly, energy conserving practices in your design or service program:

1. Plant and protect trees to moderate building temperatures

Description

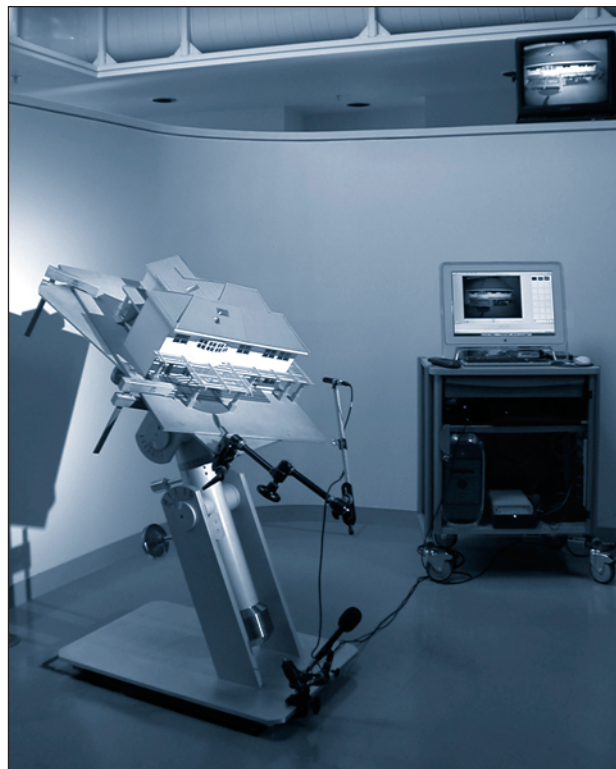
Trees conserve energy by shading, cooling the air through evapo-transpiration and reducing the velocity of wind. Selecting and placing trees to shade adjacent buildings in the summer or protect them from the prevailing winter winds can moderate building temperatures.

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%.

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.



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: THE OFFICE OF CHERYL BARTON.

Light colored, stabilized, compacted soil, in lieu of asphalt was used to surface this parking lot, reducing heat island gradients by 30%.

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, as well as shades and highly focused lamps. Visit www.darksky.org for a list of fixtures approved by the International Dark Sky Association.
- Use low voltage fixtures and energy efficient bulbs.
- Use renewable sources of energy.

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

6. PROTECT WATER AND AIR QUALITY



Bay Friendly Landscaping can help protect our *water* 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.

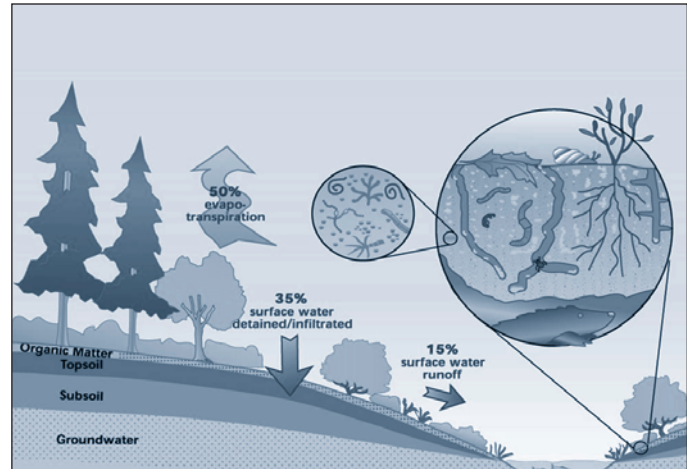
- More water runs off the surfaces – as much as 70% of all rain and irrigation water runs into waterways without moving through soil.
- The soil supports less microbial life and is less able to filter harmful chemicals out of the little water that infiltrates and moves through soil.

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.

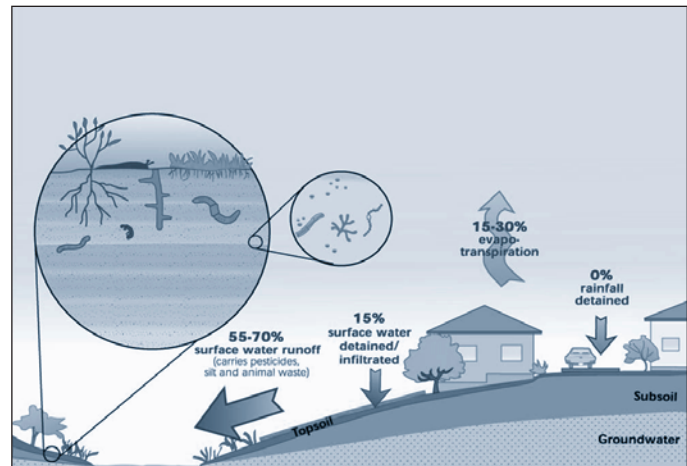
Pollutant load also increases. An acre of parking lot collects as much as 4 gallons of oil, gasoline and diesel fuel each year. When it rains and water runs off the parking lot, these toxic compounds are discharged into local creeks where they may eventually enter the Bay. Other pollutants include trace 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 green house gases.



Healthy, 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.

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

- ✓ Reducing fossil fuel consumption
- ✓ Recycling plant debris on site
- ✓ Planting trees to remove CO² and absorb air pollutants

Integrated Pest Management (IPM) is a holistic approach to mitigating insects, plant diseases, weeds, and other pests. It involves the use of many strategies for managing, but not 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 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 using on disease infected plants.

- Inspecting and removing invasive plant parts or seeds from your clothing, tools and vehicle before leaving an infested site.
- Cleaning up fruit and 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 degrees F. 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 the San Francisco Bay.

Why learn IPM?

1. Survey says...Your customers want to use Bay-Friendly landscaping practices and are ready to pay more for their use.
2. Using pesticides exposes humans and pets to toxic chemicals.
3. Increasing pesticide and soluble fertilizer use is correlated with increasing soil compaction, acidification and thatch buildup in lawns.
4. 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.
5. 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.
6. Pesticides can kill beneficial insects – the natural enemies of the pests you want to control. The pest then comes back in stronger force than before spraying.
7. Common pesticides are showing up in local creeks and the Bay, many at levels toxic to aquatic life.
8. Using pesticides may also kill the natural enemies of pests that are not at problem levels before spraying. This can cause secondary pest outbreaks.
9. Liability for employees that apply pesticides is increasing.
10. Regulations regarding pesticide use are growing, increasing the labor for oversight and paperwork.

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

1. Use Integrated Pest Management

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 plants - 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 UC Davis (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 you clients to www.outwaterourworld.org for fact sheets and information on alternative pest control strategies.
- 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.

In a study conducted for the Bay Area Stormwater Management Agencies Association in California, 75% of people surveyed indicated a willingness to try less toxic alternatives to manage household pests if they were available. They ARE!

1.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. See the table below for suggestions.
- Introduce natural predators. Parasitic nematodes are effective for control of some turf pests. *Bacillus thuringiensis* (Bt) is a bacteria that kills caterpillars, including those of non-pest moths and butterflies. (Do not use Bt in a butterfly garden.) Compost tea can be used to control some leaf and root diseases.
- Buy all biological controls from a reputable source.
- Do not use pesticides, especially broad spectrum pesticides, 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:

- Diazinon
- Chlpyrifos
- Carbaryl
- Malathion
- Pyrethroids

Use with Caution:

- Pyrethrins
- Imidacloprid
- Piperonyl Butoxide (PBO)
- Fipronil

SOURCE: KELLY MORAN, *INSECTICIDE MARKET TRENDS AND POTENTIAL WATER QUALITY IMPLICATIONS*, REPORT PREPARED FOR THE SF ESTUARY PROJECT AND THE SF BAY REGIONAL WATER QUALITY CONTROL BOARD, APRIL 2003.



“I grew up in the nursery business. The older generation had a lot of health issues, a lot of cancer. For ourselves and our own health and safety, we should try to eliminate toxics. Why should a beautiful landscape be purchased with the health of the people who work on it?”

— Glen Schneider, Proprietor, Glen Schneider Gardening, Berkeley



TIPS FOR SUCCESS

Beneficial Insects and Plants for Controlling Major Pests

Attract these beneficial insects

By planting these species

Bigeyed bug

Polygonum sp. (Silver Lace Vine)
Native grasses

Hoverflies

Achillea sp. (Yarrow)
Asclepias fascicularis (Narrowleaf Milkweed)
Baccharis sp. (Coyote brush, Mulefat)
Ceanothus sp. (California Lilac)
Eriogonum sp. (Buckwheat)
Prunus ilicifolia (Hollyleaf Cherry)

Lady beetles

Achillea sp. (Yarrow)
Asclepias fascicularis (Narrowleaf Milkweed)
Atriplex sp. (Quailbush, Saltbush)
Ceanothus sp. (California Lilac)
Rhamnus californica (Coffeeberry)
Native grasses
Salix sp. (Willow)

Lacewings

Prunus ilicifolia (Hollyleaf Cherry)
Ceanothus sp. (California Lilac)

Minute pirate bug

Achillea sp. (Yarrow)
Baccharis sp. (Coyote brush, Mulefat)
Eriogonum sp. (Buckwheat)

Parasitic & Predatory Wasps

Achillea sp. (Yarrow)
Aesclepias fascicularis (Narrowleaf Milkweed)
Eriogonum sp. (Buckwheat)
Myoporum sp. (Boobialla)

Tachnid flies

Achillea sp. (Yarrow)
Eriogonum sp. (Buckwheat)
Heteromeles arbutifolia (Toyon)
Myoporum sp. (Boobialla)
Rhamnus californica (Coffeeberry)

ADAPTED FROM CORNFLOWER FARMS CATALOG, 2001

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

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 only.

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 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.

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 the Bay.

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: KAMALA BENNETT, SENTIENT LANDSCAPE, INC.

***“Grasses are really a huge, flexible family. Native and non-native grasses can be planted to match site conditions in ways that mimic natural grasslands and don’t use a lot of resources. You don’t have to mow them. They can become meadows.*”**



— Michael Baefsky, Landscape Ecology Consultant, Baefsky & Associates, Orinda

A typical 1000 square foot urban application of diazinon contains enough active ingredient to pollute 170 million gallons of fresh water.

SOURCE: KELLY MORAN, INSECTICIDE MARKET TRENDS AND POTENTIAL WATER QUALITY IMPLICATIONS, REPORT PREPARED FOR THE SF ESTUARY PROJECT AND THE SF BAY REGIONAL WATER QUALITY CONTROL BOARD, APRIL 2003.

3. Keep soil covered

Description

In general, soil should have 100% plant or mulch cover, as exposed soil surfaces are highly susceptible to erosion and runoff. 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:

1. Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.
2. Also prevent longer term sedimentation of streams, stormwater drains and/or air pollution with dust and particulate matter.

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.

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 filter out pollutants. But it can become a pollutant when it enters the storm drain.

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 storm drain where it could become a pollutant by:

- Using berms or wattles around stockpiled organic matter,
- Storing it away from creeks and storm drains,
- 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 storm drain.
- 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. Go to www.StopWaste.Org or 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 San Francisco watershed and contributes to



7. Plant trees

the restoration of our local streams, creeks and wetlands.

Description

Trees can intercept significant amounts of rainfall each year and thus help control stormwater runoff. The Center for Urban Forest Research estimates that the the continuous tree canopy in Oakland intercepts 4 inches of rain over one acre in a typical year –about 108,000 gallons. Their root growth also increases the ability of soil to take in rainfall.

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.

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.

“In the City of Berkeley’s Parks, Recreation and Waterfront Department we do not use any pesticides. As an Arborist, I mainly deal with tree issues, and with most insect problems I face, the insect is gone in a week or so. It’s like having a cold. It passes.”

— Jerry Koch, Arborist, Parks Recreation & Waterfront Department, City of Berkeley



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.

This patio area allows water infiltration through the use of open-grid pavers with low-growing groundcover and mulch.

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, runoff reduced and your customer may save money on water bills, while protecting the San Francisco Bay watershed.

9. Design a system to capture and treat water

Description

Catching and retaining water will promote infiltration, removal of pollutants and slow down stormwater runoff. It can also add a beautiful element to the landscape. Studies have shown residential property values are greater when the home is located within 300 feet of a body of water. Leases are higher for commercial buildings that overlook a water element.

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, or
 - bioswales.
- Consider additional treatment with products such as oil/grit separators or oil/water separators for improved removal of pollutants from stormwater.

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.



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.

7. CREATE & PROTECT WILDLIFE HABITAT



Plant and animal diversity is one of the many factors that make the San Francisco Bay Watershed unique and beautiful. More than 1,500 local plant species bloom throughout 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 Bay area ecosystem and its inhabitants. Yet the loss of habitat is threatening local biodiversity. The population of the Bay Area is growing and expected to continue to do so. With increased populations 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 Bay Area, 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:

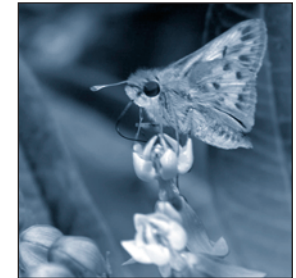
1. Diversify

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 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.



Survey Says...

More than 1/2 of single-family households with yards or gardens are interested in creating habitat for birds and pollinators in their yard.

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 Bay Area 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 plant in 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 San Francisco Bay Area, often with less water, fertilizers and maintenance. Local wildlife is fostered.



TIPS FOR SUCCESS

Sources of California Natives

Although there are more than 1,500 plants native to the Bay Area, they are only recently becoming popular in the nursery industry. Look for them, or other California natives at the following nurseries:

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

Appleton Forestry Nursery
Sebastopol, CA (707) 823-3776

Baylands Nursery
East Palo Alto, CA
www.baylands.com

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

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

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

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

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

Greenlee Nursery
Pomona, CA (909) 629-9045
www.greenleenursery.com

Native Revival Nursery
Aptos, CA (831) 684-1811
www.nativer revival.com

North Coast Native Nursery
Petaluma, CA (707) 769-1213
www.northcoastnativenursery.com

O'Donnell's Fairfax Nursery
Fairfax, CA (415) 453-0372

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

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

Saratoga Horticultural Research
Foundation
San Martin, CA (408) 779-3303

Seedhunt
Freedom, CA 95019-0096
www.seedhunt.com

Sierra Azul Nursery & Gardens
Watsonville, CA (831) 763-0939
www.sierraazul.com

Suncrest Nurseries, Inc.
Watsonville, CA 831 / 728-2595
www.suncrestnurseries.com

The Watershed Nursery
Berkeley, CA (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, although birds and bats can devour hundreds of mosquitoes in an hour.

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.
- 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*.
- Use the least toxic pesticide as a last resort only.
- 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.

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 San Francisco Bay Area's open space, plant and animal diversity is protected.

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



TIPS FOR SUCCESS

Flowering Periods of Beneficial Insect Plants

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Salix</i> sp. (Willow sp.)	■											
<i>Ceanothus</i> sp. (California Lilac)		■										
<i>Baccharis salicifolia</i> (Mule Fat)			■									
<i>Achillea</i> (Yarrow sp.)				■		■						
<i>Heteromeles arbutifolia</i> (Toyon)				■								
<i>Prunus ilicifolia</i> (Holly-leaf Cherry)				■								
<i>Rhamnus californica</i> (Coffeeberry)				■								
<i>Eriogonum</i> sp. (Buckwheat sp.)				■						■		
<i>Sambucus</i> sp. (Elderberry sp.)				■					■			
<i>Myoporum parvifolium</i> . (Creeping Boobialla)					■					■		
<i>Solidago californica</i> (Goldenrod)						■				■		
<i>Aesclepias</i> sp. (Milkweed sp.)											■	■
<i>Baccharis pilularis</i> (Coyote Brush)											■	■

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