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Bulletin 44: New Directions in the American Landscape

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NEW DIRECTIONS IN THE AMERICAN LANDSCAPE

Connecticut College Arboretum
BULLETIN 44

Cover Photo—The Memorial Meadow in the Naval Cemetery Landscape in Brooklyn, New York commemorates the site’s history as a burial ground while contributing to local ecology. This landscape is also being used to research the benefits of access to nature within the urban environment. Landscape architects: Nelson Byrd Woltz, Meadow design: Larry Weaner Landscape Associates. Photo credit: Max Touhey

NEW DIRECTIONS IN THE AMERICAN LANDSCAPE

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The Connecticut College Arboretum
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NOTICE TO LIBRARIANS

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CONTENTS

FOREWORD
by Maggie Redfern IV

INTRODUCTION
by Jenna Webster 1

REFLECTING on NEW DIRECTIONS in the
AMERICAN LANDSCAPE
by Larry Weaner 4

REGENERATIVE AGRICULTURE: CARBON FARMING and the
FUTURE of FOOD PRODUCTION
by Chad Adams 14

IMPOSITION or REVELATION? DESIGN and the
NATURE of CONTRADICTION
by Rick Darke 21

MAKING LANDSCAPE DESIGN ACCESSIBLE and JUST:
PAST, PRESENT and FUTURE
by Kofi Boone 28

CULTURE and ECOLOGY as DRIVERS of
CONTEMPORARY LANDSCAPE DESIGN: CASE STUDIES
by Thomas Woltz, thomas Baker, and Jeffrey Longhenry 35

AFTERWORD: WHAT IS ECOLOGICAL LANDSCAPING?
by Glenn Dreyer 42

FOREWORD

The origins of this bulletin date to 1990. That's when landscape designer Larry Weaner introduced his *New Directions in the American Landscape* (NDAL) symposium to Connecticut College Arboretum director Glenn Dreyer. Larry had just organized the first conference held at the Morris Arboretum in Philadelphia and wanted to expand the program's reach to a wider audience. He was attracted to the Connecticut College Arboretum for its New England location and unique native plant collection, established in 1931. For three decades now, the annual two-day conference has been a fixture in the field of ecology-based design.

With the publication of this bulletin, the Connecticut College Arboretum advances our mission of public education: to provide programs and publications about conservation, horticulture, gardening, botany and natural history that enhance people's understanding of the natural world. The annual NDAL symposium has been a pioneering influence in bringing ecology to the fore of landscape design for an audience of landscape architects, planners, horticulturalists, scientists, teachers and students of all ages. I thank Glenn Dreyer, who retired in June 2018, for welcoming the opportunity to offer this program focused on the global consequences of how we steward the landscape and the importance of individuals in making local connections.

This bulletin would not have been possible without Jenna Webster, senior designer at Larry Weaner Landscape Associates, who conceives and develops NDAL programming with Larry and Sara Weaner, NDAL's new executive director. Jenna's introduction at the January 2019 symposium was the inspiration for publishing a selection of the presentations. Although three of the presenters at the 30th symposium were women, none of them are represented in this bulletin. It is a perennial challenge to find the right mix of speakers at a time when gender and racial disparities persist in the design profession. The future of the field will benefit as other voices enter the conversation and bring their new perspectives.

In addition to those mentioned above, I would like to acknowledge the incredible assistance provided by the Arboretum staff (past and present) in running this program during the depths of winter. Long-time collaborator Jan McFarlan organizes the Philadelphia edition of the symposium for the Morris Arboretum of the University of Pennsylvania.

We look forward to continue expanding the boundaries of the ecological landscape design conversation in the years ahead.

Maggie Redfern
Arboretum Interim Director

INTRODUCTION

Jenna Webster

Presenters at the 30th annual New Directions in the American Landscape (NDAL) conference in January 2019 represented the design field, the sciences, agroecology, horticulture, and the arts. True to NDAL's mission since its founding in 1990, the presentations were diverse. Topics ranged from sound in the landscape to best and worst practices for soil during construction to environmental justice and equity in design. Other topics included historic preservation, agriculture, ethical foraging, and scientist-designer collaborations that support both scientific discovery and design goals. All the conference's presenters are doing important work, taking our field in new directions, giving our specifications new rigor, and bringing overlooked issues to the fore.

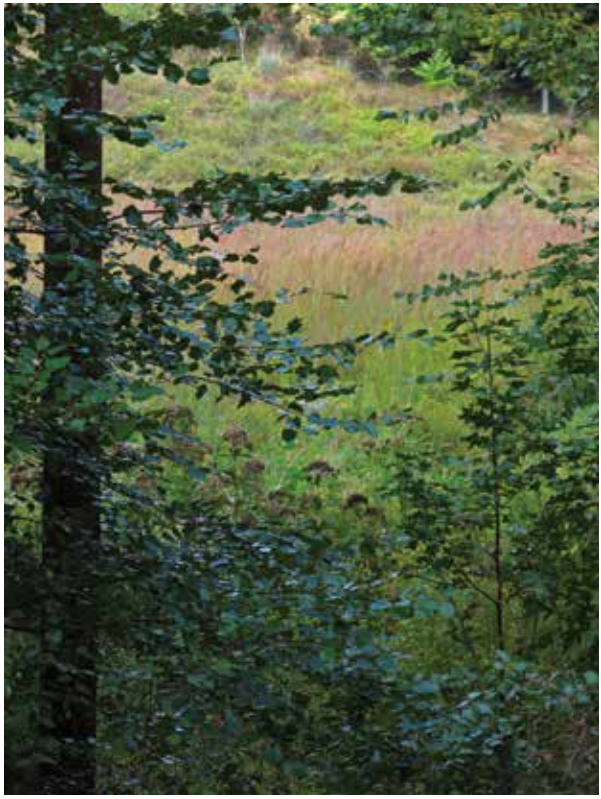
NDAL's commitment to exploring the many deeply interwoven elements that inform ecology-based design, combined with NDAL's emphasis on practical, applicable information, represents an enduring contribution to the field. Curricula with this breadth and depth also recognizes that although the message of ecological design is ascendant, knowing how to implement that message and make it ecologically functional, aesthetically compelling, and accessible to diverse audiences still has a long way to go.

When NDAL's first conference took place, ecology-based design remained somewhat on the periphery, overlooked by many practitioners, an afterthought in most design schools, and certainly not a prominent subject at design symposia. Minimalist aesthetic traditions still dominated and plants were regarded for their ornamental value, not as participants in ecological processes. This is not to disparage minimalist traditions or ornamental concerns, yet such modes of practice did not account for the complex, interacting forces that shape our landscapes.

In the three decades since NDAL's first conference, ecology has become a core consideration for most design practitioners, as evidenced by projects integrating natural processes and deeper appreciation for native plants. The growing place of ecology in educational programs also speaks to this. Attention in the design field to environmental justice and issues of inclusion is arguably undergoing a similar shift: these are no longer "edge" issues and, like ecology, never should have been.

While ecology and issues of equity may no longer be seen as peripheral, we would be well served not to lose our "edge" sensibility and not to regard these issues as satisfactorily established, our exploratory work complete. To be at the edge, ecologically speaking, is to be in a place of dynamism. At the edge—where meadow meets the woods, where lowland meets upland, for instance, many different species occur and compete. Edges are fraught by competition between species of adjacent habitats and species that thrive on the edge itself. Edges are often transitory, realigning as conditions change. Under global warming, edges serve as barometers, contracting or shifting as species alter ranges.

Edges—or ecotones, to use the more scientific term—are places for crossover, for tension, and for dramatic change. Historically, those who looked to the edges of mainstream practice have often formed the beginnings of more integrated approaches to design and management of landscapes, whether it's been those attending to ecology, social justice, or less hierarchical, top-down ways of working. Practitioners



All too often the human-influenced environment features hard limits and rigid boundaries. In contrast, the meadow-woodland interface above is soft and porous, providing nuanced habitat and a relaxed, textural feel. As we address the ecological and cultural forces that shape landscapes today, interconnected, transdisciplinary approaches will yield results superior to those derived from narrow, hard-edged ways of working. Landscape by Larry Weaner Landscape Associates. Photo credit: Mark Weaner

like landscape architects Jens Jensen and A.E. Bye, author and activist Jane Jacobs, and ecologist Frank Egler come to mind. Design practitioners who have consciously looked to the margins have built frameworks and methods based on study of nature, environmental science, and art, and commitment to human health and wellbeing. Such wholistic thinking has helped break down intellectual siloes and identified new, more integrated ways of seeing and knowing.

To be clear, probing the edges does not mean doing so for the sake of being *edgy* or resigning ourselves to the edges to avoid conflict between what is perceived as marginal and what is perceived as mainstream. Rather it is about not shying away from the dynamic, productive, disruptive, complex tensions that can result when different disciplines, different values, and different cultures meet and interact. NDAL embraces such an exploratory approach. As one attendee at an NDAL conference remarked, "NDAL is to be commended for going to the edges where there is controversy, confusion, and fertile ground."

The character of our exchanges also matters. Edges in landscapes influenced by humans tend to be abrupt, often rigid. In contrast, edges less shaped by humans tends to be gradual and more nuanced. Taking our cue from nature, our practices can be porous, fostering fluid associations between different ways of working and resisting tendencies toward hard limits and narrow professional definitions. There are no true hard divides, as Rick Darke suggests in this bulletin, just a continuum of degrees of interconnectedness. Similarly, contributor Kofi Boone urges the field to move beyond inter- or multi-disciplinary approaches toward transdisciplinary thinking where disciplinary distinctions fall away.

In the spirit of connectedness, select presenters from NDAL's 2019 conference have generously shared their work in this bulletin, which the Connecticut College Arboretum kindly offered to produce. Larry Weaner, NDAL's founder, sets the stage, as he did at the conference, considering existing avenues more deeply and suggesting new areas deserving attention. Drawing from his own design and restoration work, Larry contemplates how indigenous land management practices, agricultural traditions, issues of equity, and his own field observations inform his practices. Landscape architect and planner Chad Adams, who also has a background in farming and ecology, follows with a discussion of how scientific rigor and whole systems problem solving can prompt critical new approaches to agriculture, how land is used for food production, and how designers might contribute to these efforts. Consultant, author, and photographer Rick Darke then shares his observational ethic blending ecology, horticulture, and cultural geography. He asks us to consider the difference between revealed order and imposed order and how observation, research, and strategic intervention can reveal a site's inherent order. Kofi Boone, a professor of landscape architecture, discusses the need for a more nuanced historical understanding of designed landscapes as expressions of social power and the need moving forward for practitioners to understand and respect complex communities of people just as they do complex environmental systems. To demonstrate this in practice, Kofi shares a range of projects that integrate social and environmental concerns. Finally, exemplifying a transdisciplinary approach, Thomas Baker, Jeffrey Longhenry, and Thomas Woltz from the landscape architecture firm Nelson Byrd Woltz present a series of case studies demonstrating how Nelson Byrd Woltz engages in scientist-designer collaborations and site-based research. They share insights from how their firm's research-based approach drawing upon multiple disciplines enables rich site-specific design narratives that can help us better understand and care for the land and our own complex histories on that land.

The skills and sensitivities that landscape design and management demand—the ability to work with complex ecological and cultural dynamics—are all the more necessary in our era of climate emergency. This makes for an exciting—albeit at times alarming—moment to be in the designed environment profession, and it necessitates rigorous integration rather than monocultures of thought and exclusionary practices. The essays herein are toward that worthwhile end.

Jenna Webster is a senior designer with Larry Weaner Landscape Associates where she works on a range of private and public projects.. She co-curates the annual New Directions in the American Landscape conference and serves as a technical advisor to NDAL's other programming initiatives. She teaches in the Mt. Cuba Center certificate program, serves on the Professional Advisory Committee of the University of Delaware Landscape Architecture program, and is a trustee of the Conway School and the Crow's Nest Research Center.

REFLECTING ON NEW DIRECTIONS IN THE AMERICAN LANDSCAPE

Larry Weaner

Three decades of organizing the annual New Directions in the American Landscape (NDAL) conference has exposed me to a wide range of ideas about ecology and design. In what follows, I reflect on existing and new directions for ecology-based design. Rather than attempting to speak for the field as a whole, I discuss these issues through personal experiences—including mistakes made—and how this in turn informs my firm's work.

(RE)DISCOVERING HISTORIC LANDSCAPE PRACTICES

In the 1930s, members of the Southern Sierra Miwok tribe that had been driven out of Yosemite Valley visited Yosemite National Park and commented that the landscape appeared "untended."[1] They were not referring to a modest garden here and there; they were referring to sophisticated, nuanced management of Yosemite's entire landscape, in fact of entire ecosystems. For thousands of years, indigenous peoples in the Americas were active agents of environmental change and stewardship for specific ends. They developed practices to manage water flow, favor nut and berry-producing plants, attract game for hunting, and encourage plants for fiber and shelter, among other things. When Europeans arrived in the Americas what they encountered was not "pure nature"—or untouched wilderness as John Muir described Yosemite—but highly manipulated landscapes cultivated to support complex and sometimes high-density societies.

Over the years, sessions at the annual NDAL conference have touched on this topic but much remains to be learned about indigenous practices and how flora and fauna evolved in relation to these activities. In some cases, it may be difficult to access this information fully because the cultures that managed these lands were devastated by both wholesale genocide and spread of European diseases. This in turn diminished the ability of these cultures to pass down knowledge from generation to generation. Landscape architect and historian Kerry Hardy, who presented at NDAL's 2015 conference and authored *Notes on a Lost Flute: A Field Guide to the Wabanaki* (2009), demonstrated that understanding the complex relationships between indigenous peoples and their landscapes may also require the languages and oral traditions in which land management practices were embedded. Without understanding a culture's language and the cultural context for the stories told in that language, it may be challenging to understand that culture's practices in their full complexity.

Yet some scholarship exists for land management activities of indigenous peoples in the western United States. In the mid 20th century, anthropologist Omer Stewart recognized that, in contrast to then prevailing views of Native Americans as primitive and naive, indigenous peoples significantly influenced a wide range of environments through controlled burning. Stewart's work was unfortunately largely ignored until ethnoecologist M. Kat Anderson and anthropologist Henry Lewis co-edited Stewart's *Forgotten Fires: Native Americans and the Transient Wilderness* (2002). M. Kat Anderson's own book *Tending the Wild: Native American Knowledge and the Management of*

Our backgrounds and experiences often inform how we perceive landscapes. As an example, some regard red cedar (*Juniperus virginiana*), a common colonizer of old fields, as a symbol of agricultural abandonment and lost livelihoods whereas others understand it as a wildlife food source and symbol of ecological succession. Photo credit: Larry Weaner

California's Natural Resources (2013) describes large and small-scale practices gleaned from interviews and correspondence with indigenous peoples of California. To cite one example, these cultures burned leaf litter under oaks to reduce insect populations that consumed acorns.[2] While acorns may no longer constitute a significant food source for twenty-first century humans, restoration practitioners still use oaks and could be well served to understand practices that can favor proliferation and success of oaks and oak habitats.

Do we study these techniques for the purposes of deepening anthropological research or do we study these techniques to enrich contemporary restoration work? Through symposia devoted to exploring what is described as Traditional Ecological Knowledge, I hope NDAL can contribute to both greater anthropological understanding while also helping design and restoration professions learn from past practices. This can shape not only our understanding of how our landscapes might have been managed in the past but how we might manage them more effectively in the future.

FARMING IN LANDSCAPE DESIGN, LANDSCAPE DESIGN IN FARMING

Does a planted old field landscape constitute ecological restoration or agricultural abandonment? How we perceive such landscapes may be grounded in aesthetic preferences and knowledge as much as our own life experiences. Those with an agricultural background sometimes equate red cedar *(Juniperus virginiana),* which predictably appears in old field landscapes, as symbols of farm collapse and loss of livelihood. I have my own perspective on red cedar. Interested as I am in integrating natural recruitment in designed landscapes, I would generally not bother planting red cedar as it will likely show up on its own anyway.

For a winery in New Jersey's coastal plain, my firm designed and installed native meadows, shrublands, and woodland groves. These designed habitats surround agricultural fields, providing space for events and passive recreation that enable supplemental income for the winery. Habitat restoration thus becomes part of the winery's economic viability.

TOP Designed natural areas, including native meadows, that surround agricultural fields at a New Jersey-based winery enhance the winery's approach to agro-tourism. This represents one way to combine habitat restoration and agriculture. Photo credit: Larry Weaner

BOTTOM Residents of Detroit's Fitzgerald neighborhood receive training and payment for installing and maintaining gardens and planted natural areas replacing vacant lots. Photo credit: Larry Weaner

This integration of ecology, agricultural productivity, economy, and aesthetics remains an exciting area of growth for ecology-based design.

MAKING DESIGN EQUITABLE, JUST, AND INCLUSIVE

Our office served as a meadow subconsultant on a master plan project for Detroit's Fitzgerald neighborhood. Led by the landscape architecture firm Spackman, Mossop and Michaels, the project involved a restoration plan for an economically depressed neighborhood, including determining which abandoned houses would be rehabbed

and which lots converted to other land uses such park space and community gardens. Neighborhood residents are proud of their homes and, as in any neighborhood, go about their lives, working and taking their children to school. When I visited, a resident told me that the community did not want meadows but rather places for kids to play. The lesson for me was that we as designers cannot enter communities with liberal do-good intentions and assume to know what the community wants or needs.

In areas of the Fitzgerald neighborhood where pocket meadows were desired, meadows were installed by community members, who received training in planting and managing these landscapes. Participants were paid and learned how to grow and care for the plants used. If people are to work, they should be compensated rather than being expected to donate time and labor. This is especially important in communities with populations of limited economic means.

Proceeding with sensitivity to context is always critical but particularly so in a setting that has faced a long series of injustices. As I sometimes do in my work, a rotting log near a home in the Fitzgerald neighborhood could be preserved as an ecologically functioning sculpture. Yet highlighting this feature might in the minds of some accentuate the neighborhood's own recent history of physical decay. On the other hand, would removing it be condescending? The right way to proceed here is complicated. Design practitioners need to think through these issues carefully.

Rural communities face similar challenges of economic decline and environmental injustice. On a project in an especially poor county in West Virginia, my firm designed and installed forty acres of meadows on former agricultural lands. Open land is abundant in this region, much of it characterized by degradation from agriculture, logging, and other extractive activities. Seed production of meadow species could represent an economic endeavor in this context. Seeds of native wildflowers and grasses are, compared to agricultural seed, expensive, due in part to the knowledge involved in producing and harvesting the seed. But seed houses will purchase unprocessed seed such that these lands could be used for seed production without requiring investment in infrastructure to process the seed. The economic viability of this needs further investigation but given the potential to restore both habitats and livelihoods, it is worth exploring.

DISTURBANCE, SUCCESSION, AND INCORPORATING ECOLOGICAL PROCESS INTO SPECIFICATIONS AND FIELD PRACTICES

A three-day course in 1984 with landscape architects A.E. Bye and Armistead Browning, Jr. proved influential in my early career as it was the first time I heard design practitioners considering design and ecology. Although three days does not a good designer make, it provided me with a preliminary understanding of ecology-based design that I could then take into practice. Indeed, academic study reinforced—or challenged by—field observation can be one of the most effective ways to learn. In what follows, I offer instructive moments from my own experiences, including what my mistakes have taught me.

LESSONS FROM CALIFORNIA POPPY

For my first meadow project, I planted annuals like California poppy (*Eschscholzia californica*), as is often done, in addition to later-stage perennials. As could be expected

Rural areas facing economic decline and job insecurity may find opportunities in using open lands for native seed production. Photo credit: Larry Weaner

of an annual species, the California poppy dropped out in the meadow's second year. Even when I overseeded the poppy in the interests of having their floral show again, the poppies did not manifest. It took me time to understand that poppies failed to appear because they were no longer competitive amidst the already establishing growth and the successional process I had set in motion.

In fact, annual wildflowers generally conflict with meadow establishment protocols. A seeded meadow is typically mown monthly during the first growing season to prevent annual weeds from going to seed and shading out developing perennial seedlings. This monthly mowing in the first year thus prevents planted annuals from flowering. Yet annuals can still be used in a perennial seeded meadow if selected thoughtfully, as I later learned on a project in which the client demanded floral show in the first year. The seed mix we designed featured annuals that bloomed lower than the monthly mow height, thus allowing annuals the opportunity to flower and the developing perennial meadow to receive the management it needed. So, my mistake with California poppy on my first meadow eventually led to me using annuals in a more nuanced way based on a greater understanding of how the seeded species grow, develop, and relate over time.

That first meadow project held other lessons for me. In contrast to the profuse flowering of California poppy in the meadow's first year, it was six years before a few individual white wild indigo (*Baptisia alba*) plants appeared. When I visited the meadow ten years later, however, white wild indigo, a long-lived perennial, was present in abundance. This taught me that a seeded meadow is truly a process that unfolds over time, which is part of the mystery and enjoyment of our work.

LESSONS FROM ORIENTAL BITTERSWEET

On another early meadow project, I failed to consider the competitiveness of Oriental bittersweet vine (*Celastrus orbiculatus*) and how its vigor could alter a seeded meadow's

trajectory. The bittersweet, not having been entirely eradicated at the meadow's edges and within the establishing meadow, gained the upper hand over seeded species. The meadow failed. From that experience, I learned the importance of controlling highly pernicious weeds, both within and adjacent to the project area. If controlling a pernicious weed outside the project limits isn't possible, mowing a path along the edges can help reduce invasion. Designing the planting to tolerate the control techniques needed can also be important.

Bittersweet commonly occurs along woodland edges, where the cessation of mowing enables bittersweet to get a foothold. To reduce the niche available to bittersweet, I discovered that planting densely branched, early leafing trees reduces light invasion into the woodland interior and subsequent colonization by bittersweet. Research supports this line of thinking; a study showed that woodlands dominated by late-leafing trees like ash (*Fraxinus* spp.) have higher levels of invasive species than woodlands dominated by early-leafing trees like maples (*Acer* spp.).[3] This kind of knowledge about the dynamics between light levels and weed invasion can be readily applicable in the highly disturbed landscapes that many of us work in.

LESSONS FROM CANADA GOLDENROD

The native Canada goldenrod (*Solidago canadensis*) exhibits highly aggressive rhizomatous growth in moist to wet soils. In meadows with these characteristics, we actively discourage this plant's growth so that it does not competitively exclude a more diverse species matrix. When goldenrod cannot be eradicated, mowing a path around localized occurrences can limit its vegetative spread. New England aster (*Symphyiotrichum novae-angliae*), also rhizomatous, commonly occurs with Canada goldenrod. This can inspire selection of competitively comparable wildflowers in meadows where Canada goldenrod has a persistent presence.

A client who preferred not to use herbicide had a meadow dominated by Canada goldenrod and New England aster. To reduce the Canada goldenrod's vigor and give the meadow a more restrained, less rough and tumble character, the meadow was mown in late June, following the blooms of the meadow's spring wildflowers. Although executed outside the garden context, this technique is the same as cutting back a garden perennial to give it a bushier habit. The midseason mowing also enables more light to reach the ground plane, thereby encouraging the emergence and persistence of other wildflowers and grasses otherwise not able to grow amidst Canada goldenrod. This strategy is not without its drawbacks. In drought years, an early summer cutback may reduce flowering. The practice is still recommended, however, as it generally works and the ramifications can be explained to the client. Understanding cause and effect can sometimes be as important as the results themselves.

Canada goldenrod is not as vigorous in more xeric conditions, where it appears to present less of a threat to overall species diversity. At Aton Forest in Norfolk, Connecticut, a long-term research site established in 1943 by the ecologist Frank Egler, dry, rocky conditions enabled pearly everlasting (*Anaphalis margarticea*) and blazingstar *(Liatris* spp.), both less vigorous than Canada goldenrod, to persist for years in combination with goldenrod. In such situations, weeding out Canada goldenrod is likely not necessary because the goldenrod does not appear to present a competitive threat. Planting Canada goldenrod is not advised but if naturally occurring in these conditions, it does not appear to be a

problem. The lesson here is that the more one understands how plants behave under various conditions, the more one can predict and manage plant dynamics over time.

LESSONS FROM BEE BALM

Early in my career, a client wanted to increase wildflowers in a cool season grass field without having to remove existing grasses in a significant way. Patches of sod were physically removed and wildflowers seeded. The intervention largely failed, however, because scale was not considered. As the patches were too small, the cool season grasses reinvaded before the planted wildflowers could mature and viably compete with the already established cool season grasses.

This was an important lesson in using scale correctly to give planted species a competitive edge. But the project also taught me something else. The native wildflowers that did persist in spite of the cool season grasses—including bee balm (*Monarda fistulosa*), a vigorous rhizomatous grower—taught me which species should only be planted in drifts rather than broadcast seeded to avoid dominating a seeded meadow over time. While bee balm's growth might be encouraged in an existing cool season grass field, its presence must be restricted in other situations. Because of its reliability, aesthetic attributes, and wildlife benefits, bee balm is worth including, just with an understanding of its overall competitiveness in relation to site conditions and the desired species matrix.

LESSON FROM BUTTERFLY MILKWEED

Many years of observing cool season fields have taught me that butterfly milkweed (*Asclepias tuberosa*) is one of the few native wildflowers that occurs naturally amidst mat forming cool season European pasture grasses. Most forbs, regardless of origin, that occur in cool season fields share certain characteristics. Like butterfly milkweed, many of these forbs are taprooted, such as Queen Anne's lace (*Daucus carrota*), dandelion (*Taraxacum offinale*), and chicory (*Cichorium intybus*). This is useful information. Cool season fields are common in the northeast due to the region's agricultural past, and clients are often interested in increasing wildflower presence in these fields without the expense of eradicating existing pasture grasses and reseeding. If taprooted wildflowers like butterfly milkweed can persist amidst cool season grasses, other native taprooted forbs may be able to persist as well. Learning something about one plant often means learning something about an entire group of plants, which can be helpful when working beyond the garden scale.

FINESSING OUR PRACTICE

There are many ways to finesse the practice of ecology-based design. In what follows I focus on two areas: principles for using historic and novel plant communities and the need for advancing management strategies beyond what is traditionally used in the garden bed.

HISTORIC AND NOVEL PLANT COMMUNITIES

Understanding historic and novel plant communities is key to plant community-based design. Debate around whether designers should strive for historic plant communities or embrace novel associations can be intense. There are appropriate contexts for both approaches such that understanding the pros of each is important.

A historic plant community can be loosely defined as a group of plants that tend to naturally occur in combination and have adapted to each other over time, achieving a competitive balance. In contrast, a designed novel plant community is put together considering spatial and temporal niches but the selected plants have not grown together historically.

To design novel associations recognizes the reality that historic plant communities will never be restored to their prior dominance due to widespread anthropogenic disturbance and highly altered conditions. Creating novel assemblages provides designers with a wider palette from which to achieve high aesthetic impact and appeal. Novel assemblages also enable use of plants for highly disturbed conditions where local native species may no longer be adapted. Leading proponents and researchers of designed novel plant communities include James Hitchmough and Nigel Dunnett of the University of Sheffield in England, both of whom spoke at NDAL's 2014 conference. They acknowledge that their approach, based in comprehensive trials and studies, is not applicable in all scenarios.

Historic plant communities, because the plants have grown together over extended periods of time, are likely to contain more complexity and efficiencies than designed novel assemblages. Native species have also co-evolved with native fauna, resulting in mutually beneficial relationships, such as wildflowers that depend upon certain pollinators and vice versa. These symbiotic relationships are particularly true of specialist plants. Entomologist and NDAL Advisory Board member Doug Tallamy who presented at the 2007 conference, has done much to help advance our awareness of these relationships.[4] Research in Europe has shown that designed novel plant communities can attract high numbers of Lepidoptera (butterflies and moths). I would like to know, however, whether these plantings also sustain specialized Lepidoptera or only high numbers of generalists. Serving generalists versus specialists is a critical distinction, and we should understand that difference.

Recognizing that eradicating all invasive exotic vegetation is impossible and returning to historic environmental conditions is a nonstarter, I would advocate that preserving native species is important to the process of novel plant communities sorting themselves out over time. Novel plant assemblages, whether purposefully arranged or naturally occurring, will change over time, eventually assuming more complexity and nuance. This evolution, which could take thousands of years, will be shaped by what is in the seed bank. If non-native species dominate and native species are not contributing propagules, our native flora will not be represented in the future in a meaningful way.

While it is unrealistic to attempt to restore original historic plant communities to highly altered locations, like New York City for instance, analogue native plant communities do exist that could thrive in these conditions. As one example, the Alvar Grasslands in upstate New York constitutes an excellent analog for green-roof plantings. Alvar Grasslands occur in thin, alkaline soils, much like those found on green roofs. For a green roof designed in collaboration with the firm Alive Structures, species characteristic of the Alvar Grasslands—like hairy beardtongue (*Penstemon hirsutus*) and prairie dropseed (*Sporobolus hirsutus*)—were used with great success. The intent was not to recreate the Alvar Grasslands note for note, and so native wildflowers found outside that community were included for aesthetic effect. The point rather is that historic native plant communities can serve as precedents for many twenty-first century conditions. Ecological as well as horticultural knowledge can drive decisions about how this is done.

Some historic plant communities can serve as useful analogs for contemporary planting conditions. Alvar Grasslands—with hairy beardtongue *(Penstemon hirsutus)* and tall bellflower *(Campanula rotundifolia)* shown here—occur in thin, alkaline soils and so are useful models for green roof plantings. Photo credit: Ethan Dropkin

This green roof planting in Brooklyn drew upon New York's Alvar Grasslands as a precedent community. Design by Larry Weaner Landscape Associates in collaboration with Alive Structures. Photo credit: Ethan Dropkin

MANAGEMENT BEYOND THE GARDEN BED

The design field has progressed significantly in recent decades with more sophisticated integration of natural processes and more widespread use of native plants. Similar advancements need to be made in managing these plantings, particularly at the large scale. Doing so in ways that ensure for longevity and resilience with minimal cost and effort is also important.

Use of herbicide is often a major consideration. My firm is selective about when herbicide is used, but it is part of our tool kit because it can be more cost effective,

has greater predictability, and minimizes site disturbances compared to other methods. While herbicide can understandably be a fraught topic, targeted treatments for restoration are different than routine widespread agricultural applications or unskilled use by homeowners. In that vein, biologist and conservationist Rachel Carson in her book *Silent Spring* (1962) wrote about the role for responsible, selective herbicide treatments for restoration purposes. My firm also uses organic approaches for site preparation and weed control, and we welcome projects demanding organic strategies because it necessitates that we advance our knowledge and abilities.

For any planting, management should always be specified—whether in biddable specifications or in more narrative form—and designers should be involved as advisors to ensure plantings remain on the intended trajectory. Specifications should include explanation of management strategies, particularly if these strategies are site or project specific. As design can sometimes occur through management itself (such as through natural recruitment), management documentation and training should account for these opportunities as well. Advancing our strategies for management—especially in natural recruitment of desirable vegetation and dissuading of undesirable species—represents a critical next level for our field, and I remain excited about the potential for advances and more refined techniques.

The considerations addressed in this essay greatly inform my thinking, both in my practice and when conceiving NDAL programming. NDAL is building on its thirty-year legacy and expanding, both geographically and in subject matter that is explored. Ecology-driven design will always remain NDAL's focus but with greater attention moving forward to cultural considerations, particularly those discussed in this essay and elsewhere in this volume. Multi-day workshops, field sessions (including for contractors), and themed conferences supplementing the annual symposium will enable exploration of these issues in greater depth than before in locations throughout the United States. I look forward to NDAL continuing to contribute to our collective ability to create environmentally sound, culturally connected landscapes.

NOTES

1. See Anderson, M. Kat, *Tending the Wild: Native American Knowledge and the Management of California's Natural Resources* (University of California Press, 2013): 156.
2. Anderson, 146-48.
3. See Dreiss, Lindsay M., "Differential Canopy Leaf Flushing and Site Nitrogen Status Facilitate Invasive Species Establishment in Temperate Deciduous Forest Understories" (Master's Theses, University of Connecticut, 2011). https://opencommons.uconn.edu/gs_theses/173
4. See Tallamy, Douglas W., *Bringing Nature Home* (Timber Press, 2009).

Larry Weaner, president and founder of Larry Weaner Landscape Associates, established New Directions in the American Landscape in 1990. He is nationally recognized for combining expertise in horticulture, landscape design, and ecological restoration. His book Garden Revolution: How Our Landscapes Can Be a Source of Environmental Change *(Timber Press, 2016) received an American Horticultural Society Book Award in 2017.*

REGENERATIVE AGRICULTURE: CARBON FARMING AND THE FUTURE OF FOOD PRODUCTION

Chad W. Adams

Where does food come from? Have you seen the bumper stickers "No Farms, No Food" or "No Farms, No Beer"? The reality of our current food system is large scale, monocultural, assembly-based production. There are 400 million acres of industrial cropland and 500 million acres of other agriculture in the United States, divided between about 2 million farms. Most (76%) of those farms lose money or make less than $50,000 per year. A few (4%) of those farms make 70% of the total farm revenue in the US. How did we get to this condition and what are its implications? It turns out that many of the choices made along the way to industrial agriculture were made in the name of simplification and efficiency, but none are without consequence. This essay explores the paradigm of modern production, and poses alternative solutions which are enduring, resilient, and build in capacity over time.

MONOCULTURE

Efficiency creates an illusion of healthy and robust conditions. A single crop, plant, livestock species, variety or breed, managed in a single field or farming system, mistakes efficiency for productivity. Systems where the same species are grown year after year invariably create negative externalities that, frankly, are destroying the planet.

Industrial agriculture significantly impacts the global economy, defining how people acquire and distribute food. Farm output more than doubled between 1948 and 2015. However, one-third of all topsoil has been lost in a century, and we currently are losing 75 billion tons of topsoil per year. Tillage, the plow, destroys soil. The production increase basically has been a mining exercise. This has a finite end within our generation.

Grass finishing cattle on diversified healthy pasture enables animals to have a selection of forage to match their nutritional needs. Photo credit: Chad Adams

This highly touted successful yield increase ignores the degradation of nutritional value, destruction of diverse ecosystems, waste and pollution of clean water, and constant and consistent loss of soil health. The industrial food chain (IFC) is described as necessary to save the world from widespread hunger, yet 42% of the IFC's calories are lost in the process or wasted by the consumers.

Current large scale agricultural practices are depleting biological functions, and over 15% of ag soils can no longer be used for farming. Massive monocultures are clashing with the natural cycles

Pastured poultry — laying hens in mobile infrastructure — follow the cattle herd and eat fly larvae and other problematic insect pests. Photo credit: Chad Adams

they have interrupted to thrive. Elements of biological cycles manipulated to host singular species encourage pollution, waste, and dependency on chemicals.

As agriculture expanded into meglo- and mono- cultures, people have been figured out of the equation. Fewer and fewer individuals are required, as machinery has increased in size (and fossil fuel input) and systems have simplified. Cultures and interrelationships that once thrived locally are compromised by poor economics and poor working conditions. The consequences are a fragile methodology susceptible to catastrophic loss.

The economy of food has been distorted by access to cheap fuel. Virtually all processes of the industrial food chain are dependent on this finite resource. In the 1940s it took about 1 calorie to create 2.3 calories of food. It now takes over 15 calories to create 1 calorie of food. As we enter the depletion phase of fossil fuels, the world's food supply is reliant at every stage; from planting, irrigation, feeding and harvesting, processing, packaging and distribution. Essential infrastructure depends on fossil fuels, including machinery, processing facilities, storage, ships, trucks, and roads.

Corporate control and a profit driven mindset have allowed cheap energy to replace labor and create distance between producer and consumer. The producers do not reap the benefits; corn "profits" range from below $0 to a peak of around $300 per acre per year. Heavy debt loads to finance expensive equipment and off-farm jobs are the norm for modern farmers. Marketing has created an image of wholesome, "organic" farming brought to your plate by integrity driven elements. The reality is quite different.

The health of the human consumer has been greatly impacted by industrial agriculture. Chronic disease trends track consistently with timing and scale of widespread adoption of industrial practices. Knowing or tracing the source of your foods' true origin is challenging.

Toxicity, water pollution, junk food, antibiotic resistance, growth hormones… These and more woes are common headlines and consistently voiced concerns from multiple

disciplines and countless communities. Scientists, farmers, educators, and health care providers regularly research, write, and try to track the effects of agriculture on people and the environment. One question though? Does this sound like a system that you would design if you were trying to feed the world without destroying it?

REGENERATIVE AGRICULTURE

There are solutions. There are practices in play that work. Healthy soil is the answer to improving our food systems, our health, and the environment. It starts with sequestering carbon as humus, or soil organic matter, and fostering a diverse, living below-ground community.

Healthy agricultural land is much more complex than our simple monoculture experiment accounts for. A farm's core asset is soil, and from there the networked connections become endless, creating a thriving community above and below the surface.

Our 10,000-year experiment with the plow has failed, but there is another way. Nature has answers from our most basic to our most complicated problems. Farming should support and build life. There are global communities engaged in scientific and applied research to define a system of viable farming principles. The answer? Regenerative agriculture. The way to get there isn't new, its origins have been practiced and maintained as native traditional ecological knowledge and agroecological systems for millennia.

What is regenerative agriculture? A global movement to increase biodiversity, enrich soil, improve watersheds, and define and enhance ecosystem services. Drawn from the disciplines of organic farming, agroecology, holistic management, and permaculture, regenerative agriculture seeks to restore soil biodiversity. Practices include minimum tillage, cover crops, crop rotation, managed grazing techniques, and composting. Practices that build soil, recycle nutrients and store water are key to future generations. Regenerative agriculture promotes living soil, nutrients, air and water quality, animal welfare, and social equity.

The future farm vision of regenerative agriculture integrates crops and livestock.

At New Forest Farm, hedgerows flank perennial and annual pasture and crop zones.
Photo credit: Chad Adams

At Jean-Martin Fortier's La Ferme Des Quatre Temps, intensive organic production in permanent raised beds are interwoven with pollinator and predator habitat. Photo credit: La Ferme Des Quatre Temps

Intensive organic production in local communities secures a future independent of extractive farming, and embracing agriCULTURE.

Livestock is a controversial environmental topic. Large scale practices represent the worst of wasted polluted water, soil degradation, and emission issues. Factory farms produce as much waste as small cities. Tens of thousands of cows and pigs, and millions of chickens are crowded into confined animal feeding operations in inhumane conditions to produce proteins for our daily demands. The common "progressive" answer to this is to reduce or eliminate meat consumption. While this is not wrong, the real answer is more complex and nuanced.

Looking to nature as the model, we understand that all plant ecosystems on the planet co-evolved with herds of mammals, tightly bunched for protection from predators, moving through landscapes in a seasonal pattern and followed by flocks of birds. The mammals create tremendous disturbance to the plants, trampling, grazing, browsing, rooting, and rubbing. They deposit urine and dung, and the birds scratch through it all in their search for insect protein. The plants slough off root mass to balance their structure, and soil biota transform all these materials into humus, sequestering carbon. After the disturbance comes rest, where the plants regrow roots and foliage. Then the cycle begins again. This is how soil is made.

Consider that ungulates (cattle) in confinement are primarily fed corn, which their digestive systems are not adapted to process, which makes them sick. Further, the conditions are unsanitary, promoting harmful bacteria. They are fed antibiotics prophylactically, which compromises their gut biome. Result? Emissions. It's not cattle that are the problem, it's the way we handle them. Remember that the roving herds of 100s of millions of animals created those amazing deep topsoils and groundwater reserves that we

At La Ferme Des Quatre Temps, planting beds border pollinator and predator habitat. Photo credit: Chad Adams

decided to till and mine. Not coincidentally, our removal of those wild herds and replacement with tillage has direct correlation to the fact that nearly 20% of our carbon footprint comes from agriculture.

We need animal action to restore ecological function to ag lands. Each livestock species, managed properly, doing its "job" as in nature, can play a significant role in regeneration. You might ask where fertilizer is to come from, if we reduce or eliminate livestock numbers. It turns out that most of our nitrogen for fertilization comes via the Haber–Bosch process, an artificial nitrogen fixation process and the main industrial procedure for the production of ammonia today. This process transforms natural gas into ammonia, and was developed to create explosives for the world wars of the twentieth century. Considering the climate and environmental implications of natural gas production, should we not think about cattle eating grass, instead of growing corn to feed to cattle and then disposing of their manure as a toxic waste?

We now have the ability to manage animals at scale, and move them in the patterns of wild herds. Solar energized, flexible fencing systems that move with the herd, keeping them at specific densities matched to the needs of the forage, allow us to improve the soil, vegetation, and water conditions of the land. These fencing techniques have only become widely available in the past 10-15 years. This makes practical the ability to have animals where you want them, in the density you want them, for the amount of time you want them there.

Properly grazed animals contribute to nutrient cycling, depositing nitrogen rich urine and dung. Through hoof action and pawing soil the animals trample plants and break up soil surfaces, incorporating seeds into compacted areas. Regenerative practices in grazing strengthen vegetative structure, increase biomass production and increase seed production, dispersal, and germination. Proper livestock management can support the suitability of habitat for wild animals, creating a diverse natural ecoregion.

Sound animal management methods focus on multiple small paddocks per herd with short grazing periods and long recovery periods. These innovative land management techniques can fast track improvements to degraded soils. Multi-species pastures improve microbial health, soil structure, nutrient cycling, and create excellent stock feed. Improvements to soil ecology further reduce costs because the fields hold more water, have reduced weed pressures, and require fewer external inputs. This yields superior results to productivity and profit.

PIONEERS

There are pioneers across the globe who have applied ecological agriculture methods with great success. The Rodale Institute, Savory Network, Soil Foodweb Institute, The Carbon Underground, The Timbaktu Collective, and the Traditional Native American Farmers Association are just a few examples of this worldwide trend.

Colin Seis, based in the Gulgong district in Australia is a generational farmer, and his family has been farming and grazing the land for over 145 years. In the 1990s fire devastated this working station and innovation was the only answer. With no money for herbicide or fertilizer, Seis drilled his only remaining crop seeds into tightly grazed grassland. It worked. Pasture cropping was born.

The pasture cropping technique enables annual crops to be grown opportunistically into dormant perennial pastures or pastures whose competitive capacity has been temporarily suppressed by grazing. Avoiding the need to kill pasture grasses prior to sowing the annual crop maintains root ecology, enhancing biological health, water retention, and protection from erosion.

The results are high crop yields, sustained high pasture and animal production, improvements in biodiversity and significant reduction of input costs and risks. Improving the economic and social viability of this family and community ranch, pasture cropping is a technique Colin Seis teaches around the world and has been adopted by thousands of farmers.

In Wisconsin's "Driftless" region, Mark Shepard transformed a 100-acre degraded landscape, in a sea of industrial corn and soy, into a global example of what he terms "restoration agriculture". New Forest Farm's rolling hills have been terraformed with berms and swales that catch every drop of water that falls on the land and allows rainfall to slow, spread, and sink, recharging and hydrating the subsoil, rather than creating the massive erosion gullies seen on his neighbors' farms.

The berms are planted into hedgerows with diverse mixtures of productive trees and shrubs, from native oaks and hickories, to chestnut, hazel, apples, pears and cherries. Not only do these perennial systems encourage diverse wildlife, but each is a "crop" to be harvested and processed in turn through the seasons.

The land in between rotates between pasture for cattle, pigs, sheep, goats, and chickens, perennial crops like asparagus, and periods of annual cropping of vegetables dictated by market demand through the Organic Valley Cooperative nearby. The spacing of the fields is dictated by widths and turning radii of conventional farm equipment, allowing the efficiencies of the machines to be brought to bear.

This symphonic assembly of stacked enterprises on the land remains resilient and productive through droughts, economic cycles, and pest invasions. Mark Shepard and others pioneering this model of integrated productive systems are leading the charge toward the future of agriculture.

Jean-Martin Fortier is a global thought leader and teacher of intensive organic agriculture, also known as market gardening. Market gardening shrinks the footprint of land required for growing down to scales of one to ten acres, while showing revenues in excess of $100,000 per acre. This can be done anywhere.

This highly efficient and productive biointensive methodology borrows from the history of feeding London and Paris in the late 1800s, Eliot Coleman's work beginning in the 1960's, and a host of innovators like the "Farmhack" community, who are

Insectiary plantings are located next to living soil based production greenhouses at La Ferme Des Quatre Temps. Photo credit: Chad Adams

reengineering hand tools to pinnacles of ergonomics and function. Tractors are not necessary in market gardening, where a systematized pattern of 30" permanent raised beds, separated by 18" pathways, and interwoven with systems of perennial buffers to attract beneficial insect pollinators and predators, produces an incredible volume of top-quality vegetables. A highly coordinated calendar leverages high tunnels to begin seedlings that will be immediately planted into beds as the previous crops are harvested, and uses these low-tech structures and other insulative cover to grow in all four seasons.

Not only is this highly profitable, but the focus on living soils reduces insect and disease pressures, produces nutrient dense food that are delivered to local markets at peak freshness, and connects the farmers to their buyers. The cycle of food is reconnected at the source.

These are but a few examples of many individuals and techniques that will bridge the transformation of food production from industrial monoculture to regenerative agriculture. Industrial monocultures are fragile in the face of disturbance. Climate change related weather events are already causing billions of dollars of crop losses. The UN is warning of an estimated 60 harvests left before soil is too barren to feed the planet. Investment in resilient, robust, local production is happening, and the possibility of complete systemic change is real.

Regenerative agricultural methodologies take care and planning, but are already creating jobs, food security, and sequestering atmospheric carbon to the soil. What can we do? We can care about land, our water sources, and knowing the people who grow our food. We can make choices to embrace living systems, support practitioners, organizations, and investors, and transform the act of feeding ourselves. The future is bright.

Chad Adams is the President of Ground Plan Studio. With a background as a planner, landscape architect, farmer, and ecologist, he brings whole systems problem solving and scientific rigor to his projects. Chad has worked at Bio-Logical Capital, Urban Villages, Andropogon Associates, EDM Environmental Design and Management, Wallace Roberts & Todd, and Scenic Hudson.

IMPOSITION OR REVELATION? DESIGN AND THE NATURE OF CONTRADICTION

Rick Darke

What's the difference between revealed order and imposed order? It takes a good gardener to see order where none is apparent, and a prepared mind to see opportunity in the contradictory nature of living landscapes. In popular use the word 'chaos' implies an absence of order, and lack of order is usually equated with lack of value. In scientific context, where inherent order and the immense complexity of dynamic systems are givens, the word 'chaos' describes a lack of predictivity. Instead of devaluing chaotic systems, science seeks to understand the intricacies of their working relationships with a goal of achieving a greater measure of predictivity. Recognizing the impact of these different perspectives is fundamentally important to landscape designers' intent on adopting authentic conservation ethics. If the biology of a site is presumed to have no order, the designer feels free to eliminate it, providing a clean slate on which readily recognizable order can be imposed. Adopting a scientific approach means the designer's responsibility is to observe, research and reveal a site's biological order, providing the basis for design and stewardship guided by continuing revelation.

The autumn landscape in Whitesbog Village in the New Jersey Pine Barrens is a beautiful study in contradiction. To the eye of a casual observer, this landscape appears gardenesque: the line of the water, the near-hedge like linear sweep of highbush blueberries backed by pitch pines seems too ordered to be purely accidental. In fact, the scenes' beauty derives from a legacy of human cultural activity. To gardeners devoted to the cultivation of indigenous plants, the waterlily is a valued wild flower. To a cranberry grower it is a noxious weed. Whitesbog's unintentional gardens, evolved from utility, suggest the opportunities for deliberate conservation and management of autonomous patterns advocated by William Robinson. Photo credit: Rick Darke

With visual power to match the most elaborate of designs, this focal point in a New York garden has humble origins. The circle of light began as a simple horse trail through the indigenous woods of a working farm. It is still a riding trail. Follow it to the other side and the beech-oak woods opens on salt marsh. Look up and you might catch a great egret flying overhead. The imposed element in this design is a viewing space (where this photograph was taken from) that invites visitors to experience and contemplate the woodland window. The light touch of this brilliant understatement attests to the authenticity and appeal of a landscape that celebrates cultural layers while preserving functional habitat for local flora and fauna. Photo credit: Rick Darke

The idea of working synergistically with the partly unpredictable nature of complex living systems isn't new, but it is timely. We're growing nearer to accepting that a design and management ethic dedicated to the imposition of complete control is not only expensive and impractical: in terms of global resource allocation it is unsupportable. A change in ethics will depend in part on an embrace of new aesthetics. The human psyche readily recognizes order in straight lines and grids, in fixed-radius curves, in symmetry and uniformity. On top of this, the ability to maintain such order is valued as a confirmation of dominance. Together these tendencies result in an approach that values the static over the dynamic and the predictable over the unpredictable. Design narratives are often equally risk-averse and a-contextual, derived from comfortably familiar ideologies rather than drawn from the contradictory nature of place. The unfortunate effect is that instead of revealing inherent order, design often further obscures it.

Living landscapes that didn't originate through deliberate design are variously called wild, spontaneous, regenerative, unintentional, or accidental. Close observation reveals that, like most accidents, they're anything but accidental. They're the authentic, logical results of myriad interactions within cultural-ecological systems. They're rich with intrigue and possibility because they're full of chance. They are often rich in diversity because they harbor the autonomy that sustains resilient life. The visionary English gardener William Robinson (1838–1935) sensed this more than a century ago. His groundbreaking work

The Wild Garden (1870), introduced the concept of managed wildness within designed landscapes, and promoted an aesthetic embracing patterns that result from dynamic interaction. Robinson opened his book with an epigram from Sydney Smith (1771–1845), an Oxford-educated Anglican minister and moral philosopher celebrated for his wit and wisdom: "I went to stay at a very grand and beautiful place in the country where the grounds are said to be laid out with consummate taste. For the first three or four days I was enchanted. It seemed so much better than nature that I began to wish the earth had been laid out according to the latest principles of improvement. In three days' time I was tired to death; a thistle, a heap of dead bushes, anything that wore the appearance of accident and want of intention was quite a relief. I used to escape from the made grounds and walk upon the adjacent goose common, where the cart ruts, gravel pits, bumps, coarse ungentlemanlike grass, and all the varieties produced by neglect were a thousand times more gratifying." In one deceptively complex paragraph Smith rejects the ordered banality of the "made grounds" and opts for the unscripted intrigue of the utilitarian landscape.

Design needn't always begin with destruction. The first rule of truly sustainable, conservation-based work is to make careful assessment of existing elements and to make the preservation of living and non-living resources a principal goal. Accidental, minimally managed landscapes including derelict gardens are often home to diverse and intricately-related living communities that have proved their adaptability to site conditions. Since

The striking forms of European birches (*Betula pendula*) follow historic trackways in Berlin's Natur-Park Südgelände. The trees serve as living architecture that, in concert with the rails, adds visual order to the scene. Designers accustomed to working with blank slates might ask "What is the nature of design in such a place?" The answer is that Südgelände is an example of *revealed* order versus *imposed* order. The designer must have the skills to recognize inherent order that can be articulated and accentuated through the artistry of composition. This type of design is akin to photography. The subject matter is already there – the artist only resolves the image. Photo credit: Rick Darke

The organic architecture of the Iron Garden's spaces is evident in this November view from atop the furnace. This woodland room includes stone seating repurposed from the former hot metal bridge. In summer it provides a much-needed green retreat from sun and heat. Photo credit: Rick Darke

editing – selective removal – rather than clearing and replanting is more conserving of resources and relationships the resulting landscapes are usually richer in the living diversity that offers visitors opportunities to observe, engage and be sustained.

Unintentional, regenerative landscapes are worthy of close observation because they offer practical insights into the potential for intentional preservation of living process. Wildly beautiful order is evident in the area surrounding Whitesbog Village near Browns Mills in the heart of the New Jersey Pine Barrens. Now largely protected by the Pinelands National Reserve, the million-acre region was originally referred to as a 'barrens' because its acid, sandy conditions were unsuited to traditional upland agriculture. Despite this, the indigenous plant and animal diversity is so unique that the Pinelands has been recognized as an International Biosphere Reserve. Cranberries (*Vaccinium macrocarpon*) are indigenous, and in the early twentieth century, J. J. White's operation was one of the largest cranberry producers in the state. The village has since become an historic site within Brendan T. Byrne State Forest, and many of the oldest bogs are out of production. These derelict bogs and impoundments have inadvertently become some of the best places to observe a great diversity of indigenous pine barrens flora and fauna. Remnant landforms created by 19th century agricultural engineering now present huge areas of open and edge habitat, especially along dike roads and the margins of impoundments constructed for the wet harvesting of cranberries. Ordered patterns of the vegetation are the result of the ordered hydrology created by previous agricultural use. Shallow open water is often populated by the white fragrant waterlily (*Nymphaea odorata*). Drier but still wet margins are typically inhabited by low masses of leatherleaf (*Chamaedaphne calyculata*). A hedge-like line of highbush blueberries (*Vaccinium corymbosum*) often

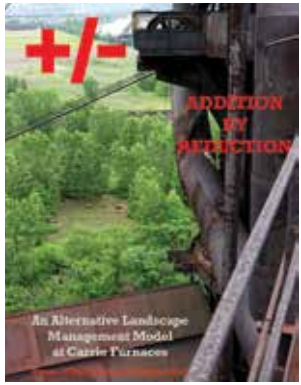
occupies the moist but not inundated sunny edge. Beyond this, higher dry sandy ground is dominated by green walls of pitch pines (*Pinus rigida*). Such landscapes suggest there is no Nature-culture divide, only a continuum of interconnected relationships.

Globally, the post-industrial landscape is rich with derelict sites in close proximity to densely populated urban neighborhoods underserved by conventional parks and green spaces. Brownfield to greenfield transformations on a broad scale will depend on design and management approaches that are extremely resource-efficient, and there are certain to be many opportunities for imaginative professionals.

Easily accessed from the Preisterweg S-Bahn station, Berlin's Natur-Park Südgelände owes its origins not to accident so much as to the collision of human politics. The 18-hectare site was once part of Tempelhof freight railyard, built in the 1880s. The yard became part of West Berlin when the city was divided in 1945. The Reichsbahn, controlled by East Germany, halted most train service to western districts in 1952. Wild plant and animal species, both native and introduced, began colonizing the abandoned

ABOVE: Aerial photography in September illustrates the simple beauty of an edited path through regenerative vegetation. The Iron Garden isn't irrigated and no fertilizers, pesticides or herbicides are used in its care. Photo credit: Rick Darke

LEFT: A Monarch butterfly takes nectar from tall thoroughwort (*Eupatorium altissimum*) an indigenous species that thrives on the site's sunny dry conditions. This opportunistic herbaceous species was common along New York's High Line prior to reconstruction, and still persists on the undisturbed section adjacent to the Hudson railyards. Photo credit: Rick Darke



LEFT: Carrie Furnaces, a former blast furnace site that is now a National Historic Landmark in Pittsburgh, Pennsylvania had been covered by regenerative vegetation after decades of abandonment. The Addition by Reduction project now uses editing to create and care for landscape features that enhance visitors' experience. The project has been photo-documented and is available in PDF format. Photo credit: Rick Darke

RIGHT: Signs sand-cast on site from melted-down scrap iron interpret the landscape's biology and culture, suggesting that the diverse array of plants and animals that now call Carrie Furnaces home offer endless opportunity to observe the vibrancy of biological process and to celebrate the regenerative capacity of the living landscape. Photo credit: Rick Darke

landscape. The indigenous white birch (*Betula pendula*) is a broadly adapted pioneer species, and it soon became a dominant feature of the regenerating woodlands. Though slated for destruction, the site's biological diversity and cultural narratives were eventually recognized as being ideal for repurposing as a public park. A master plan was created by Planning Group ÖkoCon & Planland in collaboration with the artists' group Odious. Pathways were created by selectively removing birches and other regenerative vegetation and by tamping ballast remnant from steam locomotive operation between the rails. The paths use only materials found on site, and the surfaces are durable, walkable and permeable. Birches were allowed to remain in some of the more intimate secondary pathways, demonstrating how the editing process can be varied to suit functional goals and to create different moods and experiences. The birches are not irrigated or fertilized and no herbicides or pesticides are employed in their care.

The Addition by Reduction project at Carrie Furnaces National Historic Landmark in Pittsburgh, is another example of relying primarily on editing to create attractive, useful landscape elements at a fraction of the cost of traditional design-build techniques. The 14-hectare site is dominated two non-working blast furnaces that are all that remain of a once-vast iron-making complex. Serving as a museum, park, and economic engine, it is managed by Rivers of Steel, a non-profit agency dedicated to celebrating industrial heritage in ways that inform and empower the region's communities.

The project was conceived to make best use of the regenerative vegetation that had colonized the site in the decades after the furnaces were shut down and peripheral structures were demolished. The surface of much of the site consisted of thin soils underlain by concrete rubble and other materials from demolition and summer conditions were often extremely hot and dry. Despite this, self-sown seedlings of native

and introduced herbaceous and woody plant species blanketed the majority of the area and provided shelter and sustenance for a surprising diversity of wildlife. Dense growth of locally indigenous sycamores and poplars created virtual forests. Though regrowth threatening the historic furnace structures needed to be removed, vegetation nearer the periphery afforded opportunities to create space for shade and shelter and to direct visitors' attention to site history by framing strategic vistas.

The plan of the "Iron Garden" was laid out on foot following assessment of the site's plant and animal communities, aided by high perspectives from atop the furnaces which were communicated to ground staff by mobile phones. Multi-ton dressed stones that were once part of the site's hot-metal bridge were repurposed as garden seating. A temporary furnace capable of melting scrap iron pipes and radiators was set up on site, and a collaboration of graphic artists, sculptors, ecologists and gardeners resulted in cast-iron interpretive signage that tells the Iron Garden's story. It is a tale of resiliency, offering an inspiring model for conserving the yet-to-be revealed order of wild places.

Rick Darke is a Pennsylvania-based consultant, author and photographer. His work is grounded in an observational ethic that blends ecology, horticulture, and cultural geography in the design and stewardship of living landscapes. He has authored numerous publications, most recently Gardens of the High Line: Elevating the Nature of Modern Landscapes *(Timber Press, 2017) with Piet Oudolf.*

MAKING LANDSCAPE DESIGN ACCESSIBLE AND JUST: PAST, PRESENT AND FUTURE

Kofi Boone

Based on my presentation at the New Directions in the American Landscape, the essay below reflects on issues of social equity and environmental justice as they relate to landscape architecture. As a young person in Detroit, these issues drew me to study at the University of Michigan, an academic and community center for environmental justice. This interest has continued in my academic career at North Carolina State University.

JUST GREEN

The landscape architecture profession often sees a divide between the "green" people and the "just" people.[1] Projects with an ecological framework appeal to the green people, who have strong mainstream environmental values and largely support the work of landscape architects. In the other corner, are the just people, who have endured environmental crises and injustices for generations and for whom the environment means something different than it does for the green people. Conflict often ensues between the two groups, and bridging this gap represents one of the necessary futures of our profession. Environmental justice is written in as a core mission of the *New Landscape Declaration* (2017), a call to action and an update to the 1966 *Declaration of Concern* produced by the Landscape Architecture Foundation, of which I am the Vice President of Education.

AN INCLUSIVE WE

The landscape architecture profession also faces a divide between the people who practice landscape architecture and the people who often need and benefit from our services. The interests, values, and cultural references of practitioners and educators often differ significantly from the communities served. To more accurately respond to community concerns and needs, more aware, responsive ways of working are needed.

We can start by telling a different story about landscape architecture. Most of our theory, history, and case studies apply European precedents to American design challenges. Practitioners often end up with an implicit bias towards privileged European landscapes. Celebrating everyday landscapes for the non-powerful and non-wealthy sends a different message about what landscape architecture can mean to diverse people and how we might achieve a more representative profession. Toward that end, what if there were a People's History of Landscape Architecture? Borrowing from Howard Zinn's groundbreaking work, what if landscape architecture were described with some acknowledgement of the dynamics of race, class, gender, and power? We can have a contested view of who we are and what we are about, and through contestation and debate we might arrive at more nuanced, reflective history of designed spaces.

Secondly, we can recover the Social Impact Assessment (SIA) to give rigor to the process of analyzing, monitoring, and managing disproportionate impacts on environmental justice communities in the ways that Environmental Impact Assessments

quantify ecological impacts. SIAs are currently poorly defined, and the design profession needs to recover this tool and embrace it.

Thirdly, to quote the work of my mentor and friend Randy Hester, we must practice representative representation and acknowledge "No Representation Without Representation," Hester's critique of how design practitioners portray design strategies.[2] If renderings and design imagery only include people who resemble the designers, then a signal is being sent that the community will not be welcome in the future envisioned. This extends beyond renderings to how the design process itself occurs, including who sits at the table when decisions are made.

An important publication bridging the gap between landscape architecture and environmental justice is *The Environment and the People in American Cities, 1600-1900s*: *Disorder, Inequality, and Social Change* (2009) by Dorceta Taylor, an environmental justice scholar. Taylor reveals the plight of various communities with the rise of the mainstream environmental movement, with which landscape architecture is associated. The development of Central Park serves as an iconic example. When Andrew Jackson Downing proposed a rural park in New York City, sanitation and housing reform advocates, women's groups, nascent labor organizations, and immigrant groups were also interested in access to public space. These groups had very different conceptions than that advanced by Downing and ultimately the Park's designers, Frederick Law Olmsted and Calvert Vaux. Instead of consolidating land into one large park, these groups envisioned creating park land throughout the city to provide access to light and air, improved water quality, and safe play spaces. In other words, they envisioned *central parks plural* rather than one central park. Any visitor to New York City could tell you which vision won out. What this history illustrates is that as even as urbanization and landscape architecture were formalizing, values surrounding social control, order, and reform were contested and the subsequent design response was determined by the winners of those debates. Taylor goes on to point out that the building of Central Park displaced Seneca Village, home to approximately 300 African American families, as well as the Yorkville and Pigtown, settlements of Irish and German immigrants. Adding insult to injury, Olmsted refused to hire black people for the construction of Central Park. This was also the case in the construction of the Columbian Exposition, Jackson Park, and the Buffalo Park System.

Issues of equity and justice in design date back to the roots of our profession. The Central Park landscape is not benign. It is an expression of power. African American communities in particular have experienced the traumatic effects of displacement from racial policies operating under the guises of spatial "progress." *Root Shock* by Mindy Thompson Fullilove describes the trauma experienced by people of color, who lost their homes, businesses, and social fabric as a direct result of urban modernization projects begun in the 1950s.[3] As Fullilove shows, urban renewal projects not only physically displaced black communities, these projects destroyed economic health and social cohesion.

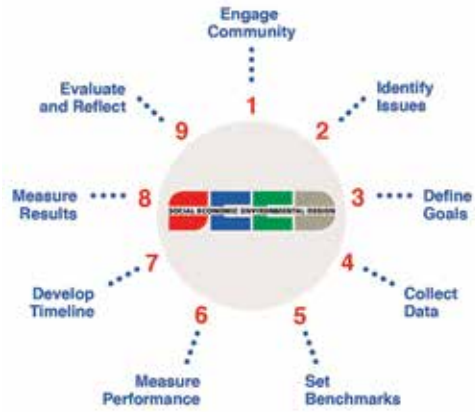
These same issues continue today. For communities presently grappling with environmental justice and social equity, including communities in my current home of Durham, North Carolina, gentrification represents a major concern. Real fear exists among these communities that investment in public spaces and infrastructure, among other endeavors, will displace residents unable to afford and join in the benefits that designers create.

So what must we do as designers? We must frame the problem and form ways to address it. Some example methods are offered here. Charles Cross and Dan Pitera lead the Detroit Collaborative Design Center (DCDC) at the University of Detroit's Mercy School of Architecture. Through intimate, long-term relationships, the nonprofit DCDC co-creates with the community using iterative, step-by-step strategies. For example, to engage diverse audiences around long-term planning in Detroit, the DCDC set up "The Roaming Table" in community spaces throughout the city. They engaged in 100,000 conversations, a process that earned The Roaming Table a place in the Smithsonian Institution's permanent collection following display in the exhibition *By the People*. This simple strategy of conversations around a table temporarily placed in locations where people actually conduct their lives enabled deep, nuanced community engagement.

Diane Jones Allen and Austin Allen, of Design Jones LLC, capture the value of neutral grounds for the Martin Luther King Memorial Walk in New Orleans. What are known as boulevards or medians elsewhere are known as common ground in New Orleans. These are very important social spaces for the communities in which they are located. By celebrating that space and the parade, gathering, and memorial aspects of that space, Design Jones engages in a dialogue with the community and honors what is important to residents.

Architect Bryan Bell of North Carolina State University, recognized for his work in public interest design, leads the Social Economic Environmental Design Network, also known as SEED. Many organizations are already using this metric to measure the social impacts of design, including at the Landscape Architecture Foundation (LAF) where I

The Detroit Collaborative Design Center set up a simple table (known as The Roaming Table) in locations throughout Detroit as a way of engaging over 100,000 residents in discussions about the long-term future of their city. Photo credit: Detroit Collaborative Design Center



The Social Environmental Economic Design (SEED) Network developed by architect Bryan Bell represents a valuable tool for assessing the social impacts of built environments. Already adopted in the field of architecture, this tool warrants broader use in landscape architecture. Image credit: Social Environmental Economic Design Network

serve on the board. The SEED metric tool deserves broader use in landscape architecture.

CONVERGENT PUBLICS

Part of the work of 21st century designers involves dealing with converging multiple publics. Not all publics are the same or have the same values or perspectives. We must recognize differences where they exist and then find where these publics overlap and converge. Design in the public realm is rarely considered in terms of conflict resolution but that is what it entails. Where conflict exists, a problem exists that needs to be addressed. Learning to accept and reveal conflict through the design processes is critical.

Stories can be important in this regard. We all have stories that give places meaning, that give our relationships with one another meaning. Unfortunately, the standard design process does not always empower the storytellers. Often, through community meetings, we ask a community to bare its soul and then repeat that process again later for another project. Practitioners working in the public realm in the environmental justice context recognize the fatigue this engenders. Rather than a top-down approach, we might enable more cooperative, collaborative processes.

The redesign of John Chavis Memorial Park, a significant African American place in Raleigh, North Carolina, demonstrates this challenge. The park is named in honor of John Chavis, who grew up in the area and was the first educator in North Carolina allowed to teach both white and black students. Built in 1937 and the only park of its size in the southeast for African Americans during segregation, the park is located in the South Park East Raleigh neighborhood, a low-lying area largely self-built by African Americans outside the original boundary of the city. Like other southern cities founded during slavery, exclusion of African Americans and other communities exists at the heart of Raleigh's DNA and its very spatial configuration. For the community, capturing the park's fraught history represented a priority.

Traditional techniques for engaging this community—such as meetings in church basements and looking at maps—were insufficient, however. A series of other engagement measures were developed, including workshops, an archival initiative, site walks, and social media strategies. The archival initiative scoured for images and other artifacts in private and public collections. This enabled the creation of a narrative of the community not based on the built environment but rather on the community's interaction with the artifacts. In collaboration with Skeo Solutions, we led site discovery tours of the park. Through mobile technology, community members recorded self-authored narratives

capturing the lifeways and cultural histories of places that may not bear evidence in the landscape itself. Mobile technology enabled these stories to be recorded without requiring scheduled community meetings or everyone being in a room at the same time. This approach helps overcome group dynamics that sometimes prevent those with the quietest voices from being heard.

The video narratives were transformed into an art projection project. Videos made by community members were projected for a month onto one of downtown Raleigh's buildings. Many who live in Raleigh have never ventured into the South Park East Raleigh neighborhood or know its proud and complex history. Perhaps most importantly, these stories started to identify that the boundaries of this neighborhood were artificial, either through historic district designations or zoning and planning decisions. This led to the development of the heritage walk concept, in which multiple sites were identified as important to preserve to fully tell the story of this place and its inhabitants. Other project outcomes included designation of John Chavis Memorial Park as one of the few listings in the National Register of Historic Places based on its significance in African American history. The project also resulted in a $12.7 million-dollar bond issue, following on a fifty-year history in which resources were divested from Chavis Memorial Park in favor of a traditionally white park less than two miles away.

In this type of design process, the community sits at the table, directly engaged and invested in the storytelling. Moving forward, the landscape architecture field needs to expand its ability to deal with the complexity of social systems, not just environmental systems.

HEALTH, SAFETY & WELLBEING

When landscape architects receive licensure and swear on the religious document of their choice to be a landscape architect, they are charged with protecting health, safety,

Site discovery tours led in collaboration with Skeo Solutions provided community members with new perspectives on John Chavis Memorial Park and its significance in the neighborhood's history. Photo credit: Skeo Solutions

A revitalization project for the John Chavis Memorial Park involved investigating archival resources, which the community then used to develop a rich, nuanced narrative about their neighborhood. Photo credit: Kofi Boone

and welfare. I posit that the "welfare" portion of that charge may need to be rethought, not just for parochial reasons but because of the importance of wellbeing moving into the 21st and 22nd centuries. The measure of our success should not be wealth but the success of the people who use and are enabled by the places we create. Terminology surrounding "wellbeing" is already well developed, particularly in the public health community, which is more progressive than the design field on the disproportionate impacts of the built environment on communities. This can mean using the Health Impact Assessment (HIA) as a tool for public work, obtaining baseline information on user health and incorporating metrics to measure the impacts and efficacy of our interventions. We must also seed innovators to encourage the type of experimentation that can lead to innovation. Unfortunately, professional practice often has low tolerance for this. Yet there must be other ways of practicing that allow our most brilliant minds to take risks, to think big, to dare to fail, and to learn from trouble shooting so that we all can benefit from their discoveries.

One of my students in the Department of Landscape Architecture at North Carolina State University (NCSU) is from Bangladesh. Interestingly enough, Sharna Chowdhury selected North Carolina's program in part because she knew our state is in the midst of determining how to build more resilient communities in the face of hurricane damage and climate change. Much of Bangladesh sits in a delta in a floodplain, with little buildable area. Because of its low-lying location, Bangladesh, despite its limited resources, is leading the world in green infrastructure and climate adaptation. During Design Week, in which NCSU students work in communities directly impacted by flooding and by hurricanes, Chowdhury approached situations in Kinston, North Carolina (downstream from the fast-growing city of Raleigh), using strategies and frameworks from her native Bangladesh. Interventions based on natural systems were designed not just to protect

communities from flooding by the Neuse River but to provide other benefits, including improved water quality, wildlife habitat, tourism and heritage opportunities, and food and energy production. The business of landscape architecture has traditionally been aesthetics and functionality, but students today are doing more by approaching landscape architecture as a mechanism for adapting and impacting our future world.

The public health community has known for many years that the most significant contributor to health is social conditions, not genetics. The World Health Organization's Commission on the Social Determinants of Health (2008) showed that 55% of health issues around the world are determined by public services and infrastructure, living and working conditions, and social, economic, and political factors.[4] The Commission also developed a framework that is multi-scalar, which applies well to the scaled nature of landscapes. Dealing with water in a parking lot, for example, means examining not just that parking lot but the larger watershed. The health community already thinks in this way such that potential for natural alignment between our realms is possible if we can find a way to hold our pieces together.

The term *multi*disciplinary refers to the phenomenon of each profession doing its own work in its own way, paralleling one another but not really intersecting. *Inter*disciplinary involves one profession adapting strategies and approaches from another profession to learn from it and build credence. To be *trans*disciplinary means that distinctions between disciplines are no longer evident and actually no longer matter. If we consider all that we do as landscape architects that encompasses the social sciences, biological sciences, environmental psychology, and anthropology—in effect all the *-ologies,* we are moving in a *trans* direction. This should be encouraged if we are to fulfill our important charge of protecting health, safety, and wellbeing.

NOTES

1. This concept was described by Mickey Fearn who presented at the Pennsylvania NDAL symposium, January 2019.
2. See Randolf Hester, "Democratic Drawing: Techniques for Participatory Design," in *(Re) constructive Communities: Design Participation in the Face of Change, the 5th Pacific Rim Conference on Participatory Community Design* (Center for Design Research, Univ. of California Davis, 2005): 176-94.
3. See Mindy Thompson Fullilove, *Root Shock: How Tearing Up City Neighborhoods Hurts America, and What We Can Do About It* (New Village Press, 2016, 2nd ed.).
4. See "The Commission on Social Determinants of Health - what, why and how?" World Health Organization, https://www.who.int/social_determinants/thecommission/finalreport/about_csdh/en/.

Kofi Boone is Associate Professor of Landscape Architecture at North Carolina State University focusing on environmental justice and tools for enhanced community engagement and design. Kofi previously served as studio leader at JJR (formerly Johnson, Johnson, and Roy) where he worked on interdisciplinary urban design and planning projects.

CULTURE AND ECOLOGY AS DRIVERS OF CONTEMPORARY LANDSCAPE DESIGN: CASE STUDIES BY NELSON BYRD WOLTZ

Thomas Woltz, Thomas Baker, and Jeffrey Longhenry

In his presentation, Thomas Baker explored the evolving process of incorporating ecological science into the practice of landscape architecture. Baker presented several projects from the portfolio of Nelson Byrd Woltz (NBW) that integrate the role of a conservation biologist into the practice of landscape architecture and explore the potential of collaboration between scientists and designers for creating ecologically performative landscapes while supporting scientific discovery.

Thomas Woltz and Jeffrey Longhenry built upon Baker's material by presenting the evolution of NBW's methodology to incorporate historians and scientists in a collaborative design dialogue. Woltz and Longhenry presented the broad application of this methodology within the context of cultural and ecological narratives that have shaped diverse environments and cultivation practices across landscapes. In the past twenty years of practice, the work of the firm has grown to encompass large-scale agriculture landscapes, sites of memory, and the management of urban parks, and is now shaping more than 150,000 acres of productive landscape.

A selection of illustrative project work covered in these presentations is as follows.

CEDAR MOUNTAIN RESERVE

Cedar Mountain Reserve comprises 900 acres in the Blue Ridge Mountains of Virginia, bordered on three sides by Shenandoah National Park. NBW was tasked with developing a master plan to explore new strategies for long term conservation of the land while providing recreational, hunting, and experiential opportunities for the client, friends, and family.

As part of the master planning process, NBW coordinated a rapid biological assessment, referred to as a BioBlitz, at Cedar Mountain Reserve. The BioBlitz focused on surveying vascular plants, lichens, reptiles, amphibians, birds, small mammals, fish, and aquatic invertebrates. Collaborators consisted of 18 researchers and three design staff from seven research organizations. The goals of the survey were to inventory the site's biological diversity and to inform management recommendations that would enhance the ecological value and biodiversity of the property.

A suite of thematic management recommendations became clear during the survey and led to the establishment of a long-term and collaborative ecological monitoring program. The regional relationship between cerulean warblers, ash trees, an invasive forest pest, and reestablishment of American chestnuts inspired the establishment of long-term studies that will inform on-site land management and support advancement in scientific discovery as data is shared.

Ornithologists from West Virginia University discovered a well-established population of cerulean warblers, a vulnerable species with a population decline of 72% between 1920 and 2014. Cerulean warblers prefer forests with canopy gaps as a mosaic of nesting

LEFT: An aerial view of vernal pool during BioBlitz process at Cedar Mountain Reserve.
Photo credit: Nelson Byrd Woltz Landscape Architects

RIGHT: Dr. Natalie Howe identifying and documenting lichens collected across the property.
Photo credit: Nelson Byrd Woltz Landscape Architects

preferences and food sources are more numerous in these areas of forest disturbance. Dendrologists and botanists from State University of New York, College of Environmental Science and Forestry documented a significant percentage of ash trees in the healthiest forested tracts on the property.

Infestation of ash trees by the emerald ash borer (EAB) is imminent in this forested tract with mostly native vegetation and low establishment of invasive vegetation. However, invasive pressure is high on the edges of the forest due to historical disturbance and current invasive establishment in the clearing. Imminent EAB infestation of ash trees and the necessity of a forestry management plan at Cedar Mountain Reserve presents a novel research opportunity to study the composition of the avian community at Cedar Mountain Reserve in light of the impact that the EAB will have on habitat options. As ash trees die, canopy gaps open and create habitat suitable for birds of conservation concern, such as the cerulean warbler. This study will document the avian community pre-EAB infestation and monitor how the avian community changes post-EAB infestation. Given the geographic scope of EAB and resulting elimination of ash trees from forested ecosystems, it is critical for both private lands and parks, like Shenandoah National Park, to understand how to manage their forests and anticipate impacts on the forest-bird communities.

Interestingly, this same forested tract contains saplings of naturally regenerating American chestnuts, although all are succumbing to blight. Historically, American chestnut dominated forest canopies, but the shade-tolerant sprouts of American chestnut existed in the understory waiting for a disturbance event to create a canopy opening, at which time the sprouts would respond with rapid growth and fill the opening. One result of the BioBlitz was NBW's engaging The American Chestnut Foundation (TACF) to study blight-resistant American chestnuts under similar environmental conditions by underplanting TACF hybrid chestnuts in the understory of a mature forest within the chestnut native range at Cedar Mountain Reserve. The particular advantage to this site is the potential future disturbance caused by the probable ash mortality resulting

from emerald ash borer infestation. As potentially blight-resistant American chestnuts become established in the understory, gaps in the canopy created by dead ash trees would provide openings in the canopy for chestnuts to fill. This study would replicate natural conditions in which American chestnuts have historically regenerated in their native range and inform land managers of the silviculture requirements that can be used in future American chestnut restoration initiatives throughout the eastern US.

OVERLOOK FARM

In 1903, the client's great-grandparents commissioned the Olmsted Brothers to design and implement plans for what was to be their weekend and summer retreat in Waverly, Pennsylvania. Seeking to deepen 100 years of the family's connection to this landscape, the client commissioned NBW to provide a stewardship plan to sustainably assure the health, productivity, and fiscal stability of Overlook Farm into the future.

The client, scientists, master farmer, and NBW designers worked in concert to consider all elements of this 320-acre landscape. Completed with a team of ecologists from the Roosevelt Wild Life Station, the BioBlitz resulted in a wealth of data that was synthesized with habitat range information to generate recommendations that were woven into the design of a holistic, long-term plan for the property. The BioBlitz inspired a framework to guide farming practices at Overlook, which in turn were integrated into a comprehensive management strategy.

The goal of this management strategy was to realize, protect, and enhance a healthy symbiotic relationship between conservation of natural resources and sustainable agriculture. This is the foundation for Overlook Farm, as NBW and the client continue to collaborate to ensure an ecologically functional and agriculturally productive landscape.

Agricultural fields alongside forest boundary illustrate harmonious programming adjacencies within Overlook Farm. Photo credit: Max Touhey

Native meadow ecology serves as a resource for an outdoor education session led by Larry Weaner. Photo credit: Max Touhey

Farming patterns were designed to mimic transitional ecosystems (savannahs, edge habitats, successional fields) in order to allow multiple products to be grown synergistically without overtaxing the site's thin soils.

Connectivity between these agricultural zones to the larger property support the farming system with critical pollinators and natural pest-control, using the land's tendency to revert to forest as an advantage. Grazers such as pigs and cattle have been intermixed in a savannah-like setting, imitating the disturbance of ancient herbivores, to generate the most productive and stable hybrid systems of restoration ecology and agricultural production.

Regional farming wisdom was incorporated with new technologies and farm philosophy. To ensure economic viability and long-term productivity, the farming plan for Overlook was roughly divided into projects requiring upfront investment and those yielding a long-term harvest. The Investment/Seedling phase encompasses vegetable production (including greenhouse and cold-frames), medicinal herbs, honey, mushrooms, and laying hens. The Long-Term/Perennial Phase establishes pasture and grazing animals, mast (fruits of trees, shrubs, and woody vines) production for specialty meats, nutteries, orchards, and strategic timber forests.

A key consideration of the framework plan was how to best to integrate the historic Olmsted landscape with the site's ecological and agricultural elements. Significantly, the relationship between the family and the Olmsted Brothers was a design dialogue that lasted three decades. As a result, the ethos of this collaboration is built into the historic core of Overlook. Remnants of the Olmsted Brothers' work remain on site, but their design intent was no longer legible. This presented an opportunity to restore and reimagine several elements of the original designed landscape. Research in the Olmsted

Archives informed design ideas for the historic core of Overlook Farm, which interweaves the familial and cultural landscape within the larger context of agricultural production and ecological conservation.

The design conversation between NBW, the client, and the farmers has been ongoing since the completion of the Conservation Agriculture Strategic Master Plan in 2012, and the property has now become the Fuller Center for Productive Landscapes. This facility draws landscape architects, farmers, and conservation biologists to engage in events and programs at the farm using Overlook as a living laboratory for ideas in Conservation Agriculture.

NAVAL CEMETERY LANDSCAPE

The Naval Cemetery Landscape, the first open-space node on the 14-mile Brooklyn Greenway, was designed on a piece of land adjacent to the abandoned Navy Yard Hospital. From 1831 to 1910, the site served as the hospital's cemetery, interring many who died at the Hospital in addition to the indigent people of the surrounding neighborhood. Documentation revealed that burials on the site were moved to Cypress Hills National Cemetery in 1926, and from that time the land sat mostly abandoned. However, it became clear in recent years that some interred remains persisted. When NBW was approached by the client with the idea of turning the 1.7-acre site into a park, it was especially critical to understand both the cultural history of the site to properly honor its past and the ecological history of the site to ensure its sustainable future.

The landscape is considered hallowed ground and the design of the park fully embraces and respects this history. To ensure minimal disturbance to the site – a key condition for its transition to a park – it was conceived as a warm-season pollinator

The entry threshold of the Naval Cemetery Landscape frames the Memorial Meadow beyond.
Photo credit: Max Touhey

meadow, a native ecology that could be planted without significant disturbance to the ground. This concept draws on years of experience installing meadows in agricultural landscapes and presented the opportunity to bring this important ecology into a dense urban context. The site was filled with 18,000 plugs and seeded with more than 50 native grasses and forbs. The Memorial Meadow focuses on the establishment of much needed native plants for the overlooked pollinators critical to the ecological health of the region and needed for the many community gardens surrounding the site. Monarch butterflies, attracted to the milkweed on which their larvae feed, have been plentiful among the sprawl of wildflowers, which includes pollinator species such as bee balm, goldenrod, purple coneflower, mountain mint, and brown-eyed susan. Since many of the names of the dead remained unknown, this rich ecology, drawing diverse life forms to the site, became a reassuring metaphor for our shared human condition, thus honoring the site's history and memorializing the cycle of life.

Opened to the public in 2016, the meadow is already making a significant positive impact on the ecological health of the neighborhood and the wellbeing of residents through the constant and diverse uses and ecological services that the landscape is supporting. Each year, this ecologically rich oasis sees the arrival of more migrating birds, and the undisturbed nature of the ground ensures the safe nesting of native, ground-dwelling bees. Social scientists are using the site, notes, and recordings to research the positive benefits of access to nature on the mental and physical well-being of the people who visit the site, and the impacts of our urban environment on people. Sponsored by the TKF Foundation, the data from the project and collected notes will contribute to a growing body of research that demonstrates the important role landscape immersion plays in the development of human intelligence, social and emotional capabilities, and

The raised boardwalk appears to float within the meadow, lushly planted with native pollinator friendly species. Photo credit: Max Touhey

the capacity for regeneration and healing.

Visitors to the Naval Cemetery Landscape pass through an entrance pavilion that acts as a formal threshold to the site. A floating boardwalk provides immersive access into the restored Memorial Meadow. In the southwest corner, the boardwalk circumnavigates a grove of native black cherry trees that will eventually form a high dome of branches over the Sacred Grove. An axis of granite blocks bisects the Sacred Grove in reference to the mooring blocks anchoring ships in the adjacent Naval Yards. In the north corner of the meadow, the boardwalk widens into an amphitheater, drawing visitors to a contemplative focus on the meadow and supporting a variety of gatherings and activities.

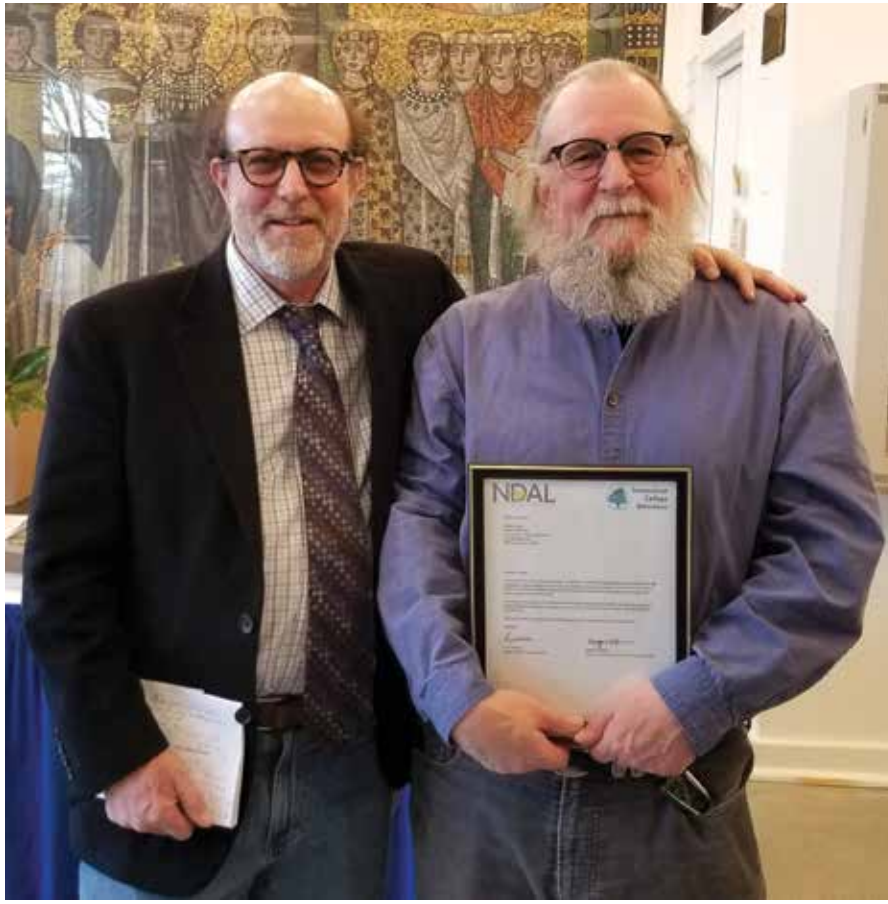
This understated landscape quietly engages the site's layered history for the benefit of its inhabitants. The park naturally builds community as it hosts yoga, meditation, and ecology classes while providing an opportunity for visitors to engage with the seasonal changes of the meadow. It engages the public in the importance of pollinator habitat in the urban environment, symbolically attracting many forms of life to a place that has historically commemorated death.

Thomas Baker is a conservation biologist with Nelson Byrd Woltz Landscape Architecture, where he leads ecological research and monitoring efforts. He previously worked as a research entomologist for Cornell University and Virginia Tech.

Jeffrey Longhenry is a senior associate at Nelson Byrd Woltz. Jeffrey has led several projects within NBW's Conservation Agriculture Studio as well as urban design, campus design, urban parks, private and public gardens.

Thomas Woltz is the owner of Nelson Byrd Woltz Landscape Architects. His numerous recognitions include being named Design Innovator of the Year by Wall Street Journal Magazine *in 2013 and joining ASLA's Council of Fellows in 2011. Thomas serves on the board of The Cultural Landscape Foundation and the University of Virginia School of Architecture Foundation.*

AFTERWORD



At the 2019 NDAL conference, NDAL founder Larry Weaner thanked Glenn Dreyer, Director Emeritus of the Connecticut College Arboretum, for his contributions to NDAL's 30 year programming legacy. In recognition of Glenn's lifelong dedication to integrating the ecological sciences into the practice of landscape design, NDAL has created the Glenn Dreyer Student Scholarship. This annual scholarship will award a student free admission to NDAL's yearly symposium. NDAL is honored to have worked with Glenn Dreyer over the years on the two-day symposium and is now pleased to connect aspiring practitioners with Glenn's deep expertise and many accomplishments. Photo credit: Christine Donovan

WHAT IS ECOLOGICAL LANDSCAPING?

Glenn Dreyer

Ecological landscaping is an approach that emphasizes an understanding of the environmental consequences of plant choices and management procedures used in creating a landscape, whether it is in a residential, commercial or public setting. Some key concepts are:

- Understanding the environmental conditions at the planting site in some detail. Rather than changing those conditions through various soil amendments, irrigation and other means, choose plant species that are well adapted to the existing conditions.
- Not planting known invasive and potentially invasive exotic species and utilizing mostly native species, preferably propagated from local or regional populations.
- Landscapes are not static pictures created solely for our viewing pleasure, but rather growing, evolving, and changing communities. Change is due both to the growth of individuals (young saplings become large trees, low blueberry shrubs form spreading patches) and natural species replacement processes (often called succession). When these processes are understood and anticipated, management or maintenance becomes a way of guiding the evolving landscape to retain both aesthetic and ecological value over the long term.
- Landscapes are the part of a living community that are foundations supporting complex food webs including all the local creatures, from microbes and insects, to birds, reptiles and mammals — and humans.
- It means gardening and landscaping isn't mostly about human enjoyment anymore, although it is still enjoyable and beautiful. Gardening and landscaping in the 21st Century is really about becoming stewards of the living organisms and environmental processes that sustain our planet.

NATIVE PLANTS

The first step in becoming an ecological landscaper is to learn to identify the common native species and habitats they are found in. A general definition of native plants for our area is those that were present in the region (which can be variously defined) prior to European colonization circa 1600 AD. Habitats are the places the species grow, which are described with terms like meadow, forest, wooded wetland, marsh, bog, etc.

The Connecticut College Arboretum, particularly the native plant collection, is a great place to learn the local native tree and shrub species. Plants in this collection should have a small metal tag somewhere in them that includes their scientific name and an accession number. The number refers to our database and mapping system. Any good plant book will have both the scientific and common names. Since scientific names are standardized (only one name per plant), and common names are not, it is best to get comfortable with the genus and species of the plants you are interested in.

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