Assessing the Quality of D.C.’s Waterways: Rock Creek and The Potomac River

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Introduction

• The quality of water in DC can determine the biological, chemical and physical characteristics between people and the water.

• Main Problems:
  ■ Rock Creek Park
    o Nitrate
    o E-Coli
  ■ Potomac River
    o Contamination (atrazine, trans-Nonachlor)
    o Recent Developments
    o Wastewater
Hypothesis

• Null Hypothesis: The water quality in terms of salinity, conductivity, dissolved oxygen, pH, orthophosphate, and nitrate levels is the same in the Rock Creek and Potomac River.

• The Rock Creek Park River water quality: in terms of low salinity, nitrate, conductivity, dissolved oxygen, orthophosphate and higher pH will be closer to the ideal freshwater ecosystem for sustaining life than the Potomac River.
Materials

- **Sample collection:**
  - Rock Creek Park – 3 Samples
  - Potomac River – 3 Samples

- **Laboratory analysis:** UDC Environmental Quality Testing Lab
  - Nitrate Testing Kit
  - Dionized Water
  - Molybidovandate Solution
  - Pipette
  - Control Variable: 25 (mL) dionized water
  - DR2800 Spectrophotometer
  - Dissolved oxygen probe, pH meter and conductivity meter
Method
Results

Potomac River is higher in Conductivity, Dissolved Oxygen, and pH.
Potomac River is higher in Orthophosphate, Nitrate, and Salinity.
Discussion

- **Dissolved Oxygen**
  - Dependent on water temperature
  - Normal Level: >5 mg/L
  - p=0.3593
- **Electric Conductivity**
  - Normal Range: 50-1500 uS/cm
  - p=0.0002
- **pH**
  - Normal Range: 6.5-8.5
  - p=0.00299
- **Salinity**
  - Normal Range: <0.5 ppt
  - p=0.8551
- **Orthophosphate**
  - Used to prevent pipe corrosion
  - In rivers, may indicate chemical runoff
  - Normal Range: <.1 mg/L
  - There is no significant difference in orthophosphate (p=0.5286)
- **Nitrate**
  - Used in fertilizers
  - Essential for plant growth
  - excess can kill water ecosystems
  - Normal Range: 0.01-3.0 mg/L
  - Natural Level: <1 mg/L
  - There is a significant difference in nitrate (p=0.0273)
Conclusion

• Rock Creek River had lower average orthophosphate, dissolved oxygen, pH, salinity, electrical conductivity, and nitrate levels.

• Statistical Significance:
  o Failure to reject null hypothesis in favor of the alternate
    ▪ Not enough evidence to prove that the quality of the two rivers is statistically significantly different from one another in terms of orthophosphate, salinity and dissolved oxygen levels

• Data does not necessarily suggest that the rivers are safe to drink from without filtration due to other contaminants:
  o Bacteria
  o Chemicals not discussed


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