

Biodiversity in the Garden

by Michael Gambino • www.natureandspirit.org

Part of my job as a naturalist has been to go out into the forests, meadows, and wetlands within the county park system to survey the ecosystems to see what's going on there.

What my colleagues and I look for are indicators of the general state and vitality of the ecosystems as well as searching for rare or endangered species. I get to see first-hand a lot of naturally assembled ecosystems, as well as significantly disturbed or manipulated ecosystems in this work.

Observing directly or indirectly the interaction of a multitude of components in these different environments reveals basic requirements for supporting a high degree of biological diversity (or *biodiversity*).

Essential requirements

Each species of plant or animal exists in an ecosystem because its survival and reproductive needs are met by that environment.

To support the greatest diversity of species for a specific ecosystem, the right balance and quality of basic components must be in place, relative to the type of habitat (desert, forest, tundra, etc.). On a basic level, these components are soil, water, oxygen, food (animal, vegetable or mineral), and sunlight, or energy. Not all species may need these ingredients directly (anaerobic bacteria, for example do not require oxygen), but they depend on them indirectly to supply what they need to live.

Soil has been called the "poor man's rainforest" such is the diversity of life that inhabits the earth beneath our feet. It has been estimated that there

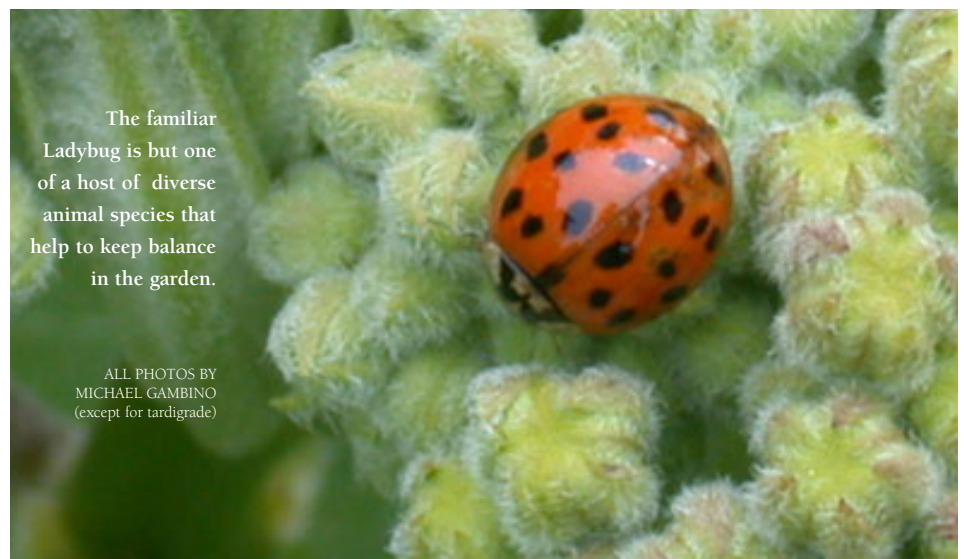
are twice as many species existing in the soil as there are in a tropical rain-forest! From its beginning, it takes 500 to 1,000 years to produce the first 3 centimeters of soil where before there was nothing but rock.

The gradual process of decay is part of the energy cycle, and supports other aspects of an ecosystem by recycling nutrients. Within the soil there are the primary decomposers – the bacteria and fungi – that break down bulk material into smaller pieces. More surface area is thus available on this material for water to loosen the

include earthworms, millipedes, centipedes, slugs, snails, isopods, spiders, mites, springtails, beetles, and ants. Even larger animals, like the shrews and moles and other burrowing animals, play a vital role in creating and maintaining healthy soil.

All this activity adds critical ingredients to the soil recipes, mixing oxygen, nitrogen, and other elements into the soil.

There are distinct levels in the stratification of the soil that these animals call home. Some can't live near the surface, others won't survive too deep.



molecular bonds and release nutrients and chemicals that are then available to a growing community of soil species. These organisms find their niche in the micro-caves and pores in the soil – in the spaces between things – where they can multiply and hide from predators such as protozoa, pot worms, nematodes, and water bears (tardigrades).

Secondary soil decomposers and predators are noticeably larger, and

The relative pH of the soil also varies at different depths, as does the relative moisture. The diversity of soil animal species and their population densities are vital to the health of soil, and from this foundation, the rest of the ecosystem is built.

Eliminating just one of these ingredients (such as moles) from the mix can drastically change the outcome. Imagine making chocolate chip cookies, but killing off the chocolate chips!

(Continued on next page)

Biodiversity in the Garden *(Continued from page 1)*

Habitats are linked by the energy cycle

Water habitats create and support incredible amounts of species diversity. Habitats that retain and slowly disperse snowmelt and rainwater throughout the landscape will typically have a much higher biodiversity than similar areas where the water drains away quickly. Additionally, the gradual release of water from the landscape minimizes erosion and the silting of streams, ponds, and wetlands. Ponds and vernal pools are essential for the life cycles of amphibians and the smaller invertebrates that share their aquatic life stages. Together, these animals and plants are responsible for transferring energy into the surrounding forests and fields as part of the food chain, drawing more species to the area and linking other habitats. If these wetlands are drained or clogged with silt, these aquatic creatures diminish or disappear. Less decomposition occurs, fewer nutrients are available to other species that also disappear, and the effect is felt through the whole chain of ecosystems.

The garden – a manipulated ecosystem

The diversity of species in any ecosystem is a measure of its health and productivity. Our gardens are no different in this respect than a large expanse of wilderness. However, as the creator of the garden, we are responsible for ensuring that all the necessary requirements are put in place. We must work to balance this manipulated ecosystem. Fortunately, nature is quite willing to show us what needs to be done in the garden. For example, the size and severity of “pest” insect infestations can be viewed as indicators of the garden’s overall health and vigor.

One of the first things that many gardeners do before planting is to till



A greatly enlarged photo of a Water Bear, or tardigrade (meaning “slow walker”), is just one of the many species of microscopic animals in soil.

and turn the soil. Recalling what I mentioned about soil animals and their habitat requirements, we can understand why tilling destroys the natural layering, immediately disturbing soil vitality. This reduces species diversity in the soil, perhaps leading to an overpopulation of certain soil animals. The garden and lawn industries have made billions of dollars on all sorts of soil conditioners and chemical treatments to deal with disrupted or “unsatisfactory” soil conditions for our gardens.

Balanced, healthy soil supports healthy plants that can defend themselves better against infestations, thus requiring less application of chemicals that further destroy soil animals.

Another aspect that invites trouble into the garden ecosystem is planting mono-cultures – large areas of one type of plant. This situation begs to be ravaged by insects. Planting select, diverse plants will help reduce chances or severity of infestations. Whenever possible, choose native wildflowers over hybrids. The latter will not produce as much pollen or nectar as will our native species and are not as good a food source for desirable insects in your garden.

Insects are caretakers too!

Nature shows us what needs tending to, and perhaps what needs to be looked at in a new way. Labels we give

to garden insects such as “pest” or “beneficial” are somewhat prejudiced views. These “pest” insects are just doing their job by cutting down weak plants in any ecosystem, and removing them from the gene pool, while “beneficial” insects control overpopulation of the pests. Both are desirable, both are required in a healthy ecosystem.

To help establish balance, predatory insects should be invited to dine in your garden. They will repay you for the meal by effectively restoring nor-



Water habitats create and support incredible amounts of species diversity.

mal populations of damaging insects. However, many of these insects need pollen or nectar at certain stages in their life cycles and you must provide these foods to entice the insects to take up residence in your garden. What happens if you remove EVERY pest insect from your garden? You guessed it, the predatory insects will skip town and head for your neighbor’s garden restaurant. So you actually *need* some pests in the garden!

Managing for biodiversity

When planning a garden for biodiversity here are some additional thoughts to consider:

- *Too much water or too little will destroy life.* The perfect amount brings great bounty and beautiful diversity into being. Inside your garden ecosystem you must work to assure the perfect amount of water is received by the inhabitants living below and above the

Biodiversity in the Garden *(Continued from page 2)*

surface. Water seeks the path of least resistance in its flow towards level ground, so look at you garden and see how water flows during a rainstorm. Work to slow, but not prevent, the movement as needed. Include drinking water for birds and insects as well as a damp, cool, shady refuge for moisture-sensitive species like toads.

- *Include transition zones in your garden plan.* These are areas where field and forest meet (or lawn and wood line). Let them be free and wild. It may already exist at the edge of your property or you may create one by planting native wildflowers and grasses. A great diversity of animals will use these areas for shelter, food, nesting, and for raising young.

- *Provide plants that will permit insects a place to overwinter.* This way, they will be ready to go in the spring, usually to coincide with available and



Overwintering insects, like this Praying Mantis cocoon, hatch in spring ready to eat and grow!

appropriate food sources (nectar, pollen, larval insects, etc.)

- *Choose plant species that are specifically attractive to certain insects such as honeybees.* Large, platform flowers such as daisies and asters offer large insects like bees a place to rest during their gathering trips.

- *Grab some field guides and learn to recognize the different insect larvae, eggs, grubs, and caterpillars.* Remove only those that are considered pests, and only enough to maintain a necessary

population. Remember, pests are not “bad” insects! They are necessary and are teaching you how to be a better gardener.

- *Don't take away all of the debris from your garden ecosystem.* The decomposers need a habitat as well in order to do their work of feeding the system from the bottom up.

- *Be mindful of mowing or trimming activities.* Search overgrown areas for nesting or bedding animals like rabbits and fawns, or other creatures like toads, frogs, snakes, and turtles. These creatures offer us inspiration and beauty as well as their aid in creating balance in the habitat.

Nature awareness in the garden ecosystem

What is going on in there? At times we can get caught up in the “doing” of gardening and forget to take time “being” in the garden. Set aside time to sit by your garden and enjoy the life within it pulsating and vibrating, stretching and growing. Observe the cryptic coloring of insects, marvelous to behold in their perfection! They mimic twigs and thorns, and even boldly flash warning colors to would-be predators, declaring their toxicity.

A spider, tucked inside the folds of flower petals waits to ambush insects that come to dine on pollen or nectar. Ladybug larvae crunch their way through a mass of aphids . The fragile



Bird Nest fungus. The process of decay supports ecosystems by recycling nutrients.

proboscis of a butterfly uncoils, dabs here and there for sweet nectar, and flutters away on silent wings. The sparkle of a lime green dragonfly in the sunlight as it weaves through the garden snatching flies in mid-flight is an awe inspiring scene.

Watching the slow unfolding of flowers in the morning is an awesome meditation, and observing the maturing process of seeds, fruits, vegetables, and berries day after day can teach you so much that is beyond words. All these images and a million more are waiting for us to stop, look and listen to what is going on in your garden.

A garden is not a factory. Neither is it simply a hobby or a decoration. It is an assemblage of co-creators each doing their part in an expression of life. Why not allow yourself to be touched by nature at least as often as you touch it with spade and hoe. ❖

©2009 Michael Gambino

www.natureandspirit.org

To use this article, please contact the author at: earthwords@gmail.com