Acid rain causes, history, and effects

- Crystal Mullen

Acid rain is a form of rain that consists of droplets of that are abnormally acidic due to the pollution in the air – particularly the extreme amounts of nitrogen and sulfur released by cars and industrial factories (Briney, 2014). While it is usually in the form of water droplets, acid rain can also occur in form of fog, snow, or even increments of dry materials that may settle within the environment (National Geographic, 2014).

Acidic deposition, or acid rain as it is more commonly known, manifests either wet or dry. Wet deposition is precipitation in any form that takes acids from the air and distributes them onto the Earth’s surface. Dry deposition, on the other hand, are polluting gases and particles that attaches to ground through smoke, dust and a lack of rain. Although the dry form is a dangerous form of deposition, wet deposition is actually more dangerous because the rain eventually washes pollutants into lakes, streams, and rivers (Briney, 2014). Furthermore, natural causes such as erupting volcanoes and rotting vegetation can release chemicals that can create acid rain. However, acid rain primarily falls due to human activities such as coal-burning power plants (National Geographic, 2014).

The electric and coal burning based gases that form acid rain were first introduced in large amounts into the atmosphere during the Industrial Revolution, In 1852, Robert Angus Smith, a Scottish chemist was the first to discover the relationship between the atmospheric pollution in Manchester, England and the corresponding acid rain (Briney, 2014).

Although acid deposition was discovered in the mid-1800s, this discovery did not begin to be common knowledge in the general public until the 1960s. In 1972, the term “ acid rain” was coined. The general public’s attention toward acid deposition increased in the 1970s when reports published by the New York Times revealed problems occurring in New Hampshire’s Hubbard Brook Experimental Forest (Briney, 2014).

There are quite a few negative ecological effects to acid deposition. One of the more prominent effects is its impact on streams, lakes, wetlands, and other water-based environments. This is because acid deposition, acidifies the waters so that the water would absorb aluminum and then blend in with the soil found around streams and lakes. This toxic combination makes poison the aquatic animals such as clams, fish, and crayfish, clams (National Geographic, 2014).

As this acid based liquid flows into streams, rivers and oceans, it does become diluted. However, over time, acids will accrue and then lowers the overall pH of the body. Furthermore, acid deposition causes clay-based soils to release magnesium and aluminum which, in some areas, further lowers the pH. The drop in pH can indeed be significant because if the lake’s pH drops below 4. 8, the plants and animals surrounding that body of water could die. The estimated 50, 000 lakes that are in the United States as well as Canada are at risk because they have a below normal pH (about 5. 3 for water). Sadly, the pH found in several hundred of these lakes are too low to support any plant or animal water-based life (Briney, 2014). Although some species can withstand the effects of acid deposition, our interconnected

ecosystem means that even non-aquatic animals, such as birds are affected by acid deposition (Briney, 2014).

In addition to streams, rivers, and oceans, acid rain can substantially impact forest regions. As the acid rain falls on the trees, the trees are then prone to losing their leaves, suffering bark damage, and stymied growth. When these parts of the trees are damaged, it makes these trees prone to disease as well as vulnerable to insect infestation and extreme weather. Furthermore, when acid falls on a forest's soil, it kills microorganisms in the soil, disrupts soil nutrients, and possibly even cause calcium deficiency. Finally, trees that are at high altitudes are vulnerable to damage caused by acid-based clouds because the acidic moisture in the clouds blankets these trees (Briney, 2014).

Although acid rain damage to forests is seen all over the world, the cases of acid rain damaged trees that shows most damage are found in Eastern Europe. In Poland and Germany, about half of their forests are damaged. Switzerland also has at least 30% acid rain damage in their forests (Briney, 2014).

Acid deposition has even impacted art and architecture because of the acid's ability to corrode certain types of materials. As acid rain falls on buildings (particularly buildings constructed with limestone) the acid reacts with minerals found in the stones and sometimes causes the building to wash away and disintegrate. Furthermore, acid rain can corrode cars, modern buildings, airplanes, railroad tracks, steel bridges, and even pipes below and above the ground (Briney, 2014).

Thankfully there are quite a few steps taken today by various government agencies to reduce nitrogen and sulfur emissions. Many governments now actually require energy producers to clean their smoke stacks by using scrubbers that can trap the pollutants before they are released in the air. Furthermore governments are also mandating catalytic converters to be installed in cars to lower their emissions. Finally, though certainly not exhaustively, alternative energy sources, such as solar plants and windmills are gaining more prominence so government funding is being administered for the restoration of ecosystems that have suffered acid rain damage worldwide (Briney, 2014). This is great news for our environment. I'm sure that more funding, as well as private sector support will continue to work to restore the ecosystem from the damage caused by acid rain.

Conclusion

As far as I know, I have never personally suffered adverse effects due to acid deposition. Unlike Kimberly from *Diff'rent Strokes ,* I never had green hair from washing with rain water. However, I wouldn't want to wait until my hair – or skin was green, before taking action to improve our environment's air quality. Furthermore maintaining higher levels of air quality ensures I'm not vulnerable to the dry form of acid rain and have to battle asthma or other breathing issues. Finally, I'm thankful that we are now fighting acid deposition because protecting air quality, which in turn protects water quality, means my six-year-old nephew will have a greater chance of living a long and healthy life without asthma, indigestion due to tainted water or green hair. I hope the measures to reduce acid rain continue.

References

Briney, A. (2014). *Acid Rain – The Causes, History, and Effects of Acid Rain.* Retrieved February 22, 2014, from Global Problems and Issues. About. com: http://geography. about. com/od/globalproblemsandissues/a/acidrain. htm

IMBd. (1982, April 1). *Diff'rent Strokes: Season 4, Episode 20 Green Hair.* Retrieved 22 February, 2014, from IMBd: http://www. imdb. com/title/tt0559982/

National Geographic. (2014). *Acid Rain – Effects Felt Through the Food Chain.* Retrieved February 22, 2014, from National Geographic -: http://environment. nationalgeographic. com/environment/global-warming/acid-rain-overview/? rptregcta= reg_free_np&rptregcampaign= 20131016_rw_membership_n1p_us_ot_w#