

Learning to Love Bugs

Here's why gardeners need to rethink their relationship with insects.

BY DANAE WOLFE

THEY ARE everywhere around us. Lurking in our gardens. Pollinating our favorite flowers, fruits, and vegetables. Serving as lunch for birds. Occasionally startling those of us who are a bit squeamish. They are invertebrates—what most of us refer to as bugs or insects—and, from the soils to the seas to the skies, they provide invaluable services that create a healthy foundation for nearly every ecosystem on earth.

In the 1980s, invertebrate conservation was just beginning to take hold. Early efforts were sparked by the Oregon-based Xerces Society (see “Resources,” page 32), which was founded in 1971 to conduct research on the conservation of invertebrates.

Despite these efforts, however, scientists are sounding the alarm because recent studies indicate potentially catastrophic declines in invertebrate populations around the world. It may sound

creatures account for the large majority of all animals on earth, making up 95 to 98 percent of the world's fauna. Most invertebrates fall into phylum Arthropoda, which includes insects and spiders, and accounts for 84 percent of the wildlife species on earth. Despite their rich biodiversity, insects and spiders are vastly underrepresented in biodiversity studies and conservation efforts. Wildlife conservation still tends to be focused on what are sometimes called “charismatic megafauna”—typically large or cuddly mammals and birds. While these creatures are certainly important in their own right, it's important not to lose sight of the little things that run the world—bugs.

Whether six-legged, eight-legged, or many-legged, arthropods are a critical part of the global ecosystem. From pollinating crops to providing natural pest control and wildlife food sources, the annual estimated economic value of wild insects in the United States is over \$57 billion. An estimated three-quarters of our flowering plants rely on insect pollinators for reproduction. Loss of these animals would cause collapse not only in wildlife food webs but also in the diversity of foods we're accustomed to seeing on our dinner plates including blueberries, cherries, peaches, pumpkins, raspberries, vanilla, and chocolate.

Economic value aside, insects and other arthropods quietly contribute to the health of our gardens and the natural world every day. Ecosystem stabilization, energy and nutrient transfer, providing food sources to other wildlife, and soil aeration are just a few of the major ecosystem services these small animals provide. And while some of these creatures might seem like a nuisance to us, their presence is vitally important to the health of the planet and our gardens. One of the primary examples that Wilson and other scientists cite is that, without insects, the world would be drowning in organic waste.



Insects such as this leafcutter bee are often unsung heroes in the garden.

Decades ago, renowned Harvard biologist, E.O. Wilson famously referred to invertebrates as the “little things that run the world.” He went on to say, “The truth is that we need invertebrates, but they don't need us. If human beings were to disappear tomorrow, the world would go on with little change.... But if invertebrates were to disappear, I doubt that the human species could last more than a few months.” When Wilson wrote those words in the

dire at a time when humans are coming to terms with their own mortality during a pandemic, but the prospect of an insect apocalypse, as this phenomenon is being dubbed, is no longer inconceivable. The good news is that gardeners are well positioned to be part of the solution.

WHAT ARE INVERTEBRATES?

In simplest terms, invertebrates are animals without backbones. These spineless



Insects are critical components of the food chain in a healthy garden ecosystem. A house wren, above, feasts on a katydid. No need to spray for these aphids, right, which are providing a meal for a cuckoo wasp.

Insect decomposers like termites, cockroaches, blow flies, and carrion beetles assist in the decomposition of dead and decaying organic materials, which helps return nutrients to the ecosystem for energy recycling.

Healthy ecosystems are maintained by a balance of predator-prey relationships that evolved over millions of years. When humans enter these systems and cause disruption—be it through habitat fragmentation, pesticides, disease, or the introduction of invasive species—we throw off that balance in unimaginable ways. We are only just beginning to understand some of these chain reaction effects. A nesting Carolina chickadee, for example, will collect more than 400 caterpillars per day to feed her growing brood. When our yards fail to support caterpillars, our yards fail to support birds that rely on caterpillars as a primary food source. Unfortunately, we're already experiencing the failure of our landscapes to support birds and other wildlife.

Last fall, a study in *Science* magazine indicating North America has lost more than a quarter of its bird population in the last 50 years, garnered worldwide



headlines. One North American study on aerial insectivores attributes declines in insect-eating birds to plummeting populations of flying insects. Another U.S. study on monarch butterfly populations showed a steady decline in monarchs over the last 20 years. Further, a 2019 study on butterfly populations in Ohio revealed a population loss of two percent per year over the last 21 years, for a cumulative loss of 33 percent in butterfly abundance in the midwestern state. Studies conducted around the world show similar trajectories in insect decline. A 2017 German study estimated a 76 percent reduction in flying

insect biomass over the last 27 years. Another German study revealed a dramatic loss of butterfly populations over the last two centuries—from 117 species in 1840 to just 71 species in 2013.

Viewed collectively, the growing number of studies highlighting insect decline is cause for concern. What alarms scientists even more, however, is that compared with the vast biodiversity of insect populations worldwide, the overall body of research on them is actually very limited. There simply aren't enough scientists to study all known insect species that exist. What's more, scientists conservatively estimate that five to 10 million more species of arthropods exist than have been described. To put that into perspective, we have just over 5,400 species of mammals on earth. To effectively study population declines of all arthropod species would be next to impossible. Even so, recent studies showing insect decline should be enough to alarm us all.

Many factors contribute to loss of insect biodiversity and biomass. Habitat fragmentation, intensive agricultural practices, pesticide use, and climate change are all responsible, in part, for plummeting populations. Other major sources of loss include the rise of invasive species and light pollution.

THE ROLE OF GARDENERS

While the causes of insect decline are intertwined and complex, there are many practices gardeners can adopt to create healthy habitats for our smallest wildlife. First and foremost, we need a societal shift in how we approach landscaping. Perfectly manicured, weed-free turfgrass lawns should be a thing of the past. Intensive—and often unnecessary—water usage, overuse and misuse of pesticides and fertilizers, and emissions from lawn care equipment should be reason enough to forego or at least reduce the reliance on grass. On top of that, manicured turfgrass lawns are an ecologically sterile monoculture, offering little benefit to local fauna. Unfortunately, many homeowners find themselves bound to unsustainable landscaping practices because of strict homeowner's association (HOA) and city codes.

If you are unable, or unwilling, to give up your lawn, downsizing it is the next best thing. Start by incorporating more native plants into your landscape. In-



A landscape designed to support wildlife doesn't have to look wild or unruly. The lawn in this backyard has been replaced with colorful beds of mixed plants, including coneflowers, black-eyed Susans, and perennial sunflowers, that provide nectar and pollen for insects.

cluding native plants in your gardens will not only create healthy habitats and food sources for native insects and spiders, but it ensures you're creating a resilient garden that can withstand your region's unique climate. Incorporating plants that are native to your region creates a foundation for biodiverse communities and provides important forage for specialist pollinators. Unlike the non-native honeybee (*Apis mellifera*), many of our most important native pollinators are specialists, meaning they've evolved to pollinate particular plants. When those plants aren't available, we lose the insect specialists that evolved alongside them. But be careful—not all native plants are created equally. Nativars, or native plant cultivars, are bred for

specific traits like color or bloom size and don't always provide the same pollinator value as true native plants. The Chicago Botanic Garden in Illinois is currently conducting a citizen science survey on the value of nativars, as part of their Budburst project (see "Resources," page 32).

With any remaining turfgrass, taking a lower-key approach to maintenance will greatly benefit the bugs. Studies show that mowing infrequently—once every two to three weeks—increases bee diversity. You might also try incorporating low or no-mow lawn species into your yard. Fescue mixes can be a great choice by offering shade-tolerance, hardiness, and minimal mowing. Lawn alternatives—such as clover or moss—might also be great options,

depending on your personal aesthetic and wildlife gardening goals. Mowing less frequently can foster growth of important pollinator plants in the lawn while cutting emissions from lawn care equipment.

And speaking of emissions, leaving your leaves is one of the best ways to reduce your carbon footprint while promoting healthy bug habitat. Two-stroke gas-powered leaf blowers are one of the biggest contributors to air pollution, so ditch these in favor of rakes (which offer the added benefit of good exercise) or electric models. Allowing leaves to naturally decompose in your garden returns important nutrients to the soil and provides vital overwintering habitat for insects and spiders. If you're worried about killing your grass, simply rake your leaves

Resources

Audubon, www.audubon.org/native-plants.

Budburst project, Chicago Botanic Garden, <https://budburst.org/projects/nativars>.

Decline of the North American Avifauna by Kenneth V. Rosenberg et al. *Science*, 04 Oct 2019. Vol. 366, Issue 6461. <https://science.sciencemag.org/content/366/6461/120>.

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The Insect Societies by E.O. Wilson. Belknap Press, Cambridge, MA. 1971.

Nature's Best Hope by Douglas W. Tallamy. Timber Press, Portland, OR, 2020.

Raising Butterflies in the Garden by Brenda Dziedzic. Firefly Books, Buffalo, NY, 2019.

Xerces Society for Invertebrate Conservation, www.xerces.org.



into a corner of the garden and let them decompose naturally there. You can also shred some of the leaves and use them in the compost pile or as a light mulch.

Another important concession to garden insects is to make sure your garden has at least a few spots of bare soil that can serve as nesting spots for ground nesting bees or as “puddling” areas for butterflies. Along the same lines, try to take a more *laissez-faire* approach to garden clean up. Leaving a few plant stems standing allows solitary-nesting pollinators like leafcutter and mason bees to find suitable habitat for reproduction. Some gardeners leave small piles of sticks or rocks tucked away in hidden areas of the garden. Commercial or homemade bee motels are also great options but be sure to use materials that can be properly sanitized, otherwise, spread of disease and pests will impact the survivability of your nesting bees.

REMOVING INVASIVES AND REDUCING PESTICIDE USE

One thing you don't want to leave in your garden are invasive plants. These non-natives have the ability to cause ecologic

Allowing the seedheads of perennials and grasses to remain through fall and winter ensures seeds and nesting materials for birds and habitat for overwintering insects.

and economic damage by out-competing native flora. Invasive species tend to be regionally specific, but some of the worst offenders include English ivy, Japanese barberry, butterfly bush, purple loosestrife, Norway maple, Japanese honeysuckle, common buckthorn, burning bush, and Chinese privet. Check with your state department of environmental resources or Cooperative Extension office to learn more about how to identify and manage invasive plants in your region. Eliminating invasive species from your garden will provide more space for native and well adapted flora and fauna that will have your garden buzzing with activity while restoring a healthy balance of predator-prey relationships. These predator-prey relationships can help reduce garden pests naturally, alleviating the need for use of pesticides.

Reducing or eliminating chemical pesticides is another critical element to encouraging insects and other wildlife in our

gardens. Adopting integrated pest management strategies like choosing appropriate plants for the garden's soil, exposure, and climate is a good first step. Also useful is a slight adjustment to mindset. For instance, strive to be more tolerant of cosmetic damage to foliage rather than automatically reaching for a pesticide at the first sign of holes in leaves. In cases where pesticides are needed, seek out the least harmful option and follow the directions for use carefully. Some classes of pesticides are particularly damaging to insect populations, especially if used improperly. Among the ones to be wary of are neonicotinoids, referred to as “neonics,” which some studies have implicated as a factor in colony collapse disorder, which has decimated honeybee populations.

This last tip for promoting insect health in your garden may come as a surprise. Recent research has highlighted the increasing importance of light pollution in the decline of insects. Light



Avoid planting invasives such as purple loosestrife, above, which will outcompete native plants and also spread into natural areas. Eliminating unnecessary lighting in the garden will help reduce light pollution, which adversely affects insects such as fireflies, right.



pollution, along with pesticide use and habitat loss, was cited as one of the primary drivers of firefly decline in a study published earlier this year in the journal *Bioscience*. As fireflies are bioluminescent, using light to find mates, artificial light disrupts mating patterns and reduces survival. Light pollution also affects other nocturnal insects, including

moths and many aquatic insects. Gardeners can help curb light pollution by using only motion-sensor security lights and ensuring that other outdoor lights are turned off overnight. Pulling the curtains or shades in your home can prevent indoor light from leaking outdoors during evening hours.

BE PROACTIVE WITH NEIGHBORS

There are lots of practical ways we can be more bug friendly in our gardens. But what if your neighbors don't love your new-found approach to gardening for our many-legged friends? Neighbors might be quick to point out that native plant and pollinator gardens look messy or unkempt. They may also worry about these gardens attracting unwanted pests.

The good news is, thoughtful design can create ecologically vibrant gardens that align with neighborhood expectations and community standards. Start by ensuring your native plant and pollinator gardens have appropriate borders. Bricks, stone, or natural wood borders can help maintain tidy edges and provide a more traditional garden aesthetic.

Signage is also helpful for educating nit-picky neighbors and curious community members about your intentions. Having your garden certified as a Wildlife Habitat with the National Wildlife Federation or as a Monarch Waystation with Monarch Watch will allow you to put up signs for your landscape that showcase your commitment to wildlife. If your neighborhood still isn't convinced, good old-fashioned conversation may help alleviate any neighborly concerns. Talk to neighbors about how your redesigned landscape reduces emissions, provides habitat and food for nesting and migratory birds, and supports healthy and vibrant food webs. It's hard to argue with the fact that these bug friendly gardening practices help us all.

THINK GLOBAL, ACT LOCAL

It's easy to feel helpless when environmental issues are large and complex—and sometimes seemingly far removed from our own lives. But as gardeners, each of us has the opportunity to meaningfully contribute to an ecologically vibrant planet, no matter whether our garden spans 10 acres or simply a couple of containers on an apartment balcony. After all, conservation starts at home.

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