The Effect of Human Interaction on the Truckee River Ecosystem

Jacinda, Raksha, Hitha

Introduction

- The Truckee River Ecosystem runs from Lake Tahoe to Pyramid Lake. Because it is located in large cities, such as Reno, NV, it has been easily polluted by environmental factors.
- Pollution is defined as “the introduction of substances or energy into the environment, resulting in deleterious effects of such a nature as to endanger human health, harm living resources and ecosystems, and impair or interfere with amenities and other legitimate uses of the environment” (“Pollution”).

Introduction (Continued)

- In an article from Utah State University, the author states that “dumping industrial pollutants directly into water can affect the pH of the water” and can impact the nutrient concentration (and nutrient toxicity) in the ecosystem.
- We hypothesized that evidence of human-environment interaction could have a significant effect on pH levels of river water and the amount of nutrients found in the ecosystem.

Research Question

What is the effect of human interaction on the pH level of the water and how does human interaction affect the vital nutrients of the water cycle such as ammonia, phosphorus, and nitrogen and their concentration values?

Hypothesis

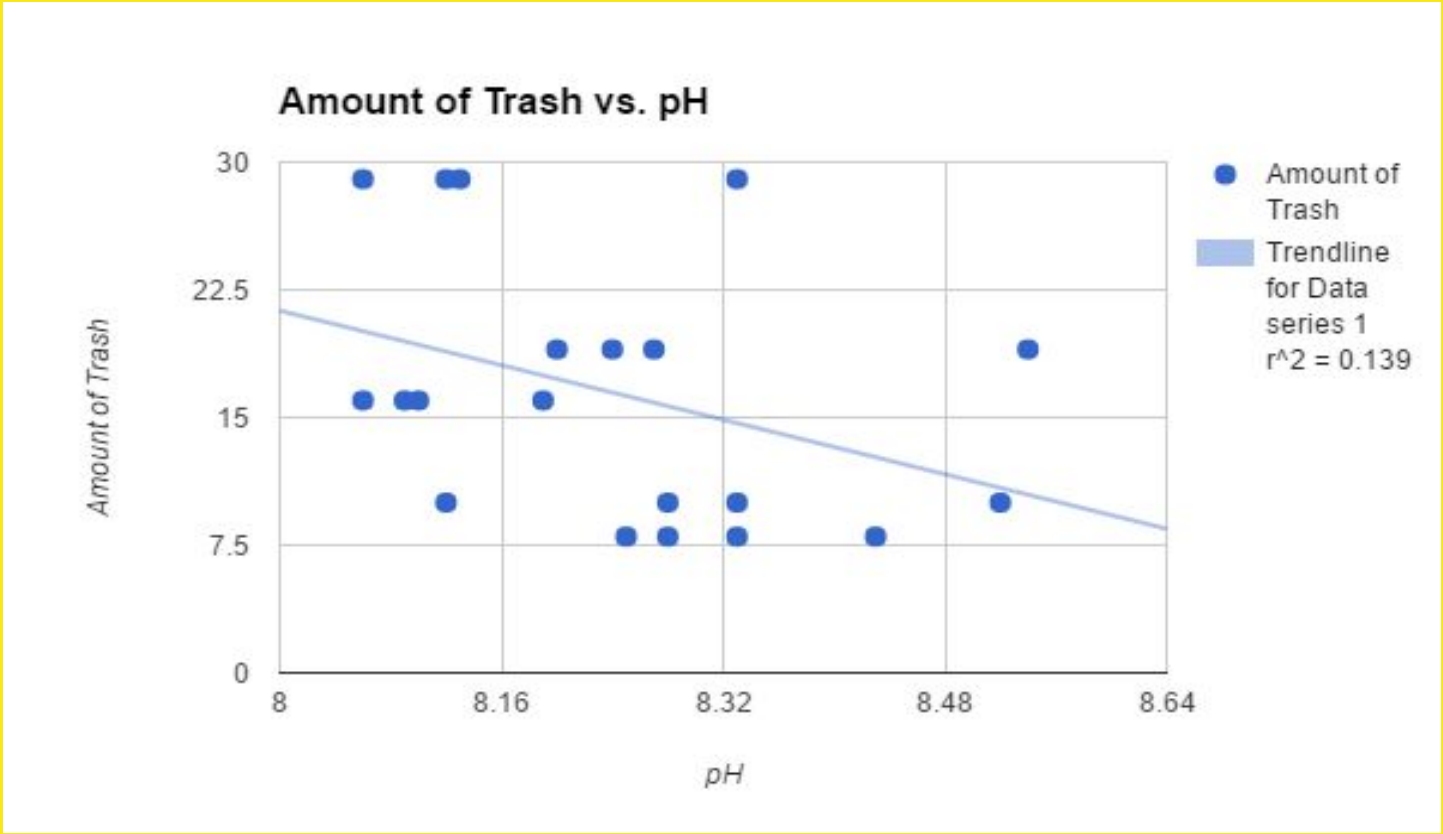
More evidence of human interaction will cause water to become more acidic and will lower the concentration of ammonia, phosphorus, and nitrogen in the ecosystem.

Methods and Materials

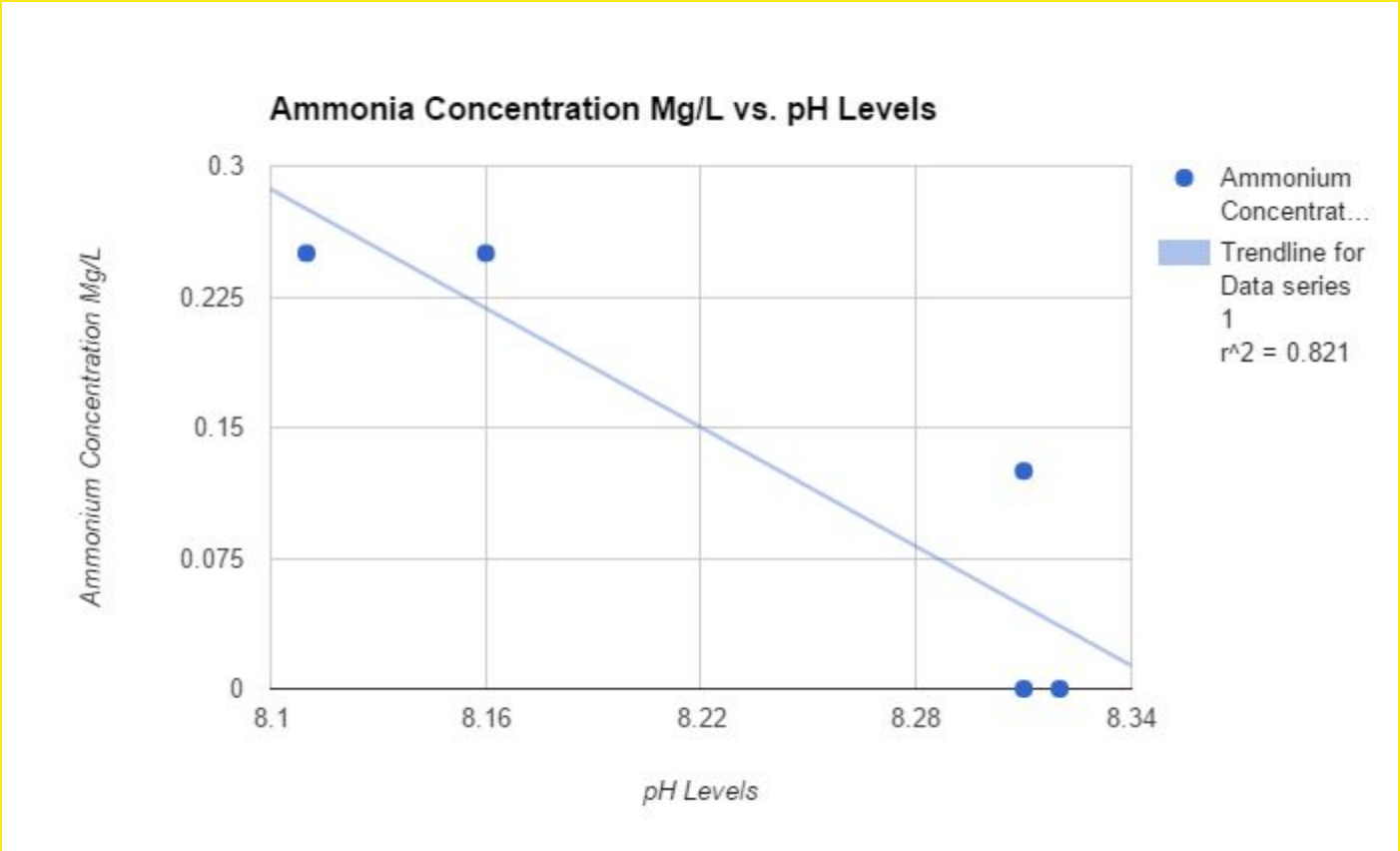
We will observe the amount of evidence of human interaction in an area and conduct a pH test to find the acidity of the sample. We will then draw conclusions about the effect of human interaction on pH level. Afterwards, we will conduct three different tests in the same area to observe the concentration of nutrients (nitrogen, phosphorus, and ammonia) and how these levels are impacted by human interaction.

- Nutrient Indicator Test Kit
- pH indicator
- Gloves
- Goggles
- Proper clothing
- Test tubes
- Distilled water (to clean equipment)

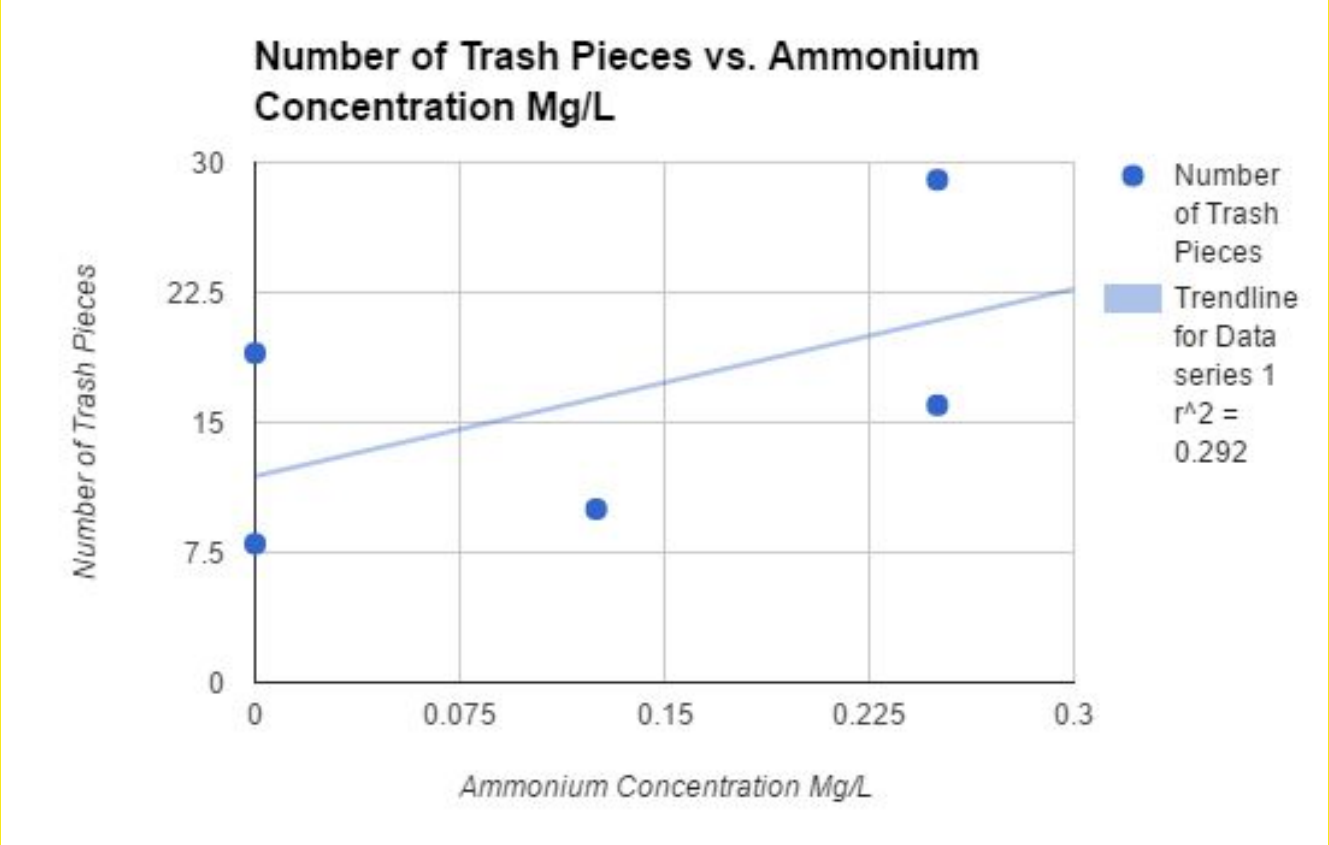
pH vs. Trash Concentration in the Truckee River



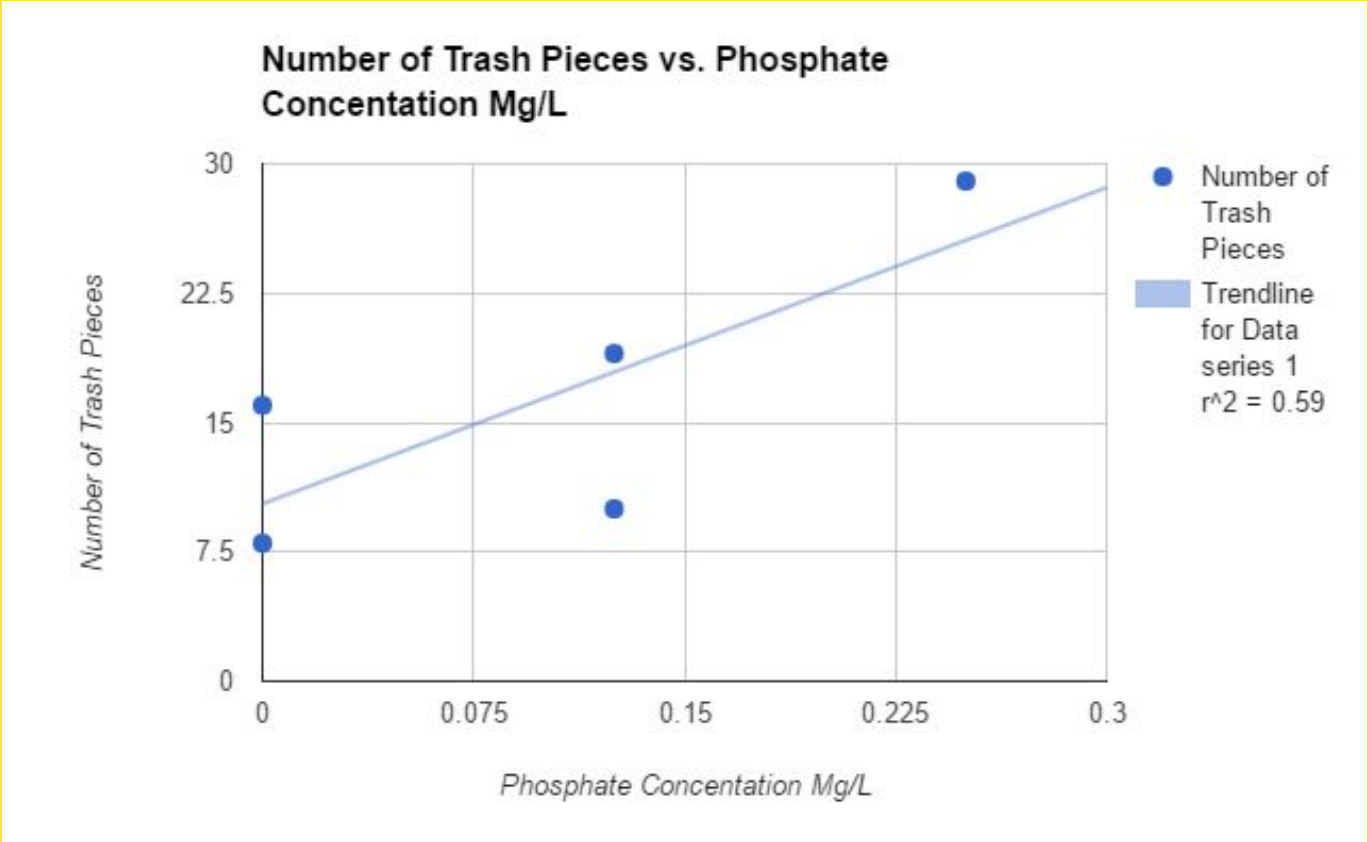
Ammonia vs. pH Levels



Ammonia vs. Trash Concentration



Phosphate vs. Trash Concentration



Supplementary Data

- Although our project was mainly testing the pH and nutrient values in the river water we found it necessary to see if the numerous amount of cigarettes that littered the area had an affect on the water. Based on that question we tested the TDS of the water and mashed up cigarette water. We found that, no, it did not have an effect on 4 of the 5 site, but had an effect and the 5th site where the most cigarettes were found. (Cigar water= 126 ; site 5 average = 104)

Supplementary Data (Cont.)

- We also tested the pH of cigarette water. The results were that the pH went from an average of 8.24 to 7.3, it became more neutral. The cigarette almost acted like a filter in the water to make it more neutral.

Results

- The results of the experiment was that there was no correlation between the amount of trash and the pH of the water.
- Also there was some correlation between the amount of trash and the various nutrients in the water (Nitrite, Phosphate, Ammonia).
- Our hypothesis was proven wrong. Instead of finding the river water to be more acidic we found that is was more basic with an average of 8.24 pH level.
- The cigarettes were more acidic and actually made the river water more neutral-acidic if you averaged them out, when we thought that the cigarettes may contribute to the basicity of the river water.

Conclusion

Though there did not seem to be an obvious relationship between pH levels and nutrient concentration, our data provided evidence of a moderate correlation between:

- Ammonia and Trash Concentration ($r^2=.292$)
- Phosphate and Trash Concentration ($r^2=.59$)
- Ammonia and pH Level ($r^2=.821$)

Though these variables seem to be related, there is strong evidence to suggest that our hypothesis was incorrect. There was not much of a relationship between pH level and trash concentration (if any, it was negative) and only phosphate was significantly affected by trash content in the area.

Future Research

- In the future, we hope to apply our knowledge of research skills to the investigation of in-class labs and IB Internal Assessments.
- This project has helped us gain an understanding of the value of planning and prior research before working in the field and the importance of proper experimental procedures during an investigation.
- If given the opportunity, we would like to examine the relationship between total dissolved solids and evidence of human interaction.

Works Cited

"PH." *Extension - Utah State Unversity*. Utah State University, 2016. Web. 8 Sept. 2016.

"Pollution." *European Environment Agency*. European Environment Agency, n.d. Web. 08 Sept. 2016.