Outcomes Monitoring within Civic Ecology Practices in the NYC Region

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A test plot of mobile planting bags at Feedback Farms in Brooklyn; summer 2012
(Photo credit: Feedback Farms, 2012)

Acknowledgements

Introduction

City dwellers throughout the United States are engaged in a variety of place-based environmental stewardship, advocacy, and management activities (United States Forest Service, n.d.). A subset of these, civic ecology practices, are aimed at enhancing or improving both the social well being of urban communities and the function of local urban environmental systems. Examples include community gardening, street tree stewardship, urban waterway restoration, and public park maintenance (Krasny & Tidball (2012), all of which involve laypeople in a form of urban ecosystem management.

Though Krasny and Tidball (2012) propose that civic ecology practices result in positive social and environmental outcomes, few practices actually measure or monitor the impacts of their work. However, during the summer of 2012, I identified a small number of practices engaged in outcomes monitoring in the New York City region. Learning about how these groups measured their impacts may shed light on both hurdles and opportunities for outcomes monitoring within a wider swath of civic ecology practices. Thus, this report looks at outcomes monitoring initiatives underway at six non-profit organizations working in and around New York City and explores the following three questions: 1) How are practitioners monitoring the outcomes of their work? 2) What are practitioners learning as a result of their monitoring efforts? 3) What barriers and opportunities are likely to exist for expanding and improving outcomes monitoring initatives amongst civic ecology practices?

The report begins with a brief research methods section followed by case studies of outcomes monitoring initiatives related to six different civic ecology practices. A discussion section examines what these cases tell us about how practitioners are monitoring the outcomes of their work, what they are learning as a result, and some issues for moving forward.

Research Methods

The following research methods section describes the sampling and data collection methods used for this project. In New York City alone, Svendsen and Campbell (2008) identify more than 2,000 organizations engaged in various forms of environmental stewardship. These organizations vary broadly in size and capacity and include governmental agencies, non-profit groups, and informal associations. This report focuses on a smaller sample of community-based environmental organizations in the NYC metropolitan region that align with the "civic ecology practice" concept outlined by Krasny and Tidball (2012). We further circumscribed the sample to focus on cases of civic ecology practice engaged in outcomes monitoring for the purpose of environmental management.

Solbé (2005) distinguishes between monitoring and surveillance as two different strategies for collecting data on environmental phenomena. Surveillance involves collecting data for recreational, educational, or advocacy purposes, and may be typified by the statement, "X happened." Monitoring, on the other hand, has to do with tracking changes in a place or a

process in order to evaluate the successes and failures of a particular approach to environmental management. Monitoring takes surveillance one step further, and tries to answer the question, "Did X outcome happen because we did Y activity?"

Many grassroots environmental groups in New York City are engaged in some form of environmental surveillance. Some collect data on air quality near schools or public housing to advocate for more stringent pollution regulations ("HabitatMap - About Us," n.d.). Others collect data on water quality near sewage outfalls to press city managers for investments in stormwater management (Silva, 2012). Despite the preponderance of surveillance activities, few organizations seem to be involved in monitoring the outcomes of their own efforts at managing urban ecosystems. As a result, the number of cases relevant to this study were few, and our sample size was therefore limited to six.

During the summer of 2012, I interviewed leaders from these six community-based environmental organizations in and around New York City engaged in monitoring the outcomes of their work. I located and gained access to these organizations through on my own knowledge of civic ecology initiatives in the region, drawing on my experience as an environmental advocate, educator, and civic ecology practitioner in New York City since the mid-2000's. The individuals I interviewed were leaders within their organizations and well positioned to discuss their initiatives (Table 1).

Table 1: Case Study Summary		
Organization	**Civic Ecology Practice**	**Monitoring Efforts**
East New York Farms [Brooklyn, NY]	urban gardening	weighing garden produce and tracking market sales
Feedback Farms [Brooklyn, NY]	urban gardening	tracking garden productivity
Gowanus Canal Conservancy [Brooklyn, NY]	tree planting and bio-swale construction	tracking # of volunteers participating in events
New Jersey Tree Foundation [Camden & Newark NJ]	tree planting	inventorying trees planted and estimating ecosystem services using iTree
Compost for Brooklyn [Brooklyn, NY]	compost production	tracking weight of compostables and household composting
Bronx River Alliance [Bronx, NY]	invasive plant removal	tracking invasive plant species re-growth after removal

In the case descriptions that follow, I allow the participants' words speak for themselves as much as possible. All quotes and statements of fact are attributable to individuals holding leadership positions within each organization. Each case description includes a brief introduction to the organization and the site where its civic ecology practices are taking place. For each caes, a description of relevant outcomes monitoring efforts is followed by a brief look at how monitoring changes or informs each group's practices.

Case 1: East New York Farms!

An Overview of East New York Farms!

United Community Centers ("UCC") is a locally-based non-governmental organization that provides residents of East New York with support services that range from child care to immigration and naturalization assitance. In 2000, UCC initiated a community asset mapping process that led to the creation of one of its most popular programs: "East New York Farms!" Building on a budding network of community gardens in East New York, the new program aimed to help residents create new gardens, improve existing gardens, and leverage all of the area's community gardens for economic development and informal youth education.

East New York Farms! directly manages two gardens: the "Hands and Heart" garden, founded in 2006, and the "UCC Youth Farm," started in 2000. Local residents—in particular, school-age youth—play a significant role in both gardens, though UCC staff are ultimately responsible for overall operations. East New York Farms! staff also provide technical assistance to a network of approximately twelve gardens in the area, each owned and operated by a variety of government agencies, land trusts, and unincorporated stewardship groups. The organization runs two farmer's markets in East New York with significant operational support from local residents. The markets give gardeners a venue to sell produce grown in the area's gardens alongside produce procured from rural farms throughout the region.

Outcomes Monitoring Efforts

Since founding the UCC Youth Farm more than a decade ago, staff at East New York Farms! have worked with young gardeners to track productivity in two ways: 1) weighing produce grown on-site; and 2) recording produce sales at a weekly greenmarket. Participants tracked produce weights using a simple kitchen scale and a physical Harvest Log Book. In recent years, East New York Farms! staff collected both data streams into a Microsoft Excel file, but struggled to keep up with data entry throughout the course of the growing season.

"Everybody, to some degree" played a role in tracking data on both sales and productivity. In order to ensure data quality, UCC staff trained participants at UCC Youth Farm to accurately fill out receipts at the market and weigh produce during harvest. "I oversee just how everything is put together and that it's being recorded. But whoever happens to be working at the market or at the farm all day with the youth also plays a role in making sure that data is recorded."

UCC staff developed both of the data tracking methods with little advice or input from outside organizations. "Over the years, we have just looked at other organizations and how they do it. Mostly we've just had to develop what works best for a program of our size and we're recording the information that's most important to us."

In 2010, UCC started working with gardeners in their network to track garden-by-garden "harvest counts" and "crop counts, " using protocols developed by Farming Concrete, an initiative to collect data on food production in gardens across New York City's five boroughs. The crop counts were an inventory of the number of vegetable- or fruit-bearing plants grown each season in a particular garden or garden plot. The harvest counts tracked the weight of fruits and vegetables harvested from the same plants during the course of the full season. UCC staff amended standard data collection worksheets provided by Farming Concrete "based on what we've seen works best."

> *[We are] tracking how much gardeners are planting and then tracking how much they are producing on their plots. Before that we've always tracked what gardeners are selling at the farmer's market, so that gave us a sense of how much they were selling and of what they were growing, but since there's a range of participation in the market, we wanted to get a better picture of who's growing what. Not everything that is grown goes to the market, but there's still an important value that people are growing healthy food and taking it home or giving it away and its being distributed through other channels besides the market.*

Consistency in data collection was a challenge. "The goal is to try to get ten people doing consistent harvest counts throughout the year and at least ten more doing crop counts of what they've planted, if not what they've harvested." It has been fairly easy for staff to manage data collection at the UCC Youth Farm, where young gardeners were regularly supervised, but data quality continues to be a challenge.

> *Sometimes consistency and accuracy can be somewhat challenging when you're working with teenagers Just making sure that their math is right or that they're using the same units every time. So that's somewhat of a challenge. When we're aggregating all the data we try to do our best to interpret what they've recorded.*

Community gardeners proved to be somewhat less reliable in their data collection habits than young people working at the UCC Youth Farm. East New York Farms! staff conjectured that gardeners may not be sufficiently motivated to take the extra step of measuring harvested produce or logging the number of plants they've grown each season.

In terms of working with the gardeners it's been a little more challenging. Most of them are doing this as a hobby or a side project. It's not their – even though some are making money at the farmer's market – it's not the primary profession for any of them, so they don't... Asking them to add one more thing to their routine is going to be challenging because they're already often overtaxed as it is. We're just happy to get the produce to the market and out to the public. We also know that to be able to justify our work to funders and to other people, to the government, we need to be able to record those numbers.

What Did They Learn?
Revenue data collected in the form of sales receipts at the farmer's market has helped reshape some gardening practices and priorities at the UCC Youth Farm.

Doing the monitoring of sales production has helped us to cut down on produce that's unsold at the end of the day and it's also allowed us to pick out crops that are productive and popular and be able to recommend those to the network of gardeners that we work with—so they can start selling those as well.

Despite the time and energy devoted to data collection, there seemed to be some ambivalence about whether or not UCC's existing efforts were sufficient. On the one hand, the person I spoke to believed the most important data were captured in the sales receipts and the new crop and harvest counts. Yet, on the other hand, the same person expressed some interest in gaining more insight into the longer-term health and economic benefits that may be resulting from local gardening efforts.

I do feel like at this stage we're capturing most of the things or starting to come up with ways to capture most of the data that is important for us – at least in terms of the farm and production and its impact. I think there are impacts and outcomes of our work that are a lot more challenging to monitor that we would love to know more about, just in terms of what the overall economic impact of our work is. ... And certainly the health impacts of our work—on customers, gardeners, youth participants – I think that's a challenging thing to quantify.

East New York Farms! staff see two basic challenges in any effort to expand their data collection efforts. First, staff have limited time for partnerships with universities or outside researchers on more robust monitoring efforts. "Sometimes we're reluctant to try to partner with someone to do that kind of study because that's not the sole motivation behind our work." The second challenge has to do with the completeness or accuracy of the data that might come out of a more robust study.

I think we're cautious about looking for data or outcomes and then not having them be there and then having that confirm what skeptics might say – that projects like these are a waste of money because people are still getting more obese in East New York... It's a complex problem and we never claim to be the sole solution to that. Hopefully there are other things that we're trying to achieve with our work, in terms of building community and building the local economy and improving community engagement.

Case 2: Feedback Farms

An Overview of Feedback Farms

Boerum Hill is one of a handful of neighborhoods that typify Brooklyn's economic resurgence during the first decade of the 20th century. After a prolonged period of decline, the neighborhood is now home to a burgeoning community of young professionals. Storefronts are occupied by thriving boutique businesses, and most empty lots were redeveloped into market-rate housing during the real-estate boom of the mid-2000's. However, a few lots remain unoccupied. One is home to Feedback Farms, an initiative launched in the spring of 2012 to experiment with mobile horticultural techniques on a tenuously held patch of land.

Feedback Farms occupies an amalgamation of vacant lots that sit side-by-side on a mostly residential block. All three lots were identified as vacant and available for gardening by a [596 Acres](#), an initiative that publicizes the availability of empty lots in New York City and organizes community members to transform the land into community gardens. Feedback Farms "got involved with 596 Acres, and a few of us were looking for space for a variety of purposes—a garden, a model of urban agriculture. We came to work with two other groups, and ended up allocating out these lots between us."

Feedback Farms is an entirely volunteer-based initiative mostly comprised of neighborhood residents. The site's owner gave the group temporary access on the condition that they would vacate the lot at a moment's notice if a redevelopment opportunity presented itself. Instead of posing a challenge, the tenuous tenancy ended up aligning with the group's main goal: innovating and testing new approaches to modular, high-yield container gardening.

We're using these irrigated planters that are very productive and water efficient, and they are really easy to build out. We are growing right now. This year was our pilot year and we just wanted to test out a bunch of different stuff to see what would grow in these irrigated planters and see what there would be a market for. We want to have a small stand on the site and have good outreach with the community. People come by this lot often. It's right on a bike path. We are growing a whole bunch of different things—15 to 20 different kinds of greens, lettuces, chards, ten varieties of heirloom tomatoes, ten varieties of peppers, cucumbers, herbs. It's very much a pilot for us.

Outcomes Monitoring Efforts

For the members of Feedback Farms, outcomes monitoring is closely tied to their horticultural work on the vacant lots. At Feedback Farm, crop yields are closely studied in order to determine which container gardening practices yield the best results. The group planted control plots and even developed extensive research plans, including testable hypotheses, that have been posted to their website. Every group member plays a role in both gardening and tracking data.

> *This year, we're testing out all these containers, what crops grow in these containers, seeing what is, ideally, a network of these different lots. So we're trying to think about what's more efficient to manage. Our initial sentence is 'Our goal is to develop a viable model for production farming in New York City.' In order to do that we've come up with the mobile model and the sub-irrigation planters and the research is to go into that system... Our hypothesis is, essentially, that our method is a viable model for urban farming.*

The Feedback Farm lots were in essence, horticultural labs. Members of the group built "five variations on raised beds, including a couple of variations on these sub-irrigated planters and then a more conventional raised bed design." For each crop planted in the beds, the group documented the "the kind of care the plants got, the maintenance they've received, whatever water we've added, and then, ultimately, the harvest." Part of the maintenance record-keeping involved an assessment of the quality or intensity of labor involved in caring for the plants.

> *We are monitoring and recording every time we are watering and we can take that information and decide how many times we had to water each kind of bed. We have a photo being taken every hour of these plots. Already in its first month and a half it is obvious how growth is going on in different beds. Some beds, consistently, the tomatoes are two or three times larger than those in other beds. The same with the kale. Sometimes had almost no harvest, others had a lot.*

Group members tracked maintenance activity using a shared online spreadsheet. They hoped to find a combination of growing practices that ensured mobility for their raised planting beds, minimized labor, and maximized output. Harvested crops were tracked using a methodology adapted from Farming Concrete, which essentially tracked the weight of all fruits and vegetables grown at a site during a growing season. Aside from its involvement with 596 Acres and its adapted use of the Farming Concrete method for harvest monitoring, the group had no formal interaction with professional researchers.

Initially, some members of Feedback Farm hoped to develop and install remote sensing technologies to track more fine-grain data for factors like temperature, soil moisture, and access to sunlight for each plant.

We've only done that on a small scale, so we've left it out of the research trial... We want to develop affordable sensors. That will be really important when we have multiple lots, as opposed to just this single one... A lot of farms can't do this kind of research because they can't afford a six hundred dollar sensor. So we have this really strong software development background on the team and they are playing with different low-cost sensors and different open source packages to code those, and we'll invest in a few to do some comparisons at some point.

Limited access to labor, space, and time were challenges for both growing and tracking outcomes. The size of the lot also constrained the number and variety of test plots the group could build out at once. "Labor is an issue – just the fact that we don't have someone working on this full time and have other obligations has been difficult. After this season, we'll have the time to evaluate it and apply for some grants to alleviate those issues."

What Did They Learn?
Since Feedback Farm had only been in operation for half a growing season when I conducted my interview, there had been few opportunities to change growing practices on the basis of insights garnered through outcomes monitoring efforts. However, the group did feel as if it had gained some insights into the monitoring process itself, mostly as a result of trial-and-error in the process of developing its research protocols.

We've learned that we really have to simplify the things that we wanted to monitor. We have a lot of questions about changes in yield based on management, biodiversity, contaminants in the water, etc. Maybe we'll be able to add little pieces back in, but in terms of what we really had the capacity to monitor rigorously across the site this year, we really had to focus our questions. We had to identify what was the most important question for us in our first season and then figure out how to address that. Then we had to drop the other very important questions—for now.

Case 3: Gowanus Canal Conservancy
An Overview of the Gowanus Canal
The Gowanus Canal is a 1.8-mile-long waterway that served as the transportation armature for one of Brooklyn's most active industrial districts in the late 19th and early 20th centuries. Following New York City's gradual de-industrialization during the 1950's and '60's, the area surrounding the canal grew desolate and abandoned. Large factories were left unoccupied or were transformed into truck depots and low-rent warehouses. After more than a century of unregulated industrial emissions and due to a peculiarity in the waterway's tidal flow, the Gowanus Canal was widely considered an irredeemably polluted eyesore.

Brooklyn's economic resurgence during the first decade of the twentieth century brought a mix of artists, small-businesses, and creative entrepreneurs to the large brick buildings surrounding the canal. Cheap rent and large floor spaces allowed for a diversity of uses, and the neighborhood took on a scrappy, bohemian identity. Within a few short years, growing property values in the surrounding neighborhoods of Park Slope, Cobble Hill, and Carroll Gardens led to increasing speculation that the area around the canal would soon see its own period of real estate redevelopment. However, the canal itself posed a significant challenge. Polluted by a mix of past industrial effluents and ongoing combined sewage overflows, its remediation would be no easy feat. In early 2010, the canal and its surrounding properties were designated a Superfund site by the US Environmental Protection Agency, and the process of documenting contamination and ongoing sources of pollution continues to this day.

An Overview of the Gowanus Canal Conservancy
The Gowanus Canal Conservancy was formed by a board of local volunteers in 2006 as an outgrowth of the area's community development corporation. The organization aimed to manage the Gowanus Canal as a natural resource, working to improve the environmental function of its watershed through direct interventions like tree planting, bioswale installation, trash clean-ups, and other, mostly horticulturally-themed activities. In 2012, the organization had one full-time staff member and a rotating crew of interns that spearheaded new projects with volunteers.

Most of the organization's environmental restoration projects were managed through its Clean and Green Program, an ongoing offering of public events geared toward informal volunteers. Activities that fall under the Clean and Green heading were varied, and included invasive plant removal, street tree stewardship, garden planting, trash removal, installation of bird and bat houses, and occasional public art projects.

> "The main goal is to actually implement environmental change and to try to make the watershed of the Gowanus Canal more resilient and more sustainable. The secondary goal is to provide public engagement—get people involved in making changes to their local watershed... Anything where we engage volunteers to build or provide stewardship and maintenance for environmental projects we consider part of that program. Most of the activities take place once a month on a set scheduled date, which is open to the public for participation."

The Conservancy also managed a Community Composting program, which used windrows on an open lot along the banks of the canal to process approximately 7,000 to 8,000 pounds of food waste each month. The resulting compost was used to amend the soil in gardens and street tree beds installed by the Conservancy. The Conservancy was also in the process of installing six engineered bioswales along four block-length streets near the canal. The bioswales were designed to capture stormwater runoff from the streets in an effort to reduce water volume in the area's sewage system and prevent combined sewage overflows into the canal.

Outcomes Monitoring Efforts

The Conservancy was limited in its capacity to monitor the outcomes of its Clean and Green program. To date, the group had only succeeded in tracking the number of volunteers participating in Clean and Green events and the number of hours each volunteer spent on-site. The volunteer numbers were logged in an Excel spreadsheet in a staff computer.

> *When we do something like install street trees, [we] don't have a database or anything like that, but we keep track of them and whether or not they survived. Part of our grants obligate us to keep them alive, otherwise we have to replace them. But [we] haven't collected the data to do something with it... [We would] really like to study how much permeable surface we've created; how many trees we've installed; how many shrubs and perennials—and we aren't tracking that really.*

Outside of the Clean and Green program, the Conservancy was tracking the weight of all food waste that went into its composting operations and the weight of all the compost that had been produced.

The bioswale installation project featured the Conservancy's most focused effort at outcomes monitoring. The New York City Department of Environmental Protection funded the project through a competitive grant process that required a systematic outcomes monitoring protocol. The Conservancy teamed up with an independent environmental analyst based at Drexel University to fulfill the grant's monitoring requirements. Once the project was up and running (it had yet to begin at the time this research was conducted), the analyst would study "water quality inflow and outflow, water volume inflow and outflow, and soil contamination" at each bioswale installation. "He has his regiment pretty well figured out for that. DEP has certain parameters that have to be studied, and he's studying them."

The Conservancy would like to expand its outcomes monitoring efforts, both around the bioswale project and, more generally, for all of the activities that happen under the Clean and Green umbrella.

> "It would be really helpful for [us] to have some sort of seminar or course that could teach us about data collection... I would love to be given the fundamentals about monitoring and data collection for community stewardship projects. People who do this a lot or who have worked with effective organizations must know quite a bit or have ideas about ways you can collect data. I would want to be taught from the ground up what some of our capabilities are. And then, if we had researchers who could come and take a look at our program and help design some monitoring parameters, that would be awesome. Even in a for-profit sense, if a researcher wanted to come to our program and

think about possible grants we could co-write together to study our work, that would be interesting as well."

The three main barriers to expanding the organization's monitoring efforts were lack of staff time, lack of resources to pay for monitoring help, and "insufficient training in the scientific method and academic research."

What Did They Learn?
The organization had yet to change its practices as a result of the few monitoring efforts it had undertaken. Though ongoing analysis of the bioswale installations may render some useful insights, the research efforts were still under development. Despite the relative lack of outcomes monitoring, the organization's leadership saw benefits for data collection efforts in the future.

> *...[we] need to understand and quantify a lot more about what we're doing. Especially if we want to communicate whether we've been an effective organization or not. I have an idea that we create all these greening projects, but I have no way to tell someone what is the quantifiable impact of our work, other than generating a whole lot of community good will... The more grants [we] write, the more I know we have to defend what we do with numbers. It's going to really enhance our ability to raise money and continue to function and thrive.*

Case 4: New Jersey Tree Foundation

An Overview of New Jersey Tree Foundation
New Jersey Tree Foundation   was created in the late 1990's to expand tree canopy in the state's urban communities. Nearly fifteen years later, the organization planted more than 150,000 trees in direct partnership with community-based organizations, most of them in the cities of Camden and Newark. Both cities suffered the consequences of deindustrialization that began in the mid-20th century, and both were home to neighborhoods that struggled with poverty, crime, and a collection of environmental burdens that typically come with post-industrialization. Research suggests that street tree planting can help mitigate some of the challenges (Anderson & Cordell, 1988; Sander, Polasky, & Haight, 2010)

The Foundation   was staffed by an executive director, two program directors—one each for Newark and Camden —and an urban forestry technician. Both program directors worked closely with community based organizations to identify new opportunities to plant trees in Camden and Newark.

> *From the beginning we made sure the program was community based – meaning that we don't go in and say, 'We want to put trees on your block.' We might offer them to you, but you need to organize a planting with us... We are an application-based program.*

Someone from the neighborhood agrees to work with us typically for two to three months to do community outreach in their neighborhood... After we have ten signatures from [residents], after the applicant goes door-to-door with English and Spanish fliers, we go out to the neighborhood, meet with them and talk about the importance of trees, and we do a meeting where the community chooses its tree planting date.

To work with the Foundation , community groups needed to identify at least ten new planting sites and collectively commit to maintaining those trees for at least two years after they had been planted. The Foundation specified trees for each site with some community input, drawing on a list of urban street trees developed by the NJ Department of Environmental Protection. For each planting event, the Foundation applied for work permits, coordinated with public utilities to troubleshoot infrastructural constraints, and hired technicians to cut sidewalks and pavement to create new tree beds.

So the person who is adopting the tree in front of their home, they are strongly encouraged to be at the planting event and required to be at [a subsequent] community event. Most of the time they come to the planting event unless they're working or something. Typically they're on Saturdays. At each event, half of the volunteers will be from the neighborhood – kids, adults, even seniors help with sign-in tables or refreshments or collecting trash. We also recruit volunteers from the city as a whole and even from beyond the city... It's a nice diverse group working together to plant the trees.

After each tree planting event, the program directors hosted a series of tree care workshops with community members, covering basic tasks like watering, weeding, mulching, and pruning. "A lot of times people say that's one thing they enjoy after the planting—to see their neighbors out taking care of the trees It's a mechanism for them to get to meet one another and take a little pride in the neighborhood."

The organization's post-planting training events were spun off into a separate program they known as Tree Keepers, hosted once each summer for residents of neighborhoods where trees had recently been planted. The program was typically capped at about 25 participants. "We recommend that one person from every block we work on go through Tree Keeper training this way, if there are any issues at all, they have a basic understanding of the issues they might face with their trees."

In Camden, the Foundation aimed to plant enough trees to bring canopy cover up to 25 percent of the city's surface area. According to the individual I interviewed, tree canopy only covered five percent of the city, based on an assessment done using aerial imagery. Similarly, the group planned to grow Newark's canopy cover from its current 7.8 percent of surface area.

Outcomes Monitoring

The Foundation   tried to regularly inventory all of the trees it planted in both Newark and Camden. Their aim was an accurate and up-to-date snapshot of mortality rates for newly planted trees. "Typically we do it once a year post-planting, and every three years afterward... Sometimes we don't get to fully inventory them every three years." The inventories revealed a 95-percent survival rate for trees planted in both cities, and staff at the Foundation   believed local stewardship was responsible for keeping so many of the newly planted trees alive.

In 2008, the Foundation   started using iTree software to assess the environmental benefits of all the trees it had planted with residents of Camden. [iTree](#) is a peer-reviewed tree inventory assessment software developed by the US Forest Service to quantify the value of ecosystem services provided by urban forests. "We do like that iTree can help to quantify the benefits that trees bring to the city. We did our first in 2008 with 3,000 trees throughout Camden. We've planted 1,500 trees since, which are also on the software. We just need to work on doing the inventory again, because we really should be doing it every three to five years."

Foundation   staff created the Camden inventories with help from Americorps volunteers. In Newark, the Foundation   was branching out to work with neighborhood-based volunteers to create the city's first inventory of newly-planted trees. Participants in the 2012 Tree Keeper training program were taught to collect data on tree species and diameter at breast height that could be fed into iTree for analysis.

The Foundation   did all of the inventory work on its own, with no input or guidance from an independent researcher.

> *It's been an in-house effort. I don't think we'd be closed off to partnering with research groups. I think the thing is, we're a small non-profit. We only have four full-time salaried employees and each of us is responsible for organizing and coordinating the programs. It seems almost intimidating to work with a research group because it feels like it would take up a lot of my time. In our current capacity we have—if I have a grant with a Foundation   for $50,000, those are my priorities. If they want certain outcomes but the current way we measure our success meets that, it's hard for us to justify [hiring] someone to do the research... I think that's the most difficult part for us—just capacity and a lack of education of not quite knowing how long it would take to do that, how much time it would take up from the employees...*

What Did They Learn?

The Foundation employee I interviewed shared many lessons learned during years of experience working with neighborhoods in Camden and Newark. The low mortality rates observed in both cities suggested that both tree species selection and stewardship efforts had, to date, been successful. However, as other places look to adapt their tree inventories to anticipate the impacts

of global climate change (Kaufman, 2011), the Foundation may also find that its exiting list of approved species will need to be revisted in the years ahead. Though the Foundation seemed interested in taking its monitoring efforts further, staff remained concerned about the amount of time and financial resources such efforts would demand.

Case 5: Compost for Brooklyn
An Overview of Compost for Brooklyn

Compost for Brooklyn was launched in early 2010 as an effort to create a compost drop-off and production site at an empty lot in the Kensington neighborhood of Brooklyn. As one of Brooklyn's oldest residential communities with a history of settlement that dates back to the Dutch colonial period, Kensington is characterized by the ethnic diversity of its residents and the eclectic assortment of its housing stock (Mooney, 2008). High-density apartment complexes abut single-family homes throughout the square-mile neighborhood. The Compost for Brooklyn site was centrally located for most Kensington residents, one block from Ocean Avenue (a multi-lane boulevard with heavy vehicular traffic) and four blocks from Cortelyou Road (the neighborhood's main pedestrian shopping district).

Up until the organization was founded, the Compost for Brooklyn lot was an informal neighborhood dump. "I would see neighbors from just a couple blocks away drive around the block and dump garbage in the lot. So it was full of furniture and demolition debris and it was disgusting." Over the course of two years, volunteers—the organization does not have paid staff—transformed the lot into a composting operation ensconced within an ornamental garden.

> *The reason we didn't grow food was because we felt like, in community gardens, we didn't want there to be an ownership issue—like who owns the food and who gets to eat the food and who cultivates and all that. And, also, because we wanted it to beautiful all year round. That's really our big goal. The compost site works all year round. So we wanted a garden that would have some kind of aesthetic throughout the year. We wanted it to be low maintenance and work on rainwater and improve the general health of our city.*

The organization's composting efforts grew quickly during its two years of operation. The organization's core group of fifteen volunteers took turns staffing drop-off hours, when the garden was open for accepting kitchen scraps from local residents. An auxiliary group of another fifteen volunteers helped with general gardening tasks. "In the first year we just had these compost bins that were made out of pallets that we found on the side of the street."

> *The next year the garden was a little more established and we had people stopping by and saying, 'Oh my goodness, how did you grow these incredible plants? How is the garden so healthy and beautiful?' …You can have as many signs about why composting*

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is important but what's really going to speak to people is just plants. And so the plants, for us, were like a billboard that said, 'You should be composting here.' We're making sure that the soil the plants are growing in looks very rich and beautiful. That was the immediate connection. When that happened, the number of drop-offs were getting extended pretty dramatically.

Outcomes Monitoring

According to the [Compost for Brooklyn website](#), the organization processed more than 8,600 pounds of kitchen scraps into compost during the summer of 2011. The waste came from local residents, schools, and businesses. Most of the compost that came out of the group's efforts was used to amend the soil in local gardens and street tree beds. A small portion was reserved for volunteers to use in their own private gardens.

The group's outcomes monitoring efforts were straightforward. Volunteers tracked the number of households that dropped off scraps and the weight of each drop-off. They also tried to keep a count of all the people who simply stopped by the garden for a visit, but not necessarily to contribute to the compost pile. "[Shift leaders] have a piece of paper in the garden where they're just taking down numbers. They're weighing with a regular bathroom scale on the sidewalk. They take all of the total: the total visitors, the total drop-offs, and the total weight and they generally email it to … our volunteer coordinator, and then he logs it into a Google Doc."

The organization did not consistently track the weight of compostables classified as "browns"—materials like dried leaves or wood shavings from local carpentry shops that add carbon to the decomposition cycle and absorb water from the kitchen scraps. Compost for Brooklyn also struggled to measure the weight or the volume of compost it produced. "I get asked that question all the time. It's a really hard number to capture for us. We haven't gotten that down to a science yet."

The organization's monitoring efforts took some time to develop:

At the beginning we were just counting the number of drop-offs. We wanted to be able to say how many people were interacting with our services. The weight measure came in much later. We didn't have a scale. We couldn't afford it. Then, for the first six months we were taking weights we weren't actually weighing the browns coming in... We were just looking at food scraps. So we started sort of weighing browns, but it's not happening all the time. As we became more and more curious about what we were doing and more and more people got involved and developed an interest as shift leaders... I think what was really fun was to be able to put out a newsletter... People love being able to say 'Oh, this month, Compost for Brooklyn diverted 2,500 pounds.' And even though that number doesn't mean anything on its own—you have no idea what that means in terms of our city's waste issues—it feels like you're having an impact. We can say to shift leaders,

'Thanks to your work, you did X amount of pounds last month.' I think that's actually where the drive for data comes from—more to be able to reward people that were involved and keep people enthusiastic. Numbers really help with that.

What Did They Learn?
Compost for Brooklyn mainly used the data from its outcomes monitoring efforts to manage its volunteer shift schedule. "It helps us so much in picking open hours." The data also helped the group plan for expanded services in the community:

> *We have a [Community Supported Agriculture] group that composts with us, and it helps us know … how many more CSAs we can take, or how much we can lend our volunteers to help with that. We're also considering partnering with a group that's trying to start up a private compost collection service, house-to-house, and they want to compost the material at Compost for Brooklyn. The numbers help us [understand] how many hours of work does that translate into for them, because they're going to be required to do the processing work. So... it helps a lot in terms of being able to talk about partnerships; it helps a lot in terms of scheduling.*

The group had some ambitions to expand its outcomes monitoring efforts. Some of its members were interested in duplicating their community composting model in other parts of New York City, and more data about the impact of their efforts seemed necessary. To that end, the group seemed interested in partnering with outside researchers to support a wider set of outcomes monitoring efforts:

> *I think we definitely want to do more, just to figure out what the impact of the actual composting is. We know how much we're bringing in but we don't know a whole lot about the compost we're producing and how it's impacting the tree pits we're caring for... Those are all questions that I'd really love to look at that we have just no capacity right now or the means to do that... My immediate thing is that we don't have the money. But maybe that's why we need a partner that has the expertise to look at these things.*

Case 6: Bronx River Alliance
Overview of Bronx River Alliance
The Bronx River Alliance was founded in 2001 as an outgrowth of nearly thirty years of work on the part of local organizations to restore New York City's only freshwater river. More than a century of industrialization and urbanization had transformed the river into "a contaminated conduit for industrial and residential wastes" ("History - Bronx River Alliance," n.d.). Volunteers, working under the leadership of local organizations, removed trash and debris from the river and its shoreline. These small-scale efforts gradually coalesced into a plan for reclaiming the river as a linear park, or "greenway," stretching from the northern boundaries of

the city to the river's outlet in the South Bronx. The Bronx River Greenway, which has been under development since the early 2000's, is increasing the amount of recreational open space available to residents of communities that have historically been underserved by access to parks.

The board of the Bronx River Alliance is comprised of representatives from community-based organizations working along the full length of the river's path through the Bronx. The organization's executive staff works closely with the New York City Department of Parks and Recreation in guiding the development of the Bronx River Greenway and maintaining those portions of the Greenway that have already been built. One of the organization's priority projects involves ongoing efforts to replace invasive and non-native plant species along the river's shores with plants that are historically native to the area.

In 2012, Natural Resources Group, the ecological research and management division of the New York City Department of Parks and Recreation, published the *Bronx River Riparian Invasive Plant Management Plan* (*RIPMaP*) to support and guide the Bronx River Alliance and other local groups in their efforts to reintroduce native plants to the river corridor (Yau et al., 2012). The plan put forward two goals: 1) Improving conditions for native plants by reducing the spread of invasives; and 2) Increasing habitat diversity within the river's channel to provide refuge for fish (Yau et al. 2012). The plan offered best practices for removing invasive plants and for tracking progress in their permanent remval over time.

Though volunteers occasionally assisted Bronx River Alliance and other organizations in the process of removing invasive plants, most of the work was done by trained field crews employed by the Alliance and/or the NYC Department of Parks. According to the Bronx River Alliance staff person I interviewed, the field crew was typically made up of seven regular workers and three seasonal apprentices. Most of their invasive plant removal efforts happened between the months of April and October, when species identification was easier and plants were clearly visible on the terrain.

Outcomes Monitoring
The *RIPMaP* presented an approach to managing invasive plants along the Bronx River that was closely tied to outcomes monitoring and research. Every time a crew removed invasives at a particular site, a field manager tracked the work in an Excel spreadsheet. The organization recorded the type of work that was done, the kinds of plant species removed, and the removal location.

Over time, field crews monitored the effectiveness of their plant removal efforts. They tested different removal strategies at different sites and tracked their effectiveness in permanently removing invasive plants. Researchers will rely on the database of Excel spreadsheets to assess the cumulative impact of the removal efforts on a three-to-five year cycle, undertaking "rapid invasive plant assessments" to identify those sites where removal is less successful.

In order to manage the spatial dimensions of their outcomes monitoring efforts, Bronx River Alliance and the Parks Department's Natural Resources Group created a cartesian grid to demarcate removal sites along the length of the river. Each "cell" in the grid was given a number and letter coordinate, and managers tracked the location of individual plant removal efforts by noting their cell coordinate in the Excel spreadsheet. The staff person I interviewed expressed an interest in using more sophisticated tools, such as Geographic Positioning Systems, or GPS, to locate each removal activity. "Having a cool app that is kind of fun to use would really help—as opposed to filling out forms," I was told. "Something that is a little sexy and interesting to have on your phone. We tend to want a lot of information."

The Alliance's efforts to track all the invasive plant removal work that happened along the Bronx River was complicated by the fact that other groups, on occasion, mobilized volunteers to do their own invasive plant removal projects. Not all those efforts were successfully tracked, despite efforts to make the procedures put forward in the *RIPMaP* as simple and accessible as possible. As a result, some of the invasive plant removal work that occured along the Bronx River wasn't tracked and didn't contribute to the Natural Resource Group's efforts to find the most efficient methods to remove unwanted plants.

What Did They Learn?
The *RIPMaP* was published in January 2012 and its first implementation season was underway as the time this field research was conducted. However, Bronx River Alliance staff expected that the data collected using the methodologies put forward in the *RIPMaP* would help them identify more efficient and effective methods for permanently removing invasive plants. As field crews tested different methods and recordedthe re-colonization of invasive plants, over time,, they hoped to discover the methods that removed the most plants for the longest span of time using the least effort.

Discussion

Though only six organizations were included in this report, they stand out as some of the only instances of outcomes monitoring amongst civic ecology practices in the New York City region. We therefore look to them for insights into how practitioners currently engage in monitoring and the lessons these same practitioners learn from collecting data on the outcomes of their work. We also look to these cases for insights into both hurdles and opportunities for expanding outcomes monitoring amongst civic ecology practices. The following section summarizes findings drawn from the six cases that address these questions.

Feedback Farms is, in essence, an initiative aimed at developing and testing new methods for urban container gardening. Volunteers at Feedback Farms frame their gardening efforts as a scientific investigation, posting research protocols on their website and going so far as to plant

"control" plots to compare against other innovative ways of growing food crops. Similarly, Bronx River Alliance relies on an outcomes monitoring protocol to determine the merits of different invasive plant removal and management strategies. Over time, the strategies that demonstrate the greatest success with the least inputs of time and labor are likely to become standard practice for invasive plant removal along the Bronx River. At East New York Farms!, gardeners have used data on crop productivity and greenmarket sales to shape their horticultural practices from year to year. Compost for Brooklyn has made minimal use of the data it collects, focusing more on records of kitchen-waste drop-off times in order to schedule volunteer shifts than any data related to actual compost output. Similarly, New Jersey Tree Foundation relies less heavily on its outcomes monitoring efforts to guide their ongoing tree planting efforts, but may find more use for monitoring the viability of different tree species in the face of climate change. Finally, although Gowanus Canal Conservancy has a rigorious outcomes monitoring plan for measuring the efficacy of its stormwater management initiatives, it has yet to implement those protocols. More modest data collection efforts around the organization's compost program help with month-by-month planning for new windrow construction.

Representatives from all of the organizations expressed some interest in either expanding or improving their outcomes monitoring efforts. That said, most of the representatives I interviewed also expressed concerns about the extra work involved in improving or initiating robust monitoring initiatives—particularly the effort involved in partnering with a research scientist. Representatives of groups that rely heavily on volunteer labor, such as Compost for Brooklyn and Gowanus Canal Conservancy, expressed some of the greatest enthusiasm for outcomes monitoring, but also recognized that there would be challenges to engaging volunteers in partnerships with researchers.

Of the six groups included in this report, the representative from East New York Farms! expressed the least interest in expanding outcomes monitoring activities, citing two concerns: 1) the amount of staff time taken up by collaborative research projects; and 2) the risk that outcomes measures inaccurately reflect the breadth of community benefits generated by local gardening initiatives. Although the representative acknowledged that research projects create opportunities for organizational learning, she was concerned about funding related staff responsibilities.

Conclusion
Small organizations in and around New York City are actively trying to improve communities and ecosystems through civic ecology practices. However, few of these organizations are monitoring the outcomes of their work. Six groups practicing civic ecology in the region demonstrated a variety of approaches to monitoring the impacts their efforts. All six expressed an interest in expanding their outcomes monitoring efforts, and all six described staff time and capacity as barriers to moving forward. Given the small number of cases available for study,

future research in this area will rely on interventions that seek out and set up new opportunities for outcomes monitoring amongst civic ecology practices. Researchers seeking to stimulate new outcomes monitoring efforts amongst civic ecology practices may find that couching their work in terms of "action research" (Greenwood & Levin, 1998) may help make the inquiry more responsive and useful to participating practitioners.

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