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How Northeastern Winters are Changing

Growing up in the Northeast, I found comfort in the winter months. I looked forward to the ski season and snowy walks in the woods with my family. But as I've grown older, winter has changed; the temperatures are warmer and less snow is produced. When the weather changes, so does the environment and it's reflected throughout society. We now know this is due to climate change, and it affects every aspect of our lives.

There are a few obvious reasons for this change in weather. What was once a winter wonderland has now become cold, grey days with precipitation. It starts with the warming of the ocean. Rising sea temperatures that occur due to pollution, add moisture to the air which causes an increase in precipitation throughout New England. Whether it's snow or rain, this increases the intensity of storms (Zarzycki 2018). One article stated that some of the biggest storms on the Northeast Coast have occurred since 2020 and due to rising temperature trends, these '100 year storms' will continue to occur more frequently with an overall milder season (Anon n.d-c.). This will result in warm, wet environments that can become icy, and hazardous quickly, leaving unexpecting people in unsafe conditions. However**,** the sea temperature isn't the only factor that contributes to the weather.

The bigger issue is the Arctic air currents that are slowly creeping further into the United States. The North Pole is warming twice as fast compared to other parts of the world, this climate event, similar to El Nino in the tropics, is becoming a major contributor to global weather

patterns. Scientists concluded that the Northern Polar Vortex and a lag in melting ice caps cause a warm Arctic/cold continent pattern, referred to as WACC, which explains the contrast in bad storms yet warmer winters. The Polar Vortex essentially collects warm air in the Arctic atmosphere and circulates it through the stratosphere until it is pushed down, and displaced in the Northeast. Like a wave, when the cold air is pushed down, our moderate temperatures are pushed up creating that warming effect in traditionally colder places. In turn, the public receives dry weather and intermediate snowy extreme conditions, reflecting the severity of climate warming (Akpan 2018). The combination of rising sea temperatures and the polar vortex creates dangerous storms that occur more frequently throughout increasingly warmer winters each year. Not only does this affect society but also the environment around us.

The warming climate affects our ecosystems too. Because there is less snowfall, environmentalists have noticed a decrease in tree health, specifically in the Maple Tree family. Because snow provides coverage for the ground, it acts as a blanket and insulates what is below, trapping the heat. For example, a tree's root system can continue to thrive and not freeze even if temperatures are below freezing. However, in recent years with a lack of snow, the soil is able to freeze over affecting the root system. This creates a freeze-and-thaw cycle that kills and damages the tree's roots. In turn, this causes a chain reaction of decomposition in the ground so the tree can't get proper nurturance, stops growing, and reduces carbon storage (Anon 2018). Not only does this affect the forest's health, but if the roots die, the species that live around the ground must make up for the loss of their habitat too.

One species that has unfortunately benefited from the warming climate is the infamous tick. Growing up in New York, I always had ticks in my backyard, each year my family would pull hundreds of ticks off our pets and more often than not, find a few crawling around on us

after some time outdoors. Luckily, during the summer weeks, we would spend our time up north in the milder climate of the Adirondacks. During this time, the climate up there was too cold for most tick species so they were not an issue. However, with warming temperatures, tick migration has changed in many places, not only in New York but in Maine too. Warmer, shorter winters are contributing to the increase of the tick population and can spread tick-borne illnesses like Lymes which can be devastating to human health (Anon n.d.-b). Not only is this migration a danger to humans but also to the larger mammals of the forest. An article by Maine Public expresses their concern about the moose population in relation to the recent tick infestation. It's not uncommon for hunters and researchers alike to find moose swarmed with forty-thousand or more ticks. These large animals can cover hundreds of miles in a day and pick up many insects along the way. Adult moose can survive a tick infestation due to their size and opting to scrape themselves bald in an attempt to find relief. However, the problem lies in the youth group, the future of this once-endangered population. Unlike deer ticks, this species of winter ticks hunt in packs and gather in clusters on surrounding brush, waiting to latch onto a bypasser. This affects the calf population in two ways; the ticks act as a predator and consume their host's blood, depositing parasites. Research also suggests a decline in female moose making it to full-term pregnancies (Miller and Pratt-Kielley 2022). Compensating for mass blood loss, fighting parasites, and potentially a lack of food created unfair odds for young calves, and the population in general. If the colder weather and snow were to come earlier and more consistently, this would alleviate the tick population and restore the forests.

Unfortunately, ticks aren't the only animals spreading to areas where they shouldn't be. Research has shown that the warming climate directly and indirectly affects migrating species of birds. The change in weather throws off their migration times, territories, and reproductive

success. Birds use a lot of energy to maintain thermoregulation to control their internal body temperature. Therefore, the warming confuses them and creates a shift in their migration which pushes them towards the pole instead of South. While the animals can adapt to a new northern environment, the vegetation surrounding them often can't. This can result in a lack of food which threatens their survival rate. Bird species, in turn, experience nesting difficulties which translates to their reproductive success. By the time the climate advances in the northern regions, migratory birds arrive too late in the mating season and are often forced to compete for the food supply (Anon n.d.-d). Considering each aspect of their changing environment, the flipped migration is putting some species in danger. If this continues, scientists are projecting a concerning reduction in bird species all across the Northeast within the next decade (NRCM 2013).

If these environmental changes weren't concerning enough, the economy is also seeing a decrease in revenue from warmer winters. For example, states that rely on snow for winter activities like skiing are seeing a decline in tourism which affects businesses, lodging, and many other groups of entertainment. To compensate for poor winter conditions, ski mountains blow fake snow which only adds to operating costs, the opposite of what they want to do if a season provides bad conditions (Anon n.d.-a). Another concerning factor that was mentioned earlier is the decline of Maple trees, specifically Sugar Maples. In recent years there has been a 40% decline in this species which makes up more than half of a forest's biomass (Anon. 2018). Not only does this affect forest growth rates, but also Maple syrup production. For states like Vermont and New York, a decrease in tree sap could leave a big dent in the market and overall state income. In Vermont's 2021 National Agricultural Statistic Service report, they received a 21 percent decline in the production of syrup compared to the previous year (Anon. n.d.-e). Warm winters can shorten a tapping season from 38 days to 28 which significantly decreases the

amount of product produced and collected, affecting the producer, and seller's profit. For the groups of people who gain income during the winter season, the loss of snow and sap production can be devastating.

The changes that have occurred in winter due to warming climate conditions create a domino effect that can be seen in several aspects of our lives. It’s scary to think future generations may never experience a true winter if the climate continues on its current course. While we can’t control the weather or the animal's reactions, society can make a difference through eco-friendly decisions that can slow climate change and reduce its impact on the environment. Now more than ever, it’s important to educate ourselves and be aware of the human implications that have driven us to this predicament. We often take what our Earth has gifted us for granted, and if we want to save winter, now is the time to act.

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