

Investigating the Impact of River pH Levels on Drinkability

Comparing pH levels of tap water, river water, and lake water.

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Abstract

The purpose of our project is to see if there is a safer and easier way to source drinking water into our homes. We compared the pHs of the Ottawa River, tap water from our classroom, and Lake Erie to see which best fit the safe drinking water standard and how Lake Erie affects the Ottawa River. We believed that the pH of Lake Erie would reflect the pH of the Ottawa River, as it flows into it. We were incorrect, however, this benefited our experiment. Since the river had safer drinking water, since it was not affected by the pH of Lake Erie, we could have reliable drinking water for the residents of Ottawa Hills.

Introduction

The topic covered in this project answers the question: How will the pH levels of Lake Erie affect the pH levels of tap water and river water? It will explore the pH levels of Lake Erie on certain days and how tap water and water from the Ottawa River relate to it.

More questions to explore in this report include: Is tap water safe to drink? How does the water from Lake Erie flow into the Ottawa River? Could the Ottawa River be a source of tap water? With our research, we have hypothesized that if the pH of Lake Erie water rises, the tap and river water's pH will also rise because they are both sourced from the river.

Water quality is a critical environmental and public health issue. The pH level plays a key role in water safety and ecosystem health. The pH of Lake Erie likely fluctuates due to various factors, including pollution, climate change, and industrial activities. In this project, we will explore more of these ideas.

Lake Erie, one of the five Great Lakes, is a significant source of fresh water for millions in the United States, including our home, Ottawa Hills, Ohio. Due to many factors, the quality of the Ottawa River has become a concern. Lake Erie connects to the Ottawa River and supplies tap water for the residents of Ottawa Hills and many other surrounding cities. So, we explore the question of pH in our waters.

The pH of water is a measure of its acidity, ranging from 0 (highly acidic) to 14 (highly alkaline), with 7 as neutral. According to the US Environmental Protection Agency (EPA), the

ideal pH range for drinking water is between 6.5 and 8.5. Changes in pH can be caused by various natural factors as well as human intervention. Our research should reflect how the pH of our waters compares to this.

Given the Ottawa River's potential role as a water source, it is necessary to analyze whether its pH aligns with safe drinking water standards. If Lake Erie's pH rises due to other factors, there is a possibility that the Ottawa River and tap water pH levels will also be affected.

In conclusion, this experiment and research seek to address the question: How will the pH levels of Lake Erie affect the pH levels of tap water and river water? By examining existing studies on water chemistry and our collection of data and analysis, this study aims to determine whether changes in Lake Erie's pH have a measurable impact on the Ottawa River.

Methods and Materials

Materials:

- pH kit
- Test tube
- Water from both sources
- Thermometer

Procedures:

1. Collect water samples from the river (done by Dr. KG)
2. Take a sample of river water in a test tube
3. Take a sample of tap water from the sinks
4. Use pH strip to test the pH levels of each water source
5. Record the pH in data tables
6. Measure the temperature of river water
7. Record data in files
8. Compare the data found with online pH data from Lake Erie.

We used the Hydrosphere protocol from GLOBE. We only used the materials Dr. KG provided us with, such as the pH kit and test tubes. The pH kit used was the Hydrion 5.5-8.0.

When we performed our experiment, we used a pH kit, test tubes, water from both sources (river and tap), and a thermometer. To begin, we took a collected water sample from the river (done by Dr. KG). Next, we took a sample of river water in a test tube and took a sample of tap water from the sinks in the classroom. We then used a pH strip to test the pH levels of each water source. We recorded the pH and the temperature of the river water in data tables. We found the temperature of the water with a thermometer. Once all the data was recorded in files, we compared it with online pH data from Lake Erie. It is important to be cautious when handling the samples, making sure it is only the sample being tested with no additives. For each day, we recorded the average of two trials.

Presentation of Data and Results

pH of Lake Erie vs. Date

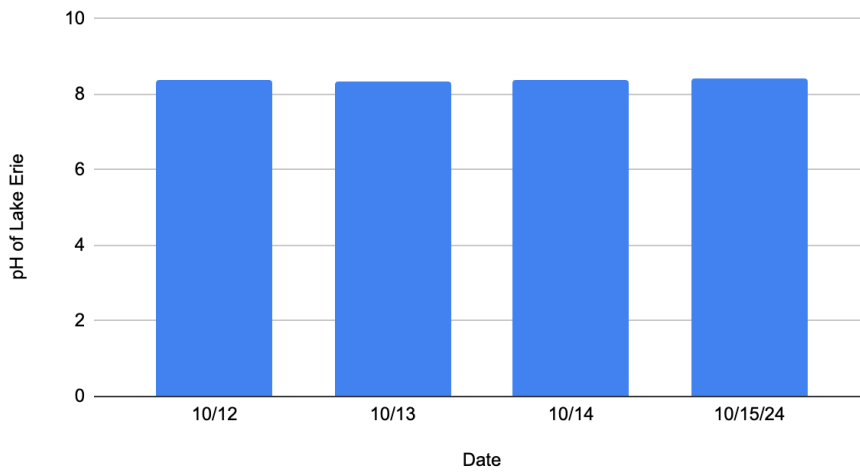


Figure 1: pH of Lake Erie

pH of Ottawa River and pH of Tap Water

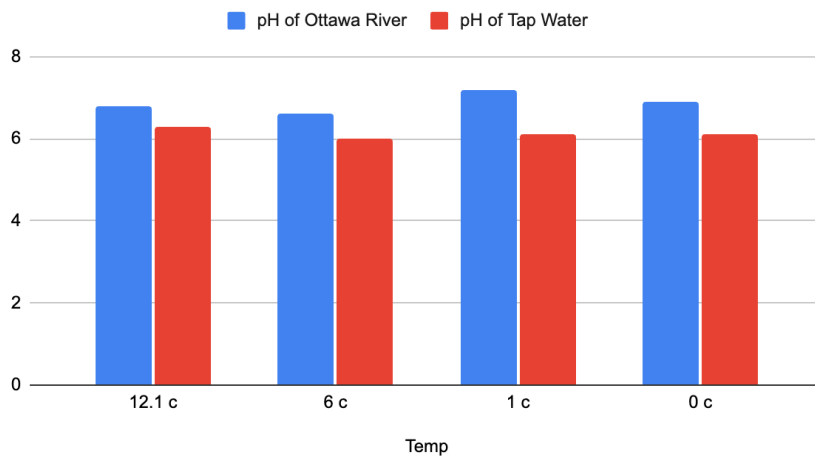


Figure 2: pH of Ottawa River and pH of Tap Water

Analysis and Results

The figures show that the pH of Lake Erie does not directly correlate with the pH of local water sources, tap water, and the Ottawa River. The data shows that the pH of Lake Erie is consistently around 8.3. Our findings suggest that the pH of the Ottawa River is consistently between 6 and 7. The pH of the tap water is consistently around 6. This may be because the water is not directly sourced from there, as the Ottawa River is sourced from the Maumee River watershed. The tap water, however, is sourced from Lake Erie. The pH does not align with the water from Lake Erie. The data also concludes that temperature does not affect the water's pH, as the temperature fluctuates in all dates tested, but the pH does not correlate.

Our hypothesis was not supported. We predicted that if the pH of Lake Erie water rises, the tap and river water's pH will also increase because they are both sourced from the river; however, this was not supported as the results showed the pH of the water sources were all different and did not correlate with each other. The experiment was intended to test the water quality by measuring the pH of different water sources to determine the best source for drinking water. The experiment was performed accurately. Uncertainties in the project may include the pH of other areas of the river.

Conclusion

With the overall average of our pH data coming out to 6.875 from the river and the standard for safe drinking water being anywhere within 6.5 and 8.5, we can safely conclude that our Ottawa River could be a much simpler water source for us. Lake Erie's pH levels are around 8.3, nearing unsafe drinking water. Since the river is closer and healthier, it would be safer and easier for the residents of Ottawa Hills to get their drinking water from the river.

Discussion

As we have concluded that the river water is safer and closer, the next step would be to find a way to source the river water into our homes, schools, and workplaces. We can also see from our research that the pH of Lake Erie does not affect the pH of the Ottawa River, so if there is ever any virus in the Lake again, like in August of 2014 when toxins bloomed in the Lake and prevented us from drinking our water.

Acknowledgments

Dr. KG provided materials, including the pH indicator paper and the samples of river water.

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