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Activating urban environments as social infrastructure through civic stewardship

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ABSTRACT

Stewardship consists of acts of claims-making on space and caretaking of place that activate urban environments to function as social infrastructure. While stewardship practices are enacted by actors across the governance network, there is a need to better understand the role of civil society. Civic stewardship groups care and advocate for green, grey, and blue spaces, and can strengthen social trust and foster civic engagement. We conducted semi-structured interviews (n = 26) with a sample of New York City civic stewardship groups from a previous survey dataset (n = 754); the sample was stratified by network position and geographic scale. This paper analyzes how these groups operate in physical geographies and through relational networks. We describe the practices by which stewards activate and transform urban environments to create more sustainable cities, finding that activation of social infrastructure depends upon the degree of group connectivity and scale at which groups work.

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1. Introduction

The combined forces of global urbanization, budget cuts to public agencies, and environmental impacts due to climate change and other stressors create challenges for urban environmental governance (Betsill & Bulkeley, 2004; Lee & Koski, 2015). At the same time, many cities are undergoing a transition from the "sanitary city" (composed of separate, siloed functions and engineered, human-made components comprising the built environment) to the "sustainable city" (composed of regenerative, multi-functional systems, including green and blue spaces) (Childers et al., 2015; Grove et al., 2015). Despite this evolution toward an understanding of the complex and interconnected nature of public health and well-being challenges, critical theory reminds us to consider power, inequality, scale, externalities, and metabolisms of the "sustainable city" project (see, e.g., Swyngedouw & Heynen, 2003). Indeed, the planning and implementation of urban greening and green infrastructure projects as part of sustainability agendas is shot through with – often obscured or hidden–power dynamics and inequities (Finewood et al., 2019). In addition to transforming the physical structures of the urban environment and widening the scope of municipally led planning, a true

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transformation to sustainability would require a more flexible, integrated governance structure (see, e.g., Borgström, 2019).

These interlinked systems require ongoing coordination, collaboration, and co-management in order to function. Municipal agencies often do not have the funding or human resources to maintain these systems alone and rely on a network of civic organizations and volunteers as well as job trainees, summer youth temporary employees, and welfare-to-work staff, alongside permanent public employees (Krinsky & Simonet, 2017). Civic groups, however, are not only a labor force – they work to envision, shape, and structure the urban public realm in their own right. Civic groups are part of environmental governance networks of the city – along with government entities and private sector actors–as they advocate for, manage, and program urban spaces (Connolly et al., 2013; Mattijssen et al., 2018). As cities seek to steer toward sustainability – including through expanding and supporting novel configurations of green and blue spaces – there is a crucial role for civic stewards in those processes. In these instances, civic groups structure civic life and become essential to the transformative potential of society (Hajer et al., 2015; Tocqueville, 1835–2000).

Klinenberg (2018) and others have highlighted the ways in which physical spaces – and associated social organizations – can serve as social infrastructure that promotes diversity and inclusion and strengthens social cohesion (see also Joassart-Marcelli et al., 2011; Peters et al., 2010). Latham and Layton (2019) push on this concept of social infrastructure, identifying the need to understand where social infrastructures function well and how such functioning occurs. We posit that there is a need to focus on the organizational aspects of social infrastructures, to highlight Klinenberg's "hidden networks" of who is activating these spaces and *how* this activation and transformation occurs. In the cases of green, blue, and outdoor gray spaces, we find civic stewardship groups shape and transform urban environments–physically, discursively, and politically. Greater attention is needed to the role and impact of civic actors as stewards who engage in acts of caretaking and claims-making on urban sites and the public realm in pursuit of sustainability and environmental justice (Andersson et al., 2014; Bennett et al., 2018; Buijs et al., 2016). Stewardship practices are undertaken by diverse civic groups–with different foci on youth, seniors, social services, housing, and arts–and across multiple urban ecological site types including not only green public spaces, but also commons such as water and air, as well as systems of energy and waste (Svendsen & Campbell, 2008). These stewards can work independent of government, in collaborative arrangements, and/or through contestation (Connolly et al., 2013; Fisher et al., 2014). While environmental stewardship by civic actors is often "unseen" in the realm of urban environments or thought to be episodic and more ephemeral in nature than government-led environmental management (Metcalf et al., 2016), the civic sector is often more effective than government at realizing environmental justice outcomes for communities (Rigolon & Gibson, 2021).

Building upon the work of Klinenberg (2018) and Sampson (2012), we pose the following research question: how do civic stewardship groups activate and transform urban environments as social infrastructure in order to create more sustainable cities? Through interviews with civic stewardship groups in New York City, we add empirical evidence about the specific practices and organizational structures by which they activate and transform the urban public realm – particularly green, blue, and gray outdoor spaces–to serve social functions. Throughout processes of programming, visioning, and planning, we investigate whether, where, and how groups are advancing social outcomes within the public realm and

environmental systems. The amount and type of space they steward and the way they work with other organizations influence how these groups interact with social infrastructure and the urban environment. We focus particular attention on the ways in which stewardship practices are not only territorially bound or place-based, but operate through relational networks across distance and scale. Stewardship groups both marshal and redirect material flows as well as transmit knowledge, beliefs, and practices through social networks, and are thereby able to impact social infrastructure locally and at-a-distance via these networks. As such, we raise questions about the transformative or exclusive potential of these networks to restructure conditions in order to create more just, sustainable outcomes for the city. We conclude this paper with a discussion of implications for social infrastructure research and environmental governance.

1.1. Social infrastructure and civic life

Social infrastructure is defined as "the physical places and organizations that shape the way people interact with each other in everyday life" or "the physical conditions that determines whether social capital develops" (Klinenberg, 2018, p. 5). Social infrastructure is not a new concept; researchers previously have pointed to the idea of a "third place" for gathering (Oldenburg, 1989) and that public space is the product of both physical space and social processes (Zukin, 1995). Many research efforts also have focused on public space (see Harvey, 2012; Mitchell, 1995, 1996; Pincetl & Gearin, 2005) and its relationships to social cohesion (Peters et al., 2010) and diversity and inclusion (Joassart-Marcelli et al., 2011). Social infrastructures are not limited to a single sector, they can be public (playgrounds, markets), private (i.e. coffee shops, courtyard), or semi-private places (i.e. houses of worship) where people can assemble in a community. These spaces become the building blocks for social capital and social cohesion. Social infrastructures can help the individual combat feelings of isolation and exclusion. Through personal exchanges and encounters in these spaces, social infrastructures can assuage conflicts related to difference in culture, class, and politics (Blommaert, 2014; Klinenberg, 2018, p. 9). In this way, social infrastructure can be viewed as part of the larger network of spaces, groups, and institutions that create opportunities to deepen our social bonds and connections (Latham & Layton, 2019).

Physical spaces must be enlivened by individuals, groups, and organizations in order to function as social infrastructures that create opportunities for people to feel part of collective life. These spaces are formed, shaped, and sustained by the politics of public space and representatives of the community that engage with them (Bodnar, 2015). These often informal and everyday spaces have long been deemed essential to civic life because they foster the types of social networks and collective efficacy that are the cornerstones of a functioning society (Gans, 1962; Jacobs, 1961; Latham & Layton, 2019; Putnam, 2000). The concept of thin sociality is salient here as in some places, people move through space only slightly aware of each other (Bodnar, 2015). While individuals and groups may be tolerant of each other, no further collaboration or interaction may occur. Social infrastructures, much like public space, can be characterized as assemblages that contain varied levels of disorder, openness, and diversity (Sendra, 2015), leaving open the chance for appropriation and change that is essential to civic life. Social infrastructure provides the context for social trust and the kind of emergent networks necessary for social capital to flourish.

Urban green and blue spaces can also function as social infrastructure by offering the public opportunities for recreation and interaction with outdoor environments (Latham & Layton, 2019; Stanley et al., 2012). The environmental stewards who aim to improve community quality of life through the management and activation of these green and blue spaces can serve as transformative agents that create both social and ecological outcomes (Svendsen & Campbell, 2008). It is through the sociality of their actions that environmental stewards become embedded in any given place. As sociality is an essential element in how benefits and services of social infrastructure are delivered (Latham & Layton, 2019), important questions emerge around what gives rise to and sustains this sociality and what are the micro-spatial practices (Iveson, 2013) that give shape to specific types of social infrastructures? Examining local environmental stewardship practices in relation to outdoor social infrastructures may also offer insights to these questions and to social infrastructure practices at large.

1.2. The "sustainable city" and the role of civic stewardship groups

Since the founding of cities, parks, plazas, and other open spaces have served vital social functions, including recreation, leisure, and socialization; these greenspaces influence real estate values through their distribution and quality (Conway et al., 2010; Cranz, 1982; Morancho, 2003). Fundamental inequalities along dimensions of race and class intersect to shape who has access to and benefits from these amenities (Taylor, 2009). Since the 2000s, there has been a turn toward "urban greening" and sustainability planning by municipal governments, including in New York City, often framed in terms of efficiency arguments, competitive city, and green growth models – with less attention to issues of environmental justice (Campbell, 2017; Pearsall & Pierce, 2010; Rosan, 2012). These efforts have often focused more narrowly on the role of green spaces in providing biophysical benefits or ecosystem services such as shade, cooling, mitigating stormwater runoff, and helping adapt to climate change (Young, 2010), with a relative *lack* of attention by city agencies to the people, practices, and organizational arrangements that sustain these green spaces. More recently, however, environmental justice concerns are becoming a steady and effective part of the work of non-governmental organizations (NGOs) and local stewardship groups (Rigolon & Gibson, 2021), bringing a potential shift toward environmental justice in governance narratives within cities.

Environmental justice and critical scholarship has demonstrated the uneven quality of local environmental amenities–from tree canopy to public parkland–drawing attention to unjust outcomes as well divisive processes involved in the provisioning of those services, such as the undermining of public work through neoliberalization (Agyeman & Evans, 2006; Krinsky & Simonet, 2017). Although cities may be greening up, they are not necessarily doing so in ways that are equitable or socially just. Environmental resources are spatially uneven and distributed through processes that can privilege those with greater wealth, status, or power (Grove et al., 2018; Heynen, 2003; Schwarz et al., 2015; Watkins & Gerrish, 2018). In response, the normative solution to this inequity has been to provision more green space rather than to examine and address the uneven distribution of social infrastructure and civic capacity.

More recently, there has been a call to harness the capacity of civic actors as stewards who engage in acts of caretaking and claims-making on the urban environment (Andersson et al., 2014; Buijs et al., 2016). Many civic groups have missions that span various domains of environmental protection and community development – where stewardship is used to

advance local quality of life (Connolly et al., 2014; Krasny & Tidball, 2015). One schema theorizes stewardship through the domains of knowledge, care, and agency (Andersson et al., 2017). Bennett et al. (2018) conceptualize the ways in which stewardship actors, capacities, motivations, and actions produce social-ecological outcomes. Another way to view urban environmental stewardship is by the functional purposes that these groups take on in caring for the local environment: conservation, management, monitoring, advocacy, education, and/or transformation (Campbell et al., 2019) ; Connolly et al., 2013; Fisher et al., 2012; Svendsen et al., 2016; Turnbull et al., 2020).

In addition to the spatial distribution of green space, it is important to know more about the multiple forms of networked relations between government and civic actors, with an eye to issues of inclusion and equity (Rigolon & Gibson, 2021). Specifically, we need to better understand how civic environmental stewards work in both physical territories as well as networked relations with government to shape the public realm and social infrastructure. There remains a need to understand how the matrix of green, gray, and blue spaces are provisioned, distributed, and shaped in the urban environment. A key element of any assessment is understanding the functioning of these spaces and their associated governing regimes and networks. Who activates and contributes to the governing processes of these spaces is inextricably tied to whether and how open space performs over time as an accessible public realm (Bulkeley & Mol, 2003). This type of reflective thinking about governing processes of urban environments is critical. It is through the forces of social production that humans strive to improve the quality of life in their communities (Berlant, 2016).

1.3. Environmental governance and civic capacity

Scholars have characterized governing relationships that extend beyond the state as collaborative, multi-level, hybrid, or networked governance (Bulkeley, 2005; Davies, 2011; Gustavsson et al., 2009; Rhodes, 1996). In honing in on stewardship groups, scholars of green and blue space practices in European and American cities have called for a mosaic or hybrid governance where municipalities develop and fine-tune mechanisms in order to link up with an active citizenry, noting that there exists great variability in local cultural context that can render unilateral treatments and policies insufficient (Buijs et al., 2016; Fisher et al., 2014). Stewardship groups can function as key brokers operating in dynamic civic networks and governance networks where they deploy varied practices and tactics to create social-ecological outcomes (Baldassari & Diani, 2007; Connolly et al., 2013, 2014).

Understanding the functional aspects of stewardship helps to clarify civil society's role in actively shaping and creating new forms of environmental governance. A number of cases from the environmental realm have found civic groups to bring local knowledge to bear alongside and within government and private sector efforts, to scale up through political hierarchies, and to scale out through social networks (Beckie et al., 2012; Buijs et al., 2019). Still, there are different types of green and blue spaces that require distinct approaches in terms of function and care. Real challenges exist with tailoring approaches to a particular locale when universal treatments are more cost-effective or local groups and governments are out of sync with respect to priorities and capacities (Buijs et al., 2019). In some instances, local environmental groups are viewed by the establishment as insurgent groups working to undermine the provision of more profitable public space. This has prompted scholars to ask: what are the right-fit mechanisms that can align and sustain emergent enthusiasm of a local call-to-action

along with the systematic and often prolonged planning protocols of government? (Bodnar, 2015)

Scholars have found great variation in social infrastructure, including spatial differences in civic capacity to address environmental concerns (Sampson, 2017). Fragmented organizational networks become as much of a barrier to environmental sustainability and justice as the proximity to brownfields and other toxic areas. Many stewardship groups do not have access to the same level of resources or social networks throughout the city. Yet, green spaces that function as social infrastructures, such as community gardens and parks, often give rise to precisely the type of organizational mechanisms that produce associated benefits of community efficacy, well-being, and civic capacity (Sampson, 2012). These small-scale groups generate programs and everyday activities that create shared expectations and trust (Small, 2009), engage in the type of "do it yourself urbanism" (Iveson, 2013), and foster social networks (Connolly et al., 2013, 2014) that may in some instances help to address preexisting differences and inequalities across a given urban geography. With explicit equity goals and sufficient resources civic groups can address equity (Rigolon, 2019), but scholars caution falling into the local trap (Purcell, 2006), where local civic groups are universally characterized as more democratic and inclusive than governments. This question of equity remains, but understanding the capacity of social, policy, and governance networks may hold promise in finding the answer (Ramaswami et al., 2016).

2. Materials and methods

This paper draws upon data collected through the Stewardship Mapping and Assessment Project (STEW-MAP), a USDA Forest Service research project (see https://www.nrs.fs.fed.us/STEW-MAP/). In order to better understand environmental governance networks, capacities, and gaps, STEW-MAP surveys civic groups engaging in environmental stewardship, to capture data on their organizational characteristics, their territory – or geographic area where they work, and their networks – including collaboration with civic, private, and governmental actors (Svendsen et al., 2016). The study referenced here was implemented in 2017 in the New York City region, with a total of 7,003 groups in New York City receiving the survey and 754 responses (11% response rate). Civic stewardship groups were found to work across all five New York City boroughs on a range of physical site types, with territories ranging from a single property parcel, to neighborhoods or watersheds, to the entire city or region (see supplemental materials, Figure S1). Moreover, we found that these groups do not work alone – but participate in collaborative networks that cross institutional sectors and physical site types (see Landau et al., 2019 for complete methodology and survey results). Our sample focused on groups engaging in any aspect of environmental care; therefore, we do not comment on the full range of social infrastructure that include indoor spaces such as libraries or daycare centers. This study design allowed for a more in-depth focus on groups that aim to advance urban sustainability but does miss some dimensions of the role of civic groups in activating other forms of indoor sites for social ends.

We selected a stratified random sample of groups to participate in in-depth, semi-structured organizational interviews (Robinson, 2014). The sampling design stratified New York City STEW-MAP survey respondents by size of their geographic territory and level of network connectedness (Figure 1). This approach built on the prior research of

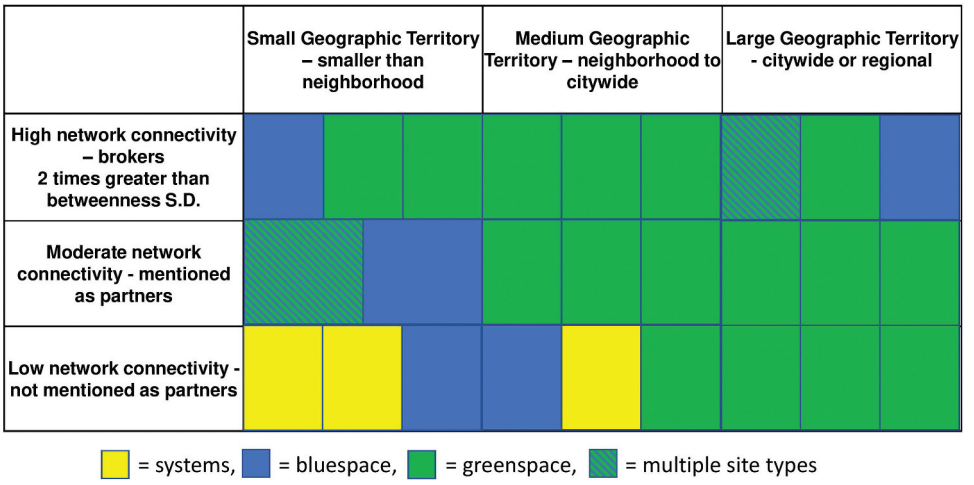

Figure 1. Sampling design for interviews, with groups randomly selected within each category. Within each category are boxes indicating the number of groups interviewed; colors indicate the group's site type (n = 26).

Connolly et al. (2013) that selected groups with high centrality and betweenness in the network in order to understand the role of broker groups. With this design, we sought to further understand the roles of groups occupying different structural locations within the organizational network, as well as groups that touch down in physical space at a range of scales. We assigned groups to one of three network categories (no named connections, named connections, and brokers–which have a two times the standard deviation for betweenness, calculated in Gephi version 0.9.1 (Bastian et al., 2009), supplemental materials, Figure S2) and to one of three geographic categories (citywide or regional, neighborhood to citywide, and smaller than neighborhood, based on territory size, calculated in ArcMap 10.5 (Environmental Systems Research Institute [ESRI], 1999–2017), supplemental materials, Figure S3). This design led to a typology of nine different group types; three groups were selected at random from each category. Following any bouncebacks or interview refusals, we selected a replacement group from the same category. In the category of large geographic territory and moderate connectivity, replacements were exhausted and only two groups were interviewed for a total of 26 interviews during 2019. These groups work on different site types (Figure 1). Green spaces include community gardens, parks, and street trees. Blue spaces include waterways, wetlands, and waterfronts. Systems include multi-sited, networked infrastructures such as waste, energy, and stormwater systems.

These semi-structured interviews were voluntary, confidential, and lasted one to two hours each (Rutgers IRB #E17-549). Topics covered included organizational histories; key turning points in those histories; relationship to and impact of government policies and programs; partnerships and networking; challenges and obstacles; and social-ecological outcomes and impacts. Because our unit of analysis is the organization, we did not collect or analyze information about respondent demographics. We recorded, transcribed, and coded interviews qualitatively in NVivo 11 (QSR International, 2015). Transcripts came to a total of 308,257 words – or approximately 617 pages. An inductive coding scheme was used, with dual coders coding transcripts of two interviews, resolving discrepancies, and coming to consensus

on the coding scheme – after which the remaining 24 interview transcripts were coded. Drawing upon grounded theory that acknowledges an "interplay between induction and deduction" (Strauss & Corbin, 1998, p. 137; see also, Strauss & Corbin, 1994; Walker & Myrick, 2006), we identified emergent codes related to social infrastructure directly from the content of the transcripts as well as being informed by the existing literature. To further analyze the data, we conducted a series of matrix coding queries in NVivo 11, to explore relationships by sampling design (network position, geographic territory), physical site type, and the sub-themes related to social infrastructure. We standardized by word count, presenting the number of raw frequencies of each theme per 100 words of account (see Larsson & Granhag, 2005). We present these themes and relationships in this paper.

3. Stewards activate and transform urban environments: green spaces, blue spaces, and infrastructural systems

Here, we present an analysis of the ways in which stewardship groups activate and transform green, blue, and gray outdoor spaces. First, we identify groups' practices and processes that serve as the mechanisms of that activation and transformation (Section 3.1). Second, we analyze stewards' territorial geographies and the ways in which they work across sites, space, and scale to influence different physical components of the city (Section 3.2). Finally, we examine stewardship groups as part of a relational network – parsing their roles in activating and transforming urban environments by their position within that network (Section 3.3). Within each subsection, we highlight thematic patterns and present illustrative quotes from the 26 interviews.

3.1. Stewardship practices and social processes

This section is organized into a set of three distinct, yet interrelated themes that describe the practices and social processes by which stewardship groups activate and transform urban environments: (1) friendship, loose ties, and social cohesion; (2) gathering space and public programming; (3) community engagement, organizing, and planning. For each theme, we analyze whether and how groups are actively engaging with the equity and inclusion implications of their work.

3.1.1. Friendship, loose ties, and social cohesion

Stewardship actions are motivated by a thoroughly social impulse to bring communities together, in addition to an environmental ethic. Street trees and streetscapes, community gardens, and neighborhood parks serve quite literally as the nature right outside one's doorstep, with low barriers to entry in their care; specialized tools, expensive materials, and highly technical knowledge are not required. Stewardship efforts offer a way to connect with strangers and neighbors through a combination of shared work and socializing. One gardener reflected,

> I knew the people that lived in this building, but beyond that I didn't know anyone in the neighborhood. So when I retired it sort of became like 'okay who do I have coffee with?' . . . So when this opportunity came up it ended up being such a nice group – you're gardening, you're on your hands and knees . . . and you're chatting and you're talking and you see them every week and so you can catch up . . . and it's been huge for the community. (R19)

One street tree steward said "At our events, we always make it fun so we have food, we have coffee, we try to make the event intergenerational so the students or younger kids [attend in addition to adults and seniors]."(R15) By activating space in consistent and ongoing ways, stewards reported becoming better acquainted not only with their group members and program participants, but also with the everyday users of the open spaces–whom one respondent termed "wave friends" (R6).

The importance of shared spaces and hyper-local social ties becomes even more evident in times of crisis. One stewardship group was created shortly after 11 September 2001, when residents on a block in Park Slope, Brooklyn realized they did not know their neighbors. They were looking for an accessible, engaging way to strengthen local social trust and cohesion–and found that opportunity in caring for their tree beds, entering a borough-wide contest around street beautification, and hosting local block parties. Caring for the public right of way represented something of a "grey zone" (see Rae et al., 2010) or a third space – not the private property of people's front stoops and lots, but still with a sense of local territoriality. Navigating the occasional disputes over who "claims" the streetscape also provided a space for dialogue. These practices that began in 2002 have carried forward to the present – evolving with the changing demographics of the block. So, while the events held by the block association have changed, the friendship and loose ties sustained by the stewardship practices and social activities keeps them connected. Another stewardship group reflected on the importance of community gardens as gathering space and social support network on the Lower East Side:

> During Hurricane Sandy the Con-Ed plant here blew up so we were out of electricity for seven days and so people gathered in the gardens to cook all the food they had at the BBQ's because the food was going to go bad in the refrigerators and also it was the only place where you could get cell phone service and there were people on bicycles that had been converted to a power source that you could charge your phones while somebody else was riding their bike. (R11)

Particularly in light of climate change, social and political unrest, and socioeconomic inequality, stewards noted the need for shared spaces that can support community cohesion from the ground-up.

3.1.2. Gathering space and public programming

Traditional interpretations of social infrastructure place a high value on shared spaces that serve as hubs where publics interact. Parks and community gardens are quintessential examples of local public space; increasingly, streetscapes are being activated as gathering spaces as well. One stewardship group cares for several miles of planted roadway medians with benches at street crossings that have created an unconventional, but thriving gathering space. The physical design of the water's edge also affects what types of human-water engagements are possible. One steward reflected on the way the first public access to a polluted waterway in 2007 generated additional interest in ecology and stewardship of the site, saying "We feel very strongly about the power of access as a transformative way to bring people in" (R12).

Stewardship groups play a crucial role not only in maintaining existing green and blue spaces, but also in activating these sites through events that amplify their potential for community engagement and inclusion. Interviewees shared numerous examples of creating environmental festivals as well as multilingual programming including music, art, dance, and theater of different cultural groups. Youth engagement programs were widely mentioned, and

included paid job training programs, experiential education, and environmental curricula. One group of neighbors identified a need for more safe spaces for women of color to pursue healthy lifestyles in visible, public ways that are affordable and accessible, and organized a running club that holds training events and public races in their local park. Another stewardship group advocated for maintaining off-leash hours for dogs in NYC Parks. But rather than simply create a petition to the agency, they activated their local park with a series of dog-focused events, including park cleanups, that drew media and public attention. These social events strengthened a community of dog owners who use the park in off-hours, making it a safer space for all. Stewardship groups are well poised to know the hyper-local needs of their communities and to identify when there is a gap to be filled.

Program delivery can be an opportunity to strengthen inclusion, as some groups explicitly target underserved communities. One of the larger public-private partnerships with NYC Parks described the way in which they use programming with public libraries and other cultural institutions to ensure that the park they co-manage is reflective of their changing community, providing everything from storytelling, to dance, to immigrant rights workshops. They said "High on our priority list, especially as the communities in Brooklyn change, is making sure that everyone still feels welcome in the park. There are still activities for everyone in the park" (R23). For educational groups, focusing on Title 1 schools, Head Start centers, or low-income neighborhoods allows stewards to ensure that their resources go to underserved areas. One group that aims to build relationships between upstate water supply forests and downstate drinking water publics reflected on the way in which educational programs can serve as "neutral ground" to build stronger relationships across those divisions. Their programs bring together demographics that don't often interact–diverse urban youth (and their teachers and parent chaperones) and rural and suburban volunteer anglers–who are primarily older, white men. A group that creates rooftop greenhouses developed a service-learning curriculum to help students learn how to navigate the food system, from growing food to distributing it through meals on wheels or food pantries in order to address food justice concerns.

Programming can seek to foster a sense of ecological citizenship, including by rendering sites and infrastructural systems more visible. One citywide group working on waterfronts hopes that through their programs, New Yorkers will better appreciate their estuarine environment. When their organization creates oyster monitoring stations or constructed reef projects, those installations become physical touchpoints that activate that portion of the waterfront as a site for learning. Even non-participants can learn through observing the spectacle of people entering the water in waders. Another steward talked about aiming to change New Yorker's relationships to water and land by occupying waterfront space and building a participatory, temporary, human-powered pedestrian bridge from Brooklyn to Governor's Island. The artist described the prototyping of this bridge as a celebratory event–including a parade through neighborhood streets–that brought out residents to experience the water in new ways. Many arts-based groups draw upon public theatrical performance to generate awareness and inspire future engagement in sustainable practices.

3.1.3. Community engagement, organizing, and planning

Community engagement takes a variety of forms depending on the mission, scope, degree of professionalization, and territory of the stewardship group. But the abiding feature unifying this work is direct, often hands-on, opportunities for the public to contribute toward caring for

the local environment and community. Volunteers include city residents, youth groups, and corporate employees engaging in service days. Stewardship activities include, for example, neighborhood clean-up days, tree planting, invasive plant removal, mulching, bioblitzes, recycle-athons, and composting events. One steward reflected on the importance of community contributions, saying "What really makes a city a vibrant and a safe and an interesting place to live is when you have the community that actually cares about it, and they define an area that they will take responsibility for, they commit to doing it, and they do it . . . that's a nice place to live" (R19).

Community organizing occurs at a range of scales from site level decision-making among groups, to door-to-door outreach, to citywide advocacy campaigns, to regional and national coalitions. For example, there are 550 community gardens citywide, which have a rich organizing history that includes the 1990s garden preservation crisis under the Giuliani administration. The resulting network of groups, coalitions, and land trusts is working to address issues such as aging gardeners, shifting demographics, and ongoing preservation battles in the developing city. Moreover, site-specific decision-making about group membership, public access, allocation of space, and rules require stewards to develop finely honed abilities to mediate difference, both internally – between group members – and externally – between sites and neighbors. But in these conflicts, under the best of circumstances, lie opportunities for learning. For example, one steward shared the story of a local conflict around whether a garden could keep chickens that erupted into a full-on dispute that reached the pages of the *New York Times*. The way in which the group navigated this dispute is illustrative of how managing shared green space can produce new modes of communication, compromise, and collaboration:

> One of the criticisms the neighbors had was 'you know you're just not good neighbors, you don't even shovel your sidewalk when it snows predictably, how do you expect yourself to look after chickens?' . . . We thought 'we have to be better neighbors.' . . . I made sure if it snowed, we would go over more than once . . . and made sure not only was our sidewalk shoveled, but our neighbor's sidewalk was shoveled too. We stopped getting complaints. We had friendly chats with some of our most hostile neighbors . . . . And the amazing thing about it was the chicken became the model for how teamwork should be. (R9)

Stewardship groups shape a collective vision for green, blue, and gray spaces through community-based planning. In addition to working with their place-based communities, many groups organize through communities of practice. These gatherings are not permanently sited but serve as moments of mutual learning and relationship building that are crucial building blocks for transforming systems. Many groups use a mix of in-person gatherings with the more frequent use of digital tools including monitoring portals, virtual meetings, and social media

Stewardship groups help ensure that community voices are heard in the visioning and planning of local sites and systems. Often, they work to specify, expand, and root in place the channels of public engagement and planning. One steward talked about the need to tailor outreach with communities in ways that start from being authentically embedded in the experiences of and relationships in place:

> We understood–since I lost my house also in Sandy–a lot of people don't realize that 25% of the homeowners in Coney Island are Chinese and they don't speak English and we have very high Russian populations, so I realized that communication was key . . . Not only did you

> have to have your flyers and have an interpreter . . . but you had to go out and knock on doors . . .. When you're working with the underserved community, it's a little different. Most people want to put it on Facebook and Instagram and email, but people don't have that, so it's still the old-fashioned door-to-door, talking to your neighbor. (R10)

Others, rather than participate in and expand state-led plans, initiate civil society-led planning processes in their own right. One group–along with a national NGO, professional design firm, and community members–created its own vision and 150-page plan for a contaminated, industrial waterway. That plan contained 85 different proposals ranging from shoreline access, to wetland remediation, to stormwater infrastructure upgrades to offer a comprehensive, bottom-up vision for the watershed. Finally, one steward reflected on how local environmental decision-making can only truly be inclusive if it involves systemic change, including power sharing by those with more access and privilege:

> Stewardship for the environment is tied to these really big questions about how we treat one another and how we, those of us who already feel welcome in spaces make space and invitations for others there, and how people who have power can either cede some of that power for some of these groups to have more agency in these spaces to welcome others or to understand that power works best when everyone's invited to the table. (R7)

3.2. Stewards work across sites, space, and scale

The material, discursive, and political tactics stewardship groups use to transform space into social infrastructure depend not only upon the groups' mission and vision for the environment, butalso on the physical sites and networked systems where the groups touch down. These site types have unique governance arrangements and programmatic possibilities that are closely tied to the jurisdiction, ownership, and physical form of these spaces. Here we analyze differences across groups in how they activate and transform urban environments by these site types and the geographic scale of their stewardship territories and examine equity and inclusion issues where appropriate.

Civic groups have always had a role in the care of trees, plazas, and parks throughout the history of the city, but this role is increasing with the rise of multifunctional green/gray infrastructures. The recent expansion of the urban tree canopy and the proliferation of rain gardens in the public right of way create an opportunity – and a need – for enhanced and novel stewardship arrangements. Maintenance requires sustained cultivation and support and is, by its nature, ongoing – like "brushing your teeth" (R15) as a steward noted. While green infrastructure maintenance is often framed as helping maximize the provision of ecosystem services (e.g. shade, cooling, stormwater absorption), maintenance work also strengthens social ties and interactions – thereby ensuring green infrastructure also serves as social infrastructure. However, greenspace stewardship groups, particularly partnerships and conservancies, are not evenly distributed throughout the city and therefore the additional assets that are leveraged into parkland (funding, staff, programs) are not equally available to all New York City neighborhoods. Several interviewees working at public–private partnerships were keenly aware of this delicate dance – they saw themselves as supplementing the capacity of local government but did not want to stand as a rationale for further roll-backs of public support.

New York City is a coastal, estuary city, with the surrounding waterways serving as the largest local open space and public commons. However, direct access to the water is more limited than the neighborhood greenspaces just described–unless one has access to a boat or waterfront property. Stewardship groups are working through a range of tactics and at numerous scales to reconnect New Yorkers to these waterways through not only expanding physical access, butalso through creating meaning and attachments rooted in knowledge and care. Some groups explicitly mentioned the context of waterfront development and the potential for new housing and gentrification to privatize and change the access to the waters' edge. Others mentioned the shortage of existing waterfront access, particularly in areas that were historically or currently are industrialized. So, creating space for the public to safely view, launch a boat, and perhaps eventually swim–represents an increase in access for areas that have had little connection to the water.

The infrastructural systems on which the city's metabolism depends–energy, water, and food–in the past were largely managed by public agencies and private markets, but civic stewardship groups are now also working in these domains. Given the networked nature of these systems they are inherently less "sited" than green spaces–requiring civic groups to navigate multi-scaled systems with complex institutional landscapes. While some of the work of stewardship groups seeks to create ecological outcomes for these systems–such as lessening the use of Carbon or decreasing combined sewer overflows (CSO), other approaches are more explicitly social, such as changing people's personal relationship to waste, or using the food system as a way to effect community-level changes through organizing in networks. Infrastructural systems can often remain invisible to the general public – indeed they are often intentionally hidden or designed as such (see, e.g. Kaika, 2004); stewardship groups work to make these systems more visible and legible, so that people can forge new relationships with their environments. Systems groups approach the issues of equity and inclusion in different ways. Some work is framed as intergenerational equity by helping to transition to lower Carbon and less polluting industries and systems now. Other stewards aim to address the current inequitable distribution of infrastructural systems, like one group that explicitly spoke of challenges faced by unhoused populations in having adequate, safe access to sanitation.

Spanning across site types takes different forms depending upon the geographic scale at which groups work, from neighborhood, to citywide, to global. Initially working at a smaller scale, one group in a coastal community began through simple gestures of planting flowers and beautifying streetscapes following Superstorm Sandy. That entry-point led to advocacy for a local polluted waterway – including the highly technical MS4 permitting processes, to transportation siting debates, to better signage about combined sewer overflow dangers. Eventually they became part of citywide, regional, and national conversations about resilience planning, starting from the experience of living and working in an environmental justice community. At a larger scale, a citywide group saw its boundary-spanning role as one of convening practitioner dialogs that span the research-policy divide, by convening public agency and civic stakeholders around the issues of green roofs and urban forests.

Overall, geography and site type affect how stewardship groups facilitate social infrastructure. Based on the number of coded references in NVivo 11, we find that mid-sized groups made the most frequent references (0.615 mentions/100 words of account) to all dimensions of social infrastructure, followed by small groups (0.562 mentions/100 words

of account), and large groups (0.300 mentions/100 words of account). This suggests the importance of better understanding and amplifying the role of neighborhood and block level groups, in stark contrast to the attention that is often placed by funders and the media on larger groups that cover a wider terrain. At the same time, it is worth taking these results with a bit of caution, as we know that the survey data from which the sampling design was created represent only a snapshot in time of evolving groups; groups are capable, in some instances, of changing their territories as their programs shift, funding becomes available, and needs and opportunities arise.

3.3. Stewards work collaboratively via social networks

Here we consider the ways in which stewardship groups navigate relational networks that span time, space, and scale. We found that brokers made more references (0.578 mentions/100 words of account) to all dimensions of social infrastructure, less-connected groups made fewer (0.470 mentions/100 words of account), and moderately connected groups made the least (0.425 mentions/100 words of account) (See supplemental materials, Figure S4).

Highly connected civic groups in the stewardship network activate urban green and blue spaces most commonly through community-based planning, opening up space for broader and meaningful public engagement in shaping and using the local environment. We found ongoing evidence for the bipartite role of broker groups – both working collaboratively with government, but also bringing flexibility and responsiveness to community concerns (see also Connolly et al., 2013). These brokers work to foster trust and build collaborative relationships across multiple domains, including elected officials, city agencies, citizen action groups, and labor unions. In so doing, they create new conduits for communication that are above and beyond legally required public comment periods, they amplify the voice of community stakeholders in decision-making, and they draw upon their complex partnerships to create advocacy "asks" that help communities meet their needs while being rooted in the realities and constraints of governing. This quote from a citywide advocacy organization illustrates this complex navigation with the NYC Parks department:

> We are always transparent with them. We have regular check-ins with the agency . . .. I think there have been periods of time where the relationship between our organization and the agency have been more adversarial, or there hasn't been trust between the two parties that led to sort of a breakdown in regular communications . . . Right now . . . there is a sense of we can't benefit each other alone . . . It's better to have that friendly relationship . . . NYC Parks can't advocate for themselves, so we know that's why our organization exists and . . . Our sense is they're grateful for us being that voice. (R3)

As an example of how they work, this organization developed a "Public Realm Bill of Rights" that resulted from a citywide series of neighborhood-based community dialogs they organized. The bill of rights was used not only to message directly to city agencies, but also to speak with candidates running for local election.

At the same time, some broker groups have honed their abilities and repertoires for holding the state accountable – particularly around contentious open space and development issues. For example, one group that was founded to focus on community gardens has more recently become involved in organizing against the city's East Side Coastal Resiliency Project, which

will retrofit the shoreline for flood protection but involves a multi-year loss of public parkland adjacent to a densely populated neighborhood. The group expressed frustration and distrust over the city-led public outreach processes, organizing residents to voice concerns via those public channels as well as participating in rallies and protests against the plan. Many such stewardship groups are battle-tested via their histories of organizing and advocacy that have evolved along with the history of the city – from the community garden crisis in the nineties, to the effort to preserve open space in the face of rapid development in Staten Island, to the ongoing work to raise awareness of the need for equitably distributed and maintained parkland citywide.

Moderately-connected groups engage in relatively more programming and activation of the public realm than do the broker groups. This programming takes the diverse forms described above – cultural, educational, health and wellness, sports, and sustainability-related activities are widespread. In delivering these programs, many stewardship groups work with municipal government – often by receiving money, materials, or technical support. While moderately networked groups conduct community engagement, it usually takes the form of creating opportunities for volunteers to participate in hands-on stewardship activities, rather than in the larger-scale advocacy efforts led by the broker groups. We also found examples of stewards braiding together their personal and political passions, starting with local greenspaces as particularly accessible platforms for action. Stewards shared stories of organizing on a range of issues – from historic preservation, to banning single-use plastics, to climate change advocacy, to creating pollinator gardens, to engaging in horticultural therapy. We see a nimbleness in the modes of action, as these issues intersect to comprise community quality of life. Finally, some stewardship groups in this category reflected on the ways in which they aim to grow capacity for other stewards beyond their group to do this sort of work, through teaching and exchange:

> [Some residents asked us] 'when's the next event? When are you coming back?' and we said, 'Well it's a little hard for us to come back, but if you guys want to start something, we'll be happy to support you' . . . I think that would be a wonderful thing to do if we could help other groups get started . . . (R13)

Similarly, other moderately connected groups lead by example – showing the types of programs that are possible, and by giving out "starter kits" for other groups to go forth and work in other sites around the city. In these ways, the impact of these groups can spread through peer networks to distant locales beyond their individual territories. Other stewards organize via their community of practice – such as educators – to come together, share contacts, curriculum, and best practices.

Although less-connected groups are not as centrally positioned, they are not "isolates" in the network. They still develop and maintain collaborative ties with civic, public, and private sector groups and identify them as partners. However, groups in this category were not mentioned by other civic stewardship groups who responded to the STWE-MAP survey as partners. These less-connected stewardship groups frequently mentioned mediating conflict and difference, which centered on differences in opinion among members. At the same time, these groups foster many interpersonal connections in addition to inter-organizational connections. Groups in this category more often referred to forming friendships and loose ties, including meeting future spouses, friends, and collaborators. These interactions can lead to encounters with members of the public that don't always interact – such as a person without

housing frequenting an artist's temporary structure in a park on the Lower East Side of Manhattan. Through sharing the space and collaborating in the public art project together, they were able to build mutual trust and respect. One organizer reflected on both in-person ties and the virtual social ties cultivated through social media–a network of dog-lovers and supporters is connected citywide through these platforms. Finally, a group that was facing the potential loss of their green space due to a major highway construction project reflected on that physical disruption and the way in which the group might be able to continue to work together–albeit on a new physical space. After 10 years of working on their current site, they told NYC Parks they might be willing to relocate to another site across the neighborhood. This ability and desire to transcend the loss of a site shows the strength of the social ties that the group has cultivated – a set of bonds and capacities that would remain invisible were we to consider the physical site alone.

4. Making stewardship visible in shaping urban environments

We find that stewardship groups activate and transform the urban environment via multiple pathways that vary by group network position and geography to create and maintain social infrastructures. Working alongside or independent of government actors, civic stewardship groups clearly play a role in the advocacy, maintenance, and activation of the public realm and urban environments. They can create tangible, visible, often site level outcomes–such as programming and events that welcome multiple publics into a space, as well as intangible–often collectively held–outcomes, including friendship, trust, and shared values. Through their social and material networks, these groups can function in transboundary roles–through brokering, coalition-building, and convening communities of practice–that span different sectors and scales. Moreover, stewards are carriers of institutional and collective memory that can move across space and over time; for example, if access to physical sites is lost, the group carries forward knowledge and relationships that can be transferred or adapted to new conditions. Overall, what is crucial in this analysis is not to miss the role of the *groups* that comprise an essential network of transformative stewardship. While physical space is necessary for social infrastructure to occur, it is not sufficient – activation is dependent upon organized, motivated, and dynamic stewards.

Our findings indicate the need to acknowledge the functional importance of network position and geographic scale of groups within the broader system of stewardship for understanding their varied impacts on social infrastructure, revealing some of Klinenberg's "hidden networks" related to activation and care. We found that localized groups and those with fewer network connections are building friendship and social ties, while moderately connected groups develop programs, and brokers advance planning and visioning. Thus, by strengthening trust and social bonds, hyper-local groups are creating crucial building blocks that can strengthen civic life and are essential for addressing diversity, equity, and inclusion. All stewardship groups interviewed create social impacts through engaging in relationships of care – subtle to radical transformations of self, group, and neighborhood. The impacts weave through diverse areas of interest (such as housing, seniors, and community development) and across the physical landscape of the city's green, blue, and gray spaces into a rich tapestry of civic life and the environment. At the same time, we know that these groups do not exist evenly across geographies (Johnson et al., 2019, Joassart-Marcelli et al., 2011; Sampson, 2017) and that certain groups are better positioned within the network to access information and

resources, as such their impacts differ widely. Given this spatial unevenness and network structure, how can more parity be built into the system? While active stewardship alone is not an indicator of inclusion and equity, a strong network has the potential to address these issues by redistributing resources and working collaboratively to ensure that under-resourced groups have access to grants and materials. By making these hidden networks and spatial patterns of stewardship capacity more visible and understood, we can inform outreach, community organizing, and planning strategies toward more inclusive processes and goals (see also Landau et al., 2019).

Going forward, as cities – including municipal governments, civic organizations, and urban residents–seek to advance sustainability and resilience agendas, how can these stewardship groups be incorporated into these efforts? Currently cities have an over-reliance, but under-resourcing of civic stewardship groups, particularly in frontline communities. There is a need to support collaborative partnerships in order to strengthen and sustain environmental governance capacity. Not an either/or, but a both/and approach is needed to support an interdependent, equitable system of stewardship across public, civic, and private sectors. The public sector provides crucial parks maintenance workers as paid jobs, but volunteerism and civic leadership provide important sources of personal meaning, community contribution, and social cohesion. Vibrant urban public open spaces require government and NGO programs that enable and foster civic engagement at all times of year and in all neighborhoods. How best can stewardship groups be supported in an inclusive way that–at minimum–does not amplify existing inequalities or better still, advances social justice? Prior research has found that environmental justice nonprofits in Los Angeles improved equitable access to parks, suggesting stewardship groups with explicit equity goals have the potential to affect change (Rigolon, 2019). Indeed, we found evidence of some stewardship groups explicitly aiming to address diversity, equity, and inclusion through their programs and organizational structures–while other groups were silent on these crucial concerns. Some current organizations and coalitions in New York City have been able to see this dispersed network of stewardship groups and organize it into successful campaigns and efforts to strengthen inclusive social infrastructures. Yet, there remains ongoing work to be done to invest in people and programs, in addition to physical spaces and capital projects. Fostering the mosaic governance that Buijs et al. (2019) describe would require government land managers to adjust their place-based thinking to incorporate the work of civic groups alongside their efforts to bolster and strengthen a public green workforce. In order to do so, we need to better understand where civic groups are present, where there are gaps, and what mechanisms are needed to help them grow and thrive equitably throughout the city.

Through this research, we identify how civic environmental stewardship groups serve to activate and transform gray, green, and blue spaces into Klinenberg's (2018) concept of social infrastructure. The sites stewarded by environmental groups are unique in comparison to other forms of social infrastructure, such as local businesses, in that they are largely outdoor public spaces. Efforts to improve access to and beautify these assets have the compound impact of both improving physical sites to draw more visitors and creating an onramp for these visitors to form social ties and participate in civic life and environmental governance. Our interviews with these groups, working across different physical geographies and positions in a collaborative network, have identified themes central to how social infrastructure is activated and transformed in situ and beyond. By increasing a focus on these civic environmental stewardship groups, with a critical eye to issues of inclusion and equity, researchers can

attend to ways of making visible these patterns and processes. Recognition of the value and efforts of these groups by other governance actors, as well as their effects (both positive and negative) on the distribution of resources and capacities across neighborhoods, can contribute to ensuring a sustainable, just, and resilience urban environment. Building upon the organizational focus of this paper, further work is needed to understand the demographics of stewardship group leadership, membership, and communities served – in order to better understand what drives these differences and to advance aims of diversity, equity, and inclusion in both stewardship participation and outcomes. Future work can explore how these themes and patterns observed in New York City occur in other cities and landscapes with varying configurations of governance and gray, green, and blue spaces and whether effects of geography and network connections hold for other types of social infrastructure.

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References

Agyeman, J., & Evans, B. (2006). Justice, governance, and sustainability: Perspectives on environmental citizenship from North America and Europe. In Andrew Dobson & Derek Bell (Eds.), *Environmental citizenship* (pp. 185–206). MIT Press.

Andersson, E., Enqvist, J., & Tengö, M. (2017). Stewardship in urban landscapes. In C. Bieling & T. Plieninger (Eds.), *The science and practice of landscape stewardship* (pp. 222–238). Cambridge University Press.

Andersson, E., Barthel, S., Borgström, S., Colding, J., Elmqvist, T., Folke, C., & Gren, Å. (2014). Reconnecting cities to the biosphere: Stewardship of green infrastructure and urban ecosystem services. *Ambio*, *43*(4), 445–453. https://doi.org/10.1007/s13280-014-0506-y

Baldassari, D., & Diani, M. (2007). The integrative power of civic networks. *American Journal of Sociology*, *13*(3), 735–780. https://doi.org/10.1086/521839

Bastian, M., Heymann, S., & Jacomy, M. (2009). Gephi: An open source software for exploring and manipulating networks. *International AAAI Conference on Weblogs and Social Media*.

Beckie, M. A., Kennedy, E. H., & Wittman, H. (2012). Scaling up alternative food networks: Farmers' markets and the role of clustering in western Canada. *Agriculture and Human Values*, *29*(3), 333–345. https://doi.org/10.1007/s10460-012-9359-9

Bennett, N. J., Whitty, T. S., Finkbeiner, E., Pittman, J., Bassett, H., Gelcich, S., & Allison, E. H. (2018). Environmental stewardship: A conceptual review and analytical framework. *Environmental Management*, *61*(4), 597–614. https://doi.org/10.1007/s00267-017-0993-2

Berlant, L. (2016). The commons: Infrastructures for troubling times. *Environment and Planning D: Society and Space*, *34*(3), 393–419. https://doi.org/10.1177/0263775816645989

Betsill, Michele M., & Bulkeley, Harriet. (2004). Transnational networks and global environmental governance: The cities for climate protection program. *International Studies Quarterly*, *48*(2), 471–493. https://doi.org/10.1111/j.0020-8833.2004.00310.x

Blommaert, J. (2014). Infrastructures of superdiversity: Conviviality and language in an Antwerp neighbourhood. *European Journal of Cultural Studies*, *17*(4), 431–451. https://doi.org/10.1177/1367549413510421

Bodnar, J. (2015). Reclaiming public space. *Urban Studies*, *52*(12), 2090–2104. https://doi.org/10.1177/0042098015583626

Borgström, S. (2019). Balancing diversity and connectivity in multi-level governance settings for urban transformative capacity. *Ambio*, *48*(5), 463–477. https://doi.org/10.1007/s13280-018-01142-1

Buijs, A. E., Hansen, R., Van der Jagt, S., Ambrose-Oji, B., Elands, B., Lorance Rall, E., Mattijssen, T., Pauleit, S., Runhaar, H., Olafsson, A. S., & Møller, M. S. (2019). Mosaic governance for urban green infrastructure: Upscaling active citizenship from a local government perspective. *Urban Forestry and Urban Greening*, *40*(June 2018), 53–62. https://doi.org/10.1016/j.ufug.2018.06.011

Buijs, A. E., Mattijssen, T. J., Van der Jagt, A. P., Ambrose-Oji, B., Andersson, E., Elands, B. H., & Steen Møller, M. (2016, January). Active citizenship for urban green infrastructure: Fostering the diversity and dynamics of citizen contributions through mosaic governance. *Current Opinion in Environmental Sustainability*, *22*, 1–6. https://doi.org/10.1016/j.cosust.2017.01.002

Bulkeley, H. (2005). Reconfiguring environmental governance: Towards a politics of scales and networks. *Political Geography*, *24*(8), 875–902. https://doi.org/10.1016/j.polgeo.2005.07.002

Bulkeley, H., & Mol, A. (2003). Participation and environmental governance: Consensus, ambivalence and debate. *Environmental Values*, *12*(2), 143–154. https://doi.org/10.3197/096327103129341261

Campbell, L. K. (2017). *City of forests, city of farms: Sustainability planning for New York City's nature*. Cornell University Press.

Campbell, Lindsay K., Landau, Laura, Svendsen, Erika S. & Johnson, Michelle. (2019). Civic stewardship of urban ecosystems: Forms of community engagement with landscapes and places. In Chatterjee, Monalisa & Svyatets, Ekaterina (Eds.), Environmental Issues and Policy: *Exploring Past, Present, and Future Socioecological Relations* (pp. 208–224). San Diego, CA: Cognella Academic Publishing.

Childers, D. L., Cadenasso, M. L., Grove, J. M., Marshall, V., McGrath, B., & Pickett, S. T. A. (2015). An ecology for cities: A transformational nexus of design and ecology to advance climate change resilience and urban sustainability. *Sustainability*, *7*(4), 3774–3791. https://doi.org/10.3390/su7043774

Connolly, James J., Svendsen, Erika S., Fisher, Dana R., & Campbell, Lindsay K. (2013). Organizing urban ecosystem services through environmental stewardship governance in New York City. *Landscape and Urban Planning*, *109*(1), 76–84. https://doi.org/10.1016/j.landurbplan.2012.07.001

Connolly, James J., Svendsen, Erika S., Fisher, Dana R., & Campbell, Lindsay K. (2014). Networked governance and the management of ecosystem services: The case of urban environmental stewardship in New York City. *Ecosystem Services*, *10*, 187–194. https://doi.org/10.1016/j.ecoser.2014.08.005

Conway, D., Li, C. Q., Wolch, J., Kahle, C., & Jerrett, M. (2010). A spatial autocorrelation approach for examining the effects of urban greenspace on residential property values. *The Journal of Real Estate Finance and Economics*, *41*(2), 150–169. https://doi.org/10.1007/s11146-008-9159-6

Cranz, G. (1982). *The politics of park design: A history of urban parks in America*. MIT Press.

Davies, J. S. (2011). *Challenging governance theory: From networks to hegemony*. Policy Press.

Environmental Systems Research Institute. (1999–2017). *ArcGIS. Version 10.5.1*.

Finewood, M. H., Matsler, A. M., & Zivkovich, J. (2019). Green infrastructure and the hidden politics of urban stormwater governance in a postindustrial city. *Annals of the American Association of Geographers*, *109*(3), 909–925. https://doi.org/10.1080/24694452.2018.1507813

Fisher, D., Svendsen, E., & Connolly, J. (2015). *Urban environmental stewardship and civic engagement: How planting trees strengthens the roots of democracy*. Routledge.

Fisher, D. F, & Svendsen, E. S. (2014). Hybrid arrangements within the environmental state. In Lockie, S., Sonnenfeld, D. A., & Fisher, D. R. (Eds.), *Sociological methods. Routledge international handbook of social and environmental change* (pp. 179–189). Routledge Press.

Fisher, D. R., Campbell, L. K., & Svendsen, E. S. (2012). The organisational structure of urban environmental stewardship. *Environmental Politics*, *21*(1), 26–48. https://doi.org/10.1080/09644016.2011.643367

Gans, Herbert. (1962). *The urban villagers*. Free Press.
Grove, J. M, Cadenesso, M., Pickett, S., Machlis, G., & Burch, W. J., Jr.. (2015). *The Baltimore School of Urban Ecology: Space, scale, and time for the study of cities*. Yale University Press.
Grove, M., Ogden, L., Pickett, S., Boone, C., Buckley, G., Locke, D. H., Lord, C., & Hall, B. (2018). The legacy effect: Understanding how segregation and environmental injustice unfold over time in Baltimore. *Annals of the American Association of Geographers*, *108*(2), 524–537. https://doi.org/10.1080/24694452.2017.1365585
Gustavsson, E., Elander, I., & Lundmark, M. (2009). Multilevel governance, networking cities, and the geography of climate-change mitigation: Two Swedish examples. *Environment and Planning C: Government and Policy*, *27*(1), 59–74. https://doi.org/10.1068/c07109j
Hajer, M., Nilsson, M., Raworth, K., Bakker, P., Berkhout, F., De Boer, Y., Rockström, J., Ludwig, K., & Kok, M. (2015). Beyond cockpit-ism: Four insights to enhance the transformative potential of the sustainable development goals. *Sustainability*, *7*(2), 1651–1660. https://doi.org/10.3390/su7021651
Harvey, D. (2012). *Rebel cities: From the right to the city to the urban revolution*. Verso books.
Heynen, N. C. (2003). The scalar production of injustice within the urban forest. *Antipode*, *35*(5), 980–998. https://doi.org/10.1111/j.1467-8330.2003.00367.x
Iveson, K. (2013). Cities within the city: Do-it-yourself urbanism and the right to the city. *International Journal of Urban and Regional Research*, *37*(3), 941–956. https://doi.org/10.1111/1468-2427.12053
Jacobs, Jane. (1961). *The death and life of Great American cities*. Vintage Books.
Joassart-Marcelli, P., Wolch, J., & Salim, Z. (2011). Building the healthy city: The role of nonprofits in creating active urban parks. *Urban Geography*, *32*(5), 682–711. https://doi.org/10.2747/0272-3638.32.5.682
Johnson, Michelle L.., Locke, Dexter H., Svendsen, Erika, Campbell, Lindsay K., Westphal, Lynne M., Romolini, Michele, & Grove, J. Morgan. (2019). Context matters: influence of organizational, environmental, and social factors on civic environmental stewardship group intensity. *Ecology and Society*, *24*(4), 14. https://doi.org/10.5751/ES-10924-240401
Kaika, Maria. (2004). *City of flows: Modernity, nature and the city*. Routledge.
Klinenberg, Eric. (2018). *Palaces for the people: How social infrastructure can help fight inequality, polarization, and the decline of civic life*. Crown Publishing.
Krasny, Marianne, & Tidball, Keith. (2015). *Civic ecology: Adaptation and transformation from the ground up*. MIT Press.
Krinsky, J., & Simonet, M. (2017). *Who cleans the park?: Public work and urban governance in New York City*. University of Chicago Press.
Landau, Laura, Campbell, Lindsay K., Johnson, Michelle, Svendsen, Erika, & Berman, Holly. (2019). *STEW-MAP in the New York City region: survey results of the Stewardship Mapping and Assessment Project. Gen. Tech. Rep. NRS-189* (p. 69) . Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. https://doi.org/10.2737/NRS-GTR-189 .
Larsson, A. S., & Granhag, P. A. (2005). Interviewing children with the cognitive interview: Assessing the reliability of statements based on observed and imagined events. *Scandinavian Journal of Psychology*, *46*(1), 49–57. https://doi.org/10.1111/j.1467-9450.2005.00434.x
Latham, A., & Layton, J. (2019). Social infrastructure and the public life of cities: Studying urban sociality and public spaces. *Geography Compass*, *13*(7), e12444. https://doi.org/10.1111/gec3.12444
Lee, T, & Koski, C. (2015). Multilevel governance and urban climate change mitigation. *Environment and Planning C: Government and Policy*, *33*(6), 1501–1517. https://doi.org/10.1177/0263774X15614700
Mattijssen, T., Buijs, A., Elands, B., & Arts, B. (2018). The 'green' and 'self' in green self-governance – A study of 264 green space initiatives by citizens. *Journal of Environmental Policy & Planning*, *20*(1), 96–113. https://doi.org/10.1080/1523908X.2017.1322945
Metcalf, S. S., Svendsen, E. S., Knigge, L., Wang, H., Palmer, H. D., & Northridge, M. E. (2016). Urban greening as a social movement. In J. Gatrell, R. Jensen, M. Patterson, & N. Hoalst-Pullen (Eds.), *Urban sustainability: Policy and praxis. Geotechnologies and the environment* (Vol. 14) (pp. 243–248). Springer.

Mitchell, D. (1995). The end of public space? People's park, definitions of the public, and democracy. *Annals of the Association of American Geographers*, *85*(1), 108–133. https://doi.org/10.1111/j.1467-8306.1995.tb01797.x

Mitchell, D. (1996). Introduction: Public space and the city. *Urban Geography*, *17*(2), 127–131. https://doi.org/10.2747/0272-3638.17.2.127

Morancho, A. B. (2003). A hedonic valuation of urban green areas. *Landscape and Urban Planning*, *66*(1), 35–41. https://doi.org/10.1016/S0169-2046(03)00093-8

Oldenburg, R. (1989). *The great good place: Cafés, coffee shops, community centers, beauty parlors, general stores, bars, hangouts, and how they get you through the day*. Paragon House.

Pearsall, H., & Pierce, J. (2010). Urban sustainability and environmental justice: Evaluating the linkages in public planning/policy discourse. *Local Environment*, *15*(6), 569–580. https://doi.org/10.1080/13549839.2010.487528

Peters, K., Elands, B., & Buijs, A. (2010). Social interactions in urban parks: Stimulating social cohesion? *Urban Forestry & Urban Greening*, *9*(2), 93–100. https://doi.org/10.1016/j.ufug.2009.11.003

Pincetl, S. & Gearin, E. (2005). "The reinvention of public green space." *Urban Geography*, *26*(5), 365–384.

Purcell, M. (2006). Urban democracy and the local trap. *Urban Studies*, *43*(11), 1921–1941. https://doi.org/10.1080/00420980600897826

Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. Simon and Schuster.

QSR International. (2015). *NVivo qualitative data analysis software. Version 11*.

Rae, R. A., Simon, G., & Braden, J. (2010). Public reactions to new street tree planting. *Cities and the Environment*, *3*(1), article10. https://doi.org/10.15365/cate.31102010

Ramaswami, A., Russell, A. G., Culligan, P. J., Sharma, K. R., & Kumar, E. (2016). Meta-principles for developing smart, sustainable, and healthy cities. *Science*, *352*(6288), 940–943. https://doi.org/10.1126/science.aaf7160

Rhodes, R. A. W. (1996). The new governance: Governing without government. *Political Studies*, *44*(4), 652–667. https://doi.org/10.1111/j.1467-9248.1996.tb01747.x

Rigolon, A. (2019). Nonprofits and park equity in Los Angeles: a promising way forward for environmental justice. *Urban Geography*, *40*(7), 984–1009.

Rigolon, A., & Gibson, S. (2021). The role of non-governmental organizations in achieving environmental justice for green and blue spaces. *Landscape and Urban Planning*, *205*, 103970. https://doi.org/10.1016/j.landurbplan.2020.103970

Robinson, O. C. (2014). Sampling in interview-based qualitative research: A theoretical and practical guide. *Qualitative Research in Psychology*, *11*(1), 25–41. https://doi.org/10.1080/14780887.2013.801543

Rosan, C. D. (2012). Can PlaNYC make New York City "greener and greater" for everyone?: Sustainability planning and the promise of environmental justice. *Local Environment*, *17*(9), 959–976. https://doi.org/10.1080/13549839.2011.627322

Sampson, R. (2012). *Great American city: Chicago and the enduring neighborhood effect*. University of Chicago Press.

Sampson, R. (2017, January). Urban sustainability in an age of enduring inequalities: Advancing theory and ecometrics for the 21st-century city. *Proceedings of the National Academy of Sciences of the United States of America, 114*(34), 8957–8962. https://doi.org/10.1073/pnas.1614433114

Schwarz, K., Fragkias, M., Boone, C. G., Zhou, W., McHale, M., Grove, J. M., O'Neil-Dunne, J., McFadden, J. P., Buckley, G. L., Childers, D., & Ogden, L. (2015). Trees grow on money: Urban tree canopy cover and environmental justice. *PloS One*, *10*(4), e0122051. https://doi.org/10.1371/journal.pone.0122051

Sendra, P. (2015). Rethinking urban public space. *City*, *19*(6), 820–836. https://doi.org/10.1080/13604813.2015.1090184

Small, M. (2009). *Unanticipated gains: Origins of network inequality in everyday life*. Oxford University Press.

Stanley, B. W., Stark, B. L., Johnston, K. L., & Smith, M. E. (2012). Urban open spaces in historical perspective: A transdisciplinary typology and analysis. *Urban Geography*, *33*(8), 1089–1117. https://doi.org/10.2747/0272-3638.33.8.1089

Strauss, A., & Corbin, J. (1994). Grounded theory methodology: An overview. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 273–285). Sage Publications, Inc.

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Sage.

Svendsen, E. S., Campbell, L. K., Fisher, D. R., Connolly, J. J., Johnson, M. L., Sonti, N. F., Locke, D. H., Westphal, L. M., LeBlanc Fisher, C., Grove, J. M., & Romolini, M. (2016). *Stewardship mapping and assessment project: A framework for understanding community-based environmental stewardship* (Gen. Tech. Rep. NRS-156, pp. 134). U.S. Department of Agriculture, Forest Service, Northern Research Station.

Svendsen, Erika, & Campbell, Lindsay. (2008). Understanding urban environmental stewardship. *Cities and the Environment*, *1*(1), 1–32. https://doi.org/10.15365/cate.1142008

Swyngedouw, E. & Heynen, N. C. (2003). Urban Political Ecology, Justice and the Politics of Scale. *Antipode*,*35*(5), 898–918.

Taylor, Dorceeta. (2009). *The environment and the people in American cities, 1600s–1900s: Disorder, inequality, and social change*. Duke University Press.

Tocqueville, A. D. (1835–2000). *Democracy in America* (Harvey C. Mansfield and Delba Winthrop, Trans.). University of Chicago Press.

Turnbull, John, Johnston, Emma, & Clark, Graeme. (2020). LESI: A quantitative indicator to measure local environmental stewardship. *Methods X*, *7*, 101141. https://doi.org/10.1016/j.mex.2020.101141

Walker, D., & Myrick, F. (2006). Grounded theory: An exploration of process and procedure. *Qualitative Health Research*, *16*(4), 547–559. https://doi.org/10.1177/1049732305285972

Watkins, S. L., & Gerrish, E. (2018). The relationship between urban forests and race: A meta-analysis. *Journal of Environmental Management*, *209*, 152–168. https://doi.org/10.1016/j.jenvman.2017.12.021

Young, R. F. (2010). Managing municipal green space for ecosystem services. *Urban Forestry & Urban Greening*, *9*(4), 313–321. https://doi.org/10.1016/j.ufug.2010.06.007

Zukin, S. (1995). *The cultures of cities* (Vol. 150). Blackwell.