Turbidity & TDS Monitoring at Coastal Carolina University

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Introduction

Our drinking water is heavily impacted by stormwater, which is water from rain or snow that flows into small bodies of water such as ponds, which can then ultimately flow into larger bodies of water such as rivers. Stormwater collects different pollutants which range from suspended and dissolved solids but are not limited to micro and macro-organisms such as parasites. These pollutants can be measured through turbidity and TDS. Stormwater monitoring is extremely important because if the water is polluted it can degrade coastal environments, and if flowing into rivers where people get their drinking and washing water from, it can ultimately cause illness. The stormwater quality monitoring program at Coastal Carolina University collected 717 samples from the Wall Pond Bridge site and tested for turbidity and TDS biweekly from Oct 13, 2011-Nov 16, 2020. These results are important because Conway residents get their water from the Waccamaw River, in which CCU's small ponds flow into.

Importance & Motivation

- If turbidity and TDS were not monitored and treated regularly, then our daily water use would be contaminated, making us vulnerable to illness.
  - For example, hundreds of thousands of people in Milwaukee, Wisconsin had intestinal illnesses (cryptosporidiosis) because of water-system problems due to abnormal turbidity. This caused awareness on the importance of turbidity monitoring.
- Turbidity is a measurement that monitors how clear, cloudy, or opaque the water is in relation to micro and macro suspended matter that can sometimes be harmful to humans.
- TDS represents the number of dissolved particles in a volume of water, measured in mg/L. These materials can range from dirt, animal and sea life decay, and even fecal matter.

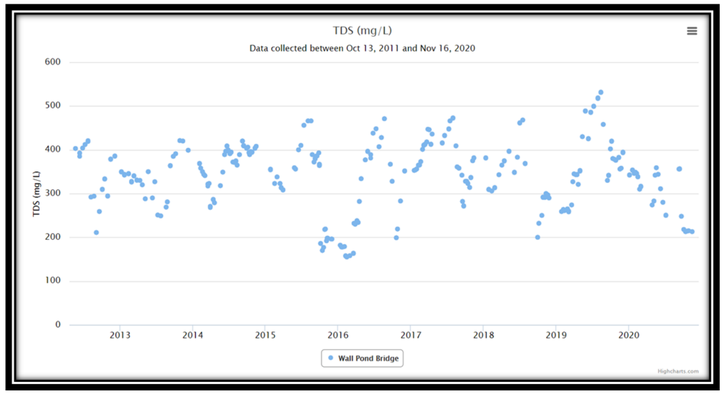
Materials & Methods Used

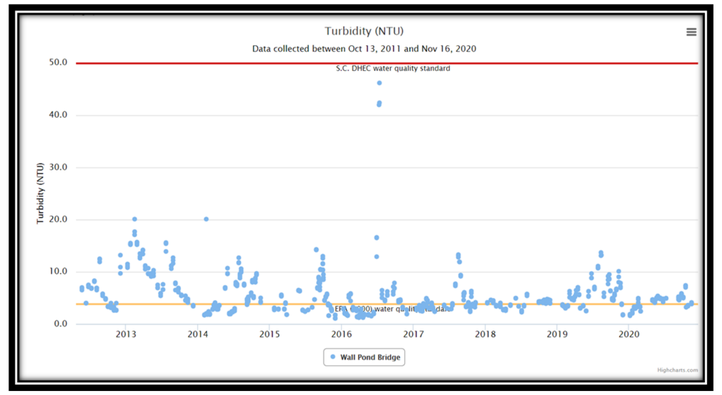
- A turbidimeter measures the relative clarity of a fluid by measuring the amount of light scattered by particles suspended in a fluid sample. At CCU, either a Hach 2100P Turbidity Meter Calibration or a Hach 2100Q Turbidity Meter Calibration (pictured below on the left) is used to test these parameters.
- TDS can be solids that are dissolved salts (sodium, potassium, calcium, magnesium, chloride, bicarbonate, and sulfate) and is measured using an Orion Water Quality Monitor (Pictured below on the right, The Thermo Scientific Orion Star A329 Portable pH/ISE/Conductivity/RDO/DO Meter to be exact).

- In South Carolina, normal turbidity levels are considered under 50 NTU (anything above will be considered toxic to the environment), and the majority of samples at the Wall Pond Bridge are well below this standard, exceptions will be during heavy rainfall seasons.
  - Similarly, the United States Environmental Protection Agency (EPA) holds the drinking water standard at about 4.0 NTU and below.
- TDS does not have a mandated level but should regularly be monitored in case of abnormal spikes in measurements.

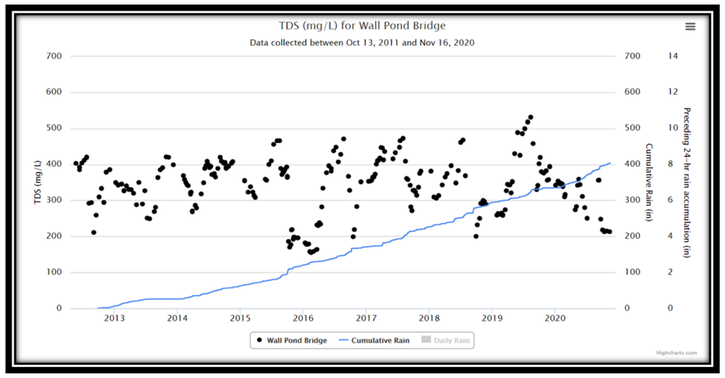
Examples of high turbidity to low turbidity (In most cases, the clearer the water, the lower the turbidity levels)

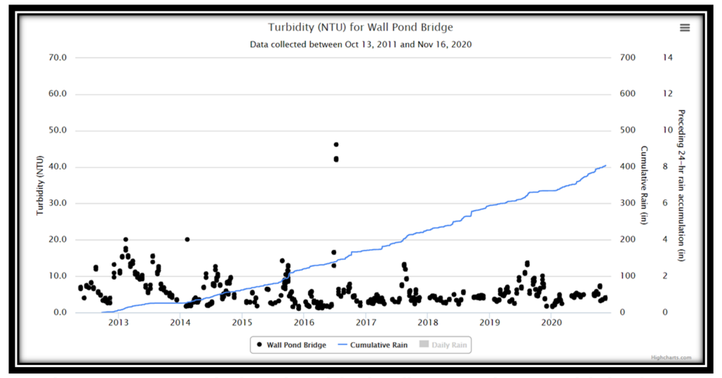
Results





Above shows the time trend throughout the ten years of sampling turbidity and TDS. Notice the TDS levels fluctuate throughout the years.





Above shows the rain trend during the sampling years and as you can see, they correspond closely with the figures above, which show the time trend. This data shows that the rain closely impacts the spikes in turbidity and even TDS levels.

Conclusion

- In conclusion, the campus water monitoring that takes place at Coastal Carolina University not only tests turbidity and TDS, but other water quality concerns like pH, conductivity and more.
- All of these, especially turbidity and TDS, are extremely important to keep up with and monitor because not only does it help keep humans safe and healthy but also helps make sure the water is suitable for the aquatic life that makes CCU's campus attractions stay lively.
- The Wall Pond Bridge was tested for turbidity and TDS biweekly for ten years and proves to stay within the limits of required safety for those around it.
- The results are well above the EPA standards except during peak rain seasons which is when turbidity levels rise due to runoff and water being stirred up.
- The provided data shows that the values for this site were below the 4.0 NTU drinking water standard for the EPA but were also in compliance with the SC DHEC standard of less than 50 NTU (environmental standards) and thanks to the equipment and volunteers who go out to do this testing, this was all achievable.

References

- CCU Campus Volunteer Water Quality Monitoring Database Access http://bccmws.coastal.edu/ccum/index.html
- John Woodard, "What is TDS in Water & Why Should You Measure It?" on February 26, 2021 https://www.freshwatersystems.com/blogs/blog/what-is-tds-in-water-why-should-you-measure-it
- Coastal Waterways, Coastal Waccamaw Stormwater Education Consortium, "Why is stormwater important?" http://cwsec-sc.org/why-is-stormwater-important/#:~:text=In%20short%2C%20stormwater%20is%20important,lake%20can%20contribute%20to%20problems

Acknowledgment

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