

Bonifacio, Charmaine  
Hall, Skylar  
Ho, Jessica  
Lam, Benjamin

Project Title: **Lawn Replacement in Southern California**

## **Introduction**

The average American household uses 320 gallons of water per day, about 30 percent of which is devoted to outdoor uses. [320gpd/household x 30% = 96 gpd] in outdoor uses. More than half of that outdoor water is used for watering lawns and gardens. [96 gpd/day x 50%= 48 gpd/household] (EPA 2013). 50 gpd is a huge amount to waste on a luxury item in a drought ridden environment. Instead, switching to drought resistant plants is a way to conserve water and provide a native Californian aesthetic. For the purposes of this paper, we are focusing on the Southern California which is defined as the 10 southernmost counties in California.

The objective is to estimate water use by landscaping and determining water savings by converting lawns into native plants (xeriscaping) in Southern California.

## **Objective**

**The main objective of this project is to determine the economic feasibility of replacing lawns in California and in order to do this, the project is divided into these steps:**

## **Methods**

1. Quantify area of lawns in Southern California
2. Quantify average water usage/area of lawns
3. Calculate average water usage/area of xeriscaping
4. Calculate water savings by switching to xeriscaping
5. Multiply water savings by the average cost of water

Bonifacio, Charmaine  
Hall, Skylar  
Ho, Jessica  
Lam, Benjamin

6. Compare the cost of replacement to the money saved by improved water usage

## **Hypothesis**

Hypothesis: Is it economically feasible to switch from traditional lawns to xeriscaping considering water savings versus the cost of replacement?

## **Data Sources**

Data is from both primary and secondary sources. Most of the data will come from secondary sources such as the cost of water in Southern California, average amount of water used by a lawn in Southern California, and the average water savings from xeriscaping. The cost of water for Southern California is varied depending on how much of a demand there is for water, this data could be pulled from the water utility districts and then averaged. Estimating how many square feet of lawn there is in California could either be done by us or pulled from a secondary source. If done by us, we would use a spectral profile in order to find the area of lawns using remote sensing.

## **Expected Results / Products**

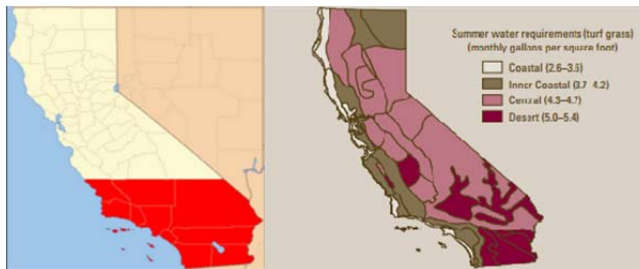
There is a total of 48,384 square feet of lawns in Southern California (Hanak and Davis 2006). In a study conducted by Sovocool in 2005 (Sovocool 2005), it was estimated that submetered xeriscapes use an average of 17.2 gal/square foot/year, while submetered turfs use 73 gal/square foot/year. Based on this data alone, it can be estimated that there would be at least 50 gal of water saved every year per square foot.

Bonifacio, Charmaine  
Hall, Skylar  
Ho, Jessica  
Lam, Benjamin

The average cost of water per acre-feet under the Tier I Supply Rate (cost of maintaining a reliable amount of supply) in the Metropolitan Water District of Southern California is \$106 acre-feet.

Based on the steps outlined above, the results are listed below

1. Lawn areas in Southern California in square feet
  - a. 9,018 lawn ft<sup>2</sup>/household



Estimates from the PPIC report were used to calculate average lawn size of California. The report provides average lawn size for Inner Coastal, Coastal and Desert regions, we estimate the areas of these regions and conducted a weighted average of the lawn size.

- b. 7.4 million households (US Census Bureau, 2015)
    - c. 66.8 billion lawn ft<sup>2</sup>
2. Average water use for lawns is 297.6 gal/ft<sup>2</sup>/year (6.2 gal/ft<sup>2</sup>/week) (Erickson 2007)
3. Average water use for xeriscaping is 55.8 gal/ft<sup>2</sup>/year (Sovocool, 2005)
4. The water savings is 241.8 gal/ft<sup>2</sup>/yr by converting lawns to xeriscaping (Sovocool, 2005)

Bonifacio, Charmaine  
Hall, Skylar  
Ho, Jessica  
Lam, Benjamin

5. The savings from cost of water is calculated by the equation below

$$241.8 \text{ gal/ft}^2/\text{yr} \times \$0.0015/\text{gal} \times 66.8 \text{ billion ft}^2 = \$24.2 \text{ billion /year}$$

6.  $\$2/\text{ft}^2 \times 66.8 \text{ billion ft}^2 = \$133.6 \text{ billion}$  (Xeriscaping - EcoLibrary, 2015)

The average cost to install a xeriscaping garden is \$2 per square feet, while the total lawn areas in Southern California is 66.8 billion square feet. If the cost of installing a xeriscaping garden is multiplied by the law areas in Southern California, then the total cost of replacement will be equaled to \$133.6 billions.

Result: Net Benefit over 1 year = -\$109.4 Billion

### **Parties of Interest**

Parties of interest are primarily policymakers. They have the power to create and implement programs which could influence the transition from xeriscaping. The State Water Resources Control Board (SWRCB) is the primary policy maker for the state, so they would be the primary party of interest. A effective program could be similar to the Multi-tenant lighting commercial (MTLC) projects done by UC Davis's Energy Efficiency Center (EEC). This programs take advantage of the benefits energy companies receive for providing energy efficient upgrades to consumers. An effective approach may be providing similar incentives to water companies to help their clients switch to xeriscaping.

### **Potential problems to overcome**

Bonifacio, Charmaine  
Hall, Skylar  
Ho, Jessica  
Lam, Benjamin

Lawns in Southern California Can be extremely hard to quantify. There's a lot of area to cover, which would result in a huge error. Spectral profiling could be used to create a spectral index in order to achieve an estimate; however, other similar profiles may also be included in the calculation making the estimate much larger than normal.

Other things that we are not considering for this report are: added benefits of having xeriscaping, which could provide things like suitable habitat for native animals, and an improved groundwater recharge rate. Things like this could help to improve the cost-benefit ratio but are beyond the scope of this paper.

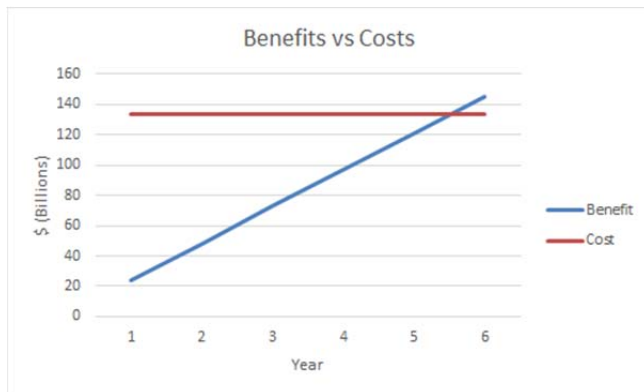
## **Conclusion**

Xeriscaping is an excellent way to reduce unnecessary water-use as California faces its biggest drought in years. One obstacle of implementing the system may be the actual enforcement of switching lawns to xeriscaping. The best way to promote xeriscaping is through media depiction and celebrity campaigns. This method promotes the use of xeriscaping through desirable contexts and would encourage the switch among regular homeowners.

## **Recommendation**

If policymakers decide to implement a program to replace all lawns with xeriscaping in California it will take 5.52 years in order to see a return on their investment.

Bonifacio, Charmaine  
Hall, Skylar  
Ho, Jessica  
Lam, Benjamin



In order to better assess the true costs and benefits of implementing xeriscaping more factors must be considered. Discounting should be used to assess future benefits, and maintenance costs more accurately calculated. In addition to that the added benefit of providing habitat for native species should be quantified and put into monetary terms.

Bonifacio, Charmaine  
Hall, Skylar  
Ho, Jessica  
Lam, Benjamin

Sources:

EPA(2013). "Outdoor Water Use." *USEPA*

Erickson, Ben.(2007). "How to Calculate Lawn Irrigation Water Usage and Cost." *Today's Homeowner*. <http://www.todayshomeowner.com/calculating-lawn-irrigation-costs/>>(June 2, 2015)

H2OUSE. (2009). "Lawn Water Use." *H2Ouse*,  
[http://www.h2ouse.org/tour/details/element\\_action\\_contents.cfm?elementID=12E32A2A-4A30-4AC5-92DF4F2327372D65&actionID=11252FC5-E889-45A5-A088549C8CF50361](http://www.h2ouse.org/tour/details/element_action_contents.cfm?elementID=12E32A2A-4A30-4AC5-92DF4F2327372D65&actionID=11252FC5-E889-45A5-A088549C8CF50361)

Hanak, E and Davis, M.(2006). "Lawns and Water Demand in California." *California Economic Policy*., 2, 1-24.

HomeAdvisors. "How Much Does it Cost to Install Landscaping?: Install Landscaping Costs" *Homeadvisor*, <  
<http://www.homeadvisor.com/cost/landscape/install-landscaping/>> (June 2, 2015)

Sovocool, K. (2005). *Xeriscaping Conversion Study Final Report*. Southern Nevada Water Authority. Nevada, USA

United States Census Bureau. (2015). "State & County QuickFacts." *US Census Bureau*, < <http://quickfacts.census.gov/qfd/states/06/06059.html>> (June 2, 2015)

"Xeriscaping - EcoLibrary." (2015). <<https://myrecycling.recyclebank.com/ecolibrary/xeriscaping>> (June 2, 2015)

Xeriscaping. "What is Xeriscaping?" *Xeriscaping: Creating Sustainable Landscape*, <  
<http://www.xeriscapeweb.swiftpromotion.com/default.html>> (June 2, 2015).