Spotlight on Climate

The Smallest Victims—Pollinators on the Brink

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(700 words)

After a record-breaking winter, the Southwest is bursting with springtime flowers. Parts of the Sonoran Desert are officially now in "superbloom." With the flowers come green hillsides, springtime allergies, and…pollinators!

In spring, pollinators begin their visits to wildflowers. Bees, flies, moths, butterflies, hummingbirds, bats, and wasps collect floral rewards and in return transfer pollen grains to fertilize other flowers. About 87% of flowering plants worldwide—and more than one-third of our agricultural crops—rely on pollinators to produce their seeds. Pollinators assist in outcrossing—or exchange of genes between individuals, increasing genetic diversity. Populations with greater genetic diversity can more readily adapt to stressors such as new diseases, environmental contamination, and climate change.

Climate change threatens the southwestern US and Colorado Plateau with more extreme weather. It has already raised our average temperatures, increased drought, raised the frequency of disturbances such as wildfires and floods, and caused higher intensity of rain downpours and snowstorms. Sound familiar? These changes do not always affect plants and pollinators in the same way. While plants can respond to extra moisture with superblooms, their pollinators may experience flooded nesting sites, increased disease, and shifts in the timing of their emergence.

In our region, hotter temperatures mean that pools and streams dry up more often. Pollinators need moisture from such sources and from the nectar they collect. Pollinators must harvest nectar, pollen, or oils from the plants they visit. Climate change in our region makes drought more intense and more frequent and can reduce the growth and survival of pollinator forage plants. Drought-stressed plants can also produce less nectar. Plants may also flower earlier or later in the season, matching their flower production to the most favorable temperatures.

As a result of these changes, pollinators may find that their foraging and reproduction are out of sync with the availability of needed plants. Some pollinators migrate with changing seasons. For example, broad-tailed and rufous hummingbirds overwinter in Mexico, and appear in Flagstaff in mid-April. Other pollinators overwinter in the ground or in vegetation: in many bumblebee species, for example, the queen will spend the winter hibernating in a below-ground nest. Under climate change, when these pollinators return to their springtime or summertime ecosystems, they may encounter a scarcity of forage plants due to mismatches in time and space. If plants flower earlier or later, or shift their ranges, the pollinators that rely on them may not find them at critical points in their life cycles, such as during reproduction.

Pollinator populations may decline as a consequence. This then creates a potential feedback cycle, with pollinator losses leading to reduced plant reproduction and a lowered ability for plants to adapt to the effects of climate change.

Climate change is reducing pollinator populations in many ways. The Western Bumblebee was once a common pollinator throughout the West and is now rapidly disappearing due to rising temperatures and drought. On the Mogollon Rim and nearby mountains (i.e., Flagstaff), its populations have declined by 82% and will likely be completely gone by 2050. In California, populations of Edith's Checkerspot butterfly are disappearing in the most southern parts of their range and are now found only at higher elevations where temperatures are cooler. Research done at NAU by Dr. Lindsie McCabe and colleagues showed that 26 species of leaf cutter, mason, and resin bees had 30% lower survival of pupae when transferred to warmer sites on the San Francisco Peaks.

The effects of climate change on pollinators are intertwined with many other pressures, and pollinator declines have been recorded in ecosystems around the globe. What will happen to agricultural productivity as pollinators decline? What will happen to our wildflowers in Arizona when some of our pollinators are missing? Current research focuses on ways to support pollinators in the face of climate change, perhaps through planting of pollinator-friendly gardens, restoration of habitat after fire, and protection of riparian areas. Citizens can help by planting native plants, retaining vegetation debris as cover and nesting material in their yards, and avoiding the use of toxic chemicals that can poison vulnerable larvae. Climate change creates new conditions that we are only beginning to understand and predict—but we must work together to protect its smallest victims.

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