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The spring transition

The transition from April to May in Vermont is always extraordinary, and this year perhaps even more so than usual. I live in the lowlands of Pittsford (elevation 450 feet), so the snow was melting fast here in early April. By mid-April, I had finished turning over my rye cover crop. (The task was easy, as I had dug over more than half of it back in the January thaw.)

Then came almost two weeks of warm dry days, many in the 70s, with the daffodils and forsythia in bloom. I soon forgot winter. Peas and lettuce sprouted in our vegetable garden, even as Vermonters up in the mountains still had snow on their north-facing slopes. Friends familiar with my field of research thanked me for giving them all this dry, sunny weather. A few then added, a little worried, "When is it going to rain?"

Of course, I had nothing to do with it! The spring transition happens every year, and it illustrates beautifully the subtle interrelation of weather, climate and climate change. In spring the weather gets warmer because the sun is returning to the north and moving higher in the sky. But temperatures remain low until the snow melts, because the snow reflects a lot of the sun's energy (and melting the snow sucks up a lot of heat).

If there's a ridge of high pressure over the east to give us a clear sky, the sun can warm the earth quickly. This year the transition from snow-melt to warm dry days seemed especially sudden. A couple of days in April, I even had to put on sunscreen to work in the garden, with the noonday sun burning in a clear, blue sky.

These warm spells are typical of Vermont's spring climate. The weather can stay dry for a while, when there are no leaves on the trees. But it gets so warm that in a couple of weeks, the trees quickly leaf out. Leaves take in carbon dioxide to grow, and they pump (or "transpire") huge amounts of water vapor into the atmosphere. This process, transpiration, moistens the air and cools the forests, much in the same way that we cool ourselves by sweating. Addison County forester Chris Olson explains that on a sunny day in the growing season, a large, healthy maple or oak tree will pump 300 gallons of water out of the soil and into the air.

On average, afternoon temperatures drop more than five degrees as the leaves come out. With all the transpiration, the air becomes more humid, so that clouds can form. Clouds reflect some sunlight, and this cools the earth also. Afternoon showers are again possible, and passing fronts get more vigorous. This spring in Vermont, a big rainstorm came through at the end of April, and temperatures plunged. Weather and these spring climate transitions are intertwined. The past week has been warm and damp, with morning dew on the grass and some morning fog. What a contrast to those hot, dry days in the second half of April!

What about climate change? As the years pass and the earth gets warmer from increased greenhouse gases in the air, the spring transition arrives earlier. At my elevation, the maples used to leaf out at the end of the first week of May, but this year the leaves were open by May 1. Frosts in mid-May used to be common, and many Vermonters did not plant their summer gardens till Memorial Day. This year, we had a light frost on May 1, which could be our last frost until fall – a sign of springs to come.

The link between vegetation and climate goes both ways. Once the trees are fully in leaf, it is much harder to get a frost. The air has become moister, thanks to all those transpiring leaves. Water vapor is a powerful greenhouse gas (along with carbon dioxide) that traps the earth's heat at night, protecting my young tomato plants from a frost. Additional protection can be provided by clouds or morning fog. Optimistically, I planted a couple of cherry tomatoes on April 26. But I had to cover them on May 1, when the north wind behind the big rainstorm blew cold, dry air down from Canada (where spring comes later).

Weather, climate, life, humanity and climate change are woven together every spring. Yes, I am grateful that winter is past, and my peas will be ready sooner. But I spent two weeks cutting and splitting trees felled by winter storms, getting ready for next winter, and thinking about our future civilization after fossil fuels. I also spent a weekend adding yet another layer of insulation to our attic. Here in Vermont we have a lot to do to get our homes and businesses ready for the changes to come.

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