
9%: Perspective on the California drought and landscape water use

Landscapes and the water they use are under relentless attack as California confronts ongoing drought. Most of these attacks are misguided when one looks at the facts, however.

Donald R. Hodel
Dennis R. Pittenger

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Donald R. Hodel

Environmental Horticulture Advisor
University of California Cooperative Extension
700 W. Main Street
Alhambra, CA 91801
drhodel@ucanr.edu

Dennis R. Pittenger

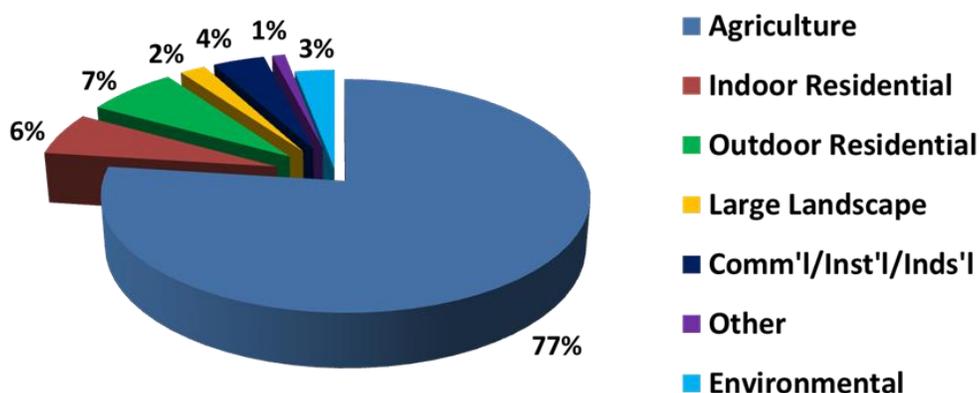
Area Environmental Horticulturist
University of California Cooperative Extension
Botany & Plant Sciences – 4114 Batchelor Hall
Riverside, CA 92521
dennis.pittenger@ucr.edu

Facts About California's Landscape Water Use

Landscape water use in California accounts for only 9% of the total statewide water use (fig. 1). Thus, if we never watered another home or public landscape, park, sports field, or golf course in California, the state would save 9% of its average total water consumption. This does not seem like much when one considers the essential functions and innumerable benefits that landscape plants provide to enhance the quality of our lives and make urban areas livable. To name just a few, tree, shrubs, groundcovers, lawns, and flowers provide:

1. Oxygen;
2. Carbon sequestration to help mitigate global warming;
3. Rain capture, dust and erosion control;
4. Shade and energy savings in heating and cooling;
5. Wildlife habitat;
6. Food;
7. Beauty and ornament;
8. Recreation;
9. Enhanced property values;
10. Psychological well-being;
11. Cultural/Historic value.

Figure 1. Average percentages of developed water use in California during a non-drought year (Sources: Calif. Dept. of Water Resources, 2013 California Water Plan Update Chapter 3. UCLA Institute of Environment and Sustainability, So. Calif. Environmental Report Card, Fall 2009).



Of that 9% of statewide landscape water use, residential accounts for 7%, while parks, golf courses, sports fields, and similar large landscapes account for 2%. Landscape irrigation is estimated to account for about 50% of annual residential water consumption statewide. That amount varies widely from about 30% in many coastal communities to 60% or more in many inland suburban communities.

Hidden Costs of Letting Landscapes Go Dry

In addition to the amenities and benefits we would lose by letting landscapes go dry, many hidden costs are associated with this strategy, and little, if anything, is ever said about them. Letting landscapes go dry will lead to damage and even death of plants. For trees such damage could mean dropping branches and even tree failures, leading to significant property damage and human injury or even death; lawsuits would certainly follow. As landscapes go dry, the risk of fires would increase. In changing over landscapes to low-water using plants or to non-planted, non-irrigated areas, labor and material costs for plants, installing or retrofitting irrigation systems, and other materials could be significant. Converting lawns to artificial turf is also expensive.

What about Lawns?

Lawns, which have been especially singled out as water wasting culprits, are estimated to use 40% to 60% of that 9%, or just 3.5% to 5% of total statewide water use. Lawn grasses are classified as either cool-season (tall fescue, Kentucky bluegrass, ryegrass, bentgrass) or warm-season (bermudagrass, zoysiagrass, St. Augustinegrass, buffalograss) based on whether they grow best in cooler seasons (fall to spring) or warmer seasons (spring to fall).

Cool-season grasses, of which tall fescue is the most common lawn grass, are among the most water-demanding landscape plants. However, research at the University of California has shown that,

when properly managed and irrigated, warm-season grasses require 20% less water than that needed by tall fescue, so considerable water can be saved without removing turf altogether. Also, the research revealed that most woody trees, shrubs, and groundcovers, including those traditionally used in California landscapes, perform well with 45% to 55% less water than that needed by tall fescue.

Many water conservation strategies call for an end to lawn irrigation or removing lawns altogether. But, remember that removing lawns will only bring water savings if they are replaced with:

1. no plants and the irrigation is turned off, which results in the loss of the essential functions and benefits of landscapes; or,
2. trees, shrubs, or groundcovers and these are cared for and irrigated according to their requirements, which can be expensive if done properly.

However, if water is turned off to lawns, many trees and shrubs solely dependent on lawn irrigation to meet their water needs will suffer, decline, and even possibly die. Declining and dead trees are particularly hazardous because they can readily drop large limbs or even the trunk can fail, causing serious damage to life and property. If one waters the trees that have lawns around them, the grass will likely survive but be of poorer quality.

Research has clearly shown that many, if not most, common trees, shrubs, and groundcovers not traditionally considered drought tolerant or low-water use are actually very drought tolerant once established if cared for and irrigated properly. Thus, replacing lawns or other landscape plants with so-called drought-tolerant or low-water use plants, like desert or Mediterranean-climate plants or California natives, is unnecessary in order to reduce a landscape's water demands significantly and meet mandated cutbacks.

Appropriate Tree Selection, Planting, and Management Are Critical to Conserving Water

Selecting the right tree for the right situation and then planting and maintaining it properly are critical to conserving water. Select species that are environmentally well adapted to the site and that fit the intended use or function. Consider the ultimate height and spread of the tree. Plant the tree correctly, at grade, and with no organic material in the backfill. Apply and maintain 1 to 2 inches of mulch and irrigate judiciously.

What Is Judicious Irrigation?

Judicious irrigation follows the principle of applying only that amount of water the tree needs when it needs it. Simply irrigating in a judicious manner can save significant amounts of water, and might be sufficient by itself to meet mandatory 25% to 35% water reductions without changing the landscape to so-called "low-water use" or "drought-tolerant" plants. Remember that most woody plants are actually drought tolerant or low-water use once established if planted and cared for properly. There are three steps that comprise judicious irrigation:

1. Goal: moisten upper 12 inches of root zone at each irrigation event.
2. When upper 12 inches of root zone reaches 50% moisture depletion (about when the soil 1 to 2 inches deep just becomes dry), then irrigate to moisten the upper 12 inches of root zone. This

amount is about 0.5 inches of water on a sandy soil and 1.5 inches of water on a clay soil. You can also determine 50% depletion by tracking historic or real time reference evapotranspiration (ET_o) data from a nearby CIMIS station; when daily ET_o accumulates to 50% (0.5 inch for sandy soil, 1.5 inches for clay soil), then it is time to irrigate. For brief periods you can allow more than a 50% depletion, stretching the interval between irrigation events even more; however, doing so for extended periods could lead to water stress and damage.

3. Don't irrigate again until the upper 12 inches of root zone reaches 50% soil moisture depletion.

These are general guidelines and they will have to be adjusted slightly to accommodate specific sites and conditions. Also, to avoid wasteful run-off, irrigation run times to apply sufficient water to moisten the upper 12 inches of the root zone might need to be broken up into two or more cycles.

Three Basic Principles for Proper Landscape Irrigation

Adhering to these three general principles will significantly reduce landscape water use:

1. **Improve irrigation system performance.** Fix any leaks and replace spray heads or other non-functioning emitters. Align spray heads so there is no overspray onto pavement and clear plant material that is blocking emitters. Adjust, add, or move spray heads so that their spray patterns overlap one another 100%. Replace an irrigation controller if it does not have at least three programs; four start times per program; an offsetting that interrupts irrigation without losing the programmed settings during a rain event; odd/even, weekly and interval program capability up to 30 days; and, a water budgeting adjustment in 10% increments.
2. **Improve irrigation schedules and water management practices.** Determine how much water your irrigation system applies during a typical cycle. Run irrigation systems between about midnight and 6:00 AM. Adjust irrigation system run times at least monthly. Many non-turf plantings will perform acceptably if irrigation is simply reduced 10% to 30% because landscapes are commonly over watered.

To estimate the amount of water your lawn and other landscape plantings require, see the easy irrigation calculators under the Landscape Water Conservation tab at www.ucanr.edu/cluh. Reducing lawn irrigation below the amount estimated in the on-line calculator could result in non-optimum performance; however, reducing the amount by up to 25% during the summer should enable a lawn to survive and recover or be reseeded in the fall or following spring if water is not restricted at that time.

3. **Adjust plant care practices.** Raise the lawn mowing height to at least 3 inches in tall fescue and 1.5 inches in bermudagrass or other warm-season grasses. Avoid pruning shrubs and trees. Fertilize lawns only moderately and generally omit fertilizing most other plants when water is limited. Apply and maintain 2 to 3 inches of organic mulch around plantings.

If additional water conservation is needed after following steps 1 through 3, then reduce the amount of lawn to cover only the areas where the functions of a lawn are needed. Former lawn areas can be replanted as a low-water requiring landscape, if desired, in the fall or winter by selecting any

types of woody plants or groundcovers regardless if they are labeled “native,” “drought tolerant,” or not because all woody landscape plants and groundcovers have similar low water demands. Maximum water savings can be achieved when former lawn areas are converted to attractive, useful, and permeable hardscape or mulched areas.

Landscape Plants and Lawns Are Worth the Water Investment

Many Californians consider public and private landscapes to be essential and therefore their irrigation to be a beneficial use of water, but many state and local government and water policy leaders consider landscapes to be unnecessary or wasteful use of water. Landscape water use research over the last 30 years has clearly shown that we can have our landscape plants, including functional lawns, meet water reduction goals, and still have the numerous amenities, functions, and quality of life benefits that landscape plants provide. In other words, landscape plants are beneficial, justify the use of water, and are worthwhile investments, even in this historic drought.

We have the science and technology to estimate and apply only the amount of water that plants require, no more, no less, and reap huge water savings. Indeed, many of our colleagues in the landscape and irrigation industries have already, and for many years, been using the most advanced water management and irrigation science and technology to schedule irrigations accurately, have healthy plants, and still save water. It is nothing new. The agriculture industry, which accounts for 77% of the total amount of water used in the state, has been using similar science and technology to water crops accurately and save water. So, already and for many years, a significant portion of the plant-based industries in California has plant water use “down to a science,” and has been saving vast quantities of water. Others who have yet to adapt landscape water and irrigation science and technology can and must “join the bandwagon” and reap similar savings.

Priorities for Landscape Irrigation in Severe Drought

Setting priorities during times of water scarcity are crucial. Here are some to consider:

1. Ensuring that public parks, school playgrounds, and sports fields have sufficient water to maintain their landscape plantings and lawns should be a high priority. Turfgrass, not bare soil or pavement provides the ideal surface for safe play, sport, and exercise activities needed by children and adults engaged in healthy lifestyles.
2. Ensuring that bona fide botanical gardens and arboreta have sufficient water to maintain their collections should also be a high priority. These institutions have documented, curated, scientific collections of plants that have immense research and educational value. For example, the plant collections at the world-famous San Diego Zoo actually have greater value than the animals. Also, it can be argued that the value of the plant collections at the Huntington Botanical Gardens is equal to if not greater than its art or library holdings.
3. Water the trees. Trees form the infrastructure of our landscapes and urban forest, and are their permanent or, at least, most long-lived and valuable components around which the other plants intermesh, if not depend. Mature trees are among the most valuable and difficult-to-replace

plants in urban areas. They sequester carbon and provide cooling urban shade. Their loss would be devastating. Trees can be likened to the steel framework of a building; how could the building exist without it? So, keep the trees watered.

4. Limit lawn to areas that require its function as a recreational or walkable surface, or where effective erosion or dust control is needed. Remember that lawns are relatively easy and inexpensive to install and establish compared to woody plants and groundcovers; thus, if severe water reductions are mandated, irrigation of functional lawns could be greatly reduced or eliminated to allow continued irrigation of high-value woody plants and groundcovers. The lawn can be easily re-established at later time.

Can We Conserve Our Way Out of the Drought?

California will be unable to conserve its way out of a serious drought by only wringing severe water savings from the 9% of water that landscapes consume statewide. Focusing primarily on water conservation that targets removing all lawns and severely damaging landscape plantings is not the answer. The statewide policy for the past decade has been to support the water demands of population and other forms of growth through conservation of urban landscape water use. This policy is a failed long-term strategy, however, because the water saved in landscape irrigation has been reallocated to meet the fundamental indoor water needs of increased population, which in turn has resulted in a hardening of water demand because there is less easily conserved water in times of drought.

Additional, reliable sources of water must be developed, other uses of water restricted, and/or, when faced with projections of 10 million more people in California by 2025 (as reported in the media recently), growth must be mitigated; yet, seldom have these options been discussed or presented as long-term means to balance water supply and use in this unprecedented drought. Politicians and other leaders and officials appear ignorant of the facts about the science and technology of landscape water requirements and irrigation management, and they seem to be out of touch with Californians' quality of life requisites. Crucial public policies and decisions on water use and distribution must be based on science, not illusion or perception that severe limitations on landscape water use will drought proof the state.

Conclusion

In conclusion, it can be clearly argued that landscape plants are worth the investment in water even in this time of severe drought. Landscape plants are worth having and saving for a host of reasons, and irrigation to ensure their health is a beneficial use of water. Through appropriate plant selection and proper management and irrigation, based on the science and technology largely developed at the University of California, we can have our cherished landscapes, enjoy the innumerable amenities and benefits they provide, and still save water.