

**THE PSYCHOLOGICAL BENEFITS OF PUBLIC GARDENS
FOR URBAN RESIDENTS**

by

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Administration

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GLOSSARY

Likert scale - a survey question format that utilizes a numbered scale with two opposite choices at either end; respondents answer questions by rating their feelings, opinions, beliefs, etc., along the scale

Public garden - an institution whose principle activity is to maintain living plant collections for use in serious programs for the public. Programs for the public may include display, research, and education. Collections may be described as all living plants purposefully assembled by an institution according to some criterion or criteria, stated or assumed (Lighty 1984).

Restoration - recovery from mental fatigue and stress

Stress - an event or force (a stressor) that is unpleasant, thus threatening the well-being and existence of the affected individual

ABSTRACT

Because the urban environment is inherently stressful, urban residents need outlets for stress reduction and restoration. Exposure to nature in a variety of settings has been shown by researchers to reduce stress in humans. Little research, however, has been undertaken to quantify and describe the benefits of visiting public gardens. This research examines the relationship between a visit to an urban, public garden and stress reduction in urban residents.

Through an on-site visitor exit survey, visitors to two urban, public gardens were questioned about their perceived stress levels before and after a garden visit. Respondents also were questioned about their reasons for visiting the gardens.

The survey results indicate a reduction in stress in urban residents after a garden visit. Furthermore, urban residents identify relaxation, stress reduction, and inspiration as the three most important reasons for visiting the gardens. All three reasons are related to feelings or affects, suggesting that urban residents find the affective rewards of visiting public gardens to be more important than other, more tangible rewards.

The results of this research will be useful in public garden administrators' efforts to obtain funding from both public and private sources. The positive benefits available to the urban community as a result of a garden visit should be emphasized to funding

sources as proof of public gardens' significance to the community. Garden administrators can further use the research results in promoting gardens to the public, thus encouraging increased attendance and membership.

Chapter 1

INTRODUCTION

Throughout the centuries humans have benefited from plants for their wide-ranging and useful products, and for the improvements they impart to the environment. The beneficial effects of plants on human well-being are not as well-known or understood. A small, but growing, group of researchers is dedicating time and effort to the goal of clarifying relationships between plants and people (Altman and Wohlwill 1983; Kaplan and Kaplan 1989; Knopf 1987; Ulrich 1985). Environmental psychologists (Kaplan and Kaplan 1989), horticulturists (Lewis 1973, 1979), geographers (Ulrich 1979, 1984, 1985, 1986), recreational managers (Driver and Brown 1983), sociologists (Catton 1983), and others are making great strides in describing and analyzing people-plant interactions. Researchers affiliated with a variety of disciplines have studied the relationship between human stress and urban environments. The negative effects of the urban situation on human well-being are well documented. Urban conditions have adverse effects on humans, contributing to stress and weakening coping skills (Stainbrook 1973). Urban residents frequently may suffer some level of uncomfortable stress as a result of work demands, commuting pressures, crime, and other factors (Ulrich

1986). The urban environment, with few natural areas, can evoke a negative self-appraisal from residents continually surrounded by bleak urban settings. In response humans often seek natural settings for their restorative qualities, which lead to renewed coping abilities with regard to the complex world (Stainbrook 1973). In an historical study, Stillman (1975, 1977) concludes that as stress levels escalate within a culture, the importance of natural environments as places of solace also increases.

Access to passive experiences with parks and other nature in cities has positive influences on psychological well-being (Ulrich 1986). Exposure to nature scenes causes stressed individuals to feel significantly better, when compared with their condition after exposure to American urban scenes lacking nature elements. In fact, such urban views may be detrimental to emotional well-being by increasing sadness in individuals (Ulrich 1979).

Physical health and recovery also have been associated with plants and nature. Patients with views of trees from their hospital windows have shorter post-operative hospital stays, and have fewer post-surgical complications (Ulrich 1984). Kaplan and Kaplan (1989) discuss the importance of nearby nature with regard to psychological and physical well-being. Their work suggests that contacts with green areas, whether they are parks, yards, golf courses, gardens, etc., foster improved individual well-being. It becomes clear, when reviewing the literature, that there is a link between well-being and exposure to plants and nature. The sight, sound, smell, and touch of plants can actually

lower levels of environmental stress (Gold 1974). Though much of the research in this area has been conducted outside public gardens, the effects of public gardens on humans should prove similar to those experienced in natural areas outside the public garden setting. The following research will focus on the beneficial effects of public gardens on humans, specifically on urban residents.

Urban Stress

That cities are stressful places is a well-established fact supported by a large body of research (Krupat 1985; Glass and Singer 1972). Stress is defined as an event or force (a stressor) that is unpleasant, thus threatening the well-being and existence of the affected individual. After an individual becomes aware of such threats, there is an attempt to reduce or eliminate the threats (Krupat 1985).

The literature describes three classes of stress. The first, “cataclysmic phenomena,” are sudden and powerful events affecting large numbers of people. Examples of cataclysmic phenomena are floods, earthquakes, and other natural disasters. The second class of stress may be sudden or not, and just as powerful as the first; the stress, however, focuses on one person or a small group of people. Examples of this type of stress include job loss, divorce, or a death in the family. The third class of stress is “daily hassles,” which are minor or semi-minor annoyances that seem to occur continuously or repeatedly. Daily hassles tend to be multiple, chronic, and repetitive (Lazarus and Cohen 1977). Most urban stresses fall under the category of daily hassles.

Stresses in the city arise from a variety of sources. Crowding and density are stressful elements of the urban environment that, in most instances, cannot be avoided. The two differ in a subtle, but important way. Density is the physical description of people in relation to the amount of space available. Crowding, however, is the “psychological or subjective experience resulting from a recognition that one has less space than one desires” (Krupat 1985).

Noise is another element of potential stress common to city life. Noise, with regard to stress, is defined as unwanted sound that is annoying, can interfere with ongoing activities, and can be unhealthy physiologically. Excessive noise, as is common in urban environments, may result in over-stimulation of the senses. Such over-stimulation leads to overload in the individual, and a reduced ability to cope with stress. Most complaints about noise in the city are related to traffic (Krupat 1985).

Air pollution, clearly a threat to physical health, is also harmful to psychological well-being. According to a 1994 report by the American Lung Association, almost 23 million people in the United States live in locations where air pollution violates Federal standards. The American Lung Association estimates that as many as 120,000 deaths per year in this country may be linked to air pollution. A study of urban drivers suggests that poor air quality contributes to decreased alertness and increased aggressiveness (Rotton 1978).

Because most urban residents live some distance from their place of employment, commuting becomes a necessity. The urban commute is yet another source of stress for those who live and work in urban areas (Krupat 1985).

Large amounts of physical or social stimulation caused by daily hassles may overload the city dweller, resulting in feelings of loss of control over the environment. Yet, people are able to develop mechanisms for coping in order to meet the demands of the city, which are sources of stress (Milgram 1970).

Individual Stress

Stimulation of the mind and body requires attention from the individual. Stephen Kaplan (1992) discusses the psychological process of attention with regard to “mental fatigue.” Pressures of the modern world demand increasing amounts of attention from human beings. “Involuntary” attention is an effortless reaction evoked by an interesting or exciting stimulus in the environment. “Directed” attention, on the other hand, is a voluntary reaction that requires effort from the individual (James 1892). Because directed attention requires effort, it is subject to fatigue. As the world becomes more complicated, humans utilize directed attention with increasing frequency to block unwanted stimuli, resulting in mental fatigue. This result may have a variety of debilitating effects, including susceptibility to distraction, difficulty in decision-making, impatience, irritability, and inclination to make risky choices. These effects ultimately may lead to excessive drug or alcohol consumption and/or violent behavior (Kaplan

1992). Kaplan differentiates between stress and mental fatigue, explaining that mental fatigue may result from situations an individual enjoys and/or from negative situations. Stress is most often associated with negative conditions evaluated as being threatening or harmful. Though the two are differentiated, for the purposes of this paper both mental fatigue and stress will be considered to be negative consequences of an individual's environment, and will be referred to as "stress."

As stresses build within the urban resident, the individual reacts by trying to reduce or eliminate the stress. In an interview with Lawrence Cohen, Ph.D., Professor of Psychology at the University of Delaware, he commented that a visit to a public garden may be recognized as such a reaction to stress, or a means of coping. Two types of coping are described in the literature: problem-focused and emotion-focused. Problem-focused coping is characterized by an individual striving to change the event causing stress. An urban resident, however, will find it difficult to change such stressors as crowding, noise, and air pollution. Emotion-focused coping is characterized by an individual trying to deal with feelings about a stressful event. This method of coping may be more effective when dealing with the daily hassles of urban living. A visit to a public garden as a means of stress reduction may be seen as a method of emotion-focused coping. The desired outcome of this coping strategy is restoration; the individual is restored to pre-stress levels of psychological well-being after visiting a public garden (Interview, 3 October, 1994). Cohen further postulated that though restoration may be

achieved, it is probable that this outcome is short-term; currently, it is unclear how long the restoration will last, though it will probably depend on the individual (Interview, 5 December, 1994).

Restoration

Any experience that results in recovery from mental fatigue and stress can be considered a restorative experience. Four components of a restorative experience are described in the literature: being away, extent, fascination, and compatibility (Kaplan and Kaplan 1989).

Being away. The restorative environment is in a setting different from the usual, allowing thought about things other than the pressing or immediate. In psychological terms, being away implies a person is involved in cognitive content different from what is usually experienced. In the urban environment, nature is not the usual everyday content, and, thus, enhances the feeling of being away. The concept of being away does not necessarily mean physical distance from the source of one's stress. A distinctiveness and separateness from the every day experience may be as important as physical distance. Therefore, a visit to a public garden may feel to the urban resident like being very distant or separate from the usual pressures and stressors of daily life.

Extent. The restorative environment must be of a large enough "scope" that one can move around in it without having to be careful of going beyond limits. The various parts of the environment must be "connected" and perceived as belonging to a larger

whole. Scope, with regard to the public garden, is suggested by the garden's layout or landscape design. Though its size may seem limited, an important aspect of the public garden is the sense that there might be more to explore than is immediately visible to the human eye. The individual parts of a public garden intuitively are perceived as connected to a larger whole--nature.

Fascination. The restorative environment must be fascinating or interesting to the individual, thus drawing upon involuntary (effortless) attention. Nature is inherently fascinating; clouds, trees, flowers, the ripples of water from a breeze--all capture attention. The public garden is a haven for such subtle attention-grabbers. Yet, when one's involuntary attention is attracted by nature, one is able to have other thoughts--the mind is allowed to wander, thus allowing reflection and rest from directed attention.

Compatibility. There must be compatibility among environmental patterns, the individual's inclinations, and the actions required by the environment. What one wants to do and is inclined to do are what is needed and supported by the environment. Nature appears to be highly compatible for many people. In fact, some people find it easier to function in a natural setting than in more civilized settings (Cawte 1967). It has been hypothesized that, because humans evolved in natural environments, we exhibit a special link with nature (Lewis 1994, Thomas 1977). Public gardens provide the link to nature that is not immediately available in other aspects of urban life.

The restorative experience functions to clear one's head, permits recovery of directed attention, allows cognitive quiet so the individual can face matters of concern, and permits reflection on one's life, priorities, actions, and goals. This final function occurs only after deeply restorative experiences (Kaplan and Kaplan 1989).

Purpose and Justification

As increasing numbers of non-profit organizations compete for fewer available dollars, it is clear that public gardens must justify their existence to funding sources. There has been a disturbing trend of reduced funding for public gardens in recent years. Queens Botanical Garden, a 39-acre garden located in New York City, has experienced a funding reduction of 45 percent from the city in the last few years. The Garden currently is operating with fewer than 50 percent of its pre-cuts staff (Grella 1994).

Over a period of two years (1990-1991) Brooklyn Botanic Garden experienced a budget cut of one million dollars (Zuk 1994), and the New York Botanical Garden has suffered a cumulative loss of four million dollars since fiscal year 1991 (Spero 1995). Though these gardens have survived massive budget cuts, it will be difficult to maintain quality gardens if funding continues to decrease.

Societal needs such as health care, public safety, and education demand increasing amounts of public moneys. As a result, government funding of public gardens will continue to decrease in response to societal demands (Grella 1994). Gardens which are primarily funded by government sources will suffer staff cuts and overall decreased

garden quality if steps are not taken to curtail this shrinkage of funds. By demonstrating not only the horticultural, but also the psychological benefits provided to the community, public gardens will better justify their existence to both government and individual funding sources. As interest in human stress continues to grow, contributors to public gardens can feel confident that their donations support worthy institutions--institutions that may have the power to reduce stress and offer restoration to urban residents.

With the wide range of recreational options available in cities, public gardens must aggressively promote their benefits to the community, including stress reduction and restoration for urban residents. By publicizing the stress-reducing and restorative effects of a garden visit, public gardens may consciously be sought out for these effects, thus attracting new visitors and members. If urban residents understand that public gardens are conducive to stress reduction and restoration, public gardens will become more meaningful to society. The following research has been conducted with this goal in mind.

Chapter 2

METHODOLOGY

Description of Case Study Gardens

Two urban, public gardens, Brooklyn Botanic Garden (BBG) and New York Botanical Garden (NYBG)--both in New York City--were chosen as case studies. Both gardens are appropriate for this research because each consistently attracts high numbers of urban visitors.

Brooklyn Botanic Garden. BBG is located in the borough of Brooklyn in New York City, and is easily accessible by subway (the Eastern Parkway--Brooklyn Museum station). The Garden is a living museum founded in 1910 on a reclaimed waste dump. The formal and informal gardens boast 12,000 kinds of plants from around the world on 52 acres of land. Seventeen individual gardens, collections, and displays are highlighted in the Garden. The Steinhardt Conservatory houses three separate pavilions and a variety of exhibits. Educational programs include opportunities for both children and adults.

An independent non-profit institution governed by a volunteer board of trustees, BBG is owned by the City of New York and supported partially by public funds through the Department of Cultural Affairs and the New York State Natural Heritage Trust.

Additional support for the Garden comes from private sources including contributions from individuals, corporations, and foundations. Admission to the Garden is free, though there is a suggested donation posted on weekends during the spring and summer. Garden literature states that the annual visitation is about 750,000.

According to BBG's Visitors' Questionnaire, which was conducted as four seasonal questionnaires in 1993, 70 percent of the visitors were from Brooklyn; most of the remaining visitors came from the other four boroughs of New York City (Bronx, Manhattan, Queens, and Staten Island). Forty percent of the Garden visitors walked to BBG, 33 percent arrived by car, and 20 percent took the subway. Over half of BBG's visitors were 25-44 years of age; 9 percent were 65 or older. Sixty-six percent of the visitors were female. Garden visitors came from diverse ethnic origins: 54 percent European American, 13 percent African American, 7 percent Latino/Hispanic, 3 percent Asian American, and 3 percent international visitors. Ninety percent of the visitors identified English as their primary language (Smith and Wolf 1994).

New York Botanical Garden. Founded in 1891, NYBG includes 250 acres of both natural and landscaped grounds. Highlighted in the Garden are 27 outdoor gardens and collections, a Victorian conservatory, and a 40-acre forest (the only remaining uncut stand of forest in New York City). The terrain includes dramatic rock outcroppings, a river and cascading waterfall, undulating hills, wetlands, and ponds. Educational opportunities through the Garden are available to both children and adults. The Garden is

located in the Bronx, New York City's northernmost borough, and is easily accessible on the Metro North train. A private, non-profit corporation, the buildings and grounds of the Garden are owned by the City of New York; operation is partially supported with public funds from the New York City Department of Cultural Affairs. In addition, the Garden is supported by individual, foundation and corporate gifts, and by the State of New York through the Natural Heritage Trust.

According to Visitor Analyses conducted for NYBG in 1992 and 1993, visitors to the Garden were predominantly from the surrounding market areas: 36 percent of visitors were from the Bronx, 17 percent were from Manhattan, and 13 percent were from Westchester County. Thirty-four percent of visitors came from areas outside the five boroughs of the city. Though the Garden is accessible by train, 52 percent of visitors drove to NYBG, 26 percent walked, 13 percent rode the bus, and 9 percent rode the train. Fifty-three percent of visitors were 20-50 years of age; twenty-one percent were over age 60. More women than men visited the Garden, with 53 percent of visitors being female. Visitors to NYBG came from a variety of ethnic backgrounds: 74 percent white/Caucasian, 12 percent Latino/Hispanic, 7 percent African American, and 5 percent Asian (People, Places and Design Research 1993).

Visitor Survey

The research tool was an on-site, exit survey administered to visitors after they had experienced the garden environment, while the experience was fresh in their minds.

It seemed appropriate to approach visitors while they were still in the gardens, just before they were ready to depart to be certain they had completed their visits. A written questionnaire was more appropriate than a personal interview because people would be less likely to take the time to sit down and talk to an interviewer, than to fill out a short survey. I used the American Association of Museums' publication on Visitor Surveys (Nichols 1990) as a reference when designing the questionnaire. I further consulted Barry Morstain, Ph.D., Professor of Urban Affairs and Public Policy at the University of Delaware, and the Statistical Lab at the University.

The final survey consists of one page with ten questions in three formats: Likert scale, fill-in-the-blank, and multiple choice. The short and easily-understandable format allowed visitors to complete surveys in three to four minutes. People are more likely to complete a short questionnaire than a long one. With this in mind, I made a concerted effort to limit the survey to one page, and to make the format as easy to understand as possible. The Likert scale is a recognizable format that most people understand, as are fill-in-the-blank and multiple choice formats (University of Delaware Statistical Lab 1994). Surveys were color-coded (on four different colors of paper) to distinguish between gardens and days of administration. Visitors exiting the gardens who appeared to be over the age of 18 were approached and asked to complete the survey on a voluntary basis. In an effort to randomly sample visitors, I began my research by approaching every tenth person leaving the gardens; groups visiting together were counted as one

person. Poor weather conditions on certain days (which resulted in reduced visitation) made it more feasible to approach every fifth (or fewer) person leaving the gardens in order to collect enough surveys to obtain meaningful results. My goal was to collect 25 completed surveys per garden visit. Eight garden visits (four to each case study garden) would result in 200 completed surveys.

When conducting the survey, I was located at the busiest garden gates to access the highest number of visitors. Surveys were placed on clipboards so respondents could stand while completing the survey. At BBG, my survey station consisted of a small round table and two wooden chairs. When surveying at NYBG, I was not stationed at a table; there were, however, benches in the immediate area where respondents could sit. The Visitor Information booth was also nearby, if respondents needed to lean on a surface to write.

Surveys were collected during two different seasons (spring and fall), and on weekdays and weekends. During the spring, I surveyed visitors to NYBG on Thursday, May 19, 1994; Saturday, May 21; and Thursday, June 2 (an additional day included to make-up for poor weather conditions on May 19). During the fall, I surveyed NYBG visitors on Thursday, September 29, and Saturday, October 1. The weather on October 1 was rainy and cold; fortunately, the Garden was hosting a Fall Festival, and many visitors were in the auditorium for activities, and in the gift shop. I was permitted to survey visitors in both these locations, and collected my goal of 25 surveys.

I conducted the survey at BBG during the spring on Friday, May 20, and Sunday, May 22. May 20 was a sunny, but unseasonably cool and windy day. I was permitted to survey visitors outside the gift shop, which proved to be fruitful. During the fall, I surveyed BBG visitors on Friday, September 30, and Sunday, October 2.

Survey questions

Because conclusions will be drawn from data collected from the visitor survey utilized in this research, it is important to understand why the questions comprising the survey were included. Following are a list and explanations of the survey questions.

A. How do you feel after TODAY'S visit to this garden?

completely									completely
stressed	1	2	3	4	5	6	7		relaxed

I feel this to be one of the most important questions on the survey. It was included to discover the perceived stress levels of visitors after they experienced the gardens. Two clearly opposite choices were placed at either end of the Likert scale to allow respondents a wide range of options between the two. The scale consisted of seven points, four being the midpoint.

B. How do you USUALLY feel after visiting gardens?

completely									completely
stressed	1	2	3	4	5	6	7		relaxed

This question was included to discover whether the respondents consistently experienced the perceived stress levels when they visit gardens.

C. How did you feel during THE PAST WEEK?

completely									completely
stressed	1	2	3	4	5	6	7		relaxed

This question results in data which will illustrate stress reduction experienced after the garden visit, by comparing perceived stress levels in the past week to perceived stress levels after the garden visit (data from question A).

D. What are your reasons for visiting the garden today? (n/a means “not applicable”)

		not at all						extremely
		important						important
Relaxation	n/a	1	2	3	4	5	6	7
Inspiration	n/a	1	2	3	4	5	6	7
Stress reduction	n/a	1	2	3	4	5	6	7
Fun/social	n/a	1	2	3	4	5	6	7
Educ/awareness	n/a	1	2	3	4	5	6	7
Change of pace	n/a	1	2	3	4	5	6	7
Special garden event	n/a	1	2	3	4	5	6	7
Class at the garden	n/a	1	2	3	4	5	6	7
Tour of the garden	n/a	1	2	3	4	5	6	7
Nothing better to do	n/a	1	2	3	4	5	6	7

The most important reasons visitors identify for visiting the gardens result from this question. "Not applicable" was included as an option for those who did not consider a specific choice to be a reason for visiting at all (important or not).

E. What aspects of the garden did you find most enjoyable?

	not at all enjoyable					extremely enjoyable		
Conservatories	n/a	1	2	3	4	5	6	7
Flowers	n/a	1	2	3	4	5	6	7
Fountains	n/a	1	2	3	4	5	6	7
Bright colors	n/a	1	2	3	4	5	6	7
Lawn areas	n/a	1	2	3	4	5	6	7
Ponds	n/a	1	2	3	4	5	6	7
Trees	n/a	1	2	3	4	5	6	7
Wooded areas	n/a	1	2	3	4	5	6	7

Results from this question identify aspects of the garden visitors found most enjoyable. General aspects of the gardens were listed, instead of specific garden areas, in case visitors were not able to remember the specific areas they visited by name. "Not applicable" was included as an option in this question for visitors who did not see certain aspects of the gardens. "Conservatories" was not an option on the NYBG surveys, because the conservatories were closed for renovations during the survey periods.

F. Did you visit the garden today alone? with family? with children? with friends? (Please circle one or more.)

Information collected from this question was descriptive of the survey sample.

There may also be correlations between this data and stress reduction experienced by visitors.

G. Is this your first visit to a garden? YES NO

This question was included to screen answers to question B, and to learn whether repeat and first-time visitors experienced the same levels of stress reduction.

H. My age is ____.

Data collected from this question are descriptive of the survey sample. Possible correlations between age and stress reduction will be investigated.

I. I am a male/female. (Please circle one.)

Data collected from this question are descriptive of the survey sample. Possible correlations between sex and stress reduction will be investigated.

J. My zip code is ____.

Data collected from this question serve to identify urban residents. Zip code ranges for the five boroughs of New York City were used to screen out non-urban visitors.

Description of Respondents

A total of 206 surveys was completed by BBG and NYBG visitors. Of this total, 156 visitors were identified by zip code to be residents of the five boroughs of New York City. The remaining 50 surveys, which were completed by visitors who do not live in New York City, were not included in further analysis. Fifty-seven percent of the respondents were female. The average age of respondents was 40 years; the range of ages was from 20 to 78. Sixty percent of respondents were between the ages of 26-45, and eight percent were over 65.

Of the 156 urban visitors to the gardens, 22.5 percent visited alone, 41 percent visited with friends, 34 percent visited with family, and 9 percent visited with children. The majority of visitors had visited this or other gardens before. Eighteen respondents (12 percent) reported the day of the visit as being their first visit to a garden. The remaining respondents, 138 visitors (88 percent), reported that this was not their first visit to a garden.

Statistical Analysis

Correlation analyses were performed to assess the relationship between age and stress reduction, between age and stress levels the week prior to the garden visit, and between enjoyment of garden aspects and stress reduction. Correlation analyses also

were utilized to determine relationships between enjoyment of individual garden aspects, and between importance of individual reasons for visiting.

To determine significant differences between data collected at different gardens, during different seasons, on different days of the week, two-sample T-tests assuming equal variance were performed. This test also was utilized to assess differences between stress reduction reported by males and females, and stress reduction reported by first-time visitors versus repeat visitors.

Paired two-sample T-tests for means were performed to determine significant differences between reported stress levels the week prior to visiting and immediately after the visit.

A single factor analysis of variance (ANOVA) was performed to determine differences in stress reduction between respondents who visited with friends, with family, with children, or alone. The single-factor ANOVA was utilized further to determine differences between the importance of reasons for attending, and between enjoyment of the individual garden aspects. After analyzing the results of these two ANOVAs, the Student-Newman-Keuls (SNK) multiple range test was performed to determine where significant differences lie with regard to reasons for visiting and enjoyment of gardens aspects. All possible pairs within these two groups of data were tested for significant differences.

All statistical analyses were performed using a 95 percent confidence level.

Chapter 3

RESULTS AND DISCUSSION

Most Enjoyable Garden Aspects

Means for the enjoyment of garden aspects have been calculated and ranked in decreasing order of enjoyment (Table 1).

Table 1. Enjoyment of Garden Aspects: Mean, Median, Standard Deviation

Survey respondents rated their enjoyment of the listed garden aspects on a scale of 1 ("not at all enjoyable") to 7 ("extremely enjoyable").

Aspect	Mean	Median	Standard Deviation
Trees	5.85	6.00	1.71
Flowers	5.72	7.00	1.85
Wooded Areas	5.09	6.00	2.30
Ponds	5.07	6.00	2.25
Bright Colors	5.04	6.00	2.15
Lawn Areas	4.63	5.00	2.28
Fountains	4.25	5.00	2.49
Conservatories	3.74	4.00	2.82

Analysis of the means of garden aspects enjoyment (using a single-factor ANOVA) revealed statistically significant differences between the means ($p < 0.05$).

The SNK test identified significant differences between enjoyment of individual garden aspects (see Table 2). Though survey respondents identified “trees” to be the most enjoyable aspect of the gardens, there was not a significant difference between enjoyment of “trees” compared to enjoyment of “flowers” ($p = 0.15$), which was the second most enjoyable garden aspect. Both “trees” and “flowers,” however, were reported to be significantly more enjoyable than “wooded areas,” the third most enjoyable aspect of the gardens. Analyses show that there were no significant differences between enjoyment of “wooded areas,” “ponds,” and “bright colors” (the fourth and fifth most enjoyable garden aspects). These three aspects were significantly more enjoyable than “lawn areas” and “fountains,” the sixth and seventh most enjoyable aspects, which received equivalent ratings. The least enjoyable garden aspect reported by respondents was “conservatories,” which was significantly less enjoyable than all other aspects on the survey. As a result of statistical analyses, the garden aspects can be grouped as follows, from most to least enjoyable:

1. Trees / Flowers
2. Wooded areas / Ponds / Bright colors
3. Lawns areas / Fountains
4. Conservatories.

Table 2. Significance of Difference Between Enjoyment of Garden Aspects

An asterisk represents significant difference between enjoyment of individual garden aspects at the 95% confidence level.

	Trees	Flowers	Wooded areas	Ponds	Bright colors	Lawn areas	Fountains	Conservatories
Trees			*	*	*	*	*	*
Flowers			*	*	*	*	*	*
Wooded areas						*	*	*
Ponds						*	*	*
Bright colors						*	*	*
Lawn areas								*
Fountains								*
Conservatories								

The perception of and preference for natural vs. man-made components in the natural environment have been discussed to some extent in the literature (Kaplan, Kaplan and Wendt 1972; Wohlwill 1976; Zube 1976). It is clear that most individuals prefer natural to man-made components in their surroundings. The degree of naturalness also may be important with regard to preference (Carls 1974; Wohlwill and Harris 1980). In a 1991 study, Schroeder discovered that visitors of the Morton Arboretum near Chicago strongly preferred natural-appearing settings, such as natural deciduous woods, to formal landscapes with pruned shrubs and mowed lawns. The fact that respondents visiting BBG and NYBG found trees, flowers, wooded areas, and ponds to be most enjoyable supports the conclusion that naturalness is an important factor in landscape preference. Each of these garden components occurs in nature, without human intervention. Whether

this fact is understood by urban visitors to public gardens is unknown. Research has shown, however, that the presence of green, natural areas is a strong indicator for preference. This preference appears to be inherent in humans, dating back to man's earliest ancestors (Lewis 1994).

The three least enjoyable garden aspects (lawn areas, fountains, and conservatories) share a common characteristic--none occur in nature without human intervention. Though all three may be visually pleasing and tastefully designed, urban residents seem to recognize that these garden components require human intervention to exist. Lawn areas clearly require a good deal of maintenance to retain their integrity and appearance. Fountains in the landscape are man-made features that may be regarded as intrusive in a natural setting.

Conservatories bring nature indoors for visitors to enjoy year-round. Yet, the indoor landscape, and the conservatory structure itself, are clearly unnatural to the visitor. The feeling of being in a limited indoor space may be confining to urban residents. Of further significance is the possibility of crowding within conservatories on busy days. These characteristics of conservatories may reduce visitors' enjoyment of this feature. It is important to note that the conservatories at NYBG were closed for renovations during the study. As a result, only visitors to BBG were able to experience conservatories on the days of their visits. Yet, statistical analyses proved enjoyment of the conservatories to be significantly less than the other garden aspects. Because "conservatories" was not

defined on the survey, it is possible that respondents did not understand the meaning of this word. A commonly used word, like “greenhouses,” may have been more appropriate to use on the survey.

Though lawn areas and fountains were rated as relatively less enjoyable, analyses show that these two garden aspects were strongly correlated with all other garden aspects, and may be related in meaning to the other aspects. Conservatories, however, showed a weak correlation to trees, flowers, wooded areas, and ponds; conservatories did not appear to be strongly related in meaning to these four garden aspects. Conservatories were strongly correlated with lawn areas and fountains; these three aspects appear to have related meaning to visitors.

With the exception of conservatories, all garden aspects were strongly intercorrelated (see Table 3).

Table 3. Correlation Coefficients Between Enjoyment of Garden Aspects

Strong correlations are in bold type. $P < 0.05$ for all r-values.

	Trees	Flowers	Wooded areas	Ponds	Bright colors	Lawn areas	Fountains	Conservatories
Trees		r=0.61	r=0.62	r=0.48	r=0.48	r=0.55	r=0.47	r=0.24
Flowers			r=0.49	r=0.41	r=0.68	r=0.52	r=0.48	r=0.35
Wooded areas				r=0.65	r=0.42	r=0.50	r=0.57	r=0.29
Ponds					r=0.45	r=0.46	r=0.60	r=0.36
Bright colors						r=0.60	r=0.59	r=0.26
Lawn areas							r=0.52	r=0.49
Fountains								r=0.45
Conservatories								

Though garden visitors found the more natural aspects of the gardens to be most enjoyable, there is no correlation between these aspects and stress reduction. Therefore, it cannot be assumed that natural garden features tend to promote the stress-reducing and restorative experience to a greater extent than less natural garden features. It appears that the garden as a whole, not its individual parts, enhances stress reduction and restoration.

Reasons for Visiting

Means for importance of the reasons for visiting the gardens were calculated and ranked in decreasing order of importance (Table 4).

Table 4. Reasons for Visiting Gardens: Mean, Median, Standard Deviation

Survey respondents rated the importance of the listed reasons for visiting the gardens on a scale of 1 ("not at all important") to 7 ("extremely important").

Reason	Mean	Median	Standard Deviation
Relaxation	5.58	6.00	1.71
Stress reduction	4.78	5.50	2.38
Inspiration	4.76	5.00	2.30
Fun/social	4.48	5.00	2.30
Change of pace	4.20	5.00	2.39
Educ./awareness	3.78	4.00	2.27
Special event	1.99	1.00	2.43
Nothing better to do	1.25	0.00	2.00
Tour of the garden	1.23	0.00	2.00
Class at the garden	0.77	0.00	1.57

Analysis of the means of the importance of reasons for visiting the gardens revealed statistically significant differences between the means. The SNK test identified significant differences between the importance of individual reasons for visiting (see Table 5). Though “relaxation” was the most important reason for visiting the gardens, this reason was not significantly more important than “stress reduction” and “inspiration” (the second and third most important reasons for visiting). “Fun/social,” the fourth most important reason for visiting, was significantly different from each of the aforementioned three reasons. The least important reason for visiting the gardens was a “class at the garden,” which was significantly less important than all other reasons. As a result of the statistical analyses, the reasons for visiting the gardens can be grouped as follows, from most to least important:

1. Relaxation / Stress reduction / Inspiration
2. Fun/social
3. Change of pace / Education/awareness
4. Special event / Nothing better to do / Tour of the garden
5. Class at the garden

Table 5. Significance of Difference Between Importance of Reasons for Visiting Gardens

An asterisk represents statistically significant differences between the importance of the individual reasons for visiting at the 95 % confidence level.

	Relaxation	Stress reduction	Inspiration	Fun/ social	Change of pace	Education/ awareness	Special event	Nothing	Tour	Class
Relaxation				*	*	*	*	*	*	*
Stress reduction				*	*	*	*	*	*	*
Inspiration				*	*	*	*	*	*	*
Fun/social					*	*	*	*	*	*
Change of pace							*			*
Educ/awareness								*	*	*
Special event								*	*	*
Nothing										*
Tour										*
Class										

Correlation analyses revealed that relaxation was strongly correlated with inspiration, and with stress reduction. Inspiration was strongly correlated with stress reduction, but was weakly correlated with fun/social (see Table 6). No other strong correlations between reasons for visiting the gardens were found.

Table 6. Correlation Coefficients Between Reasons for Visiting Gardens

Strong correlations are in bold type. $P < 0.05$ for all r -values.

	Relaxation	Stress reduction	Inspiration	Fun/social
Relaxation		$r=0.52$	$r=0.56$	$r=0.19$
Stress reduction			$r=0.66$	$r=0.23$
Inspiration				$r=0.22$

The three most important reasons urban residents visited the two gardens were relaxation, stress reduction, and inspiration. Each of these reasons represent feelings or affective responses evoked by the visit--feelings of relaxation, feelings of reduced stress, and feelings of inspiration. The visitor who experiences these feelings or affects does not take something tangible from the garden; nor does this visitor focus primarily on the knowledge that can be obtained from the garden. The affects resulting from the garden visit are paramount to other benefits that might be derived from visiting the gardens. This result is supported by research conducted by Schroeder (1991), in which many Morton Arboretum visitors viewed the Arboretum as a place of refuge from daily routine and urban hassles; visitors sought solitude and peace in the Arboretum--both affective responses. BBG visitors also identified two affective reasons for visiting the Garden as most important--relaxation and inspiration (Smith and Wolf 1994).

Relaxation, stress reduction, and inspiration cluster together in terms of being the most important reasons for visiting the gardens. All three reasons for visiting displayed high intercorrelation and, therefore, may be considered by respondents to have related meaning.

Of particular significance is the fact that stress reduction was identified as a very important reason for visiting the public gardens. It has been established that urban residents live in stressful environments and, therefore, require avenues for stress reduction and restoration. That urban residents identify stress reduction as an important reason for visiting public gardens implies that these stressed individuals are consciously seeking the sanctuary of the public garden setting as a means of coping with the stresses of the city.

Many public gardens identify education as a high priority with regard to their missions. The educational function of public gardens is commendable, and should not be diminished. Yet, survey respondents identified educational endeavors as relatively less important than affective reasons for visiting the gardens. Such endeavors include “education/awareness,” “special events,” “tour of the garden,” and “class at the garden.” It seems that urban residents often visit public gardens in search of more affective or emotional rewards, as opposed to knowledge. BBG experienced similar results with its 1994 Visitors’ Questionnaire; the least popular reasons for visiting the Garden were “tour,” “special event” and “class/course” (Smith and Wolf 1994).

It is important to note that special events were occurring during only two of the eight days of surveying. As a result, one would expect this to be rated as an unimportant reason for visiting. As for classes and tours at the gardens, both are limited to a certain number of participants who may exit the gardens by different gates than other visitors. Furthermore, people in group tours find it difficult to break away from the group to complete a survey, for fear of detaining the group. It may have been useful to ask respondents whether they are members of the gardens. Members tend to participate in classes more often than non-members; therefore, the importance of classes among members may be much higher than for the total visitation. It is not, therefore, unexpected that individuals participating in tours and classes would be underrepresented in the survey sample; thus, these two reasons for visiting are rated as relatively unimportant on any given day.

The fact that "change of pace" was reported to be the fifth most important reason for visiting the gardens is somewhat unexpected. It is surprising that this reason was ranked higher than all educational endeavors. Yet, "change of pace" may be related to the concept of "being away," allowing a person to be physically and mentally removed from the usual, thus leading to a restorative experience. "Change of pace" also could mean relaxation from matters demanding directed attention. These possibilities may explain the relatively high importance placed on "change of pace" as a reason for visiting.

Stress Reduction

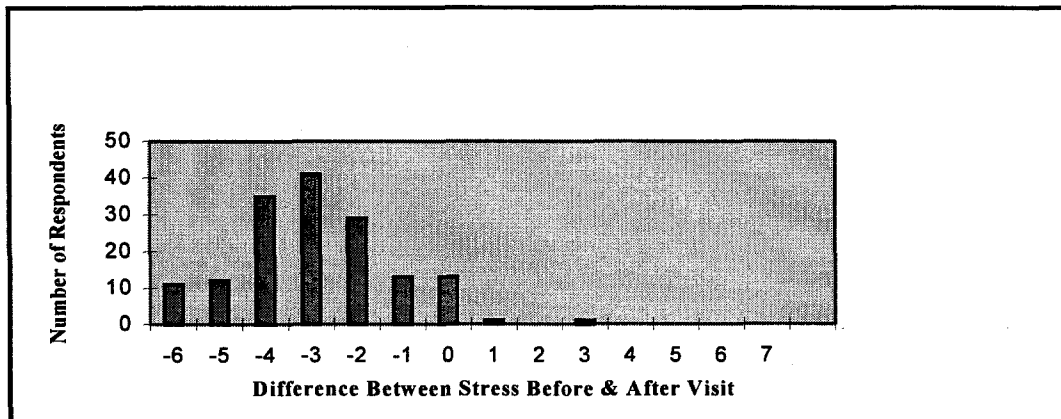


Figure 1. Magnitude of Stress Reduction

Survey respondents rated their perceived stress levels before and after the garden visit on a scale of 1 (“completely stressed”) to 7 (“completely relaxed”). The difference between perceived stress reported before and after the visit resulted in the above scores. Negative scores represent a reduction in stress.

To determine whether stress reduction occurred after visiting the gardens, the difference between responses to question C (“How did you feel during the past week?”) and question A (“How do you feel after today’s visit to this garden?”) was calculated (C-A). A negative score from this formula represents a reduction in stress; the more negative the score, the more stress reduction occurred. The most stress reduction achievable on this scale is denoted by -6. Positive scores represent increased stress levels, and zero represents no change in stress levels. The greatest increase in stress achievable on this scale is denoted by 6 (see Figure 1).

Ninety-one percent (142 respondents) reported some level of stress reduction after visiting the gardens. Sixty-four percent (100 respondents) showed a stress reduction score between -3 and -6. Nine percent (15 respondents) reported no change or an increase in stress levels. Analysis of these 15 respondents showed that only three of these individuals were visiting with children. One might expect that children, who may not be interested in spending time in a garden, could cause a visit to be somewhat stressful. However, twice as many visitors in this group (six) visited alone than with children. Because only 15 respondents did not report stress reduction as a result of the garden visit, it is difficult to draw conclusions from the resulting data. A single factor ANOVA showed no significant differences in reported stress reduction among individuals who visited with friends, family, children, or who visited alone ($p=0.11$). Respondents were allowed to choose more than one option in identifying the group with which they visited; therefore, those visiting with friends also may have been visiting with family and/or children. The low percentage of people visiting with children is somewhat deceiving, as several visitors with children declined to complete the survey.

The high percentage (91 percent) of visitors reporting stress reduction, and the fact that stress reduction is reported as an important reason for visiting, is supportive of the hypothesis that urban residents visit public gardens as a means of stress reduction. It is clear that urban residents consciously seek out public gardens as means of coping with stress. Because public gardens meet the criteria for restorative settings--being away,

extent, fascination, and compatibility (Kaplan 1992)--the outcome of this coping mechanism should be restoration.

Magnitude of stress reduction was determined by comparing the visitors' perceived stress during the week before the garden visit and the visitors' perceived stress immediately after the visit. It may have been more revealing to ask visitors how they felt, with regard to perceived stress, immediately before the visit, as this may have evoked a different response than the question asked on the survey. Visitors may not have felt stressed in the week prior to their visits, yet felt very stressed immediately before the visits, or vice versa. The questions included on the final survey do show a definite reduction of perceived stress between the week prior to the visit and immediately following the visit.

Analyses revealed significant differences between perceived stress levels the week prior to (mean = 3.21) and immediately after the garden visit (mean = 6.13). No significant differences were found between stress levels perceived after the garden visit the day of the survey (mean = 6.13) and stress levels perceived after other garden visits (mean = 5.98).

Though the two case study gardens are unique with regard to appearance, atmosphere, and audience, visitors to BBG and NYBG report similar levels of stress reduction (means = -3.00 and -2.82, respectively). The same is true of visitors in two different seasons, on different days of the week. Reported stress reduction was not

significantly different in spring (mean = -3.09) compared to fall (mean = -2.80), or on weekdays (mean = -2.87) compared to weekends (mean = -2.97). One may mistakenly assume, as a result of this information, that urban residents are able to experience stress reduction at any urban, public garden, any time. Yet, it would not be responsible to make such an assumption because only two gardens were tested during only two seasons of the year. It would be beneficial to conduct the survey at other urban gardens during all four seasons of the year. Visitors to BBG and NYBG do report similar levels of stress reduction during spring and fall, and on weekdays and weekends.

No significant differences were identified between stress reduction reported by males (mean = -2.83) compared to females (mean = -2.99). Furthermore, males and females did not show significant differences in perceived stress levels the week prior to the garden visit (male mean = 3.06; female mean = 3.23).

Analysis was performed to examine differences in stress reduction between first-time garden visitors (mean = -3.50) and repeat garden visitors (mean = -2.85). Results showed no significant difference between groups. This result suggests that visitors do not need to be repeat visitors to experience the beneficial effects of public garden visits. It is important to note that few respondents were first-time garden visitors (18 visitors).

Table 7 shows the relationships discussed above.

Table 7. Comparison of Several Variables Affecting Stress Reduction

*p<0.05

	Mean		Mean
Perceived Stress Levels Week Prior to Visit	3.21	vs. Perceived Stress Levels After Today's Visit	6.13*
Perceived Stress Levels After Today's Visit	6.13	vs. Perceived Stress Levels After Other Visits	5.98
Stress Reduction Reported at BBG	-3	vs. Stress Reduction Reported at NYBG	-2.82
Stress Reduction Reported in Spring	-3.09	vs. Stress Reduction Reported in Fall	-2.8
Stress Reduction Reported on Weekdays	-2.87	vs. Stress Reduction Reported on Weekends	-2.97
Stress Reduction Reported by Males	-2.83	vs. Stress Reduction Reported by Females	-2.99
Stress Levels Perceived by Males Week Prior to Visit	3.06	vs. Stress Levels Perceived by Females Week Prior to Visit	3.23
Stress Reduction Reported by First-time Visitor	-3.5	vs. Stress Reduction Reported by Repeat Visitor	-2.85

Survey Design

Open-ended questions can elicit accurate and meaningful responses from individuals, and would have been beneficial to this research. Closed questions (such as multiple choice and Likert scale) limit the respondent to the choices provided by the surveyor. Deeper insights into the needs, preferences, and feelings of the visitor may result from open-ended questions. This format, however, is more difficult to analyze once the data have been collected and requires additional time and thought from the respondent.

For the preceding research, garden visitors were expected to report their stress levels as perceived the day of the visit. Results may have been more accurate if

physiological tests (such as blood pressure testing) had been conducted to determine visitors' stress levels before and after the visit. Owen (1994) measured blood pressure and heart rate of visitors to Botanica, The Wichita Gardens before and after they had spent time in the Gardens. Visitors exhibited significant decreases in systolic blood pressure after visiting the Gardens. This type of testing can be time-consuming, and requires special equipment; the results, however, would be significant with regard to accuracy.

The results of visitor surveys can be valuable to garden administrators for a variety of uses. Conclusions drawn from the preceding research and recommendations for its use by public gardens are made in the following chapter.

Chapter 4

CONCLUSIONS AND RECOMMENDATIONS

The preceding research infers that urban residents consciously seek public gardens to achieve feelings of relaxation, stress reduction, and inspiration. Though the educational function of public gardens is of great significance to the community, this research suggests that education is secondary to the affective rewards reaped from the garden visit. Without diminishing the importance of the public garden's educational role, administrators should embrace the notion that urban residents visit public gardens for the affects, or feelings, and restoration that result.

The annual cost of mental health care in the United States has reached \$80 billion (Frank 1993). Clearly, any relief in the area of mental health will be beneficial to society and to the country as a whole. Such relief can be achieved through visits to public gardens. Two important facts emerge: 1) stress reduction is a very important reason for visiting public gardens, and 2) a reduction in stress levels results from a garden visit. These facts provide a strong case for garden administrators in their on-going efforts to obtain funding. Stress reduction and restoration are important services to the community that could improve the quality of life for city dwellers; these services should be

emphasized by garden administrators when applying for funds from both public and private sources. By focusing on the stress-reducing and restorative qualities of a garden visit, donors may be more readily convinced of the importance of public gardens to the community, and of the importance of contributing generously to these urban oases.

Garden administrators should use the results of this research in promoting their institutions to the public. Some urban residents currently seek public gardens as a means of coping with stress. Yet, how many city dwellers do not realize the possible benefits of a garden visit? Gardens should emphasize the stress-reducing and restorative qualities of the garden visit in promotional materials. Not only will gardens benefit from such promotions with increased attendance and membership, but also will make strides in improving the quality of life for their constituents by recognizing the vital importance of public gardens.

The research indicates that urban residents who visit a garden differentiate between aspects of the garden that naturally occur outside the city in the wilderness, and those that cannot. City dwellers seem to prefer the presence of natural, as opposed to non-natural, garden elements. Because a garden visit may be the only exposure to nature urban residents experience, public garden administrators and designers should be aware of their constituents' preferences and include natural elements in garden designs and renovations whenever possible. Though the preceding research suggests that urban residents find natural garden elements to be most enjoyable, analysis shows no

relationship between stress reduction and the enjoyment of specific garden aspects. It may be inferred from these results that the entire garden, taken as a whole, enhances stress reduction for the urban resident. The individual features of the garden, whether natural or non-natural, do not appear to affect stress reduction as separate entities.

The stress-reducing and restorative qualities of nature are recognized by a small, but expanding, group of researchers. Yet, these qualities are not well-recognized by the general population as a whole. The intuitive feeling that nature has beneficial effects on humans can be supported by this and other related research. Wide-spread use and appreciation of nature will be encouraged by placing a higher value on nature because of its favorable effects. Urban, public gardens provide urban residents with an exposure to nature in an environment where such exposures are rare. Public gardens must recognize the strong affects they produce in urban visitors, and enhance the restorative experience for all their constituents.

Future Research

Additional research in this area might focus on the individual's memory of a restorative experience in a public garden. Is it possible for garden visitors who experience stress reduction to think back to the visit and experience restoration as a result of the memory? Or must a stressed individual visit a restorative setting (such as a public garden) to experience stress reduction?

A study focused on non-urban residents and the stress-reducing effects of public gardens would be beneficial. Are there differences in how public gardens affect urban and non-urban residents? Do non-urban residents find certain garden aspects to be most conducive to stress reduction?

A small number of respondents reported no change or an increase in stress levels after the garden visit. What are the factors that prevented these individuals from experiencing stress reduction and restoration? Do these individuals prefer garden aspects different from those preferred by individuals who do experience stress reduction?

This research has focused on passive exposure to public gardens. It would be interesting to assess participative activities within public gardens as means to relieve stress and achieve restoration. Such participative activities may include activity stations, supervised gardening, and garden classes.

Related research in the area of environmental psychology has been conducted using physiological tests (such as blood pressure testing) to measure stress levels in test subjects. These types of tests might prove more accurate in determining visitors' stress levels before and after a garden visit than self-report questions about stress.

Finally, a study similar to the preceding research, but utilizing open-ended survey questions would likely provide deeper insights into the urban resident's needs, preferences, and feelings with regard to public gardens. An additional question about membership to the gardens would be of particular interest with regard to the importance

of classes taken at the garden. As mentioned in the text, a study conducted in all four seasons of the year would be more revealing than one conducted in only two seasons.

APPENDIX

Conducting surveys in the realm of public gardens is a fairly recent development and currently is not a common undertaking for most gardens. Through the preceding research, I learned some important lessons for conducting visitor surveys that may not be evident to those who plan to utilize visitor surveys in studying their constituents. The following is not presumed to be a guide to conducting a visitor survey, but a compilation of lessons learned that may be helpful to others.

The tool for this research was an exit survey. From the onset, an exit survey is difficult to conduct due to the high refusal rate. Many people want to be on their way once they have concluded their garden visit. It is difficult for people to stop, even for five or fewer minutes, when they have made up their minds to depart. It is important, however, to remember that it is the garden's right to survey its visitors, and surveyors need not apologize for this request.

A smile and a positive attitude are invaluable when surveying the public; however, it is easy to become "burned out" when continuously approaching visitors. I conducted my survey alone, without anyone to relieve me from my station. Most gardens, however, have access to volunteers, who can be very effective in administering

surveys. I recommend that more than one person conduct the survey, with ample opportunities for breaks.

The verbal approach to visitors must be very short and to the point. Before I shortened my approach, I found visitors walking away from me before I had a chance to explain my request. An invaluable lesson I learned was to stress that the survey is being conducted for the garden, and that the garden will benefit from the results. Visitors seem to feel some ownership for public gardens after a visit, and respond positively when asked to help the garden in a simple (non-monetary) way. My refusal rate decreased immensely after I realized this fact.

The most important factor in conducting a visitor survey is encouraging visitors to fill out the questionnaire. Without completed surveys, the research is useless. Therefore, the survey itself should be as visually unthreatening as possible. Barry Morstain, Ph.D., Professor of Urban Affairs and Public Policy at the University of Delaware, was exceedingly helpful in advising me in this regard. Identifying numbers at the top of the page are threatening to visitors who wish to remain anonymous, and may increase refusal rates. At the top of my survey, I typed in a large font, "Thank You for Coming"--a non-threatening message. My surveys were printed on pastel-colored paper, which gave them an unthreatening appearance, and which I used to color-code different days of the survey period.

The questionnaire should be as short and as simple to complete as possible. A respondent will not answer a question he or she does not understand. My survey filled one side of one page, and could be completed in about three minutes. This was an important fact about the survey that I conveyed to visitors when I approached them, thus alleviating any fears that they may be detained for an extended period. The format of the survey also must be easily understood. I used a Likert scale format because it is recognizable by most people, and can be completed quickly. I also used fill-in-the-blank and multiple choice formats, both of which are readily recognizable.

Clipboards are invaluable in surveying. Though a table and chairs were available to respondents, most did not wish to take the time to sit down, but opted to remain standing to fill out the survey on the clipboard. I feel certain that my refusal rate would have increased greatly if respondents were required to sit at a table to complete the survey.

The Statistical Lab at the University of Delaware helped me to identify the most important questions for the survey, and to discard questions that were unneeded. This is an important step in designing a survey. Every question must be included for a specific reason; if such a reason cannot be identified, the question should be deleted. A survey should be designed with analyses in mind. The data resulting from the survey questions should be easily coded to facilitate computer input. If the designer considers this early in the process, analysis will be easier.

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