Sustainable Water Solutions and Campus Water Quality Analysis

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Sustainable Water Solutions PHYS 386H – Prof. Nicholas P. Truncale

Global Water Sustainability

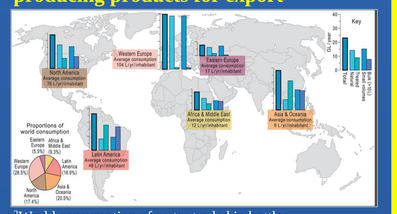
Economics

Population growth and increasing demand for water will reduce the global per capita water resources by more than a third in the coming 50 years

In some countries privatization of water has proven successful as a way of providing cleaner water to the poor, in others, it has only made matters worse

Virtual water' is the term given to the water used to make products; it equals the total volume of water it requires to produce a commodity

16 percent of global water is used for producing products for export



[2]World consumption of water traded in bottles

Ecology

3.6 Million people die each year from waterborne disease

Agriculture is the largest use of water in the world

Nitrates from agricultural fertilizers are a rising threat to water quality

Removing nitrates and other bad substances from public water supplies is very expensive

Almost four children die every minute from poor sanitation and water supply

'No-plumbing disease' is a combination of the many diseases and problems causes by the lack of public water systems, which receives a lot less funding than malaria or AIDs but tends to kill even more children than AIDs, HIV, malaria, measles and tuberculosis combined

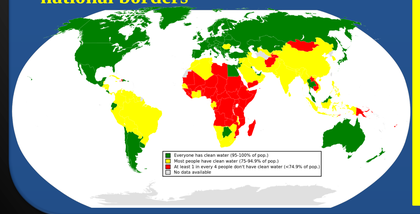
Politics

Inadequate governance and corruption within countries play a large role in the water crisis, especially in underdeveloped countries

Commercialization, privatization and globalization of water cause conflict between profit motive and service provision

Multinational companies, national governments, and the people are beginning to clash over water resources

Shared water resources are a main source of this conflict, with two-thirds of rivers in Africa and Asia crossing national borders



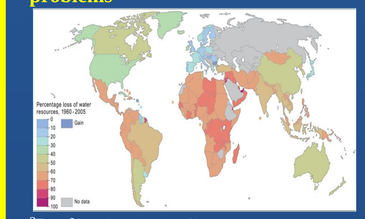
Culture

Education and government help are a key to adopting cleaner and safer water strategies

Poorer countries are the most vulnerable to water stress

The growing urban poor, the old and the very young are the worst affected

Many suffer from harsh climates, unreliable rainfall, poor governance and corruption, and rapid population growth, plus a lack of expertise, technology and finance to overcome problems



[2]Decline in per capita water resources since 1960

The Method

Testing the water in the buildings and houses on and around campus is an experiment that was performed to see if there are trends in the water quality at The University of Scranton. The goal of the experiment is not to decide if the water is drinkable, but rather to see how the water here on campus compares to clean water standards in the United States, as well as to find any trends in the water quality that may prove what buildings if any, have the best water, and if the location of these buildings play a role in the quality of their water.

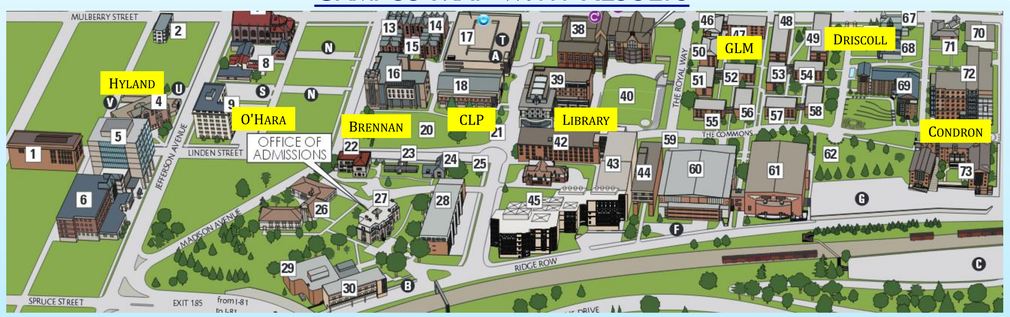
Technology

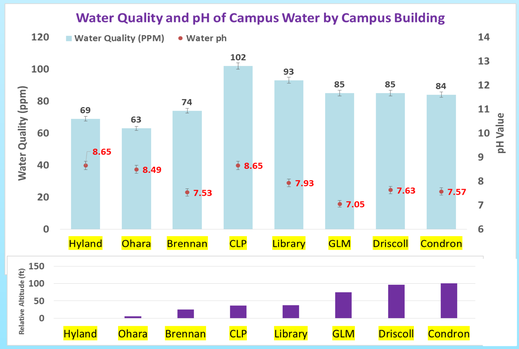
[4]pH meter (above); [3]TDS&EC meter (below)

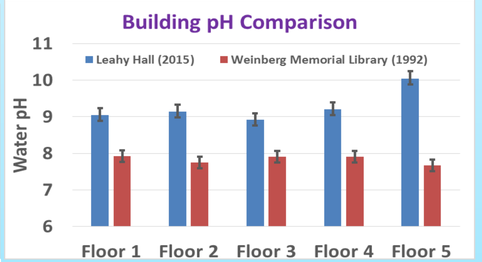
Procedure

Before taking water from the taps, the nozzle was wiped with a paper towel and the tap was run for about a minute before collecting both the cold and hot water to make sure that the temperatures were the coldest and hottest samples. The pH meter and the TDS&EC meter were both places into the water at the same time to ensure that the temperature was still the same for both readings. After about a minute in the water or when the readings on the meters were stable for 30 seconds. The results of the temperature, total dissolved solvents (TDS), electric conductivity, and pH were recorded.

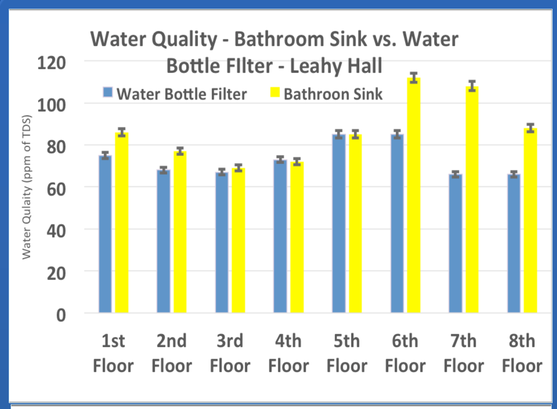
Campus Map with Results

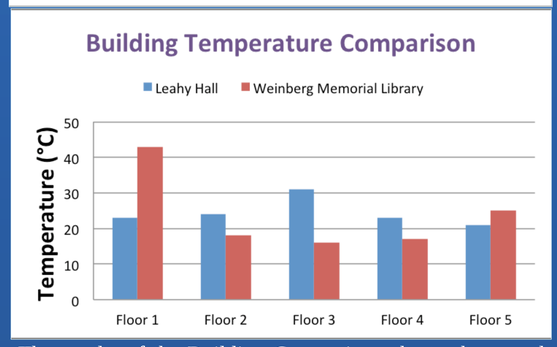




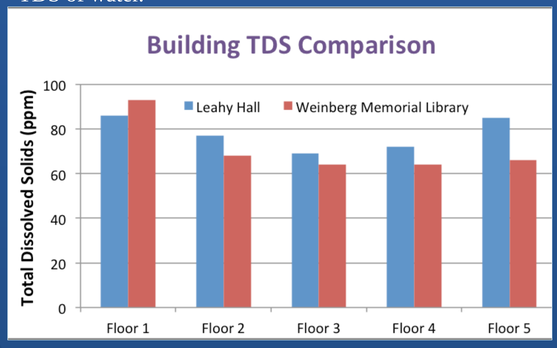


[5] The ideal pH level is between 6.5-8.5. Below 6.5 is too acidic and could cause damage to piping and leach metals into the water. Above 8.5 is too basic and is aesthetically unpleasing, discoloring water.





The results of the Building Comparison charts above and below suggest that total dissolved solids (TDS) is dependent on the temperature of the water, however, Floor 5 is an outlier and is a case for further investigation. It is important to note that this finding is consistent with the accepted relationship between the temperature and the TDS of water.



Citations

[1]Abdalla, Charles. "Shaping Proposed Changes to Pennsylvania's Total Dissolved Solids Standards." *Agricultural Research and Cooperative Extension.* The Penn State University, 2009. Web. Apr. 24 2016.

[2]Jones, J. A. A. *Water Sustainability:* A Global Perspective. London: Hodder Education, 2010. Print.

[3]Water Quality Test Meter. Digital Image. *Amazon.* Amazon.com. Web. 24 Apr. 2016

[4]Pocket Size pH Meter. Digital Image.. *Amazon.* Amazon.com. Web. Apr. 24 2016.

[5]"The PH of Water." *PH*. Water Research Watershed Center, 2014. Web. 24 Apr. 2016