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Community Garden as a Context for Civic Ecology: A Multidisciplinary Project in Restoration and Environmental Education

Mary Leou
New York University, mary.leou@nyu.edu

Tania Goicoechea
New York University, tg1045@nyu.edu

Bethany Kogut
bk2232@nyu.edu

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Community Garden as a Context for Civic Ecology: A Multidisciplinary Project in Restoration and Environmental Education

This paper describes a civic ecology program called Bees Alive! developed by the NYU Wallerstein Collaborative for Urban Environmental Education & Sustainability over three years to establish a native plant pollinator garden in Greenpoint, Brooklyn, New York. The project brought together a large university, public schools, non-profit organizations and a community garden called Lentol Garden to support wildlife and create an outdoor classroom to educate the public about the importance of pollinators. The garden was utilized as a context for civic ecology, environmental education and stewardship. Theories of place-based education and experiential learning were incorporated in designing this long-term project funded by EPA Region 2. This article illustrates how partnerships between educators and stewards can enhance green infrastructure, ecosystem services and human well-being in cities (Krasny 2014).

Keywords

civic ecology, environmental education, experiential learning, pollinators, community garden, stewardship, place based education, urban, cities, university

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INTRODUCTION

How can a community garden serve as a nexus for civic ecology? Can we engage students and the local community in stewardship and habitat creation in urban areas? How can we adequately measure increased biodiversity as a result of civic ecology practices? What partners could enhance our efforts in increasing environmental knowledge within a community? These are a few of the questions we asked ourselves as we designed an environmental education initiative called *Bees Alive!* to increase environmental literacy and create a hospitable habitat for pollinators in urban settings.

Bees Alive! was a three-year initiative funded by EPA (2018-2021), designed as a multifaceted program using education, stewardship, and habitat development as frameworks for learning. The components included:

- the creation of a pollinator-friendly habitat within a community garden called Lentol Garden,
- community science, stewardship and service learning opportunities for all,
- the expansion of 3 public school gardens within walking distance of Lentol Garden,
- the development of a curriculum module on pollinators for elementary school children
- and professional development opportunities for teachers coupled with field trips to Lentol Garden, Queens Botanical Garden, and Kingsland Wildflowers Green Roof.

This paper will focus primarily on the intersectionality of habitat development and environmental education as it applies to stewardship and civic ecology within a community garden in Greenpoint, Brooklyn.

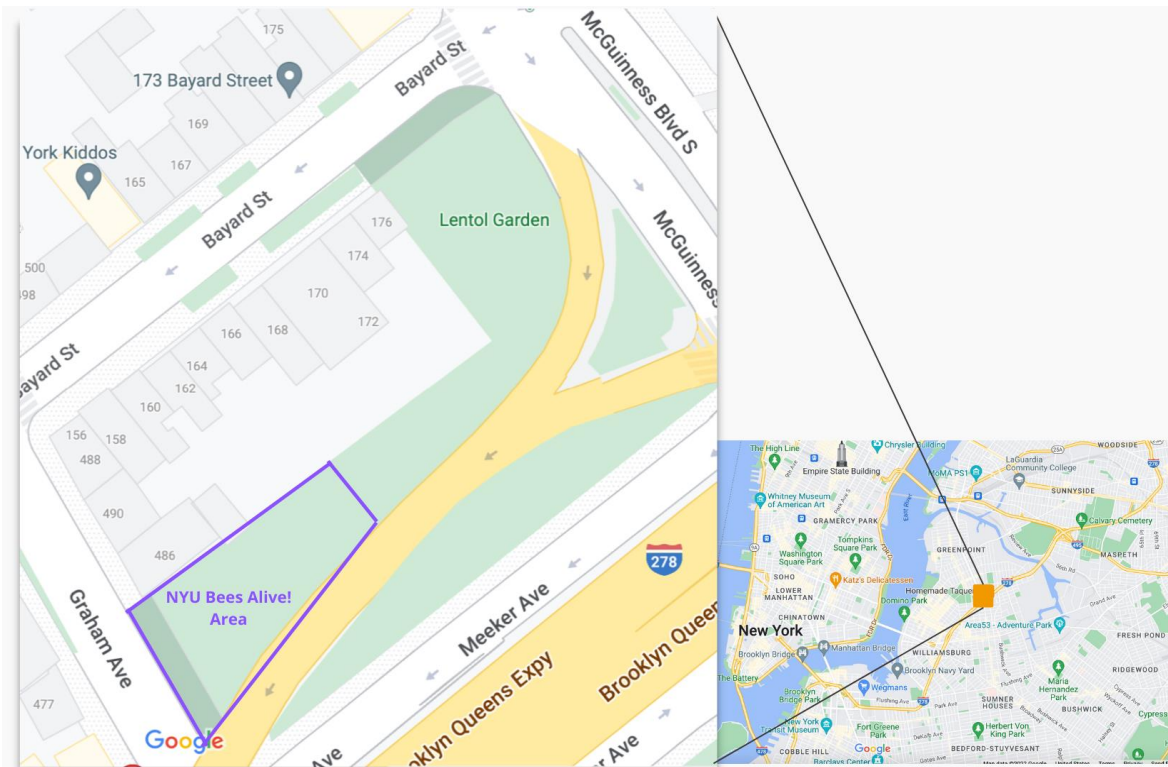
Greenpoint is a neighborhood that has been disproportionately affected by environmental issues throughout its history, including one of the largest oil spills¹ ever recorded in the United States, which turned its main waterway into a Superfund site. Other contributing factors to these environmental issues include: hosting New York City's largest wastewater treatment plant, several fuel companies, scrap metal recyclers, and waste transfer stations. As a result, greenspaces are even more valuable as they help mitigate some of the area's environmental injustices.

Lentol Garden, (named after NYS Assemblyman Edward S. Lentol in 1992) was designated parkland shortly after the development of the Brooklyn Queens Expressway (BQE) in 1946 and took shape over several decades; first by the Bayard Block Association, and more recently by local community gardeners. There was however, a smaller section of the garden adjacent to the BQE with an additional entrance on Graham Ave (see Figure 1), that was in need of stewardship. Over a period of 10 years the NYU Wallerstein Collaborative for Urban Environmental Education & Sustainability established a public private partnership bringing together a large university and a small parcel of public land where summer programs for youth bloomed and new opportunities for teaching and learning evolved.

¹ <https://nysdecgreenpoint.com/ProjectHistory.aspx>

It was in this shady 7,500 square foot untamed area that we proposed to create a pollinator garden with native plants to increase the biodiversity needed to support pollinators and educate children, teachers, and the local community about the vital role pollinators play in our lives.

Figure 1: Map of *Bees Alive!* area in Lentol Garden, Greenpoint, Brooklyn.



Our approach was grounded in place-based education, experiential learning, and civic ecology. Place-based education utilizes the local environment as a context for learning; thus enabling local residents to connect to nature in their own community (Leou 2005) through hands-on experiences. Civic ecology practices are community-based, environmental stewardship actions taken to enhance green infrastructure, ecosystem services, and human well-being in cities and other human-dominated landscapes (Krasny et al. 2014). The integration of these theories provided a rich palette from which to develop programming for this initiative.

Lentol Garden became the context for learning about micro habitats and how to support a healthy ecosystem of plants and wildlife, while using the garden as a setting for teaching and learning.

HABITAT DEVELOPMENT

A total of 1600 native plants representing 47 new species (see plant list in Appendix A) were introduced to Lentol Garden (Figure 2 and Figure 3) over a period of three years. With technical support from landscape designer Cindy Goulder and the Natural Areas Conservancy's Native Plant Center, we identified native plants suitable to the site. These plants were added in three waves beginning with shrubs and later adding herbaceous plants, so we could monitor their success over time.

We believed if we introduced new plant species to create a more diverse habitat, we could potentially support more pollinators. Even small plots of land in the most inhospitable environment can have a huge impact on pollinators (Shoesmith 2017). At the same time, we were able to introduce community science to local residents, teachers, parents, and students through civic ecology practices.

Figure 2: Native plants in our pollinator garden



Figure 3: *Bees Alive!* pollinator garden in Lentol Garden.



As Krasny (2012) and others have claimed, measuring ecosystem services is complex and often difficult to quantify. We therefore partnered with scientists from NYC Audubon, in order to train the NYU team of educators in monitoring techniques to measure biodiversity in the garden. These techniques served to fortify our understanding of how to measure the success of the garden, and as tools for teaching the public about the importance of biodiversity in supporting pollinators.

To support our monitoring, we created an iNaturalist² project in 2019 called *Bees Alive!* to record changes in biodiversity throughout the project's four umbrella sites, and to enable participants to engage in a community science effort by contributing their observations to the data repository. For the purpose of this paper, we will focus only on the [Lentol Garden's iNaturalist data](#) uploaded during the period between 2016 and 2022, so as to compare observations recorded on iNaturalist before and after the *Bees Alive!* grant period.

²iNaturalist is a social network of naturalists, citizen scientists, and biologists built on the concept of mapping and sharing observations of biodiversity across the globe.

We chose iNaturalist as a suitable platform for a number of reasons: a) it is free and available to anyone who can take a photo and upload it to the project site, b) it is relatively easy to learn, c) data can be retrieved for use by anyone and d) we have a permanent long-term record of flora and fauna observed in the garden over time. Throughout the grant period, a fair amount of time was spent monitoring species richness and engaging stakeholders in the process.

Chart 1: New observations documented on iNaturalist in Lentol Garden (2016-2022)

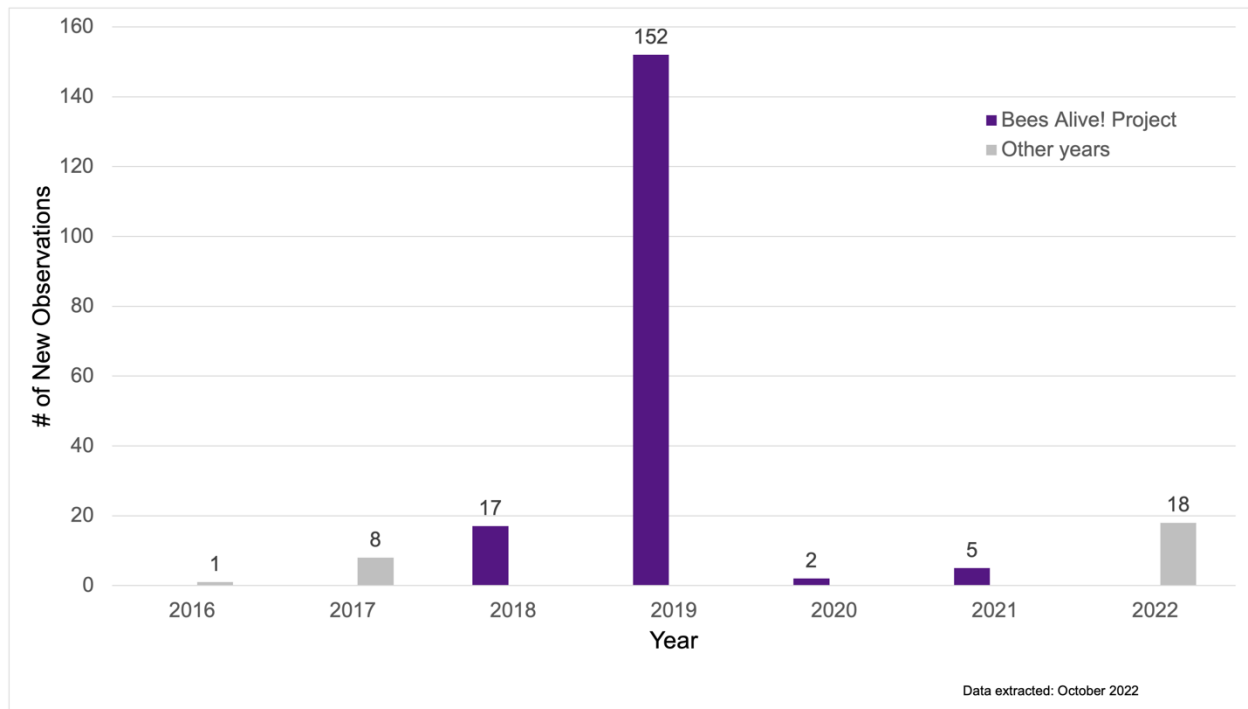


Chart 1 clearly demonstrates the heightened interest in documenting observations at the onset of *Bees Alive!* in 2018 and 2019. The purple bars on the graph show the years that the *Bees Alive!* program was funded. The dramatic drop in new observations in 2020 is attributed to the Covid-19 pandemic, as the garden was closed and we were not permitted to offer any programs or access to the garden. As restrictions were lifted, people still hesitated to come out to events or volunteer days, and we limited the number of people who could safely participate. However, even so, a total of 194 observations representing 130 species of flora and fauna have been documented since the onset of the *Bees Alive!* project in 2018, and that number is still growing as people continue to visit the garden.

Figure 4: Map illustrating the observations documented on iNaturalist in Lentol Garden organized by taxonomic class (2016 – 2022).

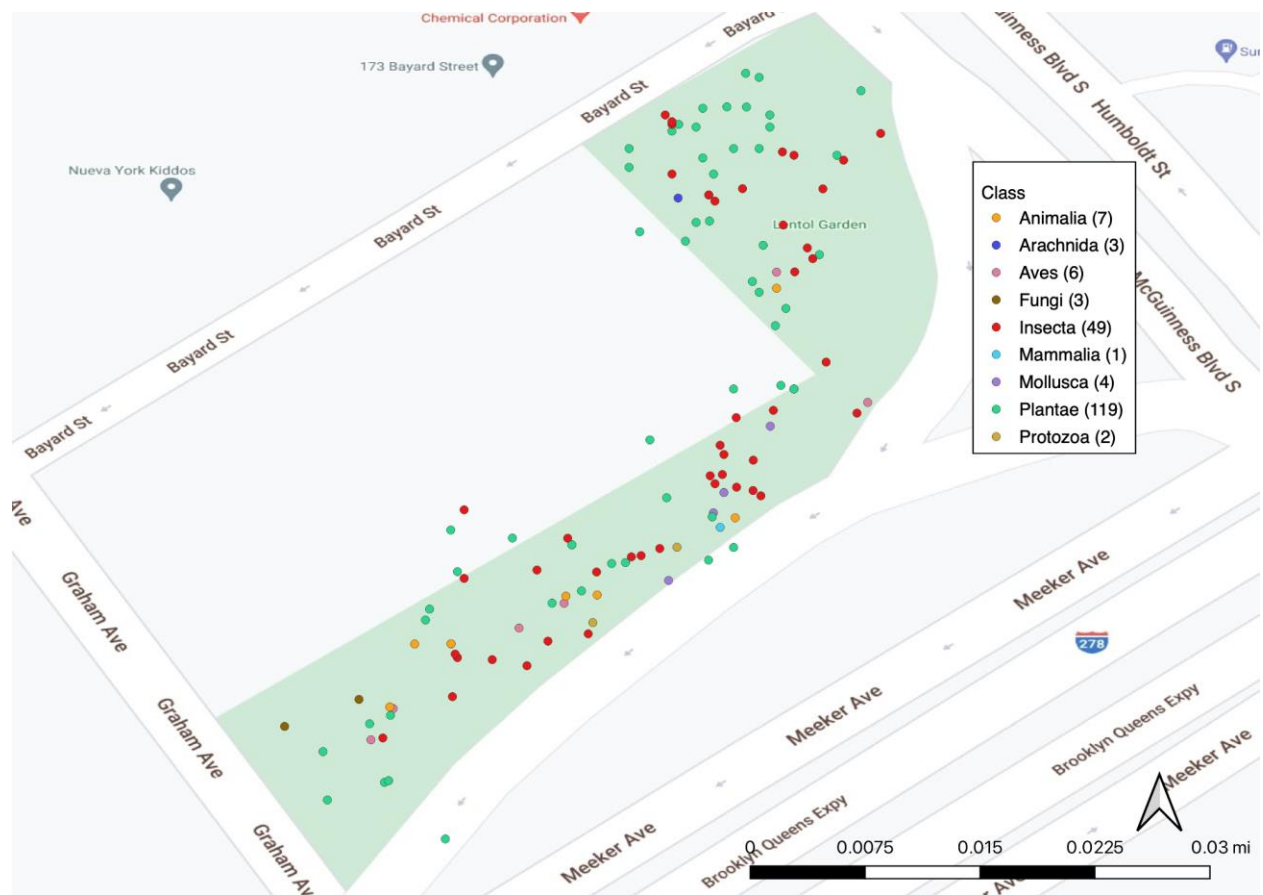


Figure 4 shows the geolocation and taxonomic class of the flora and fauna observations made in iNaturalist in Lentol Garden. This figure illustrates the variety and types of observations that were recorded throughout the entire garden from 2016 to July 2022. Plants and insects were recorded more frequently by visitors and program participants, which reflects the project’s focus on native plants and pollinators.

The [Bees Alive! iNaturalist](#) project continues to be a repository of information for visitors, educators, and researchers. As noted by Bonney et al, (2009) developing and implementing public data-collection projects that yield both scientific and educational outcomes requires significant effort. Our focus on environmental literacy was coupled with an effort to attain ecological outcomes.

PARTNERSHIPS

Bees Alive! created a network of partners whose expertise contributed to the development of the project. As Krasny and Tidball (2012) have noted “...forming partnerships with scientists, non-profits, and government helps to ensure larger impacts and longer-term sustainability of these

community driven efforts”. The interdisciplinary nature of the *Bees Alive!* program and the expertise of each of our carefully selected partners provided a robust framework which enabled us to reach learners of all ages by employing diverse educational techniques to facilitate civic ecology and stewardship. These partners included but were not limited to; Queens Botanical Garden, NYC Audubon, National Wildlife Federation, The Natural Areas Conservancy, and P.S. 110 (The Monitor School of Brooklyn).

Queens Botanical Garden provided expertise on botany, native plants, wildlife gardens, and beekeeping. They provided teacher workshops at their site, field trips for school groups and public talks in Lentol Garden. *New York City Audubon* offered their expertise on pollinators, citizen science, and wildlife monitoring. They trained the *Bees Alive!* staff, offered teacher workshops, provided public talks and workshops, and facilitated field trips focused on pollinators.

The *National Wildlife Federation* built pollinator gardens in two schools (PS 31 and PS 34) in Greenpoint and used them as outdoor classroom resources for pollinator education and citizen science. The *Natural Areas Conservancy* grew native plants specifically for our gardens in their Native Plant Center in Staten Island, and provided advice in the planning and maintenance of the pollinator garden in Lentol Garden. *Public School 110* incorporated an eight-week module on pollinators created by NYU into their enrichment periods and expanded their schoolyard garden to include pollinator friendly plants.

Implementing civic ecology practices in a diverse urban area requires a strategy that includes various stakeholders in the community. Collectively, they formed concentric circles of practice engaging people of all ages in stewardship and education. By partnering with cultural institutions, local schools, non-profit organizations, and community science organizations, we increased our capacity to create a robust environmental literacy program. This ultimately provided a variety of entry points not only for the residents of Greenpoint, but the larger urban community of New York City as well.

COMMUNITY BUILDING

Our environmental education strategies were critical in further developing communities of learning and collaboration. Eventually all stakeholders and partners felt a sense of connection to Lentol Garden thereby building a complex configuration of interrelated communities. Environmental Education provided the overarching theme that connected all of our civic ecology efforts from K-12 schools to university-level teaching and learning.

K-12 Community

The National Wildlife Federation partnered with us to develop two nearby pocket schoolyard habitats similar to what was planted in Lentol Garden. These smaller schoolyard gardens provided elementary school children with easy access to plants and pollinators but also created a network of gardens within a one-mile radius that enriched the local biodiversity. Cities are complex ecosystems and research has shown that they can support unique communities of organisms including bees through the creation of urban green spaces (Ayers and Rehan 2021).

P.S. 110 collaborated with the *Bees Alive!* Project to develop an enrichment class that focused entirely on curriculum about native plants, pollinators, habitats and civic ecology. In 2019, we piloted the module two times and brought it to life in an elementary classroom setting working with a total of 60 elementary students and their teacher. This interdisciplinary module is now online and accessible to all at the [NYU Wallerstein Collaborative For Urban Environmental Education & Sustainability website](#). During Covid-19, the *Bees Alive!* staff worked with parents to provide out-of-school learning in the garden and to design outdoor learning spaces in their schoolyard to allow students to learn outside for some portion of the day.

The *Bees Alive!* Project also supported 25 school field trips to Lentol Garden, Queens Botanical Garden and the Kingsland Wildflowers Green Roof. These field trips enabled students to observe local flora and fauna across the city to understand the interconnectedness of urban ecosystems and participate in a variety of stewardship activities that foster a sense of place (figure 5).

Additionally, over 65 high school students from Brooklyn Technical High School earned service credit required of the NYC DOE for graduation by volunteering in Lentol Garden on the weekends assisting with planting, invasive plant removal, mulching and garden maintenance.

Figure 5: School field trip to Lentol Garden.



Professional Learning for Teachers and Environmental Educators

In an effort to increase environmental literacy in urban areas it is important that educators view cities as classrooms (Leou and Kalaitzidakis 2017) and learn to use outdoor settings as educational resources. It is vital that educators be given opportunities to gain experience in environmental concepts they may not have been exposed to.

Working with partners, the *Bees Alive!* team developed four professional learning sessions for teachers in varied settings (figure 6): Kingsland Wildflower Green Roof, Queens Botanical Garden, Lentol Garden and one virtual workshop which featured our *Bees Alive!* Curriculum Module. The workshops focused on content knowledge and the importance of integrating field experiences with classroom learning. These workshops were open to K-12 teachers enabling us to expand our reach to more teachers and their students across the city.

Figure 6: Professional Learning Workshop at Queens Botanical Garden.



Throughout this project, NYU Environmental Conservation Education graduate students and faculty from the Department of Teaching and Learning participated in monitoring, stewardship, and educational activities (figure 7). They developed outdoor education materials and helped design and implement professional development sessions for teachers and non-formal educators. *Bees Alive!* provided opportunities for internships and summer employment so that graduate students acquired real-world work experience. During Covid-19 we rapidly switched to virtual programming providing workshops for teachers and school groups via zoom.

Figure 7: *Bees Alive!* Virtual Workshop for Educators



Community of Stewards

The *Bees Alive!* project enabled us to create a community of diverse stewards (figure 8). By hosting community days with our partners, we enabled people to develop a connection to Lentol Garden as regular visitors who cared for the space in multiple ways. Local residents and families that visited the garden frequently came to feel connected with the land and find solace in a local green space. The repeated visits to the garden helped many residents develop a sense of responsibility and place attachment which has been shown to potentially contribute to pro-environmental behaviors (Kudryavstev et al 2012).

Every participant contributed to the community we developed within Lentol Garden and *Bees Alive!*, whether through sharing content, monitoring wildlife, or coming by on a Sunday morning to plant in the garden. Individuals felt connected to the place they lived in and learned about it through stewardship. The work was rooted in civic ecology practices and focused equally on the ecological value and the social benefits to the community.

Figure 8: *Bees Alive!* Community Day.



LESSONS LEARNED

Bees Alive! provided us with a rich opportunity to explore the intersectionality of community gardens and civic ecology. Some of the lessons learned include the following:

Foster Connections between Stakeholders and the Community

In order to complete a project with an interdisciplinary focus, building rapport with those involved is key. It is important to develop a level of trust through participation and communication with stakeholders that are also caring for the space. Additionally, the work can gain a level of depth and breadth through partners from cultural institutions, schools, non-profit organizations and other experts from the community.

Think Broadly About Collaboration

Being flexible and open to collaboration with diverse groups in the community can yield great results. Allowing for people of all ages to actively participate can encourage the development of a powerful intergenerational learning community. Local teachers can be strong advocates for

outdoor education and can provide support through field trips, after school programs, and outreach to families. By providing culturally responsive activities to promote civic ecology, the broader local community can participate in a variety of ways.

Build Sustainable Programs

When engaging in civic ecology initiatives one must consider ways to create long-term sustainable outcomes that go beyond the duration of any grant period. The planning and preparation of the land takes time at the beginning of the project but it supports a strong green infrastructure which will contribute in sustaining the space long term. In order to stay motivated it is valuable to think of the work in phases. This allows time to attain short term goals throughout the project and for success to be measured over time. Working in collaboration with others and being flexible can turn obstacles into opportunities. A sustainable program creates committed stewards and develops long term relationships with the land.

CONCLUSIONS

Bees Alive! was a three-year journey through habitat restoration, community building and environmental education grounded in civic ecology and place-based education theories. While we were met with numerous challenges including Covid-19 lock-downs, weather conditions, budget constraints, and numerous other unforeseeable obstacles, we felt the project attained and in some instances exceeded its targeted goals. We attribute this to the rich configuration of stakeholders and partners that we engaged along the way.

With the support of the community, the garden served as a habitat for pollinators and other wildlife and functioned as an outdoor classroom. This area has become a gathering space and green oasis where individuals meet their neighbors, become aware of the garden, and contribute to protecting local habitats to support native flora and fauna.

APPENDIX A**Bees Alive! Native Plant List introduced into Lentol Garden**

Latin Name	Common Name	Quantity
<i>Aronia arbutifolia</i>	Red Chokeberry	3
<i>Aronia melanocarpa</i>	Black Chokeberry	4
<i>Cornus amomum</i>	Silky Dogwood	4
<i>Gaylussacia baccata</i>	Black Huckleberry	4
<i>Morella pensylvanica</i>	Bayberry	7
<i>Ilex glabra</i>	Inkberry	9
<i>Athyrium filix-femina</i>	Lady Fern	230
<i>Carex pensylvanica</i>	Pennsylvania sedge	80
<i>Carex rosea</i>	Curly wood sedge	90
<i>Dryopteris marginalis</i>	Marginal Shield Fern	25
<i>Eurybia divaricatus</i>	White Wood Aster	120
<i>Heuchera americana</i>	Coral Bells	20
<i>Penstemon digitalis</i>	Foxglove beardtongue	60
<i>Polystichum acrostichoides</i>	Christmas Fern	37
<i>Andropogon virginicus</i>	Broomsedge	8
<i>Antennaria plataginifolia</i>	Pussytoes	30
<i>Asclepias syriaca</i>	Common milkweed	10
<i>Baptisia tinctoria</i>	Wild indigo	25
<i>Eupatorium hyssopifolium</i>	Hyssop	30
<i>Fragaria virginiana</i>	Virginia Strawberry	30
<i>Geranium maculatum</i>	Wild Geranium	104
<i>Monarda fistulosa</i>	Wild Bergamot	50
<i>Opuntia humifusa</i>	Eastern Prickly Pear	5
<i>Panicum virgatum</i>	Switchgrass	90
<i>Pycnanthemum incanum</i>	Hoary Mountain Mint	50
<i>Pycnanthemum tenuifolium</i>	Mountain Mint	30
<i>Rudbeckia hirta</i>	Black-eyed Susan	50
<i>Schizachyrium scoparium</i>	Little Bluestem	250
<i>Silene stellata</i>	Starry Champion	40
<i>Solidago caesia</i>	Blue Stemmed Goldenrod	125
<i>Solidago sempervirens</i>	Seaside Goldenrod	25
<i>Sorghastrum nutans</i>	Indian Grass	6
<i>Symphyotrichum laeve</i>	Smooth Aster	30
<i>Chelone glabra</i>	White Turtlehead	8

<i>Corylus americana</i>	American Hazelnut	2
<i>Phlox divaricata</i>	Wild Blue Phlox	50
<i>Mertensia Virginca</i>	Virginia Bluebell	30
<i>Trillium erectum</i>	Red Trillium	12
<i>Hamamelis virginiana</i>	American witch-hazel	1
<i>Chrysogonum virginianum</i>	Green & Golds	50
<i>Heliopsis helianthoides</i>	False Sunflower	32
<i>Heuchera (Dale's Strain)</i>	Dale's Strain	64
<i>Packera aurea</i>	Golden Ragwort	50
<i>Tiarella cordifolia</i>	Heartleaf Foamflower	32

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