Water Quality and Meteorology, How do they affect each other?

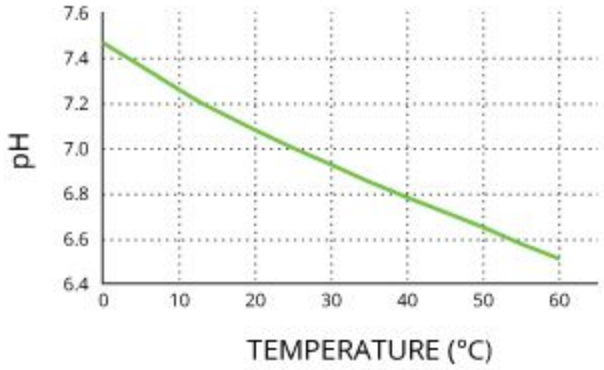
Water is everywhere, whether its condensed water vapor in the stratosphere, trapped in polar ice-caps, or located in a water reservoir, there is no denying its abundance on planted Earth. While it's important to have water, not all water is safe, which is why the quality of the water is extremely important to know. Water Quality, while it hasn't been known to directly influence Meteorology, can indirectly influence certain components based on the water's acidity and temperature, as well as its chemical components that are added into the water as a result of runoff and dumping.

The acidity of water is one of the most important things to keep an eye on, based on the water's pH levels, everything about it fluctuates, including the solubility and biological availability of chemical constituents such as nutrients (phosphorus, nitrogen, and carbon) and heavy metals (lead, copper, cadmium, etc.). For example, in addition to affecting how much and what form of phosphorus is most abundant in the water, pH also determines whether aquatic life can use it. In the case of heavy metals, the degree to which they are soluble determines their toxicity. Metals tend to be more toxic at lower pH because they are more soluble.

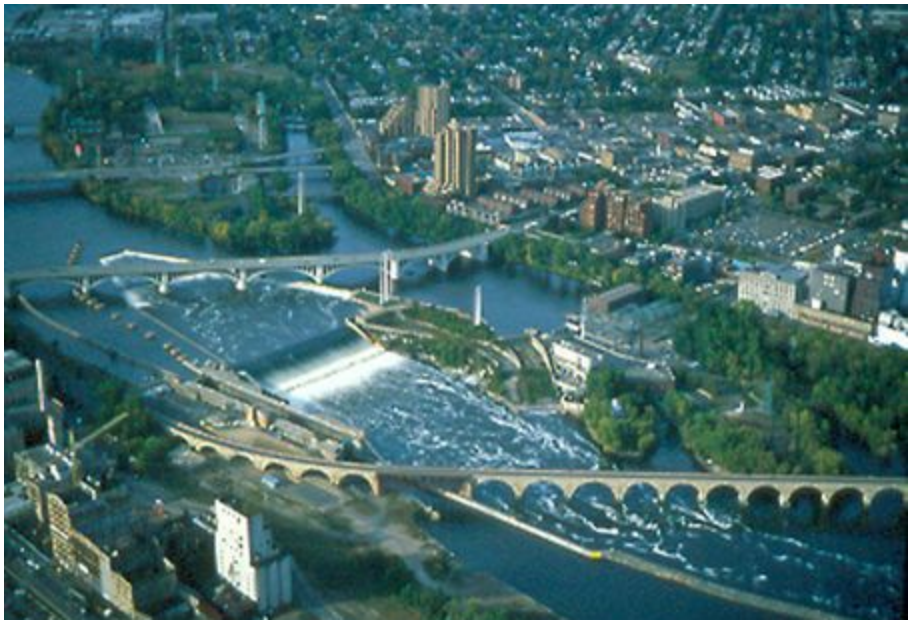
Acid Rain, a major cause of rapidly intensifying acidic levels in water basins and bodies is directly caused by the burning of non-renewable energy sources, mainly Fossil Fuels. The release of Sulphur Dioxide and Nitrogen Oxide will linger in the atmosphere usually leading to Air Pollution, but can also latch onto water molecules and plummet back to the Earth via precipitation. Most of that water will run off into bodies of water. With the rapid intensification of Severe Weather and more prominent rainfall which has been increasing globally due to Climate Change, and with the rapid industrialization of developing countries, the number of reported cases of Acid Rain, and the intensity of its effects are rapidly increasing.

The overall quality of water in a specific body can be drastically inculcated by its climate and weather. As the Greenhouse effect continues to grow stronger in the earth's troposphere, ocean temperatures begin to increase, leading to stronger, more intense storms. This is most prevalent in the Earth's oceans, especially the Atlantic and Indian oceans, where over the past 5 years, multiple intense typhoons and tropical systems have been setting records left and right. One example of this was Hurricane Harvey in 2017, that slammed the Gavelston and Houstonian areas with torrential flooding.

Water's temperature also influences the water's pH levels. With multiple studies done by the NOAA, EPA, and other private organizations finding that with increased water temperatures, the pH of the water drastically decreases. This is done by the temperature altering the specific ions present in the water, which in turn causes the acidity to rise and fall.



With the aforementioned increase in rainfall and Severe Weather due to Global Climate Change, the occurrence of Floods can also drastically affect water quality. In dense, urban areas, such as metropolitan areas or densely packed villages and towns can have tons of debris and unwanted substances that can end up in bodies of water, including Ciggeratte buds, Oil from vehicles, Trash, and many, many more things can end up washed into a body of water like a lake or river. In rural areas, such as farmland or prairies, pesticides, herbicides, and insecticides, as well as fertilizer can end up in bodies of water, which can be a massive hazard to the native species of that area, and can lead to eutrophication.



Both the Mississippi and Minnesota rivers have had an interesting history with Water Quality. Especially following its settlement by Europeans in the late-1700s. The Mississippi has had the task of dealing with a large urban center being the Twin Cities and its surrounding metro. While the Minnesota river dealt with massive swaths of agriculture runoff. The Upper Mississippi was near unhabitable up until the late 1960s, when cleanup missions began to be taken seriously in an effort to clean up the "Great Muddy River". Not much meteorological data is available from prior to the Mississippi's Cleanup, but Acid Rain due to poor water quality could have been common, due to lower pH levels on a massive scale. To this day the Minnesota River has on average lower pH and higher turbidity levels then the Mississippi, with the Minnesota River on average being regarded as having much more poorer quality.

Meteorology can directly influence Water Quality, but it's more of a one-sided relationship. Water Quality, while it can lead to an increase of Acid Rain within an area, doesn't have much of an effect of Meteorology as once thought. Rather, Meteorology and Global Climate Change are leading to an overall decrease of Water Quality due to runoff and the greenhouse effect. But, what can you do as an individual to increase water quality and potentially decrease the amount of acid rain that falls on your home? The six easiest things a person can do are:

1. Keep paved and other impervious surfaces clean. Sweep grass clippings and rake leaves from the street and storm drain.
2. Turn your downspout onto your lawn.
3. Reduce fertilizer use.
4. Wash vehicles on the lawn.
5. Capture and infiltrate your runoff.
6. Minimize use of road salt.

Another way you can help to improve water quality is to drive less, switch to renewable energy sources to avoid to reduce Acid Rain.

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