Collecting Data About Atmosphere and Hydrosphere at School

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Abstract

The objective of this project was to measure different atmospheric conditions present at Rochester School. We measured aspects such as temperature, pressure, pH in the water, the type of clouds, among others. Later we analyzed the data and came up with conclusions regarding the behavior during the months of february and march

Research Questions

Asking Questions

Does the water from the reservoir present any type of contamination?

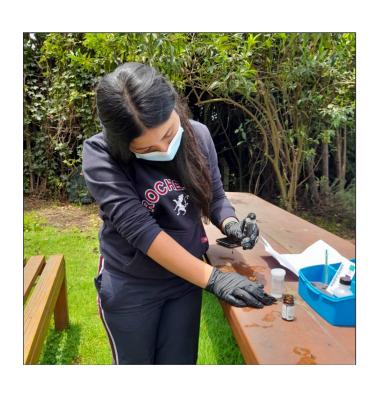What does the quantity of dissolved oxygen represent within the context?

What does an atmospheric or hydrospheric pH variation indicate?

What is the importance of collecting this information?

Introduction

Content Knowledge

According to the Merriam-Webster dictionary, the atmosphere is the gaseous envelope of a celestial body (such as a planet) in this case planet earth, this atmosphere is responsible for allowing life within planet earth. We analyzed atmospheric characteristics such as the temperature of the atmospheric pressure among others and collected data that is going to be used in this project. On the other hand according to the Merriam-Webster dictionary the aqueous envelope of the earth including bodies of water and aqueous vapor in the atmosphere. We utilized the water reservoir, which is a little pond in the backside of the school, to measure different properties that the hydrosphere around the school could have.

Research Methods

Planning Investigations
Describes the planning process

The study was planned and took place at Rochester School, located in Chía, Colombia. The school has a soccer field, where the data regarding the atmosphere was going to be collected, and a water reservoir, where the data regarding the hydrosphere was going to be obtained. For the study, tools and materials such as an infrared thermometer, a barometer, the globe page, a chart with the characteristics of clouds, a pH meter, chemical substances, and others were going to be needed. The data was going to be taken every day at midday.

Carrying Out Investigations
Describes what happened

For the collection of the data regarding the atmosphere, the soccer field and the meteorological station were the places where the collection took place. The temperature was obtained with the infrared thermometer, we collected the average temperature and the temperature from 9 spots of the field. The conditions of the clouds were analyzed thanks to the information provided by some charts that included types, characteristics, etc. For the collection of the data regarding the hydrosphere, the water reservoir was the place where the collection took place. The pH, salinity, and alkalinity data were measured with various samples from the water, which were subjected to different procedures, involving the usage of chemical substances. The data was collected every day, between 11:00 am and 2:00 pm. Tomas was in charge of the experimental part of the experiment, while Juanita wrote down the results. Carolina did both.

Hydrosphere measures dictated by Globe Protocols:
Dissolved oxygen protocol: students will measure dissolved oxygen in the water at their site using a dissolved oxygen test kit or probe.
Salinity protocol: Students will measure the salinity of a salty or brackish water sample using a hydrometer and thermometer.
pH protocol: Students will measure the pH of the water using either pH paper or a pH meter.
Alkalinity protocol: Students will measure the alkalinity of water using an alkalinity test kit.

Atmosphere measures dictated by Globe Protocols:
Barometric Pressure protocol: Students use an aneroid barometer to measure barometric pressure in support of the Aerosols and Water Vapor Protocols.
Clouds protocol: Observe and report which types of clouds are visible, how much of the sky is covered by clouds, and the opacity of clouds.
Surface Temperature protocol: Students use an infrared thermometer (IRT) to measure the temperature of the Earth's surface.
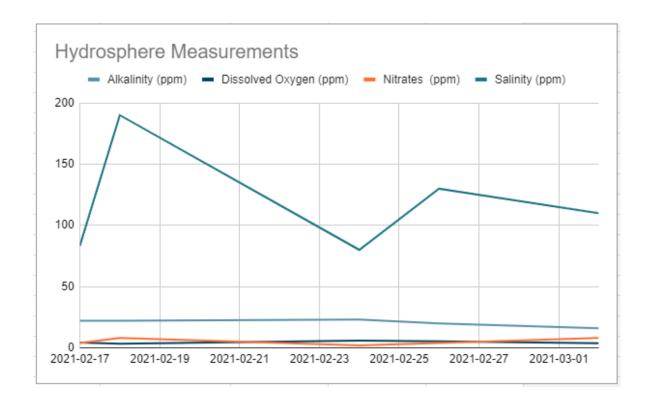
Results

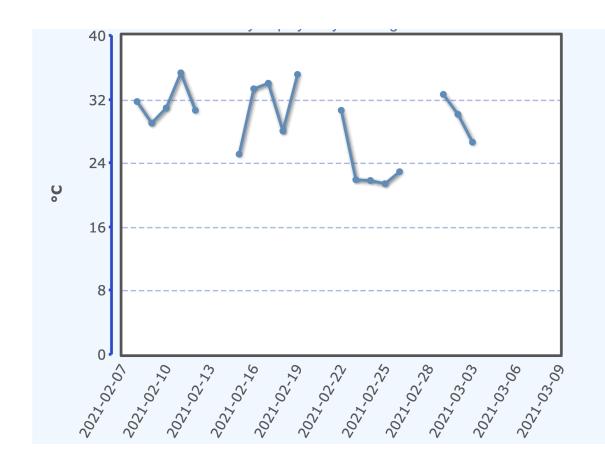### Analyzing Data

Figure # 1
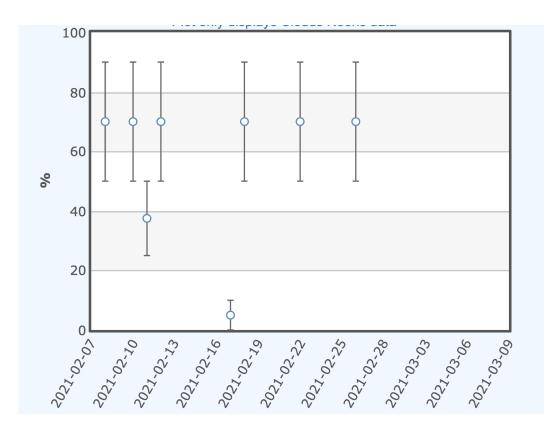

Figure # 2. Temperature Measurements

Figure # 3. Cloud Measurements

To access more information about the measurements regarding results, access this QR code

Discussion

Among the hydrosphere measurements, it can be observed that the highest values correspond to alkalinity in comparison to dissolved oxygen, nitrates, and salinity.

On graph 6 the % of humidity had a tendency to fluctuate downwards by this we mean that only a couple of times did the relative humidity went up unlike the couple more it went down.

In graph 2 we can observe that we were only able to record the precipitations once this is because the method used to measure set precipitations needed high quantities of precipitations to be considered into our data if that threshold wasn't passed the data that it gives was too small to be taken into account.

All the data was taken indirectly with the different tools for things like the atmospheric pressure or the temperature, so no calculations are necessary.

For obtaining water's oxygenation we needed to add different chemicals to it, to get a mixture that will give us the value.

Based on the different measures of alkalinity it was seen that it was always between 7 and max 7.8 indicating the water capacity of neutralizing acids.

To explain why sometimes we obtained more than 7 in pH which means the water was more basic. The water that was taken during these measurements usually has the presence of some strong bases that contribute to a more basic pH result.

The quantity of DO indicates whether the water is contaminated or not, based on the ppm of DO found on the water which was between 5 and 6 as you can see in figure 1 we can assure that the water is capable of housing living organisms on it.

As can be seen in figure #2 the nitrate level is low, which is a good indication; remembering that excess nitrates can cause overstimulation of the growth of aquatic plants and algae, and that excessive growth of plants and algae creates an unstable amount of DO.

Based on the data that was given by the hydrometer and the results that are shown in figure 1 and that normally the salinity of these types of water are less than 1000 ppm it was seen that the results were among the normal range.

Conclusions

- In the case of dissolved oxygen, we observe that it varies by temperature, the higher the temperature, the less amount of dissolved oxygen.

- It was analyzed that salinity depends on several factors, for example, evaporation, rainfall, and the depth of the aquifer body, which can explain its variation as seen thanks to data collection.

- The alkalinity depends on the geographical location and the minerals and rocks of the environment, for this reason, this parameter does not vary much.

- The pH was kept constant, proving that the concentration of hydrogen ions was not affected by the environment, proving that it was not an acid or a base, always being neutral with an approximate pH of 7.

- The clear and usual interaction between the hydrosphere and the atmosphere was observed. Mainly showing the water cycle, in which water evaporates due to the sun. The water vapor then turns into water droplets as it cools, and then they connect to form clouds. Then it rains and the water flows into rivers, streams and falls directly into the ocean, where the cycle can restart. This leads us to think that if, for example, the pH of the water where the samples were taken is less than 7 (acidic), eventually when it rains (precipitation) the rain could be acidic.

- Our recommendation when doing this project in the future is for the people who are collecting the data is to be sure that the instruments are all in working order since if they are not then the collection of data might become inaccurate.

- We recorded the precipitations with a tube that stored the amount of water precipitated into the area in question. However, we relied on big quantities of water to precipitate to get a potential data point. So we suggest that in the future the precipitation is recorded using another tool so that it's less weather reliable.

- We can observe that both the barometric pressure graph from graph 3 and the cloud % from graph 5, stayed pretty consistent within each other since for example in graph 3 We were measuring the barometric pressure at the same location each time, so a fluctuation in the data would be of much concern. On the other hand graph 5 being consistent just means that there were many clouds at the time of taking this data which is reasonable considering both the time of year and the location where the recollection of data took place We can see that the temperatures recorded in this experiment were very fluctuant by this we mean that there wasn't a single day when they were the same. The peak temperature recorded was around 33°C and the lowest was around 20°C.

- This data might not seem important on a small scale i.e when 1 or 2 people at 1 or 2 different locations take it. However, it becomes crucial to understand things like climate change since it helps to have a record of how different locations may have different atmospheric and hydrographic characteristics. It is also important since it helps to keep a record of the different areas which are going to change and by taking this data we can rest assured that we will know how to react if anything changes for the worse.

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