Anderson Watershed Water Quality Analysis

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Research Question

How does the management of Colbert Hills Golf Course affect the surrounding watershed, and waterways, when compared to suburban and native areas?

Hypothesis

- The management of Colbert Hills Golf Course does not affect the surrounding watershed with as much pollution as compared to the urban developed area.

Project Overview

The water quality of the Anderson Watershed in Manhattan, KS was tested and studied. This area is comprised of urban area with the Colbert Hills golf course near the top of the watershed. The main point of this study was to find whether or not the golf course has negative ecological effects on the watershed. The variables compared throughout the watershed included: pH, nitrate, phosphate, and dissolved oxygen levels, and electrical conductivity. Statistical Analyses were done to determine which variables were effected by the land use differences, as well as look at temporal changes throughout the growing season.

Procedure

Step 1
Sample Sites  Determined
Areas at key points in watershed
Random sampling throughout the semester

Step 2
HATCH Kits
Used to determine water quality
Measured pH, Temperature, Electrical Conductivity, Nitrate, Phosphate, Turbidity, and Dissolved Oxygen

Step 3
Use of GIS
Data entered using GIS software
Allowed on site data collection using GIS applications on mobile devices

Step 4
Statistical Analysis
Used Microsoft Excel to run analysis on data
Allowed for initial conclusions to come from the data

Materials

<table>
<thead>
<tr>
<th>Materials</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permachem Dissolved Oxygen 1 Reagent</td>
<td>1 packet per D.O. sample</td>
</tr>
<tr>
<td>Permachem Dissolved Oxygen 2 Reagent</td>
<td>1 packet per D.O. sample</td>
</tr>
<tr>
<td>Permachem Dissolved Oxygen 3 &quot;Powder Pile&quot;</td>
<td>1 packet per D.O. sample</td>
</tr>
<tr>
<td>NitraVer 5 Nitrate Reagent</td>
<td>1 packet per nitrate sample</td>
</tr>
<tr>
<td>PhosVer 3 Phosphate Reagent</td>
<td>1 packet per phosphate sample</td>
</tr>
<tr>
<td>pH Meter &amp; Electric Conductivity Meter</td>
<td>1 pH meter &amp; 1 E.C. Meter</td>
</tr>
<tr>
<td>Turbidimeter</td>
<td>1</td>
</tr>
</tbody>
</table>

Results

The graphs shown represent time scale of collected samples. Each graph displays the date range as to which a data point was collected and identifies the data point as representing Colbert Hills or Urban Development. Rainfall events that accumulated more than 0.1 inches of total rainfall were marked on the graph displaying the total rainfall for the specified date. Levels of DO appear to decrease after the rainfall event on the 21st of April, then increase directly before the rainfall event on the 24th of April and continue to increase after the rainfall event on the 29th. The observed lack of correlation between rainfall and DO levels suggests that rainfall did not significantly impact the fluctuations in measured DO levels. There appears to be a broad distribution of phosphorus levels for both spatial ranges. This distribution of phosphorus levels does not correlate with rainfall events, which suggests that rainfall did not impact the measured variation in measured phosphorus levels.

Literature Review Information

- Pollution due to excreta and chemical waste harms the lives of living things
- Recognizing point source pollution is simple because the data from runoff areas is directly related to the source. To recognize nonpoint source pollution, inferences must be done based on data (Hayakawa, A. M. et al., 2006).
- Grab sampling is simple method that determines polluted areas. This method incorporates the assessment of samples from random areas at random times (Harmel, et al., 2010).

Study Area

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Conclusion and Discussion

- The Colbert Hills Golf Course has minimal effect on the surrounding watershed, streams, ponds, and waterways
- Urban had a larger effect on the watershed
- This supports our hypothesis
- There was a lack of rain over the time that this study was done. This likely affected the results of the study by decreasing available sample areas and altering the data from those areas. Eighty percent of nutrient loading in an area occurs during precipitation events that occur ten percent of the year (Banner, et al., 2009).
- This study could be improved by regularly taking samples throughout a full year and obtaining more control samples from areas like the Konza Prairie.

Works Cited