



Announcing a New *Grasslands* Series: Native Landscaping Snapshots

by Billy Krimmel¹, photos courtesy the author

Introduction

The purpose of this series is to explore the potential for habitat restoration through native landscaping, and the value that using natives adds to landscapes by connecting them to larger contexts (e.g., habitat restoration, science education, resource conservation, etc.). As part of this series, in each edition of *Grasslands* we will include a snapshot that digs into a portion of this large topic, from broad trends to highlights of interesting species interactions, species of conservation interest, and do-it-yourself tips for creating your own native garden. We will first provide a brief background and touch on some of the major themes for this series.

State of the industry

Americans spent \$83 billion on landscaping in 2016, the industry growing at 5.1% annually over the previous five years (IBISWorld 2017). Not all this money went to planting and maintaining plants

(e.g., think barbeques and patios), but it was directed towards enhancing the outdoor experience in urban and suburban areas, which comprise around 54% of land in the continental United States. With another 41% of our land dedicated to agriculture, 'natural areas' (those we have not converted to urban, suburban or agricultural uses) comprise only about 5% (Tallamy 2008). Imagine the \$83 billion we spend each year on landscaping being prioritized toward creating native habitat as the primary means to enhance the outdoor experience. Imagine the 54% of our land that we've altered being pushed in the direction of supporting native bees, birds, and other wildlife, rather than just being 'decorative'. The impact of human population growth would look a lot different.

Landscaping is not often thought of as a means to a conservation or restoration end. Very few ecologists or conservation biologists are in the landscaping industry because they tend to focus on the untouched or about-to-be touched areas, rather than urban or suburban areas. Meanwhile, the landscaping industry pushes forward, using its resources to create experiences centered around aesthetics (e.g., colors, textures, and shapes) and nostalgia (e.g., British gardens and Grandma's roses), but with little conceptual

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emphasis on how creating native habitat can contribute to experiences. There is a wide gap between landscape designers and ecologists and how each group thinks about the value of their work.

On the other hand, there are a growing number of individuals and organizations dedicated to bridging this gap. In California, because of an extended drought and resulting water restrictions, many homeowners are replacing lawns with plants that require less water. Public marketing campaigns and financial incentives have helped promote this. As homeowners are compelled to consider the environmental impacts of their gardens via water usage, they also may consider other ways to control their impact for a common good, like using native plants that require little water and create habitat for wildlife. As landscape designers and contractors embrace more sustainable practices, they may see added value that native plants (as opposed to non-native but still drought-tolerant alternatives) provide through habitat restoration and a window into nature's fascinating evolutionary ecology.

The garden meta-population

People generally do not think about their gardens as being part of an ecosystem. The scale of a backyard can feel miniscule

compared with the vast mountain ranges and watersheds we imagine when we think about ecosystems. But the sum of these small patches of habitat created by native gardens can add up to a resilient ecosystem that supports native wildlife—a garden meta-population. Understanding this allows home and business owners, landscape designers, and contractors to take part in something special and impactful when they plant natives.

Science in your front and back yards

The home garden is where most people engage on a daily basis with plants. In gardens we observe insects and birds, enjoy floral colors, get our hands dirty handling soil, plants and mulch, and contemplate the interactions taking place between the different organisms. One of the amazing components of using native species in gardens is that these interactions carry added meaning due to their evolutionary history with the other species with which they interact. Plants create a vast assortment of chemical products with a wide array of functions that interact with microbes, other plants, insects, and other animals in important ways.

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An insect walking around on a plant with which it has co-evolved interacts with myriad chemical cues that carry meaningful information about, for example, the plant's nutritional state, its level of chemical defense, whether or not other insects have been there recently, and many other time-sensitive types of information—very specific cues that are perceived by specialized receptors in the insects' antennae that are adapted to those particular cues (e.g., Fatouros et al 2012). Plants have been shown to signal to each other—in particular to closely-related individuals—when they are under attack by insect herbivores. They do so by releasing volatile compounds that are perceived by nearby plants, which then have a chance to boost up their own chemical defenses to reduce the negative effects of imminent herbivory (Karban et al 2000).

Plants can also signal to predators when they are being eaten by herbivores (e.g., Kaplan 2010), a loose mutualism in which both parties benefit; the predator gets its prey, and the plant gets its herbivore killed. These interactions are often very species-specific; plants respond to specific salivary contents present in herbivores that eat them (Tian et al 2012), for example, and in other instances

plants signal specific parasitic wasps of the particular herbivore (e.g., an insect) eating them (e.g., Walling 2000). Evolutionary history between plants and insects is what enables the specific signals and responses in these interactions.

By placing native plants in gardens, observations we make of plants interacting with native insects, birds, and other plants take on new meanings, make more sense, and provide learning opportunities. Young children can create experiments where experimental treatments involve moving insects around between plants, and data collection can be as simple as counting the number of herbivore-chewed leaves on plants from various experimental treatments (a simple way of ascertaining how experimental treatments affect how desirable a plant is to herbivores). A large number of fascinating studies have been published on plant-insect interactions that involve simple methodology and materials, and can be observed with the naked eye and replicated in native gardens for school projects, citizen science, or exploration grounded in scientific context.

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The mission of the California Native Grasslands Association is to promote, preserve, and restore the diversity of California's native grasses and grassland ecosystems through education, advocacy, research, and stewardship.

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Seeking a new style

Gardens have long been a type of status symbol. Neatly-manicured lawns and shrubs in the front yard demonstrate the organization and resources of the homeowner. By and large we have mimicked British gardens in California, favoring lush lawns reminiscent of English hillsides rather than our own native plants, despite the tremendous amount of inputs (fertilizer, and water, in particular) needed to keep them alive here. Breaking out of this conventional style of gardening can be difficult, and homeowners can be reticent to do something that looks different from what exists in the rest of the neighborhood. So how do we transition the statement a garden makes into something that creates habitat? What elements of the conventional garden do we discard, and which ones do we keep?

Maximizing a garden's habitat potential often means maximizing the number and diversity of native plants in the garden—filling in the spaces with plants that provide habitat for critters. This can be somewhat at odds with expectations of neatness, and some people react adversely to gardens they deem “overgrown,” which often means that plants are touching each other. Fortunately, gardens like those in many UC Arboretums provide beautiful examples of how to create full, yet organized assemblages of plants. In addition, annual native garden tours organized by the California Native Plant Society and other organizations offer homeowners examples of how to design habitat gardens that look nice and meet their needs. Landscapers need not sacrifice aesthetics or organization to create a native habitat garden—neatness and habitat are not mutually exclusive. Achieving this requires combining knowledge and skills derived from ecological and restoration with those from landscape-design fields. Linking ecology, evolution, and habitat restoration into other concepts at play in landscape designs can add more context, natural history experiences, and value.

Resources and rebates

In an attempt to catalyze the transition from conventional gardens to native gardens, the state of California, together with local municipalities and water providers, have been offering rebates for home and business owners to replace their water-intensive landscapes with more drought-tolerant designs. These rebates (generally around \$2 per square foot, and up to \$2,000 for homeowners, and more for businesses) have been offered concurrently with media campaigns aimed at showcasing examples of drought-tolerant gardens and providing information on the water usage of these gardens compared with conventional ones.

Conclusions

There is tremendous potential to restore functional habitat to cities and suburban areas by changing the way we landscape. There are also considerable challenges, and overcoming the inertia within the industry to change their products, styles, and methods will take time. It's hard to say how much people will continue to replace their lawns with more sustainable landscapes now that the drought emergency has passed, but creating native gardens for the sake of habitat restoration is a conservation goal that has nothing to do with the drought. That said, we seem to have an increasingly interested audience within the landscape design and architecture fields when we talk about creating context, stories, a sense of place, and connection with the garden and greater ethical and environmental movements. For homeowners, the option of owning an aesthetically-pleasing, environmentally-friendly landscape is an appealing option in terms of cost and aesthetics, and is competitive with traditional gardening methods. Please let us know what you want to learn about or discuss within this broad topic.



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