

Awakening Seed Pond Water Chemistry

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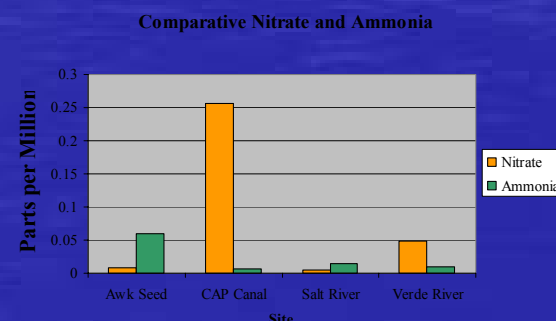
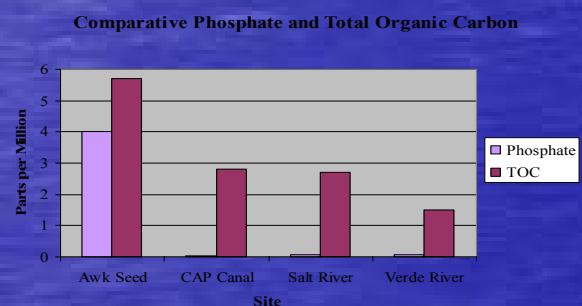
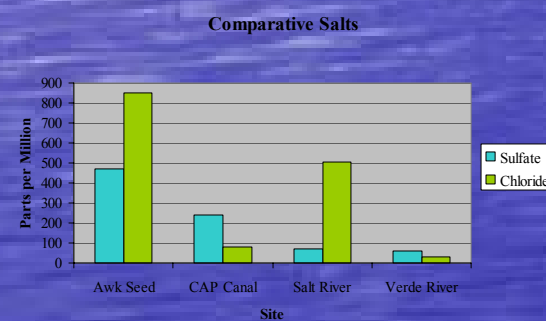
Fourth and fifth graders at Awakening Seed School, a partner in SCENE's Schoolyard Habitat program, undertook a semester-long study of the pond in the school's native habitat area during the spring of 2003. Data from the pond was collected and compared to data collected at selected CAP-LTER sites.

Our Question: Is our pond polluted?

Our Investigation

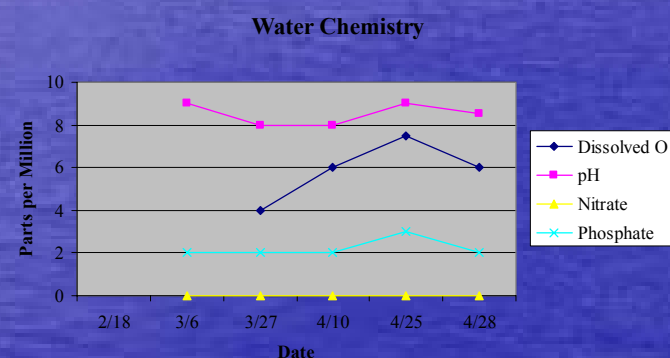
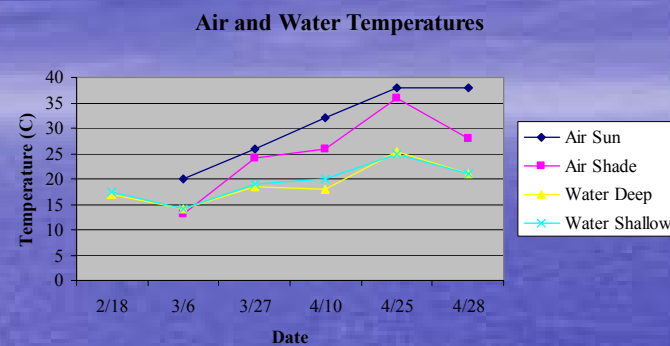
- We discussed what kinds of pollutants we should look for. We narrowed down the aspects of pond chemistry that we would investigate to those that we could monitor with our water testing kit and those that could be analyzed by the stream laboratory at ASU. We decided to monitor air and water temperature as well.
- We determined how we needed to set up our data sheets to record the information.
- Each time we visited the pond, we placed thermometers in four locations (shallow water, deep water, a sunny location along the pond fence, and in the shade of a tree) and left them there while we conducted chemical tests for pH, dissolved oxygen, phosphate, and nitrate. When the chemical tests were complete, we collected our thermometers and recorded the temperatures in both Fahrenheit and Celsius.
- We tested for the presence of E. coli bacteria one time.
- We collected three samples of water from the pond and sent them to the stream lab at ASU to be tested for ammonia, nitrate, phosphate, total dissolved organic compounds, sulfate and chloride.

Our Pond in Comparison to Other Water in Central Arizona



The stream lab at ASU not only tested our pond water with state-of-the-art equipment, but also provided us with data from three other water bodies in Central Arizona to compare with our own: the CAP Canal at Power Road, the Salt River, and the Verde River.

We found that the levels of salts (sulfate and chloride) and phosphate in our water were much higher than that of the other water bodies, while our level of nitrate was much lower than that of two of the other sites. Our pond water was also richer in dissolved organic carbons than that of the comparison sites.



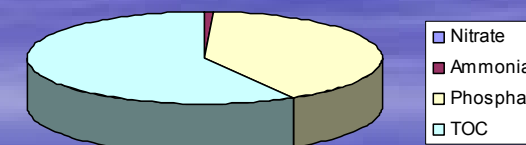
Our Findings

- We noticed that shallow and deep water temperatures were virtually the same.
- We saw that the water temperature is more closely related to air temperature in the shade than in the sun.
- We noticed a peak in temperature and chemical levels in our pond on April 25th, including in dissolved oxygen, which normally decreases as the temperature rises. We hypothesized that more sun = more photosynthesis = more oxygen, since oxygen is a by-product of photosynthesis.

Our Conclusion: Our Pond is Not Polluted

- Our pond had a healthy level of dissolved oxygen, which is necessary to support animal life.
- Our pond had a lower level of E. coli bacteria than that which is allowable in drinking water.
- Our pond had very low levels of nitrate and ammonia, which are necessary nutrients but can become pollutants if present at high levels.
- Our pond had a moderate level of phosphate, neither too low to inhibit plant growth nor too high to be considered a pollutant.
- Our pond had an adequate level of dissolved organic carbons to provide nutrients for plant and animal life.

Awakening Seed Pond Nutrients



We found that our pond has plenty of phosphate and dissolved organic carbons (TOC), very little ammonia, and almost no nitrate. All of these compounds provide nutrients for plants in the pond, which in turn support other organisms, such as snails and fish. Phosphate, nitrate, and ammonia can become pollutants if they are present in high amounts. Our pond did not contain high amounts of these compounds. In fact, nitrate is present in such low amounts that it is a limiting factor to plant growth in our system.

Questions for Further Investigation

- How do the salts (sulfate and chloride) get into our pond?
- What effects do these salts have on pond life?
- What is the highest level of salt that freshwater organisms can tolerate?
- Which aspects of the water chemistry are affected by fish and snails in the pond?
- Which aspects of the water chemistry are affected by the plants in the pond?
- Which part of the pond do fish prefer?
- Which part of the pond do snails prefer?
- What is the carrying capacity of our pond? That is, how much plant and animal life can our pond support?
- What are the relationships between pond size, water chemistry, and the population of living organisms?