Coping With Climate Change

By Kim Eierman

Far from a Chinese hoax, climate change was identified more than a century ago. In 1896, Swedish scientist Svante Arrhenius claimed that if humans doubled atmospheric carbon dioxide by burning fossil fuels, the average temperature on Earth would rise by four to six degrees Celsius.

His calculations may have been high, and he mistakenly thought that this warming would take thousands of years, but he was on to something.

More than 100 years later, climate change and global warming are still being disputed, despite the scientific evidence to the contrary. Our observations in our own landscapes are quite telling and confirm what the majority of the scientific community has been saying for some time.

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New Realities

Some of the new realities we see include the increased and often prolonged risks of floods and droughts. Extreme weather events have become commonplace. What we once considered to be a 100-year storm seems to have become a 5-year event.

Major snowfalls in early fall or late spring, the lack of snowpack in winter, floods and droughts ping-ponging back and forth – it's hard to predict any weather, including a date for hard frost. Gardening has become a speculative affair, more reminiscent of blackjack than a predictable hobby.

Impact on Species

Climate change is particularly tough on the plant and wildlife species that inhabit our landscapes. According to the Harvard School of Public Health, "climate change alone is expected to threaten with extinction approximately one quarter or more of all species on land by the year 2050." In fact, they believe that climate change will surpass habitat loss as the greatest threat to life on land.

The Audubon Society echoes this species loss due to climate change, estimating that nearly 50% of birds in the U.S. will be imperiled by the end of the century due to shrinking and shifting ranges.

All photos / Kim Eierman

Climate change, and the unpredictable weather it brings, presents problems for plants.

Biodiversity

With species extinctions becoming an increasing reality, biodiversity has never been more important in our landscapes. Planting a wide array of native plants is one of the most important steps.

Plant diversity equates to wildlife diversity, with a nod to the evolutionary relationships that we rarely notice. The plight of the monarch butterfly and the dearth of its host plants, milkweeds, have served as a basic lesson in evolution for those who had never contemplated what a butterfly caterpillar might eat.

Plant diversely, but plant sufficiently, emphasizing native plants that have evolved with native wildlife.

Mismatches in Phenology

With increasing and erratic temperatures, climate change brings phenological mismatches. Phenology is the relationship between climate and periodic phenomena, such as plant flowering or bird migration.

The cues to plant flowering include the amount of sunlight, warming temperatures and the amount of precipitation. A very late spring with cold weather is sorry news for early emerging bees that depend on early spring flowers for pollen and nectar. The resources that these creatures depend upon may not be there.

Planting an abundance of early-blooming perennials as well as trees and shrubs, such as pussy willow *(Salix discolor)* and red maple *(Acer rubrum)*, may help early pollinators to survive. [*Editor's Note:* See Nancy DuBrule-Clemente's story on page 3.]

Climate change can also wreak havoc with bird migration. A long stretch of warm weather in the fall may trick birds into delaying their trip South, at a time when natural food supplies are dwindling.

Gardeners can help support many of these birds by planting native trees and shrubs with nutrition-packed fruit, such as native viburnum berries, flowering

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dogwood drupes, and native honeysuckle berries. To make a successful migration, birds must have the right nutrition, and not all plants provide equivalent nutrition.

Some birds may fail to migrate at all, like Robins, which are now frequently overwintering in the Northeast. Including persistent fruits in our gardens can help these birds make it through the cold season.

The fruits of winterberry *(Ilex verticillata)* and inkberry *(Ilex glabra),* rose hips from native roses, and drupes of Northern bayberry *(Myrica pensylvanica)* are some examples of persistent fruits that hang on during winter as a food of last resort when the tastier choices are gone.

Leaving flowering perennials and native grasses standing through winter can offer cover, as well as seed sources for birds.

Succession of Bloom & Plant Diversity

With the seasonal confusion of climate change, planting a succession of bloom has never been more important. The first step is to evaluate our landscapes to determine where bloom gaps occur. Strive to have a continual succession of bloom from early spring through late fall.

Not all pollinators are attracted to, or can use, the same species of plants. Body size, mouth parts, and species determine which pollinators can utilize which plants. While white turtlehead *(Chelone glabra)* may offer an easy meal for a strong bumble bee, a hover fly has little hope of nectaring on that flower, being far better able to access a more open flower, like tickseed (*Coreopsis* spp.).

Plant Choices & Assisted Migration

Many plants are at risk in the face of climate change. Often cited is sugar maple *(Acer saccharinum),* a tree that is losing its southern range as documented in the USDA's *Climate Change Tree Atlas.*

Species can survive in the face of climate change in several ways – adaptation, acclimation or migration.

Plants cannot migrate on their own, although seed may be carried by the wind or an accommodating bird. This reality poses some challenging questions. Do we stop planting species that we think will vanish from our region? Do we assist plants in their migration?

If we plant diversely in our landscape, the argument could be made for including a sugar maple, along with many other tree species. But, the days of tree allees and monoculture hedges are over – we cannot afford to risk using these old-fashioned landscaping practices in our challenged modern landscapes. Biodiversity is our greatest tool in the face of climate change.

Assisting migration of plants can be problematic – planting species where they do not naturally occur has some dangers. We have seen the consequences of seemingly harmless introductions before – Japanese barberry *(Berberis thunbergii),* Oriental bittersweet *(Celastrus orbiculatus),* burning bush *(Euonymus alatus),* et al.

Untested assisted species might become the invasive species of the future. Of course, many plants have proven themselves to be well behaved outside of their natural range. A wild bleeding heart *(Dicentra eximia)* is just as charming in New York as it is in its native range. Favoring regionally native plants and the judicious use of tried-and-true non-natives seems a safe bet.

Favoring plants that have a wide hardiness range may give us an increased chance of coping with climate change in the garden. This is also the case for utilizing more *rain garden* plants – those plants that can take occasional inundation as well as periods of drought.

Invasive Plants & Climate Change

While our native plant species are at a disadvantage with climate change, some research indicates a positive response of invasive plants to increasing CO_2 levels. Not good news for gardeners. Reducing – or even better, eradicating – invasive plants is a critical part of gardening for biodiversity. Unfortunately, invasive plants have a tendency to re-seed prolifically and are often highly deer resistant.

A further challenge for gardeners – the timing and methods of invasive plant removal are determined by species.

Gardening in the face of climate change means learning the fine points of invasive plant removal and always replacing invasives quickly and thickly with competitive native plants.

A plant that may be *frisky* in a formal planting bed may be a helpful ally against invasives. The happily reseeding Northern sea oats *(Chasmanthium lati-*

From left: 1. The berries of American cranberry bush *(Viburnum trilobum).* 2. Wild bleeding heart *(Dicentra eximia).* 3. Trees can intercept rainwater, helping to reduce flooding and erosion.

folium), one of our native grasses, is a good match against thuggish Japanese stiltgrass *(Microstegium vimineum).*

The Power of Trees

If you want to help fight climate change in your landscape, start by reducing your lawn and plant more trees.

The more frequent and severe flooding of climate change results in stormwater runoff that pollutes our water supply and erodes soil. By limiting impermeable surfaces and planting more trees, you can help to keep stormwater on site. A mature tree may store 100 gallons or more of water.

Tree leaves and tree bark intercept raindrops during storm events, allowing for more gentle infiltration of rainwater into the soil and reducing erosion. Tree roots take up moisture from the soil and store it, also limiting soil erosion while increasing ground water recharge – critical for clean drinking water.

Trees are nature's air conditioners. As water evaporates from their leaf surfaces, trees cool the area around them. In a single day, the evaporation from one mature tree can equal the cooling effect of 8 room-sized air conditioners.

Trees absorb carbon dioxide and other gasses. In turn, they release oxygen that we can breathe. Trees are oxygen factories that we depend upon for survival. A single tree can provide a day's worth of oxygen to four people, while absorbing carbon dioxide from the air.

The Payoff

Gardening more ecologically in the face of climate change has the happy benefit of connecting us more closely to the environment that we depend upon. We need to be good stewards of our landscapes – now more than ever.

Kim Eierman is the founder of Eco-Beneficial (ecobeneficial.com)*, a consulting and communications company specializing in ecological landscapes and native plants. Kim is a horticulturist, a naturalist, an organic landcare professional, and a Master Gardener.*

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