Bringing Nature Home©

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INTRODUCTION

Most of us have never thought of our gardens — indeed, our entire landscapes — as wildlife preserves that represent the last chance we have for sustaining the plants and animals that were once common throughout the U.S.A. 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 chance to express our artistic talents, to have fun with and relax in. 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.

WE HAVE TAKEN IT ALL

The population of the U.S.A., now over 300 million people, has doubled since most of us were kids and continues to grow by 8640 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, and their paved surface is 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 over 62,500 sq miles, some 40 million acres, in lawn. Each weekend we mow an area 8 times the size of New Jersey to within 1 in. and then congratulate ourselves on a job well done. And it's not like 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 like autumn olive, multiflora rose, Oriental bittersweet, and Japanese honeysuckle. Over 3400 species of alien plants have invaded 100 million acres of the U.S.A., and that area is expected to double in the next 5 years (Qian and Ricklefs, 2006).

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 in 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. Over 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 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. A new study commissioned by President Bush has found that 1/3 of our birds species are endangered. (State of the Birds. <http://www.stateofthebirds.org/>)

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 and buffers extreme weather events like 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.A. 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. That is 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 awhile, so if we start sharing our landscapes with other living things, we should be able to save much of the biodiversity that still exists.

BRINGING BACK BIODIVERSITY

Redesigning Suburbia. The good news is that we can restore much of what we have destroyed in the past. We can landscape in ways that are both socially acceptable and ecologically vibrant. Nature has disappeared from suburbia because we have made no effort to share our spaces with other living things. We can invite life back into our yards, though, by providing the two things all species need: food and shelter. Before we start, there are a few concepts to consider that will improve our chances of success.

Rebuild Local Food Webs. Nothing lives in isolation of other living things. Instead, every species exists within complexes of interacting species that ecologists call food webs. The more complex a food web is, the more stable and sustainable it is. So, to enable one particular species to thrive in your yard you must provide the fundamental parts of that species' food web. All food webs start with plants, because plants are the only organisms that can capture the sun's energy: the energy that fuels life on earth. Through photosynthesis, plants lock the sun's energy into the carbon bonds of simple sugars. All animals get the energy they need either by eating plants directly or by eating other animals that eat plants. The importance of plants in supporting the rest of nature cannot be overstated. Because plants make all of the food that animals need, and because plants provide all or most of the shelter animals need, the amount of vegetation in your yard will determine the amount of nature in your yard.

All Plants Are Not the Same. It would nice if we could bring nature home just by adding any plant that looks good to our yards. Unfortunately, all plants are not equal in their ability to support food webs. Food webs develop locally over thousands of generations, with each member of the web adapting to the particular traits of the other members of the web. A plant that evolved outside of a particular food web is usually unable to pass on its energy to the animals within that food web because those animals find it unpalatable. Plants protect their leaves from animals with nasty compounds such as cyanide and nicotine. These chemical defenses work well and keep most animals from eating most plants. But the plant-eating animals within a particular food web have developed the physiological ability to overcome the defenses of at least some of the plants in their web, and that is how they get enough nutrition to survive and reproduce. This is called specialization, and as long as the plants that animals have become specialized to eat are available, the food web works.

Natives Support Nature Best. The problem is that we humans have not landscaped our yards with food webs in mind. In fact, we have done the opposite of what our local food webs require to keep functioning. Typically when we build a new development, we bulldoze all of the native plant communities and then landscape sparsely with ornamental plants that are not members of the local food web. How can you tell if a plant belongs to the food web that evolved in your area? Well, you can be sure that an ornamental plant from Asia or Europe did not evolve within your local food web and therefore will provide little or no food for the animals you are trying to encourage in your yard. Unfortunately, the vast majority of plants for sale at garden centers have evolutionary origins in China or Europe. You should look for plants that are native (e.g., have an evolutionary history with the plants and animals in your geographic area), because they will supply the most energy to your new food web.

Insects Are the Key. Most of us have been taught from childhood that the only good insect is a dead insect. In fact, one of the traits we have favored when selecting our landscape plants is that they be "pest free." We should hardly be surprised that we now live in landscapes with very few insects because, for the last century, we have replaced the native plants on which insects develop with plants that our local insects cannot eat. To the joy of many, we have created sterile, lifeless landscapes, but that is precisely why our children do not have nature in their yards any longer. Why can't nature be happy without those pesky insects? Insects are an essential part of every terrestrial ecosystem because they are the primary way most animals get their energy from plants. In other words, most creatures that cannot eat plants themselves eat insects that ate plants for them. Birds are an excellent example. Ninety-six percent of the terrestrial birds in North America rear their young on insects. No insects, no baby birds. People think of birds as seed- and berry-eaters, and many birds do eat seeds and berries during the fall and winter. But when they are reproducing, birds need the high quality protein produced by insects to succeed. Bottom line: if you want birds, or toads, or salamanders, or countless other species in your yard, you must put the plants that support your local insects in your yard.

Your Garden Has a Function. In the past we didn't designed gardens that 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. 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 plants 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)*, under-planted with woodies like serviceberry (*Amelanchier canadensis*), arrowwood (*Viburnum dentatum*), hazelnut (*Corylus americana*), blueberries (*Vaccinium* sp.) . Our studies have shown that even modest increases 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. All we need to do is plant native plants!

LITERATURE CITED

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State of the Birds. <http://www.stateofthebirds.org/>