

Water Usage of Businesses in Davis

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**Abstract**

Many businesses around the world depend on the use of water. Water allows a plethora of businesses to run day-to-day operations smoothly. Businesses have an incentive to generate profits, but they also must realize that there needs to be a balance between profit maximization and water conservation. Given the environmental problems that we are currently facing and will be encountering in the future, it's vital that businesses do their part in using water efficiently. What we want to do is to conduct a study on various businesses in Davis and their water usage. Each member of our group attained the monthly water bill of a specific type of business. We used four business types: a laundromat, a hotel, a gymnasium, and a restaurant. Our main objective is to evaluate which type of business tends to use the most water and why. We will also provide alternative methods for how these businesses can reduce their water usage. After gathering all of our data, what we found was that the monthly water bill for the hotel was much higher than the monthly water bills for the three other businesses. The reason being is that hotels encompass a wide range of services that require the usage of water, including plumbing services and dining services. Of course, we understand that there are limitations to the study that we conducted. We weren't able to gather the same amount of monthly water bill data for each business and we didn't have a specific month in which we could all compare our data. Also, our study only shows the direct water usage of these businesses - and not the indirect water use.

**Introduction**

Businesses rely heavily on water, a resource that is quite limited and is in high demand from people all over the world. With a growing population and a finite amount of water, water scarcity problems will only exacerbate as time progresses. Because of this, every individual, organization, household, etc. needs to conserve water and use it more efficiently to the best of its ability. For our purposes, we want to investigate the water usage of businesses in Davis, California and get an idea of which type of business uses the most water. Our motivation is to decipher why certain businesses use more water than do other businesses and to provide methods for how businesses can conserve water so that future generations can have a reliable source of water for consumption.

**Objective**

The main goal of our project is to quantify the water usage of various businesses in Davis and to evaluate why each of the businesses under study use as much as water as it does. Each member of our group will reach out to a specific business in Davis to attain its monthly water bill. The four businesses that we will study are a laundromat, a hotel, a gymnasium, and a restaurant. After all of us gather our data, we will conduct a comparison of the data. Given the amount of data that we will be able to attain, we will provide both statistics and bar graphs to illustrate our results.

**Hypothesis**

We predict that out of all the businesses that we will study, the hotel will use the most water compared to the other three businesses. The reason being is that hotels tend to provide many more services than do a restaurant, laundromat, and a gymnasium. Some of the services that hotels provide that require the use of water include plumbing, dining, and cleaning. In fact, some hotels alone can provide the services that are offered by a gymnasium, restaurant, and laundromat.

**Data Sources**

The source of data for our project will be the businesses themselves in Davis. They will provide us their monthly water bill and we will get as many monthly water bills as we can.

**Methods and Assumptions**

As previously stated, each member of our group will reach out to a specific business in Davis and attain its monthly water bill. Once we attain the data from each of the four businesses, we will evaluate the data and see which type of business tends to use the most water.

## Calculations/Results

### Results for the Laundry Lounge:

From: 5/08/2013 - 7/06/2013 (Number of Days: 59)

Water Consumption:

- 493 CCFs (2013)
- 367 CCFs (2012)

Source: Laundry Lounge (2013). Water Bill May-June 2013. Public Work Department, City of Davis, Davis CA.

The 26% increase of water consumption from 2012 to 2013 could be a result of a departed laundromat in Davis. In 2012, there were two laundromats: Laundry Lounge and Wash Mill but in the beginning of 2013, Wash Mill was forced to close. This led to Laundry Lounge being the only laundromat in Davis, so the increase of water usage could be a result of a greater amount of people using this business. For one month, the Laundry Lounge uses 259 CCFs, which is not a small amount of water. For a laundromat, to conserve water is to have High Efficiency clothes washers, which can reduce water consumption by 50% (Brown, 2009). But the Laundry Lounge already has High Efficiency clothes washers so they have conserved a significant part of their water usage. One way that Laundry Lounge can conserve even more water is to use newer models of High Efficiency washers. According to Energy Independence and Security Act, the older HE models have a maximum water factor of 9.5 (EISA, 2007). While the newer models have a water factor of 4 to 8 and uses as little as 15 gallon per load (Brown, 2009).

We can compare the water consumption of non-HE washer, old HE washer, and new HE washer.

Type of Washer	Number of washers	Capacity (Ft <sup>3</sup> )	Water Factor	Use(loads/day)	Water Usage per day (gallons)	Water Usage per month
Non-HE	24	3.2	12	3	2764.8	85708.8
Old-HE	24	3.2	9.5	3	2188.8	67852.8
New-HE	24	3.2	6.5	3	1497.6	46425.6

The only variable that is changing is the water factor, which provides us with how efficient the washer is. And we can see that the difference of water usages with simply changing it from a old-HE washer to a new-HE washer can make a difference. The difference between a non-HE washer and a new-HE washer is almost saving 46% of water consumption.

### Results for 3rd & U Cafe:

From: 7/01/2013 - 8/01/2013 (Number of Days: 31)

## Water Consumption:

- 14 CCFs (2013)

3rd & U Cafe's water consumption for July to August was only 14 CCF, which is surprisingly a low amount compared to the other businesses. Being right of the UC Davis main campus, 3rd & U Cafe is situated in a great location and usually has many customers. A potential reason why the water consumption is so low is that the data we collected is from a summer month before school had started and most of Davis's college population is not present in summer months as students usually return home for summer break. Most of 3rd and U Cafe's water is used on dishwashing and food preparation. One way to reduce the amount of water that they consume and increase water efficiency is implement water efficient faucets. WaterSense labeled faucets are high performing, water-efficient faucets that are approved by the Environmental Protection Agency. WaterSense faucets use a maximum of 1.5 gallons per minute and can reduce a sink's water flow by 30 percent or more compared to the standard flow of 2.2 gallons per minute without sacrificing the faucet's performance (U.S. Environmental Protection Agency). Implementing WaterSense faucets can greatly reduce the amount of water 3rd and U Cafe uses and help 3rd and U Cafe save more money.

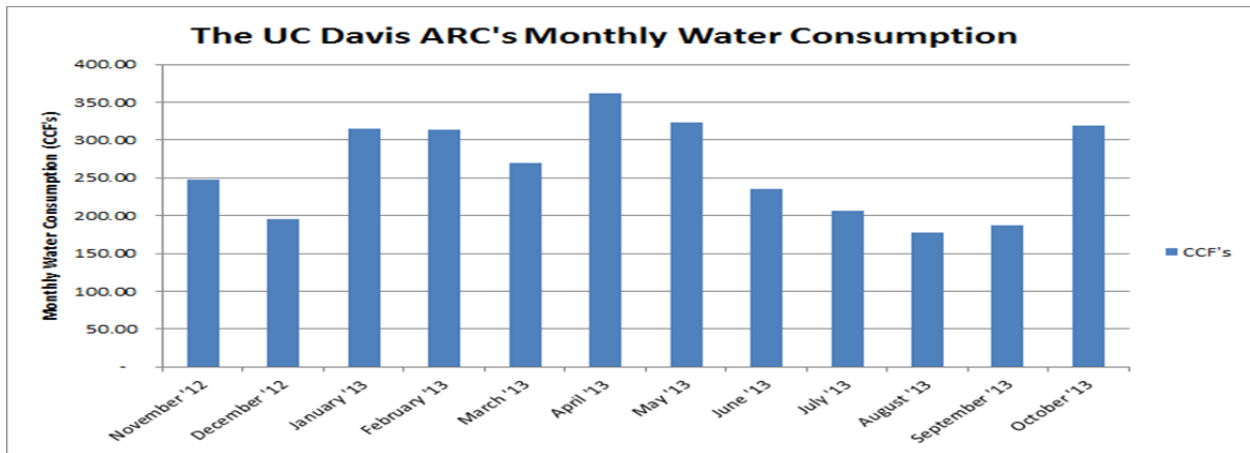
*Results for the UC Davis Activities and Recreation Center (ARC):*

Figure 1: Chart of ARC's Monthly Water Use

Month/Year	Gallons	CCF's
November '12	185,300	247.72
December '12	146,500	195.85
January '13	235,700	315.11
February '13	234,110	312.98
March '13	201,990	270.04
April '13	270,100	361.10
May '13	241,600	322.99
June '13	176,400	235.83
July '13	154,500	206.55
August '13	132,400	177.01
September '13	139,600	186.63
October '13	238,300	318.58

Source: UC Davis ARC (2013). Monthly Water Bill. UC Davis Utilities, Davis, CA.

Figure 2: The UC Davis ARC's Monthly Water Consumption.

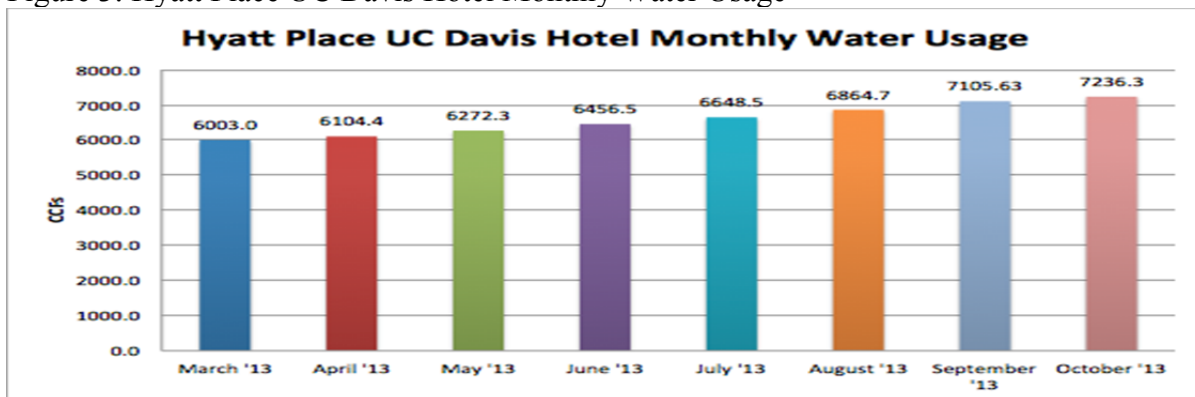


Source: UC Davis ARC (2013). Monthly Water Bill. UC Davis Utilities, Davis, CA.

Figure 2 represents the ARC’s monthly water consumption from November of 2012 to October of 2013. Figure 2 does not include water use by the Pavilion (Scalzi, 2013). For the data from January of 2013 to October of 2013, the ARC used about 270 CCFs of water per month on average and has used a total of approximately 2,700 CCFs of water. What’s interesting to note is that there is a noticeable decrease in the ARC’s monthly water consumption from June of 2013 through August of 2013. My interpretation of this is that during those specific months, many UC Davis students leave the campus and either travel or go home for the summer. Then when the UC Davis students do come back to campus for school, there is an increase in the ARC’s monthly water consumption, as displayed by the data for both September of 2013 and October of 2013. What’s useful about Figure 2 is that it shows the ARC’s water usage over the past 12 months and it represents an accurate pattern of the ARC’s water usage over a given year.

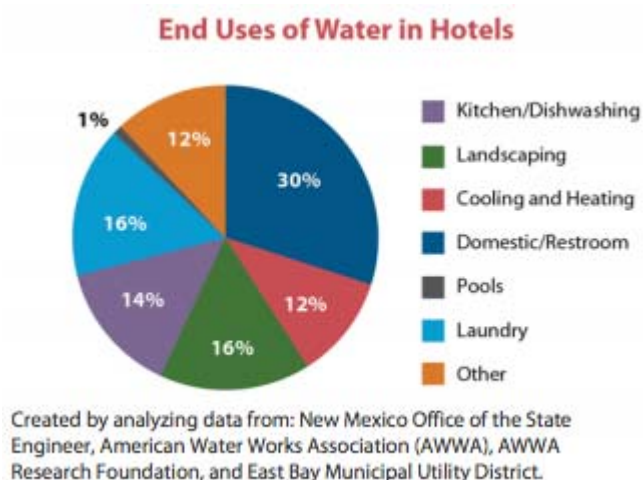
Results for the Hyatt Place UC Davis Hotel:

Figure 3: Hyatt Place UC Davis Hotel Monthly Water Usage



Source: Water Meter Reading from Lisa Flintoff, Assistant General Manager at Hyatt Place UC Davis Hotel

Figure 3 shows the monthly water usage for the months of March to October 2013 of Hyatt Place, a 51,000 square foot, 75-guest room hotel located on the UC Davis campus next to Mondavi Performing Arts Center (Davis Wiki, 2013). Since opening to the public on March 17th, 2010, the hotel has recorded its water usage everyday on an excel sheet (Flintoff, 2013). The hotel's water usage has been steadily increasing since beginning of March. Its high water usage is attributed to plumbing services, dining services, aesthetic purposes, and laundry services. Plumbing services include toilets, sinks and showers in the lobby, near the swimming pool and in the guests' rooms. Dining amenities that have food-related water usage includes Starbucks, complimentary continental breakfast buffet and their 24 hour room service and drinking fountains. Recreation and aesthetic purposes include the outdoor pool, and upkeep of plants, trees, and backyard grass area. Laundry services for sheet, towels, robes and clothes hotel guests have to be washed daily. The largest sector that water is allocated to is domestic/restroom, followed by landscaping and laundry.



Source: epa.gov

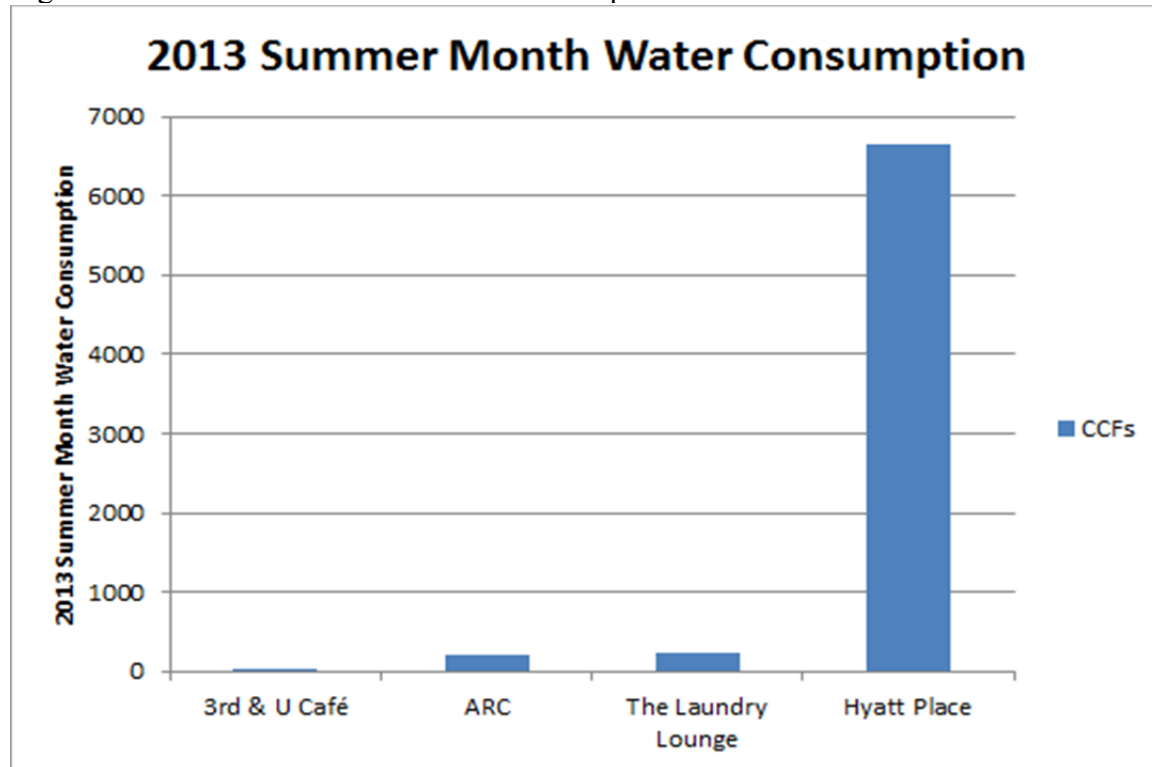
In comparison with the other businesses' water bill during the summer month, the hotel's water usage is significantly higher. Guests that stay at the hotel are usually not residents of Davis but rather visitors from out of town. Hyatt Hotel accommodates guests like parents for freshmen orientations, professionals for conferences, and performers at the Mondavi Center.

## Conclusion

Our results show that the Hyatt Place UC Davis Hotel has a much higher monthly water consumption than does the Laundry Lounge, 3rd & U Cafe, and the ARC. What's surprising is

how much more water the Hyatt Place UC Davis Hotel uses compared to the other three businesses. The Hyatt Place UC Davis Hotel's monthly water consumption ranges in the thousands. This supports our hypothesis in which we stated that the hotel will use more water compared to the three other businesses.

Figure 4: 2013 Summer Month Water Consumption



Source: Summer Month Bill (2013). Public Works Department, UC Davis Utilities, and Hyatt Place, Davis, CA.

Figure 4 shows a comparison of the water consumption for one summer month of 2013 for each business under study. This really shows just how much more water the Hyatt Place consumed compared to the other businesses during a summer month for 2013.

### **Recommendations/Limitations**

We're aware that our business study is not absent from limitations. Our results would have been given more validity if we were to study multiple laundromats, restaurants, gymnasiums, and hotels in the Davis area. With that information, we could have done a water consumption comparison not only between distinct businesses but also between the same type of business. Another limitation of our study is that we do not have one common month to compare all of our data. The best we are able to do is show a comparison of all the data during one of the summer

months. What's also important to note is that our business study solely includes direct water use and not indirect water use.

We recommend that businesses take action to reduce their water usage. Having more water efficient showerheads, toilets, washers, etc. can go a long way towards the goal of water conservation. The up front costs for these businesses to perform upgrades might be high, but it will pay off in the long run as less water will be used. For example, the Laundry Lounge already have High Efficiency washers but they can upgrade their washers to newer models. The newer models tend to be \$300-\$400 more expensive but the newer models can conserve more water, which decreases their water bills even more, which in the long run can help this laundromat by saving more money. At the Hyatt Place UC Davis Hotel, since most of the water is allocated to domestic/restroom, followed by landscaping and laundry, the staff can upgrade guest rooms and water landscape wisely. To upgrade the guest rooms, they can install water efficient faucets, showerheads, toilets, and flushing urinals. They can also allow guest the option of reusing towels and bed linens ([epa.gov](http://epa.gov)). For laundry, they can upgrade to more efficient laundering equipment. We recognize the Hyatt hotel has incorporated native plant species that requires less water in the front yard, but they also have a grass lawn in the backyard that requires more water from sprinklers. They can cut down on water loss from evaporation, wind, and runoff using clock timers with water efficient irrigation controllers. For example, turning on the sprinklers at night time to keep the water from evaporating. Something else that businesses can do is to simply keep track of their water use on a monthly basis and become mindful of it. Having the awareness of how much water you are using will go a long way.



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