



Networked governance and the management of ecosystem services: The case of urban environmental stewardship in New York City [☆]



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ABSTRACT

Urban environmental stewardship groups have become an essential component of the governance structure that regulates ecosystem services in cities. New York City is one example where these groups have grown rapidly in number, size, and visibility since the 1970s. In this article, we combine quantitative survey data with qualitative interview data to examine the structure and development of the governance network that has grown around the management of urban ecosystem services in New York City. We find that the network is organized according to ecological function and geography. We find as well, that certain historical conditions led to the development of a hybrid institutional form with regard to management of ecosystem services in the city. We discuss the implications of this hybrid networked governance structure in New York City and what it might mean for further cross-disciplinary research around ecosystem service governance.

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1. Introduction

The extensive role for humans in shaping interactions between living and nonliving components of the urban environment makes the city a unique type of ecosystem. The built environment can hinder or enhance basic ecosystem functions such as biogeochemical cycling, habitat connectivity, and the flow of energy (e.g. Hutrya et al., 2011; Schlesinger et al., 2011; Kaushal and Belt, 2012). These functions serve to regulate and stabilize the natural environment. As a result, the effect of the built environment upon basic ecosystem functions can determine the extent to which areas are vulnerable to disturbance and have extensive impacts upon the health of humans and other living organisms (Tzoulas et al., 2007).

Based upon a rising awareness of the need to preserve these ecosystem services that protect human wellbeing, numerous civic organizations and individual volunteers focused on urban environmental stewardship have organized around efforts to regulate the relationship between the built and natural environments. As a

result, these groups and individuals have driven the formation of an emergent governance structure in many cities throughout the world. This networked governance structure seeks to coordinate public and private resources in order to mediate the sometimes competing social and ecological demands made by urban living. However, the structure of stewardship networks and the extent to which this structure helps or hinders ecosystem functioning has only begun to be understood.

Motivated by the connection between neighborhood-level quality of life and preservation of the local ecosystem, urban environmental stewardship groups conserve, manage, monitor, restore, advocate for, and educate the public about a wide range of issues related to sustaining the local environment (for more details on this definition of stewardship see Fisher et al., 2007). The actors involved in urban environmental stewardship and the preservation of local ecosystem services include individuals and organizations working in locations that range in size from neighborhood blocks and waterfronts, to watersheds and estuaries, to entire cities and regions. In densely populated urban environments, stewardship has become an increasingly complex process often requiring integrated knowledge and intense coordination among an array of social actors. Within this context, civic stewardship organizations often connect with government agencies and private corporations to improve the capacity to effectively manage and monitor the complex multi-scalar geography of ecosystem services. However, for civic stewards, this role may also be

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oppositional, pushing the public and private sectors to adopt policies that protect ecosystem services despite economic or other incentives to do otherwise (Connolly et al., 2013). Scholarly research has sought to understand better how urban environmental stewards operate within this system in order to enable effective management of local ecosystem services (e.g. Fisher et al., 2007, 2012; Grove et al., 2005; Svendsen and Campbell, 2008).

New York City (NYC) is one example where urban environmental stewardship has become an essential part of ongoing efforts to improve quality of life through direct action, engagement with local government, and oppositional politics. Over the past four decades, a growing set of stewards have worked literally to make the city a greener place by planting, maintaining, and restoring existing green spaces. They have provided labor and resources for planting trees, monitoring water quality, expanding urban agriculture, maintaining parks and gardens, and cleaning waterfronts. Stewardship groups have also worked to make New York City a “greener” place in the figurative sense. They have served as advocates and expert advisors for policies and practices that preserve and restore essential ecosystem services and continually pushed to make development reflect the goals of “green urbanism” (see Beatley, 1999; Lehman, 2010). For example, urban environmental stewardship groups have been integral to successful efforts to mandate lower carbon emissions from buildings, reduce water pollution from storm water runoff, and remediate contaminated formerly industrial land. Meanwhile, many of these same groups have concurrently engaged in more traditional civic activities that involve young people and families, arts and culture, and urban planning (Campbell, 2007; Ripper, 2008). As such, urban environmental stewardship is an individual and organizational activity that involves direct management of the local ecosystem as well as targeted civic engagement aimed at improving human well-being and ecological functioning in urban areas (see Cox and Bower, 1998; Shandas and Messer, 2008; Svendsen, 2009; Barthel et al., 2010; Campbell, 2014).

In seeking to protect human and ecosystem health, urban environmental stewards have begun to form the hybrid institutional structure between civic groups and government that can balance social and ecological demands within the urban core (e.g. Fisher and Svendsen, 2013). With a set of local environmental interests that has been steadily expanding and formalizing (see Fisher et al., 2012), the stewardship system of New York City is an ideal case for examining the specific strategies of civic engagement required to create this hybrid institution where the roles and responsibilities between civic groups and government become intertwined. As well, the involvement of the civic sector in local environmental issues since the 1970s allows for analysis of how these strategies have developed over time.¹

2. Background

Recent research on social–ecological systems (e.g. Anderies et al., 2004; Bodin et al., 2006; Folke, 2006), regional biogeochemical processes (e.g. Dow, 2000; McDonnell and Hahs, 2009), common-pool resource management (e.g. Ostrom, 2001; Dolsak and Ostrom, 2003; Daly and Farley, 2004; Adger, 2006), and

stewardship (e.g. Svendsen and Campbell, 2008; Fisher et al., 2012; Connolly et al., 2013; Locke et al., 2014; Fisher et al., *In Press*) has focused on the complex interactions between built and natural environments that characterize urban systems. Work in this area has applied the frame of complex systems theory, an approach that is the foundation of much of the new literature on climate, sustainability, ecological economics, and environmental planning and management (see Berkes et al., 2003 for a full discussion). Complex systems thinking applied to the management of urban environmental problems generally holds that ecological resilience and robust preservation of ecosystem services is achieved through an increased capacity to develop new non-linear, non-hierarchical relationships amongst and between social and ecological systems (e.g. Ernstson et al., 2010). As Pickett et al. (2005), complex conditions exist in the spatial, organizational, and temporal dimensions requiring analyses that work across traditional disciplinary boundaries in order to develop tools for managing complexity.

Such analysis has been developed within the literature on social–ecological systems, which begins from the observation that “ecological systems are intricately linked to and affected by one or more social systems” (Anderies et al., 2004, Section 2). Olsson et al. (2004) argue that, because of this interlocked complexity, management of urban ecosystem services requires flexible governance structures that can change along with new knowledge and new ecosystem conditions. They highlight the fact that adaptive social–ecological systems can “emerge through organizational change within existing institutional arrangements” (p. 83; see also Dale et al., 2000; Walker et al., 2002). This model of institutional change, which involves an emergent and self-organizing process of interactions within organizational networks, is prominent in the social–ecological systems literature (see Buck et al., 2001; Ruitenbeek and Cartier, 2001). Such systems respond to existing institutional contexts, but also require institutional structures that enable emergent processes of problem solving to be effective.

In addition to being able to respond flexibly to changing ecological conditions, many authors have argued that institutions in resilient social–ecological systems must be able to work across multiple scales. Ernstson et al. (2010) provide an example of why multi-scale capacity is important for preserving urban ecosystem services. They describe the ecosystem service of pollination, which requires an array of sites with healthy pollen-producing species to be accessible to pollinators across a wide geography. The individual sites, or patches, as well as the larger landscape with links between patches are both important levels to preserve in order to maintain pollination. However, while some urban sites like community gardens and pocket parks may have a very local set of stewards that maintain them, these stewards likely have little capacity on their own to connect their management practices in order to preserve pollination services at the landscape scale. To be successful, local stewards often establish social ties to an organizational infrastructure with the capacity to connect their work across geographic scales and sectors of activity. Thus, the governance system associated with stewardship is an on-the-ground means for managing the multi-scale complexity inherent in preserving ecosystem services.

In order to meet the multi-scaled and multi-sectoral demands of managing urban ecosystem services, urban environmental stewardship requires coordination between individual actions, organizational networks, and larger fields of policymaking. As a result, stewardship groups around the United States have sought to strengthen their actions by working along with and outside of government agencies and the private business sector (e.g. Andrews and Edwards, 2005; John, 1994; Sirianni, 2006; Sirianni and Friedland, 2001; Svendsen and Campbell, 2008). They manage ecosystem services, protect human and ecosystem health, and

¹ The findings reported in this paper are based on several datasets developed and analyzed as part of an ULTRA-Ex research project funded by a grant from the National Science Foundation (DEB-0948451). The grant, entitled Understanding the Dynamic Connections among Stewardship, Land Cover and Ecosystem Services in New York City’s Urban Forest involved work by a research team comprised of social and physical scientists that examined changes in land cover relative to changes in the social system associated with stewardship in New York City over the past 25 years. While this research covers many areas, only a limited set of findings focused on the social data are reported below.

educate broader publics with varying degrees of involvement in hybrid governance processes (see Svendsen, 2010). In other words, civic and governmental actors are engaged in ongoing experimentation with shared management practices (Campbell, 2014). They are developing a hybrid institutional form for urban environmental governance through what has come to be known as “civic innovation” (Boyte, 1999, 2004; Sirianni and Friedland, 2001).

For urban environmental stewards, civic innovation involves finding new ways to manage diverse ecosystem services in conjunction with public and private interests (see Carpenter et al., 2009, p. 1310 on the need to study such systems). The hybrid arrangements that they form comprise one mechanism for enhancing the flexible problem-solving capacity needed to meet the demands of complex social–ecological systems in cities. The following sections report findings from a recent study focused on urban environmental stewardship activities in New York City. In this paper, we provide data to illustrate the ways that stewardship groups are engaging in civic innovations and playing a hybrid role within the urban regime. We further analyze the extent to which this emergent social structure possesses the attributes discussed above that theoretically create conditions for robust management of ecosystem services.

3. Data and methods

To understand the social and ecological interactions within the stewardship system of New York City,² we incorporate data from two sources: (1) A 2007 assessment of stewardship organizations in New York City known as the Stewardship Mapping and Assessment Project (STEW-MAP) that contains information on each group’s founding, vital statistics, and connections to civic groups and government agencies,³ and (2) 13 semi-structured qualitative interviews with the leaders of stewardship organizations identified through network analysis as the most connected civic groups in New York City. In all, the data used to develop the findings reported below describe the organizational dynamics of the stewardship system in New York City over the past twenty-five years.

The first set of data analyzed includes a census of civic stewardship organizations (for a full description see Fisher et al., 2012). These organizations were defined as any group that works to conserve, manage, monitor, restore, advocate for, and educate the public about the local environment. To build a citywide sample of civic stewardship groups, all of the public agencies and nonprofits that work at the city-wide or borough-wide scale (there are five boroughs in the City of New York) on issues related to the environment and natural resource management were approached with a request to utilize their lists of organizational partners. Using multiple sources to compile the list of organizations that would be surveyed ensured that there were no potential biases in the data based on any particular source (see particularly Brulle et al., 2007). In the end, the effort yielded 506 completed surveys, which represents a response rate of 18.3%.⁴

The second set of data employed open-ended semi-structured interviews conducted with representatives of the 13 civic organizations that were identified through network analysis of the organizational data described above as being highly connected and as serving important connecting roles within the stewardship network. These groups were at least two standard deviations

above the mean in number of ties they had with other groups and in “betweenness,” or the extent to which a group serves as a crucial connector among various otherwise disconnected parts of the network (for a full description see Connolly et al., 2013). These groups tended to be the “umbrella groups” that serve as brokers to fund, administer, organize, and provide training and advocacy for a number of other organizations that are in direct contact with individual volunteer stewards. The focus of our interviews was to understand better what role these groups play, how they came to play their role, and how the stewardship system has developed over the past 25 years from their perspective. No organizations that met our criteria for selection refused to participate.

With the development of the data reported above, we have gained insights into a dynamic system of stewardship in New York City. In a previous publication (Connolly et al., 2013) we highlight the “bridge” role played by the most connected groups. In the discussion below we focus on the general structure of the stewardship system and the ways that stewardship groups have shaped the overall system of hybrid governance that manages local ecosystem services. This analysis raises the issue of a need for more data on environmental governance networks in order to gain a more complete “sociocentric” view of network dynamics.

4. Results

4.1. Stewardship organizations and the urban environmental governance network

We begin our analysis by examining the ties among civic stewardship groups. We visualize those ties as an organizational network diagram and describe the network in terms of its form, centrality, and density. After analyzing and describing the civic environmental stewardship network, we describe how the role of stewardship groups has changed over time; how the relationship between civic and government groups has shifted toward a bimodal system of management; and how geography and ecosystems have organized the stewardship system. In all, we display the developing institutional structure for managing complex urban ecosystem services.

4.1.1. The civic-to-civic stewardship network

Critical to an understanding of how local organizations are engaging with a larger system of stewardship is the degree to which civic groups are connected to other civic groups within the urban environment. Social network analysis (SNA) helps to deepen our understanding of connections between civic groups and between civic and government entities. SNA is a formal method for analyzing and displaying networks by identifying nodes (groups or individuals represented as dots) and the ties or links between them (represented as lines). Immediately apparent upon inspection of the diagram of the civic-to-civic stewardship network ($N=704$) presented in Fig. 1 is that it contains a moderately connected core set of groups ($N=404$) organized in a polycephalous network.

Groups are tied in this diagram if they were identified as civic partners in the survey and arrows point from respondents to partners. The size of the node indicates popularity based on the number of groups that listed them as key partners. Otherwise stated, the size of each node correlates with the number of in-ties, or connections with other groups that were identified in the surveys. Position of the nodes is based on the software UCINET’s spring embedding algorithm (see Borgatti et al., 2002). Isolates that did not indicate any connections with other civic organizations are excluded from the network diagram.

Examination of the data displayed in the civic network diagram (Fig. 1) shows that groups are largely connected by the types of

² Each of these datasets is described in greater detail in the cited publications.

³ For more information, see http://www.nrs.fs.fed.us/nyc/focus/stewardship_mapping/.

⁴ This response rate is within the common range for mail-in and Internet surveys of organizations (for a full discussion, see Hager et al., 2003). For a full description of the data collection methods see Fisher et al., 2012.

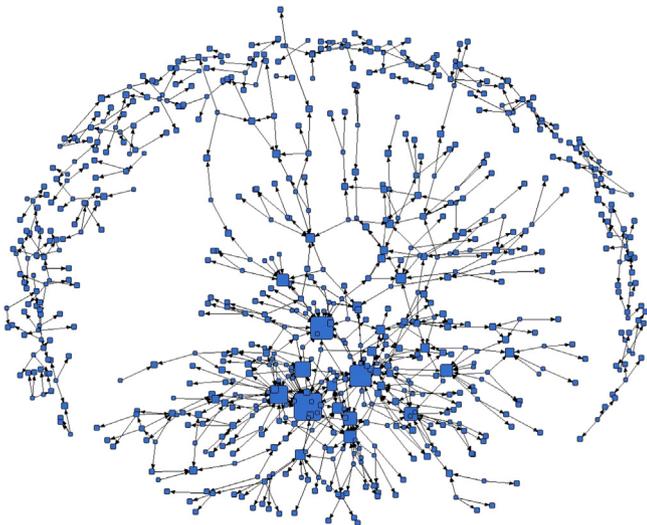


Fig. 1. This figure shows the civic-to-civic network of stewardship organizations. The size of the nodes corresponds to the number of links each group has. This diagram demonstrates the bifurcated structure of the civic stewardship network and the central role played by a handful of groups who, further qualitative research finds, serve as connectors across sectoral divides. Fig. 3 further specifies these groups.

sites that they steward. For example, in the lower middle portion of this graph is a cluster of nodes that includes the Green Guerillas, Council on the Environment of New York City (CENYC, now known as GrowNYC), Just Food, several land trust organizations, New York Restoration Project (NYRP), the Brooklyn Botanic Garden, the NYC Community Garden Coalition, and the East New York Gardeners Association. This cluster is comprised of land stewardship groups, largely community garden and local food groups—including urban farms and community supported agriculture groups, as well as a number of local block associations, which are connected through these citywide civic nodes. On the far right and upper right hand side of Fig. 1 are a number of groups that deal with water-related issues, including the American Littoral Society, the Metropolitan Waterfront Alliance (MWA), the Hudson River Foundation (HRF), the New York/New Jersey Baykeeper, and Riverkeeper. These water groups are also connected to large, national environmental advocacy and legal organizations, including the Natural Resources Defense Council (NRDC), the Environmental Defense Fund (EDF), and the Nature Conservancy.

The core civic stewardship network also includes clusters of groups with a mission that is not solely environmental, but rather is some other civic aim with links to environmental stewardship. For example, there is a cluster of groups concerned with historic preservation, architecture, urban planning, and the built environment that are anchored by the nodal Municipal Arts Society (MAS) and the Historic Districts Council (HDC). To a lesser extent there are also some geographic clusters of groups working at the neighborhood scale, which include block associations, “friends of” parks groups, and community gardens. As well, a Bronx borough cluster of a number of smaller but interconnected nodes, including Sustainable South Bronx, Rocking the Boat, The Point, Bronx River Alliance, Mosholu Preservation Corporation, Phipps CDC, and others form a distinct section of the network. These citywide and neighborhood groups, traditionally concerned with quality-of-life issues, have long been embedded in urban governance networks. In fact, some of these groups date back to the progressive era of politics in New York City. In recent years, environmental issues have become more prominent on their agenda. In the words of a representative of one such group: “It’s a good time to build relationships with environmental groups. I

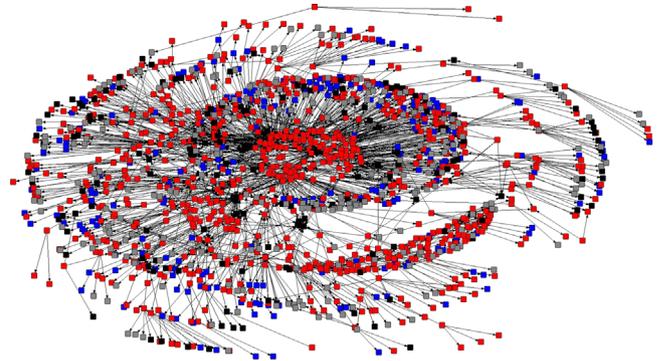


Fig. 2. This figure identifies the full stewardship network in New York City across civic, private, and public groups. Red points identify civic groups, black points identify government agencies, grey points identify schools, and blue points identify private businesses. Examination of this diagram reveals a strong coordinating role for public sector agencies. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

had eight round tables on a variety of issues around the subject...it was really about relationship building...[we haven’t] always had much of a relationship at all with environmental groups and we’re trying to build that.” In other words, environmental stewardship has become a theme around which civic groups – those with environmental protection in their mission statements and those without it – organize.

4.1.2. *The cross-sectoral stewardship network*

All of the civic clusters are also connected to government agencies and private business interests. The diagram in Fig. 2 represents all public, private and non-profit organizations within the stewardship network. The diagram shows several dominant nodes in the public sector linked to clusters of interconnected activities in the non-profit and private sectors.

When we narrow our analysis of the network shown in Fig. 2 to include only civic-to-government connections, we find a network that is 28.4% centralized compared to the 3.28% centralization in the civic-to-civic network. The greater degree of centralization between civic and government partners points to the role of governmental actors in coordinating stewardship activities throughout New York City. The difference between these measures demonstrates that civic stewardship groups coordinate activities amongst themselves across diffuse small-scale clusters seen in the civic-to-civic network, and then tend to focus those activities at the citywide level via connections with government agencies. These interlocked social structures build in multi-scalar capacity for managing urban ecosystem services.

Though no governmental agency in New York City has overall planning authority for all physical sites or ecosystem services, the NYC Department of Parks and Recreation (201 in-ties across all programs) is by far the largest governmental node in the stewardship network, followed by the state Department of Environmental Control (23 in-ties), the city Department of Environmental Protection (20 in-ties), and a variety of other federal, municipal, and state agencies. By way of comparison, 120 of the 135 public agencies identified as participants in the civic-to-public stewardship network had less than 10 in-ties. Still, by the time of our survey in 2007, several government agencies with a specific mandate to manage and regulate land use and ecosystem services in New York City had become central connectors for civic groups.

4.2. *Bridging across sectoral networks: A historical view*

To understand further how civic and government networks operate in NYC, we conducted in-depth interviews with the civic

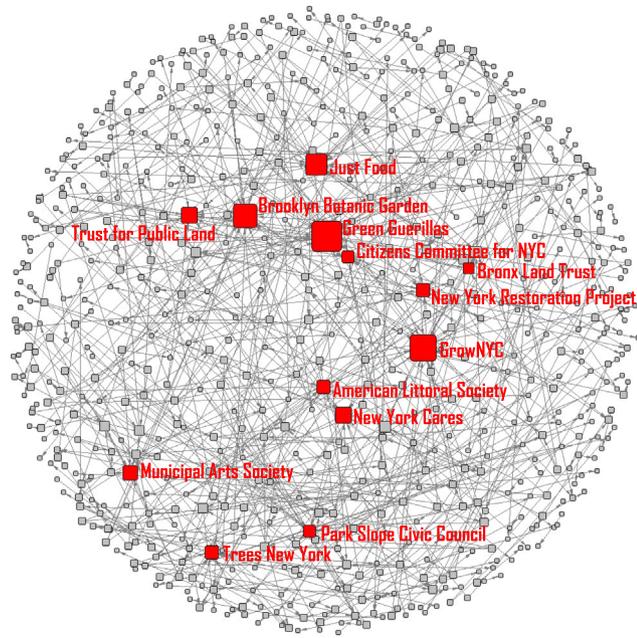


Fig. 3. This figure identifies the groups with the most ties and the greatest “betweenness” measures in the civic stewardship network of New York City. These groups serve as bridges between many civic groups, private interests, and public sector agencies.

groups that ranked as the most connected. These groups were identified as civic organizations with 2 standard deviations or greater in terms of the number of ties they have with other civic groups and in terms of their “betweenness” or key position as network connector. The network position of these groups is shown in Fig. 3. The size of the nodes again refers to the number of ties each group had. The labeled nodes are those that met the criteria listed above.

Through these interviews, we find that the stewardship system of New York City has developed in three major historical periods over the past 25 years, each with strong implications for civic-to-government connections. First, between the 1970s and the 1990s, stewardship of the local environment was a main concern of community activists working within a context of deep disinvestment in city services. Second, during the 1990s, an economic upswing led to political battles over development and established the early stewardship groups as potent political actors. Third, in the 2000s, oppositional politics subsided and a hybridized governance mechanism began to form around management of ecosystem services in the city.

4.2.1. Responding to crisis: Community quality of life in the 1970s–1980s

Between the beginning of the 1970s and the beginning of the 1990s, much of the work on the local environment in NYC was linked to community development efforts designed to help the city and specific neighborhoods recover from the effects of disinvestment and fiscal crisis that resulted from the political, economic and demographic shifts that surfaced in the 1960s. As one respondent who currently works closely with city staff remarked, “back in the ‘70’s when the city went through its last economic meltdown it divested itself of a lot of its cultural institutions.” Many of those interviewed spoke of this formative period in the 1970s and 1980s, as one wherein civic groups organized in response to the retreat of the public sector from maintenance and improvement of the local environment. As one representative of a group focused on street trees said:

...The crisis in the mid-‘70s during the Koch administration was the impetus for the organization’s start. It was founded in the

mid-1970s as a response to the fact that there was no money to take care of street trees. While there was money enough in the capital budget to plant the trees, there was not any maintenance money.

Many of the civic groups echoed this comment, explaining that their activities were developed in direct response to a lack of government action in improving the local, urban environment. This proactive response is part of the legacy of urban environmental stewardship groups in New York City, creating the basis for a highly engaged civic sector.

4.2.2. Responding to development: Civic collaboration and public opposition in the 1990s

By the 1990s, several civic groups including those that worked on developing community gardens, parks restoration, and water quality issues reported having established a stable political and economic position, setting the stage for the second phase in the growth of the system of urban environmental stewardship. The 1990s were marked by a period of economic expansion in New York City and pressure for more developable land drove the city to hand most of its “In Rem” properties, which had been claimed for unpaid taxes, over to private developers. This step also led to battles over garden space, privatization of parkland, and development around waterfronts. These battles served to galvanize many of the groups and force them to become a more cohesive citywide effort. The most visible of these battles was fought over control of community gardens:

The whole idea of trying to sell off the gardens, I think that was a big ... became an international thing where people who didn’t even know what a community garden was and they are using those words together where they would never do that before. And I think that changed the whole idea. Again, nationally and in international work. What is a community garden, you know, it’s not just a place that people grow tomatoes...

Other issues such as preservation of the waterfront also came to the fore at this time:

...And that was the Economic Development Corporation, the city wanted to promote development out there. The local community board, jobs, jobs, jobs, and we kept saying well jobs are plastic. You don’t put them on the edge of the bay. And you know we only have remnant areas left around the bay. So let’s try to protect what’s left. And we fought for about two years until finally the developer himself left...he said forget about this.

The oppositional politics of the 1990s intensified two types of connections: civic-to-civic cooperation and civic-to-public opposition. While these trends were not absolute, they were dominant at this time according to the organizational representatives whom we interviewed. In some areas, though, civic groups also began to work closely with government agencies such as the Department of Parks and Recreation. For example, inspired in part by the high-profile success of the Central Park Conservancy, a public-private partnership designed to support the maintenance of Central Park, it was during this era that hundreds of new “friends of parks” groups were established at a local, neighborhood scale. These groups, in turn, were able to bring an overwhelming amount of multi-sector support to restore and expand the public park system city-wide. This position that developed in the 1990s – both oppositional around issues such as developing gardens and cooperative around issues such as parks upgrading – would become internalized within the work of many stewardship groups in New York City.

While the ‘friends of parks’ activities demonstrate that those who were involved at the time did not only see their role as oppositional, a number of high profile battles between civic and government interests served to transform the many civic stewardship groups from mostly service providers to political actors. The civic-to-civic cooperation that these new politics involved was formative for many organizations. It was an essential pre-cursor to the coalitional politics that would dominate the 2000s and further entrench civic stewardship groups within local environmental governance networks. As one representative of a garden group commented of the mid-to-late 1990s, “...that’s when the gardens were threatened...and that’s when we really, you know, raised a lot of money to work on preservation and really started to work closely with all the other green groups.”

In addition to strengthening civic sector coalitions, the oppositional politics of the 1990s also planted the seeds for important changes that would widen the field of stewardship in New York City in the first decade of the 21st Century. Several new groups formed in the 1990s to work on issues of urban agriculture, food safety, and waterfront access. These issues were seen as rising concerns: “I think that the emphasis on food production, urban agriculture, is also on the rise or is something that has really come a long way even in the last five years.” Another longtime activist remarked, “One of the fascinating trends of the last 10 years, around environmental activism, is people wanting to get into the water in boats and even you know, an opportunity to swim.” Thus, by the end of the 1990s, civic stewardship groups had strengthened coalitions with one another and expanded the range of issues they were affecting beyond the basic service concerns of the 1970s. Meanwhile, the close inter-relation between quality of life at the neighborhood level and preservation of ecosystem services at various scales became increasingly visible within urban governance processes and, in response, public agencies, sought to build on the cooperative relations that existed with civil society around these issues.

4.2.3. *Coalitional politics and emerging hybrid governance in the 2000s*

Finally, in the most recent period of the environmental stewardship system in New York City, stewardship organizations have leveraged the political power developed in the 1990s to gain standing in the decisions made by government agencies. They have increasingly become specialists utilized by public agencies in the environmental management process. In the words of a representative from one of the groups working on programs in parks:

Our relationship with Parks has always been ... they know that we’re very important to them ... and they’re very important to us...We’ve had contracts that came through Parks but...But even higher up, you know, they know that we are an important piece of the whole ... the greening in New York City.

In order to maintain the bridge between civic and governmental actors and carry out their role as network brokers, many directors of civic organizations reported a similar bi-modal relationship with government agencies referenced above. Often, groups operated as both an institutionalized sub-unit of one or more public agencies and as a critical voice that sometimes opposes those same agencies. Several examples were offered during the interviews that described the stewardship groups’ role as representing New Yorkers’ interests. The groups noted that “the citizens have to prod the bureaucrats because they get too comfortable sitting at a desk.” In general, this relationship is seen as flexible and opportunistic on the part of civic groups, and has developed over time. At the same time, several groups reported

that their relationship with the government was both antagonistic and collaborative. For example, one respondent remarked: “We threatened to sue the city if they didn’t follow the...previous consent order...[that]...the state people had put on them. And it went back and forth for a few months and give and take, give and take.” That same respondent later spoke of a friendly resource-sharing relationship with the same agencies that they were suing: “...they all use all my photographs for their brochures and their displays, and you know the City Parks and the Army Corps of Engineers and DEP, you know, because I give them to them for nothing so that helps.”

These organizations have a long history of being both partners with and critics of public agencies. All groups that we interviewed exhibit some degree of this bi-modal relationship with government agencies, but only the more mature groups spoke of it as a conscious part of their activities. In the words of a representative of one of the older groups that we interviewed:

With [that city agency] we do both, dispatch funds for them but we also do projects with them. They’re kind of understaffed ... They just don’t have the capacity or maybe desire to do it all and so we end up sort of taking on some of that work but we try and do it somewhat in conjunction with them. But then sometimes we file lawsuits, you know, in opposition to things they’ve done, so, we can go back and forth. It’s amazing. They never seem to get that mad at us.

These types of bi-modal relationships are commonly accompanied by ongoing two-way cooperative sharing of responsibilities and staff between civic groups and city agencies. The simultaneously critical and engaged aspect of the brokerage role played by civic environmental groups is characteristic of the organizations that we interviewed. They literally have their bases of action in two different parts of the network. Legitimacy on both sides depends upon their capacity to be seen as representative of the interests of both sides. Generally, this relationship translates to reticence and circumspection about becoming too involved with government agency processes, lest the perception of bias and removal from the on-the-ground stewardship world affect their ability to participate in potential future conflicts. Here is how the leader of one group explains it:

You know, over time there’s always been criticism I felt directed towards us, because we’ve sort of been looked at as a city agency by some of the community garden folks, and there have been individuals over time, I’m not going to mention anybody’s name, that have always felt that they were gonna do this without us because they thought that we were ‘the Man’.

In other words, the bi-modal relationship of civic groups with governmental agencies can be challenging to navigate. However, these connections are vital to the stewardship network in New York City.

4.3. *Contemporary urban environmental stewardship*

Civic groups that serve as brokers with government agencies connect the resources that the agency can provide with the other civic groups in their network. They insert flexibility and multi-scaled capacity into the governing system, potentially enabling the creation of a more resilient social–ecological system precisely because they can fluidly cross between sectors. In order to maintain that quality, the groups that serve as flexible meso-level brokers highly value the coalitions that they form. For the most part all of the groups we spoke with had a positive view of coalitions with other civic, public, and private organizations. Across all of our interviews, there were 75 individual references

to cooperative action between civic organizations and only 26 references to oppositional action between civic organizations. With regard to the relationship between civic groups and public agencies, there were 84 references to cooperative relations and 32 references to oppositional relationships. In other words, at least in their responses during the interviews, these groups emphasized the cooperative aspects of coalitions.

In all, each historical period planted the seeds for the next and expanded the network connections of stewardship groups across various sectors. The groups that formed in the 1970s were the basic building blocks of the coalitions that resulted from oppositional politics in the 1990s and then became the bedrock of hybrid governance structures in the early 2000s. In the 1990s, there were two modes of operation: the civic-to-civic relationships were largely cooperative, but the civic-to-government relationships varied along a spectrum of oppositional and cooperative partnerships, with the most visible being oppositions over community garden space. However, the coalitions that formed became the foundation for a new era of governance wherein private donations being given to civic groups for local environmental stewardship activities were linked to the goals of public agencies within the context of a thick set of inter-organizational connections. There was a high degree of hybridity within the actions taken by civic, public, and private organizations involved with stewardship. The end result has been a system that relies upon feedback from public, private, and civic actors—each seeking to utilize the resources that their position can best leverage. This type of feedback is described by a representative of an organization that recently shifted toward more environmental programming:

Through this [program] we have relationships with transportation and work very closely with Sanitation and Parks. We do a lot of stuff with them. We do a lot of work for example with [a privately funded environmental group]...We do some work with [a corporate volunteer group] because we have a lot of corporate gifts and a lot of increasingly—this is a big change, these corporations are sending their employees down to do volunteer work.

Within this hybrid set of activities associated with local environmental activism, civic stewardship groups have become the boundary-crossing entities that are essential to building the multi-scaled and multi-sectoral capacity needed for effective management of local ecosystem services.

5. Discussion and conclusion

The findings from our research in New York City reveal a complex set of interactions between stewardship groups and decision-makers. The growth and steady engagement of stewardship groups in New York City alongside local decision-makers and planners is indicative of the integrated social and ecological demands of urban infrastructure. These qualities of the local stewardship system highlight some of the challenges and opportunities in building a governance system that can effectively manage ecosystem services in cities. Local stewardship groups have demonstrated the capacity to evolve over time in response to a changing set of conditions in the political, economic, and social realms. Inherent in the adaptive capacity of stewardship groups is the ability to engage with new actors along a spectrum of oppositional and cooperative relationships.

This paper suggests that, over time, local environmental groups self-organized into a network of civic actors capable of working both locally and within a larger organizational system of stewardship. Local environmental groups have shown the capacity to work across sectors and engage in activities that stem not only from a particular

social–ecological impulse, but from broader concerns over the quality of urban life. Engaging in a bi-modal form of communication that is both oppositional and cooperative, these local groups serve as a bridge to other civic and government groups. As a result, their work extends from the neighborhood to larger, city-wide decision-making and civic participation.

In the end, our findings suggest that by examining the structure and function of urban environmental stewardship groups we may find useful lessons that lead to better capacity to manage and preserve ecosystem services within cities in an ongoing fashion. In this case, civic stewardship organizations have emerged as important managers of urban ecosystems organized into multi-scale networks grouped by type (e.g. air, water, land). Representatives of stewardship organizations have demonstrated a shrewd understanding of local politics and government agencies. This insight has allowed stewardship groups to gain entry into arenas of public decision-making, including agenda setting and management of ecosystem services. In this way, stewardship groups signify a new mode of hybrid actors active in cities, as demonstrated by the civic-to-public networks. As well, they demonstrate the capacity to build the flexible and responsive social infrastructures needed to sustain ecosystem services. More research, though, is needed to determine how hybrid actors may influence environmental policies and civic engagement. Thus far, we are only able to understand how a portion of these networks operate but ongoing research in this area is expanding our knowledge.

This research also raises new questions about the governance of urban ecosystem services. On one hand, shifting resources available for managing the local environment resulted from changes in the political and economic conditions of the city. On the other hand, an increasing capacity for managing the complex social–ecological system which no one sector can address on its own resulted from the civic sector response to a lack of public sector services. Taken together, these forces resulted in a move toward combined activity within the public and civic sectors. There are still large challenges faced in the effort to alter fundamentally land use in cities toward a more ecologically sound pattern that incorporates preservation of ecosystem services, but the strategies being developed by stewardship groups may be creating the institutional space for such a conversation to move toward action.

More research is needed to understand better how similar stewardship governance networks operate in other cities and in other socio-political contexts. New York City is unique with regard to a number of socio-demographic and political variables. Whether the historical development of stewardship that took place in New York City or the hybrid governance model that is developing will be seen elsewhere remains unclear. It is clear, though, that a continued understanding of these trends will allow for the development of better strategies to manage social–ecological complexity in cities and to better preserve ecosystem services at all scales.

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