

THE HEAT IS ON: A Look into New England's Future Climate

David J. Nicosia

Every Autumn, tourists flock to admire the spectacular fiery foliage of New England. Tourists and residents alike take photos and many show children how to preserve colorful leaves by pressing them between sheets of waxed paper. We tend to take this annual show for granted. However, if fossil fuel burning goes unchecked, the climate of southern New England will be very different than it is today. In the worst case, New England's vivid fall foliage display could become a memory of the past.

Consider these scenarios for future New England winters and summers:

It is early December, the weather forecast for tonight is calling for clear skies with a widespread killing frost. It is expected to be the first freeze of the fall season. It has been a long and very mild fall season with temperatures consistently in the 60s and 70s with high temperatures occasionally in the 80s. This first freeze is a sign of things to come, as colder weather will become more common as late fall transitions into winter. Winter typically brings daytime temperatures in the 50s and 60s with morning lows in the 30s. Frost with occasional freezing temperatures will become more common. The chances for snow are slim to none in a given winter season. Measureable snow falls about once every 4 years. When it does fall, entire communities are paralyzed because they just don't have the equipment, salt and sand to cope with snow and ice, and residents don't know how to drive on snow and icy roads. Anytime the weather forecast calls for snow or ice, people rush to the stores, schools shut down, and businesses close. If several inches fall, a state of emergency is declared. Fortunately, a snowstorm of several inches is very rare and occurs once every 10-20 years. The vast majority of the time, precipitation falls as rain. The rains are often heavy and lead to floods.

Spring arrives early with temperatures frequently rising into the 70s by

March. By the middle of March, the chances of sub-freezing temperatures are extremely small. By May, daytime highs frequent the 80s and toward the end of May, temperatures often climb past 90 degrees. The humidity also kicks in strongly during May. Summers are long, hot, and humid with about 50 days exceeding 90 degrees. On a few days of the summer, temperatures exceed 100 degrees. Even though the heaviest rainfall comes in the summer season, the searing heat of the summer leads to intense evaporation of moisture from the soils. So despite an increased frequency of intense flooding rains, short term drought conditions occur almost every summer. Although rare, longer droughts of up to 6 months occur once every 10-20 years. Thus, the cycle of flooding rains and summer drying with occasional drought leads to challenges for both agriculture, and water supply. The heat and humidity of the summer lasts well into September with cooler weather not typically arriving until October.



C. Arnold

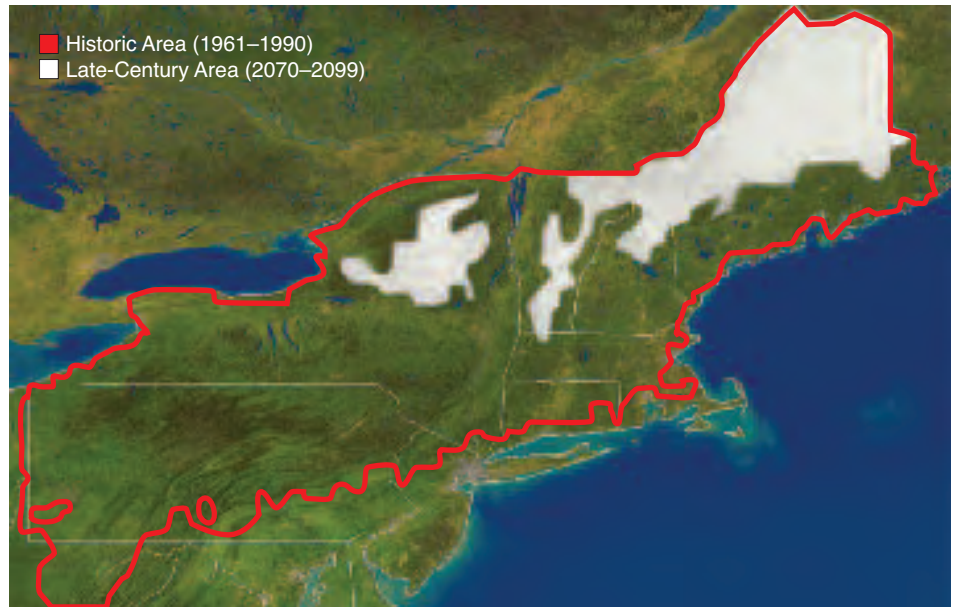
Could New England's legendary fall foliage color become a thing of the past? Many scientists say yes, if we continue to emit the amount of greenhouse gases we currently do.

Even so, temperatures in October often exceed 80 degrees. One would have to travel very far to the north to see fall color. The predominant forest type is pine and oak which lack the brilliant fall hues typical of a maple dominated forest. The above describes the current climate of South Carolina. But, it could someday describe our climate in southern New England.

If fossil fuel burning goes unchecked and we follow the Intergovernmental Panel on Climate Change's (IPCC's) high greenhouse gas emission scenario, by the end of this century, the climate of southern New England will be similar to the climate of South Carolina today.

The forests of maple, beech, birch, hemlock, spruce and fir will respond, as climatic zones shift to the north, vacating central and southern New England. Indeed, there was a time 6 to 8 thousand years ago, as indicated from pollen samples taken from lake cores, when these tree species did retreat far to the north of central and southern New England. The forests were predominantly oak, pine and chestnut. It is postulated that summers were 4 to 8 degrees F warmer than today during this time. Thus, it is entirely plausible that our forest composition will change with maples becoming much less common. With the retreat of the maples to the north, comes the loss of the brilliant fall colors so common in much of New England today. In addition, the maple sugaring business will suffer. Snow will become much rarer, especially along the coast. Snow cover will become non-existent across most of New England except over the far north and in the higher mountains of Vermont, New Hampshire and Maine. In these areas, snow cover would still remain for about 1/2 of the winter. The ski industry would be decimated with only a few resorts hanging on across the highest mountains.

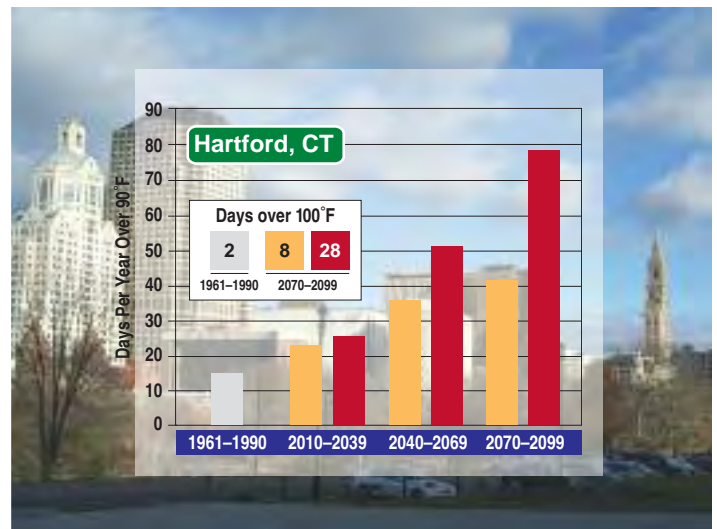
In addition to the loss of fall color, and snow, summers would become brutally hot and humid in southern New England. An average summer would be much worse than even the recent hot and humid summer. For comparison, the summer of 2010 saw 34 days exceed 90 degrees in Hartford, Connecticut; tied for third most days in a year above 90 degrees. The record number of days above 90 degrees is 38 days set in 1983. If such high emission climate projections hold true, the average number of days topping 90 degrees would be a staggering 78, with the number of days exceeding 100 degrees averaging almost 30! This would make the summer of 2010 seem cool in comparison! Coastal locations would see fewer 90 degree days than inland stations but would likely top 50 per year similar to the South Carolina coast.



In a future scenario for climate change in New England, this is the area in which snow covers the ground for at least half of the days in December, January and February.

Source: Union of Concerned Scientists (<http://www.climatechoices.org/>) which is adapted from *Climate Change in the U.S. Northeast* (PDF): A report of the Northeast Climate Impacts Assessment (NECIA), October 2006.

With the marked increase in air temperatures will come a sharp increase in our ocean temperatures. Under a high emission scenario, sea surface temperatures in coastal New England and the Long Island Sound will increase as much as 9 degrees F relative to today. This means that summer ocean temperatures which normally average close to 70 degrees could approach 80 degrees. This change in ocean temperature will have a profound impact on marine life with changing composition of fish species. Cold adapted species, including lobster, would migrate well to the north of Long Island Sound. This would end the lobster industry for southern New England. Brown kelp could vanish from the Sound as well, causing changes in the benthic estuarine ecosystem.



In summer 2010, 34 days exceeded 90 degrees in Hartford, Connecticut; tied for third most days in a year above 90 degrees.

Hartford skyline photo by Mark Parker



Low-lying coastal cities such as Bridgeport, Connecticut and transportation corridors such as Interstate 95 will have to adapt to rising sea level.

Accompanying the rising sea surface temperatures would be a rise in sea level due to thermal expansion of the ocean waters. Sea levels are projected to rise almost 20 inches under a high emission scenario. This is from thermal expansion only. If one factors in potential increase from glacial melt, which is much more uncertain, the rise could reach almost 3 feet. This would certainly flood many of our coastal communities. To make matters worse, rainfall intensity and storminess are projected to increase. Most climate models are indicating that the number of days with 2 inches of rain may double by the end of this century. This increased storminess not only would increase flooding but also lead to more coastal flood events as there would be more frequent coastal storms.

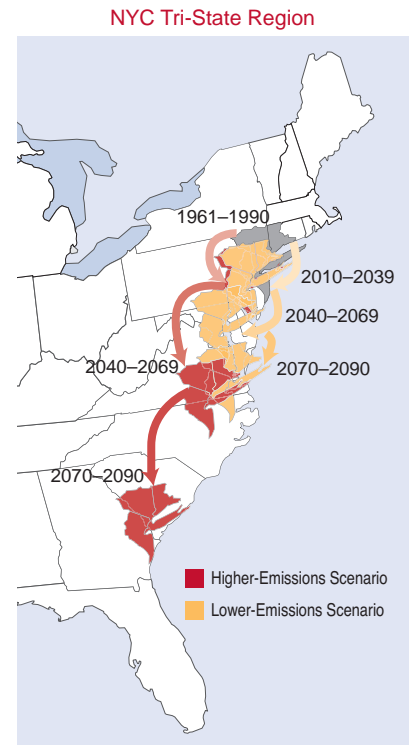
Agriculture will also be significantly impacted by such rapid changes as well. Even with an increase in rainfall over the entire year, the higher summer temperatures will allow evaporation to outpace the increase in rainfall. This will lead to more summer-time drying, increasing the incidence of drought. The occurrence of droughts lasting 3-6 months is projected to increase by almost threefold.

In contrast, agriculture could benefit by an extended growing season. Under a higher emission scenario, the growing season could be extended by as much as 6 weeks with first frosts not occurring until well into November, or even December, along the coast. The last freeze would be in March instead of April or May.

It is hard to believe that a child born today, in his or her lifetime, could see such profound changes in our climate. In a human lifetime, our familiar climate with 4 distinct seasons of winter snows, spring thaws and maple sugaring, warm, pleasant summers and crisp, cool colorful falls could radically change. Gone will be the colorful falls, and winter snows to be replaced by very hot and humid summers. Fall and winter will be mild and rainy with a much warmer and earlier spring. Rainfall patterns would be more erratic, leading to increasing

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Will New England be the “new South Carolina” by 2090? If we continue our energy-consuming patterns, very possibly.

instances of flooding and droughts. Such changes would be the most the human species has had to encounter since the end of the last ice age around 10,000 years ago! If you believe the climate models, this will occur under a high emission scenario. Even lower emission scenarios still have pronounced warming of around 5 degrees F which would make southern New England’s climate more like North Carolina and Virginia instead of South Carolina.

Will there be some benefits to climate change? Longer growing seasons could benefit agriculture. Imagine growing two crops of tomatoes in a summer season! Recreation could shift away from winter sports to summer recreation. Maybe the beaches of Southern New England will become more sought after vacation destinations with warmer water temperatures and hotter summers. Of course, this is only true if the sea levels don’t rise too much. Warmer and mild winters could make southern New England a popular winter destination for the snow-birds of central Canada. Can you imagine that?!

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