Water Action Research Team
Final Report
Spring 2014

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UCLA
Institute of the Environment and Sustainability

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EXECUTIVE SUMMARY

In response to the University of California's mandate to reduce campus water consumption per capita by 20% by 2020, as well as the chronic water stress of the Southern California Region, the 2014 Water Action Research Team focused on researching and implementing water conservation efforts at UCLA. Over the course of two quarters, we conducted (1) a drought-tolerant landscaping survey and presentation, (2) an artificial turf survey and report, (3) a stormwater policy proposal for the campus, and (4) an insert for the Housing Administration's *Green Guide to Living* pamphlet.

The first of these projects, the drought-tolerant landscaping survey, assessed student's opinions on their prefered prevalence, locations, and varieties of drought-tolerant landscaping at UCLA. We found significant student support on "the Hill" for increased use of this landscaping and reported these results to a group of Housing representatives. We then conducted a similar survey concerning potential locations of artificial turf on campus, finding that there was marginal support for the technology and the prefered locations were grassy medians and the Court of Sciences. These results were compiled in a report which was sent to Capital Programs to prompt further action.

We additionally developed a draft stormwater policy for UCLA that would require all new buildings and major renovations on campus to install a stormwater capture and reuse system. We submitted this document to Capital Programs, where it will pass through various levels before potentially becoming a permanent part of the university's sustainability policy. Our final project was to develop an insert to the *Green Guide to Living* that encouraged student water conservation. This addition will be included in the print and electronic pamphlets distributed by the Housing Administration in the 2014-15 academic year and years thereafter.

BACKGROUND

a. California's Water Resources

The Water Action Research Team continued with its second consecutive year in 2014. The team was first created in 2013 in response to an increasing water shortage in California. Characterized by a Mediterranean climate, Southern California is a semi-arid region with an average rainfall of only 13 inches per year (Weather). Approximately 30% of the region's water comes from groundwater, while the remainder is imported from other sources, such as the Colorado River and the San Francisco Bay Delta (Where Does Southern California's Water Come From). California's current climate, however, is taxing the state's water resources. As discussed in a campus wide email from Chancellor Gene Block in February 2014, "California is now experiencing a drought emergency." It is necessary that Southern California reexamines the ways in which it uses water.

b. Prior Research

We began our research by reading reports by the past ART water teams. The 2013 Water Action Research Team focused on campus plumbing fixture changeovers and residential landscaping changeovers. Working with the director of the UCLA plumbing department, Tim Petta, the 2013 Team conducted an audit of faucet and toilet use in the restrooms of the fifth floor of Math and Sciences and Powell Library, sites selected due to high student traffic. Taking into consideration both water savings and finances, the 2013 Team found it to be a sound decision to install meter-censored appliances. However, when our team met with new director of plumbing, Tim Moore, we learned that these conversions were not feasible due to sanitary regulations and infrastructural issues due to UCLA's outdated plumbing system. We therefore

turned our attention to other areas recommended by previous teams and also added new focus areas determined by our team with the help of our stakeholder.

c. UCLA Water Task Force

In response to California's water crisis, the UCLA Water Task Force was created in December 2013. The 2013 Water Task Force was comprised of UCLA faculty and staff: Tracy Dudman, Nurit Katz, Aliana Lungo-Shapiro, Lewis Rosman, Tim Petta, Val Padilla, Teresa Hildebrand, Carl Newth, Joshua Witt, Yoram Cohen, and Mark Gold. In order to reduce campus water use by the necessary 143,800,000 gallons to achieve the campus goal of 20% water reduction by 2020, the Water Task Force created a Water Action Plan of comprehensive steps (Dudman, 2013). Some of the initiatives in the Water Action Plan included attention to artificial turf and stormwater, furthering the direction of our team. We were able to participate in Water Task Force meetings, where we gained greater insight into water conservation efforts at UCLA.

PROJECT GOALS

In accordance with UCLA's Water Action Plan, our goal was to help UCLA reduce its water use by 20% by the year 2020 as mandated by the University of California. With the guidance of our stakeholder, we decided to attack this goal from a variety of directions, focusing on research, policy, and education. The diversity of these approaches allowed our team to gain a comprehensive understanding of water use on campus. Furthermore, our four projects allowed us to tackle many important water issues and topics that interested us, and we were very successful at achieving our goals.

1. Drought-Tolerant Landscaping Survey: The goal of this project was to spur implementation of increased drought-tolerant landscaping on the Hill after having gathered data through surveying. We were motivated by the 2013 ART Team's work on this area of water

conservation (Final Report 2013: Water Action Team). This survey focused on student perception and knowledge of drought-tolerant landscaping on the Hill. Following our research and surveying, we wrote a report analyzing our data and presented our results to the Housing Directors at the start of Spring Quarter.

2. Artificial Turf Survey: We were motivated by UCLA's conversion of the IM field to artificial turf, and wanted to do a survey focusing on the perception of the UCLA community in regard to the potential installation of artificial turf on campus. Research by the 2009 Artificial Turf Team did extensive research on the IM field that was inspiring to us, and we wanted to expand upon this (Final Report 2009: Team Turf). We completed multiple surveys, both online and in person, and created a final report of results and analysis. The goal of this project was to write a report and present our findings to a relevant group on campus. We altered our goal of presenting to collect more data, and instead only wrote a report, which will be handed off to the right people via our stakeholder. Furthermore, we are more than willing to present our results in the Fall.

3. Stormwater Policy: This project's focus was our attempt to enact comprehensive stormwater policy for new buildings on the UCLA campus. Our goal was to provide Capital Programs with a draft of stormwater policy that will be moved through the ranks and hopefully be implemented into the official UCLA Sustainability Policy. We were motivated by the Water Action Plan and UCLA's current lack of stormwater policy.

4. Green Guide to Living: This two-page insert focused on water saving tips, why one should save water, and what UCLA is doing to help. We were motivated by the 2010 Action Research Team Green Orientation that created the pamphlet, and we were successful in our goal

was to have it included in the 2014-2015 paper and pdf version (Final Report 2010: Green Orientation).

DROUGHT-TOLERANT LANDSCAPING

a. Research Methodology

Drought-tolerant landscaping, or xeriscaping, is landscaping using plant species that are suited to arid climates and require little to no irrigation. Though this alternative landscaping style has the potential to reduce irrigation by up to 80% of normal landscaping demand, it is seriously underutilized at UCLA (LandscapingNetwork). Given these factors, we decided to devote our first project to exploring the possibility of expanding the university's use of drought-tolerant landscaping.

To do so, we decided to conduct a survey to gauge student preferences concerning drought-tolerant landscaping on the Hill. Though a similar survey had been conducted by the 2013 Water Action Research Team, we felt that an additional survey could garner more specific and conclusive results. In addition, the previous team had not shared their results with Hill staff, and our team wanted to conduct an additional survey so we could present our own data to Hill representatives. With these objectives in mind, we worked with our stakeholder to design a questionnaire that would gauge students' prefered prevalence, placement, and varieties of drought-tolerant landscaping that could be implemented at UCLA.

We went through many versions of this survey, as we had some difficulty keeping the survey short and the questions concise while still covering all points of interest. After many revisions, we finally settled on a seven question survey that would briefly assess the participant's support for drought-tolerant landscaping on the Hill and on campus, as well as their preferred

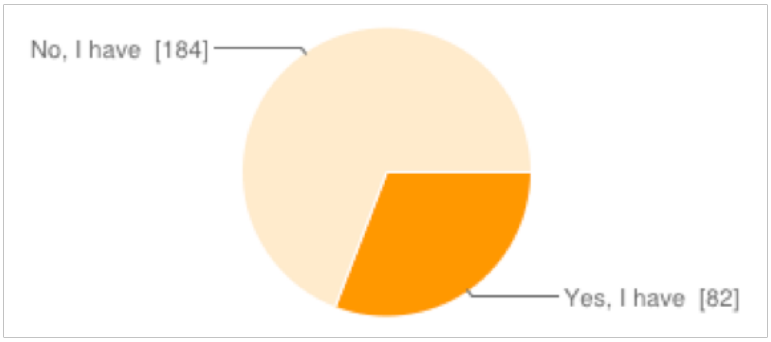
varieties of drought-tolerant plants. The final version also included a picture and a short explanation of drought-tolerant landscaping.

We conducted this survey outside of Bruin Plate during the dining hall's dinnertime hours (5:00pm-8:00pm) for two successive evenings. Team members approached students exiting and entering the dining hall and requested their participation, using both hard-copies of the survey and computers to access the online version. Adding an educational component, we displayed two original posters that illustrated and explained drought-tolerant landscaping. Team members also fielded questions and provided additional verbal explanations to interested students. Several examples of drought-tolerant succulents and grasses were also on display during these survey periods, and students were encouraged to examine these as references.

b. Results and Analysis

Overall, our survey results showed that students were largely unaware of the presence of drought-tolerant landscaping on campus, but were mostly supportive of its expanded use. These main findings are represented and elaborated upon in the graphs and text below. In total, we received responses from 266 students.

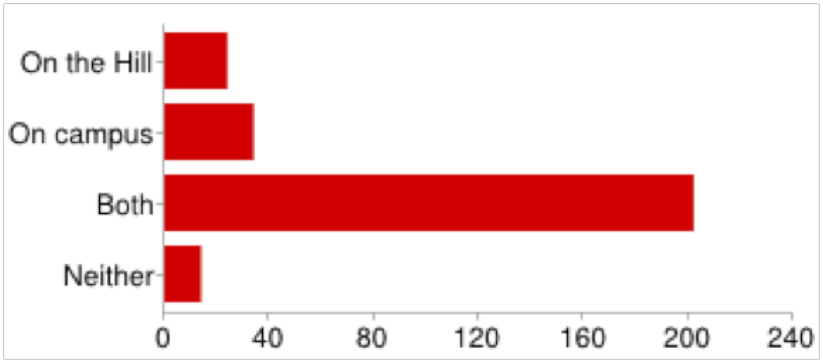
Have you noticed drought-tolerant landscaping on campus?



When asked if they had noticed drought-tolerant landscaping on campus, 69% of students surveyed responded that they had not. This is indicative of the current underutilization of this

type of landscaping at UCLA, as well as the lack of student awareness of areas on campus that currently contain these types of plants.

Where would you like to see more drought-tolerant landscaping at UCLA?



A large majority of respondents (74%) indicated they would like to see more drought-tolerant landscaping both on the Hill and on campus, whereas only 5% indicated they would not like to see more drought-tolerant landscaping in either area. The remaining respondents either indicated they would prefer to see more exclusively on the Hill (9%), or exclusively on campus (12%). The aggregate percentage of students surveyed who want more drought-tolerant landscaping on the Hill is therefore 86%, representing significant support for landscaping of this type. This, along with additional questions, gave us confidence that drought-tolerant landscaping was largely supported by UCLA students, and we decided to advocate for its increased use on the Hill and on campus.

Working with Tracy Dudman and Aliana Lungo-Shapiro, the team produced a report summarizing our results. We presented these results to a group of Hill representatives at the beginning of Spring Quarter. We suggested that this alternative landscaping style be seriously considered in all new landscape projects and renovations, as well as to replace existing plots. Our recommendations were very well received. A few specific locations were brought up during the subsequent discussion as viable sites for drought-tolerant landscaping, including the island in the

center of Sproul turnaround and the grassy hills in De Neve Plaza (in front of Cedar and Dogwood). We recommend that the next Water Team consider further research and analysis on these and other specific plots on the Hill in regards to conversion to drought-tolerant landscaping.

ARTIFICIAL TURF

a. Research Methodology

Artificial turf is a form of synthetic landscaping. It was first introduced for use by professional sports teams in the 1960's. From this arena, the use of artificial turf has progressed; it can now be found in numerous recreational areas and residential lawns. The installation of artificial turf has the potential to reduce water usage. For example, an average lawn of 1,800 square feet could save up to 99,000 gallons of water each year if converted to artificial turf (Dudman, 2013). The UCLA Water Task Force has realized the benefits of artificial turf; UCLA will be converting the 7.7 acre Intramural Fields to artificial turf beginning in December 2014. This conversion is projected to save the university 6,400,000 gallons of water per year (Dudman, 2013). We devised a survey to evaluate the perception of the UCLA community in regard to potential installation of artificial turf on campus.

Amidst the negative connotations associated with artificial turf, our team wanted to better understand the opinions of the broad range of individuals who step onto the UCLA campus. In order to obtain accurate information about those who would be in contact with the grassy areas, we created an artificial turf survey. Similar to the need for drought-tolerant landscaping, the installation of artificial turf in areas around campus contributes to a more water-sustainable campus. Knowing we would encounter a wide variety of individuals on campus, the survey was customized for responses from participants. We worked closely with our stakeholder to devise a

survey that not only assesses an individual's feelings or beliefs on artificial turf but also takes into account the individual's affiliation to the campus.

In order to catch the attention of passer-bys, this survey could not be too plain or simple but also could not be too complicated. We created many versions of this survey to strike the perfect balance between the two. After reviewing the strengths and weaknesses of our drought-tolerant survey and the manners in which it was conducted, we discussed ways to make this survey accepted by the public. Once we finalized our draft, our product resulted in an eleven question survey with two images. The first of these images was an example of artificial turf; the second was of a map of UCLA highlighting the areas we reference as potential sites for artificial turf. The survey was conducted in person and also distributed on relevant department listservs in order to gain greater response.

After exploring many options for surveying, we decided to utilize the heavy foot-traffic on the patio outside of Kerckhoff Hall. We conducted our survey on two consecutive days, primarily focused on morning and early afternoon hours. Students were encouraged to look closely at the artificial turf samples provided alongside posters depicting the areas in consideration (e.g. Dickson Plaza, Court of Sciences, grass medians). Participants were able to interact with three different options for turf implementation, one of which included an inorganic filler while the other two had conventional rubber. Similar to the drought-tolerant survey, we were available to provide in-person answers and educate participants. The team used hard-copy surveys on clipboards to make it easily accessible for all of the passer-bys. By the end of Winter Quarter, we were able to complete over 200 surveys.

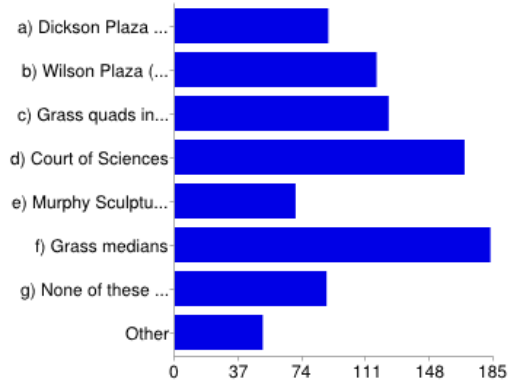
During Spring Quarter, we conducted the artificial survey again during "Earth Week." The team participated in two separate events, on April 22 at the Hospital Sustainability Earth

Day Fair and on April 23 at the campus' Earth Day Fair. Again, we had a specific table with samples of artificial turf and a campus map poster on display. UCLA students, faculty, and guests approached the table of their own volition and we requested their participation, using a combination of hard-copy and online surveys. Again, participants were encouraged to examine our three artificial turf samples as references.

b. Results and Analysis

We received 366 total responses to our survey. The responses were filled with strong opinions, however indicated a smaller degree of polarization than we had hypothesized. Our survey results indicate that the vast majority of the participants were familiar with artificial turf. These main findings are represented in the graphs and text below.

Of the following locations, where would you like to see artificial turf on Campus?

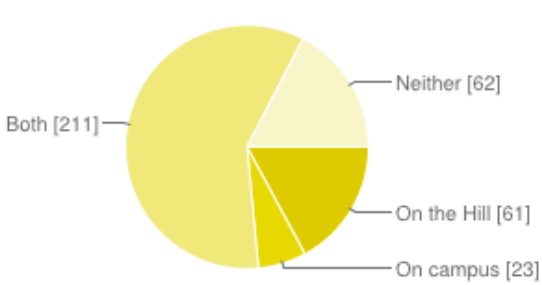


a) Dickson Plaza (Sunken Gardens)	**89**
b) Wilson Plaza (bottom of Janss Steps)	**117**
c) Grass quads in between Powell, Royce, Haines, Humanities	**124**
d) Court of Sciences	**168**
e) Murphy Sculpture Garden	**70**
f) Grass medians	**183**
g) None of these locations	**88**
Other	**51**

The results indicating potentially desirable locations for installation of artificial turf were less decisive. This is likely because respondents were encouraged to select one or more areas. The results indicate the two areas with the highest support for conversion are (1) grass medians and (2) the Court of Sciences. Therefore, these areas should be the first to receive further research in regard to artificial turf conversion. In contrast, the two areas with the least support for conversion were (1) the Murphy Sculpture Gardens and (2) Dickson Plaza (Sunken Gardens). These and other large, iconic grass areas of campus are not recommended as areas of further

study, as confirmed by the free-response portion of our survey. Additionally, 88 respondents indicated “None of these areas,” presumably not selecting any of the areas for conversion. This indicates that 24% of the respondents would not support the installation of artificial turf in any of the indicated areas. Additionally, 51 of 366 respondents indicated “Other” as their choice site of potential conversion to artificial turf. This may refer to alternative areas such as the grassy areas by the Ronald Reagan UCLA Medical Center or areas on the Hill.

The University of California – all 10 campuses – is committed to a 20 percent water reduction per person by 2020. Do you support installation of artificial turf at UCLA to help achieve this goal?



On the Hill	**61**	17%
On campus	**23**	6%
Both	**211**	59%
Neither	**62**	17%

When respondents were informed of California’s goal to reduce water use by 20% per person by 2020, 59% of the respondents indicated that they would support the installation of artificial turf both on the Hill as well as on campus. Minimal education of the UCLA’s water reduction goal and a reminder of California’s current drought, prompted a substantial increase in support for artificial turf. Seventeen percent of the respondents indicated that despite awareness of California’s water scarcity and UCLA’s goal to reduce water use, they do not support the installation of artificial turf on the Hill or on campus. In choosing between the installation of artificial turf either on the Hill or on campus, more respondents were willing to support installation on the Hill (17%) than on campus (6%). Greater support makes the Hill an ideal location for further research and implementation of turf technology.

STORMWATER POLICY DRAFT

a. Research Methodology

In December of 2013, UCLA's Water Task Force published their Water Action Plan to reduce the campus' water use by 20% by 2020. The University of California mandated that this plan would include a section on stormwater, and in this section the Water Task Force cited that they would work with the student Water Action Research Team to develop a stormwater plan during the coming year. As such, Capital Programs charged our team with the task of drafting a stormwater policy for the campus. The size and scope of this policy was initially unclear to us, and we encountered some difficulty proceeding with this project during the beginning of our first quarter. However, after much research, assistance from our stakeholder, and meetings with senior planners for UCLA, we discerned and agreed upon the purpose and breadth of the policy.

We first approached this project by doing research on existing stormwater policies and on the University of California policy itself. The city of Santa Monica has an effective and renowned stormwater policy, and given the proximity and similar climatic conditions of the city, we chose to study their policy for reference. However, finding applicable policies from other universities proved more difficult, and our search ended unfruitfully. Fortunately, by familiarizing ourselves with the format and general style of current UCLA Sustainability Policy, we were able to create a framework for crafting our policy draft using concurrent structure.

Through meetings and discussions with our stakeholder, the scope and purpose of our policy became much more apparent; our policy needed to be strictly focused on stormwater recapture and storage systems, and would not include stormwater quality concerns as we had previously thought. Our stakeholder introduced us to a key report for the new UCLA Teaching and Learning Center for Health Sciences titled *Water Reuse Storage Options – Overview.* In this

report, the Atelier Ten environmental consulting group considered the various possibilities for water capture, storage, and reuse systems within this new building. However, instead of just considering a stormwater capture and reuse system, Atelier Ten suggested that the facility also recapture condensate from cooling coils in the Heating, Ventilation, and Air Conditioning system (HVAC). This could provide a yearlong source of water for reuse on site, making up for the short storm season of precipitation and therefore minimal stormwater supply in the Los Angeles region. Given that this type of system dramatically increases the usefulness and annual effectiveness of a stormwater tank and reuse system, making it a more feasible and cost-effective project for developers, we decided to incorporate an HVAC system in our policy as well.

Last quarter our team attended two key meetings that helped clarify several aspects of this project. The first of these meetings was with select members of the Water Task Force who specialize in stormwater. We discussed current stormwater recapture systems and challenges to implementing such systems. One of the biggest issues concerning stormwater reuse systems is not that project designers have trouble integrating such systems into new projects, it is the fact that these designs are often value-engineered out to reduce project costs. In fact, we learned that the new Luskin Conference Center had plans for a stormwater capture tank, but they were taken out during the final planning stages. During our first meeting we also learned the specific LEED points that projects could gain from implementing water recapture and reuse systems, which we included in our policy as further incentive to pursue such systems. Many other finer details were discussed as well, and the meeting was very helpful overall in terms of helping us collect information and formulate ideas for our policy draft. The second meeting was a Water Task Force meeting with a special guest from Heal the Bay, James Alamillo. James Alamillo, an urban programs manager, shared his stormwater expertise in regard to current projects in the City of

Los Angeles. He was instrumental in providing our team with a well-rounded education of stormwater structures and insight into the growing stormwater discussion in Los Angeles.

With most of our research done during Winter Quarter, Spring Quarter was spent writing and revising our policy draft. Our stakeholder was instrumental in the revision process because for most of us, this was our first time drafting a policy of any sort.

b. Results and Analysis

The stormwater policy that Capital Programs tasked us with drafting discusses feasibility and applicability for both new developments and redevelopments on campus. Our team decided that applicable sites must conduct a feasibility study of a stormwater/HVAC cistern for reuse as landscape irrigation and/or internal toilet flushing which must include the following: structural composition/location of site, air conditioning for building, condensate/discharge volume, change in permeability of site surfaces, and optimal size for cistern given these parameters. The importance of the stormwater policy draft is not to explain the logistics or scope of stormwater and HVAC reuse systems, this will be handled on a project-to-project basis. Rather, our policy draft simply stipulates requirements that projects include stormwater systems, giving the responsibility of scale and design to the specific project managers who will conduct a feasibility study of the site.

GREEN GUIDE TO LIVING

a. Research Methodology

In 2009, the ART Team "Green Living Project: Water" focused on water use on the Hill, conducting an impressive audit of water use in the dorms and drafting several proposals for measurable change (Final Report 2009: Green Living Project - Water). The Green Orientation ART team of 2010, however, failed to draw upon information gathered by the previous ART

team and realize the importance of water when creating the *Green Guide to Living* (Final Report 2010: Green Orientation). The *Green Guide to Living* is a 15 page pamphlet full of sustainability tips. Topics range from sustainable food practices to energy usage. It is distributed by the UCLA Office of Residential Life (ORL) to new students on the Hill and can also be found year-round in ORL facilities and online in a pdf version, making it an important educational outreach tool. Regretfully, the *Green Guide to Living* does not include a water portion.

b. Results and Analysis

Our team decided to revisit the *Green Guide to Living* and amend it to include a two-page portion specifically dedicated to water. We began by familiarizing ourselves with the current *Green Guide to Living*, as we wanted our new addition to be in a similar style, featuring corresponding jargon, graphic design, and color choice. We then researched water facts applicable to residents of the Hill, consulting with our stakeholder and Aliana Lungo-Shapiro, the Sustainability Manager for UCLA's Housing and Hospitality Services, throughout the process. We created a two-page water addition to the *Green Guide to Living* which features helpful tips, facts, and fun design. Through the use of this pamphlet, we hope to motivate students to realize the impact of their individual actions in regard to water use and conservation. We are excited for our insert to be included in the Fall 2014 publications of the *Green Guide to Living* and to also be included in an online version.

RECOMMENDATIONS

Since water is an important issue, we hope that Water Action Research Teams will continue to work with Capital Programs. We suggest that these teams continue the work of past teams. First, we recommend that future Water Action Research Teams focus on a continuation of work done by our team. We suggest site-specific landscape surveying, in regard to both the

installation of drought-tolerant landscaping and artificial turf. The Office of Residential Life, specifically Sustainability Manager Aliana Lungo-Shapiro, is fully committed to the installation of drought-tolerant landscaping in an effort to reduce water consumption. We recommend that the future Water Action Research Team complete site-specific analysis of current and projected water use and financial savings of Sproul turn-around, a prime location for drought-tolerant landscaping conversion, as suggested by Peter Angelis, Assistant Vice Chancellor of the Housing and Hospitality Services. We also recommend that the future team works with Capital Programs and grounds directors (Facility Management) to create a diverse and viable drought-tolerant plant palette, calculate total water savings data, and determine payback period assessments.

Results from our artificial turf survey also lead us to recommend a turf site-specific assessment and cost benefit analysis of the installation of artificial turf in (1) grass medians and (2) the Court of Sciences. These two sites are ideal locations in comparison to other areas on campus; they do not often feature student recreation and their location would not greatly diminish the campus' aesthetics. The installation of artificial turf in these areas would further UCLA's efforts to reduce campus water use 20% by 2020.

In addition to continuing and expanding upon projects we completed, we recommend the addition of new projects. The first of these draws from the 2009 Water Action Research Team (Green Living Project: Water), who performed a comprehensive study of water use on the Hill. The 2009 Team found that student water use varied with different monitoring methods (Final Report 2009: Green Living Project - Water). We found their monitoring data in student restrooms, particularly the shower eco-drop bags, to be substantial and we affirm their recommendation for implementation of these bags in the residence halls. We highly recommend a future water team works in this area by gathering new data and comparing it toward the 2009

Team's data, educating the Housing and Hospitality Services of their findings so as to implement eco-bags, and finally educating new Hill residents on water waste and how to use the eco-bags. Furthermore, the team should ensure the decal created by the 2013 Water ART Team is placed in all restrooms on the Hill.

Additional new projects could include the a study of irrigation on campus, specifically monitoring sprinklers or sprinkler systems that leak and produce water runoff and reporting the data to UCLA maintenance to fix, as a contracted audit. Installing aerators in campus sinks to reduce water could be another project; the team could gather data concerning cost effectiveness and water saved prior and post aerator installation. We initially considered all three of these projects before settling on our goals, however we continue to see a lot of potential in these areas and believe further research should be executed.

CONCLUSION

We are proud with the breadth of projects and depth of action research we were able to accomplish during our tenure. By identifying four feasible projects with attainable water conservation goals, we were able to affect change within the UCLA community. Specifically, we used our position as UCLA students to effectively survey the Hill population on drought-tolerant landscaping and also survey the campus population on artificial turf. The information in our reports and presentation will stimulate water conservation change in the landscaping across UCLA. Similarly, we composed a draft of stormwater policy to be reviewed by Capital Programs before it is implemented in the campus-wide sustainability policy. Our efforts provided various UCLA departments with important data, information, and drafts. Lastly, we wrote and formatted an educational and visually appealing insert to the *Green Guide to Living*. The future outlook of water conservation and sustainability at UCLA continues to look bright.

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APPENDICES

1. Drought-Tolerant Landscaping Final Report with Survey and Materials

Student Preferences Concerning Drought-tolerant Landscaping at UCLA

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Introduction

Drought-tolerant landscaping refers to the use of plant species in landscaping that are adapted to arid climates and require minimal water to maintain. The use of drought-tolerant landscaping in place of conventional landscaping or lawns has the potential to reduce irrigation by up to 80%[3].

UCLA currently has a number of incentives to reduce its current water consumption: (1) University of California policy mandating all campuses to reduce per capita water use by 20% by 2020[1], (2) the current California drought state of emergency declared by Governor Brown January 2014[2] and the chronic water stress of the southern California region, and (3) reduced utilities expenditures. The campus' Water Task Force recently published a Water Action Plan[1] describing five main projects designed primarily to address the first of these incentives. The Water Action Plan will continue to evaluate projects that can reduce the campus' potable water consumption, and the use of drought-tolerant landscaping is a new project under evaluation. Given the potential water savings from the implementation of drought-tolerant landscaping, this Water Action Research Team ("Water Team") wanted to assess student opinions concerning its use at UCLA.

Executive Summary

The Water Team conducted a survey of the student resident population ("the Hill"), and collected both in-person surveys using hard-copies and online surveys using Google Forms. Posters and plants were used as visual and instructive aids during the in-person survey sessions, giving both visual and verbal explanations of what drought-tolerant landscaping is. In two days of surveying, 266 responses were collected. In general, a large proportion of students both did not know what drought tolerant landscaping was and had not noticed any at UCLA. In addition, after being informed of the California water crisis and the University's goal of reducing water use by 20% by 2020, respondents were overwhelmingly in favor of installing drought-landscaping on the Hill. Given the strong student support for this issue, and the potential water and cost savings, we recommend implementing drought-tolerant landscaping on the Hill.

Methodology

A seven question survey was designed to assess student opinions concerning their

preferred prevalence, placement, and varieties of drought tolerant landscaping that could be implemented at UCLA. The survey included an image of drought tolerant landscaping for reference and photographs of different plant species corresponding to a specific survey question. These two graphics were printed on two separate posters that were prominently displayed during the in-person surveying sessions. The survey was available in both hard-copy format during in-person survey periods and online using the web service Google Forms.

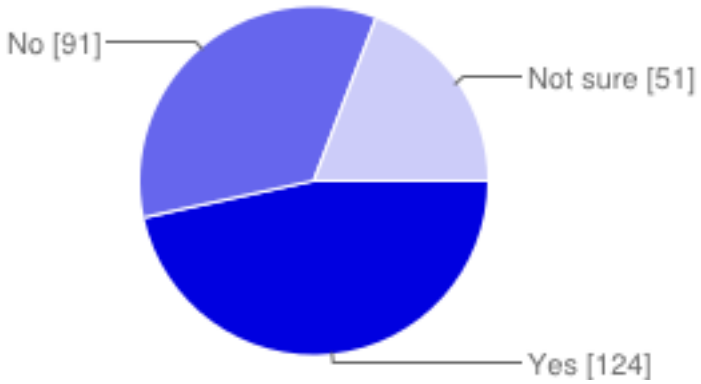
The survey was conducted in-person outside of Bruin Plate during the dining hall's dinnertime hours (5:00pm-8:00pm) for two successive evenings. Surveyors approached students exiting and entering the dining hall and requested their participation, using a combination of hard-copy surveys and computers for students to complete the online version on site. Several examples of drought-tolerant succulents and grasses were on display during the in-person survey periods as well, and students were encouraged to examine these as references.

Results and Analysis

The Water Team received 266 responses during the in-person survey periods. Below are the seven questions asked on the survey and the percent breakdown of responses to each of the questions.

Question #1: Do you know what drought-tolerant landscaping is?

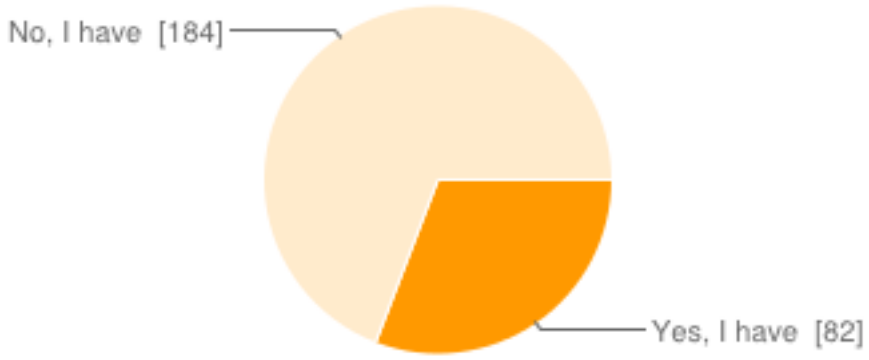
Of these respondents, 47% answered "yes" when asked if they knew what drought-tolerant landscaping is, the remainder responded as "not sure" (19%) or "no" (34%). The Water Team anticipated this lack of familiarity concerning drought-tolerant landscaping, and informed respondents through use of visual aids and verbal explanations. It was critical to convey this information to respondents because it allowed them to make informed decisions during the remainder of the survey. However, as more than half of the respondents were previously unfamiliar with this landscaping palette, this presents a potential source of bias in the survey.



Question #2: Have you noticed drought-tolerant landscaping on campus?

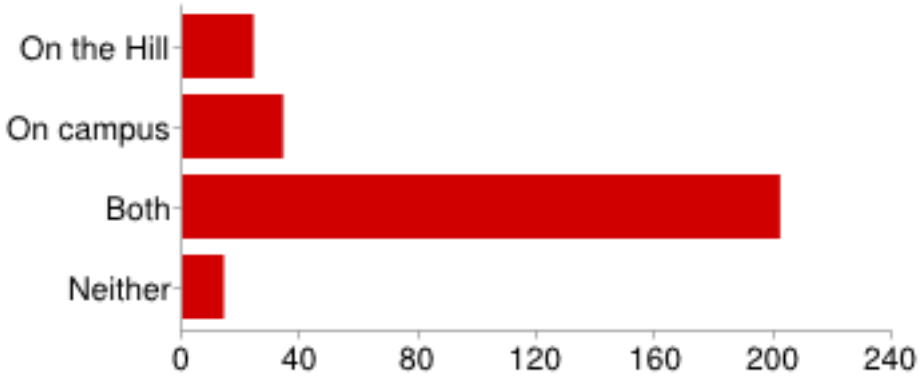
When asked if they had noticed drought-tolerant landscaping on campus, 69% of students

surveyed responded that they had not. This is indicative of the current underutilization of this type of landscaping at UCLA, as well as the lack of student awareness of areas on campus that currently contain these types of plants.



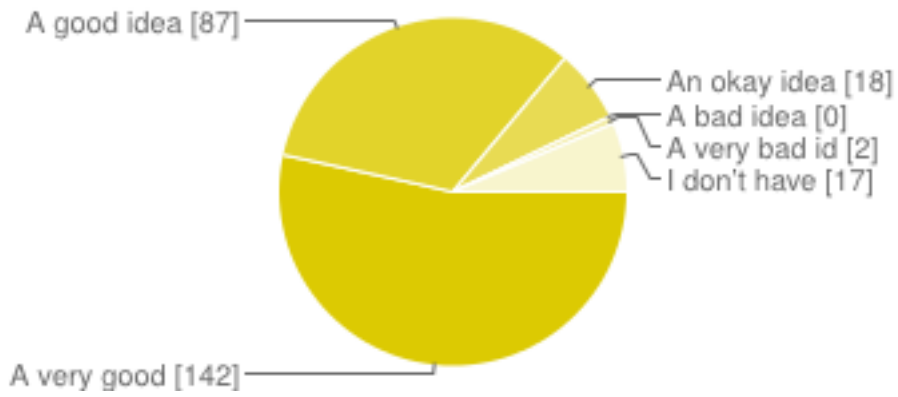
Question #3: Where would you like to see more drought-tolerant landscaping at UCLA?

A large majority of respondents (74%) indicated they would like to see more drought-tolerant landscaping both on the Hill and on campus, whereas only 5% indicated they would not like to see more drought tolerant landscaping in either area. The remaining respondents either indicated they would prefer to see more exclusively on the Hill (9%), or exclusively on campus (12%). The aggregate percentage of students surveyed who want more drought-tolerant landscaping on the Hill is therefore 86%, representing a significant support for landscaping of this type.



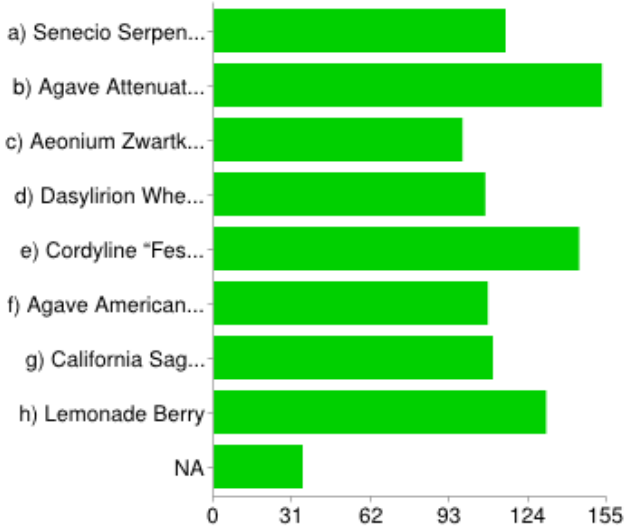
Question #4: To reduce water consumption at UCLA, do you think installing drought-tolerant landscaping is:

When asked to qualify their opinions on drought-tolerant landscaping on a given scale, 86% of respondents indicated they believed that the installation of drought-tolerant landscaping was either “a very good idea” or a “good idea” to reduce water consumption at UCLA. Of the remaining respondents, 7% indicated they thought this was an “okay idea” and 6% felt they did not have enough information to answer the question. Only 1% of students surveyed indicated they thought this was a “bad idea” or “very bad idea,” further demonstrating student support for employing this water-saving landscaping.



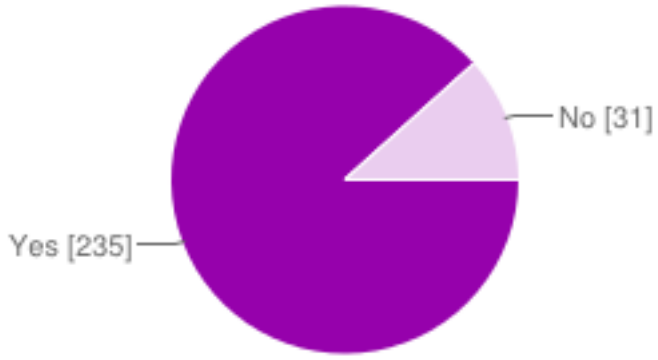
Question #5: Of the images you see of drought-tolerant landscaping, which would you like to see on the Hill?

The results concerning species preferences were much less definitive, but the fact that most respondents were interested in many of the options indicates that if a combination of plants were used, most students would find the landscaping visually appealing. The top three species (of those listed) in order of desirability were: Agave Attenuata “Nova” Foxtail Agave, Cordyline “Festival Grass,” and Lemonade Berry

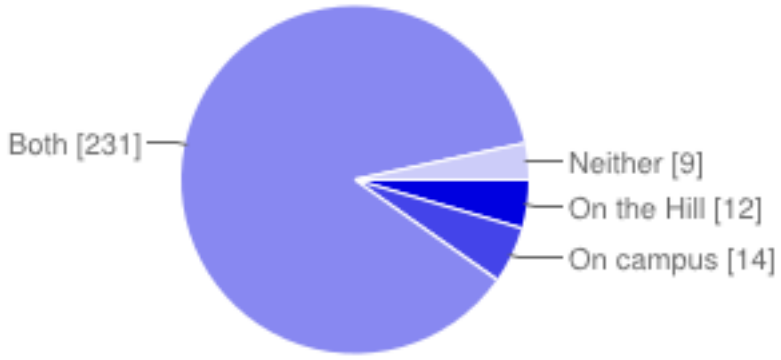


Question #6: Are you aware that California is experiencing a water crisis?

A large majority of respondents (88%) were aware that California is currently experiencing a water crisis. When reminded of this information, and informed of the University of California's goal to reduce water use by 2020, 87% of students surveyed indicated that they would support the installation of drought-tolerant landscaping both on the Hill and on campus—a 13% increase from when first questioned. This indicates that education and awareness about California water scarcity and the University of California's goal to reduce water use can increase support for drought-tolerant landscaping. This last question showed that an aggregate 92% of respondents supported the installation of drought-tolerant landscaping on the Hill.



Question #7: The University of California – all 10 campuses – is committed to a 20 percent water reduction per person by 2020. Do you support installation of drought-tolerant landscaping at UCLA to help achieve this goal?



Recommendation

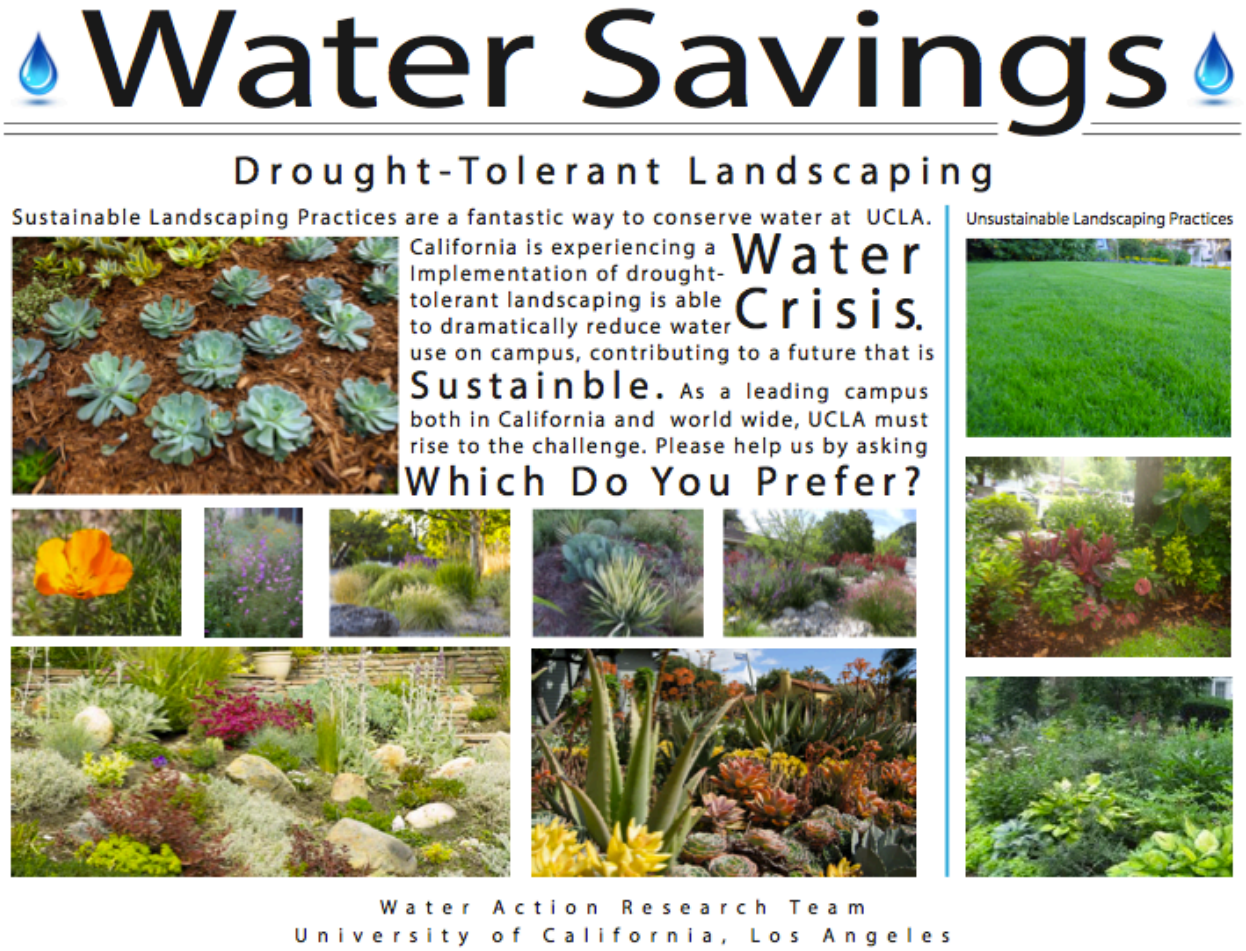
The data from the survey shows that there is overwhelming student support for drought-tolerant landscaping on the Hill. Given that students are the vast majority of the Hill population, and their student fees fund the housing administration, their preferences should be seriously considered. Additionally, utilizing drought-tolerant plants in lieu of traditional landscaping has the potential to reduce current water used for irrigation by 80% and would be another initiative

for the campus to achieve its goal of 20% reduction in water use per capita by 2020.

We recommend that this alternative landscaping style be seriously considered in all new landscape projects and renovations, as well as to replace existing plots. Assessments of individual plots should be made to determine the potential water savings of replacing existing plants with drought-tolerant ones, and payback period analyses can determine optimal replacement locations.

Materials:

1. survey (online version): https://docs.google.com/forms/d/17uxMoWfeoSjgRuTFBnLjT8fO7f2nxTrY87F4nkC3Chg/viewform
2. survey (print version): Appendix
3. poster images:



Drought-Tolerant Plants

All plants below are drought-tolerant and many are native toSouthern California.
They are an effective way to conserve water while contributing to our natural landscape.

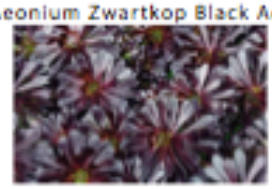
a) Senecio Serpens Blue Chalk Sticks

e) Cordyline "Festival Grass"

b) Agave Attenuata "Nova" Foxtail Agave

f) Agave Americana Century Plant

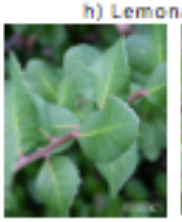
c) Aeonium Zwartkop Black Aeonium



g) California Sagebrush

d) Dasylirion Wheeler Desert Spoon

h) Lemonade Berry



References:

1. Dudman, Tracy; Katz, Nurit; Lungo-Shapiro, Aliana; Rosman, Lewis; Petta, Tim; Padilla, Val; Hildebrand, Teresa; Newth, Carl; Witt, Joshua; Cohen, Yoram; Gold, Mark. *UCLA Water Action Plan*. The University of California, Los Angeles Campus Sustainability Committee—Water Task Force, December 2013.
2. "Governor Brown Declares Drought State of Emergency". *CA.gov - Office of Edmund G. Brown Jr.* State of California, 17 January 2014. Web. 19 January 2014.
3. "Xeriscape Landscaping". *LandscapingNetwork*. LandscapingNetwork.com, 2014. <http://www.landscapingnetwork.com/xeriscape-landscaping/>

Survey: Drought-Tolertant Landscaping For The Hill

Name:

1. Do you know what drought-tolerant landscaping is?
☐ Yes
☐ No
☐ Not sure

The utilization of drought-tolerant plants in landscaping is an effective way to conserve water, reduce pesticide and fungicide use, lower facility and maintenance cost, and save landfill space.

For your reference, here is a picture of drought-tolerant landscaping.

2. Have you noticed drought tolerant landscaping on campus?
☐ Yes, I have noticed drought tolerant landscaping
☐ No, I have not noticed

3. Where would you like to see more drought tolerant landscaping at UCLA? (check one, none, or both)
☐ On the Hill
☐ On campus
☐ Both
☐ Neither

4. To reduce water consumption at UCLA, do you think installing drought-tolerant landscaping is:
☐ A very good idea
☐ A good idea
☐ An okay idea

☐ A bad idea
☐ A very bad idea
☐ I don't have enough information

5. Of the images you see of drought-tolerant landscaping, which would you like to see on the Hill? Check all that apply:
☐ a) Senecio Serpens Blue Chalk Sticks
☐ b) Agave Attenuata "Nova" Foxtail Agave
☐ c) Aeonium Zwartkop Black Aeonium
☐ d) Dasylirion wheeler Desert Spoon
☐ e) Cordyline "Festival Grass"
☐ f) Agave Americana Century Plant
☐ g) California Sagebrush
☐ h) Lemonade Berry
☐ NA

6. Are you aware that California is experiencing a water crisis?
☐ Yes
☐ No

7. The University of California – all 10 campuses – is committed to a 20 percent water reduction per person by 2020. Do you support installation of drought-tolerant landscaping at UCLA to help achieve this goal?
☐ On the Hill
☐ On campus
☐ Both
☐ Neither

From: "Chancellor Gene D. Block" <chancellor@ucla.edu>
Subject: **Please Help UCLA Respond to the Drought Emergency**
Date: February 14, 2014 1:04:13 PM PST
To: allstudents@bruinpost.ucla.edu
Reply-To: chancellor@ucla.edu

UCLA Office of the Chancellor

To the Campus Community:

Although we at UCLA have long recognized that water is a critical issue for our state, California is now experiencing a drought emergency.

In November, we announced UCLA's first Grand Challenges project, which will make the Los Angeles region completely sustainable in water and energy without harming biodiversity by the year 2050. As I stated at that time, failure to take constructive action is not an option.

Anticipating California's water challenges, UCLA has already begun to conserve and use water more efficiently, working toward the UC target to reduce potable water use per capita by 20 percent from 2000 levels. Through water recycling, high-efficiency fixtures, drought-tolerant landscaping and smart irrigation, we have reduced water use by more than 70 million gallons per year since 2000, and we will continue these efforts in accordance with UCLA's 2020 Water Action Plan.

In the years to come, we will install artificial turf on the Intramural Field, which will save 6.4 million gallons of water per year, and we will combine research and operations in projects like a filtration system at the campus cogeneration plant that will save the campus another 25.5 million gallons per year.

Given the severity of the drought, we have taken further steps to enhance our water conservation. We have reduced watering cycles and restricted watering of athletic fields and landscaping to before 9 a.m., and we will continue to reduce watering in select areas while taking care to minimize damage to our landscape. We also are working with the other UC campuses to identify additional immediate conservation measures.

Each of us must take action to address this statewide crisis. With 70,000 people at UCLA each day, our individual actions can make a tremendous collective difference. If you see water leaks, please report them online or by calling x59826. Please visit the Be Water Wise website for conservation tips, such as taking shorter showers (showers that are five minutes shorter can save 12 gallons of water), and turning off faucets while washing your hands (which can save a half-gallon per wash).

If everyone at UCLA reduced their water use by a gallon a day, we would save more than 25 million gallons a year. By changing our habits, we can address not only this year's drought but also the challenges that we know are coming.

Sincerely,

Gene D. Block

Chancellor Gene Block's call for water conservation

2. Artificial Turf Final Report with Survey and Materials

Student Preferences Concerning Artificial Turf at UCLA

Ellen Lomonico, Grace Olson, Thomas Arndt, Paul Cleland, and Erika Kidera
Water Action Research Team
Education for Sustainable Living Program
University of California, Los Angeles

Introduction

Artificial turf is a form of synthetic landscaping. It was first introduced for use by professional sports teams in the 1960s. From this arena, the use artificial turf has progressed; it can now be found in numerous recreational areas and residential lawns. The installation of artificial turf has the potential to reduce water usage. For example, an average lawn of 1,800 square feet could save up to 99,000 gallons of water each year if converted to artificial turf.[1] The UCLA Water Task Force has realized the benefits of artificial turf; UCLA will be converting the 7.7 acre Intramural Fields to artificial turf beginning in December, 2014.[2] This conversion is projected to save the university 6,400,000 gallons of water per year. Furthermore, the payback time of this project is only 10-14 years.

Despite these benefits in water savings, we hypothesized that the idea of artificial turf on campus would be a polarizing topic. We projected members of the UCLA community would express a general dislike for artificial turf. Possible reasons for dislike of artificial turf could include: a general distaste for synthetic material, questions of heat retention, and contributions image of the university campus. The Water Action Team therefore devised a survey to evaluate the perception of the UCLA community in regard to potential installation of artificial turf on campus.

Executive Summary

The survey begins by investigating usage of prominent grassy areas on the UCLA campus. From here, the survey transitions to general questions of artificial turf, featuring a short educational component. The survey then discusses potential areas for implementation of artificial turf and finally concludes with questions regarding California's current water crisis. Although the survey resulted in a range of opinions, there was a noticeable preference from the UCLA community in the potential installation of artificial turf. Given the support for this issue, and the potential water and cost savings, the Water Action Research Team recommends site specific research be conducted regarding the following areas: the grass medians, the Court of Sciences, and locations on "the Hill."

Methodology

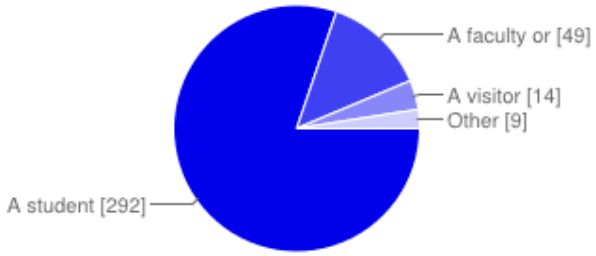
The Water Action Research Team conducted an 11 question survey designed to assess UCLA student, faculty, and guest opinions concerning preferred areas of potential placement of artificial turf. The survey used both hard copies and online surveys via Google Forms and was conducted both in-person and online. The survey included a reference picture of artificial turf and a campus map with seven prominent grass locations. During the in-person survey sessions, three varieties of artificial turf were also available, with which survey participants could personally examine

and touch. Posters were also used as visual and instructive aids, acting as a complement to the verbal explanations by the surveyors and adding an educational component. The survey was available in both hard-copy format during in-person survey periods and online using the web service Google Forms. In total, 366 responses were collected.
The survey was conducted in-person on April 22, 2014 in the Ronald Reagan UCLA Medical Center courtyard during the Ronald Reagan Earth Day Fair from 10:00am-1:00pm and on April 23 on the Intramural Field during the campus' Earth Day Fair from 10:00am-2:00pm. In addition, in-person surveying was conducted on two separate days at Kerckhoff Patio. Surveyors had specific tables for the respective Earth Day events with samples of artificial turf and a campus map poster on display. UCLA students, faculty, and guests approached the tables of their own volition and then participation was requested, using a combination of hard-copy surveys and computers for students to complete the online version on site. During the in-person survey periods, participants were encouraged to examine the three artificial turf samples as references.

Results and Analysis

The Water Action Research Team received 366 total responses to our survey. Below are the eleven questions asked on the survey and the percent breakdown of responses to each of the questions.

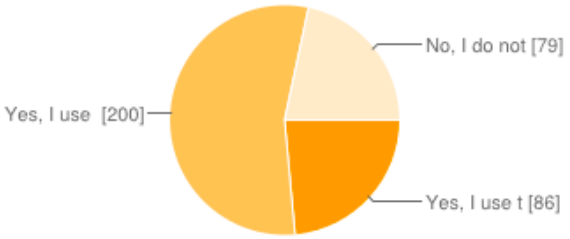
Question #1: Are you: a student, faculty or staff member, visitor, or other?



A student	**292**	80%
A faculty or staff member	**49**	13%
A visitor	**14**	4%
Other	**9**	2%

Of these respondents, 80% were students, 13% were faculty or staff members, 4% were visitors, and 2% were survey respondents who categorized themselves as "Other." The Water Team anticipated the majority of the respondents to be students due to the plethora of student passerby's in comparison to any other category. As the team hoped to receive as many responses as possible through both in-person and online survey methods, there was no deliberately targeted group; everyone was encouraged to take the survey. This being said, through the use of listservs provided directly for and from the students of the team – e.g. UCLA department list serves - the surveys may have been made most available to students. As more than three quarters of the respondents were students, this presents a potential source of bias in the survey. Anticipating this bias, we made an effort to survey at the UCLA Hospital Earth Day Fair in order to capture results from other groups.

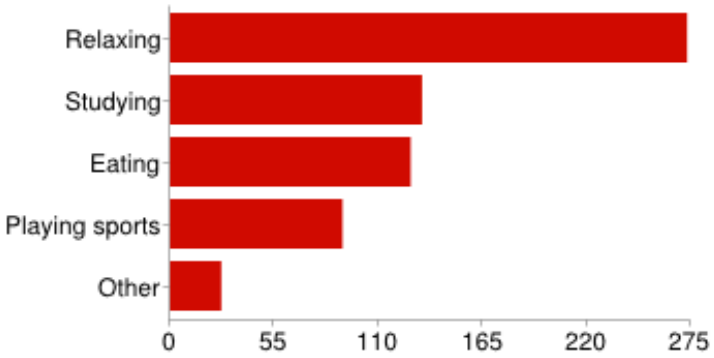
Question #2: Do you use the large grass areas on campus? (Example: Janss Hill, Dickson Plaza, Wilson Plaza, etc.)



Yes, I use them often	**86**	24%
Yes, I use them occasionally	**200**	55%
No, I do not use them	**79**	22%

When asked if surveyors used the large grass areas on the campus, choosing from a range of provided examples of locations – e.g. Janss Hill, Dickson Plaza, Wilson Plaza, etc. – 55% responded by indicating occasional use, 24% responded that they used it often and 22% responded that they do not use them. Given that over three-fourths of the respondents indicated that they use the grass areas to some extent, it is important to consider their opinions regarding replacing these areas with artificial turf.

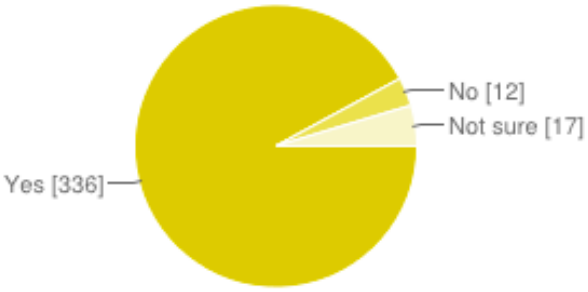
Question #3: If you use the large grass areas, what are those uses?



Relaxing	**273**
Studying	**133**
Eating	**127**
Playing sports	**91**
Other	**27**

The results concerning the types of frequented uses of the large grass areas appeared less definitive; respondents selected many of the options. The greatest indicated use of the large grass areas was for "relaxing," composing 273 selections. The variety of activities selected indicate extensive use. Because grassy areas are so heavily used, and especially as those uses involve close contact with the grass surface, respondents' attitudes towards replacing grass with artificial turf should be seriously considered.

Question #4: Do you know what artificial turf is?

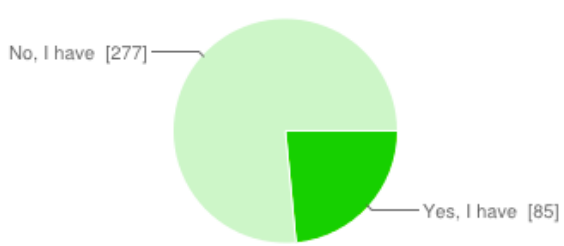


Yes	**336**	92%
No	**12**	3%
Not sure	**17**	5%

A strong 92% of the respondents indicated that they knew what artificial turf is, while 3% and 5% responded that they were either unfamiliar or "Not sure," respectively. The Water Team anticipated this strong percentage of respondents who were at least to some extent aware of what

artificial turf. As a large majority of respondents were familiar with artificial turf, their opinions concerning its implementation at UCLA should be given due consideration. Additionally, in order to assist survey takers, our online survey also featured an educational component with a picture and definition of artificial turf. For those who took the surveys in person, the Water Action Research Team was available to answer questions and provide physical samples of turf.

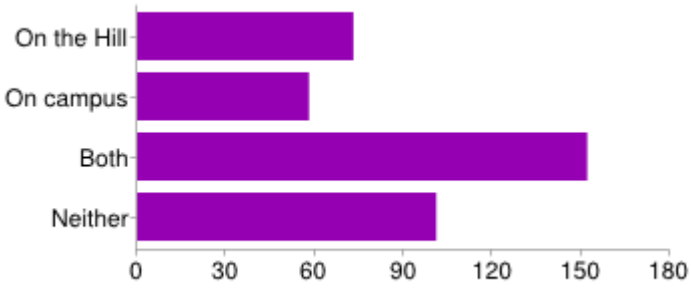
Question #5: Have you noticed artificial turf on campus?



Yes, I have noticed artificial turf	**85**	23%
No, I have not noticed artificial turf	**277**	77%

When asked if they had noticed artificial turf on campus, 77% of the respondents answered that they had not. Therefore, a small 23% of the total respondents noticed areas around campus with artificial turf. Over three-fourths of respondents had not noticed the few artificial turf strips that already exist at UCLA. This supports the idea that artificial turf is not noticeable, suggesting that switching many areas from grass to turf will have little aesthetic impact.

Question #6: Where would you like to see more artificial turf at UCLA?



On the Hill	**73**	19%
On campus	**58**	15%
Both	**152**	40%
Neither	**101**	26%

In order to help the Water Action Research Team identify general areas where respondents would like to see more artificial turf at UCLA, survey takers were given a choice between either "On the Hill," "On campus," "Both," or "Neither." The two strongest responses were "Both" or "Neither." Those who responded "Both" comprised 40% of the total respondents; meanwhile those who responded "Neither" compromised 26% of the total respondents. While this represents a substantial fraction of respondents do not support artificial turf in any location, it also demonstrates that a large majority of people support installing turf in at least one area at UCLA, with a slight preference for "the Hill" as opposed to on campus.

Question #7: If you do not like artificial turf, what are your reasons why?

In order to better understand some of the reasons why respondents do not like artificial turf, a section was left open for "free responses." The reasons were frequently similar and could be categorized into factors more specifically related to each of the following sub-categories: heat, wildlife, environmental conservation, plasticity, degradation of natural landscape, or better alternative solutions to conserve water. These are a few of the responses that embodied participants' concerns towards artificial turf:

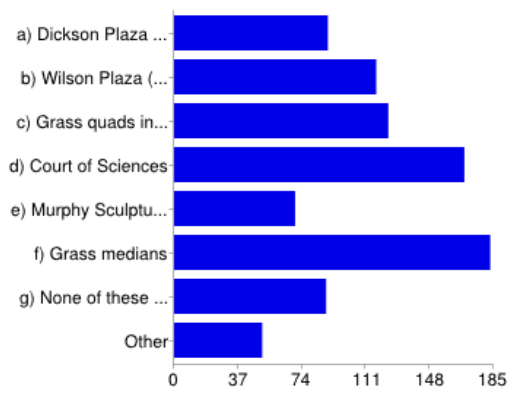
"It's not natural. We already live in a concrete jungle. The grass is one of the last natural things we have on this campus besides the trees. And I can't relax or nap on a tree. Please don't take the grass away."

"I like that it reduces water consumption. Although I do think regular grass looks better."

"It takes away from the natural landscape."

The responses highlighted above convey a general sentiment that artificial turf doesn't feel, smell, or look as authentic as real grass. Many respondents also mentioned a feat that artificial turf was bad for the environment due to its synthetic nature. Others brought up safety issues such as turf burns and rashes. These are common sentiments, and they are all factors that must be evaluated if a changeover is considered.

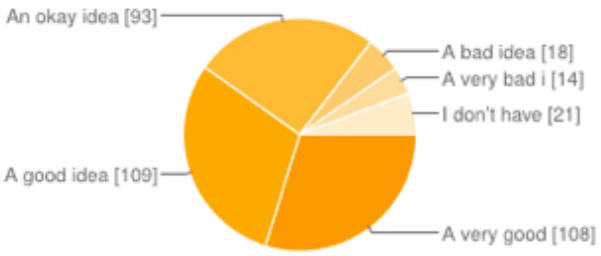
Question #8: Of the following locations, where would you like to see artificial turf on Campus?



a) Dickson Plaza (Sunken Gardens)	**89**
b) Wilson Plaza (bottom of Janss Steps)	**117**
c) Grass quads in between Powell, Royce, Haines, Humanities	**124**
d) Court of Sciences	**168**
e) Murphy Sculpture Garden	**70**
f) Grass medians	**183**
g) None of these locations	**88**
Other	**51**

The results indicating potentially desirable locations for installation of artificial turf were less decisive. This is likely because respondents were encouraged to select one or more areas. The results indicate the two areas with the highest support for conversion are 1) areas of grass medians and 2) the Court of Sciences. Therefore, these areas should be the first to be receive further research in regard to conversion to artificial turf. In contrast, the two areas with the least support for conversion were 1) the Murphy Sculpture Gardens and 2) the Dickson Plaza (Sunken Gardens) areas. These and other large, iconic grass areas of campus are not recommended as areas of further study. Additionally, 88 respondents indicated "None of these areas," presumably not selecting any of the areas for conversions. If this data holds true, then 88 of 366 or 24% of the respondents would not support the installation of artificial turf in any of the indicated areas. Additionally, 51 of 366 respondents indicated "Other" as their choice site of potential conversion to artificial turf. This may refer to alternative areas such as the grassy areas by the Ronald Reagan UCLA Medical Center or areas of On-campus Residential Life ("the Hill").

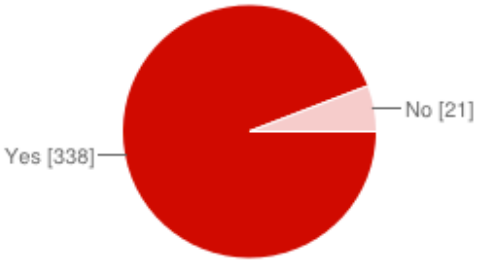
Question #9: To reduce water consumption at UCLA, do you think installing artificial turf is:



A very good idea	108
A good idea	109
An okay idea	93
A bad idea	18
A very bad idea	14
I don't have enough information	21

When asked to qualify their opinions on artificial turf on a given scale, 60% of the total respondents indicated a belief that the installation of artificial turf was either "a very good idea" or a "good idea" to reduce water consumption at UCLA. Of the remaining respondents, 25% indicated that the installation would be an "okay idea," 9% indicated either a "bad idea" or a "very bad idea," and 6% indicated a fault in information which prevented them from making a decision. These results indicate that although some respondents may have qualms about artificial turf, a large majority believe the idea of using turf to save water at UCLA is at least an "okay" idea. This trend supports the idea that although people are not necessarily enthusiastic about artificial turf, they recognize and approve of the water-saving benefits.

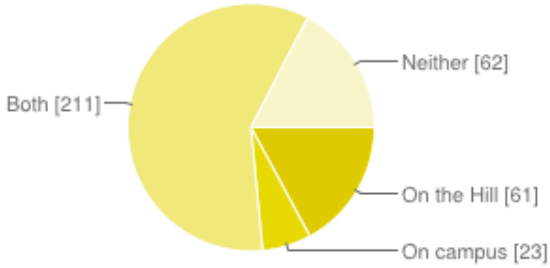
Question #10: Are you aware that California is experiencing a water crisis?



Yes	338	94%
No	21	6%

A large majority (94%) of the total respondents indicated an awareness of California's current water crisis. Twenty-one of the 366 respondents reported a lack of awareness, indicting "No." As nearly all respondents were aware of California's water crisis, it is reasonable to assume that most survey takers were able to make informed decisions concerning the importance of water-saving technologies such as artificial turf.

Question #11: The University of California – all 10 campuses – is committed to a 20 percent water reduction per person by 2020. Do you support installation of artificial turf at UCLA to help achieve this goal?



On the Hill	61	17%
On campus	23	6%
Both	211	59%
Neither	62	17%

When respondents were informed of California's goal to reduce water use by 20% per person by 2020, 59% of the respondents indicated that they would support the installation of artificial turf both on "the Hill" as well as on campus. This is an increase from Question #6, in which 40% supported the installation of turf in both locations. Minimal education of the UCLA's water reduction goal and a reminder of California's current drought, prompted a substantial increase in support for artificial turf. Seventeen percent of the respondents indicated that despite awareness of California's water scarcity and the UCLA's goal to reduce water use, they do not support the installation of artificial turf on "the Hill" or on campus. In choosing between the installation of artificial turf either on "the Hill" or on campus, more respondents were willing to support installation on "the Hill" (17%) than on campus (6%). Higher support makes "the Hill" an ideal location for further research and implementation of turf technology.

Recommendation

While some respondents had specific negative comments and concerns about the potential implementation of artificial turf (Question #7), 85% still believed it is a "very good, good, or okay idea" in regard to water conservation (Question #9). Furthermore, Question #8 identifies grass medians and the Court of Sciences as two of the highest areas of support. Also, respondents indicated that they prefered artificial turf on both campus and "the Hill," even though there were no Hill-specific locations in Question #8. These results lead us to recommend an artificial turf site-specific assessment and cost benefit analysis of grass medians and the Court of Sciences. The Water Action Team agrees that these two sites are ideal locations in comparison to other areas on campus. These sites do not often feature student recreation and their location would not greatly diminish the campus' aesthetics. Most importantly the installation of artificial turf in these areas would further UCLA's efforts to reduce campus water use 20% by 2020.

Materials:

Survey:

SURVEY: ARTIFICIAL TURF FOR CAMPUS

1. Are you:
☐ A student
☐ A faculty or staff member
☐ A visitor
☐ Other

2. Do you use the large grass areas on campus? (Example: Janss Hill, Dickson Plaza, Wilson Plaza, etc.)
☐ Yes, I use them often
☐ Yes, I use them occasionally
☐ No, I do not use them

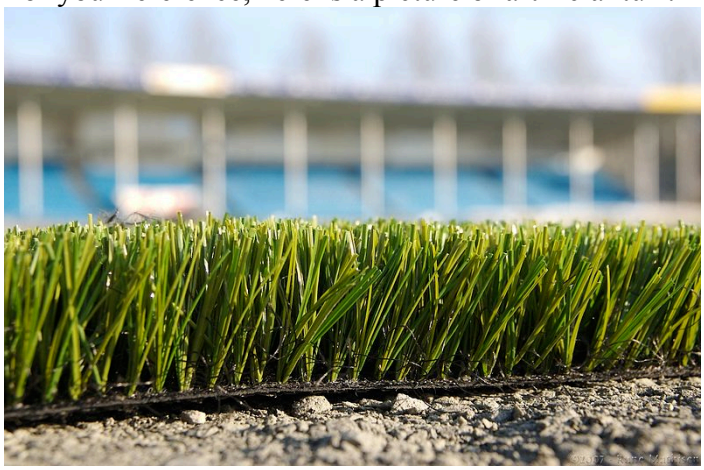
3. If you use the large grass areas on campus, what are those uses? (**Check all that apply**)
☐ Relaxing

☐ Studying
☐ Eating
☐ Playing sports
☐ Other (please specify) _____

4. Do you know what artificial turf is?
☐ Yes
☐ No
☐ Not sure

Artificial turf is an alternative to the traditional lawn and its benefits include little to no water use; increased durability; and elimination of fertilizers and mowing. In hotter climates, the surface can retain heat, and depending on the level of use, the artificial surface eventually needs to be replaced and recycled.

For your reference, here is a picture of artificial turf.



5. Have you noticed artificial turf on campus?
☐ Yes, I have noticed artificial turf
☐ No, I have not noticed artificial turf

6. Where would you like to see more artificial turf at UCLA?
☐ On the Hill
☐ On campus
☐ Both
☐ Neither

7. To reduce water consumption at UCLA, do you think installing artificial turf is:
☐ A very good idea
☐ A good idea
☐ An okay idea
☐ A bad idea
☐ A very bad idea

☐ I don't have enough information

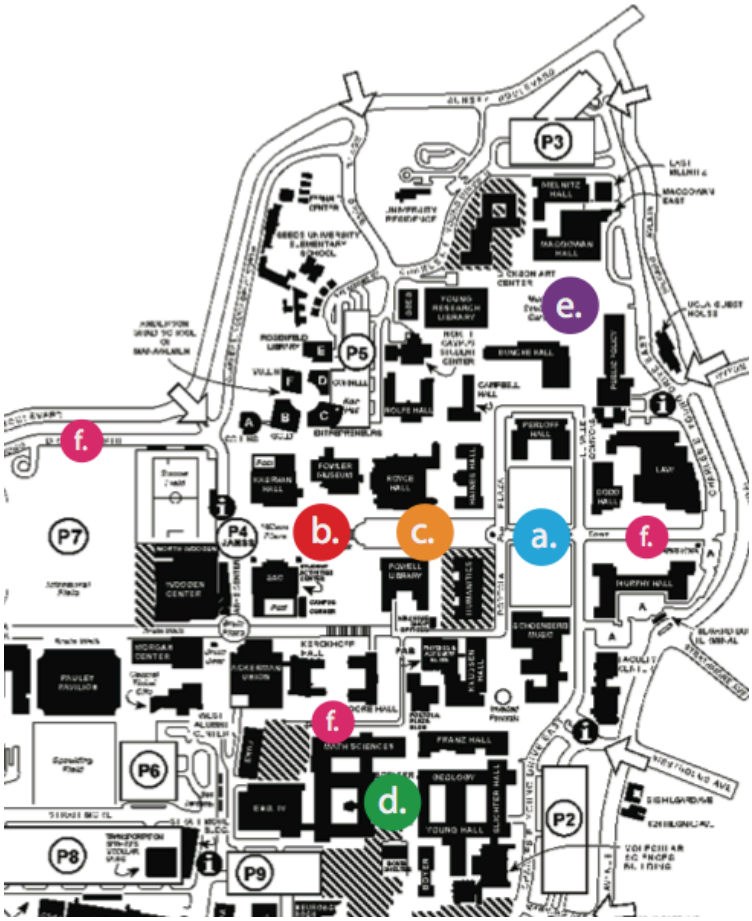
8. If you do not like artificial turf, what are your reasons why?

_____

_____

9. Of the following locations, where would you like to see artificial turf on Campus? **Check all that apply**: (Please refer to the map on the next page for reference)

☐ a) Dickson Plaza (Sunken Gardens)
☐ b) Wilson Plaza (bottom of Janss Steps)
☐ c) Grass quads in between Powell, Royce, Haines, Humanities
☐ d) Court of Sciences
☐ e) Murphy Sculpture Garden
☐ f) Grass medians
☐ g) None of these locations
☐ h) Other (please specify) _____



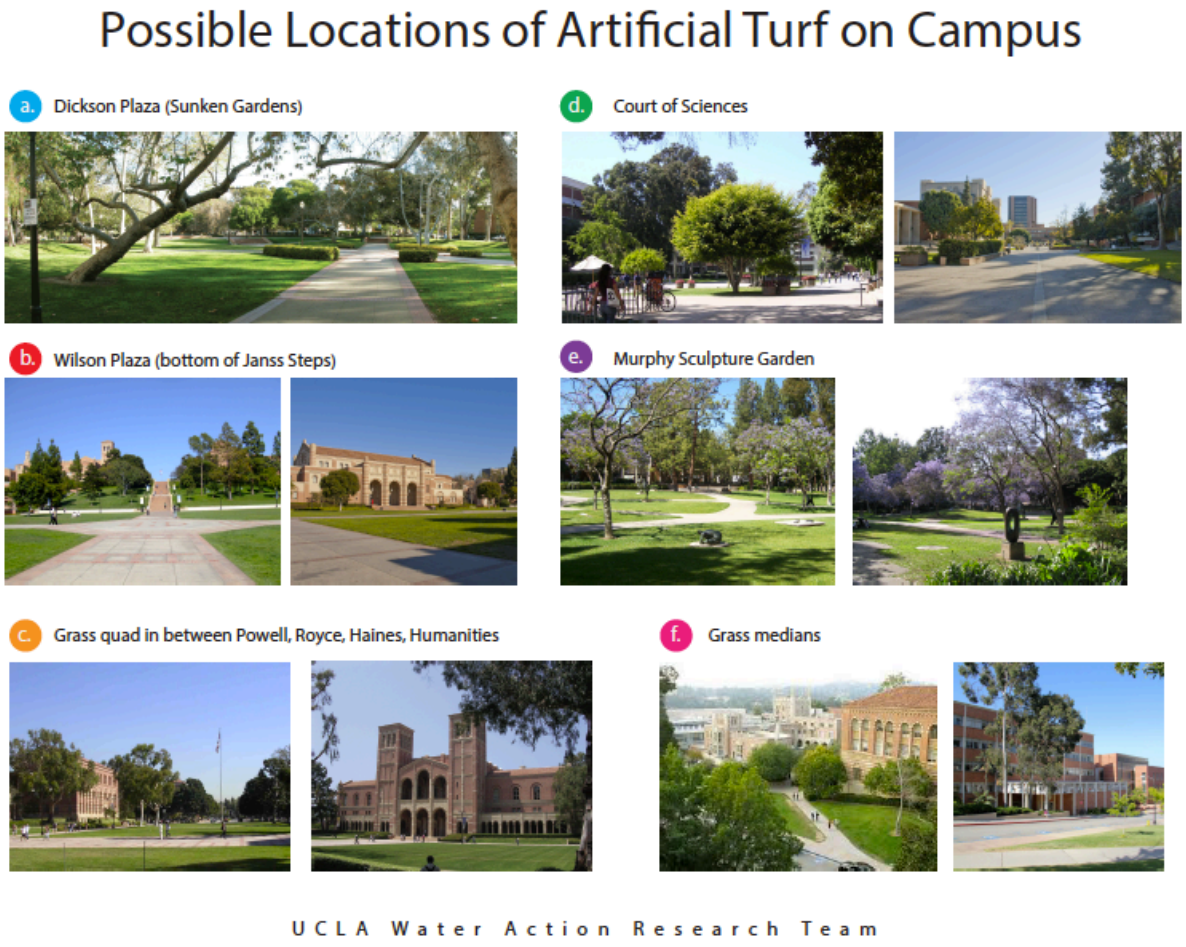
10. Are you aware that California is experiencing a water crisis?

☐ Yes
☐ No

11. The University of California – all 10 campuses – is committed to a 20 percent water reduction per person by 2020. Do you support installation of artificial turf at UCLA to help achieve this goal?

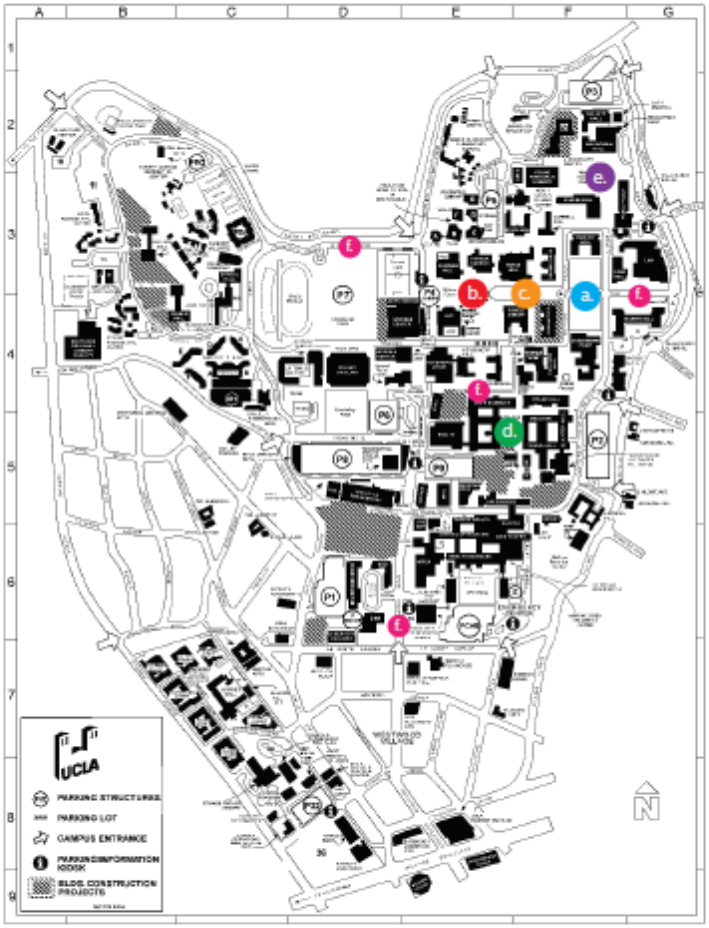
- ☐ On the Hill
- ☐ On campus
- ☐ Both
- ☐ Neither

Posters:



Map of UCLA

Possible Locations of Artificial Turf on Campus



a. Dickson Plaza (Sunken Gardens)

b. Wilson Plaza (bottom of Janss Steps)

c. Grass quads in between Powell, Royce, Haines, Humanities

d. Court of Sciences

e. Murphy Sculpture Garden

f. Grass medians

Works Cited

1. "Frequently Asked Questions." *Synthetic Turf Council*. n.d. Web.

2. Dudman, Tracy; Katz, Nurit; Lungo-Shapiro, Aliana; et. al. "UCLA Water Action Plan." *University of California, Los Angeles: Water Task Force.* Dec. 2013

3. Stormwater Policy Draft

ROUGH DRAFT OF STORMWATER POLICY

Table of Contents

Rough Draft: UCLA Stormwater Policy

I. POLICY SUMMARY

The University of California, Los Angeles is committed to responsible stewardship of resources and to demonstrating leadership in sustainable practices. Whereas the University of California Sustainable Practices Policy includes Sustainable Water Systems, water is one such valuable resource in need of greater attention, particularly stormwater. Attention to stormwater has the potential to increase the individual water sustainability of the campus and to position UCLA as a forerunner in water sustainability.

The UCLA Stormwater Policy establishes clear goals in capturing, treating, and recycling stormwater at UCLA as it applies to both water from precipitation and Heating/Ventilation and Air Conditioning Units (HVAC).

II. BACKGROUND

A. UCLA Grand Challenges

Changes to water resources are one of the consequences of climate change in California. Los Angeles is particularly vulnerable to water shortages due to its burgeoning population, climate, and reliance on imported water. Reimagined infrastructure systems enabling improved water distribution would allow optimal use of water, while adaptation and mitigation of water use would be a critical step to neutralizing the disruptive effects of climate change impacts.

UCLA Grand Challenges addresses and recommends action for potential water shortages. UCLA Grand Challenges is comprised of eight specific components, one of which is Water Technologies. The vision and actions that comprise the Water Technologies component stem from the UCLA Grand Challenges goal of transforming Los Angeles into a 100% water self-sustaining region by 2050. UCLA must take steps towards ensuring the campus water supply sustainability to attain this goal, especially as Los Angeles currently receives 85% of its water supply from outside the region. In accordance with UCLA Grand Challenges goals, 20th-century infrastructure should be replaced with an integrated, multi-benefit, distributed, and energy-efficient approach. In terms of water efficiency, the campus' water management should rely on a series of distributed water treatment systems that treat wastewater and stormwater and produce a locally reliable water supply.

B. UC Policy on Green Buildings: LEED Certification

The implementation of stormwater policy would increase the number of water credits needed for LEED certification of the UCLA campus. The campus is committed to achieving Silver, yet each project strives for Gold. The new developments and redevelopment projects in adherence with this policy will give the projects additional LEED points and contribute to the overall sustainability of the campus.

There are two potential stormwater credits for quality and quantity control in the LEED Building Guide.

- SS Credit 6.1: Quantity Control

The intent is to limit the disruption of natural water hydrology by reducing impervious cover, increasing on-site infiltration, and either reducing or eliminating pollution from stormwater runoff, and eliminating contaminants. UCLA can receive this one point credit by implementing a stormwater management plan that decreases the discharge rate, based on the existing imperviousness.

- SS Credit 6.2: Quality Control

The intent is to limit the disruption and pollution of natural water flows by managing stormwater runoff. UCLA can receive this one point credit by implementing a stormwater management plan that reduces impervious cover, promotes infiltration, and treats the stormwater runoff from 90% of the average rainfall using acceptable Best Management Practices (BPMs).

UCLA projects can also earn points outside of the direct stormwater realm based on recycled water efficiency (WE).

- WE Credit 1.1: Water Efficient Landscaping: Reduce by 50%

The intent is to limit or eliminate the use of potable water, on or near the project site, for landscape irrigation. UCLA can receive this one point credit by reducing its potable water consumption for irrigation by 50% from a calculated mid-summer baseline case. Reductions can come from a combination of many factors.

- WE Credit 1.2: Water Efficient Landscaping: No Potable Water Use or No Irrigation

In addition to the one point credit from WE Credit 1.1, this requirement can be achieved by the use of only captured rainwater, recycled wastewater, or recycled greywater.

- WE Credit 2: Innovative Wastewater Technologies

The intent of this credit is to reduce generation of wastewater and potable water demand, while increasing the local aquifer recharge. UCLA can receive this one point credit by reducing potable water use for building sewage conveyance by 50% through the use of non-potable water.

- WE Credit 3.1: Water Use Reduction: 20% Reduction

The intent is to maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems. UCLA can receive this one point credit by employing strategies that use 20% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 1992 fixture performance requirements. LEED specifically sites considering the reuse of stormwater and greywater for non-potable applications such as toilet and urinal flushing, mechanical systems and custodial uses.

- WE Credit 3.2: Water Use Reduction: 30% Reduction

In addition to the one point credit from WE Credit 3.2, this requirement can be achieved by employing strategies that use 30% less water than the calculated baseline.

C. Campus MS4 Phase II Stormwater Permit

In July 2013, the UCLA campus' Municipal Separate Storm Sewer System (MS4) Permit Guidelines were approved for new developments or redevelopments under one acre. , The permit requires the planning process and construction activity of new developments or redevelopments, must prioritize the use of Low Impact Development (LID) and include effective stormwater systems. This applies to all new and redevelopment projects resulting in a 50% or <50% increase in impervious surface, which have the

potential to produce runoff from the projects, whether its source is from new or pre-existing impervious surface areas.

The LID requirements require Permittees to include facilities designed to evapotranspire, infiltrate, harvest/use, and/or bio-treat stormwater to meet at least one of the following hydraulic sizing design criteria:

- Volume Criteria: determined using Urban Runoff Quality Management, approximate to reducing the 85th percentile 24-hour storm;
- Volume Criteria: volume of annual runoff required to achieve 80% or more capture;
- Flow-Based Criteria: runoff produced from rain event equal to or greater than 1.2 inches/hour; and
- Flow-Based Criteria: runoff produced from rain event equal to at least 2 times the 85th percentile hourly rainfall intensity.

D. Water Action Plan

The University of California Policy on Sustainable Practices has committed each campus to reduce per capita water consumption by 20% by the year 2020. In response to this mandate, UCLA's Water Task Force completed a Water Action Plan in December 2013. This plan contains five main initiatives that are intended to reduce water consumption at UCLA, however the plan lacks a definitive stormwater recapture and reuse plan. Such a plan is required by the University of California Policy on Sustainable Practices. UCLA's Water Action Plan specifically delegates the creation of such a plan

to the Water Task Force and the 2013-2014 Water Action Research Team. This policy is intended to fulfill both the University of California Policy and UCLA's Water Action Plan's requirement to manage stormwater.

III. POLICY TEXT

All new developments or redevelopments on the University of California, Los Angeles campus must give attention to stormwater capture, treatment, and reuse in site specific orders of importance. Importance will be determined by factors including but not limited to, the timeline for building construction, amount of water use, and feasibility of implementation.

Attention to stormwater will be dictated on a site specific basis. During the new development or redevelopment process, each location will be analyzed for the most effective stormwater capture and reuse system as it pertains to that location.

A. *Feasibility Study:*

Applicable projects must conduct a feasibility study of a stormwater/HVAC cistern for reuse as landscape irrigation and/or internal toilet flushing or a connection to the existing Clean Water Loop to redirect the facility's HVAC condensate. The study of site conditions must include the following components:

1. Location of site
2. Air conditioning for building
3. Condensate/discharge volume

4. Change in permeability of site surfaces
5. Area size and irrigation needs of landscaping
6. Distance of project site to the Clean Water Loop
7. Optimal size for cistern given these parameters

B*. Applicable Projects:*

The following projects shall be designed and constructed to include a stormwater/HVAC system or install a connection to the Clean Water Loop:

1. New Developments (except acute care facilities):

New developments on the UCLA campus must install a comprehensive stormwater capture, treatment, and reuse systems on site. Based upon the results of the feasibility study, manner of reuse will be dictated on a site specific basis. The stormwater collected and air conditioning condensate generated can either be reused on site or incorporated into a preexisting clean water loop. Potential uses for the captured and treated stormwater and condensate include, but are not limited to: reuse for on site irrigation or incorporation into greywater plumbing systems for toilet flushing..

New developments will have the option of choosing to install additional stormwater management systems on site, such as bioswales. The incorporation of these systems have the potential to increase the LEED certification level of the building.

2. Redevelopments:

Renovation of buildings that require 75-100% replacement of plumbing systems must include a comprehensive stormwater system to capture, treat, and reuse stormwater on site, if one does not already exist. In the case that the redevelopment is not deemed feasible to incorporate a stormwater/HVAC system on site, captured water from said site can be diverted to a neighboring location for treatment, as deemed within a convenient vicinity by the feasibility study.

If space is not available for installation of a stormwater cistern, the building must assess the feasibility to connect into the clean water loop. This will be done if the structure is sufficiently close to the loop (within 500 ft). The scale and operation of this system will be evaluated on an individual site basis.

IV. DEFINITIONS

Best Management Practice (BMP): Activities, practices, and/or procedures that when implemented will reduce or prevent the run-off of stormwater.

Clean Water Loop: The clean water loop is a pre-existing infrastructure mainline that collects condensate water from a buildings' heating, ventilation and air conditioning systems (HVAC) and returns it to the campus' Co-Generation Plant for reuse in the cooling towers.

Construction Activity: Clearing, grading, excavating that results in soil disturbance. Construction activity does not include routine maintenance to maintain original line and grade, hydraulic capacity, or the original purposes of the facility, nor does it include emergency construction activities required to immediate protect public health and/or safety.

Development: The construction, rehabilitation, redevelopment or reconstruction of any project, or mass grading for future construction.

Impervious Surface: Any man-made or modified surface that prevents or significantly reduces the entry of water into the underlying soil, resulting in runoff from the surface in greater quantities and/or at an increased rate, when compared to natural conditions prior to development. Examples of places that commonly exhibit impervious surfaces include parking lots, driveways, roadways, storage areas, and rooftops. The

imperviousness of these areas commonly results from paving, compacted gravel, compacted earth, and oiled earth.

LEED: Leadership in Energy and Environmental Design. LEED is a registered trademark of the U.S. Green Building Council (USGBC). This trademark applies to all occurrences of LEED in this document. LEED is a green building rating system developed and administered by the non-profit U.S. Green Building Council. The four levels of LEED certification, from lowest to highest, are Certified, Silver, Gold, and Platinum. The University of California has made a commitment that all newly constructed buildings will achieve a LEED Silver Certification level and outperform California's Title 24 energy code by at least 20 percent.

LID: “Low Impact Development (LID) is a leading stormwater management strategy that seeks to mitigate the impacts of runoff and stormwater pollution as close to its source as possible. These LID practices can effectively remove nutrients, bacteria, and metals while reducing the volume and intensity of stormwater flows.”
Development or Redevelopment Involving Nonresidential Use or five or More Units Intended for Residential Use

a. At least fifty percent alteration or more of the impervious surfaces on an existing developed Site: entire Site must comply with the standards and requirements of this Article and with the Development Best Management Practices Handbook; and

b. Less than fifty percent alteration of the impervious surfaces of an existing developed Site: only such incremental Development shall comply with the standards and requirements of this Article and with the Development Best Management Practices Handbook.

Every Development or Redevelopment site shall be designed to manage and capture stormwater runoff, to the maximum extent feasible, in priority order: infiltration, evapotranspiration, capture and use, treated through high removal efficiency biofiltration/biotreatment system of all of the runoff on site, without any storm water runoff leaving the Site for at least the volume of water produced by the quality design storm event that results from:

a. If partial or complete onsite compliance of any type is technically infeasible, LID Plan shall comply with all applicable Standard Urban Stormwater Mitigation Plan (SUSMP) requirements in order to maximize onsite compliance.
b. Remaining runoff that cannot feasibly be managed onsite, the project shall implement offsite mitigation on public and/or private land

Infeasibility shall be demonstrated in the submitted LID Plan, shall be consistent with other City requirements, and shall be reviewed in consultation with the Department of Building and Safety. The technical infeasibility may result from conditions that may include, but are not limited to:

a. Locations where seasonal high groundwater is within ten feet of surface grade;
b. Locations within 100 feet of a groundwater well used for drinking water;
c. Brownfield Development sites or other locations where pollutant mobilization is a documented concern;

d. Locations with potential geotechnical hazards;
e. Locations with impermeable soil type as indicated in applicable soils and geotechnical reports

MEP: is the acronym for Maximum Extent Practicable. The MEP standard involves applying best management practices (BMPs) that are effective in reducing the discharge of pollutants in stormwater runoff.

MS4: Municipal Separate Storm Sewer System.

Reclaimed or Recycled Water: Waste, grey, or storm water treated with the intention of reuse, including: direct potable Reuse, indirect potable reuse, and non-potable reuse.

Redevelopment: Land-disturbing activity that results in the creation, addition, or replacement of 500 square feet or more of impervious surface on an already developed Site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of routine maintenance activity; and land disturbing activity related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

Retrofitting: To modify equipment (in airplanes, automobiles, a factory, etc.) that is already in service using parts developed or made available after the time of original manufacture.

Site: Land or water area where any “facility or activity” is physically located or conducted, including adjacent land used in connection with the facility or activity.

Storm Water or Stormwater: Water that originates during precipitation events and that falls onto land, water, or other surfaces.

SWPPP: Stormwater Pollution Prevention Plan.

HVAC System: Heating, Ventilation and Air Conditioning System.

Stormwater Runoff: The part of precipitation which travels across a surface to the storm drain system or receiving waters.

UCLA: University of California, Los Angeles.

USGBC: U.S. Green Building Council. The USGBC is a membership-based non-profit organization dedicated to sustainable building design and construction, and is the developer of the LEED building rating system.

V. REFERENCES

130205 MS4 Guidance Document to SWRCB.xlsx

"JOIN THE MOVEMENT." *UCLA Grand Challenges*. 2014. Web. 04 June 2014. <http://www.grandchallenges.ucla.edu/>.

LEED for new constructions and Major Renovations - Version 2.2. U.S. Green Building Council. October 2005.

"Storm Water Program." *State Water Resources Control Board*. N.p., n.d. Web. 04 June 2014. <http://www.waterboards.ca.gov/water_issues/programs/stormwater/smallms4faq.shtml>.

4. Green Guide to Living

Water

While water may seem like a free and abundant resource, Southern California water supplies are becoming increasingly limited due to climate change and population growth. Luckily, there are many easy ways to conserve water in the dorms and in apartments:

Water Saving Tips:

1. **Turn the water off when brushing your teeth.**
   Turning off the faucet while brushing your teeth or shaving could save 2 ½ gallons per minute.
2. **Take shorter showers.**
   Shortening your shower by 1 minute can save 1,000 gallons of water a year. Showers are the number one water waster in the bathroom.
3. **Only do full loads of laundry.**
   Share a load of laundry with a buddy! Some statistic about laundry water savings.
4. **Turn off water when shampooing or lathering up.**
   32000 gallons of water a year could be saved by turning off the shower whilst applying shampoo.
5. **Fix leaky faucets.**
   One drip every second adds up to 5 gallons per day of water down the drain.

Remember, even the smallest changes can make a very big difference. Do your part.
USE WATER WISELY.

pg. --

Water Facts:
Did You Know?

Why Conserve Water?

Water is an extremely valuable resource in Southern California. Southern California is a Mediterranean ecosystem, characterized by hot, dry summers and mild, wet winters[1]. In addition, few local water sources exist. Average rainfall is only about 14 in per year, little of which is captured and stored for future use[2]. Groundwater sources provide between 30 and 40 percent of water supply, and the remainder is imported from the Owens Valley, the Colorado River, and Northern CA through the State Water Project[3].

SEE A LEAK?
REPORT IT!
On the Hill
(310) 206-9633
On Campus
(310) 825-9236

What is UCLA Doing to Help?

- **UCLA has set a goal to reduce water usage by 20% per person by 2020.**
- A combination of professionals, students, faculty, and staff, UCLA's Water Task Force is working tirelessly to create innovative ideas to reduce water use on campus.
- The installation of low-flow applicances, drought-tolerant landscaping, and other measures has kept water use low despite an increasing student population.

"Failure to take constructive action is not an option…Water scarcity is likely to be one of the most severe consequences of population growth and climate change and Los Angeles is particularly vulnerable because of our arid climate and reliance on imported water."
- UCLA Chancellor Gene Block, Jan. 2014

pg. --

References: 1. *Visit California.* 2. *Watershed.org.* 3. *California Department of Water Resources.*