



## The Effects of Drought on Trees

Trees are some of the oldest and largest living organisms on our planet. They need sunlight, air, and water to thrive. Climate change however, is putting an immense strain on their health. More than 129 million trees have died in California over the past decade as a consequence of prolonged drought conditions and extreme heat.

Although trees are adaptable to variations in climate, including periods of drought experienced throughout a tree's lifetime, climate change has placed trees at risk. Recurrent droughts, as we have seen in the past decade, when combined with prolonged periods of record-breaking heat, can disrupt the trees' biological processes and compromise the health and vitality of the urban forest population.

Trees transport water through their root system to their leaves. With groundwater supplies being dangerously depleted due to drought, trees are being deprived of their life-sustaining reserves. Rising temperatures also accelerates evaporation of moisture in the soil, air, and leaves, and therefore, creates a loss to much-needed water and nutrients to support healthy tree growth.

Supplemental watering of trees can aid in offsetting the deficiency due to ground water loss. Water conserving irrigation systems and efficient watering methods, including drip irrigation, can easily be adapted and adjusted to compensate for additional water that may be needed to keep trees healthy.

Continuing drought conditions can put additional pressure on already stressed trees. Our comprehensive tree management program includes; identifying trees that are most susceptible to drought-stress, frequent monitoring for signs of stress or pest infestation, supplemental watering as needed, and pest control application when required.

## THE IMPORTANCE OF GROUNDWATER

Hot summers and dry winters require an abundance of storage capacity to meet our water demands. As drought conditions continue to intensify, the majority of the state's reservoirs are reporting below-average water levels for this time of the year. Dramatic images of reservoirs with blanched bathtub-ring waterlines and boat docks resting on dry lakebeds, capture the severity of the situation.



In addition to reservoirs and other imported water sources, Californians depend on groundwater, which is a vital component of the state's water supply network. It satisfies approximately 38% of the agricultural, domestic, and commercial water needs. Groundwater also serves as a crucial buffer to make up for water-deficits during dry years.

Groundwater is found in geologic formations, called aquifers, that are located below the earth's surface. Aquifers have much more storage capacity than the state's 1,500-plus surface reservoirs. Several communities in our region, such as the cities of Riverside and San Bernardino, depend on groundwater for the majority of their water needs.

Unfortunately, use and abuse of California's groundwater has gone unregulated for centuries. Fortunately, California passed the much-needed Sustainable Groundwater Management Act (SGMA) in 2014, providing a framework for local agencies to manage their groundwater supplies for long-term sustainability. Because of climate change, the demand for groundwater has increased alarmingly, putting a strain on state and regional water resources.

Due to the increased demands, several groundwater basins, such as the large Central Valley Aquifer, are experiencing overuse. Taking water out of a basin that exceeds the amount being replaced is referred to as "overdrafting." The side effects of overdrafting include reduced water quantity and quality, lowering of water tables that led to the need for deeper wells, and

subsidence (sinking land).

In addition to the overuse and overdrafting issues, urban development has intensified the problem by creating obstructions for capturing rainwater and recharging the aquifers. The rampant use of asphalt, concrete pavement, and other impervious materials, such as building rooftops, have resulted in the loss of permeable surface areas, which has inhibited the ability of rainwater to soak into the ground.

In response to shrinking and threatened water supplies, water agencies began offering property owners incentives for reducing water use. One popular incentive program is for the removal of turfgrass. One of the design elements included in the program is incorporating the use of dry creek beds, recognizing the importance of capturing and slowing down rain water runoff to recharge the groundwater.

Environmental Concepts has participated in several successful turf removal projects, including the one shown in the photo of a small section of a larger project. We assisted the community through the application approval process, design, plant selection, construction, and agency signoff.

The project included multiple dry

creek beds that consist of swales lined with landscape



filter-fabric and capped off with river rock. The dry creek beds were designed to detain rainwater runoff, allowing it to soak into the soil.

On a larger scale, water agencies are developing alternative methods to supplement imported water sources with the goal of becoming locally sustainable. These methods include reclaiming wastewater, treating stormwater, and replenishing groundwater sources. These programs only contribute a small percentage to a much larger issue, and are too far in the future to address immediate concerns, thus underscoring the need to continue conserving water.

# SLOPE PROTECTION and EROSION CONTROL

Landscaping slopes and hillside areas can be challenging, but when executed properly, they can be a rewarding addition to any yard or common area. Depending on the size and steepness of the slope, design factors include choosing the right combination of plant materials, proper irrigation method, plant maintenance, and erosion control.



Selecting the type of plants will not only depend on the desired visual appeal, but also physical elements such as sun exposure, shade, plant dimensions at maturity, root depth for slope stability, and plant maintenance needs.

Addressing these issues and finding the right plant materials requires planning and experience.

The first line of defense against erosion, especially in burn areas, is slope stabilization. Planting a mixture of trees, shrubs, perennials, and groundcover present a striking display that can also help to lessen the impact of runoff. Taller shrubs and perennials often offer a sculpted appeal and seasonal color to the design elements of the area.

Low growing groundcover is a popular choice for erosion control while also offering texture and color. It is easy to plant, quick to establish, and most require minimal maintenance. Groundcover is often placed in the lower areas for better visibility, followed by low profile shrubs in the mid-sections. Taller plants are placed in the higher sections, with trees randomly scattered throughout.

Watering is especially important for sloped areas with full sun and a strong probability for runoff. Under these conditions, drip irrigation is a popular watering system due to its efficiency, slow application of water, and ability to reach the plants' root systems. Another advantage of using drip is that it will not be affected by wind and can be used any time of the day.

It is also important that the water applic-

ation rate does not exceed the infiltration rate of the soil. In order to not exceed the soil absorption rate, it might be necessary to use shorter run times and repeat the application after allowing time for the water to penetrate into the soil. A multi-program irrigation controller is needed to perform the task.

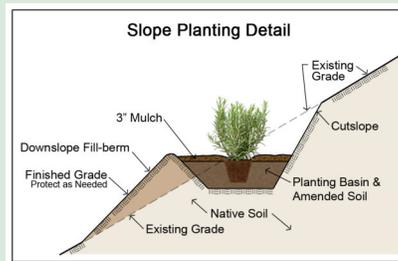
Bare soil areas between plants are required to be covered with a minimum 3" layer of mulch. The benefits of using mulch include reducing soil moisture evaporation, maintaining cooler soil temperatures, improving the nutritional quality of the soil, and helping to reduce weeds. Although there are many types of mulch, our experience has shown that a medium, organic mulch works best.

Steeper slopes, between 33% and 50% cross slope, can also be planted as described above. However, in these instances, because there is a strong likelihood that the mulch could be washed away during a downpour, a blanket of jute netting serves as an alternative. The jute netting is normally secured to the ground with landscape staples. Other types of materials such as geotextiles and burlap also work.

In areas where the cross slope is steeper than 50%, there

are several methods that can be successfully used. The first alternative is creating planting basins for the shrubs and trees. (see drawing) This allows plants or trees to grow straight rather than at an angle. The basins also help to retain moisture from irrigation as well as rainwater. They also act to reduce soil erosion.

Another method for taming a slope is creating mini-terraces with large rocks, timbers, or decorative concrete blocks that follow the contours of the slope. These products are available at your local home improvement center or landscape supply company. Anything beyond a series of small terraces would require consultation with a landscaping or engineering professional.



## CA Drought Emergency Wait & See

Recent actions taken by the state and regional water management agencies in response to continuing drought conditions in California and the Southwest have been making headlines lately.

The answer to whether or not we are headed into water use mandates remains to be seen. It has become a cautionary wait and see position as agencies impose voluntary water conservation measures.

Despite a series of storms that brought rain and snow to Northern California in October, over 80% of the state remains within Extreme (D3) or Exceptional (D4 - worst) drought intensity categories.

With the majority of water resources and surface reservoirs at critically low water levels, experts estimate that it would take 140% of the state's annual precipitation to fully recover from the drought.

As a result, the state declared a drought emergency, affecting all 58 counties, while directing Californians to voluntarily reduce water use by 15%.

The Municipal Water District of Southern California (MWD), who manages the majority of Southern California's imported water, also took precautionary measures and declared a drought emergency.

According to NOAA, there is a 90% probability that La Niña will continue through this winter, bringing warmer and drier conditions to Southern California and colder, wet weather to Northern California.

However, there is only a 50% likelihood that La Niña will last into spring 2022. Climate scientists are saying that they will have to wait until the end of the wet season in early spring to determine whether drought conditions have improved.

