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Drivers of Public Participation in Urban Restoration Stewardship Programs: Linkages Between Environmental Identity and Knowledge, and Motivations

Amanda E. Sorensen, Rebecca C. Jordan, Gloria Blaise, Jeff Brown, Lindsay K. Campbell, Myla F.J. Aronson, and Michelle L. Johnson

Abstract. Environmental restoration projects are widely used as a means to reverse the degradation and damage done to an ecosystem by a range of different disturbances. Literature shows that engaging the public in restoration projects is important to long-term success; therefore, it is important to understand who participates in stewardship of these projects and why. Here, researchers investigate what aspects of individuals' environmental knowledge, environmental identity, demographics, views of and engagement in their community, and current civic stewardship might predict willingness to engage in restoration stewardship activities. This project takes place in the context of an ongoing maritime restoration planting experiment in the Jamaica Bay region of New York City, New York, U.S. The study authors developed a questionnaire with scales of the metrics above. Researchers found that individuals who were most willing to engage in environmental restoration stewardship had high sense of personal agency (i.e., their actions can have impact), saw value in their stewardship contributions for their community, were older, and were very knowledgeable about environmental issues. Additionally, the desire to preserve local biodiversity was not correlated with engagement in environmental restoration programs, whereas a desire to help and improve the local community was positively correlated. These results suggest a need to reframe how scientists and practitioners approach and discuss future restoration projects with community members to garner support for these types of programs.

Key Words. Biodiversity; Civic Science; New York City; Restoration; Stewardship; Urban Ecology.

Environmental restoration projects are widely used to reverse the degradation and damage done to an ecosystem by direct or indirect human activity (Jackson et al. 1995; McDonald et al. 2016). The body of literature on environmental restoration has emphasized the outcomes of restoration on the ecosystem (Benayas et al. 2009). However, there has been less work done to investigate the development of social capital for restoration projects of, and long-term impact on, the communities in which the projects take place (Davis and Slobodkin 2004; Higgs 2005). Most restoration projects are initiated by professionals; community partners are rarely incorporated in restoration projects or are incorporated after the project begins. A major factor identified in long-term restoration success is the inclusion of local stakeholders in participatory processes (Higgs 2005; Choi et al. 2008; Shakelford et al. 2013). This finding suggests a need for scientists or practitioners wishing to implement a restoration project to understand communities and the drivers that lead to participation by local stakeholders. As cities around the world grow (Grimm et al. 2008) and face mounting environmental degradation (Blanco et al. 2009), environmental restoration will become more important in these landscapes. It is clear that in order to increase the likelihood of longitudinal restoration project success, professionals should proactively seek to include community members in project development, implementation, and long-term maintenance. To do so, understanding what aspects of individual identity may drive

community participation in environmental restoration can help project managers account for the interests of the community when designing projects and recruiting community participants.

While there are numerous ways to increase inclusion of stakeholders in restoration projects (e.g., town hall meetings, public opinion surveys, etc.), participatory frameworks have been identified in the literature to provide a deeper integration of community members in restoration projects. Environmentally-focused restoration projects that provide deeper inclusion of members of the public often take the form of civic science or civic ecology stewardship (e.g., Dolan et al. 2015; Peters et al. 2015). Civic science has been defined in the literature to encompass the many different types of public engagement (i.e., citizen science, participatory science, democratic science) with the underlying theme of public participation in the production and/or use of scientific knowledge (Bäckstrand 2003). Civic ecology stewardship (hereafter stewardship) is most often driven from within a community (Krasny and Tidball 2012), and it is defined by the functions (conservation, management, monitoring, education about, or advocacy) in which community members engage as part of caring for the local environment (Svendsen and Campbell 2008; Connolly et al. 2013; Svendsen et al. 2016).

These two forms of inclusion can serve different roles in a restoration project and may change over time, depending on project needs and community interest. Civic science can be beneficial for long-term data collection (Silvertown 2009), in which projects are looking to collect data to ask and answer scientific research questions relating to the restoration. Developing a restoration project inclusive of stewardship practices may be more important for those projects looking to promote community engagement in the conservation, monitoring, and management of these restored areas. Integrating community stewardship practices in restoration projects that are scientist-driven and initiated is an important challenge to address, as Krasny and Tidball's (2012) work suggests, civic ecology stewardship is often initiated from within communities. Therefore, it is important to identify what drives individuals to participate in these types of stewardship activities.

Identity and Stewardship Contributions

Personal identity can guide decision making (Dresner et al. 2015) and views of personal responsibility toward engaging in stewardship, environmental behavior, and a desire to contribute to restoration projects. Identity frames are "cognitive frameworks or schemes of the characteristics belonging to individuals, or categories of individuals, as we develop our identity from our social experiences" (Guichard 2001). Dresner and colleagues (2015), among others, have shown that identity frames can impact decision making, behavior, and interpretations of information. These identity frames, therefore, can guide personal desire to be an environmental steward and also guide views of personal responsibility towards engaging in restoration and the environment more broadly.

Environmental identity is a formed concept of the connection between the natural environment and self (Clayton 2003). This identity is formed in part by personal behavior, history, and emotional attachment; this identity impacts the ways individuals perceive and act toward the environment. From this identity comes the belief that the environment is important to people and is a key part of who someone is as an individual (Clayton 2003). Prior work has found that individuals identifying as environmentalists predicts positive environmental behavior and being highly knowledgeable about the environment (Hines et al. 1987; Kashima et al. 2014). An environmentalist identity has been conceptualized in the literature as what it means to be an environmentally friendly person in terms of personal actions and the internal drivers of those actions (Kashima et al. 2014). Linking identity to environmental stewardship, research on stewards from Portland, Oregon, U.S., found that environmentalist identity, environmental behavior, and current civic engagement correlated with frequency of stewardship participation (Dresner et al. 2015). A recent study on stewardship groups from New York City, New York, U.S., found that those individuals participating in urban tree-planting stewardship programs exhibited an emergent, uniquely hybridized environmentalist-civic identity post-participation

(Fisher et al. 2015). The study authors propose that possessing this unique hybrid identity may drive future engagement in stewardship programs. These personal identity frames can help researchers understand who within communities may be interested partners in environmental restoration, particularly in terms of the proposed civic and environmental identities.

Objectives

As previous research found emergent hybridization of individuals' civic and environmental identities (Fisher et al. 2015), researchers wanted to explicitly test whether these identities may drive individuals to participate in stewardship, and not just manifest from engaging in stewardship. Researchers ask, in this paper, what aspects of individuals' environmental knowledge, environmentalist identity, demographics, and views of, and engagement in, their community and current civic stewardship might predict willingness to engage in restoration stewardship activities?

Additionally, researchers wanted to ask what types of restoration stewardship activities people would be willing to engage in (e.g., data collection, long-term plot maintenance, community beautification). Different types of restoration stewardship activities may be more appealing than others, which is important to consider when trying to engage individuals in these projects. This research can help inform the capacity to translate scientist-driven environmental restoration projects into community-engaged stewardship opportunities. Creating a better picture of the drivers of participation in environmental stewardship projects can help professional scientists and practitioners understand the motivations of members of the public to participate in restoration projects.

METHODS

To investigate what may drive local community members to become stewards of an environmental restoration project, the authors conducted a survey of individuals living in the neighborhoods of a recently implemented, scientist-driven, urban restoration program in New York City. The restoration project is a Native Maritime Planting (NMP) as a part of Jamaica Bay Fringing Habitats Experiment across the boroughs of Queens and Brooklyn. The NMP consists of 10 experimental plots spread across four sites surrounding Jamaica Bay (Figure 1) that were established in the summer of 2015. The NMP has two major goals: 1) to collect establishment data on native maritime plants to assess survivability, and 2) to increase community engagement in the restoration efforts. At the onset of the research described in this manuscript, the NMP restoration sites were established the prior summer, and the project leaders sought to include community members in the long-term stewardship of the sites (via data collection, maintenance, and broader development and advocacy of restoration efforts within the community).

The restoration sites were spread across six parks in Queens and Brooklyn. As the majority of restoration plots were established in local NYC parks, the authors chose to constrain the sampling of respondents to current park users. The plots at Site #1 were spread across two public parks, Spring Creek Park and Fresh Creek Park (~1.6 km apart). The plots at Site #2 were also spread across two public parks, Springfield Park and Idlewild Park (~0.8–1.6 km apart). The plots at Site #3 (Floyd Bennett Field) were excluded because they are on National Park Service lands and thereby have a different management approach and governance structure. The plot at Site #4 (Southeastern Queens) was excluded due to low foot traffic and public use of the area. Further description of the parks included at the two sampling sites can be found in Campbell et al. (2016). Researchers conducted an in-person survey with park users at Site #1 and Site #2 during June–August 2016. Site #1 and Site #2 were visited twice for a minimum of six hours, once during the weekend and once on a weekday, to ensure a comprehensive snapshot of potential local users of the parks was captured. Adult park users were approached using the street-intercept survey method, as it has been found to have higher survey success rates in urban environments (Miller et al. 1997). Potential participants were initially asked if they lived locally. Only individuals who identified as living locally to the area were asked to complete the full survey. Local users of the parks on which these restoration sites are located were chosen as the sample population because prior research using the street-intercept

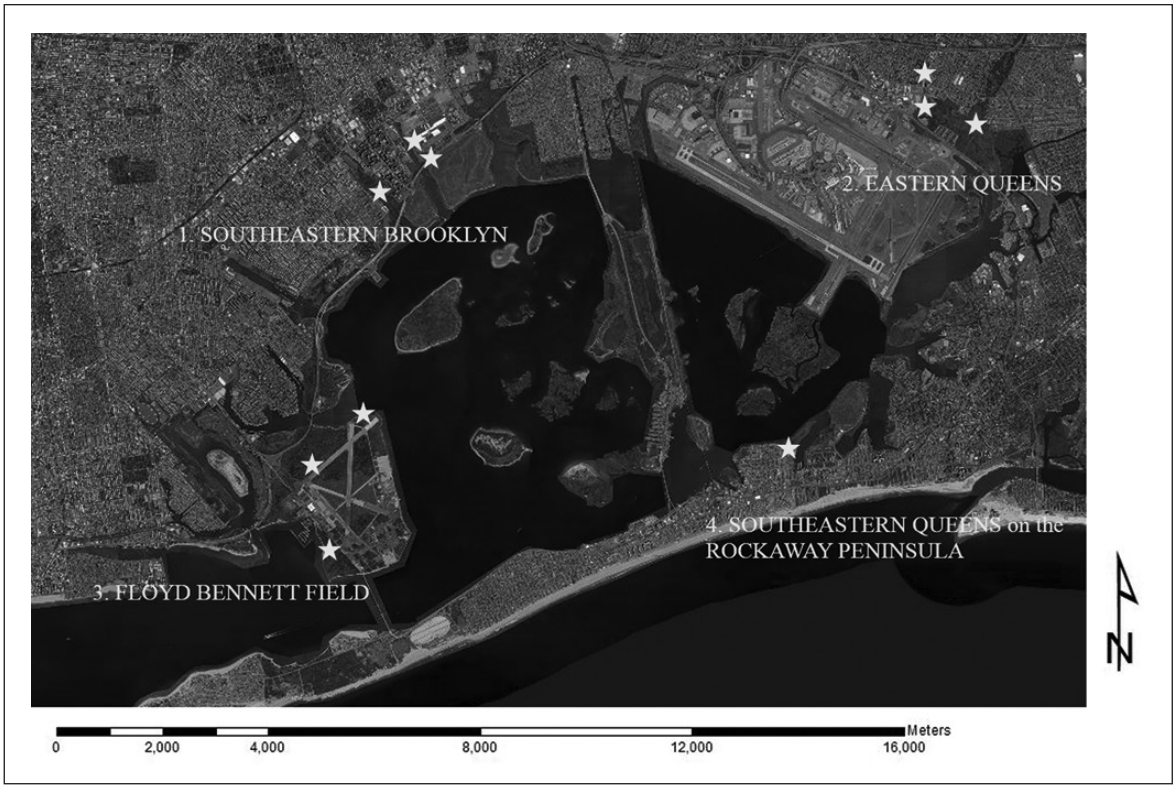

Figure 1. A map of the study area, Jamaica Bay in New York, U.S. Jamaica Bay is surrounded by the New York City boroughs of Queens and Brooklyn. Within the four sites, the experimental plot areas are denoted by stars. Site #1, Southeastern Brooklyn, has three experimental plot areas. Site #2, Eastern Queens, has three experimental plot areas. Site #3, Floyd Bennett Field, has three experimental plot areas. Site #4, Southeastern Queens, has one experimental plot area. Research was conducted in Site #1 and Site #2. Image credit: Jean Epiphan.

method in parks captured a broad range of demographic, socioeconomic, and value representations of the local population (Jordan et al. 2015).

Response rate was 65%, as 35% of the individuals approached did not want to participate in the survey or were not living in the area. For in-person survey techniques, a response rate of 80% is considered very good (Shaughnessy and Zechmeister 1990; Punch 2003). Some of the individuals who declined to participate in this survey did so due to language barriers (i.e., told researchers they did not speak English when they were approached). In New York City, a highly diverse area of the U.S., there are more than 200 spoken languages, and more than half of residents speak a language other than English in their home (NYC Planning 2010). If the individuals who declined to participate due to language barriers are removed the response rate becomes 78%. The authors acknowledge that this may have implications for the results of this survey because non-English speaking individuals were not represented in this survey, yet are important stakeholders within these communities. The survey in total took most participants about 30 minutes to complete with the researchers. No identifying information was collected to ensure anonymity. All participants who completed the survey were compensated USD $10 for their time. All research was done with institutional IRB approval and participant consent.

Survey Creation

The survey conducted in this study aimed to investigate an individual's intention to engage in stewardship of these restoration sites in relationship to identity, demographics, individual perceptions of community, and environmental knowledge. The survey was composed of 56 total items, with 35 of the items used for the analysis in this paper (see Appendix for full survey). The survey used a mix of Likert-like, binary, and open-ended items. Likert-

scale questions were on a scale of 1 (strongly disagree) to 5 (strongly agree). The survey was divided into six sections: *views of community*, *views of local greenspaces*, *views and perceptions of native plants*, *environmental identity and knowledge*, *demographics*, and *stewardship*.

The views of community, views and perceptions of native plants, and views of local greenspaces portions of the survey were composed of items developed and published in previous work (see Jordan et al. 2015). The views of community survey items focused on individuals' perceptions of their community, or how cohesive or community-oriented they felt they believed themselves and others living in their community to be (civic-mindedness). Examples of such a survey item statements include: "Do you feel that people in your neighborhood feel community is important (or where you live is community-driven)?" and "Do you actively participate in any local groups or organizations in your community?"

For stewardship interest and motivation, survey items developed and published in Grese et al. (2000) were applied. These questions focused on future desires to engage in stewardship and what individuals perceive as benefits to themselves for engaging in stewardship. Examples of such Likert-like survey items include: "Engaging in local stewardship of my community allows me to learn new skills" and "Engaging in local stewardship of my community protects natural places from disappearing." To investigate interest or participation in stewardship, respondents were asked about their interest in participating in different local environmental stewardship opportunities (e.g., a cleanup event, collecting data about the plants in the experimental plots, maintaining the plots through weeding and watering, or attending cultural events, such as art days or nature walks) and the frequency to which respondents would be willing to participate in these opportunities. The average value of responses to these questions was used as a dependent variable to investigate what factors influence participation, or willingness to participate in, a stewardship activity (later referred to as "stewardship score"). Additionally, respondents were asked if they considered themselves stewards and this response was also used as dependent variable in the analysis. The demographic information collected from each survey respondent was age, highest education level, race, and income.

The environmental identity items (views of the environment, personal environmental identity, behavior towards the environment, and environmental preferences) were developed by the first and second author and the National Environmental Education Foundation (2015). The environmental identity portion of the survey was composed of items framed around the operational definition of environmental identity. Those developed by the authors were vetted through the Program in Science Learning at Rutgers University and published in prior research (see Jordan et al. 2015; Sorensen et al. 2015). Examples of the Likert-like survey items on views and personal action toward the environment/biodiversity included: "Preserving local biodiversity is important to me." Examples of the Likert-like survey items on personal environmental identity included: "I consider myself an environmentalist," "I believe I can have an impact on solving environmental issues," and "I think climate change is in part caused by human actions." Additionally, survey items of behavioral intent were included as a part of environmental identity (intention to act positively toward the environment). Survey items to assess behavioral intent included items such as, "I would support policies to improve the Jamaica Bay ecosystem" and "I would be willing to pay (up to/more than) $25 per year to improve the Jamaica Bay ecosystem." These survey items assessing environmental attitudes and behaviors have been previously published (Jordan et al. 2015; Clark et al. 2016), but specifics in the questions were modified for the Jamaica Bay area.

Analysis

All data were analyzed using R, Version 3.3.3. Since this work hopes to help incorporate community members into stewardship projects, the stewardship score was investigated across demographic factors using analysis of variance. To determine what questions predicted if an individual

would identify as willing to participate in stewardship activities (indicated interest or active participation in stewardship activities through the stewardship score), a boosted regression tree (BRT) was used. The BRT was run to investigate how responses to survey questions influenced the likelihood of a respondent participating in or being willing to participate in stewardship activity. Another BRT was run to investigate what factors led to a respondent self-identifying as a steward. The BRTs were run with package gbm, which runs a series of binary regression trees in order to best fit variables to data (Elith et al. 2008). The BRTs explain how strongly the answers to a given question help explain the results. Questions with high levels of influence may strongly predict likelihood of stewardship, while questions with low levels of influence do not impact stewardship. After the BRTs were run, all questions were ranked by relative influence on stewardship. The six questions with the highest level of influence for self-identifying as a steward and participating in stewardship activities were then investigated to see how the response to the question influenced the respective dependent variable. Researchers chose the top six questions because the standard on boosted regression trees suggests choosing the most influential variables through a cutoff (Elith et al. 2008).

RESULTS

In total, there were 55 individual respondents; Site #1 had a total of 26 respondents and Site #2 had 29 respondents. For demographics of the 55 survey respondents, researchers had a roughly equal representation across gender identity, with 28 male and 27 female respondents. For a breakdown of respondents by age (% of survey respondents): ages 18–25 (23%), ages 26–35 (22%), ages 36–45 (18%), ages 46–55 (13%), ages 56–65 (11%), ages 66+ (4%), and preferred not to answer (9%) (Figure 2a). For education: 65% of respondents had some college education or below, and 33% of respondents had completed college or had more advanced education (MA, Ph.D., MBA, etc.) (Figure 2b). For ethnic identity, the majority of respondents identified primarily as African American/African/Black (Figure 2c). The demographic breakdown of respondents in the survey closely represent the demographics of the broader community (DATA USA 2017).

The average stewardship score for respondents was 2.98, with a standard deviation of 0.85, indicating the average respondent was somewhat interested in participating in stewardship activities and varied from neutral to very interested. Stewardship score did not vary by race ($P = 0.23$), gender ($P = 0.68$), level of education ($P = 0.98$), or age ($P = 0.34$). The six questions that had the most influence on whether an individual identifies as a steward were composed primarily of questions address-

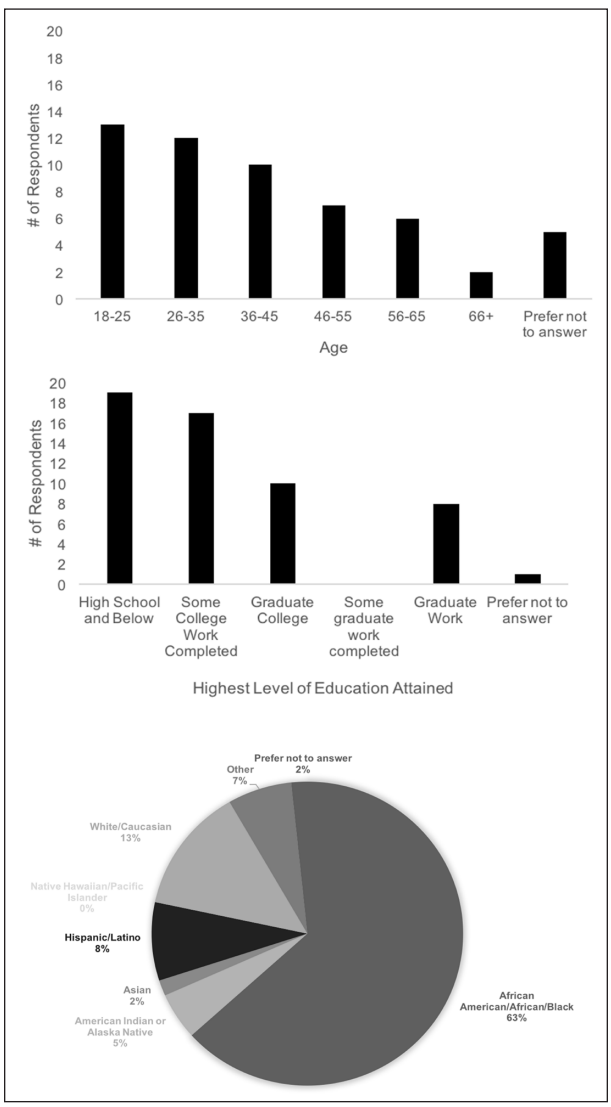

Figure 2. A breakdown of survey respondent demographics (n = 55): a) age, b) highest level of education attained, and c) ethnic identity.

ing an individual's knowledge of native plants and how plants can positively serve the needs of the local community (Figure 3). Age was also an important determining factor as to whether someone would be involved in stewardship activities. None of the other demographic variables (race, gender, education, income) showed up as important in the models, and none of

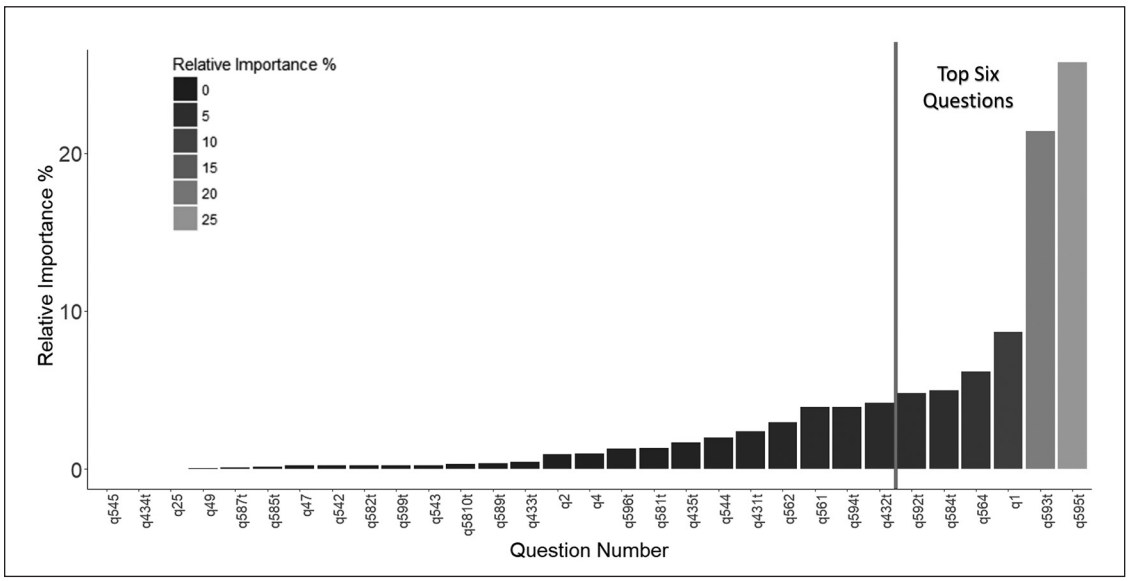

Figure 3. The top six questions that resulted in an individual identifying as a steward are as follows: Question 59.5: "Research on the role or effect of native plants in my community is important." Question 59.3: "Native plants and animals serve an important role in Jamaica Bay." Question 1: "What year were you born?" Question 59.2: "Preserving local biodiversity is important to me." Question 58.4: "When I volunteer I want to go outdoors." Question 56.4: "How interested are you in taking care of a community garden."

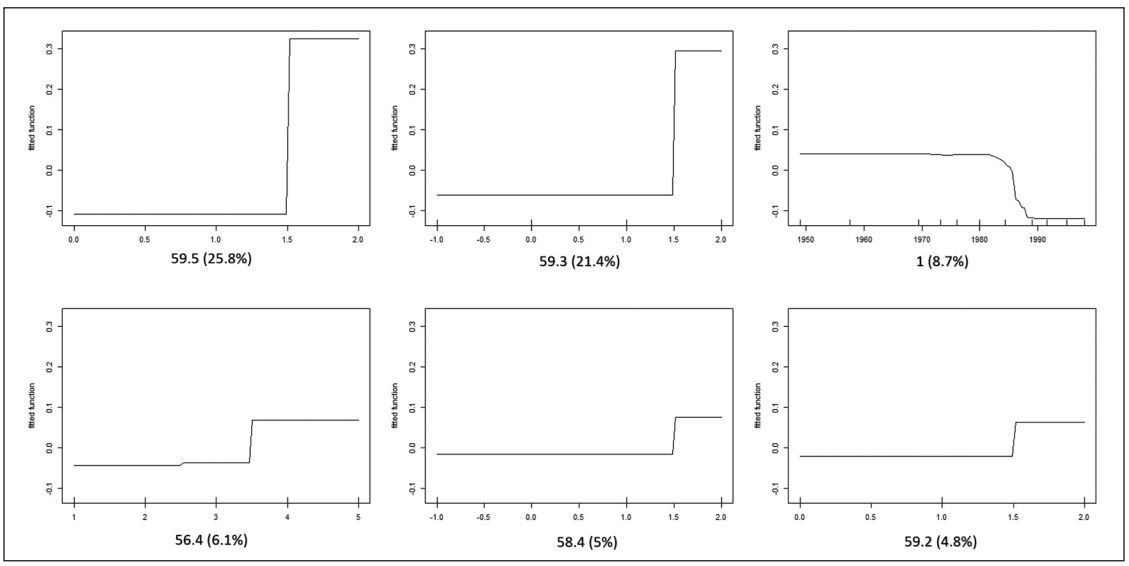

Figure 4. These six graphs show the influence each of the top six questions have on self-identifying as a steward. The x-axis represents an individual response to the given question, while the y-axis shows how it influences the likelihood of self-identifying (1) or not identifying (0) as a steward. All questions, except question one, have positive relationships with identifying as a steward, whereby responding more positively to the question means an individual will more likely be a steward. Question 1 has a negative relationship with self-identification as a steward, as increasing birth year (decreasing age) is negatively correlated with identifying as a steward. Question numbers and their relative importance are listed below each figure.

the variables of views of community or current civic engagement within the community were important in the model. Additionally, a desire to spend time outdoors and an interest in taking care of a community garden played a large role in an individual's self-identification as a steward. How the response to one of the top six questions influenced the likelihood of identifying as a steward can be seen in Figure 4. The BRT analysis ran for 4,500 iterations with a final AUC score of 0.843, identifying that the selected variables were a good fit for predicting the independent variable (Elith et al. 2008), that is, if an individual identifies as a steward (Figure 5). Additionally, individuals who identified themselves as stewards were more likely to be willing to or already be taking part in stewardship activities than individuals who did not identify as stewards ($P = 0.03$). Those who self-identified as stewards were taking part or willing to take part in stewardship activities two to three times a year, or monthly, while respondents who did not consider themselves stewards participated in stewardship activities never or once a year.

The top six questions that influenced a respondent's stewardship score were similar to those that led to self-identification as steward, with whether an individual identified as a steward being an influence question in terms of stewardship willingness or activity. Willingness to participate in stewardship activities was driven strongly by a desire to be part of the community. Two of the top questions directly address being part of the community, while two other questions relate to how the community may be impacted by climate change and a desire to stop it. Additionally, compensation in the form of money or credits negatively correlates with increased stewardship willingness. Figure 6 displays the relationship between the response to each of the top six survey questions and how it influences stewardship score.

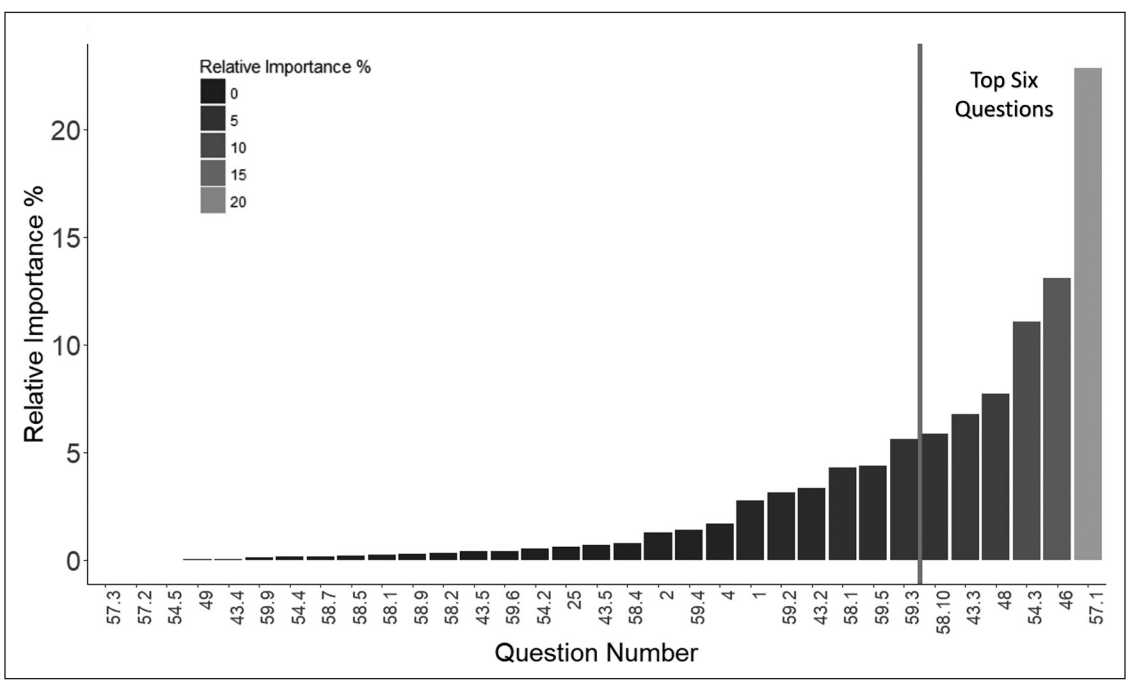

Figure 5. Responses to six questions that best predict an individual's stewardship score. These questions, in order of relative importance, are as follows: Question 57.1: "How often would you be willing to participate in a clean-up event." Question 46: "Do you define yourself as a steward?" Question 54.3: "It is very important to me to be a part of this community." Question 48: "Would you consider planting any of these in your own yard?" Question 43.3: "I think climate change will cause harm to people living in Jamaica Bay." Question 58.10: "Volunteering is an opportunity to potentially make money or earn credit."

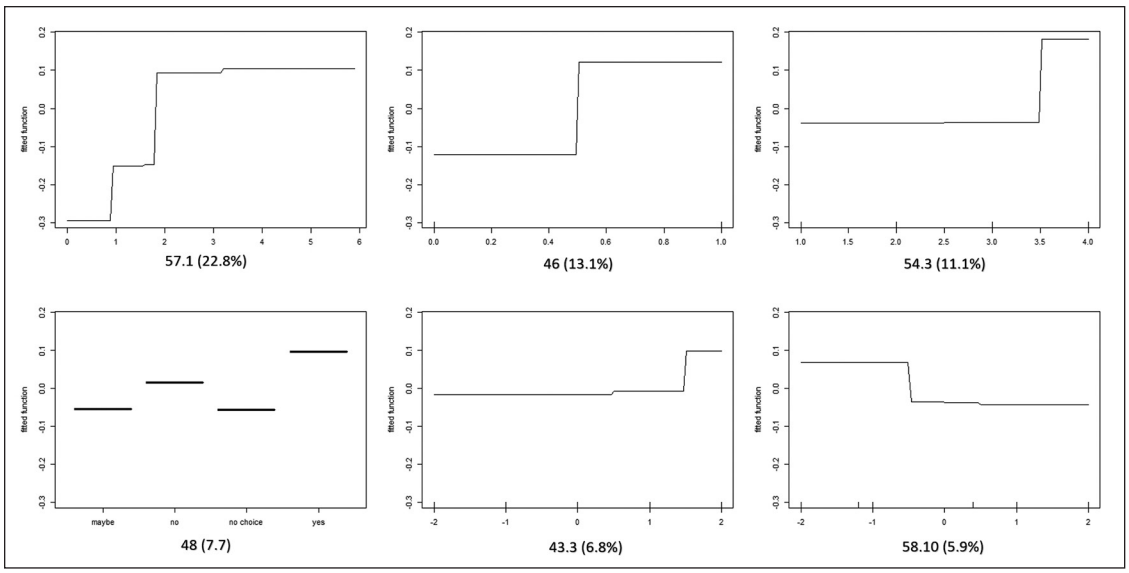

Figure 6. These six graphs show the influence each of the top six questions has on an individual's stewardship score. The x-axis represents an individual response to the given question, while the y-axis shows how it influences an individual's stewardship score. The more time an individual was willing to participate in a clean-up event (57.1) the more willing an individual is to participate in stewardship, and those that respond they would participate less than two or three times a year are less likely to be willing to be stewards. Identifying as a steward (46) also positively correlates with increased willingness to partake in stewardship activity. One's desire to be part of a community also increases one's stewardship score, but this response is only seen in individuals responding that they somewhat or completely agree. Willingness to plant specific plants (48) also positively influences stewardship score. Agreeing that climate change will negatively impact Jamaica Bay increases likelihood of stewardship; however, disagreeing does not strongly detract from an individual's willingness to participate in stewardship activities. Finally, individuals who do not want to make money or earn credit from their activities are more likely to be willing to participate in stewardship activities.

DISCUSSION

In this intensively urban landscape, the research shows that community members are most likely to be willing to participate in stewardship of restoration activities if they are knowledgeable about environmental issues and have a strong desire to be part of the community. From the study results, researchers observed an interesting pattern wherein individuals' knowledge of environmental issues, rather than self-identification as an environmentalist, predicted willingness to participate in stewardship and identify as a steward. These findings support the notion that civic identity and aspects of environmental identity (knowledge and perception of importance) drive stewardship engagement. These results diverge from the current understanding of the impacts and implications of self-identifying as an environmentalist. As noted earlier, environmentalist identity encapsulates what it means to be an environmentally friendly person through action and the internal drivers of those actions (Kashima et al. 2014). However, in the context of this study, there is a separation of individual environmentalist identity with one's environmental knowledge and environmental behavior. Instead of environmental identity, a strong connection to the community drives willingness to participate in stewardship activities, while a strong knowledge of environmental issues leads an individual to identify as a steward. While researchers did not find that individuals explicitly identifying as environmentalists were more willing to engage in stewardship, it may be that participation in stewardship strengthens environmental identity or that only particular elements of individuals' environmental identity drives initial behavior. This work may suggest that individuals in these communities participate in pro-environmental behaviors and are knowledgeable about the environment (signifiers of environmentalist identity), while not

self-identifying as an environmentalist. Indeed, a recent study of how strongly students in STEM fields identify with four identities (scientists, environmentalist, conservationist, and environmental-justice practitioner) found that, for minority students, environmentalist identity was intertwined with their identity as a conservationist, environmental-justice practitioner, and to a lesser extent, scientist (Taylor 2017). The findings from the current study, in conjunction with the work of others (Heinz 2005; Taylor 2017; Gupta et al. 2018), suggests that how the literature has conceived of environmental identity and what it means to be an environmentalist may not be representative or sufficiently encapsulate the complexity and intertwining of identities in minority individuals' environmentalism.

Other variables that predict individuals' willingness to engage in stewardship: individuals who like to be outdoors, individuals who think science research is important, individuals who feel environmental issues are important, and individuals who believe their actions have an impact. This last finding aligns with previous literature investigating individuals' sense of agency. An individual's sense of agency refers to the feeling or attribution of their actions having an effect on external events (Chambon et al. 2014). As a part of this sense of agency, individuals believe that their actions are important and that, when they take action, it will be effective (Bandura 1997). It is not surprising that people who are willing to partake in stewardship are those who also believe that their actions will have an impact on the broader community. When recruiting community members to participate, this finding highlights the importance of identifying community members who not only enjoy being outside, are knowledgeable, and care about the environment, but are also creating opportunities for engagement that are clear actionable steps that allow participants to see how their actions will make a difference in their community. Research on collective agency shows that groups who share the belief that their collective action can produce desired outcomes can foster commitment to the group mission, resilience to adversity, and performance (Bandura 2000; Reese and Junge 2017). In connection to this, it is also important to note that broader individual personality metrics may predict persistence in projects, particularly in the face of setbacks (Morris and Staggenborg 2004).

In terms of demography, in the findings, it was older individuals who were most likely to identify as stewards, although there was no relationship between any of the demographic metrics and the willingness to participate in stewardship projects. Anecdotally, many traditional civic science project demographics are dominated by older, highly educated adults (predominantly retired individuals), rather than younger individuals (school age through working age) or individuals with lower educational attainment. The results indicate that while many older individuals may identify as stewards, they are not more likely than the younger respondents to be willing to participate in the stewardship activities highlighted in this survey. A study of individuals in the participatory science project "TreesCount!" in New York City found that the majority of its contributors were older, more educated, and more affluent (Johnson et al. 2018). Recent work evaluating individuals' sustained motivations for engaging in civic science programs found that older individuals (55+) participated because the projects were an avenue for inclusion in a community (S. Petluru pers. comm.). For developing projects, the relationships between identity, demographics, and motivations for the highest likely users (i.e., age and desire for community) is important for project managers to consider and understand.

As this study is one of respondents' behavioral intent to engage in stewardship activities of the restoration plots, it is important to note how intent translates to action. However, the literature on how behavioral intent translates to action is mixed. A meta-analysis on studies of intended behavior and actual behavior showed that the strong intention drove small to moderate actual changes in behavior (Webb and Sheeran 2006). However, there is also literature showing that reported behavioral intent is different than actual behavior (Barr 2004). More specifically, recent work looking at the intention of individuals engaging in pro-environmental behavior and their actual behavior indicates that people are susceptible to believing they are behaving more positively

toward the environment more often than they actually are (Barr 2004). Because of the complexity in the relationships between the social and psychological underpinnings driving individual motivations and engagement in environmental restoration, further research is needed to continue this work. An attempt was made to investigate what factors may lead to actual participation in stewardship events, but only 7 of the 55 individuals surveyed stated they already participated in any of the stewardship events.

Social Implications

It is important to note that while restoration projects aim to engage members of the public, there are groups of individuals that are less likely to engage or to be engaged because of various constraints and barriers. Important for issues of urban restoration and stewardship, prior literature suggests that individuals living in urban environments, particularly ethnic minority communities, are less exposed to nature (Bixler et al. 1994; Finney 2014), thus influencing future desire to engage in outdoor and environmental activities. Lack of exposure and opportunity to engage with nature interplays with socioeconomic status, race or ethnic identity, gender identity, and educational opportunity, influencing the broader cultural norms and patterns around outdoor preference and engagement noted in the literature (Chinghua et al. 2005; Ryan 2005; Byrne and Wolch 2009). However, the current study found that the majority of park users, and those individuals willing to engage in environmental stewardship, were predominantly individuals who identified as a member of an ethnic minority group. This aligns with recent work from Fisher et al. (2015) that found minorities are overrepresented in urban stewardship practices in terms of their broader demographic proportions. Additionally, work from Gupta et al. (2018) found that racial minority groups comprised almost half of the total environmental educators compared to the general population. These findings together suggest that there is a broader underestimation of the number of minorities participating in environmentally-focused efforts (i.e., stewardship, education). These conflicts in the literature suggest that further research is needed to understand how individuals conceptualize urban environmental restoration in the context of their own environmentalism.

Recommendations

When developing materials to engage potential community partners, it may make sense to target areas that serve older community members for sustained participation. When developing outreach materials, the current study suggests the importance of framing these materials to particular individuals with high environmental knowledge, self-efficacy, and a strong connection to their community. In framing these materials, researchers appeal to people's environmental knowledge and the potentially broader, positive impacts that people's involvement may have on their community to engage people in stewardship activities—particularly urban environmental stewardship. Conversely, if project managers are looking to diversify the pool of stewards outside of those who are already motivated, new strategies in material development and recruitment need to be tested. For recruitment messaging to reach those less-engaged populations, these messages need to "meet people where they are" and resonate with their own cultural experiences, knowledge base, and interests. One example of this is highlighted by Johnson et al. (2018), in which TreesCount! and NYC Parks partnered with AfroPunk to give away free music tickets as an incentive to attract a new demographic of participants to the tree census effort. Other programmatic strategies that leverage stewards' environmental knowledge and civic awareness might take the form of mobilizing stewards as communication leaders, whereby individuals could translate outcomes and advocate for the restoration project to other community groups (e.g., religious organizations, schools, sports groups). From the collective agency perspective, creating discrete, actionable steps throughout the restoration project that the stewardship group can accomplish, and emphasizing how these steps translate to broader community benefits, would reinforce the member's sense of agency. While these are just a couple of programmatic strategies, there are certainly others that need to be investigated and implemented. Taken together, this research provides a first step toward thinking

about what those new directions can be in order to bring more community members to projects.

Additionally, it is anecdotally known by many who run volunteer programs, and was thus identified in the current data, that individuals' desire to participate in stewardship did not have any relationship to commitment of frequent or regular participation. Therefore, program managers could consider creating multiple opportunities for community members to engage in projects with varying levels of necessary commitment. In this, having one-off or shorter engagement opportunities for people who may want to contribute but not commit to regular participation, and a longer term and sustained protocol for engagement for those individuals who come to these types of projects for community. From prior literature investigating civic-science participation, engaging individuals in one-off or low-commitment experiences can translate to sustained participation in projects over time (Everett and Geoghagen 2016). While project leaders will need to judge what is appropriate and feasible given each project's constraints (e.g., funding, staffing, time), these opportunities to engage the public in environmental restoration are necessary for long-term success, and further research is needed to help practitioners develop programs and materials in a more nuanced and informed way.

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Amanda E. Sorensen (corresponding author)
Department of Human Ecology
Rutgers University
New Brunswick, New Jersey 08901, U.S.

Rebecca C. Jordan
Community Sustainability
College of Agriculture and Natural Resources
Michigan State University
East Lansing, Michigan 48823, U.S.

Gloria Blaise
Department of Ecology
Evolution and Natural Resources
Rutgers University
New Brunswick, New Jersey 08901, U.S.

Jeff Brown
Department of Ecology
Evolution and Natural Resources
Rutgers University
New Brunswick, New Jersey 08901, U.S.

Lindsay K. Campbell
USDA Forest Service
Northern Research Station
NYC Urban Field Station
Bayside, New York 11359, U.S.

Myla F.J. Aronson
Department of Ecology
Evolution and Natural Resources
Rutgers University
New Brunswick, New Jersey 08901, U.S.

Michelle L. Johnson
USDA Forest Service
Northern Research Station
NYC Urban Field Station
Bayside, New York 11359, U.S.

Résumé. Les projets de restauration environnementale sont largement considérés comme un moyen d'inverser la dégradation et les dommages occasionnés à un écosystème affecté par toute une série de perturbations variées. Une revue de littérature démontre que l'engagement du public dans les projets de restauration est garant d'un succès à long terme; par conséquent, il est essentiel de caractériser qui sont les participants d'une telle intendance et pourquoi. Les chercheurs ont examiné quels sont les aspects des connaissances environnementales d'un individu, de son identité environnementale, de ses données démographiques, de ses perceptions et de son engagement communautaire ainsi que de son intendance civique en vue de prédire son implication potentielle dans des activités de restauration environnementale. Ce projet a été réalisé dans le contexte d'une expérience de plantation en cours pour la restauration d'un site maritime dans la région de Jamaica Bay dans la ville de New York, état de New York, États-Unis. Les auteurs de l'étude ont développé un questionnaire afin de qualifier les aspects mentionnés ci-haut. Les chercheurs ont découvert que les individus les mieux disposés à s'engager dans les projets de restauration environnementale avaient un sentiment élevé de leur capacité à influencer par leur actions individuelles, qu'ils étaient conscients de la valeur communautaire de leur contribution, qu'ils étaient plus âgés et très informés quant aux questions environnementales. En outre, le désir de préserver la biodiversité locale n'était pas en corrélation avec un engagement dans les programmes de restauration environnementale, alors que le désir d'aider et d'améliorer la communauté locale était favorablement corrélé. Ces résultats soulignent la nécessité de recadrer l'approche des scientifiques et des praticiens aux fins de discussion des futurs projets de restauration avec les membres des communautés en vue de mobiliser le soutien pour ce type de programmes.

Zusammenfassung. Ökologische Restorartionsprojekte werden weitläufig genutzt als ein Mittelwert, um die Degradation und den Schaden an einem Ökosystem, verursacht durch eine Reihe von verschiedenen Ursachen rückzurechnen. Die Literatur zeigt, dass das Engagement der Öffentlichkeit in Restorartionsprojekte für langfristigen Erfolg wichtig ist. Daher ist es wichtig zu verstehen, wer an den Förderungen für diese Projekte teilnimmt und warum. Hier untersuchen Forscher, welche Aspekte von individuellem Umweltverständnis, Umweltidentität, Demografie, Blickwinkel auf und Engagement in ihrer Kommune und gegenwärtige bürgerliche Förderung die Willigkeit zum Engagement in Restorationsförderaktivitäten vorhersagen können. Dieses Projekt findet im Kontext eines fortlaufenden maritimen Restorationsexperiments zur Bepflanzung in der Jamaica Bay Region von New York City, New York, U.S. statt. Die Autoren dieser Studie entwickelten einen Fragekatalog mit Skalen in oben erwähnter Metrik. Die Forscher fanden heraus, dass Individuen, die sehr willig waren, sich in ökologischen Restorartionsprojekten zu engagieren, einen hohen Sinn für personelle Handlungen haben (d. h. ihre Aktionen können Einfluss haben), einen Wert darin sehen für ihre Kommune einen Förderbetrag zu leisten, älter waren und sehr wohl gebildet waren in Umweltangelegenheiten. Zusätzlich war der Wunsch, die lokale Biodiversität zu erhalten, nicht korreliert mit dem Engagement in ökologischen Restorartionsprojekten, wobei ein Wunsch zu helfen und die Verbesserung der lokalen Kommmune positiv korreliert waren. Diese Ergebnisse führen zu einem Bedarf, wie Wissenschaftler und Praktiker zukünftige Restorartionsprojekte angehen und diskutieren, um eine Unterstützung für diese Arten von Programmen zu erhalten.

Resumen. Los proyectos de restauración ambiental son ampliamente utilizados como un medio para revertir la degradación y el daño causado a un ecosistema por una variedad de diferentes perturbaciones. La literatura muestra que involucrar al público en proyectos de restauración es importante para el éxito a largo plazo; por lo tanto, es importante entender quién participa en la administración de estos proyectos y por qué. Aquí, los investigadores investigan qué aspectos del conocimiento ambiental, la identidad ambiental, la demografía, los puntos de vista y el compromiso de los individuos en su comunidad, y la administración cívica actual podrían predecir la voluntad de participar en actividades de restauración. Este proyecto se lleva a cabo en el contexto de un experimento de plantación de restauración marítima en curso en la región de la Bahía de Jamaica de la Ciudad de Nueva York, Nueva York, EE. UU. Los autores del estudio desarrollaron un cuestionario con las escalas de las métricas señaladas. Los investigadores descubrieron que las personas que estaban más dispuestas a participar en la administración de la restauración ambiental tenían un alto sentido de agencia personal (es decir, sus acciones pueden tener impacto), vieron valor en sus contribuciones para su comunidad, que eran mayores y tenían mucho conocimiento sobre temas ambientales. Además, el deseo de preservar la biodiversidad local no se correlacionó con la participación en los programas de restauración ambiental, mientras que el deseo de ayudar y mejorar a la comunidad local se relacionó positivamente. Estos resultados sugieren la necesidad de replantear la forma en que los científicos y profesionales abordan y discuten proyectos de restauración futuros con miembros de la comunidad para obtener apoyo para este tipo de programas.

APPENDIX. A list showing the complete survey items and divided into the sections of the survey highlighted in the paper. Survey items in italics were not used for analysis in this manuscript, but were used to provide insight to the community and the restoration program itself.

SURVEY SECTIONS	SURVEY QUESTIONS	QUESTION TYPE	NOTES
Views of community	*Do you know of any local community groups in the neighborhood where you live? (These could be nonprofit, religious, athletic, environmental, educational etc. groups that are active in your neighborhood)*	Open-ended	Questions were used to identify other community groups to recruit to this project and establish community identity from participants.
	If Yes, Do you participate in any of these local groups?		
	Q47 Do you feel that the people in your neighborhood feel community is important (or where you live is community driven)?	Binary (Y/N) with open-ended follow-up	
	Please Explain:		
	Q54.4 I feel hopeful about the future of this community	Likert (Strongly Disagree–Strongly Agree)	
	Q54.2 I can trust the people living in this community.	Likert (Strongly Disagree–Strongly Agree)	
	Q54.3 It is very important to me to be a part of this community.	Likert (Strongly Disagree–Strongly Agree)	
Views of local greenspaces	*Do you think your local park/greenspace is a good place to spend time?*	Binary (Y/N) with open-ended follow-up	Questions were used to establish community member views of parks restoration plots were established in.
	Why or why not?		
	How would you rate the quality of parks in your area?	Likert (Very Poor–Very Good)	
	Please rank which features you would like to see in your local park(s)? (With most preferred at the top [1] and least at the bottom [10])	Ranking of features	
	Q49 Would you be willing to contribute to a park upkeep fund?	Binary (Y/N)	
Views and perceptions of native plants	*Do you know what a native plant is?*	Open-ended	Questions in italics were used to establish ideas for signage and next steps for the restoration project.
	Can you define what a native plant is?	Open-ended	
	Which of these plants do you find desirable? (Choose any and all that apply)	Sorting to three categories (Undesirable, Neutral, Pretty)	
	For the plants that you chose, why did you choose them? What did you like about them? (Please list at least three features you liked)	Open-ended	

SURVEY SECTIONS	SURVEY QUESTIONS	QUESTION TYPE	NOTES
	What (if anything) did you dislike about the plants shown?	Open-ended	
	Q48 Would you consider planting any of these in your own yard?	Multiple choice (Yes, No, Maybe, Cannot)	
	Q59.9 Native plants provide important services that benefit me.	Likert (Strongly Disagree–Strongly Agree)	
	Q59.3 Native plants and animals serve an important role in Jamaica Bay.	Likert (Strongly Disagree–Strongly Agree)	
	Q59.4 Certain types of plants can help reduce damage to my property from storms (hurricanes, flooding, etc.).	Likert (Strongly Disagree–Strongly Agree)	
	Q59.5 Research on the role of native plants in my community is important.	Likert (Strongly Disagree–Strongly Agree)	
Environmental identity and knowledge	*Do you enjoy the outdoors?*	Binary (Y/N)	Environmental identity metrics were composed of previously published items assessing individual's views on the environment and their behavior towards the environment in multiple areas (direct action, economic behavior, political action, etc.)
	What is your preferred environment to live in?	Multiple choice (Urban, Suburban, Small Town, Rural)	
	If you notice trash/litter on the ground when you are outside in your community, how likely are you to pick it up and dispose of it in appropriate bin?	Likert (Strongly Disagree–Strongly Agree)	
	What factors do you take into account when you are deciding whether or not to buy something (e.g., food, household products, clothes, etc.)?	Choose all that apply	
	Q59.2 Preserving local biodiversity is important to me.	Likert (Strongly Disagree–Strongly Agree)	
	Q59.6 I would support policies to improve the Jamaica Bay ecosystem.	Likert (Strongly Disagree–Strongly Agree)	
	I would be willing to pay up to $25 yearly to improve the Jamaica Bay ecosystem.	Likert (Strongly Disagree–Strongly Agree)	
	Q43.1 I consider myself an environmentalist.	Likert (Strongly Disagree–Strongly Agree)	
	Q43.2 I believe I can have an impact in solving environmental issues.	Likert (Strongly Disagree–Strongly Agree)	
	Q43.5 I am confused about what is good and what is bad for the environment.	Likert (Strongly Disagree–Strongly Agree)	
	I think climate change is caused by human actions/choices.	Likert (Strongly Disagree–Strongly Agree)	

SURVEY SECTIONS	SURVEY QUESTIONS	QUESTION TYPE	NOTES
	Q43.3 I think climate change will cause harm to people living in the Jamaica Bay in the future.	Likert (Strongly Disagree–Strongly Agree)	
	Q43.4 Global climate change is a very serious problem.	Likert (Strongly Disagree–Strongly Agree)	
Stewardship	Rank interest in participating in the following events: - Participating in a cleanup event. [Q56.1] - Collecting information (data) about plants to send to scientists. [Q57.2] - Taking care of a community garden (e.g., weeding, watering, tending the plants).[Q56.4]	Likert (Strongly Disagree–Strongly Agree) for each	In these questions, researchers talk about stewardship and defined stewardship for participants. Here stewardship is defined as members of the public who conserve, manage, monitor, educate about, or advocate for the local environment including land, air, water, waste, and toxins.
	Rank how often you would be willing to participate in the following events: - Participating in a cleanup event. [Q57.1] - Collecting information (data) about plants to send to scientists. [Q56.2] - Taking care of a community garden (e.g., weeding, watering, tending the plants). [Q57.3]	Likert (Strongly Disagree–Strongly Agree) for each	
	Engaging in local stewardship (as defined) of my community. . . - is an opportunity to earn money. [Q58.10] - allows me to learn new things and skills. [Q58.2] - gives me a chance to be outdoors [Q58.4] - allows me to connect to my community. [Q58.5] - makes me feel good about myself. [Q58.7] - protects natural places from disappearing. [Q58.1]	Likert (Strongly Disagree–Strongly Agree) for each bullet point	
Demographics	Q4 What is the highest level of education you have completed?	Multiple choice	Basic demographic information in line with the U.S. census items.
	Q25 What race/ethnicity do you identify with?	Multiple choice	
	Q1 What year were you born?	Open-ended	
	Q2 Which gender do you identify with?	Multiple choice	
	What is your annual household income?	Multiple choice	