



Climate change is affecting what we grow and how we grow it

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Ask just about anyone who plants seeds if they've noticed a change in Pennsylvania's climate and your answer will likely be, yes. Farmers and gardeners often talk about weather extremes - heat, weird patterns of heavy rainfall or prolonged drought - as they should. They count on the weather to be relatively reliable. It affects what they plant and when. But Mother Nature isn't cooperating.

Last year was the hottest on record, according to the National Oceanic and Atmospheric Administration, which has been keeping records since 1880. It topped the previous record holder - 2015 - by 0.07 degrees, and 2015 topped record holder 2014.

Pennsylvania has been warming, too. Since 1895, the five-year annual average temperature increased 2.3 degrees, or 5 percent, based on a Reading Eagle analysis of National Weather Service data.

And it has been erratic. In February, local temperatures hit 70 degrees. Days later, the mercury was well below freezing and was followed in mid-March by a major snowstorm. And it wasn't an isolated occurrence. In recent years, warm weather followed by a freeze has frustrated local fruit growers, who have seen apple, cherry and other crops suffer. So what's going on?

Climate and meteorology

To learn more, I spoke with Kyle Imhoff, state climatologist at Penn State University, about the data collected and how he uses the information to study the changes in climate.

First, let's clarify the difference between climatology and meteorology. Meteorology is the study of weather conditions for a period of seven to 14 days in a given location. Climatology is the study of weather conditions averaged over a longer period of time.

"We are looking at data from 1981 to 2010 to find a base for normal (weather patterns)," Imhoff said. The next period of study will end in 2020.

What types of data are we paying attention to?

"We look at the extended periods of dry weather, like that of 2001," he said.

They also measure local precipitation, soil moisture levels and the rate of evaporation, which helps determine what will happen. Sometimes wind has an effect on drought conditions. The U.S. Drought Monitor, based at the University of Nebraska at Lincoln, provides information.

Climatologists look at global ocean patterns and evaluate the changes and impact of current temperatures, Imhoff said. They look for patterns that can help forecast climate conditions three years ahead.

They also study tree rings and ice cores to evaluate how temperature has evolved and why. Warming has occurred before, Imhoff said, but for different reasons. Now, he says, "the change in temperature is significant in the sense that warming occurs when it shouldn't naturally."
Are there factors that pinpoint the cause of climate change being a result of human activity? To some degree, yes.

"We can measure CO₂ (carbon dioxide), and there is clear evidence of increase. Beyond that factor it is less direct, less clear. In terms of scientific evidence, emissions correlate with an increase in CO₂, however there is disagreement on the degree of attribution."
But regardless of the political debates over the causes, the impacts of climate change are documentable.

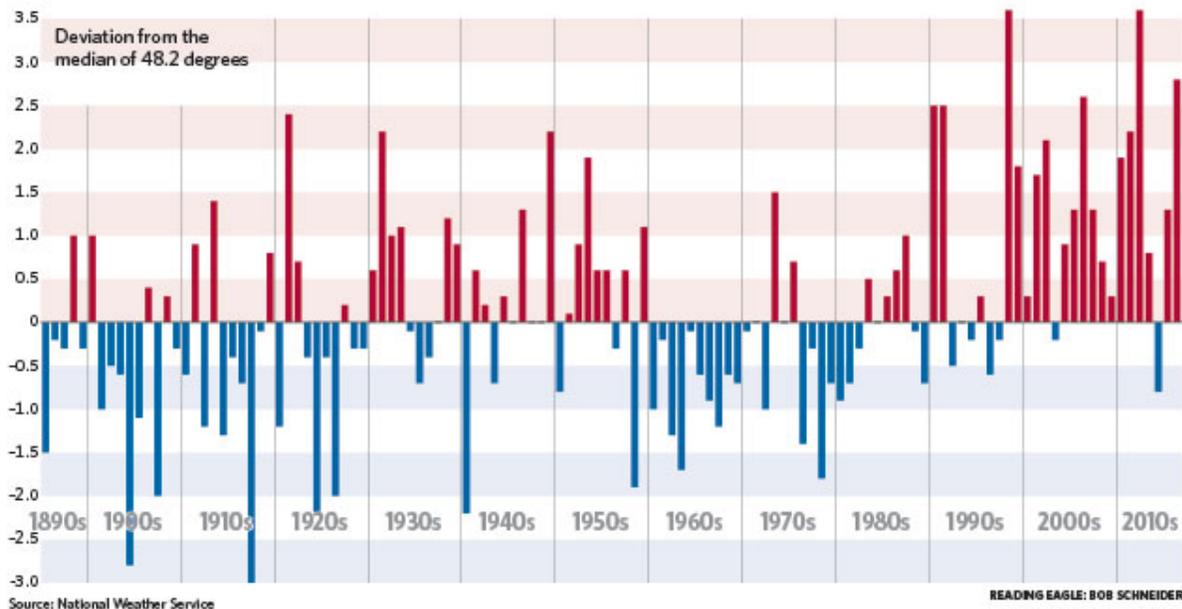
Rainfall data, such as the number of days a year where it exceeds 2 inches, confirm that storms are more intense and connected to the warming trend, Imhoff said. Increased evaporation from the oceans increases energy, which increases the rainfall. It's a cyclical event.

The changes we are experiencing come as sudden, heavy downpours. These thundershowers, often preceded by hail or strong winds, cause erosion and flooding, which is often followed by extended periods of drought, and not necessarily in summer. In January, Berks County was one of several Pennsylvania counties placed under a drought watch.

If you want to do some research on your own, try tracking the number of days between our last spring freeze and our first fall freeze. Then we might know if May 15 is truly our "safe" day to plant tender crops and annuals in the garden.

Hot and cold

Pennsylvania's average annual temperature has been consistently warmer than the median for 25 of the last 38 years.



What can we do?

But how should we use this information where we live? To answer that question, I turned to Kim Eierman, an environmental horticulturist and founder of EcoBeneficial, a horticulture communications and consulting company in New York. Eierman, who specializes in ecological landscapes and native plants, presented a lecture March 8 at the Bowman's Hill Land Ethics Symposium at Delaware Valley University on "Dealing with Climate Change in your Landscape," where she outlined what individuals can do to mitigate its effects.

Citing facts about temperature, rainfall and habitat destruction, she warned the audience about complacency and urged attendees to take action.

The responsibility for global warming is on our shoulders, and if we want to continue to support animal and insect species we need to change our planting choices, methods of farming and landscape maintenance. Declining populations of monarch butterflies and honeybees due to increased herbicide use and loss of habitat is a wake-up call, she said.

So, how can we slow climate change? Eierman urges us to start by looking at our lawns, which she calls "green deserts."

Lawns do not support insect life, nor are they beneficial as habitat, she said. Neither do "exotic shrubs sheared into meatballs and unrecognizable unnatural shapes." While we can laugh at her descriptions, she is right about our impact on the world and demands we look at the global picture. She stressed the need to replace mono-cultures and increase biodiversity in the landscape. Among the ways to do that, create rain gardens and use native plants as alternatives to lawns.

"The roots of turf (grass) are only inches deep, not best for catching storm water," Eierman said. She challenged the audience to plant trees, lots of trees.

Noting that the proper sequence of bloom times, phenology, is affected by warmer temperatures, Eierman recommended planting flowers that will appear earlier in spring and later in fall. This would support pollinating insects and provide food for migrating birds. Pussy willows and red maples are early nectar sources, while asters and native viburnums extend well into the fall.

Reminding us that species are picky about what they eat because evolution takes a long time, as the monarch caterpillar exemplifies: able to consume only milkweed. Do we want to help these species survive our warming earth? We can if we choose to coexist.

Rethinking your garden

Here's how to change your landscape to include habitat and species diversity:

Plant lots of trees suited to the region where you live

Plant pollinator food sources, including larval food sources

Plant alternative lawns wherever possible

Plant regionally specific native and edible shrubs

Manage storm water on-site with rain gardens, cisterns, ponds and increased diversity of ground cover

Manage waste on-site with composting and shredding

Decrease pesticide and herbicide use

Maintain healthy turf where used, use low mow or deep-rooted seed varieties

Install irrigation to minimize water usage and maintain the lines for optimum efficiency

Remove invasive species and replant with native species

Eradicate monoculture and install four-season plants to diversify and support the habitat and extend the growing season

Keep runoff from contaminating clean water, streams and sewage systems

Journal the changes you see, both positive and negative; it may be the only legacy we leave for the next generation.

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