Investigating climate's effect on soil temperature and moisture

GLOBE Team

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Summary

GLOBE students at Gozo College in Sannat, Malta, carried out an investigation as part of the GLOBE Malta Soil Project to learn about soil's role in ecosystems and agriculture. They collected data on soil temperature, air temperature, and soil moisture content over several weeks. Through their observations, they found that high air temperatures led to increased soil temperature, which in turn reduced soil moisture. They also noticed that when air temperatures were lower, soil moisture content increased. The students concluded that climate change is impacting soil, particularly due to unpredictable and unreliable rainfall, causing soil to become dry and compact. The students did not stop there, they wanted to make an impact and be part of the change by proposing to grow their own crops at school, promoting the consumption of local seasonal food to reduce their carbon footprint and mitigate the effects of climate change on the soil.

Research Questions

- Is climate change affecting the soil temperature?
- What affect is the lack of rainfall having on soil moisture content?

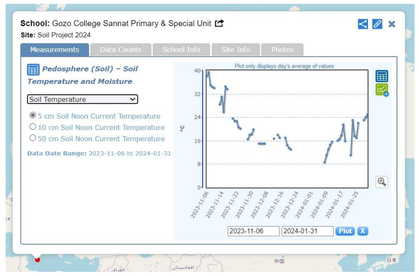
Research Methods

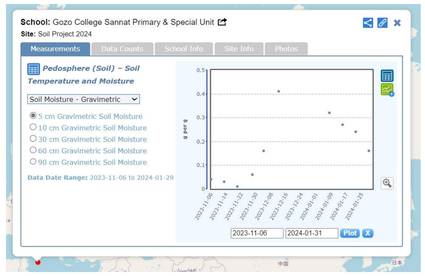
Gozo College, Ġuże Aquilina, Sannat Primary and Special Unit, is located in Sannat, a small settlement in the island of Gozo. The School wanted to investigate more about soil and decided to participate in the GLOBE Malta Soil Project, Exploring the Hidden World, which ran between November 2023 and January 2024. The GLOBE team, consisting of a Year 3 class, met several times with the GLOBE teachers to plan this investigation.

The main aim of this investigation was to learn about the significance of soil in sustaining ecosystems and supporting agriculture. Through hands on activities the students on a daily basis collected soil surface temperature using an infrared thermometer and measured weather parameters, including air temperature, air pressure, humidity and cloud cover using a data logger. Moreover, the students collected a soil sample which they weighed and then left exposed to dry and measured again the following week. This procedure was done once a week. All data was recorded and reported on a data sheet and later uploaded to the GLOBE database.

Results

The screenshots below show data uploaded on GLOBE website during the observation period between November 2023 and January 2024 (Figs. 10, 11 and 12). The students collected daily readings of air temperature and soil surface temperature. Whereas soil moisture was sampled once a week. All data was collected following the GLOBE Protocols guide.





Conclusion

From this investigation, the students were able to answer their research questions. When analysing the graphs, the students noticed that there is a relationship between air temperature, soil temperature and soil moisture content. Thus, they came to the conclusion that when the air temperature is high, the soil temperature increases and in turn this reduces the moisture content of the soil. Infact on the 8th of December, we noticed an increase in the soil moisture content and this was recorded when the air temperature was low.

Even though our data is limited, we can still come to the conclusion that climate change is having an impact on soil. Like any other country, our islands are experiencing a change in climate. Unfortunately, rainfall in Malta is becoming unreliable and unpredicable which is causing our soil to become dry and compact.

This investigation helped students realise the importance climate has on soil as an ecosystem and how it sustains life on earth. In an effort to reduce our carbon footprint the students came up with the idea to grow their own crops at school. In this way the school is promoting the idea of eating local seasonal food

References

GLOBE Observer https://observer.globe.gov/ (Accessed October 2022).

GLOBE teacher guide https://www.globe.gov/ (Accessed October 2022).