Improving Water Conservation in Smith College Housing through Environmental Education

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Abstract

The purpose of this study was to test the hypothesis that increased signage, shower timers, and educational events would change behavioral patterns in Smith College housing and encourage students to reduce water consumption. Three houses on campus were chosen for this study based on their capacity to meter daily water use. Two houses received educational materials while one did not, and the impacts on water consumption were measured. Data on water use before materials went into houses was compared with water use data after the study was implemented. Students across campus were encouraged to participate in an online survey to measure water use patterns in Smith housing.

The results of this study provided support that educational materials and increased awareness of water use will alter behavioral patterns and encourage students to conserve more water. However, this is contingent upon the presence of an active sustainability representative in each house. Findings from the online surveys also supported the proposed need for increased education and transparency of water consumption at Smith College.

Findings from this study and the online survey support recommendations to bolster the sustainability representative program at the college, providing student representatives with additional resources and requiring more active participation in the program. The survey results also indicate students' willingness to alter their behavioral patterns to consume less water if the college increases signage and implements technical updates. These findings are significant because they are in accordance with the goals of the Smith Sustainability and Climate Action Management Plan to reduce the college's environmental impacts over the next 20 years.

Introduction

In the modern-day age of environmentalism, water conservation is an area that typically takes a backseat to energy conservation, especially in college housing. Most students know to turn off their

lights, unplug electronics, and set their laptops to go to sleep to reduce their carbon footprint, yet few are aware of the impact that their daily water use has on the environment. Without access to monthly utility bills, students living in dormitories are unaware of the gallons of water per day that they are using, and how much this costs the college. The purpose of this project is to educate students about water use at Smith College, increase transparency of water use records, and influence behavioral changes to encourage conservation efforts in Smith housing.

In 2010, the Smith College Committee on Sustainability passed the Sustainability and Climate Action Management Plan (SCAMP), a "20-year plan to reduce the college's environmental impact (SCAMP, xi.) The plan includes a detailed section on current water use at the college, and outlines strategies and goals for reduction and improved efficiency over the next 20 years. According to the plan, Smith College used 45.6 million gallons of water in 2009, with an average of 27.4 gallons per student per day (SCAMP, 2-3). This total annual water use is down from 54.9 million gallons in 2006 (SCAMP, 2), as a result of several infrastructure improvements explained later in this report. The vast majority of Smith's water consumption goes to housing and dining, with sizable portions used in academic and administrative buildings, the campus cooling plant, a wet lab, and irrigation (see Figure 1). This high percentage of Smith's total water consumption used in housing and dining demonstrates the likelihood that behavioral changes through education will have a measurable impact.

The Sustainability and Climate Action Management Plan "targets saving 1.5 million gallons of water through behavioral change by 2015, and an additional 1 million gallons by 2030" (SCAMP, 4). The college intends on reaching these goals through upgraded metering infrastructure to display water consumption data to students and facilitating inter-house competitions to reduce water use (SCAMP, 4). The plan outlines seven methods of potential student involvement to meet these goals, three of which were focused on for this project. These were "analysis of water use within specific buildings or

departments," "development of communication and/or educational materials on water use," and "development of survey instruments or other methods for analyzing student water use" (SCAMP, 5).

Materials

The Smith College Office of Environmental Sustainability recently ordered a case of plastic shower timers, manufactured by Niagara Conservation. These waterproof five-minute sand timers are encased in a hard plastic shell and suction to the wall of the shower. Since they were bought in bulk, they only cost the college $1.50 per timer (Manning). The office hopes to distribute these timers to all of the houses on campus, so their distribution and visibility became a focal point of this study.

Educational signage was also designed for the purpose of this study. Signs were designed for shower stalls with timers that included information about water conservation and encouraged students to try the timers. Additional signs were also made specific to water use at sinks and for laundry areas (see appendices).

Additionally, spreadsheets of hourly water use in metered houses were provided by Jen Marcotte of Smith College Facilities Management for analysis in this study. Updated data was sent every few days to track progress.

Methodology

Analysis of Water Use within Specific Buildings

The primary goal of this project was to test whether increasing environmental education in houses and implementation of educational signage and physical reminders would reduce students' average daily water use. On Smith campus, there are currently seven houses with the capability to meter daily water use, broken down on an hourly basis. In a meeting with the Campus Sustainability Director, Deirdre Manning, we determined the best houses to use for this study were those without

dining to capture the most accurate measure of students' individual water consumption. For simplicity, we also excluded the two cooperative living houses on campus, Tenney and Hopkins, since they offer a different living style than the traditional student houses and this may affect their water use. Finally, we decided to focus on houses with particularly active sustainability representatives, since they could facilitate the implementation of the project into their houses and be a resource for us. Based on these qualifications, we decided to focus the study on Lawrence House, Park Complex (including house and annex), and Morris House. All three of these houses are comparable in total student occupants, making comparisons among them easier.

Initially, the sustainability representative in each of these houses was contacted to invite her house to participate in the study. In order to make an accurate assessment of which tactics were most effective, each house received a slightly different educational program. The sustainability representative in Lawrence House was particularly active in her role and showed a demonstrated interest in this project. She was briefed on the study and given educational materials to display in Lawrence House. This house received three of the shower timers (one for each floor of the house) and shower, sink, and laundry room signs. Materials were left with the sustainability representative to display, and no educational event was held in Lawrence House. However, an email describing the project and encouraging the members of the house to participate in the study was sent to the Head Resident to forward to the house.

Park Complex was visited during a house tea and an educational briefing on the project and on water conservation was given to the approximately 12 students in attendance. The house received four shower timers and shower, sink, and laundry room signs, with an explanation on their use and where they should be displayed. Materials were left in the possession of the house sustainability representative to oversee their display.

The sustainability representative for Morris House did not respond to requests to visit the house and bring educational materials, so it was chosen as the control for this study. The house received no shower timers, signage, or educational events on water use.

Development of Communication and/or Educational Materials on Water Use

As called for in SCAMP, this project included the development of educational materials for display in Smith College housing to encourage water conservation. Signs to accompany shower timers were designed by the campus sustainability representatives and were taped to the doors of shower stalls that contained the timers. Signs for sink areas and laundry rooms used eye-catching visuals to display relevant facts on water use gathered from prior student sustainability projects and the internet (Van Ness 2008, Jaris 2009, www.wateruseitwisely.com, 2009). Signs for water use at sinks, including teeth brushing and face washing, were hung over banks of sinks in common bathrooms on each floor. Laundry room signs encouraged students to wash larger loads at a time and were hung on the wall over the washing machines in the house laundry room.

Development of Survey Instruments for Analyzing Student Water Use

A secondary component of this project was to develop a survey to accurately analyze student water use in Smith housing, as well as students' awareness of water consumption by the college as a whole. The survey, which was created on Google Docs, sought to capture students' water use in an average day, their perceptions of water consumption on the campus-wide level, and their willingness to implement behavioral changes. The survey began with questions about daily water use, including how many showers the student takes in a week, how frequently she does a load of laundry, what the average length of her showers is, and other daily uses of water at the tap. Secondly, the survey asked questions about water use at Smith College as a whole, asking respondents to estimate how much water the

average student uses in a day and what percent of the college's annual water use goes to housing and dining. Next, students were surveyed on their perceived willingness to make changes that would reduce their water consumption. Students were asked whether or not they had already tried the new shower timers, and if the physical display of water use had impacted the average length of their showers. They were also asked to rate their likelihood of modifying their behavior if additional signage near showers, sinks, and laundry areas was available. Finally, students were encouraged to share any additional comments or questions concerning water use at Smith College.

A link to the online survey was emailed to members of the studied houses, Lawrence and Park Complex. It was also emailed to the director of the sustainability representatives to be sent out to all reps and passed along to all houses. A request was also sent to members of the Environmental Science and Policy senior seminar class to participate in the online survey. A Facebook event was created and over 80 Smith students were invited to take the survey, as well as encouraged to invite their friends to participate.

Additional Water Use at Smith

Although student behavioral patterns were the focus of this study, research into several other areas of water use at the college was also completed. Representatives from Facilities Management were contacted to provide information about showerheads, toilets, and sinks in campus buildings. They provided information about the recent project in summer 2009 to replace 500 showerheads across campus with low-flow efficient ones, and what the costs and energy savings of this project were. Facilities also contributed information about the toilets on campus, and how many gallons of water they use per flush.

With the help of student volunteers, an experiment was carried out in a bathroom of Baldwin House to test the flow rate of the sinks in gallons per minute. Using a .5 liter water bottle and a

stopwatch, water flow was measured at various water pressures, ranging from a slow stream to full power. Conversions were used to convert liters/second into gallons/minute, and a range of values was determined.

Results

Lawrence House

Prior to the implementation of educational signage and shower timers, Lawrence House was averaging 1616.04 gallons of water per day (gpd), an average of 24.12 gallons per student per day, for the month of April. In the days since the signage and timers went into the house, the average daily water use has dropped to 1374.1 gpd, a decrease of almost 250 gallons per day. This averages to 20.51 gallons per student per day, a drop of 3.61 gallons per student. This is the equivalent of every student in the house cutting at least two minutes off of their shower time every day. Additionally, in the six days since educational materials and visuals were put up for which data is available, Lawrence House has experienced four of its five lowest water consumption days for the entire month of April (see Graph 1).

Park Complex

Prior to the educational tea and implementation of timers and signage, Park Annex averaged 346.6 gpd for the month of April. In the days following these changes, the Annex has averaged 354.4 gpd, an *increase* of 7.8 gpd. However, since the educational event in Park, the Annex has produced two of its three lowest meter readings for the month of April. In Park House, the average daily water use was 1522.45 gpd before changes, and 1504.9 gpd after educational materials were distributed, a drop of 17.55 gpd.

Morris House

Morris House received no timers, signage, or interactive educational event, so it was predicted that water use would remain essentially unchanged. Before the study's start date, Morris averaged 1621.12 gpd, an average of 23.84 gallons per student every day. Since the start date, Morris has averaged 1612.47 gpd, a drop of only 8.65 gpd. This equals an average of 23.7 gallons per student per day, a minimal decline of only 0.14 gallons.

Survey Findings

The online survey elicited 73 responses, with representation from 18 of the 35 Smith houses. With regards to shower use, most students reported the average length of their shower is 5-10 minutes, and most take between 4 and 7 showers a week (see Figures 2 and 3). 85% of students are happy with the current water pressure of the showerheads in their houses (Figure 4), which is especially optimal considering Smith's recent transition to low-flow showerheads. Almost no one reported leaving the water running while brushing their teeth (Figure 5), and ¾ of students would rather wash their hands with cold water than wait for the tap to get warm (Figure 6). With regards to laundry, just over half of students polled do a load once every two weeks, with another 28% waiting every three weeks to do laundry (Figure 7). The vast majority of respondents wait until they have a large load before washing their clothes (Figure 8). When students were asked to report their other common uses of water in a typical day, popular responses included washing one's face at the sink, washing dishes, and watering plants (Figure 9).

When students were asked whether or not they had tried the new shower timers, 44% answered yes, 43% have not tried them yet, and 13% do not plan to (Figure 10). Of those who answered yes, nearly 2/3 reported that using the timer has impacted their average shower times, while another ¼ said that it sometimes affects their shower times (Figure 11). Of the respondents who have not yet tried

the timers, 46% predicted that using a timer would affect their shower lengths, 21% answered "probably," 16% answered "maybe," and 17% said that using timers would have no impact on their shower time (Figure 12). With regards to impacts of educational signage about water consumption, the spread was fairly equal, with no clear majority. 17% of respondents predicted they would decrease their shower lengths if there were more signs, 37% said "probably," 23% answered "maybe," and 23% said no (Figure 13). When asked if they would reduce other water consumption such as face washing or tooth brushing if there was more signage, 30% said yes, 29% answered "probably," 21% responded with "maybe," and 21% said no (Figure 14). This uncertainty can likely be attributed to the fact that these survey questions asked students to *predict* how they would react to increased signage, rather than measure how they *have* changed their water consumption. However, one particularly interesting finding came when students were asked if data from water consumption meters were made available to them, would it impact their water use. 43% of respondents answered yes, and another 27% said "probably" (Figure 15), meaning over 2/3 of students polled would respond positively to visible metered data.

When students were asked to estimate Smith's water use, most were off the mark, indicating the importance of increased education and transparency of water consumption on campus. 33% of respondents correctly estimated the daily water use per student as between 25 and 30 gpd (the correct answer is 27.4 gpd). However, 37% underestimated this value, and 30% overestimated (Figure 16). When asked to identify the percent of Smith's total water use that goes to housing and dining (58%), 23% answered correctly, 59% overestimated, and 18% underestimated (Figure 17).

Findings from conversations with Facilities Management

In the summer of 2009, Smith Facilities Management installed 500 new low-flow showerheads in all campus showers, switching from flows of 2.5 gallons per minute (gpm) to 1.5 gpm. According to facilities staff, the upfront material cost for this project was $27,500, with additional labor costs bringing

the total to about $40,000. The energy savings resulting from the switch to low-flow showerheads were estimated to be approximately $49,200 a year (Holland). This means that the project will pay for itself in less than one year. An estimated three million gallons of water will be saved every year as a result of this infrastructure update (Colatrella, 2009).

There are 1054 toilets on Smith campus and 54 urinals. Approximately 80% of the toilets use 1.6 gallons per flush (gpf), while the remaining 20% use 3.5 gpf. Facilities staff estimated that there are fewer than 50 toilets on campus that are considered low-flow toilets, using 1.25 gpf. The urinals are reported to use 1 gpf (Tosi). Based upon the experiment that was run, the sinks in Smith housing use between 1.078 gallons per minute (gpm) and 2.112 gpm. The federal standard for maximum water flow for sinks is 2.2 gpm (EPA).

Discussion

Analysis of Water Use within Specific Buildings

Lawrence House

The findings for Lawrence House over the course of the study were consistent with the predictions of this project. Since the day that the shower timers and signage went up in the house, the meters have shown a marked decrease in total daily water use. A particularly relevant and important finding is the number of record low water use days since the study began. In only six days of data since the study began, Lawrence has already reported four of its five lowest meter readings for the entire month of April. Additionally, only one of the readings since the study began has matched the average daily water consumption for before the study.

It was hypothesized that holding an educational event in the houses in addition to providing them with materials would decrease water use even further, but this doesn't seem to be necessary in the case with Lawrence. What is notable is the fact that Lawrence House has a particularly active

sustainability representative this year. She put up all signs and timers immediately upon receiving them, and sent out an email with information about the project to the entire house. She also sent along information about the study to the Head Resident and House Community Advisor of Lawrence, ensuring participation by the leaders of the house.

With regards to the survey, 28 residents of Lawrence House participated, more than any other house. This is a participation rate of 42% of the entire house. This demonstrates the effectiveness of communication via the sustainability representative, and proves that an increased awareness of the issues of water consumption can encourage behavioral change.

Park Complex

The findings for Park Complex were not consistent with the hypothesis of the study. An educational event was held during an afternoon tea and materials were distributed, but neither the House or the Annex have shown marked deduction in metered water use over the course of the study. This can likely be attributed to the inactive sustainability representative in the complex. Although materials were left with the sustainability representative to oversee display, it is unclear whether or not she actually distributed the materials in bathrooms and laundry areas. Several students in the house have reported not yet seeing the timers or signs, so this could be the cause of limited behavioral change. The fact that Park Complex includes two houses should also be considered when interpreting results. The Park sustainability representative serves for both the House and the Annex, but the division between two buildings may make communication efforts difficult. The educational event was held in the Annex, so materials may have never made it to the House.

Only one resident of Park Complex completed the survey, even though it was sent to the sustainability representative for distribution. This is a participation rate of only 1.4%, indicating that the survey was never sent out. The one student who did answer likely heard about the survey via Facebook.

She indicated that she had not yet tried out the timers although she believed that they would limit her water use.

Morris House

The findings for Morris House were consistent with the study's hypothesis. The house received no timers, signage, or educational event, and according to the timer sign-out sheet, no one from Morris House has yet checked out any timers for the house. The survey was not completed by a single Morris resident, which allowed it to remain the control group in the study. The average daily water use for the house did not change significantly over the study period, and the minor drop can likely be contributed to the small sample size.

Feedback from surveys

When asked whether they planned to use the timers, students who responded "no" were invited to explain why not. Most students replied that showering is one of the few times a day when they can relax and not think about work or the other things they have to do. They argued that using the timers would stress them out during the one time of day in which they can relax and get away from their regimented schedules. Many students also responded that they already take short showers and do not find the timers to be personally necessary. Several students stated that they place a higher value on getting fully clean over saving a few gallons of water a week. One student in particular pointed out the lack of incentive to reduce shower length. Since students pay a flat rate for utilities within room and board fees, there is no incentive to take shorter showers. This student answered that she will be showering lavishly until she graduates this spring and has to pay for her own water.

Many students polled reported that their houses did not yet have timers, and that they would use them if they were there. Currently only 15 of the 35 Smith houses have timers in some of their

showers. Sustainability representatives for all houses were contacted and were offered to have the timers delivered to them, but only one house responded to this offer. Currently the shower timers reside in the Center for the Environment, Ecological Design, and Sustainability (CEEDS), and any student can stop by and sign a few out for their house.

The final question on the online survey invited students to share additional comments or concerns regarding water use at Smith College. Several students pointed out the inefficiency of irrigation systems at Smith, stating that they feel that sprinklers are used too frequently and are wasteful. It seems that students would be willing to give up having bright green lawns all year in exchange for saving water as an institution. Respondents also asked that the college ensure that washing machines are working properly. The washers in houses are frequently broken, which can result in more wasted water. Some students provided feedback on the shower timers, stating that they sometimes do not work in the humidity of the shower and that they should beep or have some sort of audible notification to tell you when the five minutes is up. Students offered tips of their own, including recycling sink water into toilets for flushing, installing a rain garden as a water-use demo in the Botanic Garden, and holding inter-house competitions with prizes for the houses that used the least water. Another student suggested that if the survey was run again, adding a question about where students were from to see if it correlated with water-use patterns would be interesting. Here in New England, water appears to be inexhaustible, but students from places out West may have grown up with different perceptions of water availability. Several students indicated a willingness to change habits if more information was readily available to them, and would be very receptive to having a live feed of metered water use in every house.

Although this study set out to monitor water use in Smith houses and test whether educational materials would result in a reduction of water consumption, it also ended up testing the effectiveness of the sustainability representative program. It is clear from the results that the effectiveness of the educational materials depends upon the level of involvement of the house sustainability representative.

Lawrence House, with one of the most active reps on campus, showed the most notable behavioral changes over the course of the study, and a high participation rate in the online survey. Park Complex, with a less active rep, showed less of a decrease in daily water use and less engagement in the study. The sustainability representative for Morris did not respond to the invitation to participate in the study, nor did anyone from that house take the online survey, and this lack of participation was demonstrated in the unchanged daily water consumption for Morris. It can be concluded that in order for a study like this to achieve a high success rate, it needs to be facilitated by a representative within the house.

Recommendations

As a component of this project, the Campus Sustainability Director requested that research be done on other water-saving measures that the college could implement at low cost, similar to the new shower timers that cost only $1.50 per unit. One such technical improvement is the use of faucet aerators in kitchen and bathroom sinks across campus. Aerators easily screw into existing faucet heads, and introduce air into the water stream resulting in a high pressure flow while reducing water and energy usage. Currently the Smith sinks use a maximum of 2.2 gallons per minute (gpm), in accordance with federal standards. However, implementing faucet aerators that cap maximum flow at 1.5 gpm provides a flow rate reduction of 30%, and a 1.0 gpm aerator would reduce water flow by 54% (Conservation Warehouse International). The implementation of this technology would drastically reduce water consumption without producing complaints of pressure decrease, since the air from the aerator produces a high-pressure flow. The Smith College Sustainability and Climate Action Management Plan includes the introduction of faucet aerators in 1500 bathrooms across campus in the next five years (SCAMP, 4). After researching manufacturers of these faucet aerators, the best deal was found through Conservation Warehouse International. This company sells 1.5 gpm aerators in a bulk supply of 144 aerators for $260, a unit price of only $1.80 per aerator

(http://www.conservationwarehouse.com/faucet-aerator-bulk-1-gpm-qty-144.html). The college could order 144 of these aerators as a pilot plan to test their effectiveness at saving water and students' reaction to them, and if they are successful, the college could purchase enough for all sinks on campus.

The Smith SCAMP outline also calls for the replacement of 100 toilets with reduced-flow flush systems by 2015, and 300 more replacements by 2030 (SCAMP, 4). Potential low-cost substitutes for this replacement were researched, and one product, the Toilet Tummy ™, could prove to be effective at Smith. The Toilet Tummy ™ is an 80oz. durable plastic bag that hangs inside the back tank of a toilet and offsets at least .625 gallons per flush, resulting in water and energy cost savings. The AM Conservation Group sells this product in bulk on their website. If Smith were to purchase 500 of these Toilet Tummy™'s, enough to put in about half of the toilets on campus, the cost per unit would only be $0.99 (http://www.amconservationgroup.com/store/pc/viewcategories.asp?idcategory=19#hidAnch_452&idaffiliate=295). The only issue with this update is that the majority of the toilets at Smith are public toilets, so the rear tank is not easily accessible. However, if this proposal was presented to Facilities Management, they may have suggestions for how to access the toilet tanks to implement this upgrade.

In the past few years, Smith College has been working to improve the functionality of the sustainability representative program. Based upon the results of this study, it is recommended that the college continue to work with the Sustainability Office to make this program even more robust. The Sustainability Director has proposed requiring sustainability representatives from each house to return to school a week early in the fall and participate in an orientation program. During this orientation, sustainability representatives should be familiarized with the resources available to them, including all offices, departments, and faculty members that work on sustainability issues. They should work with an advisor to set goals for what should be accomplished in each house during the semester and year. Sustainability representatives should also be required to attend weekly or biweekly meetings to track progression towards these goals and plan campus wide collaboration events. Making the sustainability

representative a paid work-study position in the future would also increase accountability and provide students with career-focused work experience in the sustainability field.

Although it may be difficult to implement, students responded that they would react positively to a financial incentive to reduce water consumption in their houses. A fee cut or reimbursement on the semester bill for those students who used less water during the semester would encourage more students to conserve. However, implementing this program may be far off, since it is unclear how this would be measured in Smith houses.

Climate Impacts of Water Use

According to the Smith College Sustainability and Climate Action Management Plan, water on campus is heated through either the central steam system or by gas hot-water heaters. By reducing domestic water consumption at Smith, especially hot water demand for showers, laundry, and face washing, we will reduce our release of greenhouse gases into the atmosphere and minimize our contribution to climate change (SCAMP, 5).

Excessive water use can also harm biodiversity and ecosystems. As human consumption of water increases, the amount of freshwater on our planet is dwindling, wetlands are disappearing, and precious biodiversity is being lost. Thousands of plant and animal species are threatened, and almost all of these are a result of human activities. Water also plays a major role in agriculture through irrigation, so water shortages will mean less available food resources (World Water Council).

Final Thoughts

Over the past few years, Smith College has made tremendous strides in implementing environmentally-friendly practices, and has demonstrated its commitment to reducing its climate footprint over the next two decades. President Carol Christ's signing of the Presidents' Climate

Commitment, the publication of the college's Sustainability and Climate Action Management Plan, the introduction of a new major in Environmental Science and Policy this past fall, and the opening of the Center for the Environment, Ecological Design, and Sustainability are just a few measures that Smith has taken to make our institution a leader in sustainability. Last year, the College Sustainability Report Card gave Smith College an overall grade of an A- for green practices, and included Smith on their list of College Sustainability Leaders (greenreportcard.org).

Students have demonstrated their willingness to make behavioral changes to reduce their carbon footprint by swapping out light bulbs for efficient ones, implementing free boxes in their houses to recycle clothes, and participating in inter-house competitions including an annual switch hunt. It is now time to do the same for water consumption. The shower timers are a simple and even fun way to make students aware of their daily water use, even just to put the idea into their minds. It is amazing to see what can be accomplished when those minds all become one.

Tables and Figures.

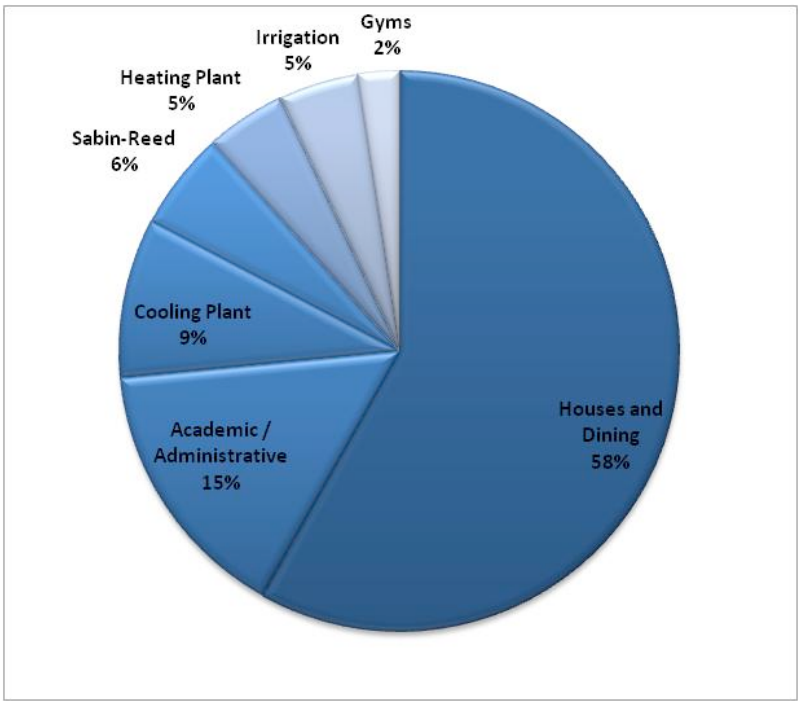
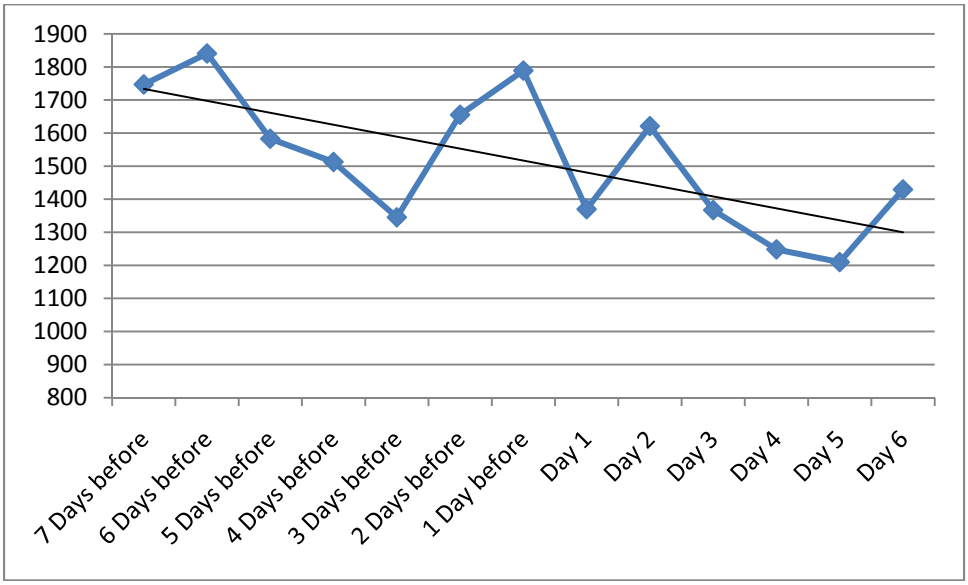


Figure 1: Sources of Water Consumption FY 2009 (SCAMP)



Graph 1. Lawrence House Total GPD (7 days before study and 6 days of study)

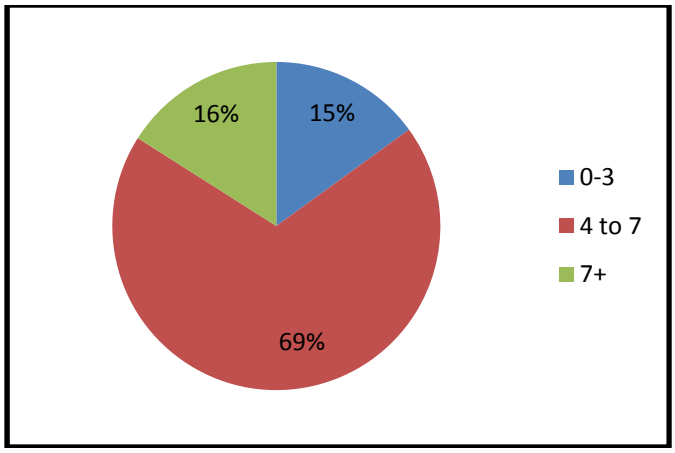


Figure 2. How many showers do you take in a week, on average?

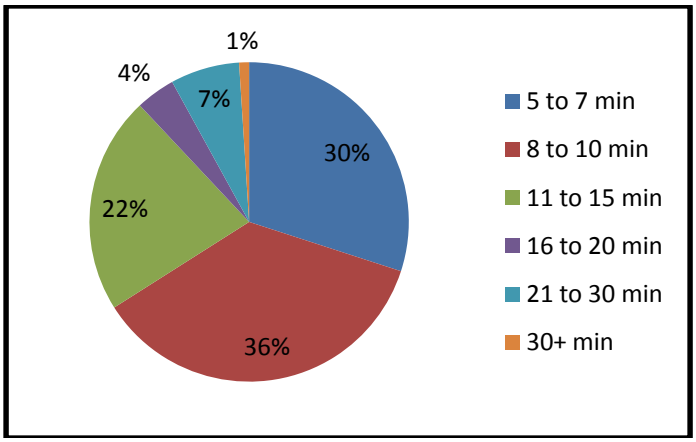


Figure 3. What is the average length of your shower?

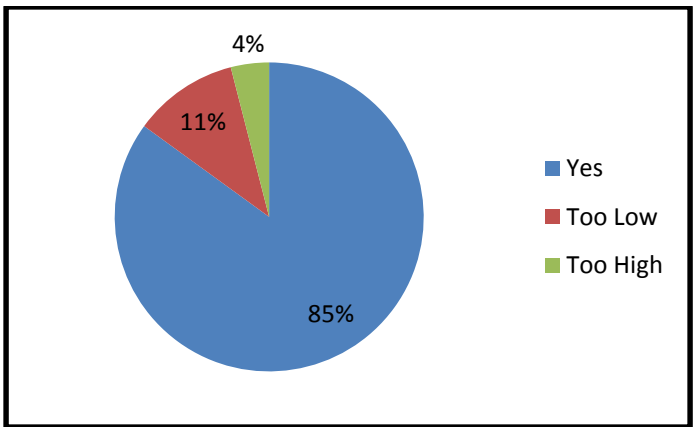


Figure 4. Are you happy with the water pressure of the Smith showers?

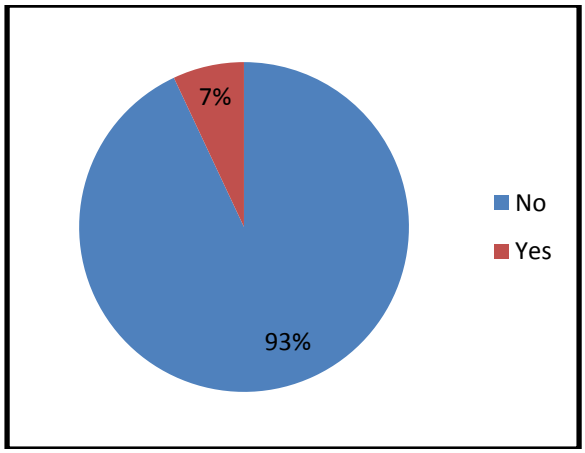


Figure 5. Do you leave the water running when brushing your teeth?

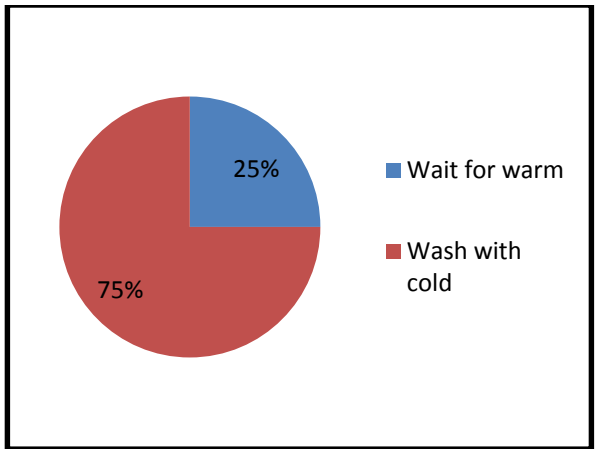


Figure 6. When washing your hands, do you wait for warm water or wash with cold?

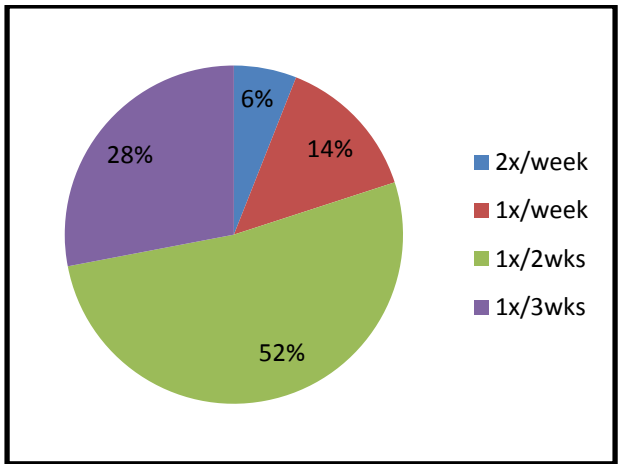


Figure 7. How frequently do you do a load of laundry?

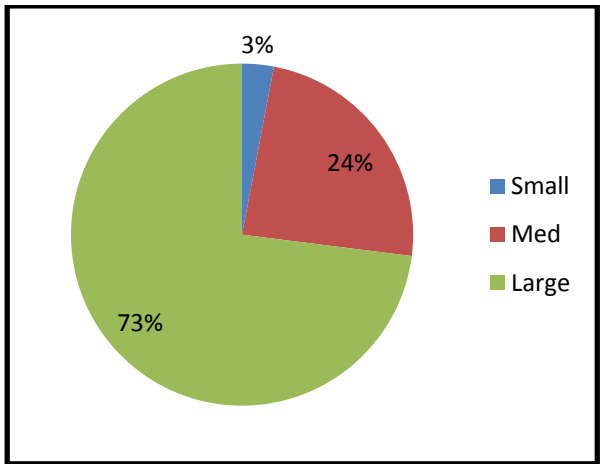


Figure 8. What is the average size of your laundry load?

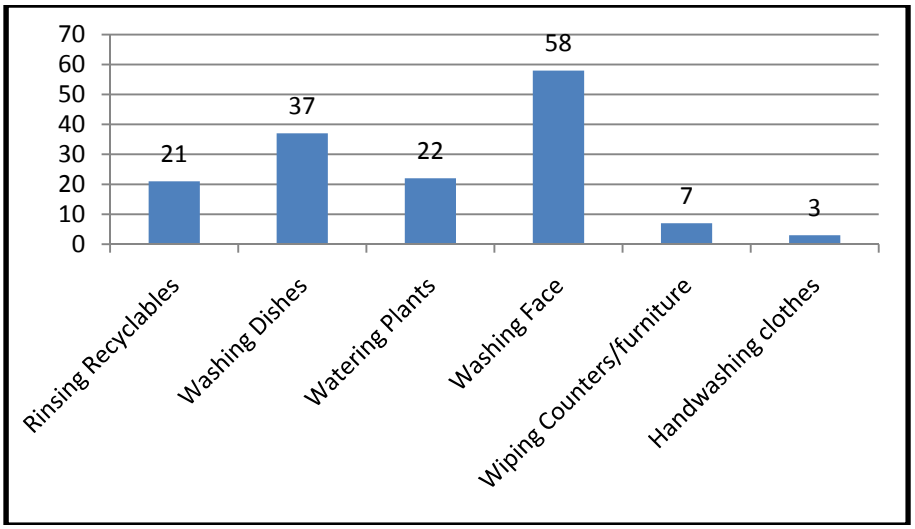


Figure 9. Other uses of water in Smith housing (in # of responses)

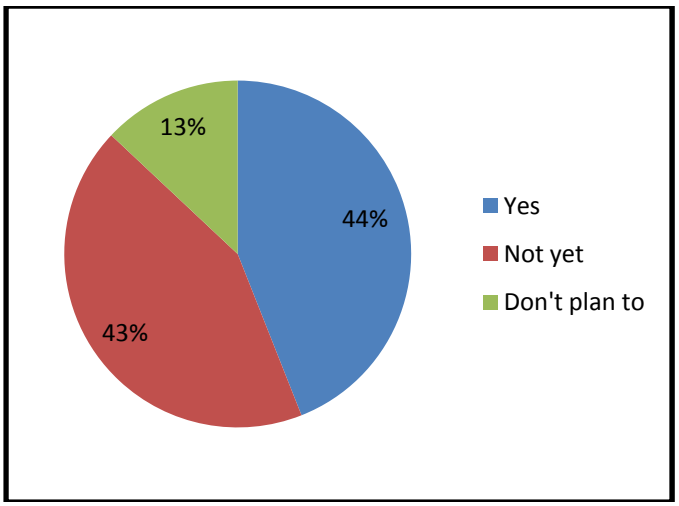


Figure 10. Have you tried the shower timers yet?

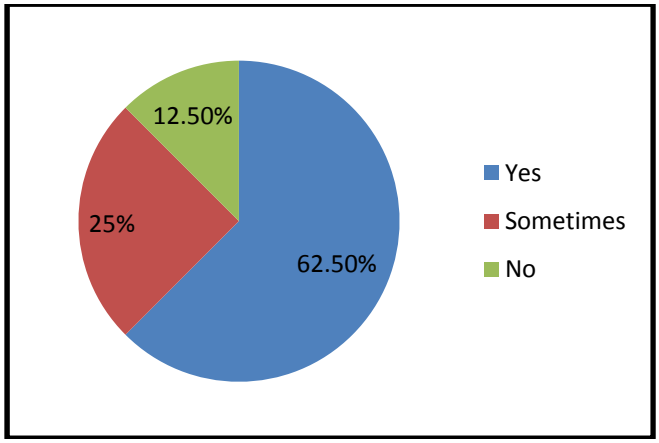


Figure 11. Using timers limits my shower time.

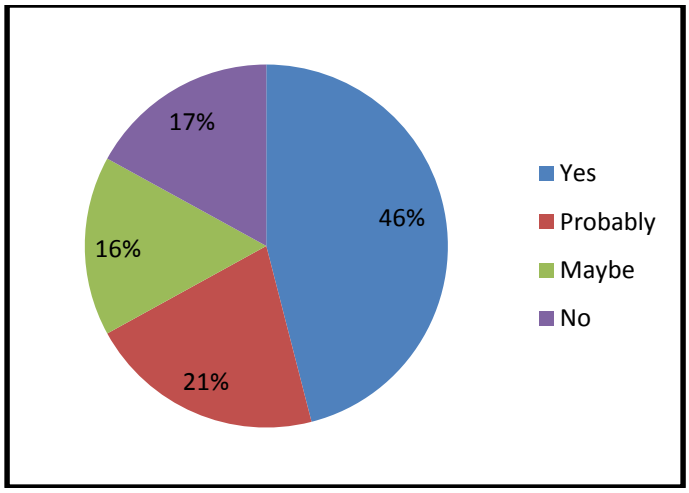


Figure 12. If there was a timer, would you limit shower time?

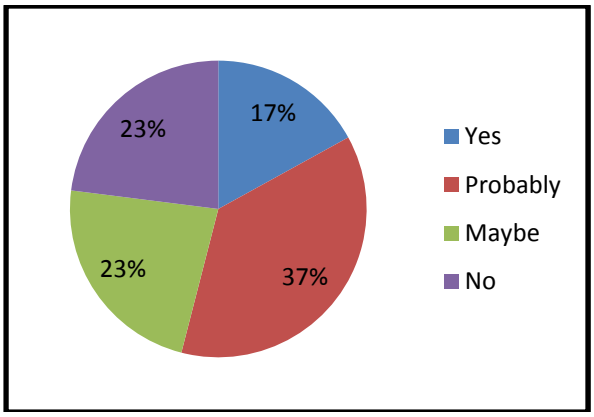


Figure 13. Would you be more mindful of shower length if there were more signs?

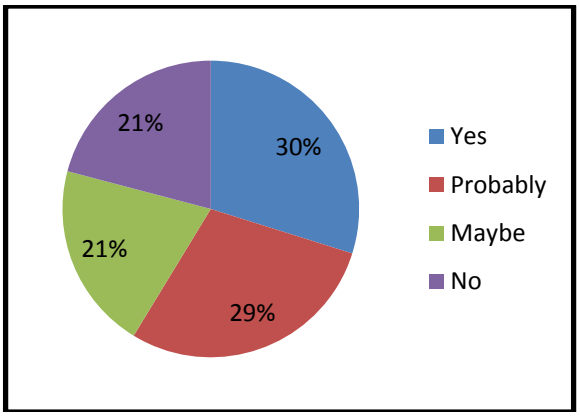


Figure 14. Would you be more mindful of other water use if there were more signs?

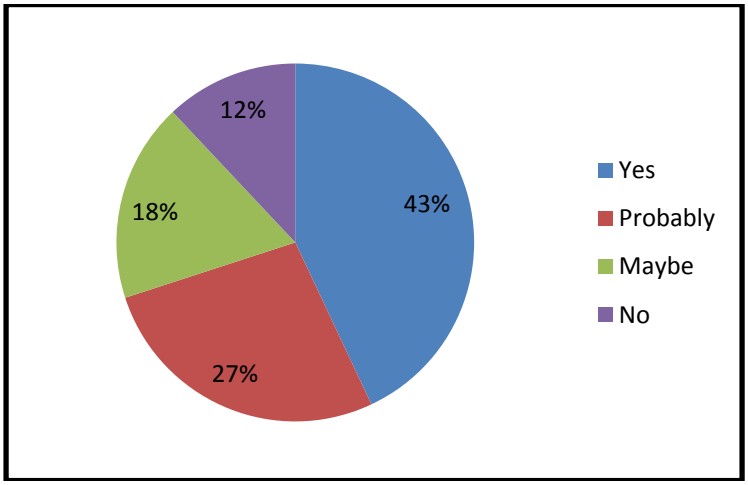


Figure 15. If metered data on water use was available to you, would this impact your consumption?

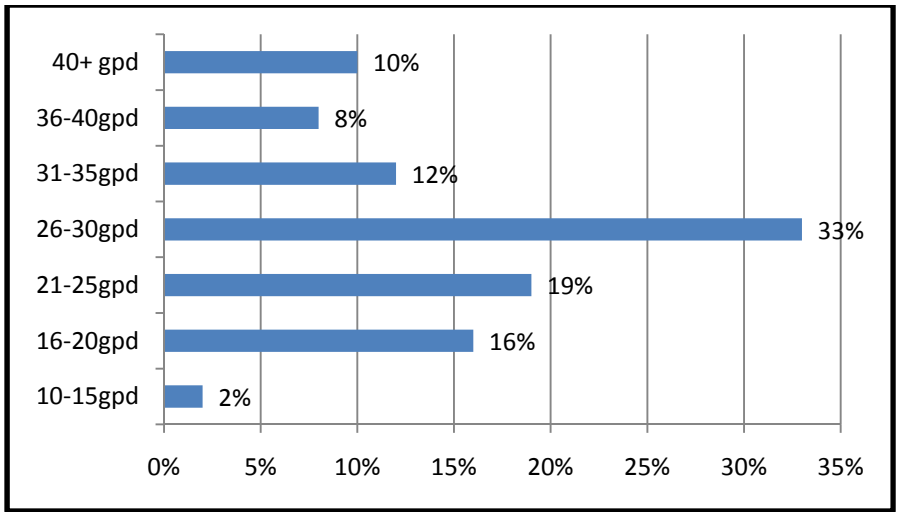


Figure 16. Estimate of daily water use per student (in gallons per day).

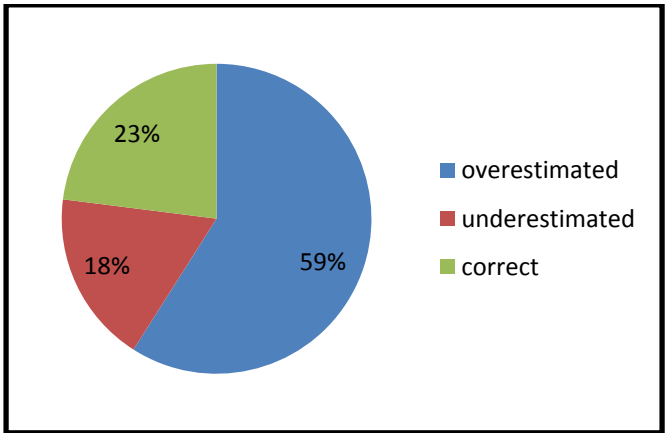


Figure 17. Estimate of % of Smith water use that goes to housing and dining.

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Appendices.

Appendix 1. Email to house participating in study.

Hi Lawrence House! My name is Emily and I am currently working on a sustainability project for my senior Environmental Science and Policy seminar. My project is studying water use in Smith College Housing and how we can encourage water conservation through education, signage, and other visibility. Lawrence House is an important part of my study because it is one of few houses on campus that can do live metering of water use. This means that I can look to see how much water is used every hour of every day in Lawrence. This is important because it will allow me to test the effectiveness of my project and see if water use decreases over the next couple weeks.

In several of the bathrooms throughout your house, you should now have 5-minute shower timers. This is part of a campus-wide project to make students more aware of the time they spend in the shower. You can flip them, but we are trying to encourage students to "strive for five." Try them out! You'll probably be amazed at how much you can actually accomplish in 5 minutes. Be on the lookout for the accompanying signs that give some water conservation tips.

Over the past week, Lawrence house residents used an average of 1,612 gallons of water per day! Just changing a few simple habits can dramatically reduce this amount. Turn the water off when you brush your teeth, cut a few minutes off your shower time, and don't leave the water running while you do dishes. Also, make sure you wait for a full load of laundry before you wash it.

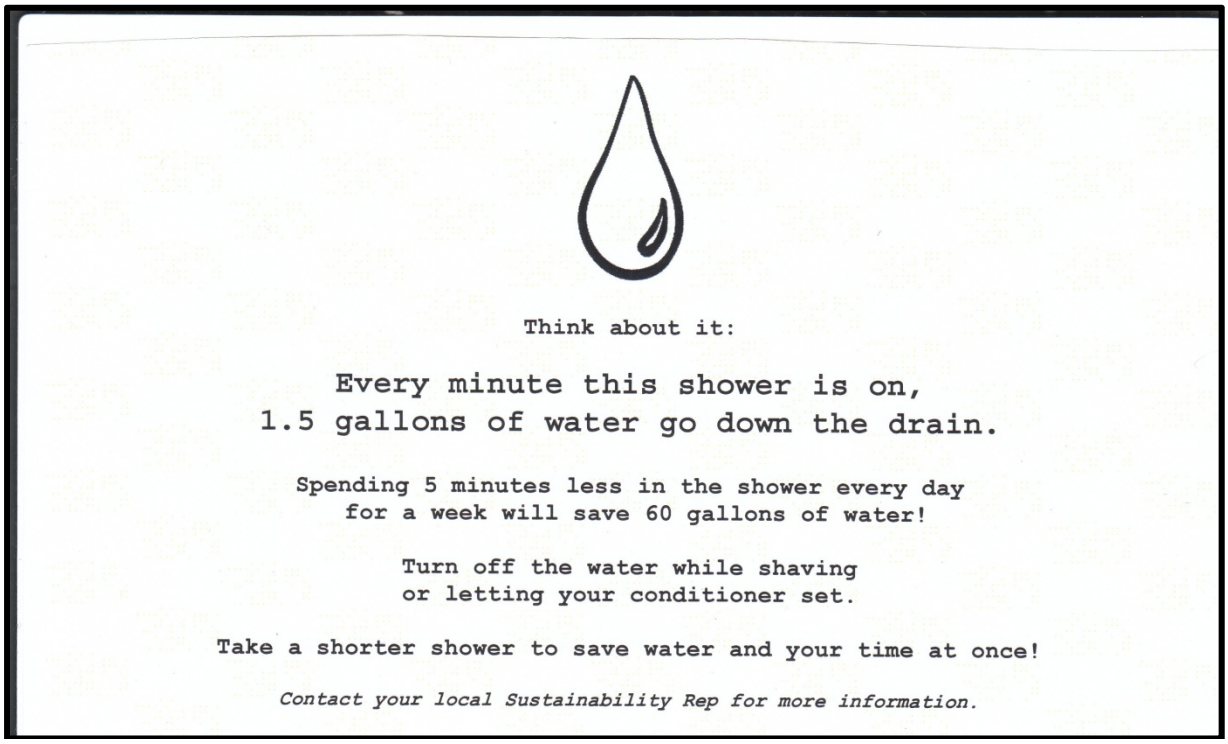
Be on the lookout for more water conservation tips and signs in your house over the next few days. Also, as another important component of my study, I am surveying the student body about their water use and perceptions of Smith water use. The link to the survey is here:
https://spreadsheets.google.com/spreadsheet/viewform?formkey=dFdnSG03akF6ellPOG5xWm5yano2SXc6MQ&ifq
It is completely anonymous and will really help me gather data for this great project! Morris and Park are the other houses that have metering, so let's try and compete with them to see who can reduce the most!

Thanks, and contact me with any questions!
Emily Mailloux '11

Appendix 2. Link to online survey.

Water Use in Smith College Housing:
https://spreadsheets.google.com/spreadsheet/viewform?formkey=dFdnSG03akF6ellPOG5xWm5yano2SXc6MQ&ifq

Appendix 3. Signs for Showers with Timers



Think about it:

Every minute this shower is on,
1.5 gallons of water go down the drain.

Spending 5 minutes less in the shower every day
for a week will save 60 gallons of water!

Turn off the water while shaving
or letting your conditioner set.

Take a shorter shower to save water and your time at once!

Contact your local Sustainability Rep for more information.

Did You Know??

By turning off the water while you brush your teeth in the morning and at night, you can save up to **240** gallons of water a month!!

Every minute that this sink is on at full volume, **2.2** gallons of water go down the drain.

When washing your hands, lather up before you turn on the water.

Consider washing your hands with cold water rather than waiting for the tap to get warm.

Did You Know??

Smith students do about ***60,000*** *loads* of laundry each year, at an average of **24** loads per person annually.

Because there is no way of adjusting the load size on the machines, the same amount of water enters the machine regardless of how many clothes are inside.

So, be sure to wait until you have a full load before doing laundry. You can save hundreds of gallons a month!!