



Education and Research: Testing Hypotheses

More Plastic than Fish

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Summary

Students will analyze data using statistics to connect human population to the amount of as well as the types of microplastic found in the ecosystems of Antarctica, the Gulf of Mexico and a local fresh water source in order to create a Public Service Announcement to influence their community to reduce the use of plastics.

Key Concepts

- Compare and contrast microplastics in the ecosystems found in Antarctica, the Gulf of Mexico and a local fresh water source.
- Create awareness on how individuals can reduce their impact on the number of microplastics found in the world's water sources
- NGSS Disciplinary Core Ideas:
 - HS-ESS3-4 Earth & Human Activity: Evaluate or refine technological solution that reduces impacts of human activities on natural systems
 - HS-ESS3-6 Earth & Human Activity: Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

Objectives

Students will:

- **Observe** and **identify** ecosystem microplastic data found in the Antarctic, the Gulf of Mexico and the local water source
- **Organize** and **Record** data in tables, charts and graphs.
- **Demonstrate** an understanding of microplastics versus population density found in those ecosystems by analyzing data of microplastics using statistics and construct a logical conclusion of findings
- **Communicate** through a Public Service Announcement created based on their views given the data found.
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Materials

- Class set of data for Antarctica on microplastics
- Computers with internet access
 - R-Project.org = free statistical software
 - Research microplastics in the Gulf of Mexico
- Filtration equipment to separate microplastic fibers from the water samples
- Water collection vials
- Microscopes

Procedure

1. Define microplastics and differentiate between types of microplastics.
2. Analyze given data on Antarctic microplastics
3. Research and analyze Gulf of Mexico microplastics
4. Graph data:
 - a. Within each ecosystem (depth of water vs. amount/type of microplastic)
5. Field Trip:
 - a. Collect Water Samples of Local Fresh Water Source
 - b. Observe the Filtration Process of the water at UWF
6. Graph data:
 - a. Comparing Local Water Source data to the Antarctic/Gulf of Mexico data
7. Compare and Contrast using statistical data:
 - a. Population Density vs. the amount of microplastics in the 3 ecosystems
8. Create a PSA in a form of their choosing (print, play, commercial, song, etc...)

Assessment

- **Performance-**
 - PSA Presentation
- **Product-**
 - Graphs and Statistical Analysis
- **Assessment-**
 - Discussion questions:
 - Explain the comparative distribution of microplastics in the water samples. Why were there more/less in one sample than another?
 - List and describe 2 ways microplastics can enter water.

- List and describe 3 types of microplastics.
- How can we reduce the amount of microplastics released into the environment?
- Which industry contributes to the largest production of microplastics?
- Students will be able to write a logical conclusion given their data
 - Can microplastics be eliminated from the environment? Justify your answer using your data and research.

Additional Resources

- Dr. Alexis Janosik data on microplastics found in Antarctica's waters.
- MBARI website
- R-Project.org
- Beat the Bead Website