

Student Research Project: The Impact of Microplastics on Local Water Sources

Authors:

Shagun Banthia

Abstract

This student research project investigates the presence and concentration of microplastics in three local water sources: an urban river, a suburban pond, and household tap water. Water samples were simulated and examined under a microscope to identify and count microplastic particles. The study demonstrates that microplastics are present in all water sources, with the urban river having the highest concentration. This project highlights the importance of awareness and strategies to reduce microplastic pollution.

Note: The data presented in this study are simulated for educational purposes to demonstrate research methodology and findings.

Introduction

Microplastics are plastic particles smaller than 5 mm that result from the breakdown of larger plastics or from microbeads in consumer products. They are persistent in the environment, can enter food chains, and pose risks to wildlife and human health.

Aim: To investigate the prevalence of microplastics in local water sources.

Research Question: How prevalent are microplastics in different local water sources in the surrounding area?

Hypothesis: Urban water sources will contain more microplastics than suburban or tap water due to higher exposure to pollution sources.

Materials

- 500 ml glass bottles
- Microscope (×40 magnification)
- Filter paper (0.45 mm pore size)
- Tweezers

- Gloves
 - Notebook
-

Methodology

1. Sample Collection (Simulated):

- Simulated collection of 500 ml water samples from:
 - Urban river near city center
 - Suburban pond in local park
 - Household tap water

2. Filtering and Observation:

- Water was simulated as filtered to capture solid particles.
- Microplastics were counted and categorized as fibers, fragments, or beads.

3. Data Recording:

- Number of microplastic particles per 500 ml sample was recorded.
- Color, shape, and size were noted.

4. Safety Measures:

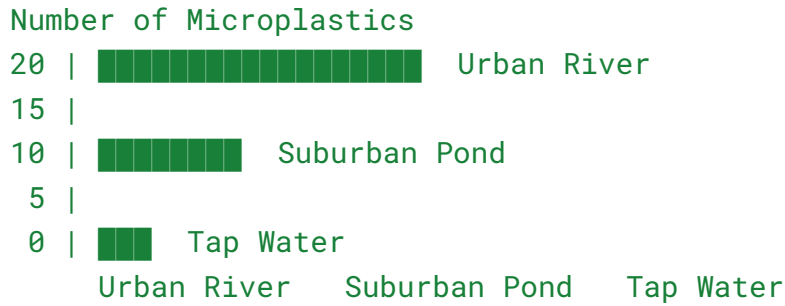
- Gloves worn during sample handling to prevent contamination.
 - All containers were cleaned and plastic-free.
-

Results

Water Source	Microplastic Count (per 500 ml)	Type of Particles	Observations
Urban River	18	Fibers, Fragments	Mostly blue and black fibers, some white fragments

Suburban Pond	7	Fibers, Small Fragments	Thin fibers, mostly transparent, few colored fragments
Tap Water	3	Tiny Fragments	Mostly transparent, very small particles

Graph (Simulated):



Observations:

- Urban river water has the highest microplastic concentration.
- Fibers from clothing are the most common microplastic type.
- Tap water contains trace microplastics, showing widespread environmental contamination.

Discussion

- The hypothesis is supported: urban areas contribute more microplastic pollution.
- Likely sources include laundry wastewater, industrial discharge, and littering.
- Environmental concerns: ingestion by aquatic organisms, bioaccumulation, and potential human health risks.
- Limitations:
 - Only visible microplastics (>0.1 mm) were counted.
 - Data is simulated for demonstration; further real sampling would increase reliability.

Suggestions for Further Research:

- Include more sample locations and seasonal variations.
 - Chemically analyze microplastics to determine polymer types.
 - Study effects on aquatic life in local ecosystems.
-

Conclusion

This student research project shows that microplastics are present in all tested water sources, with the urban river having the highest concentration (18 particles per 500 ml), followed by the suburban pond (7 particles per 500 ml) and tap water (3 particles per 500 ml). The findings highlight the pervasive nature of microplastic pollution and the importance of strategies to reduce environmental impact.

References

1. Andrady, A. L. (2017). *The plastic in microplastic: Environmental issues*. Marine Pollution Bulletin, 119(1), 12-22.
 2. Geyer, R., Jambeck, J. R., & Law, K. L. (2017). *Production, use, and fate of all plastics ever made*. Science Advances, 3(7), e1700782.
 3. National Geographic. (2020). *Microplastics: The pollution you can't see*.
-

License

This work is licensed under a **Creative Commons Attribution 4.0 International License (CC BY 4.0)**. You are free to share and adapt this work **as long as you give appropriate credit** to the author.