Road salt threatens environment says Cary's Kelly

By Jesse Ordansky

Victoria Kelly came to The Cary Institute in Millbrook in 1988 for a two-year internship. After years of research and scientific publications, Kelly is now Cary's Manager of Environmental Monitoring.

Kelly's program is based on long term monitoring of environmental characteristics and data. Initially, she makes an assumption or estimation about an ecological function then she maintains instruments, looks for a trend in the data, and either confirms or negates the initial assumption.

"If there's a trend, I try to explain it," said Kelly. "That often takes a deeper look into the mechanisms that controls whatever it is that I'm looking for."

She said that in order to figure out changing trends in data; it is necessary to understand the normal functions of the subject as well as how ecosystem and atmospheric processes affect it.

Kelly published a report in December of 2010 about the amount of sodium chloride in local watersheds and how it got there. She determined that chloride levels in Wappinger Creek near Millbrook as well as sodium levels in many Dutchess County wells have increased notably since 2000.

While the United States Environmental Protection Agency (EPA) limits the allowable levels of chloride in water, it says nothing about sodium. The EPA suggests that 20 milligrams per liter (mg/L) of sodium is an acceptable concentration in drinking water. Kelly's study found that the average sodium concentration in 125 Dutchess County wells was 48 mg/L.

Kelly said, the sodium chloride levels have "not increased to such an extent that it would harm an organism, but the increasing trend is quite alarming."

For an individual on a sodium-restricted diet, some of the higher concentrations found can be significant – one well's sodium content was 347 mg/L.

Upon analyzing and interpreting the

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data, Kelly found the cause of the high sodium chloride levels was due to the washing of road salt into the local watershed. The solution, Kelly reported, is to methodically decrease the amount of road salt used.

Kelly said regulators can be attached to the salting mechanism on trucks that will conserve salt while still adequately de-icing roadways. She said drivers in New Paltz actually made a contest out of who could most efficiently treat roads without wasting salt.

"The upshot was they also saved an enormous amount of money and salt," she said. "It's a win – win. You become more efficient, save money in cost of salt, and save in environmental effects. So basically the moral is more is not better and potentially hazardous in the long run."

Another long-term data-intensive study conducted by Kelly was an examination of acid rain and its prevalence in precipitation in the northeastern United States. The large amount of tropical storms in 2005 inspired this endeavor and Kelly thought storms based out of the Atlantic Ocean might be able to alter the chemistry of local precipitation. She studied the amount of rain and snow "events" from 1984 to 2007 with an "event" ending when "there has been a six hour hiatus in precipitation."

Samples were collected using a device called a wet-dry collector. This instrument uncovers a bucket when a sensor is triggered by moisture. When rain hits the sensor, the bucket begins collecting precipitation. After analyzing samples based on various chemical reactions, it was determinable whether the event was produced from the east or west of Cary.

It was ultimately determined that there are slightly more storms based off the Atlantic Coast recently compared to the 80s and precipitation chemistry has become slightly less acidic – however not statistically significant.

Kelly thought "if we start getting more storms from the Atlantic, maybe we don't need to have clean air legislation. But we do; the amount of change in the precipitation chemistry is because of a very small increase in storms over the Atlantic and is not enough to create an overwhelming change."

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She continued, "Clean air legislation is working. It has reduced the amount of acidity, but we're still nowhere near normal. Our precipitation PH is about 4.7 – normal is roughly 5.2. Normally our precipitation would be slightly acidic in the northeast because of the emissions of sulfur dioxide and oxides of nitrogen from coal burning power plants to our southeast."

Kelly said that although rainwater generally does not have a major impact on lakes and streams, some water bodies have been acidified due to acid rain. "4.7 is close to tolerance limits for fish, but it won't kill them," she said. "... And a PH of roughly four is when you really start to see die off in organisms in lakes."

Kelly said more legislation needs to be passed to clean our air and reduce acidity in rain and snow, but the EPA has "bigger fish to fry."

The most recent project for the Environmental Monitoring Program is a study of carbon dioxide levels in the atmosphere. Carbon Dioxide is accepted as the biggest driver of climate change and Kelly wants to create a long-term perspective on its prevalence.

The experiment is in its infancy, but Kelly is currently able to see soil freeze dates in the winter and thaw dates in the spring.

She said, "we can see when the ground thaws and a lot of the carbon dioxide comes from soil respiration which doesn't happen when soil is frozen." Levels will then go down again when the soil freezes and in the summer as the trees and plants consume more carbon dioxide.

"That carbon dioxide monitor together measuring soil temperature and moisture will give us some really important info" with respect to climate change, Kelly said.

Other scientists have conducted similar experiments, but Kelly said, "not to the extent that we're going to be able to. We're a little unique in that we have ability to develop these kinds of programs... My program is funded by the Cary Trust so far and that allows a fair amount of flexibility in asking new questions or starting new programs without having to necessarily seek funding."