



Interpreting the Science: A Toolkit to Communicate the Value of Native Plants



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Abstract

Native plants are important to the landscape. However, there is little clear information out there informing the lay public on native plant scientific benefits, uses in the landscape, and sourcing of plants. As centers of science, public gardens have a role to play in the factual education of visitors on the benefits and uses of native plants. This tool kit was created as a resource for public garden staff to achieve this goal.

The author conducted two literature reviews: one to compile scientific evidence regarding the importance of native plants in the landscape and a second to compile research on communication psychology and museum interpretation practices. Interviews were conducted with five key industry stakeholders to compile evidence of scientific studies referenced by materials and visitor barriers and perceptions regarding native plant use.

Communicating scientific evidence without regard to audience perceptions, barriers, and values is neither strong nor persuasive enough to trigger a perception shift in the minds of visitors regarding the value of native plants in the landscape. To successfully change visitor behaviors, the author recommends addressing the attitude that native plants have a weedy and unkempt aesthetic and the barrier that native plants are not easily available at nurseries. Two interpretive messages that utilize key interpretation and communication psychology concepts were identified to make the strongest case for native plant use in the landscape. *Clarify Complexity* focuses on knowing audience categories and knowledge of audience schema. *No Garden Is Too Small* addresses conservation as a motivation to use native plants and neighbor opinions as a second motivation.

Keywords:

native plants, interpretation, museum, public garden, museum communication

Table of Contents

| | |
|---|----|
| Why Include Native Plants in Our Landscape? | 1 |
| Sense of Place..... | 1 |
| Ecological Value..... | 2 |
| Conservation..... | 3 |
| To Motivate Targeted Audiences to Grow Native Plants What Are the Common Misperceptions That Must Be Overcome? | 5 |
| Attitude: Native Plants Have a Weedy and Unkempt Aesthetic..... | 7 |
| Barrier: Native Plants Are Not Easily Available at Nurseries..... | 9 |
| Key Interpretation Concepts & Resources | 11 |
| Interpretive Message: Clarify Complexity | 14 |
| Audience Categories..... | 15 |
| Schema: Ecoregions..... | 16 |
| Interpretive Message: No Garden Is Too Small | 19 |
| Conservation As Motivation..... | 20 |
| Neighbor Opinions As Motivation..... | 23 |
| Works Cited | 26 |

Why Include Native Plants in Our Landscapes?

The loss of plant, insect, and bird species has been documented in multiple studies; these losses are related. Inclusion of native plants in gardens supports the structure of the local ecosystem by feeding insects, which feed birds—two groups of animals with specialized diets.

Native plant gardening styles and species nativity vary based on region and scope of the gardener's definition of native. The widest accepted definition of native plants are plants documented in an area prior to the colonization of America.¹ Gardeners interpret this definition through the inclusion of native plants based on habitat, state, region, or country of origin. Even though there are varying degrees of naturalistic gardening, each variation brings a little bit of nature back into our gardens through the inclusion of native plants.

Sense of Place

Gardening with native plants is attractive to so many non-professional and professional gardeners because of their connection to nature. Many gardeners and native plant resources cite the “sense of place”, which native plants conjure. “Lady Bird Johnson famously said, ‘Wherever I go in America, I like it when the land speaks its own language in its own regional accent.’ What she was referring to is called a ‘sense of place.’ It’s intrinsic, something we just feel based on a broad combination of factors — and native plants are a big contributor.”²



Saguaro (*Carnegiea gigantea*)
Plant Database

Seen at the Desert Botanical Garden in Phoenix, Arizona. The saguaro is a cacti native to the Sonoran Desert, which includes southern Arizona. It is a night blooming cacti, which attracts and feeds bats and moths.



Common Milkweed (*Asclepias syriaca*)

Native Milkweed Guides

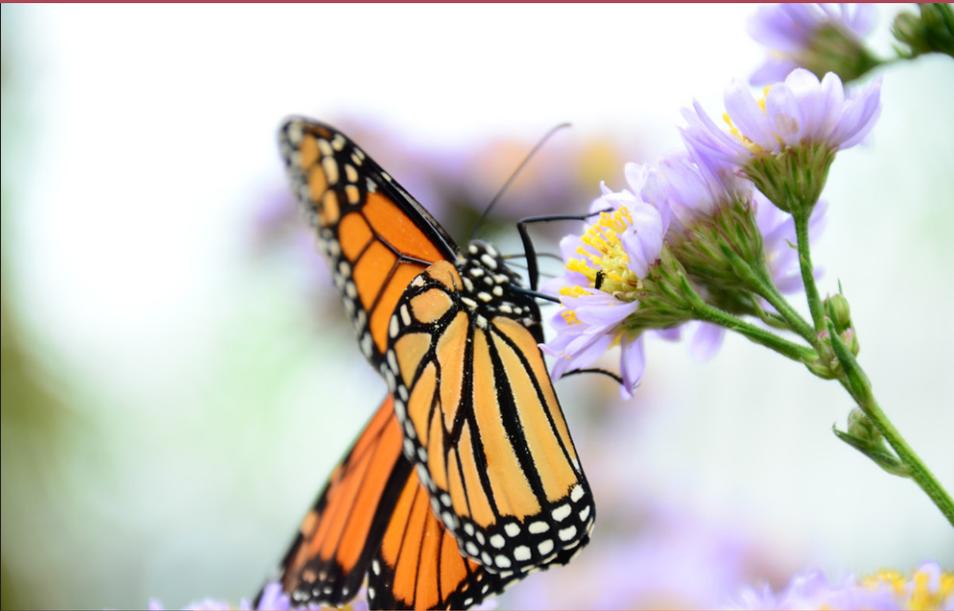
Milkweeds are the only food source for the monarch butterfly larvae. This genus includes a variety of flower colors and forms which makes it a great addition to many native gardens.

Ecological Value

If we think back to elementary school science class we likely recall learning about the ecological pyramid. Its mention should conjure conversations about ecosystem balance, food chains, and the supporting role of plants in relation to the entire system. Many invertebrates rely on plants for food and habitat; and butterfly and moth caterpillars rely solely on plants for food. Caterpillars are the largest group of specialized insects; over 5,000 species can eat only one species of plant. Additionally, there are over 600 species of other herbivorous insects that also rely on one species of plant for food.³ This study is not conclusive and is based on insect herbivores for which the scientists had geographical extensive data, which included only 7,500 species.⁴

Caterpillars are not the only specialists. In a study on spider abundance in exotic and native ornamental landscapes, scientists found that the 94 cases of spider presence were concentrated to a few particular species in their test garden,

including maple (*Acer*), redbud (*Cercis*), hydrangea (*Hydrangea*), and cherry (*Prunus*) genera. The spiders seemed to prefer native over exotic species.⁵ Without their preferred plant species, these specialized insects would not be present, which affects “96% of the terrestrial bird species in North America (which) rear nestlings primarily on arthropod prey.”⁶ Caterpillars, another important food source for birds are sources of protein, fats, and carotenoids. Carotenoids are responsible for the production of colorful feather pigments.⁷ The interactions between plants, insects and birds are intertwined, especially in urban landscapes.⁸ The proportion of urban land cover is negatively related to the density of bird species, indicating that many bird species require vegetation structure to be conserved in urban settings.⁹



Aster (*Symphyotrichum* spp.)

Asters are a group of perennials that contain keystone species. One of the many great qualities of asters is they bloom late into the fall offering food to migrating species, like this monarch butterfly.

Douglas W. Tallamy author of *Bringing Nature Home* and *Nature's Best Hope* has ranked 725 plant genera and determined that the top-20 genera that support the most insects included 19 native genera and one exotic genus.¹⁰ These top-20 genera contain keystone species, signifying their “disproportionately large effect on the abundance and diversity of other species in an ecosystem.”¹¹ Gardeners are encouraged to plant woody keystone species including oak (*Quercus*), cherry (*Prunus*), willow (*Salix*), birch (*Betula*), cottonwood (*Populus*), and elm (*Ulmus*) genera. Keystone perennial groups include

goldenrod, asters, and sunflowers.¹² In a study of native plant species supporting bird foraging, non-native plants in the same keystone genus “had a 47% lower probability of having caterpillars compared to native species.”¹³ Norway maple (*Acer platanoides*) is an example of a non-native species in the same keystone genus, maple (*Acer*). This is an important distinction since all of the genera listed as containing keystone species also contain many non-native species.

Conservation

Studies of the change in flower species in New England and New York over the past 150 years show increasing proportions of non-native plant species and decreases of native plant species. These changes are linked to land use changes and deer herbivory. The more land use changes, the more native species that are lost. The Finger Lake Region in New York has experienced a loss of 3.5% of native species, but in Staten Island, New York, a highly urbanized area, a loss of 53.1% of native species has occurred.¹⁴ Plants are not the only organisms that are declining. In 2019, Cornell Lab of Ornithology released a study that over 3 billion individual birds have disappeared in North America since 1970.¹⁵ Their [website](#) includes a list of 7 *Simple Actions To Help Birds*. One of the actions is replacing the lawn with native plants.¹⁶

In 2017, a group of scientists in Germany discovered that the country's insect biomass had declined by over 75% over the previous 27 years. Analysis identified landscape and climate change as the two factors linked to the decline of insect biomass.¹⁷

Why Include Native Plants in Our Landscape?



Red-Winged Blackbird (*Agelaius phoeniceus*) **Plants For Birds**

A common native species in most of North America, this bird rears its young mostly on insects.

Many scientific studies have come to similar conclusions regarding the decline of insects in their country; an [article](#) by *The Guardian* summarizes and links to many of these studies.

It is unclear which came first—the decline of native species, the insects, or the birds, but it is not a coincidence that they are all declining. Native plants are certainly at a disadvantage compared to non-natives when it comes to climate change reactions. In a study of differences between non-native and native plant species, non-natives generally bloom, leaf out, and fruit

earlier than native species. This causes natives to lose in the competition for resource sequestration, pollination, and seed dispersal.¹⁸ In a study of 42 species, the non-native species reacted faster to the warming conditions caused by climate change while the native species showed weak phenological responses, which makes the species at higher risk for extinction.¹⁹



Blue Cohosh (*Caulophyllum thalictroides*) **Explore Our Plants**

The ripe blue berries feed mice and white tailed deer. The foilage is avoided by animals because of it's toxic properties.

To Motivate Targeted Audiences to Grow Native Plants What Are the Common Misperceptions That Must Be Overcome?

Successful interpretation is only possible if you know your audience and the barriers that prevent them from changing behaviors. The perception that native plants have a weedy aesthetic and are not available for sale in plant nursery stores are two barriers public gardens must address in their interpretation about native plants to create behavioral change.

Understanding public beliefs and attitudes is critical to successful provocation and behavior change. Interpretive content is most impactful when it touches on visitor beliefs regarding an attitude object. For interpretation to be successful it must get the audience to focus on that specific attitude object.²⁰ In this toolkit the attitude object is native plants.

Public gardens employing behavior-changing or perception-shifting interpretation must take the time to understand their audience's beliefs and attitudes regarding the action object and perceived barriers preventing them from making a behavioral change. Without addressing audience beliefs, attitudes, and barriers interpretation will fail because the audience will “perceive that there are significant difficulties or barriers associated with engaging (the behavioral change).”²¹



Cardinal Flower (*Lobelia cardinalis*)
[Plant Database](#)

This species prefers moist to wet soil, plant it to attract and feed hummingbirds.

Half of Interpretation Is Knowing Your Audience

...the other half is knowing your resource.

In a study *Exploring the Co-benefits and Costs of Home Gardening for Biodiversity Conservation* the authors recognized that their participants on average were “well-educated, (had) higher incomes than the regional average, and owned sufficient amounts of land to garden for biodiversity.”⁶⁵ However, this may not sound like your public garden’s audience.

It is important to conduct audience evaluation to understand who your audience is and their perceptions about native plants, your collections, and programs before creating behavioral changing interpretation. Explore the following resources to learn about audience evaluation.

Fostering Sustainable Behavior: An Introduction To Community Based Social Marketing by Douglas McKenzie Mohr

Identity and the Museum Visitor Experience by John Faulk

Get On The Path Toward Understanding Your Audiences & Impact, a presentation from the APGA 2019 Annual Conference, [available online](#)

Interpretation: Making a Difference on Purpose by Sam H. Ham

[Visitor Studies Association](#)



Serviceberry (*Amelanchier laevis*)

Plant Database

Early blooming understory trees, such as this species, offer early spring nectar for pollinators and fruits in summer for animals.

Lady Bird Wildflower Johnson Center

IFAS Extension University of Florida

Cornell Cooperative Extension

To determine these audience qualities public gardens will need to utilize audience evaluation. Audience evaluation does not need to be as intimidating and expensive as it may seem. The sidebar *Half of Interpretation is Knowing Your Audience* highlights some informal techniques favored by museum interpreters. As a starting point for this research, a series of interviews were conducted with key stakeholders to compile common audience attitudes and barriers regarding native plants.

Key Stakeholders:

Mt. Cuba Center

Native Plant Trust

Attitude: Native Plants Have a Weedy and Unkempt Aesthetic

History

Gardening with native plants goes against thousands of years of landscape trends. Historically, gardens included only exotic plants and were separated from nature by a wall. Designers kept the garden as a place of cultivated art, free of nature. Landscape design has changed much since its origin and native plants have made their way into the hearts and gardens of many, but not all.

Native plants have been undervalued for their aesthetic value for centuries. The United States landscape industry was influenced by European trends, which continued the fashionability of exotic plants. In the US, the most popular shrubs recommended by gardening magazines after 1890 were Japanese barberry (*Berberis thunbergii*), Tartarian honeysuckle (*Lonicera tatarica*), sweet mock orange (*Philadelphus coronarius*), and common lilac (*Syringa vulgaris*).²²

Beauty vs. Function

“It is tempting to garden only for beauty, without regard to the many ecological roles our landscape must perform.”²³ If you break down the reasons for gardening, it is for beauty or function. Beauty is typically based on flower color with shape and structure secondary.²⁴ Function includes erosion control, ecological services, food for animals or invertebrates, and resistance to fire. Excluding function from plant selection is limiting and dated. “If you are a typical homeowner east of the Mississippi River, about 90 percent of your landscape is lawn, and your yard contains only 10 percent of the tree biomass that it supported before your house was built.”²⁵



Dutchman's Breeches (*Dicentra cucullaria*) Plant Database

An early spring ephemeral, this plant offers nectar to native bees and fades away by mid-summer to make way for summer perennials.

Suggestions:

- Encourage home gardeners to use ‘cues to care’, which include mown lawn, landscapes with colorful flowers, removal of weeds, and trimmed tree canopies.²⁶ ‘Cues to care’ show the viewer that the landscape is being controlled by human intervention. Read how Lady Bird Johnson Wildflower Center uses ‘cues to care’ in the sidebar.
- Do not use the word beauty when communicating about the aesthetics of native plants. “An object...is not made more beautiful by being called beautiful. And the perception of beauty is always in the nature of a surprise.”²⁷ Freeman Tilden, considered the father of interpretation, recommends that if interpreters are dealing with aesthetic values that they place the visitor at the best vantage point that beauty can be viewed. That way the visitor will discreetly experience the mood and come to their own conclusion regarding aesthetics. A garden that communicates the qualities of native plants without mentioning beauty but adhering to Tilden’s recommendations is Lady Bird Johnson Wildflower Center, see side bar.
- Question the demonization of exotic plants. When countering the perspective that “native plants have a weedy and unkempt aesthetic” it is easy to demonize exotic plants. Examples of this demonization include the anthropomorphizing of the plants and considering exotic plants as alien or anti-American, which bridges on pro-nativism. The [article *Against Nativism*](#) by Michael Pollan is a good resource to learn more about this topic.

Instead of demonizing exotic plants as a method to support native plants; take the stance that native plants allow us to garden for both beauty and function, while celebrating both native and non-native plants.

Mt. Cuba Center uses their historical gardens, which still include some exotic species, to create an interpretive experience that meets their audience where they are. It is unrealistic of interpreters to think that gardeners will replace all their plants with native species; most home gardeners have landscapes that are dominated by exotic species. By showcasing a conventional landscape that integrates native and exotic plants Mt. Cuba Center creates a relatable and realistic experience, which will have a higher chance of provoking change.



Merry Bells (*Uvularia grandiflora*)

[Explore Our Plants](#)

A woodland native that attracts native bees and other pollinators with nectar.

Lady Bird Johnson Wildflower Center

Located in Austin, Texas the Wildflower Center’s mission is “inspiring the conservation of native plants.” They accomplish this through three main programs: gardens, arboretum & natural areas; plant conservation; and ecological research & design.

The Wildflower Center displays “nearly 900 species of native plants from many of the major ecoregions of Texas.”⁶⁶ “This is gardening for function and aesthetics and can be accomplished in a number of styles from naturalistic to formal. This is the power of native plants.”⁶⁷

According to marketing and programmatic staff, visitors of the Wildflower Center perceive the gardens as natural; they do not realize that everything is heavily designed and managed by the human hand.⁶⁸ To conquer this perception staff and volunteers take certain measures to ensure visitors leave understanding that their plantings are not natural.

First is utilizing “cues to care” in their gardens. “Cues that indicate human intention are cultural symbols that can be used to frame more novel ecosystems in inhabited landscapes. Using cues to care in design is not a means of maintaining traditional landscape forms but rather a means of adapting cultural expectations to recognize new landscape forms that include greater biodiversity.”⁶⁹ At Lady Bird Johnson Wildflower Center specific cues they utilize are mowed meadow edges and exaggerated plant groupings.

The second is the utilization of horticultural staff and volunteers. Both groups receive training on public communication and play a major role in the interpretive experience at Lady Bird Johnson Wildflower Center. Individuals in these positions communicate to visitors about the design of the garden and ecological value of native plants.

Barrier: Native Plants Are Not Easily Available at Nurseries

Native plant species are limited to specialty nurseries as a symptom of limited plant aesthetics and lack of knowledge in sourcing native seed.²⁸

In a [survey](#) of 14 wholesale nurseries in the mid-Atlantic region; Mt Cuba Center found that only 23% of taxa were native, of that a majority of that 23% were native cultivars.



Your Yard Matters, only 25% of the plants found in surveyed nurseries at native. Used with permission by Mt. Cuba Center (July 2020).

Suggestions

Work with local nurseries:

- Partner with local nurseries that sell native plants, promote their availability to visitors.
- Survey local nurseries. This does not need to be as extensive as Mt. Cuba Center's survey, and if your area reflects a similar trend communicate the lack of native plants to visitors and encourage visitors to request native plants at their local nurseries.
- Provide education for nursery professionals. Native plant education will make the most impact in the hands of people in the trade.
- Partner with nurseries. The collection of native seed requires a lot of labor because collecting diverse specimens requires lots of traveling. Through partnerships between public gardens and nursery professionals it might be possible to get more native plants into the trade.²⁹

Encourage Visitors:

- Record which native plants are popular with visitors. If they are plants difficult to find at nurseries work with nurseries to provide them to homeowners.
- Supply the demand by selling native plants and seeds in an annual or seasonal plant sale.
- **Encourage visitors to question the source of their plants. We feel comfortable asking questions about where our food comes from, why not our plants?**³⁰

Nasami Farm at Native Plant Trust

Nasami Farm is a project of Native Plant Trust that manages the sustainable harvest of wild seed from native plant species. The goal of the project is to preserve genetic diversity while offsetting the production of plant clones sold in garden centers—all in an effort to “build resilience into a landscape facing change”⁷⁰ Nasami Farm conquers the barrier of native plant accessibility by selling native plants directly to the public. This process is made educational and relevant to the home gardener's needs through the curation of plant collections. Some curated collections include:

- [Pollinator Kits](#)
- Each [collection](#) includes plants acclimated for a specific habitat based on the collection's theme:
 - Spring Ephemerals
 - Moisture-loving
 - Summer Blaze
 - Roadside
 - Coastal Plantings
 - Woodland Bloom
 - Understory
- Information about habitat and site [requirements](#) for all plants sold

Key Interpretation Concepts & Resources

Interpretation is half knowing your audience and half knowing your resource, but it is also a solution to a problem.³¹ “Interpretation should serve a purpose and support the mission of the organization or it becomes the superfluous fluff it is often accused of being.”³² There are many tools available for mastering the art of interpretation; yes it is an art! However, interpretation is not what attracts the audience to your public garden; good interpretation enhances the experience, it does not create it.

Provided in this section are key interpretation concepts collected from some of the seminal resources of interpretation. On the right side is a list of resources for further reading.

Six principles of interpretation by Freeman Tilden

1. “Any interpretation that does not somehow relate what is being displayed or described to something within the personality or experience of the visitor will be sterile.
2. Information, as such, is not interpretation. Interpretation is revelation based upon information. But they are entirely different things. However, all interpretation includes information.
3. Interpretation is an art, which combines many arts, whether the materials presented are scientific, historical, or architectural. Any art is in some degree teachable.
4. The chief aim of interpretation is not instruction, but provocation.
5. Interpretation should aim to present a whole rather than a part and must address itself to the whole man rather than any phase.
6. Interpretation addressed to children (say, up to the age of twelve) should not be a dilution of the presentations to adults but should follow a fundamentally different approach. To be at its best it will require a separate program.”³³

Further Reading:

Interpreting Our Heritage
by Freeman Tilden

Interpretation—Making a Difference on Purpose
by Sam H. Ham

Interpretive Planning
by Lisa Brochu

Personal Interpretation: Connecting Your Audience to Heritage Resources by Lisa Brochu

[Dave Bucy’s Process of Interpretive Planning Workshop](#)

[Swift Frame Analysis®](#)
by Frameworks Institute

[National Association of Interpretation](#)

Lisa Brochu's Interpretive Planning Process:

Before you create interpretive materials, you need to consider:

- What you hope to accomplish
- Whom it is for
- What the message is
- How to deliver it
- Where to locate it³⁴

Sam Ham's TORE Method for Successful Interpretation:

Theme

Organized for easy processing

Relevant to the audience

Enjoyable to process³⁵

Universal Concepts:

“Universal concepts like family, love, and work have meaning no matter what your background might be. Using universals in interpretation helps ensure that the message will be meaningful to every audience member in some way.”³⁶ Many universal concepts transcend nationality and culture and will be understood by most visitors, but keep in mind that they will be interpreted slightly differently.

The reason universal concepts are so powerful is that they make something personal, which is an element of relevance.³⁷

- Interpretation must link to something the audience cares about.
- Interpretation that taps into universal concepts will be much more successful. Some concepts that are considered universal by interpreters are:
 - Love
 - Emotions
 - Strength
 - Struggle
 - Ourselves
 - Quality of life
 - Well-being
 - Health
 - Family



Blueberry (*Vaccinium* spp.)

Blueberries are enjoyed by humans, insects, birds, and even bears. A tasty addition to any garden.

Mt. Cuba Center

Mt. Cuba Center's mission is to "inspire an appreciation for the beauty and value of native plants and a commitment to protect the habitats that sustain them." The Garden's collection focuses on plants endemic to the eastern temperate forests in the Appalachian Piedmont.⁷¹ Formal gardens surround an on-site historic house and contain largely non-native species, following the founder's rule that 5% of collections could be non-native as long as they are not invasive.⁷²

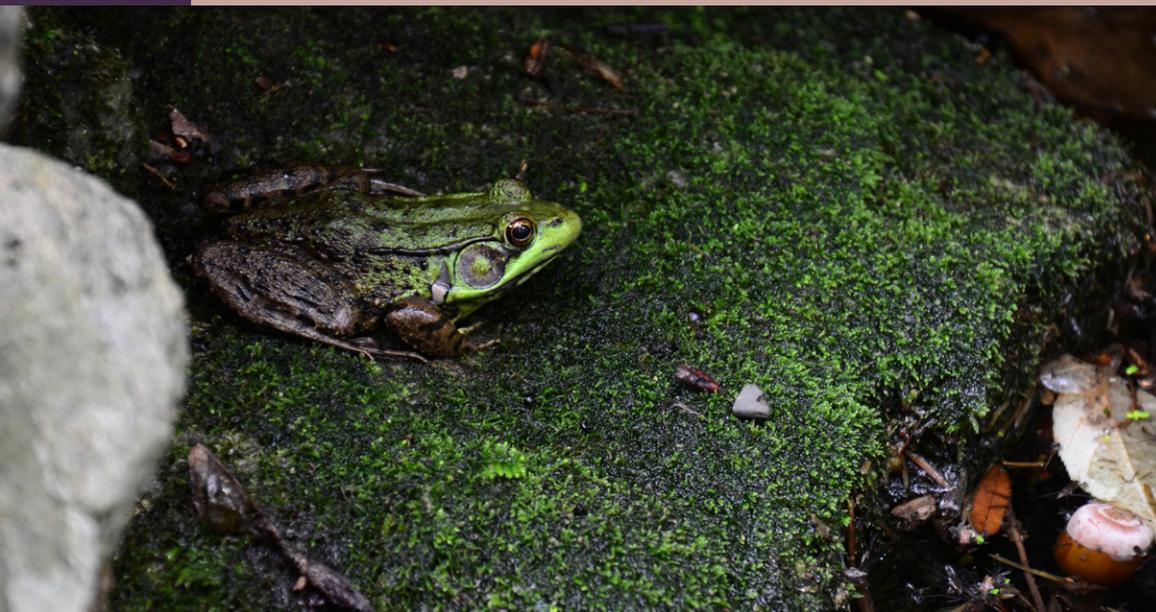
By maintaining formal gardens that contain non-native plants, Mt. Cuba Center has a unique edge in the conversation on native plant perceptions with the average visitor. By exhibiting that gardens rich in biodiversity can still contain some exotic plants, the garden comes across as non-threatening to the visitor.

Part of a [public-facing](#) portion a survey, *Native and Invasive Plants Sold by the Mid-Atlantic Nursery Industry*, visitors are asked to help increase the demand for native plants by asking the following questions about plants they are considering for purchase:

1. "Where was this plant grown?"
2. Where does the nursery stock for this plant come from?
3. Is this plant a hybrid?
4. Is this plant a selection of a naturally occurring wild species?
5. How does the flower size, shape, and color differ from the wild species?
6. Has this plant been bred for disease resistance?
7. Is this plant a dwarf version of the wild species?
8. Is there research available on this plant's ability to support wildlife and provide other ecosystem services?"⁷³

Onsite visitors are handed a *Seasonal Plant List* upon being welcomed to the gardens. Each list highlights notable plants that are beautiful at that time and a grid system with icons indicates their habitat requirements and if they are available at garden centers. All these resources point to an [online map](#) with 12 local retailers that sell native plants or seeds.

In their *Guide to Our Gardens* readers are encouraged to engage in stewardship beyond Mt. Cuba Center by "practicing conservation by addition. Start by adding one or two native plants to your garden."⁷⁴ In summer 2019 visitors could find pledge cards in the garden to take the pledge to add one native plant to their garden. When using pledges as a form of commitment along with other community based social marketing tools 3 to 4 times as many people indicated they would change their behavior.⁷⁵



Amphibians especially, but also birds and insects require a water source to flourish in a garden. A [biodiversity report](#) by Great Dixter House & Gardens in England found their biodiversity increased with attention to water sources, increased habitat creation such as piles of wooden logs, and diverse plantings of flowers.

Interpretive Message: Clarify Complexity

Public gardens can learn what other concepts are not part of their audience's schema through surveying. By focusing on complex concepts, such as ecoregions, native gardening has become niche. In order to make more of an impact on private landscapes public gardens must communicate more broad concepts to attract a wider audience.

“We expect people to know a lot”³⁸ in order to participate in native gardening. **Native gardening has remained niche by the daunting requirements**, such as knowing which plants:

- Are native to their ecoregion.
- Have leaves that support all metamorphological stages of insect life.
- Produce fruit and seeds that are nutritional for mammals and birds.
- Provide habitat and shelter for animals and invertebrates/

The list can go on and on – did any of these qualities sound familiar?

The knowledge of these intricacies is necessary for the survival of many native plant species. However, through simplification of concepts and concentration on the most important aspects of native plants, public gardens can communicate plant value to a wider audience. **By communicating broader concepts public gardens have the opportunity to inspire new gardeners, which will help get more native plants into landscapes.**



Joe-Pye-Weed (*Eutrochium* spp.)

Part of the perennial keystone group identified by Doug Tallamy, this genus attracts many pollinators to its long-blooming flowers for nectar.



River Birch 'Heritage' (*Betula nigra* 'Heritage') **Plant Finder**

The bark on this cultivar sloughs off easily, which offers habitat for native bees and other insects.

item, like the organic food section at Whole Foods.”⁴¹ **To break out of this niche, native plants need to be communicated and made available to a wider audience than just the professional/hobbyist.** In their first interpretive master plan, Mt. Cuba Center planned to create interpretive materials with a variety of communication styles in order to reach as many guests no matter their personality, interest, or learning style.⁴²

Audience Categories

Many of these native plant intricacies are lost on the average visitor. By focusing on concepts that are beyond the understanding of the average visitor, interpreters continue to communicate to their smallest audience category, the “professionals/hobbyists” visitors who possess above average knowledge about the topic.³⁹

The five audience categories by John Falk are:

- Explorers
- Facilitators
- Experience Seekers
- Professionals/Hobbyists
- Rechargers⁴⁰

There are few interpretive outputs that can be successfully created with all audiences in mind, which is why audience evaluation is so important for creating successful interpretation. Native plant gardening concepts and their users have become so specialized, Uli Lorimer has seen native plants evolve into a “luxury

Suggestions

- Start with what people know “then take them where you want to take them.”⁴³
- Create interpretive experiences for a variety of audience categories
- Prioritize your interpretive needs; focus on meaning before detail—thematic overview before details.⁴⁴
- Make interpretive concepts meaningful by avoiding technical terms and use “bridges”, such as metaphors and analogies.⁴⁵

Schema: Ecoregions

Ecoregion, which is defined by The Oxford Dictionary, as “a major ecosystem defined by distinctive geography and receiving uniform solar radiation and moisture.” Ecoregion is a very common term when exploring specialist content about native plants, restoration, and natural land. According to Uli Lorimer, Director of Horticulture at Native Plant Trust visitors do not typically understand or grasp the concept of ecoregions. This could be because the regions transcend political boundaries, the concept is abstract, or because they have never heard of the term before.

By not addressing this confusion, interpretation including ecoregion-concepts creates barriers.

The psychological concept “schema” explains how important it is to address unknown concepts in interpretation. Schema is the mental structure an individual uses to file and organize experiences and information which drive cognitive processes.⁴⁶ To figure out what concepts are considered part of our audience’s schema consult an education professional.



Eastern Prickly Pear (*Opuntia humifusa* ‘Ellisiana’)
Plant Finder

The flowers bloom for less than 48 hours but pollinators are swift to take advantage of the nectar. This is the only cacti native to northeast region.

Suggestions

- Political boundaries are part of adult Americans' schema. If you decide to use ecoregions to communicate native plant range always accompany it with state boundaries or relevant areas with which your audience is familiar, such as regional rivers or mountain ranges.
- Work with your education department or an education professional to survey the audience to learn what concepts would be understood in an interpretive experience.
- Consider the cognitive limit that people can generally only remember three to four key points of information at a time.⁴⁷
- Organize interpretive print materials with key points as the headlines.



Top: *Rooted in Place* onsite signage at Garden in the Woods, a botanical garden run by Native Plant Trust. Part of the Habitat Gardens, this sign describes environmental characteristics that guide plants' abilities to survive in certain conditions.



Bottom: *Tough Plants* onsite signage at Garden in the Woods, a botanical garden run by Native Plant Trust. Part of the Habitat Gardens, this sign builds on the environmental characteristics message from the top sign to illustrate how those conditions drive plant evolution, such as the development of tough leaves, salt tolerance, and drought resistance.

Native Plant Trust

“Plants do not occur in isolation but form relatively predictable communities largely determined by a combination of geology and climate; they are highly sensitive to the chemistry, depth, and water-holding capacity of soils weathered from bedrock. **Research indicates that each plant in a community plays a unique role**, and only together can they efficiently capture light and the nutrients from soil and water necessary to sustain them.”⁷⁶

Communicating the complex habitat needs that native species require call for an artistic as well as scientific focus. Public gardens, as centers for science, employ professionals with science-based degrees who can explain all these complexities. However, many intricacies may be lost on the visitor. With proper science communication and interpretive training public garden staff can tell stories that are enjoyable, relevant, and educational to the visitor. Popular books on science communication, such as *Don't Be Such a Scientist*, urge scientists to captivate and motivate their audience while avoiding jargon.

Garden in the Wood's Habitat Displays clearly communicate the value of unique habitats while motivating conservation. This display is laid out along a path so they cannot be missed; the content can also be enjoyed from home. A cellphone tour is available via the app UniGuide. Content from the onsite signage and the audio tour has been summarized below to illustrate the communication messages Native Plant Trust interpreters have employed to make the content enjoyable, relevant, and educational. The setup of these habitat gardens is not unique to Native Plant Trust, Lady Bird Johnson Wildflower Garden also has a similar garden display along with signage and communication messages, which highlights habitats of Texas. **Any type of habitat garden that is done well with proper interpretation should leave the visitor understanding the general principle of “right plant right place”.**

Limestone Outcrop: “A good place to spot plants you won't find anywhere else in the garden.”⁷⁷ This habitat garden exhibits the nuances of soil pH. Since most of New England soils are derived from granite, which is acidic, this limestone outcrop in contrast creates an alkaline situation for plants not typical of a New England garden. This outcrop is a manmade garden to exhibit a rare habitat that exists around river and lake beds, like the ones along the Connecticut River.

Old Meadow: This habitat garden showcases how forests succumb to meadows. An old eastern white pine (*Pinus strobus*) fell during a storm and opened up this area to sunlight. Pioneer species that normally takeover in a disturbed area was planted by garden staff to exhibit the natural succession of species, which illustrates that no forest is static.

The Swamp: This habitat garden showcases kettle holes, a common depression in the earth formed by glaciers. These depressions are common in New England and encourage the formation of swamps and wetlands, which host diverse species such as purple pitcher plant (*Sarracenia purpurea*).

Coastal Sandplain: This habitat garden showcases how environmental situations have historically guided plant developments that allow them to survive in the habitat they have evolved within. In the Coastal Sandplain native eastern prickly pear (*Opuntia humifusa*) are planted, which are adapted to well draining soils by storing water in their cacti pads.

Interpretive Message: No Garden Is Too Small

Positive change to the landscape can occur at any scale. Two core messages that can be used to motivate the audience to include native plants are the urge for conservation and the pull of neighborhood opinions.

More than 83% of the land in the United States is privately owned and 86% of the land east of the Mississippi River is privately owned.⁴⁸ The status of private ecosystems lies in the hands of landowners; their involvement in conservation efforts is critical.⁴⁹ This is where non-professional gardeners can come in; those with private land can have a direct impact on biodiversity if they manage with consideration of the surrounding ecosystems.⁵⁰ “Positive change can happen at any scale, from balconies and yards to community, city, and national initiatives.”⁵¹ Even though private land makes up the majority of the United States it is fragmented by roadways, urban centers, and housing developments; this situation is called habitat fragmentation. These small patches of habitat are important to the preservation of species and should not be undervalued. In a study on fragmented habitats scientists discovered that these “small, isolated patches” play a critical role in conserving the world’s biodiversity. Restoring and reconnecting small isolated vegetation patches should be an immediate conservation priority.”⁵²

In cities, urban green spaces are immensely important to the preservation of many flora and fauna species. In a study on the diversity of birds (54 cities participated) and plants (110 cities participated) found in urban environments, scientists discovered that “of the 10,052 recognized bird species worldwide, 2,041 (20%) occur in our cities, representing nearly three-quarters of all bird families (144 out of 198). Likewise, of the roughly 279,107 vascular plant species worldwide, 14,240 (5%) occur in these cities, representing two-thirds of all plant families (323 out of 497).”⁵³ This research shows



Wild Bergamot (*Monarda fistulosa*) [Plant Database](#)

Mt. Cuba Center trials popular perennial cultivars to test for disease resistance, drought tolerance, and biodiversity value. [Read their report on *Monarda* from the 2014-2018 trial.](#)

Insects, such as this hummingbird clearwing (*Hemaris thysbe*) are attracted to wild bergamot’s nectar.

[Lepidoptera Database](#)



Curly Clematis (*Clematis crispa*)

A climbing vine, clematis are good in urban gardens that have less space. Train them to climb up fences or poles to get flowers into far to reach spaces.

that diversity in cities is not limited to just the humans, but also the plants and animals we share it with. Surprisingly, the diversity is dominated by native species, especially in cities where there were more native bird and plant species than exotic.⁵⁴

Conservation As Motivation

Species are disappearing at an alarming rate. It is more important than ever for everyone to participate in conservation—no matter the scale. “Conservation by addition” at Mt. Cuba Center and “just change one plant” at Lady Bird Wildflower Center are small acts of conservation that anyone can partake in. In urban areas, windowsill containers offer food and resting areas for insects as they travel through the urban land cover. In suburban areas, gardens between lanes of traffic known as hellstrips offer food and habitat for birds. In backyards, a new native plant could offer a food source to a native butterfly that could never lay its eggs in the landscape

before that plant was included. The variety of opportunities for any gardener to participate in conservation are only limited by our imagination.

Public gardens can provide resources for visitors to practice conservation in their personal landscapes or volunteer to aid in efforts on private land. Communication about conservation should include the impact that efforts have had so far, who has participated, and where the projects are happening. Research has shown that “community members are most likely to be willing to participate in stewardship of restoration activities if they are knowledgeable about environmental issues and have a strong desire to be part of the community.”⁵⁵ In another study, 71% of participants engaged in acts of conservation, such as native gardening to create a “welcoming space for wildlife”, particularly birds and butterflies.”⁵⁶ **Public gardens have an important role to fulfill in educating their audience on both the environmental issues of today and motivating their audience to conserve species through the inclusion of native plants to create botanically diverse communities.**

Suggestions:

- Some gardens contain noxious or invasive species that have been promoted by the landscape industry for years or are seeded from perimeter gardens. **Draw attention to invasive species and encourage gardeners to replace them with plants that encourage biodiversity.** Botanically diverse communities are “less vulnerable to exotic species invasion, and if noxious weeds do appear they are likely to be spotted and removed by landscape managers and homeowners before they can establish recalcitrant populations.”⁵⁷
- **Conservation can occur at any level of action.** Mt. Cuba Center encourages its visitors to practice “**conservation by addition**”. By including one native plant in the landscape a biodiverse habitat is encouraged. Similar messages of this type encourage visitors to start today instead of feeling overwhelmed by the concept of redesigning their entire garden.
- Conservation efforts can occur at any size. Encouraging visitors to aid in bridging fragmented habitats by planting balcony gardens, participating in community initiatives such as [Pollinator Pathway](#), or by [not mowing the lawn in May](#) can have impact and can show how any ordinary person can participate in conservation, no matter the size of the property. **These efforts to bridge fragmented habitats are extra important in urban areas. Public gardens that serve these neighborhoods should focus on creating relevant and enjoyable programming to promote these ideas to increase biodiversity in their city.**

Conserving Native Plants by Controlling Invasives

Invasive species “cause economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to the established systems.”⁷⁸ A major part of plant conservation is the identification and removal of invasive species. Action of any amount is helpful to the ecosystem.

Native Plant Trust educates the public on invasive control through public programs, volunteer opportunities, and an [online tool kit](#). The kit recommends utilizing native alternatives that are similar in color, leaf shape, or habit as invasive species, but also provide resources for insects and birds.⁷⁹ By providing alternatives to invasive plants, that are similar in leaf color or flowering habit, home landscapes can retain their ornamental attraction while providing value for the ecosystem. Gardening for beauty and function is the message that gardens need to practice and communicate to their visitors.

Call To Action

Mt. Cuba Center has identified a series of seven “call to action” items that they want their audience to leave knowing. Increasing the use of native plants in landscapes is targeted as a primary outcome and is incorporated into all aspects of communication including social media, programmatic and marketing plan.⁸⁰ The Garden understands that they must *walk the talk*: “interpretation of the garden is more than the words that guests can read; it is also visible in the actions Mt. Cuba Center takes and the example it sets. Guests will not take actionable items home to their own spaces unless they see the institution setting a precedent for them.”⁸¹

Call to Action Categories:

- 1) Connect with nature
- 2) Utilize eco-gardening techniques
- 3) Increase the use of native plants
- 4) Create change in the market
- 5) Increase understanding and awareness
- 6) Community/Mt Cuba Center Engagement
- 7) Advocate for change

These “call to action” items are communicated explicitly and implicitly through the interpretive experience. In the interpretive plan three core messages guide the creation of interpretive opportunities. Core message 3 states that “we can steward our earth through the choices we make at home and in our communities”.⁸² This message is important and through the formative evaluation process it was determined that it should be communicated even more strongly through the use of callout bars. The callout bars are the actions highlighted at the bottom of signage as exhibited in the signs *One Native Plant At A Time* and *Garden Design*.

ONE NATIVE PLANT AT A TIME

Conservation by Addition

Our formal gardens showcase how native plants can be used in a residential landscape.

In recent years, we have begun to replace non-native plants with natives in the Round Garden. With each native plant added to your garden, you are contributing to a healthier ecosystem that supports insects, birds, and other wildlife.



EASTERN BEE BALM
Monarda bradburiana



CLOUDLESS SULPHUR BUTTERFLY
Phoebastria sennae on *Echinacea purpurea*



WILD COLUMBINE
Aquilegia canadensis

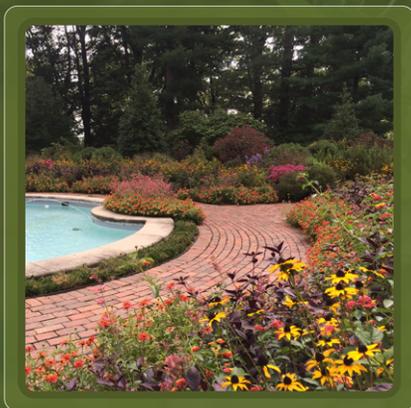


PURPLE DOME NEW ENGLAND ASTER
Symphotrichum novae-angliae
‘Purple Dome’

Adding native plants gradually to your garden is one way to increase the ecological health of your landscape.
We call this conservation by addition.

One Native Plant At A Time onsite signage from Mt. Cuba Center. Core messages are highlighted in the bar at the bottom of the sign. “Adding native plants gradually to your garden is one way to increase the ecological health of your landscape. We call this conservation by addition.” Used with permission by Mt. Cuba Center (July 2020).

GARDEN DESIGN



Mt. Cuba Center's gardens feature two styles of design, formal and naturalistic. Formal gardens, like the Round Garden, often feature geometric shapes, clean lines, and symmetric rows.

Naturalistic gardens have a wilder aesthetic and typically include softer, curved edges on the garden beds, unstructured plant arrangements, and plant combinations inspired by nature.

*Use native plants in a variety of garden settings.
They are both beautiful and versatile.*

Garden Design onsite signage from Mt. Cuba Center. Core messages are highlighted in the bar at the bottom of the sign. "Use native plants in a variety of garden settings. They are both beautiful and versatile." Used with permission by Mt. Cuba Center (July 2020).

Neighbor Opinions As Motivation

When encouraging the inclusion of native plants in the landscape it is important to be explicit. Use prompts that target specific behavior changes to make the most impact.⁵⁸ A major barrier preventing landscape changes is the American cultural norm of conforming to what the neighbors prefer. It is so strong that this norm can prevent the inclusion of gardening techniques that encourage biodiversity, but appear unsightly to some.⁵⁹ In one study, the pull of conformity to please neighbors is even stronger than the pull of a conventional lawn-based landscape.⁶⁰ Developmental pressures are one of the changes connected to the loss of floral diversity in New York and New England.⁶¹ Homeowner associations or HOAs are notorious for controlling the use of gardening styles in neighborhoods.

To create ecological change, neighborhoods need to address the change together in order to have greater chance of success.⁶² Community block leaders can inspire this change. When identifying a leader look for "a community resident who already engages in the behavior that is being promoted and agrees to speak to other people in their immediate community to help them get started."⁶³

Suggestions:

- Encourage change in the visitor's neighborhood by seeking a written pledge of commitment. "When individuals agree to a small request, it often alters the way they perceive themselves."⁶⁴
- Provide tool kits that leaders can use to cultivate change in the minds of their neighbors. Include explicit prompts that influencers can memorize or embellish that harness techniques that tackle identified misperceptions and barriers. Include key points of scientific studies, like the ones in this tool kit, to back up the value of native plants. Many of the resources written by Doug Tallamy, especially his books, are very approachable and include many scientific citations. If public gardens are working directly with neighborhood leaders, loaning out copies of his books or making sure they are carried in local libraries is a good approach for people interested in learning more about native plants.
- Address the barrier of HOAs and neighbor perceptions through interpretive content. Residents may not realize these ideas exist.
- Develop educational materials focusing on native plant benefits and the utilization of the landscape concept "cues to care". Reach out and share materials with local HOAs; start a conversation on these topics and gauge the opportunity for new educational partnerships.

Native Plant Pledge card from Mt. Cuba Center. By taking the card visitors pledge "I will add a native plant to my garden." Used with permission by Mt. Cuba Center (July 2020).



Northern Maidenhair Fern (*Adiantum pedatum*)

Plant Database

Some native plants have requirements that are so specific they can only be found in gardens where they were growing there on their own. Northern maidenhair fern needs to be kept moist, but not too wet and will die if it dries out. They are typically found growing in upstate New York alongside waterfalls. Native plant recommendations to gardeners should be realistic.



Audience Evaluation: Do It!

“How can we call ourselves professionals if we don’t (evaluate)?”⁸³

Evaluation is vital to the success of interpretation. By incorporating evaluation into every interpretive instance there is the opportunity for improvement and gauging success.

There is formal and informal evaluation. Interpreters typically focus on informal evaluation, because it is low-cost and provides a relatively easy means of evaluating interpretive materials. The following is a collection of informal evaluation techniques that are used by interpreters:

- **Elaboration Likelihood Model of Persuasion (ELM)**
Have the willing audience elaborate on their experience with the interpretation and evaluate their comments
- **Zone of Tolerance**
A method of judging “the thoughts provoked by an interpretive product”⁸⁴
- **“On The Spot Evaluation”**⁸⁵
Ask your audience before you start an interpretive presentation questions that will enlighten you to their interests.
- **Spying!**
Pretend to be a visitor and listen for their reactions to interpretive content⁸⁶
- **Ask staff to gather data**
Record questions and comments that are heard most
- **[Visitor Studies Association](#)**

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