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ENVS 117
3/10/2020

Valley Water's Landscape Rebate Program analyzed with Geospatial Data

What is Valley Water's Landscape Rebate Program?:

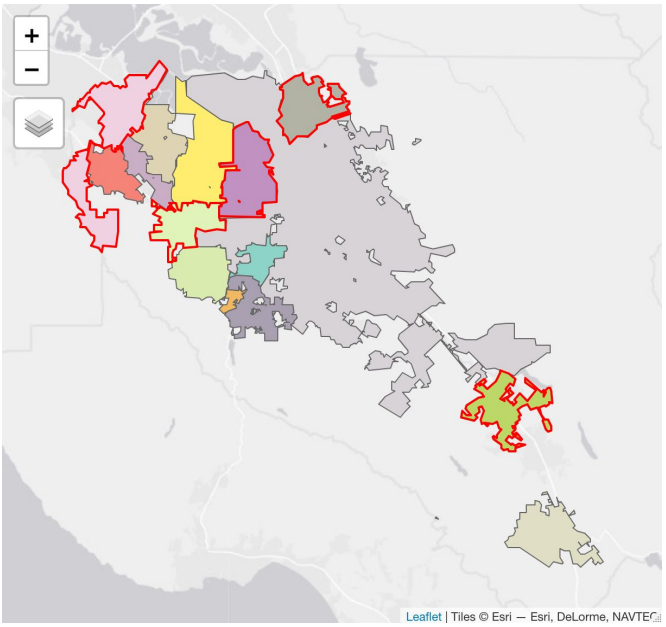
The Landscape Rebate Program is a rebate program for the removal of water intensive landscapes such as turf grass lawns or pools in favor of drought tolerant and native landscapes. Valley Water rebates $1 per square foot of irrigated landscape removed. Valley Water has a rebate cap amount of $2,000, incentivizing the removal of up to 2,000 square feet of irrigated lawn (Santa Clara Valley Water District). While the Water District does provide incentives to remove these high water use landscapes, the program also requires the installation of native species on at least 50% of the converted area. This limits a customer's ability to remove lawn in favor of artificial grass or additional hardscape, both of which are known to limit biodiversity and contribute to the heat island effect in urban Santa Clara County. Given the variable climate of California and the increasing possibility of drought as a result of climate change, removing lawn area is a simple and effective way to reduce residential water use across Santa Clara County.

Why does the Landscape Rebate Program need to be analyzed?:

With more than 50% of residential water use resulting from outdoor irrigation, the replacement of currently irrigated areas with drought tolerant ecosystems is a critical method of water reduction in Santa Clara County. As Santa Clara County continues to grow, keeping water use as low as possible is a very necessary aspect of sustainable growth. According to the Metropolitan Transportation Committee, the population of Santa Clara County will increase to 2.4 million residents by 2040 (Metropolitan Transportation Commission). A significant increase from the current 2020 population of approximately 2 million. Since the Santa Clara Valley Water District began collecting data in 1990, the residential water use for the county has remained relatively consistent despite an increase of more than 500,000 residents (SCVWD). Rebates from the water district and an increase in awareness of the need to conserve water in the county have been major factors in ensuring a responsible use of water. It is critical that this trend continues on into the coming decades as the population continues to grow. In an effort to better understand what factors contribute to a homeowner's likelihood to participate in the

Landscape rebate program, multiple factors must be analyzed to ensure that the program is reaching as many residents as possible and water use can continue to be reduced.

Cost Sharing Cities and Retailers:

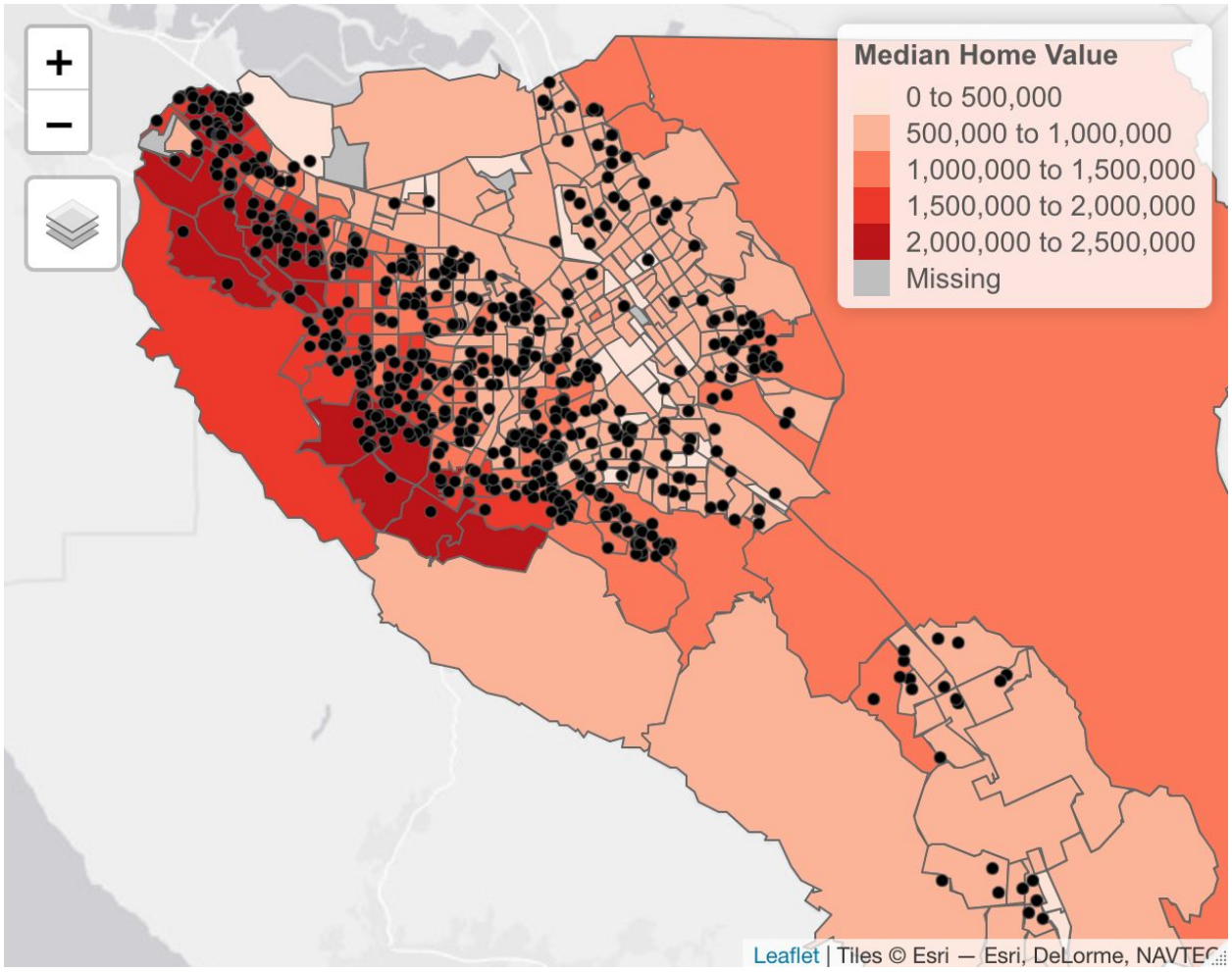


One of the most important factors for most homeowners is the dollar amount that the customer receives when participating in the rebate program. While the normal rebate from Valley Water is $1 per square foot, there are a number of municipalities that are engaged in a cost sharing program with the Water District that doubles the rebate from $1 per square foot to $2 per square foot for the first 1,000 square feet. This increases the maximum rebate by 50% to a maximum dollar amount of $3,000. The cities that currently are participating in rebate cost sharing programs with the Santa Clara Valley Water District are the City of Milpitas, the City of Morgan Hill, the City of Palo Alto, the City of Santa Clara, and the City of Cupertino. These cities can be seen with a red outline to the right. Of the 583 lawn conversions that have occured in the past two years, 147 of them occurred in these cost sharing cities. That is more than 25% of all participation in the Landscape Rebate Program coming from only five cities in Santa Clara County. Given that these areas only contain approximately 19% of the population of Santa Clara County (United States Census Bureau), it is clear that the cost sharing incentives do have an impact on the rate of participation in the Valley Water rebate program.

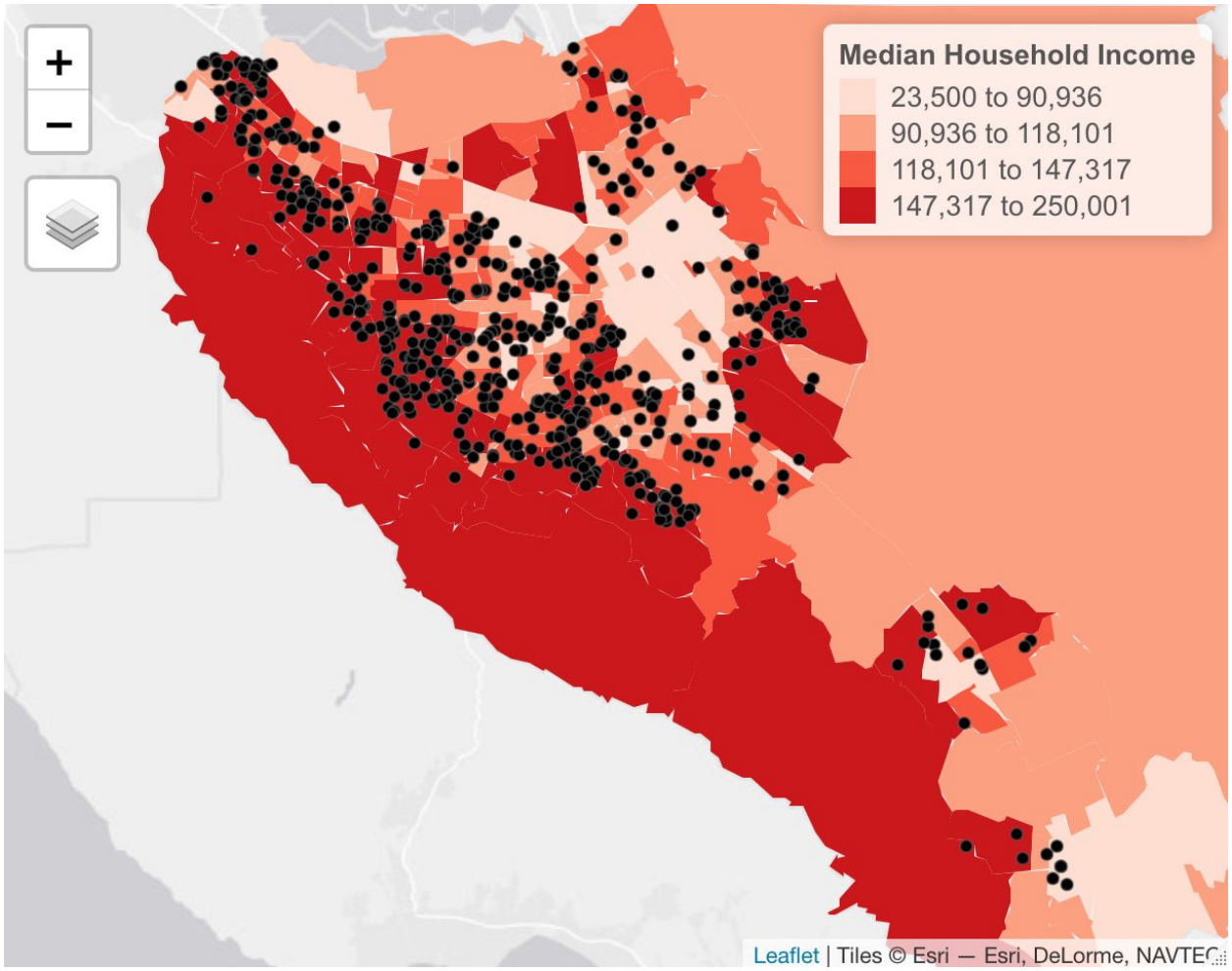
Property Value and Income:

One of the most frequently cited reasons for not removing a traditional lawn is the potential for a loss in home value. A study conducted at Virginia Tech concluded that landscaping can increase a home's perceived value by up to 15% (Virginia Tech). In an area with high real estate prices such as Santa Clara, 15% of the value of the home can rapidly approach more than $100,000. As a result, transitioning from a typical, well manicured turf grass lawn to a native, low water use garden, could be seen as a significant financial gamble. As a result, it is important to analyze the impact that property value has on a resident's willingness to participate in the Landscape Rebate Program. Using property value data from the

American Community Survey at a Census Tract level and plotting the site locations for all lawn conversions over the past two years, we can see what impact a home's value has on the willingness of the homeowner to remove their lawn.



As shown in the figure above, there seems to be little correlation between home value and willingness to participate in the landscape rebate program. This is perhaps a result of the Bay Area's higher salaries allowing more people flexibility to take the risk of diminishing property value by removing their lawn. Additionally, this could be a result of the consistent demand for housing in Santa Clara County (Bay Area Market Reports). This consistent demand and a stagnant supply of housing means that potential home buyers likely place less importance on landscaping.

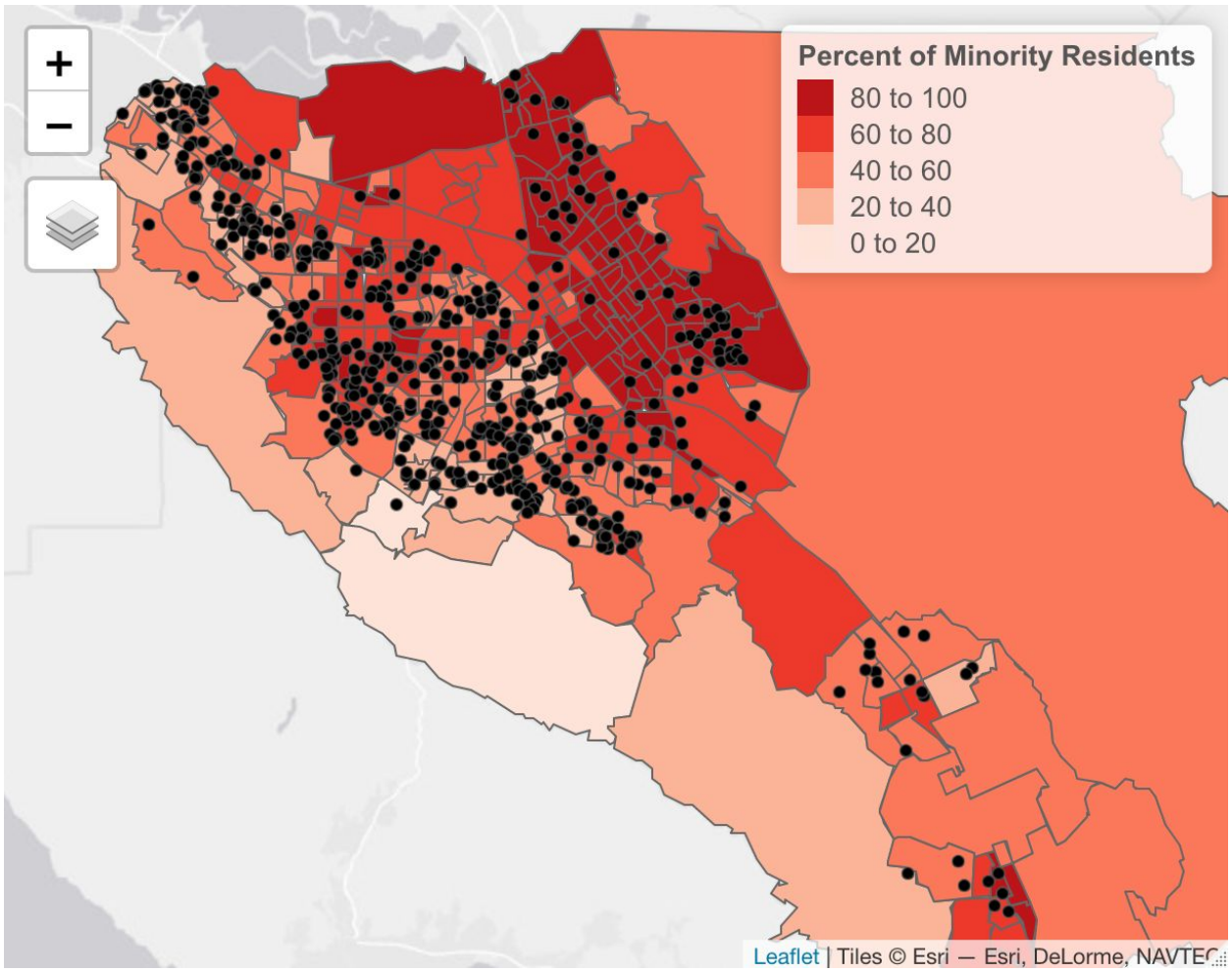


The inflated salaries of Santa Clara County are likely a major contributor to participation in the landscape rebate program. As seen above, a significant proportion, 449 out of 538 lawn removals, were completed by residents in areas where the median salary was in the top half of salaries for the county. With more than 83% of all rebates coming in areas in the top half of household income for the county, it is clear that financial factors play an important role in a resident's participation.

Race:

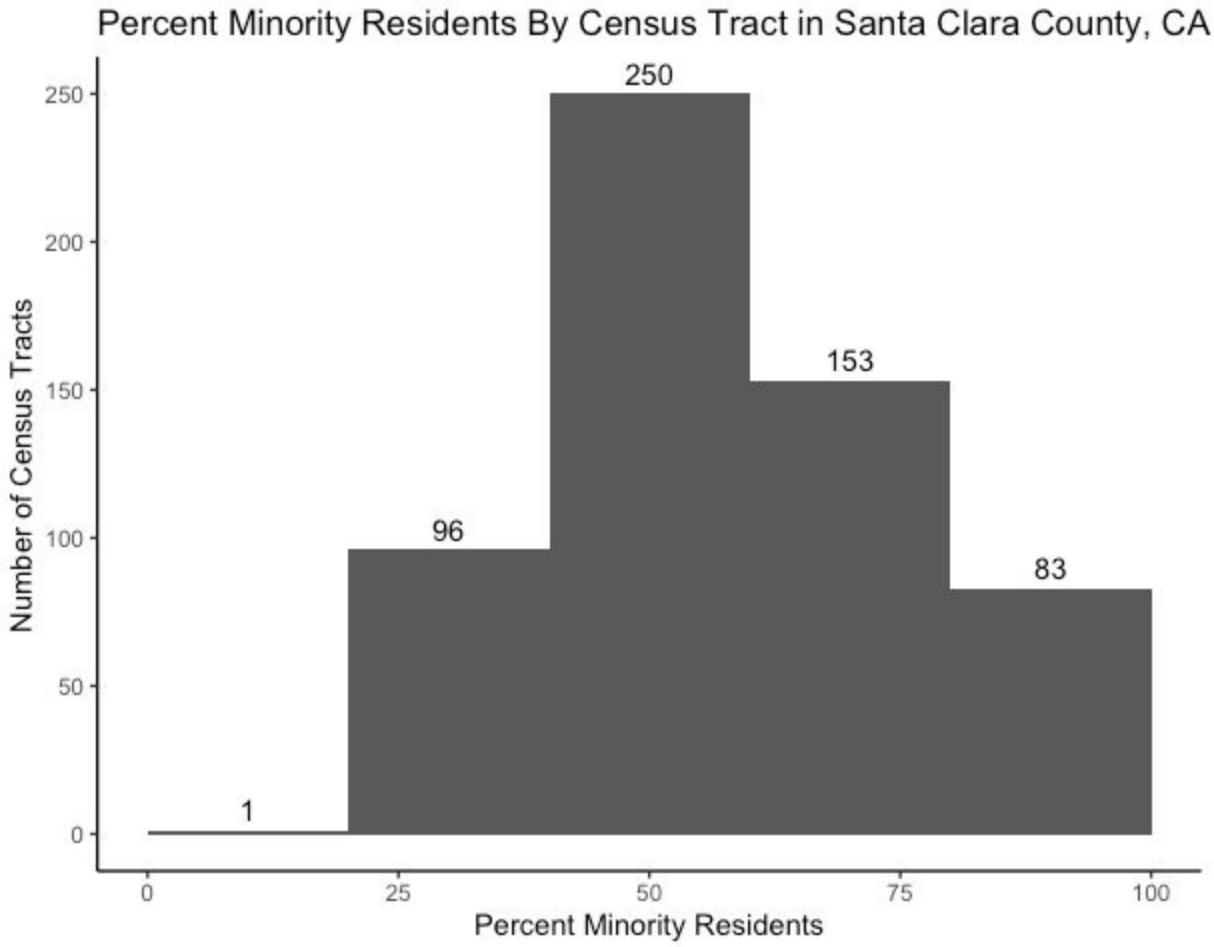
Another important factor to consider is access to the program as a result of differences in culture or the potential for a language barrier. With little customer support for languages beyond English and Spanish, customers with limited skills with those languages can easily be left behind. According to data from the 2010 Census, more than 50% of Santa Clara County residents speak a language other than English at home (County of Santa Clara). By mapping

the site locations with the percent of minority residents in each census tract, potential areas of improvement for communication of the program can be found.



As seen in the map above, there seems to be little correlation between participation in Valley Water's Landscape Rebate Program and the percentage of minority residents in each census tract. Of the 538 total rebates, 83 were in communities that had more than 80% minority residents, 153 were in communities between 60 and 80%, 250 were in communities between 40 and 60, and 97 were in communities that were less than 40% minorities. This can be seen

further in the chart below.



Using the information from the figure above, we can clearly see that the percent of minority residents in a given census tract has no bearing on whether or not a given resident will participate. While this data may appear to show that residents in minority majority communities in Santa Clara County are more likely to participate in the Landscape Rebate Program, that is not necessarily true as a result of the universal diversity across the county.

Conclusions:

When considering the need to conserve water in California growing due to an increased potential in drought resulting from climate change (Mann & Gleick), conserving water is a critical change that must be made in Santa Clara County. According to the EPA, more than 30% of all household water use nationwide, and that number is likely even higher in California where the use of aerators and low-flow fixtures for indoor water use is ahead of national standards. Of the 7 billion gallons of water used per day on residential outdoor uses, an estimated 50% of that is

wasted due to overwatering, leaks, or evaporation (EPA). Due to the immense amount of water that is used for outdoor residential irrigation, it is critical that programs like Valley Water's Landscape Rebate Program are used to their fullest extent to maximize water savings.

Using geospatial data to analyze Valley Water's Landscape Rebate Program, several factors became clear. The first major takeaway from the geospatial analysis of the rebate participants is that the income of the consumer is a critical factor in determining the likelihood that a resident will participate. The high cost of living as well as the inflated salaries in Santa Clara County serve both ends of the spectrum. On the low end, the high cost of living leads many residents to a position where a several thousand dollar landscaping project is simply out of reach while trying to make ends meet. This can be seen through the extremely low participation rate of 17% in communities in the bottom half of Santa Clara County household incomes. This issue is mitigated slightly by municipalities that are engaged in cost sharing with Valley Water. Cost sharing cities made up 25% of all rebated projects. While cost sharing was shown to be a factor that pushed more residents to participate in the Landscape Rebate Program, the cities that participate are generally higher income such as Cupertino and Palo Alto. As a result, increasing cost sharing into areas served by the San Jose Water Company could prove to be extremely beneficial due to its serving of primarily lower income areas of San Jose. This opportunity for a cost sharing partnership should be capitalized on to serve the low income residents in Santa Clara County who would benefit the most from the additional rebate funds. This will likely be a difficult partnership to make because San Jose Water Company is a private, investor owned utility that gains additional income from residential water waste.

The R Script for this project can be found here:
https://github.com/jwrzepczynski/Landscape-Rebate-Program

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