Project Green Water

The use of plastic water bottles causes great damage to the earth. We plan to distribute reusable water bottles to Rutgers students, providing access to filtered water.

Tag Words: Plastic; Bottles; Environment; Harmful; Reusable Bottles; Filtered Water; Damage

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Summary

The purpose of this project is to reduce the use of plastic water bottles and therefore reduce their harmful effects on the environment. These include the waste they cause and natural resources they use in production. This project will provide reusable water bottles to the Rutgers community and also give them access to clean water stations that will have filtered water. These bottles will be given through donations so there will be no profit made off of this project.
The Issue: Plastic Bottles

Bottled water produce unnecessary garbage and consume vast quantities of energy. Water now costs $2.50/liter which is more than gasoline at $10/gallon. Also the transportation of bottled water over long distances involved burning massive quantities of fossil fuels. The most commonly used plastic is polyethylene terephalate (PET) which is derived from crude oil. The disposal of the bottles produces toxic byproducts such as chlorine gas and ash that contain heavy metals. After disposal these bottles can take up to 1000 years to biodegrade. On average 40% of PET bottles actually get exported rather than recycled. Water bottling plants can cause water shortages in their surrounding areas which can negatively affect surrounding areas and farmers. Bottled water requires no testing by certified labs, and consumers often are not informed of contaminations.

Regulations and standards in water:
Rutgers receives its drinking water from Middlesex Water Company. The Middlesex Water Company receives surface water from Spruce Run and Round Valley Reservoirs. It receives groundwater sources from Park Avenue, Maple Avenue and Spring Lake Wellfields in South Plainfield and from its Tingley Lane Wellfields in North and South Edison. Water is monitored at each wellfield, each plant and throughout each distribution system.

Every year they release an annual report telling their customers about what compounds are being federally regulated and what the amounts measured in the final product are. The compounds being measured range from different chemicals to bacteria and organisms. The final water product that is distributed to the community is monitored and regulated with standards from the EPA (Environmental Protection Agency).

Some of the main inorganic contaminants and primary standards that are monitored in the water include arsenic, lead, and nitrate. Each of these is a health concern and lead is believed to be a suspected carcinogen. Arsenic is naturally occurring and is hard to prevent actually entering the water cycle. Lead is not particularly naturally occurring and is usually present due to lead piping in water systems.

The main microbial organisms that are monitored include fecal coliforms. This microorganism is a main indicator of polluted water and needs to be removed from the water. They are a health risk because they can damage the human digestive system and cause diarrhea.

There are also a number of secondary standards that are included in monitoring, but are only considered for aesthetic standards. These are copper, iron, chloride, fluoride and sulfates. They are not all a big concern of health but should be monitored if anything happens with the treatment plant. Many types of disinfection byproducts are formed from treating the water including trichloroethylene, trihalomethanes, and haloacetic acids and these are all monitored as well.

The EPA standards are stringent, but the Middlesex Water Company 2008 Annual report shows that all are under the MCL (Maximum Contaminant Level) and that it allows for a margin of safety, which should not be a danger to human health under these levels. There are other
standards that are considered important, but not actually regulated. They are called MCLG (Maximum Contaminant Level Goal). They are not regulated, but are considered public health goals that are set for extra safety and constitute an obtainable goal of 0 for carcinogens. These standards are safe for human use.

The Pros and Cons of Bottled Water

Pros
- Provides water for water-scarce countries
- Better tasting than tap water
- Contaminants removed through several types of processes
  - Micron filtration
  - Distillation
  - UV light
  - Ozonation
- Convenient when people are out of their homes

Cons
- Produces unnecessary garbage
- Consumes vast quantities of energy
- Costs more than gasoline ($2.50/liter, $10/gallon)
- Transportation of bottled water over long distances involves burning massive quantities of fossil fuels
- Most commonly used plastic is polyethylene terephthalate (PET), which is derived from crude oil
- Disposing of used bottles produces toxic byproducts such as chlorine gas and ash containing heavy metals
- Buried water bottles can take up to 1,000 years to biodegrade
- On average, 40% of PET bottles actually get exported rather than recycled
- Water shortage in areas of bottling plants (Texas and Great Lakes region)
  - Negatively affects farmers, fishers, and others who depend on water for livelihoods
- No testing done by certified labs
- Public often not notified of any contaminations

Different Types of Reusable Bottles

There are many alternatives available to using plastic recyclable water bottles. Most of these options do not contain Bisphenol A, or BPA, a harmful compound used to make disposable plastic bottles (SIGG). Some alternatives to using such bottles are those made by Swiss company SIGG, Spanish manufacturers Laken, and USA-based companies Earthlust and Nalgene. As most things do, the bottles made by these companies also have pros and cons. In this article, we will discuss the benefits and disadvantages of these alternative bottles.

SIGG bottles are stainless steel bottles that contain an EcoCare liner. This liner makes the bottle safer than disposable bottles because there is no BPA in the liner. Additionally, the liner prevents the stainless steel metal from seeping into the water (SIGG). This maintains the taste of water without compromising it. A disadvantage of stainless steel bottles is that they are not
easily recyclable. They must be recycled by scrap recyclers (SSINA); however, most people do not find the need to recycle a SIGG bottle due to its ability to withstand long term use (SIGG).

Laken bottles are made of aluminum, and like SIGG bottles, are BPA-free. They are the only brand of aluminum bottles that are certified as BPA-free (Laken). They contain an inner liner that prevents the metal from leaking into the water (Laken). Aluminum is recyclable, thus Laken is contributing to make the earth a greener planet. Additionally, Laken bottles are delivered in 100% renewable or recyclable packaging, so it can be recycled and reused again. This is another display of how Laken is conducive to helping the environment (Laken).

Earthlust bottles are also made from stainless steel and are BPA-free; however, unlike SIGG bottles, they do not have a liner (Earthlust). This is a disadvantage because the metal can seep into the water. Nalgene bottles are made from BPA-free plastic. They are made for long term use, but because they are made from plastic, they can also be recycled. This is an advantage of using Nalgene bottles because they can be easily disposed, unlike stainless steel bottles.

SIGG, Nalgene and Earthlust bottles can be bought in stores and online; however, Laken bottles are only sold online. They range in price from five dollars to thirty dollars, with Nalgene at the lower end and SIGG bottles at the upper (SIGG; Specifications and Care). Although many consider these prices expensive, investing in one of these bottles is cheaper than buying bottled water in the long run.

Bacteria in Water Fountains
Water fountains are much more treacherous than one might have originally thought. A thirteen-year-old, Kyleray Katherman, did a school project that revealed the truths behind the myths. Katherman discovered that the water fountain’s water was not as clean as the dirtiest toilet in his middle school (ABC News). Katherman challenged the school’s decision to ban water bottles. Reusable water bottles, if cleaned regularly, are one of the answers to the problem of dirty water fountains. The water fountains near Katherman’s middle school gym were the dirtiest. Toilet water is usually cleaner because toilets are regularly flushed and cleaned regularly while water fountains have sitting water and a spigot that rarely is sanitized.

Germs and bacteria are prominent in gymnasiums. It does not matter how expensive a gym is, germs linger all around on exercise mats, bikes, drinking fountains, showers, and more. These germs will make one ill especially if he or she is elderly, rundown or a compromised immune system (Daily News). Some common types of bacteria found at gyms in New York have been brevundimonas diminuta (fecal bacteria) and staphylococcus epidermidis (skin bacteria). These have been found in water fountains at Crunch Fitness in New York (Daily News). Bacteria causing conjunctivitis, usually found in soil, were found at a Dolphin gym in Astoria, Queens (Daily News).

NSF International, a non-profit health organization did a test to see which items in schools were most infected. NSF’s findings found that bacteria on door handles, toilets, and other surfaces were fewer in count because these surfaces are cleaned and disinfected most frequently (Curious Dad). Fountains are much more dangerous. Drinking water fountain spigots had the highest amount of bacteria of the tested surfaces – 2.7 million bacterial cells/in(squared) (NSF).
There are various water filters that should be used in schools that will eliminate bacteria. These include the Model UC-IL-3/8-CER-S, Model UC-IL-3/8-CER-I, Model UC--IL-3/8, and the INLINE WATER FILTER (Filter IL KDF/GAC) (The Water Exchange). These will remove 99.9% chlorine, heavy metals, pesticides, and other chemicals (The Water Exchange). The Inline Water Filter (IL) will be the best option for smaller refrigerators, drinking fountains, and schools that are on a budget.

Another option worth exploring is the EcoBlue Cube. This company makes EcoBlue Cubes that reduce water usage up to about 99%, work with existing urinals, eliminates odor, non-toxic biodegradable, environmentally friendly, prevents blockages, and saves money and energy (EcoBlue). Since this is only made for bathroom urinals so far, it would be wise to converse with this company to convince them to make a similar product outfitted for drinking fountains and other water-related machines.

The Service Project: Filtered Water for RU

The plan would involve making filtered water more readily available at Rutgers for students, and providing reusable water bottles to students to use for the filtered water. At least one water fountain in every Rutgers University building would distribute filtered water. These “Clean Water Stations” would be marked by a University approved sign to inform students of their presence. There would be an added web link on the Rutgers University website about the “Clean Water Stations” so that students and visitors could familiarize themselves with were they are.

To further encourage drinking filtered non-bottled water the university would start a campaign that would involve giving all students a free reusable water bottle. The distribution would follow the same lines as the football and basketball student shirt giveaways. There will be designated tables around each of the four campuses, in which the times and locations would be advertised through mass student e-mails, advertisements in the Daily Targum, and flyers. A student would simply have to show up at one of the locations and swipe their RUID card to receive a water bottle. Along with the water bottle each student will be given a fact sheet about safe ways to sanitize their reusable water bottles. This would include bleaching ratios and appropriate lengths in between each wash. At these tables would also be information booths to inform students of the hazards of bottled water, unfiltered water, and not cleaning your reusable water bottle. If a student cannot make of these scheduled table times, left over bottles will be kept at the student centers where they can swipe to get their reusable water bottle. The bottles that would be given out would be giving out are Nalgene bottles. As stated earlier they are cheaper than the other alternatives and just as safe. Nalgene bottles can be recycled unlike the other options.

With budgets being tight and this being a costly project Rutgers could acquire sponsors. Rutgers is a Pepsi school and works closely with them regularly; they would be a prime sponsor due to their company size and donation budgets. Also they would be able to advertise on the bottles. They could just have their trademark on the bottle along with the Rutgers logo or they could use Rutgers as the charter school for a nationwide campaign and use a catchy slogan such as “Clean Water” presented by Pepsi. Other corporate sponsors could do the same thing, or the project could be split among many sponsors as to split up the cost. As the project continued Rutgers would be able to increase the amount of “Clean Water Stations” until every water fountain
contained filtered water. Also it would be beneficial to give out water bottles each year to every students and have a recycling station at the giveaway tables for students to properly dispose of old reusable water bottles. The spigots would cost about $5.99 each and would be downward facing as to make it easier to fill up the bottles. To keep the filters clean they will be changed every two months.

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Appendices

BUSINESS PROPOSAL
Papa Pat’s Water
Pat Mullen, Anna Norcia, Brian Libretti, Colin Evans, Puja Patel
18 Hardenburg St.
New Brunswick, NJ, 08901

To Whom It May Concern:
The Problem:
Disposable plastic water bottles are not properly discarded and cause a tremendous amount of damage to the environment. Many students buy disposable name brand water bottled in plastic that harms our environment and is a complete waste of money, resources, and inflicts stress on our already endangered environment. We want to provide Rutgers students with a reusable bottle that is environmentally friendly. We would also like to propose to have clean water stations, similar to water fountains, which have filters to provide clean water to fill the bottles.
Our proposed business:
Our company wants to provide students with reusable water bottles and clean filtered water. We will be asking Pepsi Co. for reusable water bottle donations. This benefits Pepsi Co. in that their name is on the project and our company because it will not cost us as much. Additionally, we would like to set up filtered water stations that have downward spraying spigots appropriate for filling water bottles. Regular water fountains do not provide adequately filtered water and do not have proper spigots for filling water bottles. Our company’s filtered water stations will fix this problem and help save the environment.

Budget:
For our project we have two main costs. A variable cost for the filters includes a $50 maintenance fee for each time the filter needs to be replaced. A fixed cost to replace the filter every time is $55 for labor. The filter must be replaced every few months due to the amount of water that will filter through and also due to bacteria buildup in the filter. We plan to provide students at least 20oz of water per fill for no charge. When we provide the water to the students at no cost, all water and maintenance costs will be funded by the University and Pepsi Co. allocations. If we did not provide the water for free then it would have been charged $1 per fill of 20oz.

Here is the monthly income statement if fills at the station cost $1 per fill:

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<tr>
<td><strong>SALES</strong></td>
<td>$7,000 per month @ $1</td>
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<tr>
<td><strong>COGS</strong></td>
<td>$3 per 1,500 gal (tap water)</td>
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<tr>
<td><strong>GROSS PROFIT</strong></td>
<td>$6,997</td>
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<tr>
<td><strong>VARIABLE COSTS</strong></td>
<td>$50 per month maintenance</td>
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<tr>
<td><strong>FIXED COSTS</strong></td>
<td>$55 per 1,500 gal (filter)</td>
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<tr>
<td><strong>EBIT</strong></td>
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<td><strong>TAXES</strong></td>
<td>$2,067.60 15-40%</td>
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<td><strong>NET PROFIT</strong></td>
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Work Plan:
The filters and spigots will be installed by Rutgers facilities maintenance employees. They will be trained to change the filters appropriately and they will keep a log of when the filters are changed. The water will come from the municipal water source. The expected results are that waste from plastic bottles will decrease within the university and quality of drinking water will increase for the Rutgers community. A major risk is that if the municipal water is contaminated, the filters will become clogged and will have to be replaced much more frequently.

Conclusion:
Please take the time to consider this proposal. It is important to the ecological prosperity of our University while reducing health hazards to students. This project will help the University take another step toward a “green” future. We are confident that this model will be a successful pilot project in which other Universities will learn from and eventually implement on their own campuses.
Sincerely,
Brian Libretti, Anna Norcia, Colin Evans, Pat Mullen, Puja Patel
Editorials

Papa Pat’s Water
Brian Libretti
Sent to: NJ.com

Water fountains are much more treacherous than one might have originally thought. A thirteen-year-old, Kyleray Katherman, completed a school project that revealed the real truth behind the myths. Katherman discovered that the water fountain’s water was not as clean as the dirtiest toilet in his middle school. Finding this very disturbing, the curious teen sought out to have his questions answered regarding the potential health hazards in his school. Katherman challenged the school’s decision to ban water bottles because he presumed the spread of germs would be reduced if students did not share public facilities. Reusable water bottles, if cleaned regularly, are one of the answers to the problem of dirty water fountains. After studying, the water fountains near Katherman’s middle school gym were the dirtiest. Toilet water is usually cleaner because toilets are regularly flushed and cleaned regularly while water fountains have sitting water and a spigot that rarely is sanitized.

Germs and bacteria are prominent in gymnasiums. It does not matter how expensive a gym is, germs linger all around on exercise mats, bikes, drinking fountains, showers, and more. These germs will make one ill especially if he or she is elderly, rundown or a compromised immune system. Some common types of bacteria found at gyms in New York have been brevundimonas diminuta (fecal bacteria) and staphylococcus epidermidis (skin bacteria). These have been found in water fountains at Crunch Fitness in New York (Daily News). Bacteria causing conjunctivitis, usually found in soil, were found at a Dolphin gym in Astoria, Queens.

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One might start to wonder how to combat the spread of disease, germs, and infections, especially now that people are more health conscious with new strands of viruses, like H1N1, have been emerging. Filters for water fountains and other water facilities should be implemented quickly. There are various water filters that should be used in schools that will eliminate bacteria. These include the Model UC-IL-3/8-CER-S, Model UC-IL-3/8-CER-I, Model UC--IL-3/8, and the INLINE WATER FILTER (Filter IL KDF/GAC) found from The Water Exchange, a filter manufacturer. These will remove 99.9% chlorine, heavy metals, pesticides, and other chemicals. The Inline Water Filter (IL) will be the best option for smaller refrigerators, drinking fountains, and schools that are on a budget.

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Americans, and even those around the world, have the power to cease the spread of deadly diseases. Filters, proper awareness, and devices like the EcoBlue Cube are ideal and essential to improve our health.
More Like Bottled Waste

Everywhere I go I seem to see bottled water. It’s in supermarkets, offices, schools, and any place of recreation. It’s in vending machines next to the soda, which becomes obviously a healthier choice for many reasons. Bottled water has become a normal part of life such as packing bottled water for work, for a picnic, in the kid’s lunchbag for school. Sure it’s an easy, convenient way to quench your thirst, but no one seems to know the real story behind bottled water.

Bottled water is practically one of the reasons that we’re running out of natural resources. The most common source of plastic used in the water bottle polyethylene terephthalate (PET), which is derived from crude oil. Crude oil? Don’t we use that to produce petroleum, which eventually goes to fuel our cars?

Also when it comes down to buying bottling water in those packages it actually turns out to be more expensive than the gas we buy to fuel our cars. A gallon of gasoline in the New Jersey area can range from $2.53-$2.60 and possibly more. A gallon of water from bottled water alone comes out to almost $10 per gallon! So by buying bottled water the consumer also feels it in their pockets.

There is also tons of waste associated with bottled water. Even though it is recyclable, most of the water bottles end up in landfills or incinerators due to a lack of public awareness and just plain ignorance for not recycling. Those pre-packaged water bottles can take thousands upon thousands of years to degrade in a landfill if not disposed properly!

So how do we combat this problem of ignorance and waste and also save money doing this? Well the clear solution is reuse. By buying a $10 Bisphenol-A (BPA) free water bottle you can avoid spending tons of money on bottled water every week when you’re already paying for tap water anyway. BPA free is better for your health and you can avoid problems with the plastic leaching out. Keep reusing your bottle and wash it every week. All of the water coming from your sink is treated at a water treatment plant and monitored with strict standards from the Environmental Protection Agency (EPA), so your health is in check. Even if feel kind of shaky on just drinking tap water, you can always use a filtered water system such as Brita or PUR. They are cheap and easy to use.

So next time you go get ready for work, or an outing make sure to bring your reusable water bottle instead of spending money and creating unnecessary waste in your neighborhood!

Anna Norcia
Sent to: Asbury Park Press Editorials, yourviews@app.com, 11/2/09

As one of the most abundant resources on the planet water is often overlooked as something that needs attention. About three quarters of our bodies and the earth are made up of this amazingly simple substance, and every day millions of people use gallons of water without
knowing anything about it; more specifically, where it comes from. Due to recent promotions many Americans no longer prefer to get their water from their tap and therefore rely on bottled water. Although bottled water may be filtered thoroughly, what most consumers don’t know is that tap water is very clean as well. Water that is provided to you in most towns goes through a strict filtering process. As a matter of fact no filtering standards (even for bottled water) are as strict as the governments. The issue only arises when the pipes bringing water to the consumer are not new. Substances such as lead and other metals can leak into your water. However this can easily be fixed by a filter. There are numerous kinds of filters depending on what you specifically are looking for. These filters can range in price and precision of filtering.

Not only is tap water safer than you thought, bottled water can cause serious effects on your health and the environment. Reusing these plastic bottles can lead to allowing harmful substances to leak into your body. This is from the breakdown of the plastic in the bottle. Also the effects of these bottles on the environment are terrible. They take over 1000 years to degrade, cause water shortages by bottling plants, use various amounts of energy to make, and use up gasoline. Crude oil is used to make these bottles and gasoline is used to transport them.

Something that we can all do is start using safe reusable bottles and filtered water. In your home this is not a problem. You can reuse cups and most people have filtered water. However when you are out here are a few things you can do to keep yourself healthy and help the environment at the same time. First bring a reusable water bottle with you. These are bottles that are made to be refilled numerous times. There are many different types depending on what you prefer. There are those made out of non-degradable plastic, some made out of stainless steel, and others made of ceramic. Depending on what you prefer or feel comfortable with any of these are good options. Second ask the places that you spend the most time (work, the gym etc.) if they have filtered water. If not tell them all of the things that can seep into their water and try to ask for a water filtration system. Just remember that every person can make a big difference in the environment, and you can start by drinking filtered water out of a reusable bottle.

Colin Evans

The Star Ledger
George Arwady: Publisher
garwady@starledger.com

“Future Outlook for Water Consumption”

I have noticed a trend over the past year or so involving students and water consumption. It involves the use of eco-friendly bottles, such as SIGG or Nalgene bottles. I see many students carrying these bottles to class to get their daily amount of water each day. This is a very positive change in the right direction towards limiting our use of plastic water bottles, which are harmful to the environment. I am not saying that everyone in the world should use a SIGG or Nalgene bottle because buying plastic water bottles does benefit the economy. However, there needs to be a balance. Water companies, such as Nestle, continue to drill in places where the environment is becoming extremely effected in a negative manner because people continue to buy large amounts of bottled water. With the use of eco-friendly bottles, the issue of plastic bottle pollution and excessive drilling may slow down. People can just filter tap water through their homes or visit fountains that have filtering systems. The only problem with getting water
from other fountains is that it is not obvious whether the water is filtered or not. However, there are many fountains at Rutgers that are filtered and I constantly see students using them and filling up their Nalgene and SIGG bottles. The trend for further use of eco-friendly bottles will hopefully continue to prosper, thereby, limiting the large consumption of bottled water.

Puja Patel


According to the New York Times, Americans drink more than 30 billion single-serving bottles of water a year. However, only 12 percent of these bottles are recycled, leading to copious amounts of non-biodegradable plastic waste. Plastic water bottles don’t only harm the environment, but also contribute many health risks by releasing the harmful compound Bisphenol A (BPA). If we distribute BPA-free reusable bottles to Rutgers students, we can significantly reduce the amount of plastic waste and eliminate the health concerns arising from BPA.

Bisphenol A is a health-damaging chemical found in plastic water bottles that is released when a bottle is even slightly heated. According to Forbes Magazine, BPA can lead to cancer, diabetes, heart disease and developmental problems in children. Most consumers are unaware that the bottled water they buy is contaminated with carcinogenic toxins, since false advertising leads them to believe that they are drinking purified, clean water. By using a BPA-free bottle, there is no longer a risk of contracting disease.

Additionally, bottled water manufacturers do not tell consumers that bottled water does not have the same regulations as tap water. Tap water is regulated by the government and must pass many tests before it can be delivered to your tap at home. The EPA regulates tap water, whereas the FDA regulates bottled water. According to the EPA, the agency has standards that are stricter than the FDA, and so your tap water is probably safer that bottled water. Additionally, companies such as Aquafina and Dasani use public sources as their water supply, essentially making consumers pay more for the same water they can get at home.

Some alternatives to recyclable water bottles are Sigg and Nalgene Bottles. Swiss-made Sigg Bottles are made of sturdy aluminum and have a liner which prevents harmful substances from leaching into the water. Nalgene Bottles are made of a reusable plastic which does not contain any harmful toxins. Most of these bottles cost about $6 to $30 and can last up to 20 years. On the other hand plastic bottles can cost as much as $5 to $10 a case. If you drink one bottle per day, that’s nearly $150 spent on water bottles annually. In the long run it is exponentially cheaper to use a reusable bottle.

A few other students and I plan to distribute reusable plastic bottles, similar to the way that Rutgers football t-shirts are distributed. Since Rutgers is a Pepsi Co. school, we plan to discuss with them if they are willing to donate reusable bottles to the school. With nearly 29,000 undergraduate students attending Rutgers University this year, we can significantly reduce the amount of plastic waste contributed if students substitute reusable bottles for recyclable ones. Additionally, money-conscious students will not have to worry about buying water bottles since they can easily refill them at the many water fountains on campus.

Puja Patel