

## Article

# Recognizing Stewardship Practices as Indicators of Social Resilience: In Living Memorials and in a Community Garden

Heather McMillen \*, Lindsay K. Campbell, Erika S. Svendsen and Renae Reynolds

US Forest Service, NYC Urban Field Station, Bayside, NY 11359, USA; lindsaycampbell@fs.fed.us (L.K.C.); esvendsen@fs.fed.us (E.S.S.); renaereynolds.ufs@gmail.com (R.R.)

\* Correspondence: hmcmlen@fs.fed.us; Tel.: +1-718-225-3061

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**Abstract:** Resilience theory has received increased attention from researchers across a range of disciplines who have developed frameworks and articulated categories of indicators; however, there has been less discussion of how to recognize, and therefore support, social resilience at the community level, especially in urban areas. The value of urban environmental stewardship for supporting social-ecological functioning and improving quality of life in cities has been documented, but recognizing it as a strategy for strengthening social resilience to respond to future disturbances has not been fully explored. Here we address the question: How can social resilience indicators be operationalized as stewardship practices in an urban context? Using a deductive coding approach drawing upon existing resilience frameworks we analyze qualitative data from community managed-open spaces in the New York City area that have responded to various chronic presses and acute disturbances including a hurricane and a terrorist attack. In each case we identify and characterize the type of grounded, empirically observable stewardship practices that demonstrate the following indicators of social resilience at the community level: place attachment, social cohesion, social networks, and knowledge exchange and diversification. The process of operationalizing abstract indicators of social resilience has important implications for managers to support social (and ecological) resilience in the specific areas where stewardship takes place, as well as potentially having greater effects that bridge beyond the spatial and temporal boundaries of the site. We conclude by suggesting how researchers and practitioners might learn from our examples so they can recognize resilience in other sites in order to both inform research frameworks and strengthen practice and programming, while keeping larger institutional structures and context in mind.

**Keywords:** stewardship; social resilience; community; urban green space; New York City

## 1. Introduction

Weeding a community garden, planting a memorial tree, and collecting rubbish from a neighborhood park are examples of urban environmental stewardship (UES). Stewardship is the act of caring for the environment to enhance the quality of life for the greater public good [1] “with the underlying assumption that doing so will improve the social–ecological functioning of specific urban areas” [2] (p. 76). We define environmental stewards as civic groups that conserve, manage, monitor, advocate for, and educate about a wide range of quality of life issues in urban areas [3,4]. While stewardship occurs within interactive and overlapping networks of civic, government, and private actors, here we focus on community-based UES. As part of the US Forest Service, we also consider ourselves embedded in these stewardship networks, in our role as researchers who work with private residents, civic organizations, and government agencies in “caring for the land and serving people” as stated by our motto.

UES can be a social innovation that addresses problems in novel ways through processes that simultaneously enhance the social, economic, and environmental value of neighborhoods through “manag[ing] ecosystems, protect[ing] human and ecosystem health, and educat[ing] broader publics” [2] (p. 77). UES is a type of urban innovation that can promote sustainability [5], ecosystem services [6], social networks [7], collective identity, and sense of place [8]. At the same time, UES can have benefits that extend beyond the physical site and beyond those directly involved in the stewardship activities. Scaling up from the local to the global, stewardship activities can affect how people care for the biosphere more broadly, because they contribute to “cognitive resilience building” [9]. Stewardship activities can also contribute to social dimensions of sustainability including: well-being; power and agency; and equity and justice [10].

### 1.1. Social Resilience in the City

As urban dwellers are expected to number five billion, representing 60% of Earth’s inhabitants by 2030 [11], and cities are already the “dominant global human habitat of this century” [12] (p. 282), the importance of an integrated approach to managing the social as well as the ecological dimensions of sustainability is undeniable [13,14]. Notions of resilience, ecosystem services, health, and equity have been major themes in research and planning practice that explore the multiple, interacting drivers of change across scales. While there have been important contributions to advancing our understanding of the social dimensions of resilience in urban areas, including psychological resilience [15,16], the discussion has been more focused on governance [5], the material aspects of infrastructure [17], and the biophysical aspects of resilience [18]. Natural resource agencies, including our own, the US Forest Service, tend to focus on ecological resilience [19]. No less important, however, are the social dimensions of resilience in urban areas, a research focus of the New York City Urban Field Station where we are based (<http://www.nrs.fs.fed.us/nyc/>).

Resilience is the capacity to absorb shocks, maintain function, self-organize, learn, and adapt [20], a concept that has been applied across a continuum from ecological to social systems. Our use of resilience describes systems that are “safe-to-fail” as opposed to “fail-safe” [21] (p. 341); operate in non-equilibrium; and exhibit multiple change pathways (persistence, transition, and transformation) [22]. Based on research across 100 cities, Rockefeller Foundation [23] (p. 3) defines city resilience as “the capacity of cities to function, so that the people living and working in cities—particularly the poor and vulnerable—survive and thrive no matter what stresses or shocks they encounter”, Resilient cities are said to be: reflective, resourceful, flexible, redundant, robust, inclusive, and integrated [23]. Here our focus is on the social dimensions of resilience within urban systems and how stewardship plays a role in this complex social-ecological system [24].

While we believe ecological and social resilience are inherently interrelated, in this paper we focus on social resilience, “the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change” [25]. Research suggests social resilience “may be more influential than environmental resilience in determining the outcome of a collapse and recovery scenario” [26] (p. 1470) and that the “capacities for human (rather than environmental) transformation that lie at the heart of adaptation” [27] (p. 23). Applied at the community level, social resilience is the “existence, development and engagement of community resources by community members to thrive in an environment characterized by change, uncertainty, unpredictability and surprise” [28] (p. 401). We contend that supporting social resilience at the community level is especially important in dense, urban areas [22] and so it is our focus in the community managed, green spaces we describe here.

The importance of identifying “resilience of what to what” has been stressed [29] and a growing number of researchers focus on specific types of resilience (e.g., [18,30–32]); however, we wish to underscore the importance of the social dimensions of general resilience, rather than to any specific event or disturbance [23]. General resilience, or “the capacity to absorb shocks of all kinds, including novel and unforeseen ones . . . [is] far more difficult than planning for known types of disturbance” [33]

(p. 3250). The discussion on how to recognize, and therefore support, general social resilience at the community level, especially in urban areas [22], remains a key task [24] and has the potential to inform resource management, policy making, and research. Although there are still challenges in moving from theory to practice in incorporating resilience thinking, including in the U.S. legal and institutional framework [19], the need to mount appropriately scaled societal responses to foster resilience has been identified as crucial [34]. Here we are interested in general social resilience to chronic pressures, acute pulses, and their interactions [13].

### 1.2. Urban Environmental Stewardship and Its Role in Resilience

In an effort to understand how UES cultivates social resilience, we are drawn to research centered upon specific case studies and urban site types. For example, tree planting following natural disasters [35,36] and community gardening [11,37,38] figure prominently in fostering social relationships and promoting social resilience [39,40]. Barthel et al. [6] describe the important yet under-recognized contributions stewards play in the management of biodiversity and ecosystem services and emphasize the need for co-management among users, local stewardship associations, government agencies, and non-governmental organizations of what they call an “urban cultural landscape”. Some stewardship groups focus on natural areas, parklands, and native species, but others are more broadly focused on quality of life issues related to health and well-being. Although they are usually not the primary land owners, stewardship groups take an increasingly significant responsibility for a wide range of land use types including street and riparian corridors, vacant lots, public parks and gardens, green roofs, public housing sites, etc. [3]. These can be seen as demonstrations of the responsibility they feel to the well-being of their communities as well as a connection to and an awareness of the benefits of urban green space for ecological resilience. Foraging for plants and mushrooms are other urban practices that connect people with their environments, while also fostering identity, place attachment, and stewardship [41,42].

Research on social resilience in place-based (not necessarily urban) communities tells us that engaging in stewardship can play a role in strengthening and expanding social networks [43]. Social networks enable the practice of pooling and exchanging material (e.g., food, building materials) including human resources (e.g., knowledge and labor), especially following disturbances [44]. In the wake of economic declines, storms, and tsunamis, the pooling of resources remains critical to place-based communities for maintaining social networks and institutions, e.g., [45]. In an urban context, UES groups can strengthen the networked ties between civic, government, and private sectors thereby giving rise to new social innovations and practices. Research on UES networks has shown certain organizations to be network nodes that bridge and bond across sectors and scales to more effectively manage ecosystem services [2].

As we turn toward our discussion of recognizing stewardship practices as indicators of social resilience at the community level, we draw upon existing frameworks of characteristics that emerge from the diverse interactions between individuals, organizations, and the environment (Table 1). Although there are other examples of frameworks to explain resilience (e.g., [31,32]), the ones that follow best relate to our focus on social resilience in an urban context.

**Table 1.** Resilience indicator frameworks.

| <b>Stewardship Strategies to Enhance Social-Ecological Resilience from Chapin et al. [46]</b> |
|-----------------------------------------------------------------------------------------------|
| Foster biological, economic, and cultural diversity                                           |
| Foster a mix of stabilizing feedbacks and creative renewal                                    |
| Foster social learning through experimentation and innovation                                 |
| Adapt governance to changing conditions                                                       |

Table 1. Cont.

|                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Resilient City Indicators from the Rockefeller Foundation [23]</b>                                                                                                                   |
| Minimal human vulnerability                                                                                                                                                             |
| Diverse livelihoods and employment                                                                                                                                                      |
| Adequate safeguards to human life and health                                                                                                                                            |
| Collective identity and mutual support—observed as community engagement, strong social networks                                                                                         |
| social integration                                                                                                                                                                      |
| Social stability and security                                                                                                                                                           |
| Availability of financial resources and contingency funds                                                                                                                               |
| Reduced physical exposure and vulnerability—relies on environmental stewardship, appropriate infrastructure, effective land use planning and enforcement of planning regulations        |
| Continuity of critical services                                                                                                                                                         |
| Reliable communications and mobility                                                                                                                                                    |
| Effective leadership and management                                                                                                                                                     |
| Empowered stakeholders                                                                                                                                                                  |
| Integrated development planning                                                                                                                                                         |
| <b>Community Resilience as a Function of the Strengths or Characteristics that have been Identified as Important, Leading to Agency and Self-Organization from Berkes and Ross [47]</b> |
| Values and beliefs                                                                                                                                                                      |
| Knowledge, skills and learning                                                                                                                                                          |
| Leadership                                                                                                                                                                              |
| People-place relationships                                                                                                                                                              |
| Diverse and innovative economy                                                                                                                                                          |
| Community infrastructure                                                                                                                                                                |
| Positive outlook                                                                                                                                                                        |
| Engaged governance                                                                                                                                                                      |
| Social networks                                                                                                                                                                         |

Bearing in mind that these frameworks describe different, but overlapping concepts related to social-ecological resilience, resilient cities, and community resilience—we reviewed across these frameworks for indicators pertaining to stewardship. Although Chapin et al. [46] are speaking at larger scales, including the level of ecosystems or the entire planet Earth, the stewardship strategies that they propose to enhance social-ecological resilience can also be applied at the community level. Relevant to our discussion are the dimensions focusing on fostering cultural diversity and social learning. By expanding the diversity of available biological, economic, and cultural characteristics of a community, it has more resources to buffer against and respond to disturbance. “Diversity provides the raw materials for adaptation, innovation and social learning . . . the core processes that build the adaptive capacity and resilience of a social-ecological system” [46] (p. 237). Promoting knowledge exchange and cultural diversity through the stewardship of the sites themselves is critical as is the stewardship or transmission of the associated stories about adaptation to change. In this way, we posit that knowledge exchange has the capacity to strengthen cultural diversity and foster social innovation (cf. [38]). Relevant to our discussion here is research that describes how sites such as urban community gardens strengthen social networks [48,49], promote the exchange of diverse knowledge systems [50], and strengthen social cohesion and attachment to place [51].

Of the Rockefeller Foundation’s twelve indicators of resilient cities, the one that resonates most closely with our work includes: collective identity and mutual support (observed as community engagement, strong social networks, social integration) and the associated sub-indicators: community and civic participation; social relationships and networks; local identity and culture; integrated communities [23]. Building upon these indicators, we suggest that stewardship is a catalyst for civic participation and reflective of a collective identity that, in certain instances, can lead to increased agency, political power, and new forms of governance [52].

While Berkes and Ross’s [47] discussion is focused primarily on indigenous people in rural areas, and they describe the characteristics of community resilience rather than indicators per se, the

concepts also relate to indicators of resilience in urban communities. Themes from their framework that we follow in our discussion are: knowledge, skills and learning; people-place relationships; and social networks. Sol et al. [53] have also described the importance of social learning as a necessary precondition for addressing sustainability in terms of agriculture and natural resource management with multiple stakeholders. People-place relationships refer to place attachment, place beliefs, and place dependence, all of which are components of sense of place [54] (p. 317). Place attachment is a concept that describes the degree to which people have an emotional or social connection with others and environments where they live [55] as well as the sense of pride associated with belonging to that place [56]. It includes the cognitive, emotional, and behavioral connections to places [57] and has been suggested as an indicator of community sustainability [56] and important for identity development, place-making, perception, and practice [58]. Research has shown that higher levels of place attachment are positively associated with environmental stewardship [8], pro-environmental attitudes, and climate change adaptation [59]; however, the relationships between these variables need to be better understood. Empirical research from the Bronx (New York City) has shown that urban environmental education programs—which engaged urban high school students in environmental stewardship—promoted ecological place meaning, but not place attachment [60]. Degrees of place attachment, along with cultural frames and social values, underpin the values, beliefs, and behaviors associated with the indicators described above (Table 1) as well as in any other framework for social resilience and sustainability.

Here our overarching objective is to use urban, place-based examples—specifically community-based living memorials and a community garden in the New York City (NYC) metropolitan area—to operationalize social resilience indicators as reported in the literature [23,46,47] as a means to inform research frameworks and strengthen practice. Because they emerged as the most salient in our work and we believe have great potential to contribute to general social resilience, the specific characteristics and indicators of social resilience we focus on are: place attachment, collective identity, social cohesion, social networks, knowledge exchange and diversity. As described in the methods section below, we used the list of indicators and characteristics from the three theoretical frameworks described in Table 1 to deductively code our qualitative data. Working iteratively between the frameworks and the dataset, we identified these five indicators as most significant.

We draw from two case studies and provide empirically observable examples of stewardship to answer the following questions: How can social resilience indicators be operationalized as stewardship practices in an urban context? How can we understand stewardship as a means to strengthen attachment to place and social cohesion, expand social networks, and foster knowledge diversity and exchange? When and how does UES at one site have effects that expand outward to other sites, issues, and scales nested outside the immediate site? Here, we describe patterns and differences across the sites; including the pathways that originate in specific sites or neighborhoods and connect to and influence resilience at larger scales beyond the spatial or temporal boundaries of a given project. We discuss how to evaluate the near term and future sustainability of the specific stewardship practices we describe. Finally, we conclude with a discussion of how to operationalize indicators of social resilience through the practices of stewardship, reminding of the need to consider UES in the context of broader structural factors.

## 2. Approach, Materials, and Methods

To better understand the role of community-based stewardship in social resilience, we use two case studies, in which we are embedded as researcher-participants. For each case, we describe grounded, empirically observable stewardship practices that we contend operationalize social resilience indicators at the community scale in an urban context. In so doing, we build upon traditions of reflexive research that are used in ethnographic methods from human geography and anthropology [61,62]. Comparative case study methodology is appropriate when detailed investigation of phenomena is used to build upon existing theory, moving from the “micro from the macro” [63] (p. 5) [64–66]. As such, we selected



these cases as windows into processes of social resilience in the context of urban, community-based stewardship after disturbance. We examine two cases: (1) living or “green” memorials to 11 September 2001 (9/11) that are part of the Living Memorials Project; and (2) a community garden at Beach 41st Street Houses, which is a public housing development owned by the New York City Housing Authority (NYCHA) that was restored through design and community engagement after Hurricane Sandy.

To facilitate a discussion of general social resilience (rather than specific resilience) we chose these cases because they represent a range in terms of the socio-demographics of the communities, their experiences with disturbance, their scale and locations, the type of open-managed green space they represent, and their key partners (Table 2). They also vary in terms of the degree of researcher embeddedness in the case itself. While social science research is never objectively detached from its object of study, we acknowledge that our engagement in providing funding support, conducting collaborative design, and creating opportunities for stewards to gather via workshops reflects a high degree of researcher embeddedness in stewardship. The form and duration of that engagement varied across the two cases and is described below. The cases were created in response to varied chronic presses such as economic shifts and insufficient resource allocation as well as acute pulses such as a hurricane and a terrorist attack. In addition to being disturbances themselves, acute pulses can reveal and exacerbate chronic presses linked to economic marginalization, social isolation, and institutionalized racism.

**Table 2.** Attributes of case studies.

|                             | <b>Living Memorials Project</b>                                                                                                                                  | <b>Beach 41st Community Garden</b>                                                                                                                   |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Scale & Location            | 42 diverse sites, ranging from a single tree planting to 80 acres of forest, across the NYC metropolitan area (New York, New Jersey, Connecticut)                | One garden with 30 individual plots in a coastal area of the Rockaway Peninsula, Queens (NYC)                                                        |
| Site Type                   | Public and private land in parks, forests, coastal areas, institutions                                                                                           | Community garden in public housing                                                                                                                   |
| Key Partners & Stakeholders | Community-based organizations, family and friends of those affected by 9/11, US Forest Service Researchers, US Forest Service State & Private Forestry (funding) | US Forest Service Researchers in NYC, NYC Housing Authority administrators and residents, Till Design landscape architects, TKF Foundation (funding) |
| Research Time Frame         | 2002–present                                                                                                                                                     | 2013–present                                                                                                                                         |
| Disturbance Type            | Terrorist attack on World Trade Center (11 September 2001)                                                                                                       | Hurricane Sandy (29 October 2012); chronic economic presses                                                                                          |

The Living Memorials Project (LMP) was initiated by the U.S. Forest Service in 2002, in response to the losses suffered due to the terrorist attacks on 9/11. The initial phase of the project included funding to support communities’ efforts in creating their living memorials, but since that time, LMP has been primarily a longitudinal research project to document the creation and evolution of living memorials and to deepen an understanding of the roles of community managed greenspace and stewardship in social-ecological resilience. The LMP includes data that were gathered through semi-structured interviews ( $n = 117$  memorials), site observations, and photo documentation (2002–2004). Interviews explored the social and biophysical characteristics of memorials including: purpose, the events held on site, if the site is considered sacred and why, and landscape features. (For full results from the 117 interviews, see [67]). Results from this original research were shared via a National Registry on a public website (<http://www.nrs.fs.fed.us/urban/lmp/>) and via a multi-media public exhibition held at the fifth year anniversary of 9/11 [68]. Here we report on follow-up research, conducted in 2015–2016 on a subset of living memorials in the NYC metropolitan area (New York, New Jersey, Connecticut). Site visits and interviews were conducted (July–October 2015) at 19 living memorials and 22 telephone interviews were conducted (September 2015–April 2016) with stewards from additional sites that could not be reached for a site visit. Our level of participation and engagement included holding one major workshops on with stewards focused on networking, sharing stories, and supporting

best management practices; connecting communities to resources from landscape architects to trees; reviewing community proposals for funding from the Forest Service; and participating in occasional community events focused on planting, watering, and weeding. This was focused in the earliest years (2002–2004) as many sites were being created, but we continued to collect data and engage intermittently and organically through maintaining communication with a subset of sites in the NYC area.

The Beach 41st community garden has been documented from 2013—present through ethnographic methods including participation, observation, and interviews (unstructured, semi-structured). The site is part of a coupled research and design project supported in part by the TKF Nature Sacred program, entitled Landscapes of Resilience. It documents and supports the process of returning to gardening after the Hurricane Sandy, and how people's participation in greening activities can support resilience to future threats (The other paired site not discussed in this paper is Cunningham Park in Joplin, MO after the 2011 tornado. For more information on the Landscapes of Resilience project, see: [http://www.nrs.fs.fed.us/nyc/focus/resilience\\_health\\_well\\_being/landscapes\\_resilience/](http://www.nrs.fs.fed.us/nyc/focus/resilience_health_well_being/landscapes_resilience/)). Researchers from the US Forest Service, a landscape architect and urban design professor, and a participatory research practitioner comprise the core of the team, working in collaboration with NYCHA staff and residents. To date, a total of 19 interviews with community gardeners and local community greening organization representatives lasting one to two hours in duration have been conducted (and 10 more are planned). These semi-structured interviews covered a wide range of topics including experiences during Hurricane Sandy; gardening practices; social networks and physical connectivity to other outdoor spaces; engagement in garden design; and hopes for the future of the project. We used photographs and field notes to document site details. Through participating and observing garden activities, including a series of workshops with community residents, we gained deeper insights into both garden practices as well as the significance, meaning, and importance the gardens held for participants. These workshops were an opportunity for reciprocal learning and exchange—with researchers learning about garden practices and meanings and gardeners learning about novel design and horticulture opportunities. Together we worked with landscape architects and artists to collaboratively inform design elements in the shared garden space. Photographs and short vignettes (written by RR) were regularly shared with participants and community members via a public website to share project progress and solicit feedback and reflections (see <http://b41communitygarden.tumblr.com/>).

To strengthen the rigor of the research, we used four types of triangulation: “multiple sources, methods, investigators, and theories” [69] (p. 74). In constructing these case studies narratives, we drew upon this diverse array of detailed, qualitative data described above. In both cases, we followed procedures of prior informed consent in conducting formal interviews. (Research approval was obtained from the Committee on Human Subjects at the University of Hawaii # 23279 and the Office of Research Integrity and Assurance Cornell University #1305003870 for the Living Memorials Project and Beach 41st Gardens research, respectively.) Interviews were recorded, transcribed, and analyzed for their primary themes. We reflected upon and synthesized themes from interviews, photo documentation, and field notes during research team debrief meetings as a check for agreement among investigators. Following Berg [70], we used a deductive approach to coding these themes, guided by multiple theoretical frameworks describing indicators and characteristics of resilience (see Table 1). Using an iterative process to writing the final case narratives, we examined our cases for alignment with existing indicators and identified the five primary themes described below.

### 3. Results

Next we describe the case studies and identify their empirically observed indicators of social resilience. The public housing community garden is more recent and so we describe emergent characteristics of resilience. The living memorial sites have been observed since the early 2000s, so we describe the transitions and evolutions we have observed.

### 3.1. Living Memorials

These living memorials created in response to 9/11 reflect the place-based resources, attitudes, lifestyles, and cultures of the communities that created them. Most were initiated by individuals, informal groups, and civic organizations rather than by government agencies—though they often collaborate with the public sector for access to space and resources. They vary greatly in form, from single trees to forests, and involve both the rededication of existing green space as well as the creation of new green space. They are in forests, oceanfront, parks, community gardens, town centers, found space (e.g., traffic islands, vacant lots), and on school and hospital grounds. They honor victims from among the nearly 3000 who perished, as well as responders and survivors. Some of these sites have changed over time to commemorate other events and losses in addition to the initial event of 9/11; and the creators of these sites bring the social learning, relationships, and practices that were fostered on one site to their interactions with other sites and groups. The creation and ongoing stewardship of memorials supports social resilience in a number of ways.

#### 3.1.1. Demonstrations of Place Attachment: Site Selection, Caretaking, and Planning for the Future

In some cases, an existing attachment to a particular place drove the decision to create the memorial there, a process that, in turn, heightened the attachment to place. For example, in Babylon (Long Island), a beachfront site was chosen because surviving family members had fond memories of spending time with their loved ones at the beach. Although they were from different places in town, “the one thing [we] had in common, we’re a coastal community. Everybody went to the beach.” Once the memorial was created, another layer of meaning and attachment was formed and enacted through memorial ceremonies and rituals, acts of planting and maintenance, and visitation for quiet contemplation. One widow brings a bottle of champagne to her husband’s plaque every year on their anniversary and spends the evening with his memory, and another family planted a squash and flowers for their loved one (Figure 1).



**Figure 1.** Squash and flowers planted at plaque commemorating a victim of 9/11 in Babylon, NY, USA (Photo from USFS 2015).



Through these processes of use and stewardship, the site was enhanced and relationships were strengthened. Stewards there and at other sites expressed a strong sense of pride in their sites for their physical appearance, but also for the important (sometimes sacred) roles they serve in honoring those lost, supporting those grieving, and offering a place for reflection. The attachment stewards feel to their site is expressed through the rights they feel to the space as well as their responsibility in maintaining it. One widow whose husband died in the World Trade Center has adapted her will to allow for the ongoing maintenance of a living memorial site in New Jersey after her death. “I’ve already told my gardener that, you know, in my estate planning that my gardener would continue the process here.” Other stewards demonstrated strong place attachment through carefully training the next generation of volunteer stewards to ensure their site carries on beyond their tenure. Striking examples of place attachment as well as the ability to bounce back from disturbance have been demonstrated when stewards defended their sites from development and restored them following significant damages resulting from Hurricane Sandy.

### 3.1.2. Social Cohesion and Collective Identity: Seeing as a Group

The process of working together in creating and maintaining sites helped to foster and reinforce a sense of shared identity. “Being in that location brought a sense of community and comradeship and that sense of building something together . . . a sense of purpose together” said one steward. Others referred to the process as “community building work” and reflected on the “natural kinship all of us felt in being New Yorkers [while working together at the memorial]” and how “we have tears together”. In this way, living memorial sites are social innovations, community-based responses to facilitate the mourning process by offsetting feelings of helplessness, strengthening social support and well-being, and enhancing the appearance of the neighborhood. Stewards reported “feeling good” through weeding, watering, and engaging in horticulture as a therapeutic outlet. Another referred to the sacred nature of the collaborative work saying, “we were grieving and our desire to do something . . . action in grieving . . . typical New Yorker reaction . . . all of us felt like we needed to do something . . . Digging by hand was a manifestation of some kind of spirituality”. Creating an identity not only as those in mourning, but as survivors who encourage growth and life has been an important thread woven into the narrative of many memorial sites. Likewise, many sites include literal and symbolic demonstrations of patriotism (e.g., American flags, eagles, and the colors red, white, and blue), calling upon a collective identity people feel as Americans and reminding them of their commonalities with each other, and perhaps in distinction to other groups who are perceived as threats to Americans.

Memorial anniversary events at the sites can also reinforce the identity and social cohesion of the group, for example when bag pipes are played to commemorate fallen fire fighters and police officers, when signage and speeches are in Russian, or when a Native American tradition is adapted for other populations. In some cases, a strengthened sense of identity and cohesion can lead to exclusions. For example, many stewardship groups described struggles in defining who counts as being “from” a community in placing names on memorial plaques. Defining who is “from” a place can be challenging in an era where people often move several times from their childhood home, to where they are educated, to where they later live and work as adults. Other groups struggled with defining who counted as a 9/11 victim, given that there were delayed losses of life related to stresses and exposures of survivors and first responders who worked in recovery efforts. We also see examples of sites that seem to be less resilient. Those that are rigidly focused on 9/11, or on the death of one person, without expanding their narrative and outreach risk losing relevance as the community inevitably shifts its focus over time. These sites seem brittle, rather than flexible, and so they become vulnerable as the original stewards progress in age, and new generations have no direct memory of or less attachment to the time of 9/11. We found examples of adaptation, however, with sites adding additional names on these plaques to include these later victims and with sites expanding their narrative to commemorate victims of other acts of terrorism, war veterans, and all children; and to promote peace.

### 3.1.3. Stewardship Expands the Breadth and Scope of Social Networks for Individuals and Organizations

As group identity is reinforced, social cohesion can be strengthened and social networks can be expanded—other well described indicators of social resilience. Community engagement has long been associated with social integration. Stewardship, as a form of engagement, facilitates interactions among diverse groups, allowing for opportunities to develop relationships and expand their social networks. For example, at the Garden of Healing in Staten Island, the Summer Youth Employment Project, Federated Garden Club, Veterans, Fire Department, Public School 23, Gateway Rotary, Boy Scouts, an artist group, a poetry group, and students from the College of Staten Island all joined in the work with the Garden Club stewards. At Sterling Forest, family members affected by 9/11 were joined by survivors of violence from Sierra Leone in planting and recovering from their losses (Figure 2). At the Crescent Beach Flagpole Memorial, creating the memorial and carrying out subsequent commemorative ceremonies became an extension of their annual block party when the whole neighborhood gathers to socialize and celebrate. The residents of Russian descent who created a memorial at their neighborhood park in Coney Island changed their name from the “Russian Family Group” to the “9/11 Family Group” in order to signal their broader inclusiveness, as they support public school group tours, involvement from local politicians, and family days for all neighborhood residents of any descent. Overall, the bonding that happens at these events can promote the formation of support networks that go beyond site boundaries and existing social groups, and these have the potential to promote resilience more broadly.



**Figure 2.** Stewards planting trees together in Sterling Forest in Tuxedo, NY, USA (Photo from USFS 2002).

We found that through the processes of creating and maintaining memorials, stewards develop new or strengthen existing relationships at both the interpersonal level and the organizational level. Interpersonal relationships among stewards can be much like those among members of support groups who help each other cope and recover from a difficult event or experience. These relationships did not end with commemorating the events related to 9/11; they became social resources that were drawn upon in response to other disturbances, from the inevitable changes in one's personal life

to acute external events including Hurricane Sandy. For example, although the storm destroyed the Crescent Beach Flagpole memorial, the relationships among neighbors endured. “Just because the site came down, I don’t think the relationships diminished . . . we still see those people in the neighborhood.” When Sandy took out the power lines in his neighborhood, the chief steward and his friend (an electrician) helped their neighbors return their electrical power and “people were so grateful. Oh, how we ate! There was always dinners coming every night to us from those we helped out.”

Individuals can also serve key roles within networks of individuals and organizations involved in community recovery. For example, the initiatives of a steward at Sterling Forest, a widow who lost her husband who was a fire fighter, started a non-profit organization to support resilience training for fire fighters and others in disaster response. Her organization was also very active post-Sandy because many firefighters live in the Rockaways, an area greatly affected by the hurricane. A creator of another living memorial who was also a long-term volunteer at Ground Zero went on to become a member of a Certified Emergency Response Team and applied her training in the recovery efforts post-Sandy. Some of the friends she made in the process even went on to respond to Hurricane Katrina in New Orleans as well.

Finally, we see that stewardship organizations have capacity to alter or expand their programs in response to different disturbances. The Daffodil Project was created as a response to 9/11 and originally focused on distributing bulbs for individuals and groups to plant in NYC parkland to commemorate recovery from the event; however, in response to Sandy, organizers expanded their efforts and the reach of their bulb distribution to neighborhoods most affected by the hurricane. The disturbance created by Sandy was seen as an opportunity to expand their outreach and involvement beyond parks to: public schools; the NYCHA garden and greening program; individual residents with places to plant; senior centers; and street tree stewards. The need created by Sandy gave the project and the sponsoring organization, New Yorkers for Parks, a renewed sense of purpose—to be more involved with neighborhoods, especially in the Sandy affected areas. The Daffodil Project is now focusing on returning open spaces to normalcy post-Sandy, and working with neighborhoods that are under-resourced. For some groups, 9/11 is still a resonating narrative, for others, less so. Across sites, we see that people and organizations involved in the stewardship of specific living memorial sites can become involved in supporting others in need as well as supporting their fellow stewards in coping with and responding to other challenges.

### 3.1.4. Promote Knowledge Exchange and Diversity: Learning from Others and from the Past

We also see living memorials as sites that promote the exchange and transmission of diverse kinds of knowledge. As with biological diversity, a diversity of ways of knowing is a resource to draw upon in developing creative and adaptive responses to disturbance. Examples include integrating Native American perspectives and traditions on healing (Figure 3); experimenting with coastal restoration plantings; and integrating interfaith programming about peace, tolerance, and understanding. Some sites also foster the retention and transmission of stories with lessons about adapting to disturbance, be it natural, personal, or political. In addition to the informal sharing of information that happens among stewards as they tend their sites, stewards also shared examples about involving school groups at the sites to learn about history, remembering those who died, and teaching about ethics. Stewards referred to their sites as a “keeper of history” and a way to “keep the memory alive”.





**Figure 3.** “Healing Totem” created by Lummi (Native Americans from Pacific Northwest) and gifted to the families affected by 9/11 at Sterling Forest in Tuxedo, NY, USA (Photo from USFS 2002).

### 3.2. Beach 41st Community Garden

The Beach 41st Community Garden (B41 Gardens) is located in the Beach 41st Street Houses, a public housing development with approximately 1683 residents, consisting of four mid-rise apartment buildings, situated along the shoreline of Jamaica Bay in Edgemere, a neighborhood of the Rockaway Peninsula. This narrow, sandy land mass jots out the westernmost end of Long Island, but is part of the borough of Queens, serving as an arm that protects portions of New York City from the Atlantic Ocean. The Beach 41st Street Houses is the location of a community garden comprised of 30 individually-managed plots, linear in configuration, adjacent to the bay. Planting practices range from agricultural-style row cropping, to raised beds, to decorative borders of flowers and vegetables; and some gardeners also cultivate their plots as spaces for reflection or socializing by integrating benches, shade structures, pathways, and other design features. Gardeners adorn sites with signage, figurines, statuary and other decorative elements. The gardens were developed in the 1990s through NYCHA’s Garden and Greening Program, an effort to support public housing resident’s access and involvement in green space management. Due to their location bordering Jamaica Bay, the B41 Gardens are vulnerable to high tides and heavy storm events. In October 2012, those vulnerabilities were exposed by Hurricane Sandy. The gardens were flooded and closed for a year after the event.

#### 3.2.1. Collective identity and Social Cohesion: Understanding and Engaging with Community Dynamics through Community Organizing and Participatory Research

Although there was a core set of residents who identified as gardeners, their collective identity was shaken as a result of the closing of the garden after Hurricane Sandy and the mounting passage of time. The Landscapes of Resilience team worked with NYCHA to actively facilitate the process of re-invigorating active gardening at B41 Gardens. Knowing collective identity and social cohesion are important for social resilience, our team worked with NYCHA to strengthen these aspects among the gardeners. This included hiring a community outreach consultant with extensive horticultural knowledge to act as an organizer for returning and new gardeners. The consultant liaised among the gardeners, NYCHA, and our team. She helped guide new gardeners through processes of applying for plots, obtaining soil, and building raised beds. In summer 2015, a research practitioner (coauthor RR) from the Rockaway peninsula joined the team to engage the community, understand social dynamics,

and catalyze change while simultaneously gathering data about this process. Both the organizer and researcher worked to strengthen the collective identity of new and long-time gardeners. By maintaining a regular presence in the garden, we documented demonstrations of collective identity and social cohesion as well as threats to them.

Demonstrations of social cohesion include the reestablishment of formal and informal social norms of the garden, such as formally designated plot allocation and informally negotiated tool sharing. We also observed individual and collective actions to expand garden plantings and the mutual support gardeners provided to one another through an informal economy of labor exchange, such as gardeners tilling each other's soil or sharing and distributing seeds. The latter examples are all signs of the bonds being formed between people and are also expressions of care and concern for each other. These are the same social bonds, which will support collective action during crisis moments like a natural disaster. The activation of the garden space through physical planting and social engagement helps to create a hub of activity on the NYCHA grounds that can begin to extend beyond the garden plots and into the nearby lawn, playgrounds, and broader surrounds. We observed non-gardeners walking dogs, kids playing in the grass, men fishing off an adjacent pier. One of the goals of the design project was to help strengthen the garden and grounds as a social hub, through layering on new uses and points of engagement, for gardeners and non-gardeners alike (Figure 4). We documented increased interactions, such as during a signage workshop that was initially aimed at adult gardeners but was suddenly expanded to include the many children who left their apartments and came outside to participate in this arts-based activity. Another potential for strengthened interaction came from a fisherman who mentioned a desire to use fish guts as compost amendment to enhance garden fertility. In addition, we found that planting bioswales alongside established vegetable plots has attracted residents, including youth, and volunteers who are interested in watering and caring for this expanded garden (Figure 5).



**Figure 4.** The pergola became a focal point for socializing and knowledge exchange at the B41st Garden (Photo by Mary Wyatt, TFK Foundation, 2016).





**Figure 5.** Residents and volunteers prepare a new bioswale together at B41st Gardens (Photo from Giles Ashford 2016).

We also documented and were attuned to potential fissures within the garden group as well as between the group and other users of NYCHA grounds that might undermine collective action or social resilience. In any community-managed space, we find that the use and control of space is a delicate act of negotiation. For example, when one garden plot went fallow because a resident gardener did not have the capacity to maintain it, the outreach coordinator negotiated a process of notification and dialogue to transfer that plot to another gardener to avoid conflict among garden neighbors who wanted additional space. Another challenge to the cohesion of the nascent garden group was averted when the research team provided moral support to a gardener who discovered her pepper plants were stolen. Upon hearing the words of encouragement and empathy, the gardener stopped ripping out her remaining pepper plants in anger and began to share peppers with those present, noting that she would happily give away her produce, rather than have it stolen. Finally, another source of ongoing tension at the site that threatens social cohesion stems from conflicts around the use of the lawn and garden area. Formally, dogs are required to be on leash and curbed, however some dog owners used garden plots and lawn areas as leash-free zones; and a few incidents of dog attacks by pit bulls (a prohibited breed in NYCHA buildings) led to outright conflict. With the increased presence of gardeners on the site, scrutiny of leash-free dogs and their owners grew, as has the need for ongoing dialogue and conflict resolution.

### 3.2.2. Place Attachment: Site Selection and Naming the Space

Although the gardens were flooded by Hurricane Sandy and the NYCHA Garden and Greening Program considered relocating the garden, gardeners themselves expressed strong preferences to maintain their waterfront views and coastal breezes, despite the potential for future inundation, a demonstration that place attachment to the coastal garden plots was quite high. The project recruited a landscape designer who recognized both the constraints and opportunities of the current garden site. She developed a conceptual design approach with low-cost, high impact strategies to strengthen community organizing, mutual learning, and stewardship. This design acknowledges that the site will flood again in the future, and the process of creating it supports the development social networks that connect gardeners to each other as well as to outside material resources, such as soil, via ongoing, systemic links.

The design team collaborated with the resident gardeners to determine how to demarcate the garden space and express its value to both gardeners and visitors. Working with an artist, a workshop enlisted the resident gardeners to define the meaning of their gardens by naming them and creating signs for display. Sentiments of love, family, beauty, and dreams were incorporated in many of the gardeners' final designs for signs at their individual garden plots: expressions of attachment and care for their site (Figure 6). By embracing a collaborative, co-productive means of gathering and sharing this information, certain creative ideas that emerged were then amplified by the professional artist who partnered with them. For example, a gardener was inspired during one of the workshops to design, using foil paper, the moniker of the housing complex on a fence. The expression not only depicted a sense of pride and place attachment by saying, 'this is where I am from, this is where you are', but also demonstrated through the use of accessible materials to mark space, noting: 'this is possible'. The collaborating artist responded by echoing the design using flexible lighting to spell out "Beach 41" on the garden fences, so the name of the space was made visible at night as well. Displaying the name of the complex and the gardens themselves speaks to the collective identity of the people who live there, and particularly of the stewards who hung them, yet these efforts were temporary. These bottom-up emergent acts of place-making and signage will not necessarily become a permanent part of the NYCHA grounds.



**Figure 6.** Four garden signs created by resident gardeners during a design workshop at B41st Garden (Photos from Renae Reynolds 2016).

Juxtaposed with these acts of place-making by the gardeners, larger institutional forces and rules shape the use of space on the site. In March 2016, generator-powered floodlights were installed throughout the B41 Houses' grounds as part of a NYCHA pilot program called Omnipresence, addressing crime-deterrence and safety through lighting. These loud, bright flood lamps far overpower the more subtle expressions of place attachment by the gardeners. Although the floodlights are scheduled only for a six month study period to measure any impact on crime, they dominate the housing complex's campus at night causing disturbance to some residents in the Beach 41st Houses as well as neighboring homes outside NYCHA. This example illustrates the degree to which gardeners must intentionally work to create a space that is personalized and distinct from the institutionalized space to which there is considerably less attachment.

### 3.2.3. Promote Knowledge Exchange and Diversity: Cultural Knowledge, Experimentation, and Cooperation

In the gardens, we observed knowledge exchanges around horticultural practices, culinary expertise, and the physical construction of garden structures. Some of these practices are deeply rooted in cultural traditions; others come from a spirit of experimentation. A Korean family stores Kimchi, a traditional fermented and spiced cabbage dish, in crock buried in their garden. This staple of Korean cuisine became a vital resource for the family during Hurricane Sandy. In anticipation of the flooding, they unearthed the Kimchi, which supplied food during several days without power when other perishable food items were lost. During a time of crisis their traditional practice of food preservation was noted by other gardeners as a potential part of their own preparation for future storms. The family has shared their traditional practice with B41 Gardens and others at the neighboring Edgemere Farm and Seagirt Community Garden.

An example of learning through experimentation includes the experience of a resident who began gardening for the first time in summer 2015 and became a first place winner at the 52nd annual citywide NYCHA Garden and Greening Award Ceremony that year. This gardener exhibited creativity through the construction and design of her space by repurposing found objects including wooden pallets to make seating, racks for holding plants, and even an entire greenhouse. Her fearless experimentation in building, tearing down, and rebuilding as needed, planting and transplanting as desired, aligns with her personality as an enthusiastic ‘go-getter’, but can also be attributed in part to the tutelage of the community outreach consultant who is an experienced grower and organizer of growers in her own right. Her presence and knowledge inspired confidence in new gardeners, including this first-time gardener.

Finally, we see examples of knowledge exchange among gardeners through their cooperation with one another—where horticultural knowledge meets experimentation and innovation. A seasoned gardener at B41 Gardens noticed that a first-time gardener’s melon was growing large and its weight threatened to buckle the plant stalk or detach prematurely. In response, she knit a sling to cradle the melon and reduce its strain on the plant. This act conveys empathy among gardeners that had developed over time. As bonds have strengthened, gardeners both monitor and intervene in one another’s spaces. This act and many such subtle exchanges are small, yet incremental deposits into the knowledge bank of this community.

### 3.2.4. Strengthening Social Networks: Resident Greening Committee and Rockaway Greening Coalition

Gardeners at B41, as well as our larger team, showed the ability to adapt in the face of structural setbacks and institutional shifts. This can be attributed both to the social networks that developed through garden-related activities as well as through the ongoing commitment of the Landscapes of Resilience team to sustaining the project. As residents began to garden again in 2014 and 2015, their social bonds were based on the commonality of their residency as well as their curiosity in, proclivity toward, and passion for gardening. This allowed them to connect and to make efforts to meet on a regular basis. Beginning in winter 2015, however, two of the critical nodes in the social network were removed. The community outreach consultant left due to lack of funding and our lead contact at the Garden and Greening program took another position in the agency. This left the nascent gardening group in a vulnerable position, however they transformed from an informal group to an organization (a Resident Greening Committee), demonstrating their ability to maintain the function of the group while adapt to the changing institutional context.

Resident Greening Committees (RGC) are an organizing framework recognized and encouraged within NYCHA to support the development of resident leadership in green space management and sustainability practices. Becoming a RGC illustrated the mutual trust gardeners hold for one another, which grew by cultivating the land together, over time. Our team adapted as well, by securing private funding to support the hiring of another community coordinator. The RGC provides the opportunity to



expand the gardener's social networks beyond the site at B41 Gardens through potential partnerships with other RGCs in surrounding neighborhoods and increased access to funding so that these stewards may continue to equip themselves with more material resources to promote resilience.

In addition to the organizing efforts at B41 Gardens, the social network of the garden group has begun to expand through collaboration with other community greening entities in Edgemere and the adjacent neighborhood of Far Rockaway. A garden representative from B41 Gardens eventually became one of the founding members of an informal collaborative network named "The East Rockaway Growing Coalition", which is focusing on increased equity and access to healthy food for area residents. The continuing development of this coalition has potential to increase social resilience if successful in their attempts at capacity building. Already the group has succeeded in receiving grant funding to pilot an Urban Farming Apprenticeship Program in the spring and summer of 2016. These apprentices provide agricultural and horticultural support across green spaces in Edgemere and Far Rockaway neighborhoods. They also help encourage other residents to become invested in the B41 Gardens. Currently, only one member of B41 Gardens participates in this network, but information about the Coalitions development is shared with the rest of the gardeners leaving the potential to expand and deepen network ties over time.

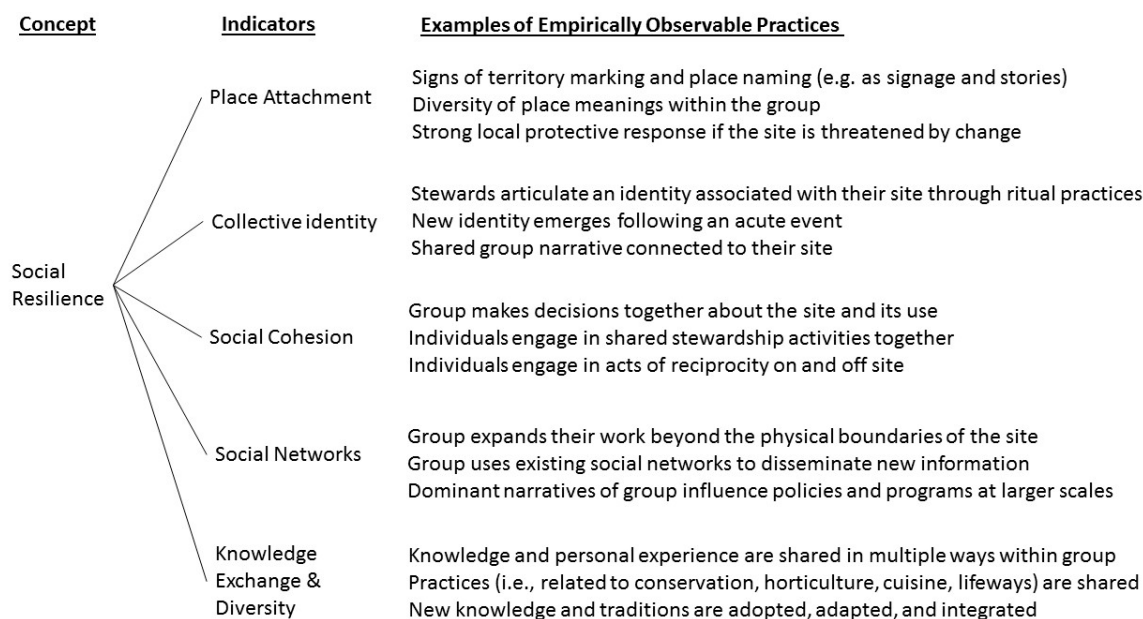
#### 4. Discussion

In this discussion section we will explain how we operationalize resilience, moving from the abstract categories of indicators to specific empirical examples we observed; describe the importance of general (versus specific) resilience; and discuss considerations for understanding the sustainability of stewardship in specific sites. Through describing two case studies and characterizing their indicators of social resilience to a range of chronic vulnerabilities and acute disturbances—be they socio-economic shifts, terrorist attack, or hurricane—we find that UES creates opportunities for strengthening social resilience (cf. [2]). On the surface, UES may seem site or object specific, focusing on the trees or plants themselves, but the roots of such community engagement transcend time and space. Planting and tending greenspace becomes a social mechanism to help people grieve, unite in dialogue, form and strengthen supportive relationships and networks, and engage nature toward a shared purpose. In the case of the B41st Garden, these actions have led to other social connections beyond boundary of this housing complex and into other parts of the neighborhood. Planting and tending greenspace can also become a point of contention, but in these cases we find the public nature of the site helps to encourage cooperation over the long-term. Active negotiation and dialogue among multiple identities may actually contribute to strengthening social resilience. We observed how relationships among people and relationships between people and places established through the processes of UES became social resources that were drawn upon in response to multiple disturbances—from the inevitable changes in one's personal life to acute external events including Sandy. We argue that these sites can be seen as landscapes of resilience that enable communities to better absorb future, unexpected disturbances.

##### 4.1. Operationalizing Resilience: How Do We Know It When We See It?

Using existing frameworks of indicators and characteristics of resilience (Table 1), we described the specific practices through which these indicators can be observed in a community garden and at living memorials. Here we discuss how these practices translate to other sites so others can recognize and evaluate social resilience at the community level through: attachment to place, collective identity, social cohesion, social networks, and knowledge exchange and diversity (Figure 7). These suggestions of how to recognize resilience are meant to help 'train the eye' of both researchers evaluating the near term and future sustainability of stewardship practices as well as practitioners aiming to support stewardship and strengthen communities' readiness for and recovery from disturbance (see also [40]).





**Figure 7.** Operationalization of social resilience via urban environmental stewardship.

Although attachment to place is only identified in one [47] of the three frameworks we drew from (Table 1), we believe it undergirds and is a prerequisite for other indicators of social resilience (cf. [37]). These attachments may not and need not be homogeneous within the community. In fact, communities with a “diversity of place meanings” and multiple kinds of attachment to place may be more resilient and adaptable to social change [56] (p. 769). Berkes and Ross [47] describe this characteristic of resilience as “people-place relationships” and focus on rural and indigenous people in their discussion, but we wish to emphasize that these relationships with place can be more universally applied and are also crucial for social resilience in urban areas. The broader importance of these concepts for managers is that stronger connections to a place, through both sense of place and place attachment, are tied to pro-environmental behavior [71] as well as the inclination to develop or participate in climate adaptation planning processes [59], which has implications for strengthening general resilience more broadly.

Many urban environmental stewards act upon a sense of rights and responsibilities to a particular garden, memorial, or park. To recognize place attachment at the community level we recommend looking for signs of: territory marking and place naming (e.g., through signage and stories); plans for transfer of site stewardship into the next generations (e.g., individual leadership turnover, new organizations formed); and the strength of the local protective response if the site is threatened by change (e.g., memorial as preservation strategy in the face of development pressures). Community-based stewardship is not only momentary or ephemeral; when place attachment is strong, we expect that we will see these acts of claiming territory and managing it over time despite changing external conditions and changing internal group dynamics.

To recognize collective identity around a specific site, one can examine: who is included or excluded in tight-knit groups; whether stewards articulate an identity associated with their site (e.g., garden, park, neighborhood) through ritual practices; whether a new identity emerged following an acute event (e.g., first responders, Sandy survivors, 9/11 family member); and if the group has a shared narrative connected to their site [72]. These identities can be expressed publically through spoken narratives, written statements, and physical acts [73]. When collective identities are site-specific or place-based (e.g., B41 Gardens), there can be clear overlap with some of the practices described as part of place attachment above. Other identities may emerge through communities of interest or shared experiences (e.g., 9/11 survivors) that are not place-bound, but rather are relational links spanning

across space. While the evidence presented in both case studies shows clear attachment to place, many of the actions undertaken by stewards might also be explained by a more personal sense of place identity [74]. For example, choosing to garden or selecting a memorial site may be entwined with one's own personal identity as much as it reflects an attachment to a particular place. We find that stewardship of a specific site presents an opportunity for groups to express a particular collective identity or to negotiate multiple identities through shared creation and management of land.

Social cohesion can be understood by considering the strength and number of bonding ties within the group as well as the degree to which: a group makes decisions together about the site and its use; individuals engage in shared stewardship activities together; and individuals engage in acts of reciprocity on and off site. Although community gardens often contain individualized parcels, we also see examples where groups co-manage sites as commons [38], which requires an ability to mediate differences and make collective decisions. This sort of collective decision-making is an indicator of a cohesive group with governance capacity [75].

Chapin et al. [46] (p. 335) suggest that social networks and bridging organizations can contribute to urban social-ecological resilience through “(1) address[ing] new urban challenges and opportunities . . . ; (2) plan[ing] for the long term in ways that reduce resource extraction from and impacts on nonurban regions; and (3) increase[ing] flexibility of governance structures to meet changing needs”. We would add that the strength of social networks can be indicated when: a group expands their work beyond the physical boundaries of the site; a group uses existing social networks to disseminate new information; and when newly formed weak ties among members emerge (including those related to enhanced trust and reciprocity). Going beyond the specific management of the site, we see the way that interaction and sociability enabled through gardening, for example, can strengthen reciprocity among members. Through the acts of planting, tilling, and harvesting collectively or side-by-side, gardeners have greater opportunities to know each other and strengthen social bonds that go beyond the garden's gates. We saw similar demonstrations of social networks at Living Memorial sites. The strength of social networks is also indicated when dominant narratives of the group become entwined in policies and programs at larger scales. For example, in New York City local stewards' public narratives about need for urban gardening (circa 1990s) later became articulated and enacted through: a range of city-wide urban gardening and agriculture programs in public, private and quasi-public land; various food visioning activities; and sustainability plans [76]. Similarly, community-based narratives calling for local memorialization of 9/11 have challenged existing rules that limit the creation of new memorials in parks, and policies have been modified [68]. Finally, a community's desire to plant on urban public land can also challenge rules, catalyzing modifications to community and public land management practices, as we have described at the B41 Garden.

Resilience is embedded in the storylines and narratives used to leverage resources for these spaces. It is revealed through the exchange of knowledge, experiences, and the self-expression of environmental stewards [72]. It can be detected through: examining how knowledge and experience gets shared and disseminated; the degree to which material practices (i.e., related to ecological conservation, horticulture, cuisine, lifeways) are shared; and whether the group adopts, adapts, and/or integrates outside traditions for their own purposes. Increasing the opportunities for new ideas from outside and exchanging knowledge within the group itself can expand the group's understanding of its purpose and relationship to other people, events, and issues, thereby creating a stronger and more solid bridge to other groups and issues. These opportunities can be facilitated through diverse supportive organizations and coalitions working at larger scales, such as community garden coalitions, food justice movements, and social service providers.

#### *4.2. The Importance of General Resilience in Open and Nested Systems*

Because these sites are embedded in open and nested systems, it is essential to look beyond the boundaries of the single site and a single press or pulse to evaluate resilience. While we agree it is important to identify resilience of what, to what, and for whom, because what promotes resilience

for one group or site may degrade the resilience of another group, there is also a risk in too narrowly defining the scope, as generalized resilience is a fundamental characteristic of a community's ability to respond to a range of pulses and pressures. "In community resilience, we expect that generalized resilience is highly desirable, providing flexibility to cope with a wide range of crises, underpinning specified resilience where required" [47] (p. 7).

Resilience that is engineered (e.g., through grey infrastructure) is designed to bounce back to a previous state after a disturbance, but ecological resilience can bounce forward, transforming into a new design, a new location, or a new purpose [77,78]. We argue social resilience can also bounce forward. In recognition of the complexities of and connections within social-ecological systems, this means we cannot evaluate success or failure of a stewardship effort solely by examining a single site. Walker et al. [79] have described the multi-scalar nature of resilience, and we bring that to the fore of our discussion on social resilience here. As with the example of the Crescent Beach Flagpole living memorial that was destroyed in Hurricane Sandy, it was the community residents who carried forth the social ties that were developed and strengthened through that memorial project, although the physical memorial no longer stands. Perhaps this need to look beyond the boundaries of a particular site in order to understand its effects is particularly true in an urban social-ecological system, where transformation happens constantly as socio-economic shifts readily initiate the conversion of neighborhoods, repurposing of buildings, and reclamation of vacant lots.

Resilience is exhibited not just with sites that endure or persist in their original capacity, but also (and perhaps more so) with those that transition and transform as their surroundings change. We observed that Living Memorial sites that are rigid in concept or design are more vulnerable and less likely to be engaged by stewards or visitors over the long term. We also observed cases when the social engagement at one site affected other areas through their social networks. For example, many of the Living Memorial stewards on Staten Island came to know each other, and shared information about site design, small grant programs, and volunteer opportunities in order to support all of the local sites. Increased civic participation via these sites can lead to more agency and power of the individual and the group. Data from urban tree planting programs has shown that stewardship activities can serve as catalyst for individuals to become more involved in other civic and democratic practices in their communities [3]. Collaborative engagement across sectors and institutions around a tangible social project, such as stewardship of urban green space, can lead to a greater understanding of multiple identities and stronger social cohesion.

#### 4.3. *The Sustainability of Stewardship over Time: How Long Is Long Enough?*

One question we continue to ruminate on is 'how long does it need to last?' When site stewardship does persist over time, at what point is the site considered sustainable or resilient? Is temporality critical in evaluating resilience? We believe it depends on the objectives of the site and its stewards. Memorials designed to promote social cohesion and social support may not need to last in perpetuity, as individuals affected by a particular disturbance may have their needs met and subsequent generations may not identify the need to recover from that same disturbance. For example, two living memorial projects (Sunflowers and Suntowers) based on guerilla planting of sunflower seeds in Manhattan were designed to quickly respond to New York residents' needs to reclaim space and reconnect, but the stewards knew the plantings themselves would be ephemeral. It would be a mischaracterization to say they were not resilient sites. They served a critical social purpose.

As Meerow et al. [22] (p. 39) describe, urban resilience describes the system's ability to "maintain or rapidly return to desired *functions* in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity" (*italics added*). Thus, in certain instances, the focus for planners and practitioners should be on function, including social function, rather than solely on the longevity of physical form. Despite the desire of many 9/11 memorial stewards to "never forget" and to have sites that last in perpetuity, even the best cared-for trees, shrubs, and plants will eventually (in the longest of terms) die, stone will erode, and bronze will

degrade. Just because a site physically decays over time does not mean that it did not serve a crucial social function at the time that it was created. While a well-tended site may be a strong indicator of attachment, cohesion, and resourcefulness of the group, a poorly tended site is not necessarily an indicator of the opposite. Perhaps a site lasted as long as it needed to last, and being open to dynamism and change in our landscapes that is driven by the needs and priorities of our communities is one of the best ways that we can support social resilience.

## 5. Conclusions: Recognizing and Supporting Social Resilience

Using qualitative methods, we have operationalized social resilience with empirically observable examples from two cases across multiple, diverse sites as a means to inform future research and practice; however, we recognize that there is no one size fits all model. These were meant to ‘train the eye’ rather than be proscriptive. We have asserted that place attachment undergirds and is a prerequisite for other indicators; future research could conduct large scale quantitative and qualitative analyses to examine the relative contribution of these five indicators across multiple sites and types of disturbances. While monitoring is important and indicators are useful for assessing if management and sustainability objectives are met, no set of indicators can measure everything at once. Indicators that are developed at the citywide, regional, or national level or are defined by outside researchers may not clearly translate or may not even include important indicators at the community level. With this case analysis, our goal was to operationalize social resilience in terms of specific practices in an urban setting in particular types of community managed open spaces. At the same time, we recognize that there is a trade-off between more accurately representing specific, place-based practices and indicators and sacrificing the degree to which they may translate to other urban communities or to national policies (cf. [80]). To address this shortcoming, we recommend engaging the communities themselves in the process of identifying and co-creating subjective indicators of resilience for their own communities [56,81], which can ensure they are relevant and can also promote knowledge diversity and reciprocal learning.

This paper has focused on social resilience at the community level as it emerges through UES; however, we acknowledge UES is often not sufficient on its own to create or sustain resilience. Community based UES can be seen as an entry point to strengthen social cohesion, expand social networks, and foster knowledge exchanges. We emphasize that it is also critical to examine the larger structural and institutional context to understand the systems in which community or site is nested [82,83]. Returning to indicators identified in Table 1 and Figure 7, we did not address important factors such as diverse livelihoods and employment, social stability and security, or adequate safeguards to human life and health [23], nor did we take on adaptive governance [46]; power and agency; or social justice [10]. Planting trees is powerful for both ecological and social reasons, and community greening may contain the seeds of change—but it is not enough. We understand that UES is enhanced through collaboration with other sectors in order to integrate with housing, public health, employment, and other vital social services. No matter how resilient a public housing garden group is, they still are affected by the presses of the larger world of socio-demographic shifts associated with development, gentrification, and the deficit of financial resources that comes from institutionalized racism. We also acknowledge how institutional structure shapes how long sites persist as well (i.e., due to resource constraints and inequity).

We concur with Chapin et al. [46] (p. 323) who advocate for a paradigm shift from ecosystem management to ecosystem stewardship, which represents a shift from reactive to proactive policies. Policy frameworks that support such adaptive management or ecosystem thinking may require regulatory reform to align with reflexive law that allows for innovation rather than specifying detailed rules, limits, and outcomes for a specific environmental issue [84]. Such a shift would promote resilience through flexibility, rather than vulnerability through rigidity. The practice of UES is one example of resilience through flexibility as it allows for emergent place-based assessment, dialogue, negotiation and change.



Social indicators of resilience reflect dynamic processes critical to sustainability goals and objectives (e.g., [10]). To the extent that stewards value civic participation and creating new knowledge through shared use and decision-making, these community-managed sites can become innovations—incubators and/or producers—that support agency and power, social justice, and cultural diversity. In NYC and other urban areas, UES is an important component in community-based recovery programs as well as in long-term sustainability planning initiatives. With population growth and climate change issues at the forefront of urban policies throughout the world, it is expected that civic stewardship groups will continue to exhibit a sense of rights and responsibilities related to place attachment and identity. How these acts are positively identified and interpreted by decision-makers will relate to the successful development and adaptation of sustainability and resilience plans. Precisely because of the need for a holistic approach to supporting general social resilience and because UES can play such an important role, especially in the post-disturbance context, it may be increasingly relevant for agencies to communicate across institutional boundaries. For example, using UES as a unifying theme, productive responses to disturbances could be mounted and amplified by collaboration among federal, state, and local agencies.

Future research should explore how to cultivate and support stewardship practices over time, including at times when there are shifts and transitions in these practices. How can we use green spaces as places to innovate and co-create knowledge about how to be resilient? How can stewards adapt and remain flexible? For example, in the face of disturbance, how do you move a community garden or living memorial site but retain the elements that comprise social resilience in the new location? Similarly, but at broader community scales, how might entire neighborhoods retreat from vulnerable coastlines in ways that preserve social ties? How can we balance attention toward supporting stewardship with tending to other aspects of resilience in a complex social-ecological system? Finally, in this paper, we've emphasized social dimensions; future research and examinations should demonstrate how stewardship may be operationalized within an integrated, social-ecological framework. These are the types of questions that may best inspire and shape the practice of cross-agency collaboration as we learn more about how resilience is operationalized and activated in our cities and towns.

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