WATER USE ON CAMPUS

THE STAKEHOLDERS:

The City of Houston - filters potable water, delivers water to customers for a price, retrieves and treats sewage water, manages storm drainage systems

Univeristy of Houston - a customer of the City; draws potable water for use on campus; returns sewage water; drains excess water into stormwater systems

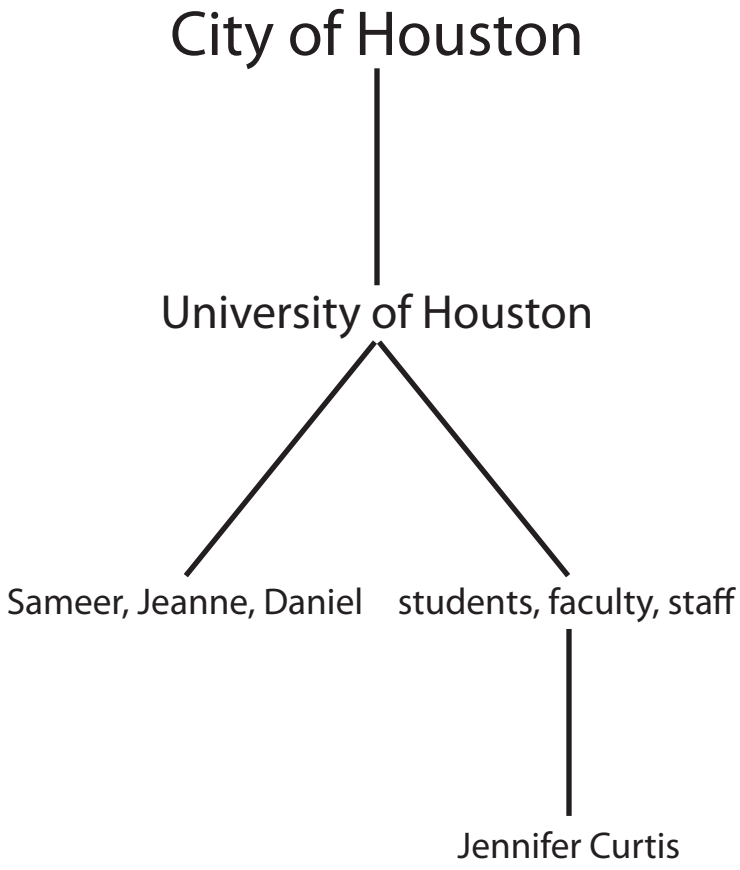
Sameer Kapileshwari - Director of Utilities at UH

Jeanne LaMontague - Assistant Director of Planning at UH

Daniel Hernandez - Grounds Supervisor at UH

students, faculty, staff - users and benefactors of water used on UH campus

Jennifer Curtis - student researcher interested in the system of water usage at UH



THE SYSTEM:

The University pays a variable rate for potable water and waste water services, depending on the size of the line. However, the average rate is .32 cents/gallon for potable water and .53 cents/gallon for waste water.

In Fiscal Year 2009, which ran from September '08 to August '09, UH purchased about 358,311,000 gallons of potable water and paid for the treatment of about 236,217,000 gallons of waste water.

UH spends about $2.5 million annually on domestic water services and waste water services combined.

THE SYSTEM (CONT'D):

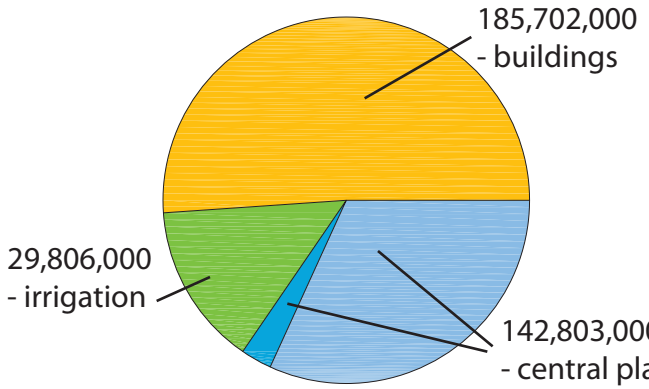
-142,803,000 gallons were used by the Central Plant for HVAC

-of that 142 million, 122,094,000 gallons were lost to evaporation in the cooling towers of the Central Plant

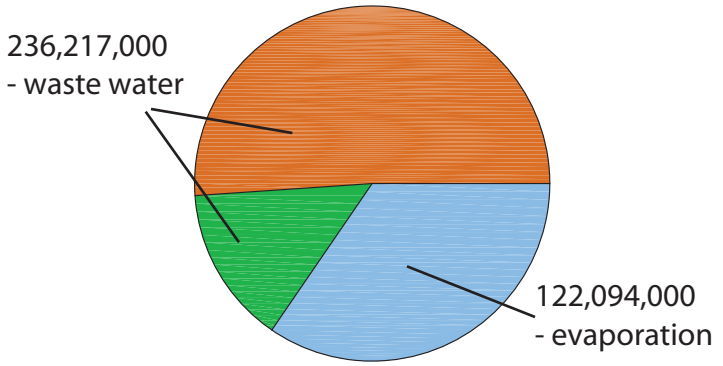
-an estimated 30,000,000 gallons (~10%) was used for irrigation of lawns and fields, in fountains, and for other landscaping purposes

-an estimated 185,000,000 gallons (~50%) was used in buildings

-about 1% of water in the system is from recaptured steam and condensate from heating and cooling processes



WATER COMING IN



WATER GOING OUT

THE SYSTEM (CONT'D):

Water use is not metered by building - the various buildings and irrigation zones around campus are divided at random between different meters, which the City monitors.

There are 53 water meters on campus. Each of these, except for the meter to the Central Plant, is linked to multiple buildings or groundskeeping purposes. There are roughly 50 buildings on campus. It can therefore be assumed that there are also about 50 groundskeeping demand points for water.

Each of these meters corresponds to a unique water rate, depending on its size and draw of water. UH has no way of tracking water by individual use, and depends on the City to determine water usage and cost.

THE SYSTEM (CONT'D):

The City of Houston is responsible for maintaining the stormwater system throughout the city, including on the University of Houston campus, at no additional cost.

Brays Bayou, located on the southern edges of campus, is considered a Floodway by FEMA, and the banks and parts of the neighborhoods and other property nearby are classified as 10-year Floodplains. The entire campus is located in the Brays Bayou Watershed.

Brays Bayou

THE IDEA:

Install meters to monitor the use of water in its various purposes throughout the UH campus.

point 1 - know what water is used for

-without the knowledge of where water is being used, no research can be done on how to eliminate wasteful use of water to reduce utility costs

point 2 - reduce water costs

-the current contract between UH and the City includes sewage treatment payments for all water not lost to evaporation in the Central Plant, including water used for groundskeeping purposes; metering would eliminate this erroneous spending

THE IMPLEMENTATION:

step 1 - determine meter needs — two months

-there are approximately 50 buildings of various sizes on campus, each with its own draw of water; meter types are based on pipe capacity

-determine how the groundskeeping water uses should be zoned for metering, and which meters would be appropriate for each zone

step 2 - purchase and install meters — six months

-each building and groundskeeping zone should have its own meter, and each meter should be installed according to a reasonable schedule for completion of the work involved

step 3 - monitor the meters — minimum one year

-detailed accounts should be kept of each meter's monthly usage, along with appropriate data such as seasonal fluctuations or building occupancy levels, to determine trends

step 5 - renegotiate water contracts — one month

-once a year's worth of data has been collected, the water utilities contract between UH and the City can be reworked to reflect more accurate water usage data collected from the meters

step 5 - adjust water usage — on-going

-recognition of trends will allow for wasteful water use to be eliminated, saving water and money

THE COSTS:

cost breakdown

the meters

-residential meters cost $200-$700
-large scale meters can cost around $2000, and in extreme cases as much as $6000
-assume there are 50 buildings and 50 groundskeeping zones to be metered, with meters costing $2000
-total meter cost is 100 x $2000 = $200,000

the water

half the cost of water for groundskeeping is sewage treatment for water that is either absorbed into the environment or drained into the stormwater system

-assume that 10% of water used on campus is for groundskeeping purposes
-10% of 358,311,000 gallons = 35,831,100 gallons
-35million gal x .53cents/gallon = ~$190,000
-$190,000 is lost each year

the break-even point

if, after all the meters are installed, it is determined that 35 million gallons are not being returned to the sewage system...

-the annual sewage treatment cost for that water no longer has to be paid by the University
-annually $190,000 will be saved
-in two years, money saved will be greater than the $200,000 spent to acquire the water meters

cost calendar

year 0

water in: $115,000 for 35 million gallons
water out: $190,000 for 0 gallons

year 1

water in: $115,000 for 35 million gallons
water out: $190,000 for 0 gallons
meters: $200,000 for 100 meters

year 2

water in: $115,000 for 35 million gallons
($190,000 saved)

year 3

water in $112,000 for 32 million gallons
($193,000 saved)
IRR at this point = 56.62%

THE BENEFITS:

-the University can not only recoup the loss of installing the water meters quickly, but also reduce its annual payments for water use on campus

-the University can track water use at all points and eliminate further instances in which the City is charging for a service unnecessarily

-additional research and studies can be conducted to determine where water use on campus may be reduced, or where waste of water can be eliminated

-money saved by metering can be redirected towards further water conservation efforts, such as low-maintenance landscaping or incorporating rainwater harvesting or gray water reuse into new construction

THE RISKS:

-the City of Houston may demand a higher rate for water utilities in return for the reduction in water usage being paid for by the University

-the actual cost of installing the meters may be higher than anticipated, creating a longer than predicted period of return on the investment

QUESTIONS?