Feature Article

Gardening For Life

by Doug Tallamy

Chances are, you have never thought of your garden—indeed, of all of the space on your property—as a wildlife preserve that represents the last chance we have for sustaining plants and animals that were once common throughout the U.S. But that is exactly the role our suburban landscapes are now playing and will play even more in the near future.

If this is news to you, it's not your fault. We were taught from childhood that gardens are for beauty; they are a place to express our artistic talents, to have fun, and relax. And, whether we like it or not, the way we landscape our properties is taken by our neighbors as a statement of our wealth and social status.

But no one has taught us that we have forced the plants and animals that evolved in North America (our nation's biodiversity) to depend more and more on human-dominated landscapes for their continued existence. We have always thought that biodiversity was happy somewhere out there "in nature"—in our local woodlot or, perhaps, our state and national parks. We have heard nothing about the rate at which species are disappearing from our neighborhoods, towns, counties, and states. Even worse, we have never been taught how vital biodiversity is for our own well-being.

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We Have Taken It All

The population of the U.S., now more than 300 million people, has doubled since most of us were kids and continues to grow by 8,640 people per day. All of those additional souls, coupled with cheap gas, our love affair with the car, and our quest to own ever larger homes have fueled unprecedented development that continues to sprawl over 2 million additional acres per year (the size of Yellowstone National Park). The Chesapeake Bay watershed has lost 100 acres of forest each day since 1985.

We have connected all of our developments with 4 million miles of roads—a paved surface nearly five times the size of New Jersey. Somewhere along the way we decided to convert most of our living and working spaces into huge expanses of lawn. So far, we have planted more than 62,500 square miles, some 40 million acres, in lawn. Each weekend we mow an area 8 times the size of New Jersey to within 1 inch and then congratulate ourselves on a job well done. And it's not as if those little woodlots and "open spaces" we have not paved over or manicured are pristine. Nearly all are second-growth forests that have been thoroughly invaded by alien plants, such as autumn olive, multiflora rose, Oriental bittersweet, and Japanese honeysuckle. More than 3,400 species of alien plants have invaded 100 million acres of the U.S., and that area is expected to double in the next 5 years.

To nature lovers, these are horrifying statistics. I stress them so that we can clearly understand the challenge before us. We have turned 54% of the lower 48 states into cities and suburbs, and 41% more into various forms of agriculture. That's right: we humans have taken 95% of nature and made it unnatural.

But does this matter? Are there consequences to turning so much land into the park-like settings humans enjoy? Absolutely, both for biodiversity and for us. Our fellow creatures need food and shelter to survive and reproduce and in too many places we have eliminated both. At least 40% of Delaware's plant species are rare or extinct, and 41% of its forest birds no longer nest in the state. More than 800 plant and animal species are rare, threatened, or endangered in Pennsylvania and 150 have already disappeared entirely. Many of those that haven't suffered local extinction are now too rare to perform their

The Bug Stops Here!

role in their ecosystem. These can be considered functionally extinct.

The song birds that brighten spring mornings have been in decline since the 1960s, having lost 40% of their numbers so far. Birds that breed in meadows are in even more trouble. Once common species such as the northern bobwhite, eastern meadowlark, field sparrow, and grasshopper sparrow have declined 82%, 72%, 68%, and 65%, respectively, in total numbers, and are completely absent from many areas that used to support healthy populations.

Why We Need Biodiversity

For most of us, hearing such numbers triggers a passing sadness, but few people feel personally threatened by the loss of biodiversity. Here's why you should. Biodiversity losses are a clear sign that our own life-support systems are failing. The ecosystems that support us—that determine the carrying capacity of the earth and our local spaces—are run by biodiversity.

It is biodiversity that generates oxygen and clean water, that creates topsoil out of rock, that buffers extreme weather events such as droughts and floods, and that recycles the mountains of garbage we create every day. And now, with human-induced climate change threatening the planet, it is biodiversity that will suck that carbon out of the air and sequester it in living plants if given half a chance. Humans cannot live as the only species on this planet because it is other species that create the ecosystem services essential to us. Every time we force a species to extinction, we are encouraging our own demise. Despite the disdain with which we have treated it in the past, biodiversity is not optional.

Parks Are Not Enough

I am often asked why the habitats we have preserved within our park system are not enough to save most species from extinction. Years of research by evolutionary biologists have shown that the area required to sustain biodiversity is pretty much the same as the area required to generate it in the first place. The consequence of this simple relationship is profound. Since we have taken 95% of the U.S. from nature, we can expect to lose 95% of the species that once lived here—unless we learn how to share our living, working, and agricultural spaces with biodiversity. 95% of all plants and animals! Now there is a statistic that puts climate-change predictions of extinction to shame. And studies of habitat islands with known histories, such as Barro Colorado Island in the Panama Canal and Ashdown Forest in England, have so far shown these predictions to be accurate. Species are lost at the same proportion with which a habitat is reduced in size. The good news is that extinction takes a while, so if we start sharing our landscapes with other living things, we should be able to save much of the biodiversity that still exists.

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Redesigning Suburbia

What will it take to give our local animals what they need to survive and reproduce on our properties? NATIVE PLANTS, and lots of them. This is a scientific fact deduced from thousands of studies about how energy moves through food webs.

Here is the general reasoning. All animals get their energy directly from plants, or by eating something that has already eaten a plant. The group of animals most responsible for passing energy from plants to the animals that can't eat plants is insects. This is what

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Below is a list of the 20 best native woody and perennial plant genera for supporting biodiversity in suburban landscapes. There are many alien ornamentals in these, as well, so be sure to choose native members of each genus for your gardens.

Woody Plants

Alder (*Alnus* spp.)
American Beech (*Fagus* spp.)
American Chestnut (*Castanea* spp.)
Ash (*Fraxinus* spp.)
Basswood (*Tilia* spp.)
Birch (*Betula* spp.)
Black Walnut (*Juglans* spp.)
Blueberry (*Vaccinium* spp.)
Cherry and Plum (*Prunus* spp.)
Crabapple (*Malus* spp.)
Elm (*Ulmus* spp.)
Hawthorn (*Crateagus* spp.)
Hazelnut (*Corylus* spp.)
Hickory (*Carya* spp.)
Maple (*Acer* spp.)
Native Rose (*Rosa* spp.)
Oak (*Quercus* spp.)
Pine (*Pinus* spp.)
Poplar (*Populus* spp.)
Willow (*Salix* spp.)

Perennials

Aster (*Aster* spp.)
Beardtongue (*Penstemon* spp.)
Bee Balm (*Monarda* spp.)
Blackberry and Raspberry (*Rubus* spp.)
Black-eyed Susan (*Rudbeckia* spp.)
Coral Honeysuckle (*Lonicera sempervirens*)
Evening Primrose (*Oenothera* spp.)
Goldenrod (*Solidago* spp.)
Iris (*Iris* spp.)
Joe Pye Weed, Boneset (*Eupatorium* spp.)
Little Bluestem (*Schizachyrium scoparium*)
Milkweed (*Asclepias* spp.)
Morning Glory (*Ipomoea* spp.)
Native Geranium (*Geranium* spp.)
Native Phlox (*Phlox* spp.)
Sedge (*Carex* spp.)
Sunflower (*Helianthus* spp.)
Verbena (*Verbena* spp.)
Veronica (*Veronica* spp.)
Violet (*Viola* spp.)

makes insects such vital components of healthy ecosystems. So many animals depend on insects for food (e.g., spiders, reptiles and amphibians, rodents, 96% of all terrestrial birds) that removing insects from an ecosystem spells its doom.

But that is exactly what we have tried to do in our suburban landscapes. For more than a century, we have favored ornamental landscape plants from China and Europe over those that evolved right here. If all plants were created equal, that would be fine. But every plant species protects its leaves with a species-specific mixture of nasty chemicals. With few exceptions, only insect species that have shared a long evolutionary history with a particular plant lineage have developed the physiological adaptations required to digest the chemicals in their host's leaves. They have specialized over time to eat only the plants sharing those particular chemicals.

We need to plant native plants!

When we present insects from Pennsylvania with plants that evolved on another continent, chances are those insects will be unable to eat them. We used to think this was good. Kill all insects before they eat our plants! But an insect that cannot eat part of a leaf cannot fulfill its role in the food web. We have planted Kousa dogwood (*Cornus kousa*), a species from China that supports no North American insect herbivores, instead of our native flowering dogwood (*Cornus florida*) that supports 117 species of moths and butterflies alone. In hundreds of thousands of acres, we have planted goldenraintree from China, instead of one of our beautiful oaks, and lost the chance to grow 532 species of caterpillars, all of them nutritious bird food. My research has shown that alien ornamentals support 29 times less biodiversity than do native ornamentals.

Your Garden Has a Function

In the past, we didn't design gardens to play a critical ecological role in the landscape, but we must do so in the future if we hope to avoid a mass extinction from which humans are not likely to recover, either. As quickly as possible, we need to replace unnecessary lawn with densely planted woodlots that can serve as habitat for our local biodiversity. Homeowners can do this by planting the borders of their properties with native trees, such as white oaks (*Quercus alba*), black willows (*Salix nigra*), red maples (*Acer rubrum*), green ashes (*Fraxinus pennsylvanica*), black walnuts (*Juglans nigra*), river birches (*Betula nigra*) and shagbark hickories (*Carya ovata*), underplanted with woodies such as serviceberry (*Amelanchier canadensis*), arrowwood (*Viburnum dentatum*), hazelnut (*Corylus americana*), blueberries (*Vaccinium* spp.). Our studies have shown that even modest gains in the native plant cover on suburban properties significantly increases the number and species of breeding birds, including birds of conservation concern. As gardeners and stewards of our land, we have never been so empowered to help save biodiversity from extinction, and the need to do so has never been so great.

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Doug Tallamy is Professor and Chair of the Department of Entomology and Wildlife Ecology at the University of Delaware in Newark, Delaware, where he has authored more than 65 research articles and has taught Insect Taxonomy, Behavioral Ecology, and other courses for 26 years. Chief among his research goals is to better understand the many ways that insects interact with plants and how such interactions determine the diversity of animal communities. His new book, Bringing Nature Home*, will be published by Timber Press in November.*

Ed Note: See www.philly.com/philly/entertainment/20070817_When_planting__go_native.html for a recent *Philadelphia Inquirer* article on Doug Tallamy.