Evaluating Landscape Effects of Turf Replacement

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Outdoor landscapes in California use water for irrigation, especially during summer. Outdoor water use is the largest portion of residential water use, especially in hotter inland areas and cities with larger lots. While lawns have value for recreation and aesthetics, replacing existing turf lawns with well-designed low-water landscapes that incorporate native and climate-appropriate shrubs, grasses, and trees, along with mulch varieties that replenish soil and retail water, can have many benefits. These benefits include diversifying plant species, lowering irrigation needs, reducing stormwater runoff, and potentially reducing fire risk in fire-prone areas. Replacing turf, combined with homeowner education and proper irrigation, also makes yards more drought resistant. In contrast to urban water management policies that "fallow" lawns during drought to conserve water, low-water landscapes with native and other climate-appropriate plants can provide water savings in both dry and wet years.

Many water utilities in California actively fund turf replacement programs that provide rebates to home and business owners. Cities with municipal water utilities, as well as regional water providers and state programs, all fund rebates. Property owners voluntarily apply to replace turf. Programs require that applicants submit a landscape plan, along with before-and-after pictures to verify. Water agencies pay out rebates that subsidize some costs of replacing turf, which might otherwise be prohibitive for many property owners.

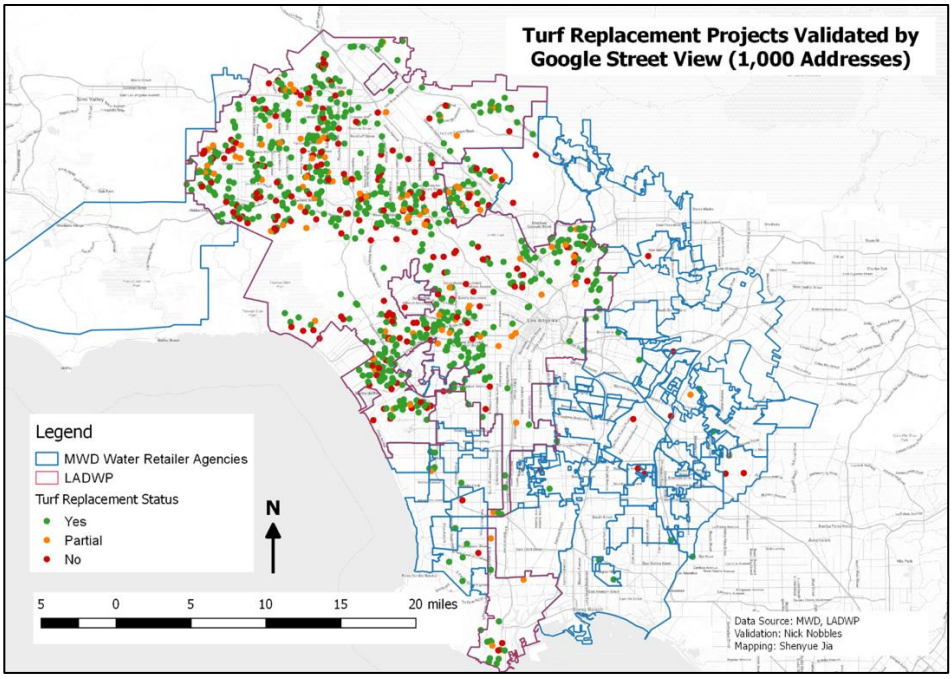
As with any public funding initiative, evaluative studies help assess the effectiveness of investments. For many years, evaluative studies of turf replacement were limited. More recent evaluations, based on well-designed experiments or statistical methods accounting for many factors that affect water use, generally show that turf replacement programs yield sustained water savings. A recent report from the Alliance for Water Efficiency compiled data across multiple turf replacement programs and found average water savings of 11-76 gallons/square foot annually after replacing turf.

While water savings is often studied for turf replacement, it is only one of several important objectives to evaluate. Post-program evaluations can study multiple outcomes, including:

1) Effects of turf removal on water use and conservation savings,
2) Changes in land cover and types of plant species after replacing turf,
3) Socio-demographic trends in program participation,
4) Preferences for post-replacement landscapes by both residents and professional landscapers,
5) Cost-effectiveness of such programs for water savings and associated cost drivers.

As part of efforts by Metropolitan Water District of Southern California (MWD) to assess its 2014-2016 turf replacement program during the California drought, we evaluated how yards

changed after converting a lawn through a MWD rebate in LA County. We also evaluated trends in participation across cities.

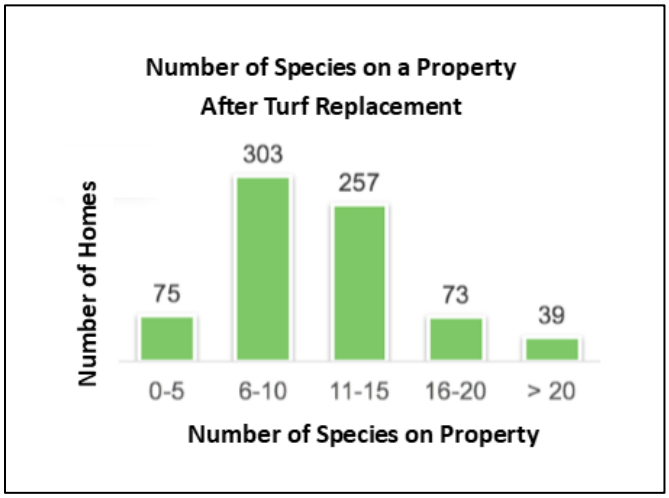


The program boosted funding for turf replacement by $350 million. Residents received $2.00 of incentives per square foot ($0.09 per square meter) of lawn removed, which was paid following documented evidence of replacement. This was sometimes supplemented by additional local incentives, such as in the cities of Los Angeles and Long Beach.

The vast majority of applications in LA County (80%) occurred within the City of Los Angeles, which offered an additional $1.75/sq-ft rebate from the local water retailer. Projects were clustered geographically, with areas of high and low project participation. Statistical analysis with landscape and sociodemographic factors identified that owner-occupied households were more likely to participate, and lower-income households were less likely to participate. Other variables such as property size did not significantly affect participation.

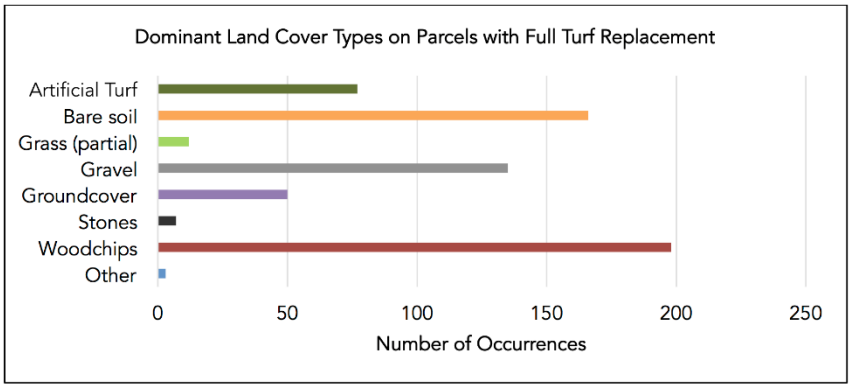
Examples from Google Earth Street View of Landscape Classification Types Used in Analysis

After replacing turf, most parcels contained a diversity of plant types, including shrubs, succulents, perennial herbs, and grasses. Most locations had 6-10 species of plants. California native plants were identifiable on approximately 15% of properties. Landscapes also had a variety of ground cover, including wood chips (mulch), bare soil, gravel, and artificial turf. Notably, MWD no longer supports using artificial turf in subsidized turf replacement projects. We evaluated these land cover changes by examining pre- and post-images of 1,000 participating properties using Google Streetview.



Land cover types identified as part of analysis of parcels with turf replacement

Land Cover Types	Description
Artificial turf	Synthetic turf, noticeable via imagery
Bare ground	No vegetative ground cover visible
Woodchips	Wood chips or mulch
Gravel	Small to medium-sized stones
Plants	Various plant types, which can be dispersed evenly or clustered. Includes low-lying or shrubby plants, but not turf
Lawn	Grass or turf



Some “neighbor effects”, where one property owner’s lawn replacement spurs nearby properties to replace lawns, also appeared. Thirty-six percent of properties examined in Streetview had nearby properties with partial or no lawn cover. This suggests that water utility programs might act as “seed funding” to stimulate broader change to converted additional landscapes.

Water utilities can improve turf replacement programs in several ways. Although the MWD program boosted funding during drought, replacing lawns during normal or wet years is a better strategy. Almost all water-conserving plants take time to establish. Drought resilience in low-water use plants results from deep root structures. Water utilities should maintain or boost turf replacement programs during wet years.

Water utilities should also incorporate native and drought tolerant species into program requirements (many do) and work with non-profit groups to educate homeowners on proper irrigation, soil management, and care. Deep-rooted trees, shrubs, and bunchgrasses require different irrigation techniques than turfgrass lawns. Most residents do not understand the different needs.

Finally, to improve equity, water agencies should seek to increase participation in lower-income communities. Agencies are sometimes restricted in developing programs that target subsidies for particular socioeconomic groups. As an alternative, they can devise programs by working with non-profits, obtain grants to support work in lower-income communities by verified installation contractors, and improve outreach and communication. A key goal should be reducing up-front costs to increase uptake.

Residents gain personal satisfaction from their yards, but yards are not just private goods. Yards beautify neighborhoods, reduce local surface temperature, and improve urban habitat. Well-designed urban landscapes also can help infiltrate water and reduce stormwater runoff. Turf replacement can provide a broader set of ecological, social, and water conservation benefits in cities.

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Further Reading

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