



# Refuges of local resilience: Community gardens in post-Sandy New York City



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## ABSTRACT

Community gardens have historically played an important role in the social–ecological resilience of New York City (NYC). These public-access communal gardens not only support flora and fauna to enhance food security and ecosystem services, but also foster communities of practice which nurture the restorative and communal aspects of this civic ecology practice. After NYC communities were devastated by Hurricane Sandy in 2012, the topic of resilience has surfaced to the top of the city's disaster planning and policy agenda. This paper explores the role of community gardens in coastal “red zones” of NYC by analyzing the meaning and relevance of community garden spaces in the resilience and recovery of local residents and community garden members post-Sandy. From April 2013 to February 2014, ethnographic analyses, including participant observation, exploratory and in-depth interviews, and archival research, was undertaken at five community gardens post-Sandy. Our findings indicate that community gardens functioned as multi-purpose community refuges which hosted meaningful and restorative greening practices, and developed supportive communities. This paper seeks to add to our knowledge of post-disaster greening, public spaces, and social–ecological resilience.

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## Introduction

### Post-Sandy NYC context

Ever since Hurricane Sandy devastated NYC on October 29, 2012, the topic of resilience has been at the forefront of the city's disaster planning and policy response (PlaNYC, 2015). Sandy has been called a “superstorm” because of the many factors that contributed to its devastating strength and power. The storm's diameter of nearly 1000 miles created a large tidal surge (8.2'), which hit at the nexus of a high tide, a full moon, and slightly higher seas resulting in an average tidal surge of 14' in NYC (Blumberg, 2014). Because of this surge, Sandy was the deadliest storm in 40 years, with 72 deaths in the Northeast directly attributed to the storm, and is the second costliest storm in US history at more than \$50 billion (Blake et al., 2013). However, because Hurricane Sandy was mainly a water event as opposed to wind event, there were huge discrepancies in

types of damage to communities because of topography and their coastal proximity. New York has been described as two cities after Sandy, one with blackouts, covered in sand, and in crisis, and the other relatively unaffected and proceeding with a slower pace but business as usual (Paumgarten, 2012).

In surge-impacted areas, public community spaces such as community gardens played a role in supporting the recovery of the gardeners and the neighboring communities post-Sandy. This paper explores the role of community gardens in coastal “red zones” of NYC by analyzing the meaning and relevance of community garden spaces in the resilience and recovery of local residents and community garden members post-Sandy. Our research is guided by the following questions: how were community gardens impacted by Superstorm Sandy? What were the functions of community garden spaces post-Sandy? How do residents and community gardeners describe the meaning community gardening post-Sandy?

### Community gardens history

Community gardens are pieces of land collectively gardened by a group of people in which food and/or ornamental plants are

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cultivated (Holland, 2004). In the US, urban communal gardens have long been used as “supportive institutions” to buffer and create opportunities for coping during times of social, economic and environmental crises (Bassett, 1979: 2; Lawson, 2005). During World War I and World War II, Liberty Gardens and Victory Gardens were cultivated to increase the US food supply, combat malnutrition, and free domestic farm supplies to be used overseas in allied countries (von Hassell, 2002). In 1944, the 20 million Victory Gardens that had been planted in the United States produced 42% of the fresh vegetables in the country (Armstrong, 2000). In addition to food security and nutrition, community gardening also provided social benefits, such as psychological support and productive work, boosting morale during times of high unemployment and economic depression (Lawson, 2005, 2014).

Like other US cities, NYC experienced waves of support for communal garden projects over the past century. During the Great Depression, unemployed and impoverished NYC residents grew their own food in nearly 5000 gardens on 700 acres of city land through a Work Projects Administration (WPA) program (Hynes, 1996). Communal garden projects that were started in NYC during the urban decline of the late 1960s and 1970s are often cited as the models of contemporary community gardens as they are now known (Saldivar-Tanaka and Krasny, 2004; von Hassell, 2002). From the 1970s to 1980s, communal gardens blossomed throughout the city, especially in poorer neighborhoods like Harlem and the Lower East Side where buildings were subjected to abandonment, arson and demolition (von Hassell, 2002). In the wake of this neglect, community members reclaimed these rubble-filled lots by creating thriving gardens. By 1998, there were over 1900 community gardens gardened by over 14,000 community gardeners in NYC (von Hassell, 2002).

The growth of community gardens coincided with an economic surge of the late 1990s which led to intense commercial and housing development pressures on community garden sites in NYC (Saldivar-Tanaka and Krasny, 2004; Schmelzkopf, 1995). Since most community gardens lacked secure land tenure, or the right to use, control and access land, many community gardens were bulldozed and the land auctioned for development (Nemore, 1998; Light, 2000; von Hassell, 2002). Two significant bodies of research on NYC community gardens arose in this political and economic struggle, one demonstrating the social, cultural, and economic benefits of community gardens to NYC communities, and another documenting and theorizing the contested and political nature of public spaces in the city. The mosaic of community gardens as diverse community-managed open green spaces throughout NYC have been shown to support ecosystem services such as pollination (Matteson and Langellotto, 2009), and provide venues for social and cultural activities (Eizenberg, 2012; Saldivar-Tanaka and Krasny, 2004; von Hassell, 2002) and self-organized environmental and civic education programs (Krasny and Tidball, 2009; Kudryevstev, 2013; Stone, 2009). The social and ecological functions of these community gardens have been shown to improve the quality of life of community gardeners (Saldivar-Tanaka and Krasny, 2004; Schmelzkopf, 1995; Stone, 2009; Waliczek et al., 1996). The fight for a right to the city and public space has been a common call from advocates for community gardens in NYC (Martinez, 2009; Schmelzkopf, 2002; Staeheli et al., 2002; von Hassell, 2002). Self-determination has been particularly important for low-income communities, who appropriated community gardens spaces for many reasons in addition to gardening, including organizing community advocacy and activism efforts (Staeheli et al., 2002; von Hassell, 2002). Currently, there are over 700 community gardens in NYC which make up one of the most active community garden programs in the US (NYC Parks, 2014). The high value of real estate in the city, however continues to threaten community gardens to this day (Eizenberg, 2012).

### *Resilience and civic ecology practices*

Community gardens have historically played an important role in the resilience of NYC's local communities (Lawson, 2005). In this paper we define resilience as the capacity of a complex system – be it a human individual, a community, ecosystem, or a social-ecological system – to respond, adapt, and continue to develop in the face of disturbance while maintaining its basic structure and function (Folke, 2006; Holling, 1973; Tidball and Krasny, 2014). Adaptation in social-ecological systems allows for appropriate responses to dynamic conditions within and outside of the system, thus enabling systems to maintain their essential behavior and identity (Folke et al., 2010; Walker et al., 2004). When systems are overwhelmed by disturbance, transformation facilitates the development of new responses to enable systems to reorganize and reenter into a new path of development (Folke et al., 2010; Tidball and Krasny, 2014). The use of community gardens as a means to adapt and transform social-economic challenges into opportunities is the reason why they are considered expressions of “local resiliency in times of crises” (Lawson, 2005).

Tidball and Krasny (2007) identify community gardens as sites for observing civic ecology practices which offer opportunities to build resilience. Civic ecology practices are defined as “self-organized stewardship initiatives” which enhance the green infrastructure and community well-being of human-dominated systems like cities (Krasny and Tidball, 2012). Civic ecology practices often begin as small-scale efforts which arise after environmental and/or socio-economic disturbance or decline (Krasny and Tidball, 2012). When systems are overwhelmed by disturbance, urban greening practices can also play a role in facilitating a more desirable transformation and rebuilding phase (Tidball and Krasny, 2014). The collaboration, trust and ecosystem services provided by urban greening efforts may help to maintain strength in the face of social, environmental, and economic changes (Tidball and Krasny, 2014). Community gardening often serves as an ideal example of civic ecology, as a generally self-organized activity, frequently developing out of situations of stress (Saldivar-Tanaka and Krasny, 2004; von Hassell, 2002).

We can further appreciate the relevance of community gardens to nearby communities if we are to accept the social-ecological systems perspective that urban infrastructure functions as an interconnecting life support system (Gandy, 2005). Furthermore, community gardens function as places where neighborhoods can set the terms and conditions of material local/global practices (Pratt, 1991). This role becomes increasingly important in post-disaster contexts, where greening responses have the potential to offer material benefits to the community and to support adaptive responses (Tidball and Krasny, 2014).

Community gardens are also arenas where residents can become environmentally and scientifically literate, gain skills through their stewardship practice, and share knowledge and develop civic actions concerning their natural resources (Krasny and Tidball, 2009). These opportunities for learning about local natural resources are especially critical in urban areas, where the connection between people and nature may be perceived as especially fractured due to modern standards of living and lack of lived experiences with green spaces (Bendt et al., 2013; McKinney, 2002; Stokes, 2006). Individual learning by community gardeners is supported through learning by doing and engaging in intentional experimentation in the garden (Armitage et al., 2008). Through social interaction between gardeners, this individual knowledge can be shared and may develop into action based on the deliberation and discussion with this group, a process often called social learning (Plummer and FitzGibbon, 2007). Thus, greening practices, such as community gardening, create learning opportunities that have the potential to support the development of social interactions

and personal identities that are situated within a relationship between humans and the ecologies where they are engaging in this work (Kudryevstev, 2013).

Social learning in community gardens occurs in what Wenger (2012) has termed a community of practice. Communities of practice are defined as groups of people (e.g. community gardeners) who share concern for a certain issue or activity (growing food, neighborhood greening, etc.) and learn how to improve their engagement with this concern through continued interactions (community gardening) (Bendt et al., 2013; Wenger, 2012). In the context of social–ecological systems, learning as “an iterative feedback between learners and their environment” can be a means of building social–ecological resilience to natural disasters by fostering adaptive changes and innovations (Gunderson, 2010; Pahl-Wostl, 2006).

Furthermore, Tidball and Krasny (2014) provide several concepts that help us to conceptualize what drives the desire to green in the moments following a disaster. In particular, Tidball argues that engaging with green elements post-disaster may be driven by a desire to reconnect with living elements, or an urgent biophilia (Tidball, 2012). This desire may be bolstered by an interest in repairing and restoring a ‘loved place’ to a healthier state, or a restorative topophilia (Tidball and Stedman, 2013). Decisions about what to plant or place in the garden during restoration practices sometimes include social–ecological symbols or rituals (Tidball, 2014b) by using trees and other garden elements as ways to symbolize social–ecological connections. Additionally, garden spaces and other green spaces are sometimes used to memorialize lost loved ones from disasters (Tidball and Krasny, 2014). Finally, acts of greening post-disaster can also represent a “discourse of defiance” to a larger discourse around interpretations of those places post-disaster (Tidball, 2014a).

Community gardens have the capacity to foster and celebrate biological and cultural diversity, develop urban ecological knowledge, and create opportunities for civic engagement through participation in management, planning and/or policy of urban green spaces (Okvat and Zautra, 2014; Tidball and Krasny, 2014). While some has been written on the role of community gardens in contributing to properties of general resilience (Bendt et al., 2013; Krasny and Tidball, 2012; Okvat and Zautra, 2014; Saldivar-Tanaka and Krasny, 2004), significantly less has been written on the role of community gardens in terms of specific resilience to disasters (Tidball and Krasny, 2014).

Okvat and Zautra (2014), however, present ways in which community gardens have the capacity to sow the seeds of individual and community resilience by providing positive stimuli to counteract the overwhelmingly negative and stressful experiences immediately following acute disasters. Another major exception would be the work of Stephan Barthel and colleagues, who have written extensively about urban allotment gardens and the present and historical role they have played in the face of social and economic shocks. Barthel et al. (2013) discuss how the urban garden projects in Europe and North America have played key roles in maintaining open green space and perpetuating “social–ecological memories” of how to produce food. Barthel et al. (2010) demonstrate through a grounded theory case study in Stockholm, Sweden how this collective memory held in urban allotment gardens, both in the form of physical infrastructural relics of gardens and the social practices of gardening, were important during historical urban food supply collapses due to war and economic depression.

The role of community gardens after natural disasters is even less examined than their role after social shocks. One contribution to this area of study is Kato et al.’s (2014) piece on urban political gardening in New Orleans. In this piece, the authors use ethnographic methods to describe the depth and nature of political engagement by urban garden projects in the Post-Katrina era. This

study takes a longer range view of community gardens, studying their capacity to foster community activism and civic engagement in the dramatically altered social–political climate of New Orleans after Katrina, and does not directly address the immediate and shorter-term role of community gardens in response to the natural disaster. The magnitude of Superstorm Sandy’s impact, in addition to the integral nature of community gardens in the social–ecological fabric of NYC create an important and opportune window of understanding on the role of community gardens in a post-natural disaster context.

## Methods

### *Background and site selection*

From April 2013 to February 2014, we conducted an exploratory multi-case study of several Sandy-impacted community gardens to understand the role of community gardens in post-Sandy NYC. This work developed from fieldwork and interviews with community gardeners from a larger study of greening in impacted areas along coastal New York post-Sandy (DuBois and Tidball, 2013). That study established the geographic focus for this study, and provided access to community garden networks and leaders who helped us to narrow down potential community garden cases.

The field researchers (first and second authors) attended several NYC Community Garden Coalition meetings to better understand the experience of various community gardens post-Sandy, and make community gardeners aware of our research. To investigate community gardens and the community gardener experience in NYC after Hurricane Sandy, we used a sampling scheme and ethnographic method consistent with our overall goal of generating insights into the role of place, practice, and community of practice of community gardeners post-disturbance. Because we were more interested in generating an understanding of a breadth of experiences and responses, we were less interested in drawing a representative sample to make normative statements.

For this reason and from our preparatory work, we drew a diverse purposive sample of five community gardens of different sizes and structures from three different boroughs (Appendix A). They were: Campos Community Garden located in the Lower East Side, Manhattan; Boardwalk Community Garden, located in Coney Island; Hip Hop Community Garden in the Arverne section of Rockaway, Queens; and Beach 91st Street Community Garden along with Smith Brothers Memorial Garden, both in Rockaway Beach, Queens. All selected garden sites were in the Sandy flood zone and experienced major destruction (water and/or sand inundation) due to the storm. Due to the limited sample size and qualitative nature of this study, our findings are not generalized beyond our study context. However, by studying a diversity of gardens in different Sandy-impacted communities, we aimed to gain a breadth of understanding that is indicative of both the impact of Sandy on community gardens and the role of community gardens post-Sandy.

### *Data collection*

The primary forms of data collected were qualitative interviews, participant observations, and archival reviews (Appendix B). These three approaches were used to improve the validity of our interpretations by collecting data from different perspectives about the gardens and the garden community before, during, and following Hurricane Sandy. Interviews were used to create a baseline understanding of the practices in the garden and to also understand the culture of the garden from a personal and affective perspective. Participant observation was used to further improve our



understanding of the practices and uses of the sites and to interpret the culture of the garden from a site/community perspective. Finally, we reviewed print and digital material produced by each garden before, during, and after Sandy to validate and extend our understanding of the uses and practices of the gardens and the culture of the garden. Taken together, these data collection strategies strengthen our understanding of the changing cultural uses and meanings of the gardens after Sandy.

### Interviews

Open-ended semi-structured interviews were conducted with seven key informants. These key informants were identified through site visits to the garden where we requested an interview with the garden leaders. In addition to five garden leaders, two very active members were interviewed from Boardwalk Garden because they offered key insights into the garden's role post-Sandy. All seven interviews averaged one hour to one hour and a half in length and were conducted on site or nearby the garden and utilized an open-ended semi-structured interview protocol to investigate the use, value, and meaning of the community gardens of interest both before and after Sandy (Appendix C). All key-informant interviews were digitally recorded and transcribed into written documents following an informed consent procedure approved by the Cornell University Institutional Review Board (ID# 1305003870). Due to the iterative nature of qualitative research, interviews were followed up with emails or in-person meetings to both clarify questions that arose in reviewing the transcripts, and address emergent research questions.

### Participant observations

Each community garden site was visited a minimum of two times (11 total visits) throughout the course of the study, each visit lasting one to several hours depending on the social activity in the garden. The field researchers conducted participant observation during these visits to understand the spatial and social context of the gardens, and informally speak with community gardeners and observe their gardening practices (Creswell, 2011; Merriam, 2009). Participant observation was also conducted at community garden social events to learn about the various activities in an attempt to ground the cultural descriptions obtained in the interviews through participating in the garden's cultural events. Descriptive and reflective field notes were written for each visit. Photos of the field site layout and social interactions at the garden events were taken as mnemonic devices (Barthel et al., 2010).

### Archival reviews

Archival review of news articles, social media postings, and documents related to the community gardens of interest from before, during and after Sandy was also conducted to produce a more complete understanding of the experience and role of the gardens post-Sandy. This print and digital material was viewed as cultural artifacts and was interpreted as self-reflexive documents by which we could further interpret the uses and meanings of the gardens.

### Data analysis

There were several key components to data analysis. First, an initial review of interview transcripts, participant observation field notes and archival work was conducted to summarize our findings and memo emergent themes (Braun and Clarke, 2006; Miles and Huberman, 1994). These initial summaries, in combination with our review of the social–ecological resilience and civic ecology literature, informed our thematic analyses based on a theoretically focused (as opposed to open-ended) coding strategy (Braun and Clarke, 2006; Saldaña, 2012). The interviews and field notes were coded by the first and second author and themes that addressed

our research questions were developed separately. These separate themes were then compared and discussed between researchers until consensus was reached regarding the final themes that most accurately captured the essence of the role of community gardens post-Sandy (Bradley et al., 2007). These are the sub headings by which we frame the results in the following section.

### Data validation

In addition to independent coding passes by the first and second author, data triangulation and member checking are additional methods we used to increase the validity of the qualitative findings generated (Lincoln and Guba, 1985). Given that themes from our limited number of key informants could be biased by the subjective interpretations of our interviewees, it was important to draw themes from other methods to compare and determine the validity of our interview themes. To triangulate our data, we compared the themes developed from key informant interviews with those from participant observation field notes and archival review to check for and resolve any thematic discrepancies (Denzin, 1978). During the member checking process, one key informant from each community garden reviewed and commented on the accuracy of the themes and their gardens' characterization (Lincoln and Guba, 1985). All five key informants agreed that our themes accurately reflected their experience of community gardening post-Sandy.

### Findings

In this section we describe and discuss our findings on the social construction of Hurricane Sandy's impacts on community gardens to provide a background to understanding the role of community gardening on post-Sandy recovery. To do this, we review each case and present information about the structure of the garden itself, the impacts of the storm on the garden, and roles that the gardening practices and communities of practice played in responding to the impacts of the storm.

#### *Case study community gardens and their role in post-Sandy recovery*

Below, we describe the physical and social aspects of the community garden cases and present findings related to the physical, ritual, social and emotional impacts of Hurricane Sandy as perceived by community gardeners.

#### *Campos Community Garden (Lower East Side, Manhattan)*

Campos is a vibrant garden in the East Village neighborhood of Manhattan built on top of the rubble of a tenement building. The site has small raised beds split amongst gardeners, and an equally large community space with storage facility (for tools, etc.), a wooden caseta, and a multi-use open space (Appendix A). Two garden leaders spoke with us about the impacts of the garden, which were extensive and the consequence of flooding from storm surge from the East River. In addition to the flooding, high winds from the storm led to the felling of a large iconic tree, altering the shade geographies in the garden. As a Greenthumb garden and the legal protections afforded to them because of their affiliation with this NYC Parks agency, gardeners were not concerned about development of their land following the storm unlike other gardens.

The garden's strong social network supported the local community facilitating communication and aid to neighbors and gardeners in need both before and after the storm.

In Campos, gardeners mobilized their support networks both before and after the storm to help ensure the well-being of local



**Fig. 1.** Announcement about elderly neighbor stranded in her apartment after Sandy, posted on Campos Community Garden's Facebook social networking page.

residents, facilitate the transfer of information in the community, and aid those stranded without electricity, food or water (Fig. 1).

"So when Sandy came, there is an elderly woman that lives across the street – Ms. Ortega. After the storm, one of the gardeners saw an article about her in the newspaper – Ms. Ortega is up in her 17th floor apt scared and lonely. We went over to the housing project and asked about her and found out that her niece had come to take care of her. And after the storm, we went around and asked about so and so, is everyone ok?"(Campos Gardener)

After responding to the community's needs, one of the first gardening activities in Campos was the re-displaying of the "eco-art" made by neighborhood children.

"Two weeks before [Sandy] we had this program called 'Litter bugs,' where we took recycled bottles and cans and kids could make bugs out of them and we hung them up on the willow tree. One of the first things we did [after Sandy] was collect all of the kid's bugs and we hung them up in the front. That's what I

remember. We were looking for litter bugs. (laughter)"(Campos Gardener)

As time progressed, Campos gardeners worked to generate social support by reaching out and collaborating with different government agencies, community groups, organizations, businesses, and schools.

"The school next door, one of the PTA members got a grant through citizens' committee and she gave the grant money to us to help the garden recover, so we built the children's garden to work with the school. But the money given to us from the school. . . helped us have some way to keep in relationship with the school."(Campos Gardener)

These connections were also formed because Campos community gardeners and other gardens in the Lower East Side neighborhood wanted to learn more about the impact of Sandy on their soil in order to ensure the food produced in the garden was healthy to consume. Some gardeners expressed increased awareness and concern about contamination, both from the storm and from extant conditions.

"We had a professor from SUNY do some soil tests on soil that we know had been flooded. He gave a soil workshop and so people came to that. So, a lot of people are just interested in what actually happened when we got flooded." (Campos Gardener)

#### *Boardwalk Community Garden, located in Coney Island*

Boardwalk garden is located just behind the Coney Island boardwalk. It is the largest and longest tenure garden included in this paper (Appendix A). The garden was set up in a form of akin to allotment gardens more common among European gardens, with gardeners bestowed a large plot of land. This meant that gardeners were allowed to grow whatever they pleased and many created small shed-like structures on their plots. One site leader and two garden members spoke to us about the garden, which was completely inundated by water and covered in sand following Sandy. Gardeners returned immediately to the garden, digging out and replanting the garden by hand. In addition, they used the garden as a social gathering space and in the two years following the storm as a space to plan activism in an effort to protect the garden from development, a process that was continuing during the writing of this paper.

Boardwalk gardeners expressed their love for gardening, identifying it as a practice that brought them great joy, satisfaction and meaning in their lives before and after Sandy.

"This space for me [is] my life. Probably [the developers] want some money for me, I don't know. I give them all harvest. I just want to work. I just want to see. It's not for me because of harvest. Because this is beauty. . . . I want to grow. I don't care who will eat, who will take. I want to do." (Boardwalk Gardener)

Gardening after Sandy also served as a source of empowerment, hope and defiance to both gardeners and community members who witnessed and supported the re-greening.

"To me it was a lesson – it was destroyed, but we took it and we rebuilt it. Some people said 'Oh it's never going to rebuilt it, never going to clean it up' and slowly but surely when they started seeing other people coming in and moving and started working they started believing. . . . To me it was this huge lesson that anything can happen. . . . our garden proved that it was so beautiful and so green this summer, and even more beautiful than last year before Sandy." (Boardwalk Gardener)

For some especially vulnerable community gardeners, the garden provided food security, and returning to gardening was a matter of livelihood, survival and agency.

"I know some Spanish woman from Puerto Rico. Such a small woman. . . . And she worked so hard. She took one wheelbarrow full of sand and grabbed it out, and out. How she worked it was impossible to explain it. . . . When [Sandy] happened, she cried so much hard because she doesn't have documents, she is not legal here, she has many kids, and this was to her everything. After Sandy she said to me, 'You know everyone got help from city. We lost everything because she lived in a basement. We lost everything and nobody help us.' . . . She fed her family with the garden." (Boardwalk Gardener)

Some gardeners mentioned changing their growing methods and garden infrastructure to adapt to the changed conditions in their garden, from adopting container gardening and new raised beds to mitigate the risk of growing in contaminated soil, to experimenting with novel ways to garden in sand.

" . . . this lady [gardener], she would [add] some ground on top of sand without even removing sand, and had the most amazing tomatoes. And it was amazing how they were basically growing in the sand." (Boardwalk Gardener)

Although Boardwalk gardeners did not make any changes to how they gardened after Sandy in response to concerns about contamination or pollution. They cited personal cultural hypotheses that they were not very concerned about the possibility of a storm occurring again or about possible soil contamination.

"I think to me and the Russian people in general. . . . We're just used to [it] kind of. They're like workhorses. This little pollution they don't think about it, it doesn't concern them. You know what I mean? It's like a mindset. After Chernobyl, this little pollution is nothing to them." (Boardwalk Gardener)

#### *Hip Hop Community Garden in the Arverne section of Rockaway, Queens*

This garden is dissimilar to other gardens in this study in that it is a garden used and stewarded by members of one community group and one community member that is paid a small stipend to mow and water the garden. The site contains landscaping elements and a large grassy area, with benches and a shed that was equipped with solar power just after the storm (Appendix A). The garden's leader spoke with us about the garden, which was completely inundated by water and some sand. The garden was used as a community gathering space and was briefly used to organize emergency aide immediately after the storm. Cleanup came much later, along with the construction of a statue through a community art project.

This art project, the Sea Song Memorial Sculpture (Image 1 [pic of sea song]), functioned as a form of memorialization. Sea Song used pieces of Sandy storm driftwood and debris to create a structure that resembled a prayer tree or stupa of Tibetan Buddhist traditions. The sculpture held small items of meaning contributed by community members and was flanked with colorful "resilience flags" designed by a residents of areas heavily impacted by Sandy ranging from Rockaways to Coney Island to Haiti (Fig. 1). The flags, which were decorated with water motifs, images of seahorses, crabs and fish native to the local watershed, and words that evoked solidarity, good will and strength, were hung throughout the garden space (Fig. 2).

#### *Beach 91st Street Community Garden, Rockaway Beach, Queens*

This is the other Greenthumb garden in this study, with a very explicit governance structure. Gardeners have access to use a raised plastic bed, and a community gathering space replete with metal sculptures, benches and other artwork (Appendix A). The garden's leader spoke with us about the storm's impacts, which inundated the garden with salt water and covered it in sand. Although the site was devastated by the storm, gardeners returned to the space to open it for use as a neighborhood gathering space and transitioned to cleaning up the garden several weeks later.

Immediately after Sandy, Beach 91st Street Garden was a site for convening, news-sharing and communal cooking. It was appropriated for emergent community needs, such as a staging ground and as a distribution site for food, clothing and solar-generated electricity immediately after Sandy.

" . . . as soon as the water went down. . . . 91st garden became a place where people knew that they could go, both to see their neighbors and maybe find out what was going on, but go and get warm, they had a fire going and people started bringing food. And then people started seeing that as a drop off point. . . ." (Beach 91<sup>st</sup> Gardener)

The Beach 91st Street Garden also hosted a regular community-healing circle to help neighborhood residents to collectively process the stress and trauma of the storm.

"There is a woman who lives in the neighborhood. . . . I believe she is a licensed therapist. . . . She has had a series of outdoor sessions in the B91st St community garden. I think basically on





**Fig. 2.** Sea Song Memorial and resilience flags in Hip Hop Community Garden. Photo credit: Joana Chan.

a weekly basis, to try and help people get past all of the stress and difficulty that they experienced on an emotional level, on a physiological level. . .”(Beach 91<sup>st</sup> Gardener)

After Sandy, these community relationships and social support networks were mobilized and cited as central to recovery. This was illustrated most vividly at Beach 91st St. Garden where the trust and camaraderie nurtured from neighbors working together in the community garden was identified as a source of mutual support and safety.

“...look at the 50 people eating homemade chili over an open fire two days after one of the most devastating hurricanes in the East Coast. Standing around joking, having hot chocolate. . . when the National Guard can’t even get through yet. . . That is the best defense we have against fear. The best defense we have against looting, rioting, or any other kind of insecurity. . . And that is a direct result of the community garden. You know being a hub for safety, security. A blanket of support between neighbors.” (Beach 91<sup>st</sup> Gardener)

#### *Smith Brothers Memorial Garden, Rockaway Beach, Queens*

This garden site is also located in the Rockaway Beach neighborhood in Rockaway Queens and coordinated many efforts with the Beach 91st Street Garden. Although, this garden had a tenuous land-tenure agreement it had a relatively explicit governance structure and landscaped space. The site had a low wooden fence that surrounded the entire garden and gardeners were given all or part of a raised bed, and access to a community hammock and other gathering space (Appendix A). One garden coordinator spoke with

us about the garden, which was completely inundated by water and covered in sand by the storm. Although this space had been stewarded by the Smith Brothers prior to the storm, their untimely death after the storm led community members to develop the garden for a broader community of users and in respect to the brothers. Although this space became a robust gardening space and social gathering space, due to the lack of garden ownership the garden has once again returned to one individual’s use.

In Smith Brothers Memorial Garden, restoring and preserving the function of the garden as a beautiful and productive neighborhood space after the storm was an important way to keep the threat of blight at bay:

“...if this weren’t a community garden right now . . . it would be strewn with trash, it would be a place where people would just sort of toss stuff. And that all happened after the storm, but now it’s not. And occasionally the wind will blow some trash in here, sure. But people will come and pick it up.” (Smith Brothers Memorial Gardener)

Gardening at Smith Brothers Memorial Garden also provided a form of spiritual and emotional nourishment in recovering after Sandy.

“...the way that [gardeners] respond and talk about the garden has very much been a catharsis for them. And something that they’re excited [about] – it’s like some semblance of normalcy back in their lives.” (Smith Brothers Memorial Gardener)

## **Discussion**

These cases provide a foundation for understanding the role that the community gardening spaces, the community gardening practices, and the community gardening community played after the storm.

### *Place*

#### *“Restorative commons”*

Despite their unassuming size, community gardens have long served as verdant refuges and community hubs in NYC neighborhoods (Campbell and Wiesen, 2011; von Hassell, 2002). This continued to be so after Sandy. The often open-access nature of some community garden spaces made them natural locations for disaster relief and neighborhood gathering during the chaotic days immediately after Sandy, such as in the case of Beach 91st Street Community Garden where residents returned to the garden to use it as a staging ground for recovery efforts in their neighborhood. Recognized as spaces of community support, this research contributes to previous studies on the role that gardens can play in fostering individual and community resilience (Okvat and Zautra, 2011) by describing the immediate role that community gardens played as places to go to receive community assistance and as places to provide community service. In addition to being functional places, community gardens held meaning as places of emotional significance. The attachment and meaning that garden members had nurtured with the garden spaces prior to Sandy made community gardens a natural refuge and meeting place after the storm. This point was made incredibly clear in Boardwalk Garden, where gardeners returned to work in the garden and to restore this loved place despite the immense task of carting several feet of beach sand out of the garden space. The restorative nature of the garden spaces relates to previous work on the benefits of other greening practices post-disaster (Tidball, 2012).

### *Spaces for social–ecological meanings and memories*

Community garden art also functioned as a form of memorialization, as exemplified by the Sea Song Memorial Sculpture (Image 1 [pic of sea song]). These examples illustrate how community garden spaces were fertile grounds for the development of “resilience conferring social–ecological rituals and symbols” in the form of community-developed land art and memorials (Tidball, 2014b). The Sea-Song Memorial was constructed in the only non-agricultural garden in the study, but despite the lack of food production, the garden space was able to provide an opportunity for community expression and community action. Tidball (2014b) posited that tree symbols and rituals in Post-Katrina New Orleans represented continuity and regeneration that can remind and reconnect communities with their social–ecological past. The art showcased in community garden spaces after Sandy evoked nature and reflected processes of remembering both the community’s relationship with the social and ecological elements of their place, and these elements in relationship with their experience of Hurricane Sandy. In the aftermath of Sandy, the nature symbolism in the installation embodies hope, beauty and a “discourse of defiance” (Tidball, 2014a). Displayed in community gardens, these post-Sandy art pieces may hold social–ecological memories of the meaning, experience and recovery from the disaster for community members (Barthel et al., 2010; Tidball, 2014b).

### *Practice*

#### *Gardening as restorative topophilia*

Our study lends credence to Okvat and Zautra (2014)’s assertions that community gardening has the capacity to nurture social resilience post-disaster by providing positive spaces and activities to help alleviate the stress of post-disaster situations.

Community gardener participants discussed the healing nature of returning to and restoring their gardens in a manner that support third author Tidball’s theories of “urgent biophilia” and “restorative topophilia,” in which people may feel compelled to engage in greening practices and restore a beloved natural place in post-disaster situations (Tidball, 2012; Tidball and Stedman, 2013). The practice of working in the garden was repeatedly highlighted as a source of catharsis and a reminder of normalcy during the stressful recovery after the storm, such as in the discussion of gardeners and non-garden members alike that stopped by the Smith Brother’s Memorial Garden to weed and clean up the garden because of a desire to engage in physical work and to restore their neighborhood.

#### *Garden recovery as adaptation*

Knowledge and memories of how to adapt and respond to major storms are not only reified in the newly rebuilt garden forms, but also institutionalized through such educational publications. Social–ecological memories of community garden responses to Sandy also take the physical form of “artifacts” of adaptations made to the infrastructure of gardens to make them more “storm hardy” (Barthel et al., 2014; GrowNYC, 2014).

In addition to the significance of community garden spaces and garden stewardship practices, the community aspect of community gardens were shown to be important to recovery after Sandy. In following Barthel et al. (2014) and Bendt et al. (2013), we found community gardens to be communities of practice that support the resilience of urban social–ecological systems. The communities of practice contained within community gardens set community gardens apart from other open spaces, such as parking lots and public parks, which also served as staging grounds for storm relief. For example, for some especially vulnerable community gardeners in

Boardwalk garden, the garden provided food security, and returning to gardening was a matter of livelihood, survival and agency.

### *Community of practice*

#### *Community garden fostering collective efficacy*

The sense of community developed from these strong communities of practice was cited as one of the primary factors that initially inspired involvement in community gardening for many members.

Our results are consistent with Teig et al. (2009)’s study demonstrating that community gardens can serve as catalysts for collective efficacy in urban communities. Collective efficacy is defined as the connection between social cohesion, arising from mutual trust and solidarity, and informal social control, embodied in the capacity to take action to benefit the community (Sampson, 1997; Teig et al., 2009). The trust nurtured between community gardeners enabled gardeners in all of the study sites to effectively cooperate and restore their gardens after the storm, and empowered gardeners in Boardwalk garden to organize against the bulldozing of their garden. By expanding their social network and deepening their extant social ties, community gardens were able to mobilize resources (ranging from grant money to volunteers) to support their garden, their members, and their neighborhood.

#### *Community gardens for social–ecological learning*

In addition to providing social support both within and outside of the garden, the community gardens were also spaces for social and ecological learning through interactions with gardeners and the garden. This learning was especially evident in Campos garden, where gardeners worked together to deliberate and reflect on the best ways to restore the garden and incorporated new efforts to test and remediate their garden’s soil. Social learning is central to the function of the communities of practice and can be a means of building resilience to natural disasters by fostering adaptive changes and innovations (Gunderson, 2010; Pahl-Wostl, 2006; Wenger, 2012).

### **Conclusion**

In June 2013, NYC’s Special Initiative for Rebuilding and Resiliency report was released in response to the impact of Hurricane Sandy and pressure to develop plans for climate change and disaster preparedness. Despite the report’s focus on rebuilding communities and mention of urban ecosystem services and green infrastructure, there was no mention of community gardens or other types of civic ecology practices (SIRR, 2013).

Our findings show that community gardens and community gardening in NYC played significant roles in lives and communities of community gardeners post-Sandy by serving as safe open spaces, as a restorative practice that sustained livelihood and sense of meaning, and as a community of practice that learns, grows, and supports each other before and after the storm. In particular, our study supports Okvat and Zautra (2014)’s argument that community gardens have the potential to bolster resilience in disaster zones by aiding processes of recovery and regrowth at multiple levels – ranging from the individual to the community. This process includes the role of community gardens in growing food, as well as other benefits that include the ownership and care that people feel capable of having with these spaces.

The capacity of community gardens to foster beneficial resilience post-disaster also functions at various temporal scales within the adaptive cycle of social–ecological systems. On the shorter time-scale of the days, weeks and months after Sandy, community gardens catalyzed transformation, by providing opportunities to empower residents to assist in rebuilding their environments, their lives, their sense of place and meaning immediately after a major natural disaster. On the longer time scale of



years after Sandy, community gardens have shown signs of supporting adaptation by fostering ecological, human and social capital, providing the structure and practices to support social–ecological diversity, learning, and community support networks to better respond to future disturbances.

This study strengthens the body of research on social and place-based benefits of community gardens by studying them in a post-disaster context. As our study focuses on the social processes within social–ecological resilience, we do not delve into the ecological functions and services that community gardens may provide as green infrastructure in urban spaces when faced with natural disaster. Future studies may consider integrating ecological assessments with the social assessments of the role of community gardens or other green infrastructure to provide more complete picture of the social–ecological role of that they play in post-disaster contexts.

At the time of writing this article, two of the five gardens we studied are vacated and no longer community gardens – both Boardwalk garden and Smith Brothers Memorial Garden are slated for property development. Our results motivate us to call for disaster resilience policies that recognize the capacity for emergent community greening practices and spaces to foster community capacity and environmental stewardship. Beyond acknowledgment, it is important that policies also be put in place to support and enhance the buffering benefits provided by community gardens, especially in the wake of a crisis or sudden shock. In particular, policies that clearly establish tenure are crucial, as the benefits of community gardening are often lost when community garden spaces are lost.

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## Appendix A. Basic information on community gardens investigated (based on Bendt et al., 2013).

	B91st Street Garden	Smith Brothers Memorial Garden	Boardwalk Garden	Campos Community Garden	Rockaway Hip Hop Community Garden
Location size (approx. m <sup>2</sup> )	595 <sup>a</sup>	460 <sup>a</sup>	6916	465	797
Founded	2011	2013	1997	2004	2008 (land ownership)
Land ownership	NYC Parks Dept	“Tacit agreement” with real estate developer	Formerly NYC Parks Dept	NYC Parks Dept	Rockaway Waterfront Alliance (non-profit)
No. of participants or members	40+	Unknown	40	32	Varies by program
Age of core participants	20–45	20–45	Children – 80	40+	Youth (8–20)
Ethnic identity of participants	European American	European American	Russian, Mexican, Puerto Rican and African American	Bangladeshi, European and Latin American	European, African and Latin American
Physical features	Water collection tank, raised beds, art, locked fence, benches	Allotment plots, art, flags, fencing, hammock, individual composting, grill, seating	Gazebo, greenhouses, individual composting, sites for livestock, art, flags, seating, fencing, allotment	Casita, rainwater collection system, individual plots, communal space, art, mural, tool shed, benches, fencing	Shed, picnic benches, art, locked fence
Main activities	Composting, growing food	Composting, growing food	BBQ, social events, growing food	Senior activities, youth activities, education, community plantings, growing food	Community events, art, service projects, staging

<sup>a</sup> Estimated area.

## Appendix B. Data collection methodology by case

Garden	Interviews	Participant observation	Archival data
Campos Community Garden	Two garden coordinators	Two site visits: 2013.11.02 (Dia De Los Muertos event) 2013.11.08 (interview/tour)	Gardener compiled presentation with photos showing Sandy impact and the garden's facebook page
Boardwalk Garden	One garden coordinators and two garden members	Four site visits: 2013.08.16 (NYCCGC meeting in garden) 2013.11.09 (interview/tour) 2014.12.27 (NYCCGC garden supporters rally) 2014.02.21 (interview/tour)	Communication from NYCCGC about the garden, and local newspaper articles and TV clips related to garden bulldozing
Rockaway Hip Hop Community Garden	One garden coordinator	Two site visits: 2013.08.27 (interview/tour) 2013.10.26 (Sea-song unveiling ceremony)	Website pages from the Sea-song artist's website, and handouts from Sea-song unveiling ceremony
B91st Street Garden	One garden coordinator	Two site visits: 2013.07.22 (community gardening observation) 2013.08.09 (interview/tour)	The garden's facebook page
Smith Brothers Memorial Garden	One garden coordinator	Two site visits: 2013.07.22 (community gardening observation) 2013.08.09 (interview/tour)	The garden's facebook page

## Appendix C. Semi-structured interview protocols

1. Talk about how you are involved in community gardening at [specific community garden].
  - a. How often have you been community gardening?
  - b. For how long?
  - c. What activities do you specifically do?
2. Tell me how gardeners and local community make use of the [specific community garden] space.
3. Sometimes groups and people change the focus of their work in order to respond to the needs of people/the environment following a natural disaster. How has the work of the gardeners at [specific community garden] changed after Hurricane Sandy?
4. Can you talk about the value or importance of the greening efforts in the garden to the gardeners and local community before and after Sandy?
5. Speaking for yourself, do any of these greening efforts before and after Sandy have any special meaning for you?
6. Sometimes objects or things are especially important to people, especially following an event such as Hurricane Sandy. Are there any specific objects or things that have been important to you or the group that you work with following Sandy?
7. Is there anything I have not asked that you that you would like to speak about?

## Additional Probe Questions

Sometimes people have a particular ecological connection with a place. If it comes out strongly that someone is making a particular connection, ask more deeply about their connection.

- 6a Could you characterize the value or importance of this tree/animal/plant to you and to your group before and then after Sandy?
- 6b Were they particularly hard hit, or do they represent something important historically about this place or your culture?
- 6c How have you been considering this tree/animal/plant in your recovery work?
- 6d Does this tree/animal/plant have any significant meaning to you or your group following Hurricane Sandy to now?

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