

Does participation in an environmental stewardship activity improve the perception of urban natural areas? Can it improve zookeeper morale?



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Abstract

Zookeepers at the Bronx Zoo were surveyed before and after an environmental stewardship activity to explore whether participation could improve perceptions of urban natural areas and improve morale. Participation and engagement in community activities, viewing zookeepers as a community, could help improve the low morale documented at the Bronx Zoo's Mammal Department. Social science studies have concluded 'sense of place', place meaning, participation and engagement are intertwined with fostering pro-environmental behaviors. The thought behind these activities was to explore if engaging zookeepers in environmental activities could foster a 'sense of community' and help improve morale over the long term. While the results of the Likert-scale portions of the surveys did not support the idea of perceptions changing, exploration of the place meaning descriptive words, submitted by participants, showed a pattern of improvement with an increase in use of positive descriptors after participating in an environmental stewardship activity. Mammal Department keepers, who responded to a survey independent of an eco-activity, reported interest in participating in a future local eco-activity and agreed it could help improve morale.

Keywords: sense of place, zookeepers, environmental stewardship, place meaning, employee morale.

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Introduction

Many social science, human geography, and environmental psychology studies have concluded a relationship exists between sense of place, social capital, and environmental concern (Acedo, Painho, & Casteleyn, 2017; Kudryavtsev, Krasny, & Stedman, 2012a; Vaske & Kobrin, 2001). Our '*sense of place*' can be described as the relationship we have with a geographic location (Acedo, et al. 2017). 'Sense of place' can also be characterized as the combination of the constructs- *place meaning* and *place attachment* (Kudryavtsev, et al., 2012a). Although experiences with a particular location can be positive and/or negative, (Vorkinn & Riese, 2001) *place attachment* applies to the primarily positive association between a person/people and a place (Mesch & Manor, 1998). While 'place attachment' describes the extent a place is of importance to the person, *place meaning* expresses the rationale behind the feeling of attachment (Kudryavtsev, et al., 2012a). Place meaning is the significance we attach to a place (Kudryavtsev, et al., 2012b), why a certain place feels special, (e.g. sanctuary).

Many researchers have suspected that people with positive place attachments to natural areas may care more about the area and wish to protect it (Buta et al., 2014). Research has been collected showing that deep place attachment, combined with ecological place meaning, can lead to the fostering of pro-environmental attitudes and environmentally responsible behavior (Kudryavtsev, et al., 2012a; Kudryavtsev, et al., 2012b; Vaske & Kobrin, 2001). Kudryavtsev et al. examined whether summer environmental education programs, using the Bronx River as a focal point, could nurture 'sense of place' among high school students in the Bronx, New York (2012a). The researchers concluded that while the environmental education programs did bolster the ecological place meaning for the students, their *place attachment* was not affected (Kudryavtsev, et al., 2012a). Meaning, the students may have experienced an increased affinity for rivers and waterways, or felt a connection to the section of the river they worked on, but not necessarily the *Bronx* (Kudryavtsev, et al., 2012a).

Building upon the bonds that individuals experience with places, there are social constructs describing the similar relationships people have with other members of their community; how ever we wish to define that community. Along with sense of place, people may experience a *sense of community* and a *community attachment*. Community attachment refers to the emotional relationship residents have to their community, their feelings of social connectedness, which develops into a sense of belonging (Buta, Holland, & Kaplanidou, 2014). Many studies have concluded that place attachment and community attachment can be used as indicators of pro-environmental behaviors (Buta, et al., 2014; Vaske & Kobrin, 2001).

Researchers have found 'sense of place' and 'social capital' are integral to citizen participation and civic engagement (Acedo, et al., 2017; Talo, Mannarini, & Rochira, 2014). Social capital can be described as the social bond that holds groups of people together (Acedo, et al., 2017). Citizen participation, sense of community, engagement and feelings of empowerment are intertwined (Perkins, Brown, & Taylor, 1996; Talo, et al., 2014). Lewicka (2011) found those people experiencing place attachment demonstrate a higher sense of cohesiveness, increased social capital and feel more fulfilled with their life when compared to others not experiencing place attachment.

Zookeepers can be considered an occupational community (Bunderson & Thompson, 2009) with local chapters of the American Association of Zoo Keepers (AAZK) found at many zoos. At the 2006 National AAZK Conference, the keynote address included the common issue of low morale among keepers (Steenberg, 2006). Though zookeepers can derive a sense of importance of their work via the philosophy that their occupation assists in the conservation of wildlife and global biodiversity (Bunderson & Thompson, 2009), it is still common to find keepers suffering from negativism, criticism, skepticism, and Steenberg's take on PMS, "Piss and Moan Syndrome" (2006). As a zookeeper for over 20 years at the Bronx Zoo, I have personally come across a few such negative, cynical, and toxic employees, who not only affect, but worse, infect, the morale of staff. Historically the Bronx Zoo's Mammal Department experiences low keeper morale, demonstrated by the department placing last in an organizational-wide employee satisfaction survey several years ago.

Steenberg suggests ways she has found to help overcome the issues of low morale, one most important of which is to become involved (2006). With the decline of civic engagement and social capital in the United States since the 1960s, classically described in Putnam's essay "Bowling Alone" (1995), engaging zookeepers can be a challenge.

With researchers concluding that the social science concepts of sense of place, place meaning, place attachment, sense of community, community engagement, participation, and empowerment are all intertwined (Acedo, et al., 2017; Buta, et al., 2014; Kudryavtsev, et al., 2012a; Kudryavtsev, et al., 2012b; Lewicka, 2011; Mesch & Manor, 1998; Vaske & Kobrin, 2001; Vorkinn & Riese, 2001), and if sense of place and environmental meanings can encourage pro-environmental behaviors (Kudryavtsev, et al., 2012a), is it possible it can work in reverse? Can engagement in ecological activities and environmental stewardship in our "backyard", using the Bronx River, which flows through the Bronx Zoo, foster a sense of community among keepers and perhaps improve morale over the long-term? Can environmental stewardship activities improve the perception of urban natural areas for keepers at the Bronx Zoo? If perceptions can be improved, this could foster a 'sense of place' among keepers.

Zookeeper participants of two environmental stewardship activities conducted in the Bronx, New York, were surveyed. The first activity was a clean-up at Orchard Beach. The second activity involved the removal of invasive Japanese knotweed (*Fallopia japonica*) along the Bronx River. The surveys studied perceptions and views before and after the eco-activities, and explored if attitudes changed. A similar survey was conducted of Bronx Zoo Mammal Department zookeepers, independent of participation in the stewardship activities, to explore perceptions and views of the Bronx and the Bronx River. The department survey also served to assess zookeeper interest in participating in a future local environmental stewardship activity.

Methods

Pre- and Post- Environmental Stewardship Activity Surveys

Survey tools. Environmental stewardship activities were conducted at two sites in the Bronx, New York (Fig 1). Paper questionnaires were constructed utilizing a combination of questions and statements, and presented to participants both before and



Fig.1 Red area depicts Bronx County, New York City

after the activity (Fig. 9a and Fig. 9b).

By presenting a survey before the activity, I was interested in the participants' pre-conceived perceptions and views of the study area and the Bronx. Participants were asked if they had ever participated in a prior ecological activity, like a beach clean-up, in the Bronx and/or elsewhere. Participants were then presented with the statement: "When I think of the Bronx, I think of natural areas" and then asked to match the response best matching their feelings about the statement utilizing a continual Likert-

scale ranging from one to five, with one being "strongly agree" and five being "strongly disagree". Likert-scale surveys are typically used to measure perceptions, attitudes and/or opinions (McLeod, 2008; Survey Monkey, n.d.). They are frequently also used to measure psychological constructs (Nemoto & Beglar, 2014). Using an odd-numbered scale meant that a neutral option was offered to the respondent.

An open-ended question was presented last for the participant to offer three to five words to describe the activity area (Orchard Beach/the Bronx River). Open-ended questions can offer insight into people's feelings and perceptions of places (Ozguner, Eraslan, & Yilmaz, 2012). Patton (2002) states there is a functionality in simply asking open-ended questions when using qualitative methods. The request for descriptors of the activity location was intended to examine and categorize the responses by whether they possessed a positive, neutral or negative connotation. By requesting descriptors pre- and post- the activity, I was interested to explore if there was a change in the

percentage of positive words, which could imply a change in perception. The hypothesis being that after the activity, the percentage of positive words would increase, inferring an improved perception of the area.

Examples of descriptors offered by respondents were also explored and categorized into themes like Spartz and Shaw, when studying visitors to an arboretum, placed words into four categories of place meanings: Sanctuary, Nature, Society, and Activity (2011). Word clouds were also generated to visually present the descriptive place meanings, with the size of the words increasing with their frequency (McKee, 2014). Different colors were used to reflect the connotation of the words, with red used for negative, and blue for positive descriptors.

After the activity, a second “post-activity” paper questionnaire was presented to participants to complete. This included the same Likert-scale statement, (1) “When I think of the Bronx, I think of natural areas”, as well as the additional following statements: (2) “after the clean-up activity my views/perceptions of the Bronx have changed”; (3) “my views/perceptions of the Bronx have improved after my participation in this eco-activity”; (4) “after participating in this clean-up my views/perceptions of natural areas in the Bronx have improved”; (5) “I would participate in a future eco-activity”. Statements two through four were framed in a positive manner like Kudryavtsev et al. (2012a), with slight variations of each since it has been found to be beneficial for Likert-scale questions to focus on one topic (Survey Monkey, n.d.).

The first statement, “When I think of the Bronx, I think of natural areas”, was presented in both the pre- and post- activity questionnaires. I calculated the means for the responses pre- and then -post the activity, and using Student’s t-test, for a paired sample, computed a p-value to test the null hypothesis: there is no difference in perceptions after participation in an environmental stewardship activity.

Study areas

Site #1: Orchard Beach, Bronx, New York, USA. A beach clean-up was conducted at Orchard Beach, Bronx, New York (Fig. 2) on October 11, 2017, after work from 5:30pm-6:30pm. Lauren DelGrosso, a graduate student in the Advanced Inquiry

Program at the Bronx Zoo, organized the beach clean-up. Zookeepers at the Bronx Zoo were invited; garbage bags and gloves were supplied. Ten people (not including myself) participated in the clean-up activity, with six of the participants being zookeepers of the Bronx Zoo, and members of the New York City chapter of the American Association of Zoo Keepers. The remaining four participants were family, spouses and friends of zookeepers. A “pre-activity” survey tool (Fig. 7a) was handed-out to each participant to fill out anonymously before the clean-up activity. After the clean-up activity, a separate second “post-activity” survey tool (Fig. 7b) was handed to each participant to be completed anonymously as well. Each participant completed both the pre- and post- questionnaires.

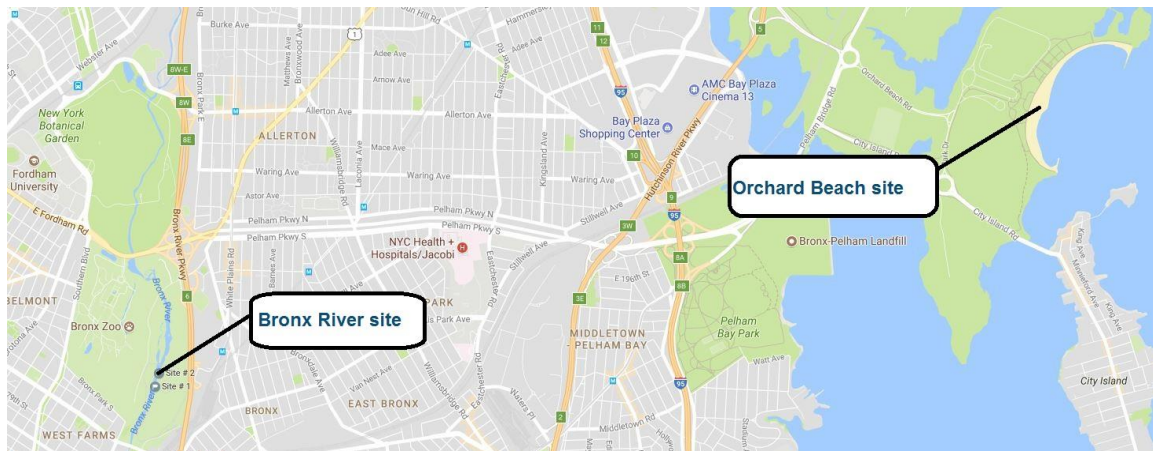


Fig. 2 Map of the Bronx. with Bronx River and Orchard Beach sites.

Site #2: Bronx River, Bronx, New York, USA. The second environmental stewardship activity involved inviting Bronx Zoo Mammal Department zookeepers working in the Wild Asia section of the zoo, to assist in the removal of invasive vegetation, Japanese knotweed (*Fallopia japonica*). A small stand of Japanese knotweed, measuring approximately 30m², growing along the Bronx River, which runs through the Bronx Zoo (Fig. 2) was selected by the author for removal. Approval for the removal of the vegetation was obtained from the Bronx Zoo’s General Curator.

Zookeepers were invited during afternoon break-time to assist in the removal of the invasive vegetation. Due to the short time frame offered for the activity, the activity was conducted over several days. In total, four zookeepers participated in removal of the vegetation on October 12th, 18th, and 21st, 2017. The same survey tools utilized

during the beach clean-up were used during this activity. All four zookeepers completed both pre- and post-activity survey questionnaires (Fig. 7a and 7b in Appendix) anonymously.

The purpose of the removal of the invasive vegetation was explained to the keepers, along with my Master Plan project, which involves use of camera trap images to compare wildlife abundance pre- and post-removal of the vegetation. The camera trap was set-up on September 16, 2017, a month prior to the activities. Some images captured from my previous study, “Use of camera traps to investigate if invasive Japanese knotweed (*Fallopia japonica*) affects wildlife abundance along the Bronx River, New York City, USA” (Medina, 2016) as well as some images captured from the month prior to the activity were shown and shared with the participants.

Mammal Department Survey

A new survey tool (Fig. 8 in Appendix) was developed and offered to all zookeepers of the Bronx Zoo Mammal Department. This survey tool was similar to the first, a paper questionnaire, with a combination of Likert-scale survey statements. The survey also asked if the respondent had ever participated in an environmental stewardship activity (e.g. clean-up, tree-planting, etc.) in the Bronx and/or elsewhere. The Likert-scale statements were as follows: (1) “when I think of the Bronx, I think of natural areas”; (2) “I have positive views/perceptions of natural areas of the Bronx”; (3) “As a Bronx Zoo keeper, my views/perceptions of the Bronx River are different from others”; (4) “A Bronx River clean-up activity would have a positive impact on morale”; (5) “I would participate in a future eco-activity on the Bronx River”.

The questionnaire again concluded with a request for three to five place descriptors. The percentages of positive versus negative descriptors was calculated, and explored for the following three categories: (1) zookeepers who have participated in an eco-activity in the Bronx; (2) zookeepers who have participated in an eco-activity elsewhere, and not the Bronx; (3) zookeeper who have never participated in any eco-activity. The compiled list of descriptors were also categorized by connotation, positive, neutral and negative, and presented visually in a word cloud.

A paper survey questionnaire, along with a brief explanation of the survey's purpose, was placed in the mailboxes of sixty Bronx Zoo Mammal Department keepers. Twelve anonymous responses were returned.

Results

Orchard Beach Clean-up

An environmental stewardship activity was conducted at Orchard Beach on October 11, 2017. Ten people participated in the clean-up, six of which were zookeepers. The ten participants were surveyed pre- and post- the activity. Forty percent of the participants had previously participated in an environmental stewardship activity in the Bronx. Sixty percent of the participants had previously participated in an environmental stewardship activity located elsewhere. One Likert-scale statement was presented both in the pre- and post-activity survey: "When I think of the Bronx, I think of natural areas". The mean of the replies to the statement pre-activity was 3.8 (Table 1); this corresponds to "Disagree" on the Likert-scale utilized. The mean of the replies post-activity was 3.2; which corresponds to "Neutral" on the Likert-scale utilized. Though this suggested a change in perception, a P-value using Student's t-test was computed, with $P=0.14$ (Table 1). Setting $\alpha=0.05$, we fail to reject the null hypothesis; there is no difference in participants thinking of natural areas when thinking of the Bronx. However, responses showed (Table 1) that participants' reported perceptions of the Bronx changed (Table 1 S2) and improved for natural areas in the Bronx (Table 1 S3).

Before the eco-activity, 43% of the descriptive words supplied by respondents were of positive connotation. After the activity, the percentage of positive words supplied by respondents increased to 71%. The connotations of the place descriptors supplied by the respondents are visually presented as word clouds pre- (Fig. 3a) and post-activity (Fig. 3b); with different colors representing negative, neutral and positive connotations.

Table 1 Orchard Beach Clean-up Survey

| Orchard Beach Clean-Up October 11, 2017 | | | |
|---|--|-------------------|---|
| # Participants | | 10 | |
| 6 were Bronx Zoo keepers | | | |
| Have you ever participated in an eco-activity such as clean-up, tree planting before? | | | |
| In the Bronx? | | 40% responded Yes | |
| Elsewhere? | | 60% responded Yes | |
| | | | Mean Correlation with Likert Scale t-test |
| S1 PRE-ACTIVITY | When I think of the Bronx, I think of natural area. | 3.8 | Disagree |
| S1 POST-ACTIVITY | When I think of the Bronx, I think of natural areas: | 3.2 | Neutral |
| S2 POST-ACTIVITY | After the clean-up activity my views/perceptions of the Bronx have changed: | 2.5 | Slightly Agree |
| S3 POST-ACTIVITY | My views/perceptions of the Bronx have improved after my participation in this eco-activity: | 2.7 | Agree |
| S3 POST-ACTIVITY | After participating in this clean-up my views/perception of natural areas in the Bronx have improved | 2.6 | Agree |
| S4 POST-ACTIVITY | I would participate in a future eco-activity: | 2.9 | Neutral |
| DESCRIPTIVE WORDS OF ORCHARD BEACH/BRONX: | | | |
| PRE-ACTIVITY | 43% Positive; 19% Neutral; 38% Negative | | |
| POST-ACTIVITY | 71% Positive; 7% Neutral; 21% Negative | | |



Fig. 3a Descriptors Orchard Beach Pre-activity*



Fig. 3b

Bronx River Invasive Vegetation Removal

Four zookeepers participated and assisted with the removal of invasive vegetation along a small section of the Bronx River on October 12th, 18th, and 21st, 2017. Fifty percent of the keepers had previously participated in an environmental stewardship activity in the Bronx (Table 2). Fifty percent of the keepers also previously participated in an environmental stewardship activity elsewhere (Table 2). When presented with the statement: S1: “When I think of the Bronx, I think of natural areas” before the activity, the mean Likert-scale response (2.25) was to “agree” with the statement (Table 2). After the activity the average response decreased and corresponded to “neutral” on the scale. A P-value, (P=0.06) for the responses to the statement pre- and post-activity was computed, using Student’s t-test. Setting $\alpha=0.05$, results suggested no change, and supported failing to reject the null hypothesis. The participants reported neutral responses to whether their perceptions of the Bronx and/or natural areas in the Bronx changed (Table 2 S2-S4).

Table 2 Bronx River Survey Results

| Bronx River invasive vegetation removal October 12, 18, 21, 2017 | | | | | |
|--|---|-------------------|------|-------------------------------|--------|
| | # Participants | 4 | | | |
| | Have you ever participated in an eco-activity such as clean-up, tree planting before? | | | | |
| | In the Bronx? | 50% responded Yes | | | |
| | Elsewhere? | 50% responded Yes | | | |
| | | | Mean | Correlation with Likert Scale | t-test |
| S1 PRE-ACTIVITY | When I think of the Bronx, I think of natural area. | | 2.25 | Agree | 0.06 |
| S1 POST-ACTIVITY | When I think of the Bronx I think of natural areas: | | 3 | Neutral | |
| S2 POST-ACTIVITY | After the clean-up activity my views/perceptions of the Bronx have changed: | | 2.75 | Neutral | |
| S3 POST-ACTIVITY | My views/perceptions of the Bronx have improved after my participation in this eco-activity: | | 2.75 | Neutral | |
| S4 POST-ACTIVITY | After participating in this clean-up my views/perception of natural areas in the Bronx have improved: | | 2.75 | Neutral | |
| POST-ACTIVITY | I would participate in a future eco-activity: | | 1.75 | Agree | |
| DESCRIPTIVE WORDS OF ORCHARD BEACH/BRONX: | | | | | |
| PRE-ACTIVITY | 69% Positive; 8% Neutral; 23% Negative | | | | |
| POST-ACTIVITY | 92% Positive; 0% Neutral; 8% Negative | | | | |

When examining the percentages of positive place descriptors, 69% were positive pre-activity, and increased to 92% post the activity. The place descriptors supplied by the participants were used to generate word clouds, to visually display the connotations of the descriptors supplied pre- and post-activity (Figs. 4a and 4b); again different colors were utilized to reflect the connotations.



Fig. 4a Descriptors from Bronx River Pre-activity

Fig. 4b Descriptors from Bronx River Post-activity

Mammal Department Survey:

Twenty percent of Mammal Department zookeepers replied to the survey. This low percentage of responses is reflective of low keeper morale and engagement. Of the

respondents, 45% had participated in an environmental stewardship activity in the Bronx, and 63% participated in an eco-activity elsewhere. Ninety percent responded that they would be interested in participating in a local eco-activity (Table 3a). The average response reported that respondents agree a Bronx River activity could have a positive impact on morale.

When examining the connotations of the place descriptors supplied by respondents, 59% were positive. Three word clouds displaying the descriptors with their connotations in different colors, were generated for the following categories of respondents: those that have participated in an eco-activity in the Bronx (Fig. 6a), those that participated in an eco-activity elsewhere (Fig. 6b), and those that have never participated in an eco-activity (Fig. 6c). The percentage of positive descriptors supplied by respondents was highest (61%) for those that had participated in an eco-activity in the Bronx (Table 3b).

Table 3a Mammal Department Zookeeper Survey

| Mammal Department Survey | |
|--|------------------------------------|
| # Participants | 12 Surveys returned |
| Response | 20% of keepers responded |
| Have you ever participated in an eco-activity such as a clean-up, tree planting, etc: | |
| In the Bronx? | 45% Responded Yes |
| Elsewhere? | 63% Responded Yes |
| How many keepers have never participated in an eco-activity anywhere? 33% | |
| Would you be interested in participating in a local eco-activity? | 91% Responded Yes |
| | Mean Correlation with Likert Scale |
| S1 When I think of the Bronx, I think of natural areas | 3.3 Neutral |
| S2 I have positive views/perceptions of natural areas in the Bronx: | 2.7 Neutral |
| S3 As a Bronx Zoo keeper, my views/perceptions of the Bronx River are different from others: | 2.3 Agree |
| S4 A Bronx River clean-up activity would have a positive impact on morale: | 2 Agree |
| S5 I would participate in a future eco-activity on the Bronx River: | 1.7 Agree |
| Descriptive Words: 59% Positive; 19% Neutral; 22% Negative | |

Table 3b Mammal Dept. Survey replies to "When I think of the Bronx, I think of natural areas"

| Mammal Department Survey | Mean Correlation with Likert | Descriptors | | |
|---|------------------------------|-------------|---------|----------|
| | | Positive | Neutral | Negative |
| When I think of the Bronx, I think of natural areas | | | | |
| Respondents who have never participated in any eco-activity: | 2.5 Slightly Agree | 58% | 16% | 25% |
| Respondents who have participated in an activity, but not in the Bronx: | 4.3 Disagree | 37.5% | 12.50% | 50% |
| Respondents who have participated in an activity in the Bronx: | 3.4 Neutral | 61% | 28% | 11% |



Figure 5 All of words used by Mammal

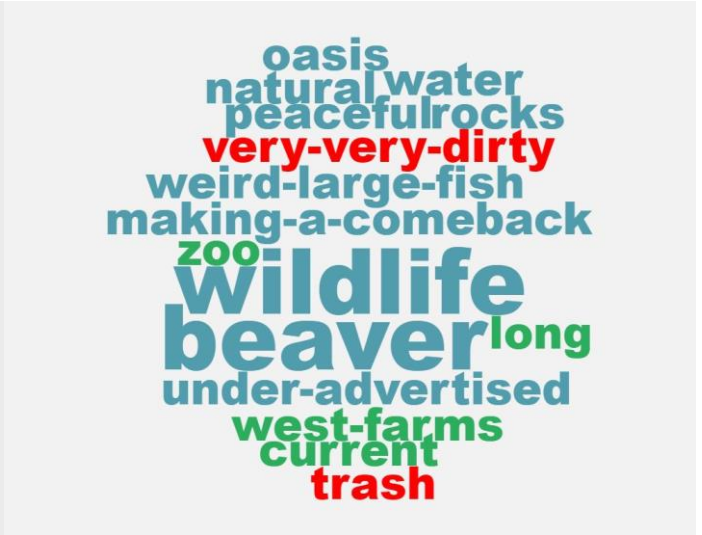


Fig. 6a Descriptors submitted by those that have participated in an eco-activity in the Bronx



Fig. 6b Descriptors submitted by those that have participated in an eco-activity elsewhere, not in the Bronx.



Fig. 6c Descriptors submitted by those that have never participated in any eco-activity

Combined Survey Data

All place descriptors supplied by participants in the two Bronx eco-activities were merged along with those supplied by respondents to the department survey. The data was split into two categories: respondents who had never participated in an eco-activity anywhere; and those that had participated in an eco-activity (either in the Bronx or elsewhere). The responses were then further examined for connotation (positive, neutral or negative) and percentages calculated (Table 4). Those respondents that had

participated in an eco-activity were more likely to use positive words when describing natural areas in the Bronx.

Table 4 Descriptors of Park + Nature + Mammal Dept. Descriptors (compiled from survey data)

| Compiled survey data (Orchard Beach, Bronx River & Mammal Dept responses) | | | |
|---|----------|---------|----------|
| | Positive | Neutral | Negative |
| Respondents who have never participated in an eco-activity | 58% | 33% | 8% |
| Respondents who have participated in an eco-activity | 62% | 10% | 28% |

All place descriptors were compiled and then explored for theme. Like Spartz and Shaw, many of the descriptors could be placed into one of four categories of place meanings: Sanctuary, Nature, Society, and Activity (2011). Table 5 displays some descriptors submitted by respondents and categorized by theme.

Table 5 Themes of descriptors. Examples of descriptors submitted by

| Sanctuary | Activity | Nature | Society |
|------------|--------------|---------------------------|-----------------------------|
| | | | |
| Retreat | Fun | Nature | Connection |
| Peaceful | Public Space | Trees | Community |
| Oasis | Greenway | Air | History |
| Quiet | Park | Water | Not safe to walk alone |
| Cool | Recreation | Wildlife | Stewardship |
| Relaxation | Fishing | Beavers | Forgotten natural resources |
| Beautiful | Zoo | Seals in winter | Under-utilized |
| Pleasant | | Natural habitats | Neglected |
| Gentle | | Rich soil | Asset |
| Serene | | Fish | |
| | | Willow trees | |
| | | Place for migrating birds | |
| | | Lots of turtles | |
| | | Rocks | |

Action

After gaining permission to remove a 30m² stand of invasive Japanese knotweed from along a small portion of the Bronx River in the Bronx Zoo, I engaged co-workers to assist in removal of the vegetation. There were tough time restraints performing the removal during work hours. The activity was conducted on three afternoons, on October 12th, 18th, and 21st, 2017. Shovels, pitchforks and garbage bags were provided. It is important that all pieces of the Japanese knotweed be bagged up, as the vegetation can re-grow from small pieces.

During the activity, I spoke to the participants about my projects, and my camera trap. During the last removal date, there was significant fish activity, i.e. fish jumping out of river, which keepers were able to view, making the activity more exciting. These social experiences are imperative to the sense of community I am hoping to improve within the mammal department. Participants in this eco-activity all replied they would agree to participate in a future eco-activity.

Ninety-one percent of the zookeepers in the mammal department, which responded to the survey, declared interest in participating in a future local environmental stewardship activity. I have spoken with the Ecology Director of the Bronx River Alliance, (a local collaborative group of environmental educators, scientists and community advocates which utilize the Bronx River), about having keepers participate in fish monitoring (i.e. fish popping) next year. This activity is usually scheduled during 'after-work' hours and located adjacent to zoo grounds; therefore, I anticipate many keepers will attend. Once the monitoring events are scheduled, I plan to recruit keepers. My intention is for activities like these, in which many keepers can participate together, can help improve morale in the department over the long term, by possibly developing a 'sense of community' and 'sense of place'.

At the site of Japanese knotweed removal, I have continued my camera trap imaging collection. I have already collected and catalogued over 5000 images from this camera since September 2017, as part of my Master plan project. I intend to follow-up in September 2018, with a two-week collection of images to gather data for my Master Plan. I am interested to examine if biodiversity increases after the removal of Japanese knotweed. My previous IAP project examined two different sites, one near Japanese knotweed and one without Japanese knotweed. The site without Japanese knotweed encountered a higher bird abundance and species diversity. My hypothesis is that comparing the site with Japanese knotweed pre - and post-removal will demonstrate a higher bird abundance and diversity a year later. I created a blog page (<https://aperegrination.weebly.com/bronx-river-camera-trap-images-of-note>) to post my favorite images from this IAP project as well as last year's camera trap project, which I will continue to share with my co-workers. Due to continued interest in the images

collected, I am leaving the camera in place indefinitely, and will continue to post and share images I find of interest on the blog page as well as via Facebook. Recently shared images include a blue heron captured both at night and during the day (Fig. 9 in Appendix).

Discussion

Employee morale can involve feelings, emotions, attitudes and perceptions towards not only the job itself, but also the work environment (Ali, 2017). Characteristics of positive morale include employees that are confident (Ali, 2017) and exhibit a willingness to participate. Low morale can manifest itself as insufficient community- engagement, participation, and attachment, as well as lack of 'sense of place' or belonging. Low morale is associated with low social capital, which has reportedly declined continually in the United States since the 1960s (Putnam, 1995).

Low morale is a common issue among zookeepers at many zoos, with affected keepers displaying high degrees of negativity and skepticism (Steenberg, 2006), and acting uninspired. Low morale among the zookeepers in the Bronx Zoo's Mammal Department has been previously documented by an organizational-wide staff feedback survey conducted in 2014; the department ranked last in employee satisfaction. Steenberg (2006) suggests one method to assist in overcoming issues of low morale is to become involved, but it can be a challenge to engage zookeepers; feeling like an uphill battle. Low morale can affect the attempt to empower zookeepers to become involved and provide the solutions to their problems, therefore becoming a 'negative feedback loop'.

There are usually about sixty zookeepers in the Bronx Zoo's Mammal Department. Only twenty percent of the keepers replied to the department survey placed in their mailboxes. This low percentage of response is reflective of our low morale and engagement with only a few zookeepers motivated enough to complete and submit a department survey. Likewise, only those motivated individuals will initially

participate in activities offered. Similar to marketing strategies, or survival strategies for social prey species, there are a few individuals who are confident to try new things, and once deemed “fun” or “safe” by the group, a larger portion will proceed or “jump on the bandwagon”. My idea is if more keepers participate in activities and can feel empowered, that morale can improve over the long term.

With social scientists agreeing that sense of place, place meaning, place attachment, sense of community, community engagement, participation, and empowerment all related to one another (Acedo, et al., 2017; Buta, et al., 2014; Kudryavtsev, et al., 2012a; Kudryavtsev, et al., 2012b; Lewicka, 2011; Mensch & Manor, 1998; Vaske & Kobrin, 2001; Vorkinn & Riese, 2001), and if sense of place and environmental meanings can encourage pro-environmental behaviors (Kudryavtsev, et al., 2012a), I chose to explore if it can work in reverse. Could engagement in ecological activities and environmental stewardship in our “backyard” foster a sense of community among zookeepers and perhaps improve morale over the long-term? I first examined if participation in environmental stewardship activities improve the perception by zookeepers of urban natural areas in the Bronx. As a first step, if perceptions can be improved, this could foster a ‘sense of place’ among keepers.

The first environmental stewardship activity was a clean-up at Orchard Beach, Bronx, New York. The activity was organized by a fellow Bronx Zoo Mammal Department zookeeper. A total of eleven people (including myself) participated in the clean-up; only five of us work in the mammal department. While t-test results from pre- and post-activity surveys showed there was no change in the perception of natural areas in the Bronx (Table 1), the participants self-reported that their views had changed, and improved of the Bronx after participating in the activity. When exploring place meaning descriptive words supplied by participants pre- and post-the Orchard Beach activity, there was an increase in use of positive words to describe Orchard Beach. Before the activity 43% of the descriptors were positive, while 71% of the place meaning descriptors were positive after the activity (Table 1; Figs 3a & 3b).

The second environmental stewardship activity was located along a small section of the Bronx River, which flows through the Bronx Zoo. A small 30m² stand of invasive

Japanese knotweed was removed with the assistance of four Bronx Zoo Mammal Department zookeepers. Again, the participants were surveyed pre- and post- the activity. Responses to the statement “When I think of the Bronx, I think of natural areas” pre- and post- the activity were compared using Student’s t-test. The resulting P-value suggests we cannot fail to reject the null hypothesis, and there is no change in perception after the activity. The responses to other statements post-activity support that there was no change/no improvement in the perception of natural areas in the Bronx (Table 2). However, when exploring the place meanings supplied by the participants pre- and post-the Bronx River activity, again there was an increase in use of positive words to describe the Bronx River. Before the activity 69% of the descriptors were positive, while after the activity they were 92% positive (Table 2).

While responses to Likert-scale statements suggests there is no change in perceptions of natural areas of the Bronx after participating in an environmental stewardship activity, qualitatively exploring place meanings show a pattern of improvement when zookeepers were describing the activity sites. This could be explained by not properly testing the survey tool for construct validity (Kudryavtsev, et al., 2012b). If the surveys were conducted in the future, it would be better to test the survey tool with zookeepers from another department (Bird and Reptile Departments). I could then examine if the Likert-scale statements I supplied could have been misunderstood, and address any questions keepers may have had about the statements to improve the survey tool.

The low response to the Bronx Zoo Mammal Department survey, with only 20% of keepers responding is again indicative of low morale. Of those that completed the survey, 33% have never participated in an environmental stewardship activity anywhere, but 91% responded “yes” when asked if they would be interested in participating in a local eco-activity (Table 3a). The department respondents average feedback was to agree a Bronx River clean-up activity would have a positive impact on morale (Table 3a S4).

Exploring the statement “when I think of the Bronx, I think of natural areas”, I categorized department responses by participation in an environmental stewardship

activity (in the Bronx, elsewhere or never) revealing some interesting results. Those that had never participated in any eco-activity had the most favorable perception of the Bronx (Table 3b); with those that had participated in an eco-activity but *not* in the Bronx, the most unfavorable perceptions. When examining place meaning descriptors from responses in the same categories, the percentages with positive connotations reflected the same for those that had participated elsewhere. Responses from those that had participated in an eco-activity, not in the Bronx, had the lowest (37.5%) percentage of positive words, and highest percentage of negative words used (50%) to describe the Bronx (Table 3b). Those respondents who had participated in an eco-activity in the Bronx had the lowest percentage of negative descriptors submitted (11%).

All the place descriptors supplied via activity surveys and the department survey was compiled and then explored for theme. Like Spartz and Shaw (2011), many of the descriptors could be placed into one of four themes categories of place meanings: Sanctuary, Nature, Society, and Activity (Table 5). Examples of submitted place descriptors which were categorized as 'sanctuary', included oasis, retreat, peaceful, serene, relaxation. These place meanings reflect that natural areas in the Bronx are viewed by some respondents as being special places of refuge.

Conclusion

Low participation and engagement in environmental stewardship activities offered to the Bronx Zoo Mammal Department keepers, as well as the low response rate (20%) of keepers responding to the department survey, can all reflect that low employee morale continues to be an issue for the department. The few zookeepers that completed the department survey agreed a local environmental stewardship activity could help improve morale. Ninety-one percent of the respondents reported interest in participating in a local eco-activity, if offered in the future. A fish-monitoring eco-activity is being planned for fall of next year with the Bronx River Alliance, to be conveniently scheduled and located for Bronx Zoo keepers. I remain hopeful that a larger number of Mammal Department zookeepers will participate. If even a few more keepers become

more engaged and participate, the numbers may increase over time and over the long-term may improve morale.

When exploring whether participation in an environmental stewardship activity affected perceptions of natural areas in the Bronx, the Likert-scale survey results did not support the idea of perceptions improving. This could have been due to failing to test the survey tool for ease of understanding and use prior to its deployment. This IAP could be considered a pilot study; one of the next steps would be to improve the survey tools.

When qualitatively examining place meaning descriptors submitted by participants and exploring whether perceptions were affected, the survey results suggest a trend towards increased usage of positive place descriptors of the natural areas, after an environmental stewardship activity.

I plan to continue deploying my camera trap indefinitely, and will share and post images of interest, as I have a few zookeepers enticed in the findings.

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Appendix

Fig. 7a

Pre-activity

Are you a zookeeper at the Bronx Zoo? Y N

Have you ever participated in an eco-activity such as a beach/river clean up, tree planting, eel mops, fish monitoring, etc:

| | | |
|---------------|---|---|
| In the Bronx? | Y | N |
| Elsewhere? | Y | N |

Please circle the number below that best represents how you feel about the Bronx, for the statement below.

When I think of the Bronx, I think of natural areas

| | | | | |
|----------------|-------|---------|----------|-------------------|
| Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
| 1 | 2 | 3 | 4 | 5 |

Please give 3 - 5 words to describe Orchard Beach/ the Bronx River

=====

Fig. 7b

Post-activity

Are you a Bronx Zoo keeper? Y N

Please circle the number below that best represents how you feel about the Bronx, for each statement below.

| | | | | |
|----------------|-------|---------|----------|-------------------|
| Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
| 1 | 2 | 3 | 4 | 5 |

When I think of the Bronx, I think of natural areas.

1 2 3 4 5

After the clean-up activity my views/perceptions of the Bronx have changed.

1 2 3 4 5

My views/perceptions of the Bronx have improved after my participation in this eco-activity.

1 2 3 4 5

After participating in this clean-up my views/perception of natural areas in The Bronx have improved.

1 2 3 4 5

I would participate in a future eco-activity.

1 2 3 4 5

Please give 3 - 5 words to describe Orchard Beach/ the Bronx River

Fig. 8

Dept

Have you ever participated in an eco-activity such as a beach/river clean-up, tree planting, eel mops, fish monitoring, etc.:

| | | | |
|----------------------|---|---|--|
| In the Bronx? | Y | N | |
| Elsewhere? | Y | N | |

Would you be interested in participating in a local eco-activity? Y
 N

Please circle the number below that best represents how you feel about the Bronx, for each statement below.

| | | | | |
|----------------|-------|---------|----------|-------------------|
| Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
| 1 | 2 | 3 | 4 | 5 |
| ===== | | | | |
| ===== | | | | |

When I think of The Bronx, I think of natural areas.

1 2 3 4 5

I have positive views/perceptions of natural areas in the Bronx.

1 2 3 4 5

As a Bronx Zoo keeper, my views/perceptions of the Bronx River are different from others.

1 2 3 4 5

A Bronx River clean-up activity would have a positive impact on morale.

1 2 3 4 5

I would participate in a future eco-activity on the Bronx River.

1 2 3 4 5

Please give 3 - 5 words to describe the Bronx River.

Figure 9. Image captured on November 20, 2017, of Blue heron (*Ardea herodias*) at Bronx River site, post-removal of Japanese knotweed

