



# A social assessment of urban parkland: Analyzing park use and meaning to inform management and resilience planning



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## ABSTRACT

Globally, municipalities are tackling climate adaptation and resilience planning. Urban green space has crucial biophysical buffering capacities, but also affects social interactions and human well-being. This paper considers the social dimension of urban green space, through an assessment focused on park use, function, and meanings, and compares results to categories of cultural ecosystem services. We develop a mixed-method approach for assessment of uses and social meanings of parkland and pilot this method in 2140 acres of parkland in waterfront neighborhoods surrounding New York City's Jamaica Bay, an area heavily affected by Hurricane Sandy. This method combines observation of human activities and signs of prior human use with structured interviews of park users. We find that urban parkland is a crucial form of 'nearby nature' that provides space for recreation, activities, socialization, and environmental engagement and supports place attachment and social ties. We show that parks, through their use by and interactions with humans, are producing vital cultural ecosystem services that may help to strengthen social resilience. Certain services were more easily detectable than others via our assessment technique, including recreation, social relations, and sense of place. The assessment method was designed to be spatially explicit, scalable, and replicable; natural resource managers engaged in park management and/or resilience planning could apply this method across individual sites, in particular districts—such as vulnerable waterfront areas, and citywide. This study demonstrates a way in which cultural ecosystem services and an understanding of social meaning could be incorporated into park management and resilience planning.

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## 1. Introduction

Municipalities across the world are engaging in processes of climate adaptation, resilience planning, and green infrastructure investment, drawing attention to the role of the environment in enhancing quality of life for urban dwellers. In an era of climate change, urban parks are increasingly viewed by policymakers and land managers as natural buffers to help mitigate the effects of storm surges, sea level rise, and combined sewer overflow (see, e.g., *City of New York, 2007, 2013*). While these biophysical capacities are crucial, this paper considers parkland a space for cultivating *social* resilience through civic engagement, active use, and stewardship activities (*Chapin et al., 2010; Gomez-Baggethun et al., 2013; Pierre-Louis, 2013; Svendsen et al., 2014*). Urban

residents use parks and green spaces as sites for exercise, for refuge from stress, and for socialization, with clear implications for public health and well-being (see, e.g., *van den Berg et al., 2010; Irvine et al., 2013*). In the context of resilience planning, parks and other urban space can be fertile ground for fostering the type of social cohesion that is essential for strengthening resilient cities (*Peters et al., 2010; Sampson and Raudenbush, 1999*), particularly in the aftermath of acute and chronic disturbance (*Tidball and Krasny, 2014*).

A better understanding of ecosystem services in megacities undergoing dynamic changes is required to meet sustainability and resilience goals in urban policy and planning (*McPhearson et al., 2014*). The ecosystem services framework includes provisioning, regulating, supporting, and cultural ecosystem services and often quantifies or even monetizes ecosystem services in particular landscapes (*de Groot et al., 2002*). While not without ongoing challenges, the ecosystem services framework has utility for planning, as it provides a common approach to valuation in order to better understand the implications of land use and management decisions for a range of stakeholders, and helps move beyond

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traditional tradeoffs of ‘environmental conservation’ versus ‘development’ (de Groot et al., 2010). In urban settings, ecosystem service valuation tools have been used to inform sustainability goal-setting (see, e.g., Campbell, 2014), and the ecosystem service framework is prevalent among both nonprofit groups and public managers of green infrastructure as it provides a means for quantifying co-benefits (Ibes, 2011; Young, 2013). Yet, cultural ecosystem services (CES) are less studied and understood (Chan et al., 2012a). Urban ecosystem services assessments that include CES are critical for making better-informed planning, governance, and policy decisions to advance human well-being and social resilience in urban environments (Chan et al., 2012b; Gomez-Baggethun et al., 2013).

Understanding urban ecosystem services requires understanding their context, yet Ernstson et al. (2010) point to a “deep neglect” of research on governance of ecosystem services in urban landscapes. One area of urban ecosystem governance research has focused on scalar relationships between governance and ecosystem services. Given the heterogeneity in ecological communities and social institutions, Borgstrom et al. (2006) argue that urban social-ecological systems face scalar mismatches that create challenges for planning and management. Many global cities are currently working to address scalar mismatches by extending planning time horizons and encouraging cross-jurisdictional collaboration among municipal agencies (see, e.g., ICLEI, 2010). Still, local government often has multiple offices working on separate, but overlapping policy issues. In examining urban governance for resilience, Frantzeskaki and Tilie (2014) identify a need for coordinating across planning departments. As well, Faehnle et al. (2014) call for multi-scalar, spatialized approaches to the planning and management of green infrastructure in order to enhance sustainable production of ecosystem services. Overall, building more resilient and adaptive governance structures requires overcoming challenges related to multi-scalar and multi-level phenomena and interactions (Cash et al., 2006). Better coordination and shared information is needed to support multi-scalar planning and decision-making, from site-specific management, to planning for particular vulnerable districts, to citywide, long-term planning.

We, as USDA Forest Service researchers, designed this study in partnership with the municipal agency NYC Department of Parks & Recreation (NYC Parks) and the non-profit Natural Areas Conservancy (NAC) in New York City (NYC) to help manage parkland as a social resource and a site of CES production. In addition to these

managers’ focus on ecosystem services, the broader planning context for NYC has shifted its focus from sustainability planning to resilience planning (City of New York, 2007, 2013). This study was conducted in a post-disturbance context, one year after Hurricane Sandy in the Jamaica Bay region, a vulnerable waterfront district identified by NYC’s *Special Initiative for Rebuilding and Resiliency* as a key area of concern. Given current CES and resilience research and the governance context of NYC, we asked the following research questions: (1) What are the uses, functions, and meanings of urban parkland as conveyed through people’s behaviors, descriptions, and narratives in a post-Sandy context? and (2) How do park use, function, and meanings contribute to our understanding of cultural ecosystem services (CES) within the context of park management and resilience planning efforts at multiple scales?

This paper (1) develops a mixed-method social assessment of uses and meanings of urban parkland, (2) pilots this method by applying it to 2,140 acres of public green space in the waterfront neighborhoods surrounding NYC’s Jamaica Bay, (3) identifies CES in parks, and (4) provides recommendations for incorporating CES and social meaning into park management and resilience planning. We argue that understanding patterns in park use, function, and meaning at the site scale can inform resilience planning at the district and city-wide scales. By addressing planning at these multiple scales, such data can bridge management arenas, reducing scalar mismatches in governance.

## 2. Literature review

### 2.1. Cultural ecosystem services

Recent decades have seen the development of the ecosystem services concept into a robust framework, linked with human well-being (Daily 1997; TEEB, 2010). This framework recognizes humans’ dependence upon ecosystems for their well-being, through the production of ecosystem services. Ecosystem services literature has typically focused at a global scale or on more rural environments, but consideration of urban ecosystem services is also needed (Bolund and Hunhammar, 1999). In a largely urbanized world, cities are increasingly the location for direct human interaction with ecosystems (Gomez-Baggethun et al., 2013).

Defined by the Millennium Ecosystem Assessment (MEA 2005) as “non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation,

**Table 1**  
Cultural ecosystem services identified in the Millennium Ecosystem Assessment (2005).

Cultural Service (from MEA 2005)	Description (from MEA 2005)
Cultural diversity	The diversity of ecosystems is one factor influencing the diversity of cultures.
Spiritual and religious values*	Many religions attach spiritual and religious values to ecosystems or their components.
Knowledge systems	(traditional and formal). Ecosystems influence the types of knowledge systems developed by different cultures.
Educational values	Ecosystems and their components and processes provide the basis for both formal and informal education in many societies
Inspiration	Ecosystems provide a rich source of inspiration for art, folklore, national symbols, architecture, and advertising.
Aesthetic values*	Many people find beauty or aesthetic value in various aspects of ecosystems, as reflected in the support for parks, scenic drives, and the selection of housing locations.
Social relations	Ecosystems influence the types of social relations that are established in particular cultures. Fishing societies, for example, differ in many respects in their social relations from nomadic herding or agricultural societies.
Sense of place	Many people value the “sense of place” that is associated with recognized features of their environment, including aspects of the ecosystem.
Cultural heritage values	Many societies place high value on the maintenance of either historically important landscapes (“cultural landscapes”) or culturally significant species.
Recreation and ecotourism*	People often choose where to spend their leisure time based in part on the characteristics of the natural or cultivated landscapes in a particular area.

\* Status assessed by MEA (2005).

and aesthetic experiences”, CES contribute to well-being through direct human experience of ecosystems. Few papers have explicitly tackled the challenge of accounting for CES in ecosystem services assessments (Milcu et al., 2013). Often, when they are included, it is only those that are more easily measured (Chan et al., 2012a). In the MEA itself, only three of the ten identified cultural services were able to be measured and assessed (Table 1). This disparity in measurement among CES and lack of a unifying framework occur because: (1) definitions are vague and relationships are unclear (Daniel et al., 2012), (2) multiple fields and methodologies involved in CES research, (3) CES are usually not the primary focus of ecosystem service research projects, and (4) CES is still an emerging area of research (Milcu et al., 2013). However, Satterfield et al. (2013) point to examples where characterizing cultural benefits and impacts with subjective metrics can improve environmental decision-making by enabling intangible concepts such as stewardship to be assessed and integrated into the conversation.

Since the MEA's publication, debate about defining services, goods, benefits, and values has continued in the literature (Chan et al., 2012a). Research reveals alternate frameworks for conceptualizing the relationship between culture and ecosystems, including ecosystem benefits (Fisher et al., 2009), cultural goods (Church et al., 2011), and social and cultural values (Gomez-Baggethun et al., 2013). Partially because of this ongoing theoretical dialog, indicators and methods for assessing CES often remains bounded by the categories identified in the MEA (Haase et al., 2014). At the same time, multiple classification frameworks currently abound (e.g. de Groot et al., 2002; TEEB 2010; Haines-Young and Potschin, 2011), which presents one of the key challenges to CES research. Quantitative methods such as stated preferences and hedonic pricing have been used to assess recreation and aesthetics (Haase et al., 2012), while qualitative methods have also been used to assess other CES (Fagerholm et al., 2012; Hernández-Morcillo et al., 2013). One approach to broadly assessing CES is to deductively analyze the presence of CES by assessing public values of landscapes, guided by a typology of CES and using psycho-social survey valuation tools (Plieninger et al., 2013).

## 2.2. Park use and meaning

Towards understanding CES in urban areas, we can also look to research on park use and social meanings, as the natural elements of urban parks are a key source of ecosystem services. Multiple disciplines engage in park use research, including park and leisure studies (Baran et al., 2013; Kazmierczak, 2013), urban design (Gehl, 1987), and geography (Byrne and Wolch, 2009). Assessing the social meaning of spaces is similar, but still distinct from social valuation methods often applied in CES assessment (e.g., Mäkinen and Tyrväinen, 2008). Values are a normative construct assumed to underlie individuals' preferences for particular aspects of place (Brown and Reed, 2000), whereas meaning focuses on the “thoughts, feelings, memories, and interpretations evoked by a landscape” (Schroeder, 1991). Place meaning has become a common term to refer to the meanings created once individuals interact with space (Tuan, 1971). Social values of parks and landscapes is often elicited deductively, through predefined typologies with positive and negative valence (Tyrväinen et al., 2007), while place meaning can be measured inductively, through semi-structured interviews that allow recording of new meanings not identified *a priori* by researchers (Loukaitou-Sideris, 1995).

Abstract layers of meaning arise from specific relationships between the observer and the environment and are linked to deeply-held personal beliefs and specific social contexts (Gee and Burkhard, 2010). Urban green areas contain social and symbolic

meaning, providing people access to a sensory and natural world and to a ‘good city’ where people can share their experiences and responsibilities (Burgess et al., 1988; see also Lee, 1972). Loukaitou-Sideris, (1995) examined patterns of meaning in neighborhood parks for different user groups. As anticipated by Gomez-Baggethun et al. (2013) and Williams and Carr, (1993), she found that the use and perception of space varies dramatically for different user groups. There was no one single experience or meaning of a park space.

## 2.3. Social assessments

Social assessments are used in diverse settings by a range of fields, including *social impact assessments* used to inform public planning efforts and *rapid assessment* or *rapid rural appraisals* conducted primarily in public health and community development contexts. Social impact assessments draw upon broad methods of qualitative and quantitative analysis, monitoring, and public involvement to plan, implement, and manage social change (Taylor et al., 1995). Rapid assessments are highly pragmatic, focused on assessing a situation or context within a defined geographic area (McNall and Foster-Fishman, 2007). In rapid assessments, teams of researchers are deployed to gather information from small samples of key informants and local residents, through surveys, semi-structured interviews, focus groups, transect walks, and mapping (Garrett and Downen, 2002). In developing our protocol to assess social meaning of parkland, we drew from these literatures, along with rural sociology (Field and O'Leary, 1972), adapting methods and concepts to an urban environment. We built upon methods of rural appraisal because these tools were designed to understand the relationships between humans and the environment (Field and Burch, 1988); they offer a useful starting point for developing *in situ*, observational studies of the use and social meaning of parkland.

Yet, social assessments are not currently well-integrated with resilience frameworks (Dale et al., 2014). To date, resilience thinking about social-ecological systems like urban areas has been primarily influenced by ecological principles, but integrating the concepts of CES and human well-being into social-ecological resilience theory points to the important role of social dynamics in ecosystem function (Armitage et al., 2012). Efforts to define and examine the social aspects of resilience within the context of social science theory have become more prominent in the literature (e.g., Adger, 2000; Folke, 2006; Keck and Sakdapolrak, 2015; Brown, 2014). As an example, Berkes and Ross (2013) proposed an integrative approach for linking *resilience from a systems science perspective* with *human resilience* developed in developmental psychology and mental health (see also Masten and Obradovic 2008). Further developing this concept of social resilience, Keck and Sakdapolrak (2015) identify a social resilience framework that addresses coping, adaptive, and transformative capacities of individuals and groups and also draws explicit connections between social agency and structure. Yet, resilience planning—the practice of building urban resilience capacity, which extends to social systems—currently focuses on the systems science perspective of resilience, as applied by city planning practitioners (Ahern, 2011). Further work is needed to integrate theoretical concepts and understandings of both social systems as a whole and the concept of social resilience into the practice of urban planners and managers. Focusing on the social dimensions of human interactions with parklands and applying a social resilience framework to examine systems' responses to change are steps toward better integrating a systems view into the planning and management of urban natural resources explicitly as spaces for cultivating social resilience and supporting healthy communities (NAS, 2015).

### 3. Methodology

#### 3.1. Study area

NYC has one of the most diverse park systems in the United States, with 29,000 acres of parkland. Moreover, NYC Parks is one of the largest municipal natural resource management agencies in the world, with more than 7,000 employees (including seasonal staff) and expenditures of \$382 million in fiscal year 2010 (City of New York, 2011). The newly-created NAC, launched in 2012, is a private non-profit focusing on the 10,000 acres of ‘natural area’ parkland citywide, including forests, wetlands, and marshes. NYC Parks and the NAC are working together in a hybrid governance arrangement along with federal researchers from USDA Forest Service to conduct a baseline ecological and social assessment of parkland to inform park planning, conservation priority setting, and programmatic development. This study represents year one of the two-year social assessment.

We selected the Jamaica Bay coastal region because it has recently become a focus of resilience planning efforts via the City of New York’s *Special Initiative for Rebuilding and Resiliency*, NYC Parks’ park resiliency efforts, and through the creation of the Jamaica Bay Science and Resilience Institute in 2013 (City of New York, 2013). This waterfront environment continues to change in response to recent disturbances, including October 2012’s Hurricane Sandy, which inundated the area with floodwater (FEMA 2014). The Jamaica Bay landscape includes salt marshes, grasslands, coastal woodlands, maritime shrublands, and brackish and freshwater wetlands (Botton et al., 2006). The region of 900,000 people is racially and culturally diverse. As of 2010 the area was 39.4% Black Non-Hispanic, 27.9% White Non-Hispanic, 17.8% Hispanic, 9.7% Asian/Pacific Islander, and 4.3% other (US Census, 2010).

Our study area includes 2,140 acres of publicly-accessible parkland managed by NYC Parks and directly adjacent to Jamaica

Bay or connected through a series of wetlands and waterways (Fig. 1, Table 2). We excluded: (1) sites closed or inaccessible by foot or vehicle; (2) parks managed by the National Park Service, as these have a different governance structure; and (3) community gardens, a community memorial park, and public swimming beaches, where use patterns and volume are better captured with other protocols.

#### 3.2. Data collection and analysis

The first phase of the project consisted of gathering GIS data, conducting background interviews with park employees and community informants, and ground-truthing park sites to create zones within parks in order to collect spatially explicit data. To enhance the rigor of our method, we pre-tested and received feedback on our protocols from park managers (Bradshaw and Stratford, 2005). Data collection occurred throughout the summer months of June–September 2013; every park was visited three times: on a weekday, an evening, and a weekend.

Drawing upon previous urban park research (e.g., Loukaitou-Sideris, 1995; Rall and Haase, 2011), we qualitatively triangulated three data collection approaches, *direct observations of human activities*, *observation of signs of human use*, and *interviews with park users*, to maximize the validity and reliability of the data collected (Beebe, 1995). We grouped human activities functionally (e.g. sitting, socializing, bicycling, exercise, nature recreation). We collected park user counts by observed age classes youth (under 18), adult (18–65), and senior (over 65). Race/ethnicity data were not collected quantitatively, due to the potential for error and mischaracterization from observation only (Kearns, 2005). However, field researchers conducted group debriefs for each park in which observed demographic patterns were discussed and documented. Signs of human use included any traces that could be detected from the prior engagement of park users, distinct from the management

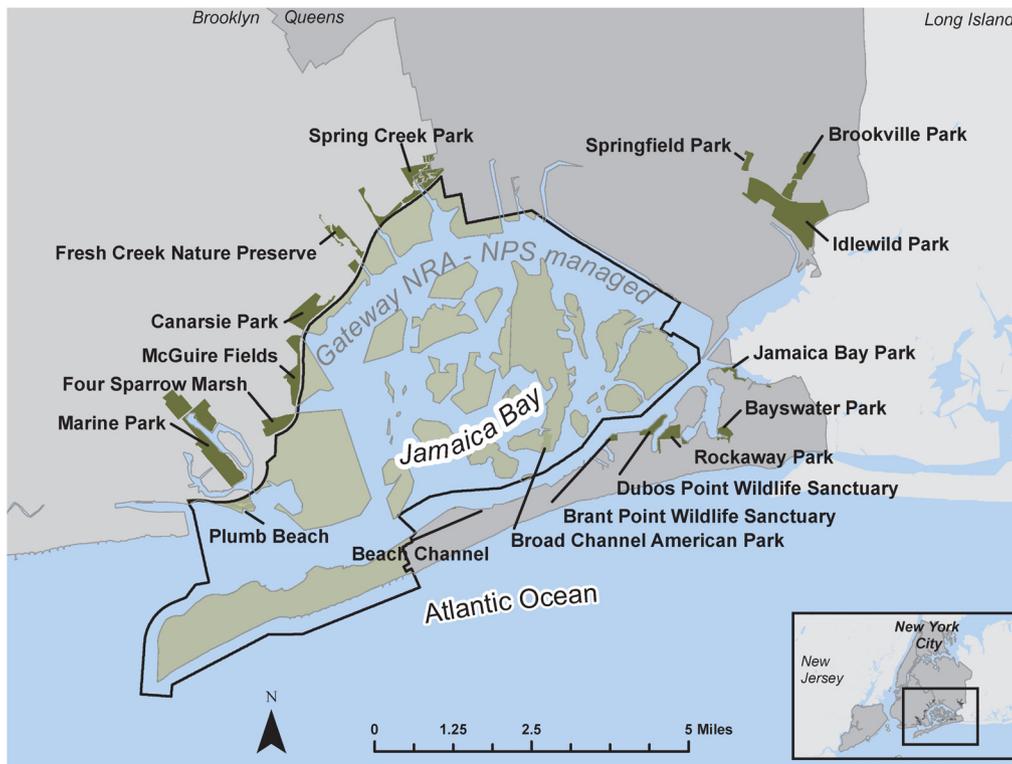


Fig. 1. Map of study area: Jamaica Bay region of New York City.

**Table 2**  
Characteristics of assessed NYC Parks-managed parks in the Jamaica Bay study area.

Park	Acres		Programming							Habitat Type			
	Total	Natural Area	BBQ	Beach	Bicycling	Dog	Playground	Sports	Water Access	Beach	Forest	Open Parkland	Wetland
Bayswater Park	25	0	x			x	x	x	x		x	x	
Beach Channel Park	2	0		x						x			
Brant Point Wildlife Sanctuary	9	4											x
Broad Channel American Park	19	6								x		x	x
Brookville Park	64	2	x		x		x	x			x	x	x
Canarsie Park	130	55				x	x	x				x	x
Dubos Point Wildlife Sanctuary	32	32											x
Four Sparrow Marsh	50	46											x
Fresh Creek Nature Preserve	40	38											x
Idlewild Park	120	96						x	x		x	x	x
Jamaica Bay Park	64	11						x					x
Marine Park	678	341		x		x	x	x	x		x	x	x
McGuire Fields	72	8										x	x
Plumb Beach	17	0		x					x				
Rockaway Park	194	0				x	x	x	x			x	x
Spring Creek Park	118	31						x					x
Springfield Park	22	0				x	x	x			x	x	

practices or infrastructure of NYC Parks. Signs include: graffiti, art, signage, and murals; informal trails, improvised sitting places, and encampments; community gardens in parks; and dumping or vandalism. Interviews with adult subjects elicited information about park use and stewardship engagement, which we defined, following Fisher et al. (2012), as participating in a group that helps take care of the environment.

We used two observation protocols and one protocol for interviews with park users (see Supplemental Material, Appendices A–C), which guided the collection of structured observations, qualitative field notes, and photographic documentation. The study spanned park interiors (Appendix A) and edges (Appendix B). Researchers worked in pairs in order to both enhance reliability through corroboration and provide greater richness of debriefs and field notes.<sup>1</sup> In addition to paired debriefs, full team debriefs were conducted at the end of each day to gather observations and questions about sites as a whole and to reflect on the process of research (Kearns, 2005).

The interview protocol (Appendix C) was implemented in park interiors only, with topics covering: what people are doing in the park, why they came to the park, how often they come, how far they travel, where else they go in the outdoors, and whether or not they participate in any environmental stewardship groups. Researchers selected every third adult park user encountered and approached for a brief interview, to introduce randomization and reduce selection bias (see Fisher et al., 2011). Interviews remained anonymous. We conducted 618 interviews, with 67 refusals, for a 90.2% response rate. The most common reason for refusal was the potential interviewee did not speak English.<sup>2</sup> Though we did not collect detailed demographic information due to the brief, on-site nature of the interviews, we did collect observed gender and age category of respondents. The gender composition was 318 male (56.3%), 249 female (40.3%), and 21 unrecorded (3.4%). The age composition was 484 adults (78.3%), 107 seniors (17.3%), and 27 unrecorded (4.4%).

<sup>1</sup> Two field research supervisors led the data collection effort, along with ten members of the Jamaica Bay Restoration Corps.

<sup>2</sup> Members of the field research team possessed foreign language skills in Spanish and Cantonese. Wherever possible, interviews were conducted in native languages. However, not all park users were encountered by our foreign-language speaking team members, or they spoke languages that our team did not (e.g. Russian). NYC is highly linguistically diverse, and we acknowledge that the inability to interview all park users in their native language has potential for biasing the study toward English speakers.

We conducted quality assurance procedures including examining errors, discussing and resolving discrepancies, ensuring accurate data entry, and preparing for analysis. In Excel, we created pivot tables to generate descriptive statistics and analyze trends in field observations and close-ended interview questions. Qualitative field observations and debrief notes were transcribed; photos were organized by park and observation.

Open-ended interview data were analyzed qualitatively. Responses to questions were coded separately by two different researchers via an open coding scheme that identified key phrases and concepts (Lofland et al., 2005). These initial codes were compared and discussed, and discrepancies were examined using an iterative approach until consensus was reached among the coders, thereby enhancing reliability (Neuman, 2003). Thematic clusters were then created to aggregate common codes together into broader themes. These clusters emerged out of key phrases, repeated language, and common ideas (Ryan and Bernard, 2003). Specific subcategories were retained. We did not conduct a member check of our analysis with park users due to the brief nature of our interviews and not wanting to overburden our subjects. We did, however, conduct interviews in pairs, allowing for verification of interpretation across researchers; and we shared interim results with park managers to clarify questions and strengthen validity of the findings.

## 4. Results

### 4.1. Park use

Our counts of directly observed human activities offer a snapshot of what people are doing in urban parkland in the Jamaica Bay district in the first summer season after Hurricane Sandy (Table 3; see also Appendix A for details on these categories). The most common activities include sports—such as soccer, tennis, cricket, baseball, volleyball, and football (28.8%) and walking (25.0%), which is not surprising given the way in which parks are often designed to foster uses of this kind. Parks also serve as locations that specifically support socialization (13.9%). Note that this category was only selected when people were observed in pairs or groups, sitting and talking in place (e.g. barbecuing, picnicking, or talking on a bench). It was not applied to people engaged in educational tours or sporting events, although these, too, are social activities. At the same time, parks also serve as a space to be alone and to relax, as 9.8% of people were seen sitting, resting, or standing alone (not in groups). When counting

**Table 3**  
Counts of observed human activities from three visits to parks within the Jamaica Bay study area.

Activity	Count	Percentage
Sports	1,737	28.8
Walking/dog walking	1,506	25.0
Socializing in place, in a group	839	13.9
Sitting/Resting/standing/waiting/keeping watch on one's own	594	9.8
Bicycling	530	8.8
Jogging/running	276	4.6
Nature recreation	263	4.4
Working	177	2.9
Educational group/tour	66	1.1
Other activity	27	0.4
Stewardship	13	0.2
Plant collecting/foraging/gathering	4	0.1
Personal property maintenance	1	0.0
Total	6,033	100.0

activities, we also observed the age of park users, and found that 38.0% were youth, 56.8% were adults (18–65 years) and 5.6% were seniors.

We also gathered information about frequency of park use via interviews, asking park users the close-ended question, “How often do you come to this park?” We found a range in frequency of use. The majority of respondents reported using parks on a daily (31.3%) or weekly (30.7%) basis, showing that parks are playing a function in the everyday lives of their users. At the same time, other interviewees replied that they visit parks only monthly (18.2%), occasionally (9.6%), or rarely (10.4%).

To detect patterns of prior use, which we triangulated with our human activity counts, we observed signs on the landscape made by previous park users and consider these as indicators of activity and engagement with the space (Table 4). The most commonly identified signs were graffiti, art, and murals (21.8%) that were created as forms of communication, turf-marking, and artistic expression. The next most common sign were trails (20.0%), which were only counted if they were desire lines – or cut-throughs – created by erosion under people's feet. Paved or mulched trails created by park managers were not counted. Similarly, our protocol instructed field researchers not to count institutional signs common to city streets and parks. Yet, other signs, flyers, and stickers (17.5%) that were left by individuals, groups, and businesses were the third most common sign of prior use. Understanding park use not only at a moment in time, but also over time, provides more robust data for understanding the ways in which parks are functioning, which is important to consider for management and planning. These signs of prior use provide

**Table 4**  
Signs of prior use of parks within the Jamaica Bay study area.

Sign	Count	Percentage
Graffiti, art, murals	210	21.8
Trails	193	20.0
Other signs, flyers & stickers	169	17.5
Other (note)	136	14.1
Illegal dumping	90	9.3
Sitting places	46	4.8
Sporting/play equipment	37	3.8
Garden in park	22	2.3
Damaged/vandalized building	15	1.6
Encampment/sleeping area	13	1.3
Memorial/shrine/sacred symbol	13	1.3
Community bulletin boards/institutional signs	6	0.6
Bird feeder/birdbath/bird box/pond	5	0.5
Fire pit	5	0.5
National flags	2	0.2
Damaged property	1	0.1
Other garden	1	0.1
Total	964	100.0

spatially explicit indicators of where different park uses and functions are occurring in consistent patterns, for example pointing to key ‘hot spots’ of public engagement, sociability, and stewardship as well as consistent challenges for managers, such as vandalism sites and damaged property.

#### 4.2. Park meanings and functions

Interviewees were asked “Why do you come to this park?” Depending upon the respondent's interpretation, this open-ended question elicits information about behavior of park users (park use) as well as motivations driving park use and the meanings and functions of park space to users. Nine primary themes emerged from the responses to this question, discussed here in descending order of frequency mentioned. Each interview response could be coded with up to three distinct themes, so percentages total to greater than 100%.

##### 4.2.1. Local

The primary reason that more than one-half of users (51.2%) gave for visiting parks is that the site is local or nearby. Respondents mentioned that parks were “convenient”, or easy to physically access and use, and in some cases respondents said that they lived “across the street”. While some users were visiting the park specifically to engage in a particular activity, others mentioned that the park served as a shortcut or pleasant walking route.

##### 4.2.2. Amenities and park characteristics

Approximately one-fourth of respondents (23.6%) said that they visited the park because of its amenities. Amenities include park infrastructure, such as bathrooms, barbecue pits, buildings, community centers, play equipment, parking, paths, trails, sports and recreation facilities, and nature centers. Which amenities in particular were most important varied with the park and the user, but the most commonly identified were sports facilities and amenities for kids. The amenities category also includes characteristics of the park itself, particularly cleanliness, maintenance, and size, and mentions of the park maintenance staff themselves.

##### 4.2.3. Nature-outdoors

Another prevalent theme for 14.7% of respondents was the ability to connect with material qualities of nature and the outdoors. Of the numerous sub-themes identified, the most commonly referenced attributes of nature were: “fish”, “shade”, “views”, “water”, and “trees”. Also mentioned were qualities of the air, including “fresh air”, “breeze”, and “cool”. Other wildlife mentioned included crabs, birds, and eels. Qualities of the coast included beaches, dunes, and salt marsh.



surrounding neighborhood (damages to homes, residential flight). A final theme related to respondents' participation in volunteerism post-Hurricane Sandy, including helping to clean up parks and engage in stewardship. These references point to issues of coping, but also potentially adaptive strategies within a social resilience context, given the potential for increased storms in the near future.

## 5. Discussion

### 5.1. From park use and social meaning to CES

Use data within and across a set of parks tells us which sites are used more and for which activities. Expanding this analysis to include social meaning gleaned from interview data, we see that these sites serve as crucial sources of CES – in some cases mapping to the MEA (2005) categories – and that some parks offer a more robust set of CES than others. The *recreational* function of parkland is demonstrated in our study by the prevalence of recreational users and interviewees' references to park amenities and activities. But this methodology also draws attention to the role of parks as thoroughly social spaces that support a range of *social relations*, including those that are highly relevant to resilience planning (e.g. place attachment, sociability, and social ties). The data demonstrate the pervasiveness of social activities in which people engage, the way in which they create patterns of use at gathering spaces (e.g. fire pits, improvised sitting places), and the ways that social ties and the sociability of the space motivate park visitation. Although respondents did not readily identify *educational* reasons for visiting parks, we observed park users engaged in both formal educational groups and informal educational play. *Sense of place* is a CES that is apparent in people's stated place attachment and place dependency on parks and their routine use of parks as a nearby resource (Farnum et al., 2005; Stedman 2003; Tidball and Stedman, 2013). While not a CES as defined by the MEA, the theme of 'local' nature emerged from our data and is related to sense of place. With half of interviewees identifying visitation as a function of distance from their homes, this result emphasizes the importance of parks as an important gathering spot for residents of surrounding neighborhoods.

The services of *inspiration*, *spiritual values*, and *aesthetic values* identified by the MEA were also found in our study. These CES map indirectly onto reasons people gave for using parks and can be triangulated with other data collected. The notion of finding refuge in nature as a respite from the densely built urban environment spans MEA's categories of spiritual values, inspiration, aesthetics, and social relations. The signs of human use data offer evidence of these CES as well, as people created art and signage inspired by and set in nature. Certain waterfront parks also contained Hindu shrines—offerings to the water, as evidence of directly spiritual uses of parkland (see also Svendsen et al., 2016). Moreover, interacting with elements of nature and the outdoors was discussed by interviewees as a reason to visit the park in its own right, without necessarily deeming these natural elements as having cultural, spiritual, or aesthetic values. Finally, *cultural diversity*, *cultural heritage values*, and *knowledge systems* did not emerge as key CES because of the methodology used. While we directly observed a diverse cross section of local residents engaging in a variety of cultural practices, a more in-depth interview, historic, or ethnographic approach would be needed to elicit these CES in greater detail (for example, see Van Hooreweghe, 2012).

In sum, we find that urban parkland is a crucial form of 'nearby nature' that provides space for recreation, activities, socialization, and environmental engagement and supports place attachment and social ties. We have shown that urban parks, through their use by and interactions with humans, are producing vital social

meanings and CES that facilitate individuals to engage in coping strategies against chronic stressors in the urban environment. Certain services were more easily detectable than others via social assessment, including recreational values, social relations, educational values, and sense of place. We found existing CES categories of inspiration, aesthetics, and spirituality through analyzing the use, function and social meanings of urban parks as sites of refuge and places in which people interact with elements of nature. However, like Brown et al. (2012), we note that the number of times a CES was mentioned in interviews is not an indication of value of that CES.

In addition to relating park use and social meaning to CES, we also examined park use and meaning in response to system disturbance from Hurricane Sandy. We found that park users made multiple mentions of the impact of Hurricane Sandy on parkland as well as their interest in engaging with park restoration and stewardship, which can be viewed as coping and possibly adaptive capacities. Tidball and Krasny, (2013) theorize that greening and stewardship often emerge in the aftermath of disaster, while Chan et al. (2015) found existing community gardens in the Rockaways served as restorative commons and sources of adaptation and collective efficacy for community members immediately following Hurricane Sandy. Future research should build upon our findings to more fully explore park stewardship potential post-disturbance as one way for helping to strengthen social resilience capacity. This is a fertile area for continued investigation by those interested in locating social mechanisms of resilience (Tidball et al., 2010) within social-ecological systems to foster trust and social cohesion through a shared resource.

### 5.2. A methodology for integrating CES into park management and resilience planning at multiple scales

In this paper, we developed a methodology for assessing park use and meaning that is scalable to larger sets of parks, replicable, and useful for assessing CES, which we piloted in the Jamaica Bay district. Our method enables us to draw valid conclusions through triangulation of observations and interviews, providing guidance for managers about the social meaning of parklands as they set priorities for conservation, development, programming, and stewardship. Given the limited resources of city managers, a structured, replicable methodology provides the opportunity for assessing an expansive urban park system, uncovering aspects of social meaning, and managing for a broad range of user groups. Understanding the unique characteristics of each site can help managers to plan more effectively at site, district, and city scales. These findings show that individual parks provide particular social functions which may not be found in other sites. Park managers can use this information to build a case for site-specific management decisions in the face of efficiently managing a citywide resource.

In providing these social data to municipal managers at NYC Parks and nonprofit managers at NAC, we intend to support decision-making about funding allocation, design decisions, management approaches, and public programming for parks at the site and district level. These data assist in answering age-old questions about where and how to prioritize conservation, preservation, and active use within and among park sites (Miller et al., 2011). Decision-makers at NYC Parks and the NAC have identified the need for fine-grained, spatially explicit social data about the forms, functions, services, and meanings of parks. The approach allows managers to identify social and spatial patterns and to raise novel questions related to park use and social meaning. Building upon this Jamaica Bay pilot, year two of our assessment expanded the geographic scope to a citywide sample of parkland and natural areas. Going forward, these social data will be

combined with ecological data collected by the NAC to create new knowledge about parks as part of social-ecological systems (Grimm et al., 2000; Redman et al., 2004). These data can be used to understand interactions among park use, social meaning, and ecological communities, such as the relationship between CES and biodiversity in urban wetlands and forests.

Comprehensive data about the CES provided by parkland can inform sustainability and resilience planning at the citywide scale. The ecosystem services framework has been readily adopted by policymakers in municipal sustainability agenda-setting, such as NYC's PlaNYC, where quantified arguments about the value of nature helped to substantiate investments in trees, parkland, and other green infrastructure (Campbell, 2014). While most of these arguments focus on biophysical benefits and services, attending to CES 'brings people in' to the valuation of ecosystems (Daniel et al., 2012). Prior research has demonstrated that people in urban environments engage with the outdoors in the context of chronic stresses in their lives (e.g. poverty, heat, aging, social isolation) (Sampson and Raudenbush, 1999), with nature serving as a buffer for stress (Irvine et al., 2013). Our qualitative interviews identified instances of social resilience (coping and adaptation capacities) to chronic and acute stressors that are salient with park users, but also are influenced by local park management and citywide planning efforts. Integrating these issues into resilience planning is critical to ensure that policies and programs focus not only on green infrastructure as biophysical resource but as a platform for enhancing human health and well-being in the face of acute and chronic disturbances. Municipalities are currently developing resilience plans that seek to minimize negative effects of disturbance on built environments, protect ecosystems, and promote human well-being—parks are one key site type that can be designed and programmed to perform multiple functions.

Our social assessment can be applied to assessing changes in CES that are relevant to resilience planning, particularly in the wake of large-scale disturbances. Our method provides a baseline measure of CES against which management decisions over time can be compared. This is particularly relevant as new investment in parks and green infrastructure focuses on adaptation and resilience to prepare for future storms and lessen the impacts of potential flooding. These baseline data can also serve as a reference point that can be compared to future datasets to understand changes in CES post-disturbance and over time. The replicability of our approach enables park managers and city planners to assess how parks' social conditions and CES may change over time, and the structured protocol increases the likelihood that managers are able to actually repeat the process or integrate it into their routine monitoring of parkland. Incorporating this method may enable urban park managers and other city agency officials to better manage parks as social resources, fostering social resilience in surrounding communities in the form of coping, adaptive, and transformative capacities in the face of changes.

At the same time, it is important to note the limitations of the method and areas for future research. Our study focuses specifically on park users and is not generalizable to the overall population. Randomized surveys provide another important approach for gathering extensive data about CES (Tyrvaainen et al., 2007). By sampling in time and space, our aim is to generalize to the population of waterfront park users in the Jamaica Bay district; the strength of our method comes from studying these users *in situ* and identifying CES in particular sites. Our 618 on-site interviews with park users allow us to gather extensive data about use and meaning and detect the presence of CES. We found that certain services were more easily detectable than others via our technique, including recreation, education, social relations, and sense of place. Additional in-depth qualitative approaches may be

required to detect CES such as knowledge systems and cultural heritage, but these approaches require more time to implement and may reduce the scalability of the approach. Furthermore, while our inductive method identifies and aligns CES concepts with social meaning from interviews, type and intensity of observed park use, and signs of park use, it does not identify which CES are more highly valued than others. Future research could utilize our dataset that spatially identifies CES in parkland to conduct a valuation approach through surveys, focus groups, or interviews. Finally, the study was designed with and for municipal and nonprofit land managers. Drawing upon Krasny et al.'s (2014) analysis of stewards as monitors of ecosystems services, this method could also be applied by stewardship groups themselves, thereby engaging a larger set of stakeholders in becoming an active part of park management and resilience planning.

## 6. Conclusion

Per Gomez-Baggenhun et al.'s (2013) call for integrating urban ecosystem services into planning, our social assessment methodology provides managers and planners with a means of assessing CES contributed by parks to the greater NYC social-ecological system. Planners could utilize these protocols to collect data on a consistent basis across the entire city and integrate them into park management and citywide resilience planning when considering green infrastructure and public well-being. Incorporating CES within the practice of resilience planning helps to shift the balance of this approach from the engineered and physical to the human and the social. Furthermore, instead of considering parks as static repositories of services, we can consider parks as human-produced cultural landscapes where people are co-creators of services in their roles as users, stewards, and 'ecosystem engineers' (Ernstson 2013; Andersson et al., 2014). Thus, further research is needed to fully understand *processes and mechanisms* involved in co-creation of CES through the interactions of parkland and park users.

Resilience planning at the municipal level to date has focused largely on built structures and biophysical capacities of parkland. However, understanding the CES contributed by parks in our study area can inform municipal agencies including NYC Parks and NYC Office of Recovery and Resiliency in their resilience efforts in Jamaica Bay neighborhoods by identifying which CES are being provided where across the district. As we gain a better understanding of the relationships among social resilience, CES, and human well-being, these data will become increasingly valuable planning resources for the greater NYC area. These data can be used across scales by making improvements to specific sites as well as across sites in a district, as we now understand the different uses, functions, and meanings associated with individual parks. As many districts, cities, and regions consider new procedures for resilience planning, we recommend that these efforts build upon the ecosystem services framework, more fully taking into account the social dimensions of urban parks, and explicitly integrating the concept of social resilience, as we work to manage cities as crucial human habitats and social-ecological systems.

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## Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.envsci.2016.01.014>.

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