

Acid rain and Newton's ponds

By **Justin Song**/ Special To The Tab
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Acid rain affects the US the most in the Northeast and the Midwest. This is mainly because of the heavy industries that exist in those areas, many of which produce gases that create acid rain when exposed to the atmosphere. The gases mostly responsible are sulfur and nitrogen oxides. At its worst, acid rain has reduced the pH of lakes and ponds to 4.6 in places, making those bodies of fresh water 10 times more acidic than they should be (the normal pH for bodies of water in the US is 5.6). At this pH, water can support little to no life. The Charles River is an example of a body of water that has been heavily affected by acid rain, due to years of industrial pollution.

For an Environmental Services Project at NNHS this past year, I tested three bodies of water in Newton to see how much acid rain continues to affect our city: Crystal Lake, Hammond Pond, and Bullough's Pond, which are all in the Charles River watershed. I tested each body of water in two locations, separated by at least 150 feet at each location, I recorded air temperature, weather, water temperature and the time. I then took a water sample measuring 50ml, and obtained a reading using a pH meter. I did four rounds of testing.

Crystal Lake and Hammond Pond had pH values of 5.5 and 5.4 respectively. Bullough's Pond was slightly more acidic than the other two, with a pH of 5.25. These pH values for all three bodies of water were normal, deviating very little from the norm of 5.6. The most likely cause of the acidity of Bullough's Pond is eutrophication. When people use lots of fertilizer, or any chemicals rich in nitrogen or phosphorous, around a body of water, these chemicals often end up in the water due to runoff from irrigation or rain. These chemicals enhance the growth of algae in the lake or pond to amounts



Justin Song taking water sample at Crystal

that are unhealthy for the life within it. Too much algae, as it dies, causes excess carbon dioxide to be dissolved in the water, which changes the pH, making the water more acidic. Eutrophication also reduces dissolved oxygen levels in the water, limiting the ability of the lake or pond to support larger organisms like fish, and it blocks sunlight to plants in the water, which further reduces oxygen levels in the water. Fortunately, although Bullough's Pond is slightly acid, Newton is not significantly impacted by acid rain at this time.

We need to remain vigilant, however, because acid rain can have silent, but devastating effects on fresh water lakes and ponds. It can free harmful chemical ions from the soil, like aluminum ions, which then run off into nearby bodies of water. These ions are absorbed by the organisms in the water and may cause disease or death. When fish absorb too many of these ions, their gills produce a mucus which interferes with respiration. Since almost all aquatic life absorbs ions in the water indiscriminately, acid rain can poison the water to a point where only the hardiest organisms can survive.

The unwanted effects of acid rain are not limited to ponds or lakes. Acid rain with a pH of less than 5 can damage terrestrial environments, including making soil uninhabitable for plants. Plants cannot absorb vital nutrients properly in soil that is highly acidic; their growth is hindered or they may die. Acid rain can literally destroy plants by eating through them. This has far-reaching ecosystem effects when plants, the staple of the food web, cannot replace themselves as quickly as animals eat them. The consequences for animals may include rashes, birth defects, elevated rates of infant mortality and even famine, which can decimate local animal populations.

Because acid rain has many serious negative environmental consequences, steps have been taken by our federal government to reduce it. The Clean Air Act of 1990 has reduced the amount of acidifying gases by million of tons. In the past 30 years, developing cleaner methods to smelt ores and mandating taller smoke stacks in factories have reduced sulfur and nitrogen oxide emissions significantly. Cleaner ways of burning coal and requiring automobiles to be more fuel-efficient and equipped with emissions control devices have also helped to protect the public and the environment from the detrimental effects of acid rain. Also, environmental groups have promoted the planting of natural chemical buffers in soils affected by acid rain, which has protected certain habitats. By working for fewer and cleaner emissions from factories and developing clean energy sources, we can all help to ensure that acid rain will not leave a permanent scar on the landscape of Newton.

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