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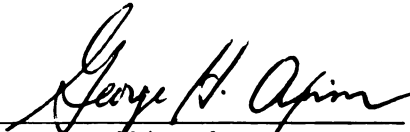
Assessing People's Attitude With Respect To
Urban Trees In Puebla City, Mexico

presented by

Rosa Maria Garcia-Nunez

has been accepted towards fulfillment
of the requirements for

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**ASSESSING PEOPLE'S ATTITUDES WITH RESPECT TO URBAN TREES IN
PUEBLA CITY, MEXICO**

By

Rosa Maria Garcia-Núñez

A DISSERTATION

**Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of**

DOCTOR OF PHILOSOPHY

Department of Resource Development

2000

ABSTRACT

ASSESSING PEOPLE'S ATTITUDES WITH RESPECT TO URBAN TREES IN PUEBLA CITY, MEXICO

By

Rosa Maria Garcia-Núñez

A study to evaluate people's attitudes with respect to urban vegetation was done in Puebla city, Mexico and a general overview of the management of urban vegetation by the municipality was also done.

The basic objectives of this research were to determine how people in Puebla city feel about their urban trees and parks; which kinds of tree species they prefer; what benefits or annoyances they perceive or get from the trees; and their evaluation of the management of the urban vegetation by the municipality. This study analyzed three social groups: housekeepers, elementary teachers, and college students, using variables, such as level of education, family income, gender, age, interest in tree-related programs, need for improvement of public services, and opinions about management and care of trees by the municipality.

With the application of a questionnaire, 59.7 percent of the respondents replied that trees are very important for the environment where they live; 51.9 percent consider that it is very important to know about the urban environment; and 85.1 percent believe that trees improve their quality of life. The housekeeper group considered the environment very important, followed by college students and elementary teachers. Nearly 52 percent of the people who desire more trees in the city prefer Eucalyptus

(*Eucalyptus* sp), laurel de la India (*Ficus* sp) and fresno (*Fraxinus* sp). There are different values that residents perceive as benefits of trees and parks in the city of Puebla, such as economic, aesthetic, recreational, attraction of animals, feel close to nature, producers of fruits and the shade. However, the shade of urban trees received the highest selection (60%) and street darkness at night by urban trees was the negative characteristic that received the highest concern.

Approximately 710 parks, 84 boulevards, 7 historic places, many avenues, many streets and boulevard median are classified in Puebla city. The institution responsible for doing the care and management of 95 percent of them is Parks and Gardens. It depends of the municipality management plans. Some management alternatives and future research are recommended.

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DEDICATION

**To my husband Alejandro and my children Leo and Daniel
for being and working always with me.**

ACKNOWLEDGMENTS

I want to recognize the help received from many people to finish this work. First of all I want to thank my husband Alejandro Velez for all of his support in every phase of my studies and research.

I would like to present sincere gratitude to Dr. George H. Axinn, my mentor and dissertation director, for his excellent and exceptional support, encouragement, and understanding. Without his help it would have never been possible to finish my Ph.D. I also want to thank Mrs. Nancy Axinn, who helped me not only in reviewing and editing the multiple drafts that I made, but also she encouraged me during my Ph.D. studies.

The members of my academic committee; Dr. James Kielbaso who was my first professor in MSU and who gave me the idea for this dissertation. His multiple suggestions, teachings, and suggestions are also appreciated. To Dr. Rene Rosenbaum who gave support, understanding and guidance of the work. To Dr. John Schweitzer who gave me encouragement and suggested me how to analyze this research. Also all my professors who have influenced my professional career.

I want to thank my home institution: The Universidad Autonoma Chapingo, particularly to the department of Preparatoria, the area of Agronomia and the academy of Sistemas de Produccion Forestal, its members gave support and permission for doing my doctoral studies. Special thanks to Ing. Roberto Rivera del Rio, Ing. Raul Reyes Bustos, Dr. Clemente Villanueva, Dr. Gustavo Almaguer, Ing. Aurelio Bastida Tapia, Ing. Gustavo Ortega, Ing. Guadalupe Brito, M.C. Clelia Moreno Zarate, Dr. Diodoro

Granados S, M.C Emma Estrada, Tec Oscar R. Lozano, and all my colleagues who helped me.

The W.K. Kellogg Foundation played one of the most important parts during my Ph.D studies. They awarded me a scholarship and funded my dissertation research. I want to mention especially the encouragement received from Dr. Marcos Carnesi, Dr. Heliodoro Diaz Cisneros, and Dr. Marcos Kisil who along with Mrs. Rebecca Hernandez, Mr. Robert De Vries, Miss Maria Martin and Miss Denise Alvarado always were willing to support me. Thanks to all of them for trusting me.

I want to express my gratitude to Arq. Liz Tamayo and Ing. Javier Rosas Perez, who work at the office of Parques y Jardines of Puebla city. They provided me with important information needed for my dissertation

The Center For Latin American and Caribbean Studies was also important in my academic work at Michigan State University. Special thanks to Dr. Scott Whiteford and Dr. Manuel Chavez whom assisted me since my first arrival at MSU.

A special thanks to members of Visiting International Professional Program. Their patience and encouragement helped me overcome the difficulty of learning English and understand to identify important aspects of American culture. I want to mention especially the encouragement I received from Ms. Shelly LeMahieu, Mr. Michel Miller, Ms. Jane Trosty, and Mr. Donald G. Lord.

Thanks also to Professor Roberto Velez de la Torre, and Teacher Lucila Martinez who helped with the applications of the interviews in elementary schools and colleges. Special thanks to Maria del Socorro Sanchez Velez, Professor of the Universidad of Puebla who helped in getting data from official reports, doing interviews, and setting

appointments with representatives of Parques y Jardines institutions in Puebla city. By the same token, thanks to Mrs. Georgina Larracilla and their friends for their special interest and help in this dissertation.

I would like to extend my gratitude to Dr. Victor S. Michaca and his wife Lorena and the children Lornita, Victor and Edgar Sanchez for the encouragement and support during my Ph.D. studies. My friend Oscar Romero also have my gratitude.

Thanks to all interviewed people for answering the questionnaire, particularly those who made comments and suggestions about the topic.

Finally, I want to thank my mother, Guadalupe Nuñez, my father Pedro Garcia, my brothers Pedro, Rafael, Jesus, my sisters Lupe and Maricarmen, my sister-in-law Cecy, my nieces Lily, Emily, Rosy, Anai, Tania; my nephews Diego, Sergio Rafita and Chuyito for all their enthusiasm and support during my studies in MSU. I appreciate also the encouragement of my husband's family, Mrs. Regina Velez de la Torre, Mrs. Eugenia Huerta, Raquel and Paul Amaya, Humberto and Matihu Martinez Huerta.

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1. INTRODUCTION

The importance of urban forestry has grown as human concentrations in big cities have become an ecological problem. Despite the importance of trees with their role in city health, to maintain and to care for trees in stressful habitats is not an easy business. Sommer, put it this way: "I believe in the environmental, social, psychological, and economic benefits of street trees. It would be nice if, just by planting street trees, all those benefits automatically came true. Regretfully, this isn't the way trees grow. To receive the benefits of street trees, there must be adequate pruning, leaf collection, disease prevention and control, and a host of other city services for ordinary and extraordinary events" (1992:60). This statement explains both urban tree relevance, and the role that urban people play in the conservation, care, species selection, and management.

It is predicted that by the end of year 2000, the population in urban areas will increase by more than 4750 million people (World Development Report, 1996). By that time, more than half the world's population is expected to be living in urban areas. This increase in urbanization is more dramatic in the less-industrialized countries, where two-thirds of the population is being absorbed by cities. This unprecedented increase in the pace of urban development has significantly affected people's relationship with urban trees (Kuchelmeister and Braatz, 1993). As a result of environmental degradation urban trees have become crucial components of urban settings (Araujo, 1994).

Urban trees are of paramount relevance to human well being. In addition to the list of goods and services that urban forestry can provide as natural filters, noise absorbers, pollutant sinks, and improvers of microclimate, urban trees have been traditionally valued for contributing significantly to the aesthetic appeal of cities. Helping to alleviate psychological stress and providing recreational opportunities are beneficial aspects directly identified by most urban dwellers in developed and developing countries alike (Kuchelmeister and Braatz, 1993). Street trees and parks in many cases represent the only source of nature contemplation for some urban families who spend most of their leisure time there.

Planting and maintenance programs are essential for health and beauty of urban forest species (Reeder and Gerhold, 1993). But if these programs are not targeted with the highest priority of public needs and perceptions, inefficiency will follow, public support will erode, and the programs will fail (Getz et al., 1982). Knowing urban people's perceptions, attitudes, and behaviors through surveys can help planners and managers properly target tree programs. However, many urban forest research and management decisions have usually been made without regard for resident values, especially inner city residents (Kielbaso, 1982).

1.1. Urbanization in Mexico.

The urban environment is a primary concern in most Latin American countries (Araujo, 1994). In the particular case of Mexico, a typically rural country a few decades ago, it has now started to experience record high migration to cities. Some Mexican

cities were affected by a wave expansion. New human and industrial settlements mushroomed everywhere, and places that were little villages a few years ago have suddenly lost their surrounding wilderness and experienced an overwhelming growth of urban construction. By 1996, the Mexican urban population had reached 75% of the national total, compared to 48 percent in 1970 (Poder Ejecutivo Federal, 1996).

This migration from rural areas, which has led to uncontrolled urbanization, has exacerbated social tensions in the largest cities. The government of Mexico, weighed down by economic problems, did not make environmental issues a priority. Air pollution, dust storms, water scarcity, and other calamities have begun to seriously affect the health of Mexico's inhabitants as well as the country's economy. This situation has forced the government to adopt extreme measures in order to relieve atmospheric pollution and traffic jams. For example, in Mexico City there is a "day without driving a car" program.

Despite these problems and extreme measures, open spaces and green areas in Mexican cities are rapidly disappearing, particularly in poor urban zones. Although some neighborhoods have more than 10 square meters of park land per person, others have less than 0.9 square meters of green area per inhabitant (Calvillo, 1978). Thus, our "modern and civilized" Mexican industrial megacities have emerged along with pernicious health effects on humans, such as heart attacks, cancer, pneumonia, gastroenteritis, nasal irritation and stress.

As if the environmental problems described above were not enough, the current inhabitants of Mexican metropolitan areas have lost their traditional devotion to trees and nature protection. In this respect, some authors mention that millions of dollars are spent

in maintenance for damages caused by vandals in parks and public gardens (Benavides, 1992 and Caballero, 1993). Moreover, trees planted in very reduced spaces on streets or parks have to be fenced to avoid destruction by youngsters.

Although Mexico City is the biggest and worst example of environmental degradation, other Mexican megalopolises such as Monterrey, Guadalajara, Tijuana and other intermediate cities like Puebla are experiencing similar problems. The processes of industrialization and economic adjustment are converting every state capital city from rural scenery to an urban site.

“Even though urban forestry as a practical activity has been applied in Mexico for a long time, it had not been considered a technical discipline until recently” (Caballero, 1986:252). The management of urban vegetation is very irregular throughout all Mexican cities, and it depends on the particular interests of local authorities, available funding, and, above all, on the empirical criteria of urban tree keepers (Caballero, 1986).

Under such circumstances, appropriate planning of urban areas and tree selection may offer some alternatives to make city environments more habitable and humane, and save money in all aspects of urban vegetation development. Many authors have demonstrated the values of trees within cities (Caballero, 1993; Calvillo, 1978; Kalmbach and Kielbaso, 1979; Sommer, 1992; Werier, 1996), when their planting has been planned, not just from an aesthetic point of view, but also from an economic view that coincides with appropriate species selection. Research in cities of the United States has shown the importance of urban tree planning based on people’s attitudes and the ability to carry out urban forestry practices, to the degree that people are willing to pay extra taxes to maintain them judiciously (Kalmbach and Kielbaso, 1979). However, this is a luxury

that inhabitants of neighborhoods of Mexican cities cannot afford to pay for unless they recognize some direct economic benefit. Careful evaluation of people's preferences for street trees is needed.

1.2. Location of the Study.

The geographic center of Mexico is a region where the greatest urban concentrations have developed. Puebla is a city located there (figure 1). Therefore, most of the urban forestry efforts need to be aimed there (Caballero, 1986).

Puebla city is considered a midsize Mexican city and it is the capital of the state of Puebla. It is located about 100 miles South of Mexico City. It represents one of the most attractive sites for national and international tourism.

Since 1950, however, Puebla has experienced substantial population growth caused mainly by the establishment of textile industries in the suburban areas, which, along with communication and improved services attracted the immigration of rural people. As in many other Mexican cities, Puebla has experienced a sudden transformation and has begun to show the impact of these large human concentrations on public services, infrastructure, traffic and population.

There are many parks and gardens throughout the city. They represent one of the best options for recreational activities for people, especially during weekends and holidays. The impact of visitors and the lack of maintenance programs are resulting in a deterioration of park trees, which in many cases die and are never replaced. As a

consequence, the aesthetic appearances of parks and street trees have been gradually decreasing.

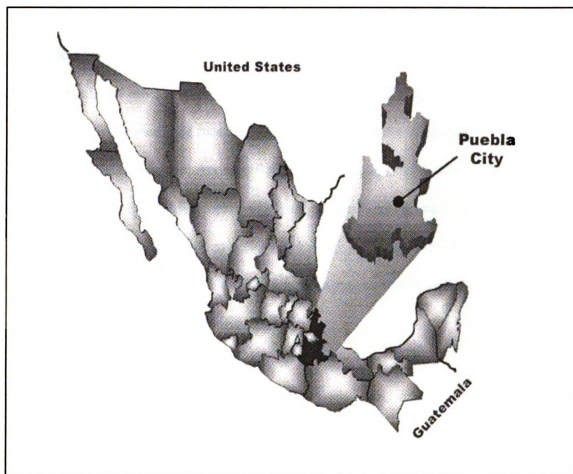


Figure 1. Location of the study area

Therefore, tree-planting programs, where the active participation of the people is involved, are needed. But, what are people's attitudes toward urban trees, and what is their interest in participating in the management of urban trees? Are they interested in participating actively? How much do they know in this respect? Are there available

programs that involve citizen's participation? "Citizen participation in forestry and natural resources programs is widely favored, generously pronounced and passionately embraced, particularly at international meetings, conferences and workshops. However, once people leave the conference hall, the actual nature of public participation varies a great deal" (Burch and Grove, 1993:20).

Recent surveys of people's attitudes toward trees have been done in the United States, Brazil, and other countries. Since 1974, Shafer and Richards studied people's attitudes and preferences and recent research has been based on their findings. Legg and Hicks (1976), Schroeder and Appelt (1985); Sommer et al, (1993), Kielbaso (1982), Kalmbach and Kielbaso (1979), Nakai (1994) and others are examples of researchers who studied people's attitudes with regard to urban trees. Although almost all of these studies have been done in the United States, many Latin American cities are in search of decisions based on reliable scientific data.

1.3. Statement of the Problem.

Even though in Mexico more is known today about urban forestry than a decade ago (Caballero 1993), more research has to be done to quantify the benefits that trees can offer to urban dwellers, and to gain a better understanding of public perceptions and preferences in urban forestry in Mexico (Kuchelmeister and Braatz, 1993).

Over the years people have recognized and identified their favorite species according to certain features of urban trees. Although it is true that the shape of canopies, height, color of the leaves, bloom beauty and similar features play important roles in

people's preferences, it is also true that many people in urban areas complain about the selection, location and structure of urban vegetation. Many tree species are perceived as a nuisance because leaves and fruit fall onto people's yards, lawns, and sidewalks. In some cities, for example, robust low trees are considered unsuitable since they shadow over sidewalks where criminals can be camouflaged.

The management of urban vegetation in many Latin American cities is usually doing following routine activities inherited by previous administrations. However, many of them are not under a reasonable judgment, and in many cases they fail.

The previous statements indicate the importance of urban forestry planning and the role that people's preferences play in the successful planting, maintenance, and cost-effective investment of street trees. For this reason, community participation represents a key element in the planning process of urban forestry (Kuchelmeister and Braatz, 1993). Hence, foresters, municipal engineers, and citizens must work together to determine how and to what extent they can meet the challenges. Promoting citizens' positive attitudes toward urban trees is one of the strategies for achieving positive changes that urban foresters must consider (Lewis, 1996). Knowledge of people's attitudes and preferences and the addition of them into the managements urban programs should be considered for a better success of them. Therefore, community involvement from all parties (citizens, planners, foresters, mayors, and leaders) is necessary to ensure the rehabilitation of our urban centers. This process ultimately depends on a coordinated effort (Cape, 1996).

Therefore, with this research, Puebla city may become a model for reliance on a more scientific approach how includes people attitudes and preferences for the promotion

and maintenance of green areas in the city. It could help to enhance urban forest development in Mexico.

1.4. Research Questions.

This study was divided in two parts. The first one was the evaluation of people's attitudes with regard to urban trees in parks and public streets. The purposes of this part were: 1) to determine how people in different social strata in Puebla city feel about their urban trees and parks, 2) which kind of tree species preference do they have, 3) what appreciation do they have with regard to the municipal management of the urban trees, and 4) what benefits or annoyances they perceive or get from the trees.

This part included five socio economic classes of groups on urban tree issues: 1) the elementary and middle school teacher's view, 2) poor neighborhood residents 3) middle class residents, 4) wealthy neighborhood residents and 5) college students.

This study analyzed other variables that could be associated with attitudes, such as level of education, gender, age, interest in tree-related programs, and opinions about management and care of the trees for the city. The research questions are:

1. How do people feel toward the urban environment where they live?
2. Which kinds of benefits do the residents perceive that they receive from trees and parks?
3. What are the public perceptions of street trees, parks and their management?
4. Are there differences in attitude among people of different social strata?
5. Which park attributes do people prefer?

6. Do city residents have preferences for specific species, place of planting and urban scenarios?
7. Is gender related to people's attitudes toward trees?
8. What is the interest level of residents regarding tree programs and community environmental services?
9. Is there any relationship between social status and other characteristics of people regarding urban tree attitudes?

The second part of this study was to evaluate municipality urban services in the city. The research questions are:

1. What are the number of parks, gardens, street trees, plazas and avenues that the municipality is maintaining?
2. What are the main difficulties of maintenance of urban trees?
3. What are the maintenance priorities of specific urban places?
4. Is there any management program(s) that involves people's participation?

The evaluation of this part was done in the office of parks and gardens (parques y jardines). It is the office in charge of the maintenance of green areas in the city of Puebla.

The examination of people's attitudes is an important variable in this study because it will help to identify characteristics and factors that could contribute significantly to the implementation of new approaches in urban forest projects. The results of this study will offer a comprehensive tool to support an urban forestry policy and management to city planners, mayors, district authorities and foresters, and especially for the people that are in charge of the parks and gardens office.

2. LITERATURE REVIEW

2.1 Importance of Trees in Cities.

Urban trees play an important role in cities because they represent the functional linkage between humans and the natural environment. Trees permit man to have near him a diminutive of the awesomeness of a verdant forest, to view this scene with pleasure, pride, and admiration, and to live in a more comfortable environment than would otherwise obtain (Barker, 1982). Moreover, trees along streets provide shade, reduce the glare from pavement, sidewalks and buildings, catch pollutants, muffle noise and if they are good trees, they increase property values (Kielbaso, 1993; Dwyer and coworkers, 1992; Hall, 1981).

However, in the last two decades the increase of migration from rural areas has been accompanied by reduction of major greenery within cities, which creates a hostile environment in which to live. For that reason, an increase in street trees and appropriate planning looks to be the answer to this situation, since urban dwellers require a wide variety of stimuli to maintain a healthy condition and to function properly.

Scientific research has demonstrated that people who live within constant view of the natural world, enjoy better health, both physical and mental (Kielbaso, 1993). As Starkey (1979:1) said “man requires trees and associated plants to assist him in maintaining a healthy mental state”.

Given the sudden population growth and lack of planning in Latin American cities, there are not enough parks and green space in urban settings, where growing

crowds can rest and relax. For instance, the percentage of green areas and open space in Mexico City is barely 8.9 percent. In contrast, the percentage occupied by roads (streets and avenues) is 27.5 percent of the total public space (Benavides, 1992). As a consequence, the quality of life in cities is more deteriorated every day.

On the other hand, the decline of forested areas and the rise of pollutants in air and water have social and economic costs, since they increase absenteeism, sickness, and reduce worker's productivity, among other issues. Thus, if we consider that quality of life is the sum of all things that make life enjoyable, comfortable, and meaningful, (including physical, mental, economic, psychological, aesthetic, and recreational) (Kielbaso, 1993), it is clear that urban foresters and street trees deserve a major consideration and an appropriate assessment.

Nevertheless, to speak about the assessment of the role of trees in cities as well as their contribution to the quality of life of urban dwellers implies the need to inquire who makes, and under what decision making process, the policies, regulations and strategies to promote, design and maintain urban trees in each city. Since these measures and decisions are made by city mayors, city foresters, and even politicians, it is assumed that they base and address their decisions on their constituency's interests. At this point, it is generally accepted that larger green areas and more trees beautify their neighborhoods. Urban citizens make such claims according to the degree of their appreciation and knowledge of this aspect.

2.2. Studies of Urban Perceptions of Trees.

2.2.1. Surveys.

In order to understand public concern for urban trees and their functions, many scientists have recommended administration of surveys as one of the best tools to assess people's attitudes¹ regarding the importance of trees, and at what point they may be involved to maintain those trees close to their neighborhoods.

Surveys have been carefully designed and conducted to assess resident attitudes toward selected characteristics of street trees. Kalmbach and Kielbaso (1979) evaluated householder response to street trees with regard to size and density in front of their homes. Getz et al (1982); Kielbaso (1982); and Schoeder and Appelt (1985) identified inner city and small town residents' attitudes regarding urban forestry and tree programs. Sommer et al. (1989); Sommer and Sommer (1989); and Sommer et al., (1990), evaluated householder responses to street trees in front of their homes. Sommer, (1992) provided information about public perception of street trees. Araujo, (1994) evaluated Brazilian residents' perceptions on urban trees.

To evaluate people's attitudes toward urban trees, Sommer et al (1992) used a mail survey as a tool for assessing practitioner opinions of tree species planted locally. The study considered agreement among arborists, gardeners, and landscape architects in rating street trees in the south of San Francisco Bay area and around the cities of Sunnyvale and Redwood city, CA. These authors used questionnaires that were sent to individuals accompanied by a cover letter and stamped self-addressed return envelopes.

¹ Attitude is a manner of acting, feeling, or thinking that shows one's disposition, opinion, etc(Agnes, 1999)

Their expectations were to receive from the mail survey at least 20-25 percent returned questionnaires from members of each profession. The findings showed, however, that gardeners had a 25 percentage of return rates compared to arborist and landscape architects with 51 percentage of return rates. This approach demonstrated the advantages and limitations of using mailed survey.

Sommer and Sommer (1989) tried a questionnaire that included a list of 10 benefits and 18 annoyances that earlier research and interviews with arborists had established to be relevant to household's attitudes. They used 14 surveys in 8 cities in California with a total database of 816 household evaluations.

Several researchers have implemented different ways to encourage people to respond to surveys. For instance, Sommer and coworkers (1990), prior to conducting door to door surveys in Davis and Stockton California, published in the local newspaper a brief article describing the purpose, data, and location of the interviews. After this, letters were sent to individual residences informing them about the survey. Aranis (1991) in a study titled "environmental attitude and its effect on growers' nitrogen management practices: A case study of St. Joseph county Michigan corn growers" sent an advance letter to sampled populations notifying individuals that he or she has been selected in the survey, and giving notice about the arrival of the questionnaire. At the same time, two weeks after the initial mailing, a reminder postcard was sent to all the growers in the sample encouraging them to fill out the questionnaire and return it.

Araujo(1994) used the same strategy in Curitiba Brazil. She used a mail survey with encouragement, but added another element. She even used a money award of US\$ 70.00 to one of the participants by means of a lottery. The cover letter clearly stated that

answers given to the questions would not have any influence in the lottery participation and entry to the lottery participation would be granted to all returned questionnaires. All of these encouragement techniques helped to increase the return rate in those studies, even though results can vary according to many other variables which do not remain constant.

2.2.2. The Importance of Street Tree Attitude Surveys.

There is little discussion on the fact that planting trees will benefit present and future generations, and that developing a long-term care program for street trees is essential for maintaining the health and beauty of the urban forest (Reeder and Gerhold, 1993). For that reason is also believed that municipal tree programs represent an efficient investment in the community future. Doing surveys of urban dwellers' perceptions, attitudes and behaviors can help planners and managers to manage target municipal tree programs properly (Araujo, 1994).

From that point on Brush and Moore(1976) cited by Sommer and Sommer (1989) suggest that the chief research task for behavioral scientists in regard to street trees is to identify those attitudes perceived as desirable, and undesirable by city residents. This way, for example, if there is to be a major increase in street trees, it could be important that the varieties selected maximize householder satisfaction and minimize public maintenance costs (Sommer and Sommer 1989).

2.2.3. Findings of Street Tree Attitude Surveys.

Araujo(1994) conducted an urban tree survey study in the city of Curitiba, Brazil. She used three kinds of survey methods to evaluate tree perceptions and attitudes: door-to-door, and two types of mail surveys. The main objective of this survey was to determine how Curitibaños (residents of Curitiba) feel about their urban trees and parks and how trees contribute to the quality of their lives. The following groups of variables were examined: (1) positive features of street trees; (2) negative features of street trees; (3) preferred park attributes; (4) preferred location for trees and shrubs; (5) program participation; (6) need for improvement in public services including street trees; and (7) statements about the City of Curitiba and its environment. The single variables analyzed are: (1) condition, pruning, and maintenance of street trees; (2) demographic characteristics: age, education, income, and years of occupation of house or building; (3) satisfaction with size of trees, need for more trees, participation in recycling, willingness to pay more for several tree programs, gender, who does the yard work, ownership of house or building, and type of building.

The findings showed that attitudes were not influenced by the method of survey used. No significant differences between methods were found for any of the attitudes surveyed. The positive features receiving the higher rates are to bring nature close, attract birds, pleasing to the eye, and to make neighborhood more livable. Gender was a factor influencing attitudes on three of the 14 positive features of street trees: filter dust from air, attract birds, and give sense of pride. Women tended to place higher values on those positive features than men. Age influenced attitudes in: give shade, slow wind speed, and

give sense of pride. Education and income had some influence on a higher number of positive features.

Sommer et al (1989) evaluated householder response to two street trees in front of their homes: European elm (*Ulmus procera*) and London planetree (*Plantanus x acerifolia*) in Sacramento California. The research was intended to evaluate: 1) attitudes toward the two street trees that householders could experience directly, including benefits and annoyances; 2) return rate differences for surveys addressed with a personal name; and 3) demographic information such as ownership, gender, race, income, age and length of residence.

They found that the major benefits of the European elm were shade and visual aesthetics. The most annoying features were insects, disease, and dropping sap. For the London planetree, the major benefits were shade, visual, aesthetics and increased property values. Demographic variables (except age) were not related to opinions of the two trees. The results showed that households are not unanimous in demanding the removal of the elms. Since most of them like the elm, they did not want to see it removed.

In the same year (1989) Sommer et al did another study about the factor structure of street tree attributes in eight cities in California. They analyzed household rating of 28 potential benefits and annoyances. The objective was to insolate clusters of positive and negative attributes that will have both the theoretical and practical value to arborists. The respondents were asked for an overall opinion of the tree, its growth characteristics, the quality of the city maintenance, animals attracted to the tree, and various demographic items used in the interpretation of the responses. The most important findings are that

tree benefits cluster, while annoyances do not. This suggests that arborists need not spend a great deal of time distinguishing between the various benefits associated with street trees. Determining that a tree is rated positively by local residents seems sufficient as a guide to initial selection and replacement.

Kalambach and Kielbaso (1979) conducted a survey to learn resident's attitudes toward selected characteristics of street tree plantings in five Michigan and Illinois cities. Questions were asked regarding tree size and tree density preference and demographic data such as age, gender, level of education, and where they lived. Color photographs and semantic differential analysis, adjective pairs or attitude scales were used to elicit personal attitudes regarding size of shade trees and amenity values of trees. The result of the semantic differential analysis strongly suggests that in the minds of residents trees do enhance urban settings. Comparison of responses to existing tree sizes and expressed verbal preferences suggest that the preference for a change in tree size is four to one in favor of larger tree size over a smaller tree size. In photo selection choices, 78 percent of the residents selected large trees scenes, opposed to 18 percent selecting a majority of small tree scenes. Examined individually, cities demonstrated no significant tendencies in photo selection based on age, level of education, or gender. No apparent differences concerning tree size preference exist between female and male (males selected large trees 80 percent of the time compared to 76 percent for females). Overall, 50 percent of residents favored more trees along their particular residential streets. The desire for more trees was very strong among the residents having occasional or no street trees. The inference was that the satisfaction level for the majority of residents is reached with planting densities of approximately one tree per home.

The majority of the survey research has been focused on adult values. However, Johnson and Monear (1994) studied a child's view of the urban forestry in Minnesota. The objective was to provide some insight on the roles that urban community forests play in a young person's life. They found that urban, suburban, and rural kids took pictures with a high percentage of green. However, urban children took the higher percentage of pictures with pavement. Therefore, the children in urban areas live in an environment that has more pavements in it than rural and suburban areas.

2.3. Overview of Puebla City.

2.3.1. Background Information.

Puebla was founded in April 16 of 1531 by Fray Toribio de Benavente, "Motolinia"(Rivera, 1997). Puebla city is also called the Angelopolis or Angelopolitane city, evoking the legend that says that the Angels, who are frequently honored in fountains and statues throughout the city, designed the city. However, the first name of the area was Cuatlaxcoapan Valley and it was sparsely settled by native mesoamericans. Puebla was the most important city of the New Spain, after Mexico City (Careager and Jerez, 1984) when the conquest took place. The city is the capital of the state of Puebla, and it was designed and built according to Vitrubio, a Spanish city planner and architect, whose methods later were improved by Alberti (Rojas, 1997).

2.3.1.1. Location.

Puebla is located in the South of Mexico City. The city is established in a huge valley, surrounded by small hilly mountains: Loreto and Guadalupe parks and in the Northeast by Malitzin and Popocatepectl volcanoes. On the West side, the Atoyac River crosses the settlement from North to South. The downtown altitude is 2160 meters above sea level. Its geographic coordinates are: 19° 03' N latitude and 98° 12' W longitude. The climate is subhumid. The average temperature is 15 °C, and an average year precipitation of 888.5 mm (INEGI, 1996). The main activities of the economically active population are trade, industry and tourism (Careaga and Jerez, 1984).

2.3.1.2. Cultural Traits.

Puebla is the Mexican city where the colonial architecture is mostly represented. An example is the famous cathedral, which was founded before of the conquest of Tenochtitlan (the current Mexico city) in January 24, 1518 (Careaga and Jerez, 1984). Puebla's cathedral is known worldwide as the "Relicario of America" (The America's heirloom) and it is the most visited monument owing to outstanding architecture and majesty. In addition to this, the city's downtown is endowed with wonderful monuments, fountains, churches, civil architecture and a cultural richness. The city is famous also for its traditional cuisine and craft, Puebla was declared in 1990, a World Heritage by the UNESCO.

2.3.1.3. Population.

From the total population of the state of Puebla (4,624,365) 26.45 percentage is living in the capital which has 1,222,569 inhabitants (INEGI, 1995). The city population has experienced a rapid growth, since only 10 years ago its population was 532,744 (Careaga and Jerez,1984). It means that in a decade the population increased threefold. The current rate of growth is 2.60 percent. That is higher than the average rates of growth in the state, which is 2.04 percent. In terms of gender, 48.7 percent are males (2,253,476) compared to 51.3 percent females (2,370,889). The population of the city is predominantly young, since more than 50 percent are less than 19 years old (INEGI, 1995). The percentage of population of 15 years or more without elementary education was 18.6 in 1990, in contrast with 40.6 in 1970, and the percentage of inhabitants with studies after elementary school was 34.2 percent in 1990, versus 8.7 percent in 1970 (INEGI, 1995).

2.4. Urban Trees, their Value, and Management.

2.4.1. Management of Urban Vegetation.

The main institution in charge of the management of green areas of the city, is called "Parks and Gardens" (parques y jardines). It is an institution that depends on the municipality, and the management of urban programs are a function of the general municipality program. They are in charge of maintenance of public parks, gardens, avenues, plazas, downtown, and sometimes gardens in schools or residential places.

The management of urban vegetation in the city is divided into north and south.
There is an office in each part, but both depend on the general municipal administration.

3. METHODOLOGY

3.1. Site of the Study.

The study was developed in the city of Puebla, Mexico (figure 1). It was chosen for this urban survey because of its prominent tourism reputation and the important role of green areas in the city. However, as a pioneer study, it could be replicated in other Mexican cities.

In the literature review, it was documented that surveys are a good data gathering technique for this kind of urban attitude study. Therefore, surveys were used in the compilation of data in the city of Puebla.

The researcher has not found any reports in the literature about other studies of this kind in Mexican cities. Therefore, this research is primarily exploratory and the data were collected in a single period of time.

3.2. Development of the Questionnaire.

The questionnaire is an extraordinarily efficient tool for collecting data from a large number of respondents, and if this approach were used successfully in collecting street tree evaluations, it may have important ramifications for compiling regional and statewide data lists using a broad pool of qualified individuals representing different professions (Sommer, 1992).

The development of the questionnaire for both parts of the study was based on preliminary experiences cited in the literature review. However, the construction of the questions was adjusted for the research questions presented in the Introduction chapter. The questionnaires are modeled after two studies: “Urban tree attitudes and comparison of three survey methods in the city of Curitiba, Brazil” (Araujo, 1994) and “Preferences of Detroit residents for urban forest and forestry programs” (Kalmbach and Kielbaso, 1979). However, the selection of questions was focused and modified according to the objectives of this research project.

The questionnaire for assessing people’s attitudes was divided in four sections: urban neighborhood information, public park information, general information about trees, and socio-economic characteristics (Appendix A). Those sections contain closed format questions (yes, no, maybe responses, and rating scales), ranking, multiple choice, and open-ended questions. There were clear directional instructions for answering each question by the interviewee, such as: check one, check one on each line, and write, etc.

Participants were asked to respond based on the condition of trees that are growing in front of their residence, trees growing along the street in their immediate neighborhood, and trees in public parks. Moreover, some questions asked the respondents to express their willingness to pay for more community services. Additional questions focus on their willingness to participate in urban tree management programs, if available.

The questionnaire includes a list of positive and negative features of street trees. They are rated from very great benefit (1) to no benefit (3), and annoyances from very annoying (1) to not an annoyance (3). The overall opinion concerning condition, pruning,

and maintenance of street trees and parks was rated from excellent (1) to poor (4). The relative importance of trees in various locations in the city, importance of the environment, interest in the management, care and maintenance, improved public services, and the importance for local government to provide more tree areas were rated on a three point scale from very important (1) to not important (3). The questionnaire was translated to Spanish. It was pre-tested on 40 persons representative of all groups. The questionnaire for the municipality maintenance information (Appendix B) has only open questions since it was applied by face-to-face interviews.

3.3. Selecting the Samples.

3.3.1. People's Attitudes.

Three different populations were sampled for assessing people's attitudes. One was householders by monthly salary² perceived the second was a sample of college students, and the third was a sample of elementary and middle schools teachers.

3.3.1.1. Householders Sample.

A stratified random selection of the householders by type of neighborhood was done according to poor, middle or wealthy residential location in the city. A city map was used to locate the neighborhoods. The neighborhoods of Maravillas, San Manuel, La Cienega, Volcanes and the center of the city were selected. Some

elementary and middle schools were selected randomly in each selected neighborhoods; and some students from each school were randomly selected for the application of the questionnaire. The sample included people from different social levels. The differentiation between poor, middle or wealthy householders was established according to the minimum income received by month³ (number of minimum salaries received by family). The survey included residents which lived in houses, apartments, shared housings, and businesses places.

3.3.1.2. Teachers Sample.

The elementary and middle school teachers population was identified in the same schools were used for the selection of householders sample. It include teachers from different gender and age.

3.3.1.3. College Students Sample.

The sample of university students was taken from the University of Puebla (Universidad Autonoma de Puebla UAP) and the Universidad de Las Americas (UDLA) in all the different grades, and departments. Those are the most representative universities in the city.

² It helped to classify householder in wealthy, middle and poor.

³ Minimum wage in Puebla city is about \$ 3.72 by day.

3.3.2. Municipality Evaluation.

In the case of the municipality evaluation the whole population was interviewed, because it was small.

3.4. Sample Size.

The sample size depended on the variation of the total population of each group. Also the variability of the preliminary data in the pilot survey. However, for assessing people's attitudes, a total of 350 questionnaires were administered, and 10 for the municipality evaluation.

In the case of people's attitudes a total of 350 questionnaires were sent. However, only 300 were received and useable for this analysis; 141 were for householders, 106 for university students and 53 for teachers. In the evaluation of municipality maintenance information, the whole population was studied. It included managers of the north and south offices with a total of 6 persons. Therefore, a total of 6 questionnaires were used for the analysis.

3.5. Survey Procedure.

3.5.1. People's attitudes.

The methods used in other studies related to urban forestry attitudes were door-to-door or face-to-face, mail, and telephone survey interviews. Since there are no previous

studies in Puebla city about the percentages of responses using survey methods, a pilot test was developed to determine which kind of method works better with the specific groups studied.

According to the results of the pilot survey, the method suggested for doing the interviews was paper and pencil written questionnaires in some cases, and face-to-face oral interviews in others.

3.5.1.1. Householders.

The householder population was the most difficult population to interview, due to the fact that a high percent in the pilot survey did not answer the questions seriously and consciously. Therefore, a practical way for administrating the questionnaires was to ask for help from teachers in elementary and middle schools. School teachers in the selected neighborhoods administered the paper and pencil questionnaire. They helped with the distribution of questionnaires to householders and gave directions for completing it.

Questionnaires through school teachers is a method that helps with the direction of the answers with authenticity and civic responsibility. It starts by obtaining the help of principals and teachers of the schools located in the sampled neighborhood. After the purpose of the study was explained, they first completed the questionnaire (for determining their attitudes and the clarity of questions), and then selected a sample of students who are assigned the questionnaire as school homework. In this way, the students had the opportunity to do an interview linked with a natural science topic, such as in this case, and their parents took this work seriously.

3.5.1.2. Elementary and Middle School Teachers.

The survey procedure in the sample of elementary and middle school teachers was to provide the questionnaires personally, and after one or two days it was picked up. This method worked fine due to the fact teachers showed interest and responsibility.

3.5.1.3. University Students.

This was the easiest population to sample because the students were available and sometimes happy to answer the questionnaires. Some university professors helped with the distribution of the questionnaires, and in others cases the researcher distributed them

3.5.2. Municipality Evaluation.

The method of face-to-face was used for the administration of the survey in the municipality evaluation. It worked well because they were friendly and gave enough time to answer the questions.

3.6. Analysis.

Univariate and multivariate analyses were performed using the Statistical Package for the Social Sciences (SPSS).

For the responses for each category of variables, a frequency distribution test was performed, followed by measures of central tendency to summarize further information.

A mean rating range was used in the analysis of group variables. It used different point scales depending on respondent's perceptions. Other analyses of association of these variables were done regarding positive or negative features of street trees and socio-demographic variables.

Some relationships were explored, such as social group, age, gender, tree condition, park's importance, who visits a park more frequently, and city maintenance.

3.7. Variables Analyzed.

The following groups variables were analyzed in assessing people's attitudes: *positive features of street trees; negative features of street trees; desired park attribute; preferred location of trees and shrub; need for improvement of public services; and citizen participation.* Data were also collected on socio-demographic variables such as: age, education, income, gender, native of city and years of occupation of their house, apartment building or business places.

For the municipality maintenance information, the variables analyzed were: *number of parks; gardens; plazas and avenues for maintenance; priority of maintenance; main activities of maintenance; infrastructure; problems of maintenance.*

4. RESULTS AND DISCUSSION

1. Attitudes of Puebla Residents.

1.1. Survey Return Rate.

Out of the 350 surveys sent out for the three sampled populations, 300 were returned in time for the analysis, for a return rate of 84 percent. In the case of householders and university students, the involvement of schools helped insure the collection of quick and more reliable information. Pen-and pencil was good method for collecting data of elementary and middle school teachers.

Generally, all the questions received a good percent of responses, but the rate was different for different sections of the questionnaire. In the first section, related to urban neighborhood information, the lowest percent of response was in the question of who planted the street trees? (75 percent). In the second section about public parks, all of the questions received more than 90 percent response. “What is your feeling about the following species of trees?” in section three received a low percent of responses (50 percent). The last section of the questionnaire received percentages from 73 (building type) to 100 percent (education level). Monthly household income got 99 percent response, which was useful since this question was the basis for dividing poor, middle and wealthy households.

The high response percentage verifies the efficiency of the methods used for applying the questionnaire. The “pen and pencil” instrument, using elementary and middle school students as collectors of information from their family members was a

very good method, specially, since under the study conditions, the householders sample was the most difficult for collecting the data. A major advantage of the method was collection of more valid information since the teachers from school served as distributors of the questionnaires, and the households felt therefore more responsibility in their responses.

1.2 Socio-Demographic Characteristics.

The socio-demographic characteristics of survey respondents are presented in Table

1. Of 300 respondents, 63.3 percent were female and 36.6 were male, and only 63.8 percent were native of the city. This implies that more than half of the respondents were females and natives of the city.

Table 1. Socio-demographic characteristics of respondents in Puebla city.

Characteristic	N	Percent	Characteristic	N	Percent
Resident of Puebla			Gender		
Yes	187	63.8	Male	109	36.6
No	106	36.2	Female	189	63.3
	293	100		298	99.9
Income			Education		
Wealthy class	35	11.7	Elementary school	66	22.0
Middle class	99	33.1	Middle school	33	11.0
Poor class	61	20.4	High school	45	15.0
No salary	104	34.8	College	156	52.0
	299	100		300	100
Age			Building type		
15-19	59	20.5	House	116	65.3
20-29	117	40.6	Apartment	88	29.3
30-39	59	20.5	Shared housing	14	4.7
40-49	35	12.2	Business	2	.7
50-59	14	4.9		220	100
-60	4	1.3			
	288	100			
Ownership			Length of ownership		
Own	204	75	1-10	156	60
Rent	68	25	11-20	66	25.4
	272	100	21-30	36	13.8
			-31	2	.8
				260	100

N= Total sample.

With regard to monthly salary received, the highest percentage belongs to people who do not receive a direct salary (34.8 percent) such as *students* or some *householders*. 33.1 percent of respondents are clasified as people from *middle class*² 20.4 percent are *poor people*, and only 11.7 percent are *weatlhy class*. For education, 52 percent of the total sample has *college education*, 22 percent have *elementary school*, 15 percent have *high school*, and 11 percent have *middle school*.

The *age* of respondents was between 20.5 and 60 years, but 40.6 percent were between 20 to 29 years old, and only 1.3 percent are older than 60 years. *Owners of their place of living* were 204 of 272 respondents (75 percent), and 25 percent rent their place. Regarding type of accomodation, 6.3 percent live in a house, 29.3 in an apartment, and 4.7 in a shared housing unit.

In summary, the majority of respondents in this study are *females* (63.3 percent), *natives of the city* (63.8 percent), and persons who do not receive any salary (34.8 percent). Those without salary are students or work at home without any monetary payment.

1.3. Importance of the Environment.

Respondents were asked three questions related to importance of the environment where they live: (1) How important is the environment where you live?, (2) How

² The classification of poor, middle and wealthy class was done according to numbers of min wage perceived for the total family per month. Therefore, poor people was classified with a perception of 1 to 10 min wage, middle class people perceive between 11 to 20 min wage, and wealthy people more than 20 min wage.

important is it for you to know about the environment where you live? and (3) What is the importance of trees for improving quality of life?

Table 2. Importance of the urban environment.

Characteristic	N		Frequency	Percent
Importance of the environment	300	Very important	179	59.7
		Somewhat important	99	33.0
		Not important	20	7.3
Know about the environment	289	Very important	154	51.9
		Somewhat important	123	41.4
		Not important	20	6.7
Trees for improving quality of life	299	Yes	246	85.1
		no	43	14.9

N= Total sample

Regarding importance of their environment, 179 of 300 respondents (Table 2) considered that the environment where they live is *very important* (59.7 percent), and only 20 (7.3 percent) considered that it is not important. From 289 answers, 154 (51.9 percent) consider that it is very important to know about the urban environment, and 246 of 297 (85.1 percent) believe that trees improve quality of life. Those high percentages suggest that, in general, citizens of Puebla city will be positive toward programs related to environmental education and management of urban trees.

In general, people from Puebla consider the importance of the environment almost in the middle between “very important” and “somewhat important”, very important was rated 1, somewhat important 2, and not important 3, and the mean (Table 3) was 1.48. There are some differences among averages of social groups analyzed. Householders scored 1.37, students 1.55, and elementary teachers 1.62. Therefore, housekeepers consider the value to be most important. There are differences between male and female. Males gave the closest value to very important (1.45); therefore, they rated the environment where they live slightly higher than females did (1.50). In the social groups

analyzed householder male consider the environment very important (1.35) and elementary male teachers somewhat important (2.00).

Almost all of the three social groups interviewed considered that knowing the environment where they live is between very important and somewhat important, since they gave an average of 1.56, 1.57 and 1.42 respectively. Male and female respondents had the same mean (1.55). This implies that no matter in which social group or gender they are, they will be receptive to educational environmental programs.

Table 3. Importance of urban environment by social group and by gender.

Social group	Gender	Statistics	Importance of the environment	Know about the environment	Trees for quality of life
Students	Male	Mean	1.50	1.60	1.13
		N	42	42	40
	Female	Mean	1.58	1.56	1.15
		N	64	64	62
	Total	Mean	1.55	1.58	1.14
		N	106	106	1.02
	Householders	Mean	1.35	1.53	1.07*
		N	60	59	58
	Female	Mean	1.39	1.61	1.21*
		N	79	77	77
	Total	Mean	1.37	1.57	1.15
		N	139	136	135
Teachers	Male	Mean	2.00	1.43	1.29
		N	7	7	7
	Female	Mean	1.57	1.41	1.16
		N	46	46	43
	Total	Mean	1.62	1.42	1.18
		N	53	53	50
Total	Male	Mean	1.45	1.55	1.10
		N	109	108	105
	Female	Mean	1.50	1.55	1.18
		N	189	187	181
	Total	Mean	1.48	1.55	1.15
		N	298	295	287

Rated on a 3 point scale from very important (1) to not important (3).

N= Total sample

* P< .05

In general, the average consideration of the importance of the the environment in which they live differs in people of different income groups. Wealthy people scored 1.46; middle income people scored 1.52; poor people scored 1.30, and for people with no salary the score was 1.55 (Table 4).

Table 4. Importance of the urban environment by social group and by respondent income.

Social group	Respondents income	Statistics	Importance of the environment	Know about the environment	Trees for quality of life
Students	Wealthy	Mean	2.00	1.33	1.33
		N	3	3	3
	Poor	Mean	1.00	1.00	1.00
		N	2	2	2
	No salary	Mean	1.54	1.54	1.13
		N	101	101	97
	Total	Mean	1.55	1.58	1.14
		N	106	106	102
Householders	Wealthy	Mean	1.24	1.42	1.12
		N	25	24	25
	Middle	Mean	1.44	1.64	1.20
		N	72	72	69
	Poor	Mean	1.29	1.55	1.05
		N	41	40	40
	No salary	Mean	1.67	2.00	1.33
		N	3	2	3
	Total	Mean	1.37	1.58	1.15
		N	141	138	137
Teachers	Wealthy	Mean	2.00	1.57	1.29
		N	7	7	7
	Middle	Mean	1.70	1.37	1.24
		N	27	27	25
	Poor	Mean	1.33	1.39	1.06
		N	18	18	17
	Total	Mean	1.62	1.40	1.18
		N	52	52	49
Total	Wealthy	Mean	1.46	1.44	1.17
		N	35	34	35
	Middle	Mean	1.52	1.57	1.21
		N	99	99	94
	Poor	Mean	1.30	1.48	1.05
		N	61	60	59
	No salary	Mean	1.55	1.60	1.14
		N	104	103	100
	Total	Mean	1.47	1.55	1.15
		N	299	296	288

Rated on a 3 point scale from very important (1) to not important (3).

N= Total sample

Therefore, poor people gave the highest value to the *importance of the environment*. The same relationship was found for *knowing about the environment* (1.48) and *trees for improving quality of life* (1.05). That suggest that, this specific group considers most important the environment, it could be due to they wise to live in better environment and it will help them to appreciate more it.

1.4. Benefits of Trees and Parks.

There are different values residents perceive as benefits from trees and parks in the city of Puebla. These were identified as: economic, aesthetic, recreational, attraction of animals, feel the nature close, producers of fruits, and the shade of trees (Table 5).

Table 5. Benefits that residents of Puebla perceive from trees and parks.

Values	N	Frequency	Percent
Shade	180	180	60.0
Feel nature close	178	178	58.9
Aesthetic	117	117	38.7
Recreational	90	90	29.8
Fruits	85	85	28.3
Attraction of animals	70	70	23.2
Economic	36	36	11.9

Respondents had the opportunity of choose among the different values that urban trees represent for them. They could choose any number of values that they considered important. In Table 5, the column N represents the number of people surveyed who chose each option.

Shade of urban trees was the value that got the highest frequency (180) with a percentage of 60. It was followed by *feel nature close* (178) with a percentage of 58.9, *aesthetic* 38.7 percent, *recreational value* 29.8 percent, *fruits* 28.3 percent, *attraction of animals* 23.2 percent, and *economic value* 11.9 percent. Therefore, *shade and feel nature*

close are the more appreciated and important values for the city respondents and *attraction of animals* and *economic value* were the less appreciated.

1.4.1 .Positive Features of Trees and Parks.

There were 13 positive characteristics studied among the residents of the city of Puebla (Table 6). Respondents had the opportunity of giving each one a characteristic the number 1 for no benefit, 2 for some benefit, 3 for very great benefit and 4 for no answer.

Table 6. Positive features of street trees and parks in Puebla city.

Positive tree characteristics	N	Mean rating*	Degree of benefits in percent		
			No benefit	Some benefit	Very great benefit
Give shade	281	2.65	3.0	28.9	67.9
Bring nature close	280	2.58	3.3	35.4	61.3
Pleasing to the eye	283	2.47	8.8	35.7	55.5
Flowers on trees	279	2.33	14.6	38.1	47.4
Attract animals and birds	276	2.33	12.8	41.0	46.2
Recreation activities	285	2.25	15.6	43.5	40.9
Slow wind speed	266	2.25	16.5	38.7	39.8
Filter dust from air	275	2.15	21.8	41.6	36.6
Give sense of pride	277	2.09	25.9	39.4	34.7
Release stress	265	2.07	27.8	37.3	34.9
Reduce noise	272	1.91	35.7	37.3	27.0
Increase privacy	274	1.70	46.9	36.6	16.6
Increase property values	281	1.60	42.1	28.3	9.9

* Rated on a 3 point scale from no benefit (1) to very great benefit (3).

N= Total sample.

Among 13 positive features of street trees (Table 6), respondents placed a high rating on the characteristics of *give shade* (2.65) and *bring nature close* (2.58) on a 3 point scale, suggesting that they had a strong perception about these two characteristics of trees. However, other characteristics such as: *pleasing to the eye*, *flowers on trees*, *recreation activities*, *slow wind speed*, *filter dust from air*, and *give sense of pride*, received means ranging from 2.09 to 2.47, suggesting that such features also represent highly appreciated values. *Increase property values* (1.60) and *increase privacy* (1.70) were the lowest rated characteristics of trees in Puebla city.

Give shade and *bring nature close* were the characteristics that received the highest percent with regard to *very great benefit* (67.9 and 61.3 percent), and had the lowest percent in *no answer* (.4 and 2.1 percent). In contrast, *increase property values* and *privacy* received the lowest percent (10.7 and 14.6 percent). Those percentages correspond to the mean rating data. Therefore, the most important two positive characteristics selected by Puebla residents were *give shade* and *bring nature close*.

1.4.2. Negative Features of Street Trees and Parks.

Respondents placed different ratings on negative features of street trees (Table 7). The mean rating varied from 1.71 to 2.24 (mean of 1.89), and may be compared to the mean rating on positive characteristics (mean of 2.18) with a range from 1.60 to 2.65. These figures indicate that there was not a great difference. This may be an indicator that respondent's attitudes toward positive features of trees, generally, are a little superior to their attitudes toward the negative features. Therefore, residents appreciate positive characteristics that urban trees offer, but they recognize the annoyance that trees create too.

Table 7. Negative features of street trees and parks in Puebla city.

Negative features of street trees	N	Mean rating*	Degree of annoyance in percent		
			No annoyance	Some annoyance	Very great annoyance
Block visibility	277	1.71	44.4	39.8	15.8
Falling leaves in fall	286	1.73	43.1	40.5	16.4
Fruit or seed fall	286	1.74	40.9	44.4	14.7
Flower parts fall	286	1.81	35.4	48.7	16.0
Falling branches	286	1.82	35.5	47.3	17.2
Insect disease in trees	290	1.94	26.9	52.3	20.8
Sidewalk damaged	286	2.17	17.0	38.8	44.2
Darken street at night	287	2.24	18.5	39.2	42.3

*Rated on a 3 point scale from no annoyance (1) to very great annoyance (3).

N=total sample

Darken street at night was the characteristic that the respondents of Puebla city considered as most negative (2.24), followed by *sidewalk damage* (2.17), *insects and disease in trees* (1.94), *flower parts fall* (1.98), *falling branches* (1.82), *flower parts fall* (1.81), *fruit or seed fall* (1.74), *falling leaves in fall* (1.73), and *block visibility* (1.71).

1.5. Public Perceptions of Street Trees, Parks and Management.

Public perceptions of trees and their management was evaluated by asking what is the general opinion that residents of Puebla city have about the condition of street trees and park trees, and how the city is maintaining them. It was important to first determine who planted the trees, because it was assumed that when somebody planted a tree, there might be a high probability that he or she would take care of it.

According to data presented in Table 8, street trees were planted by resident people and city foresters. The majority of trees were planted by resident people (63.8 percent). However, both groups are taking care of street trees. The higher percentage is from resident people (60.8).

Table 8. Who planted and is taking care of urban trees.

Characteristic	N	Degree of opinion in percent			
		Resident people	City foresters	Both	No one
Who planted the trees	232	63.8	27.2	6.0	3.0
Who is taking care	288	60.8	15.3	17.7	6.2

N= total sample.

Opinions about the condition of street trees and parks in local neighborhoods, and the maintenance of them by the city, are presented in Table 9. Condition of street trees have

a mean rating of 2.83, and park trees have a rating of 3.20. The mean was rated from 1 (excellent) to 4 (poor). Ratings suggest that street trees are in better condition than park trees. Maintenance of street trees by the city was scored as 3.56, and for park trees the score was 3.35. This indicates that the city is giving better maintenance to park trees, even though parks trees are in worse condition. This circumstance could indicate that park trees receive more pressure from visitors than street trees, and street trees are maintained not only by the city, but also by resident people (Table 8).

Generally, the condition of pruning of street trees is classified between good and poor (mean of 3.20 in Table 9). The majority of respondents (39.1 percent) classified pruning as in poor condition. This suggests that pruning needs to be improved in future management plans.

Table 9. Condition of parks and street trees and maintenance by the city.

Characteristic	N	Mean rating*	Degree of opinion in percent			
			Excellent	Very good	Good	Poor
Condition of street trees	287	2.83	8.7	27.5	36.9	26.8
Maintenance of street trees by the city	284	3.56		6.3	31.7	62.0
Prunning of street trees	266	3.09	3.8	23.7	33.5	39.1
Condition of park trees	281	3.20	2.8	6.0	59.1	32.0
Maintenance of park trees by the city	294	3.35	.7	9.5	43.9	45.9

*Rated on a 4 point score from excellent (1) to poor (4).

N= total sample

1.6. Park Attributes.

Among respondents, 47.6 percent considered the parks as *very important*, 40.2 percent consider them *important*, and 12.2 percent *not important* (Table 10). This implies that almost 90 percent of people consider parks as *very important* and *important*.

Therefore, a high percentage of residents may be receptive to management programs targeted for parks.

Table 10. Importance of parks.

Importance of parks	Frequency	Percent
Very important	141	47.6
Important	119	40.2
Not important	36	12.2
Total	296	100

The social group that gave the highest importance to parks was the *householders* with a mean of 1.60, (Table 11). The mean was calculated from 1 (very important) to 3 (not important). The *students* group followed with (1.62), and finally *elementary teachers* (1.75). Although the means are different among these social groups, all of them give a value between very important to important. Therefore they valued parks *important*. Generally, males considered parks more important than females, since males gave a mean of 1.56 and females 1.69 (Table 11).

Table 11. Importance of parks for residents of Puebla city by social group and gender.

Social group	Gender	Statistics	Importance of parks	Social group	Gender	Statistics	Importance of parks
Students	Male	M	1.62	Teachers	Male	M	1.71
		N	42			N	7
	Female	M	1.6		Female	M	1.76
		N	63			N	46
	Total	M	1.65		Total	M	1.75
		N	105			N	53
Householders	Male	M	1.51	Total	Male	M	1.56
		N	59			N	108
	Female	M	1.68		Female	M	1.69
		N	77			N	186
	Total	M	1.60		Total	M	1.65
		N	136			N	294

N = Total sample

M= mean rated on a 3 point scale from very important (1) to not important (3).

This is related to who visits a park more, with childrens, since generally in Latin American countries, mothers are the ones who take responsibility for activities of children. However, in this specific case, fathers helped by visiting more parks with childrens more often. From 295 respondents, 39.3 visit parks per year frequently³ (Table 12), 29.5 regularly, 28.5, rarely and 2.7 do not visit parks.

Table 12. Frequency of visits parks by habitants of Puebla.

Visit at parks per year	Frequency	Percent
Frequently	116	39.3
Regularly	87	29.5
Rarely	84	28.5
None	8	2.7
Total	295	100

In this study, fathers visit parks more frecuently (40.9 percent) than mothers (26 percent), and 32.7 percent were visited by other persons (Table 13).

Table 13. Frequency of parks visits by gender.

Who visits more parks?	Frequency	Percent
Father	120	40.9
Mother	76.2	26.0
Others persons	95.8	32.7

Males consider the condition of parks to be better than *females* do (3.06 and 3.28 respectively). This might be related to fathers visiting parks more frecuently than mothers. However, both consider maintenance of parks by the city government to be between good and poor (3.36, 3.34) (Table 14).

³ Frequency of parks visit per year was classified as frequently for people who visit a park each weekend or at least three weekends per month. Regularly for people who visit at least once a month and rarely was from people that visit parks less than 5 times per year.

Table 14 . Frequency of parks visits per year, opinion of park condition, and opinion of city maintenance by social group and gender.

Social group	Gender	Statistics	^Visits a park	*Park condition	*City maintenance
Students	Male	M	1.64	3.15	3.50
		N	42	40	42
	Female	M	1.93	3.19	3.42
		N	60	58	60
	Total	M	1.81	3.17	3.45
		N	102	98	102
Householders	Male	M	1.85	2.96	3.25
		N	60	54	59
	Female	M	2.01	3.35	3.40
		N	79	77	78
	Total	M	1.99	3.19	3.34
		N	139	131	137
Teachers	Male	M	2.29	3.33	3.43
		N	7	6	7
	Female	M	2.07	3.27	3.15
		N	45	44	46
	Total	M	2.12	3.28	3.19
		N	52	50	53
Total	Male	M	1.85	3.06	3.36
		N	109	100	108
	Female	M	2.01	3.28	3.34
		N	184	179	184
	Total	M	1.95	3.20	3.35
		N	293	279	292

^ Rated on a 3 point scale from frequently (1) to rarely (3).

** Rated on a 4 point scale from excellent (1) to poor (4).

N= total sample

M= mean

Respondents, were asked to mark what type(s) of attributes they prefer to see in their local parks (Table 15). *Gardens and flower beds* was the attribute that received the highest percentage of selection (76.7 percent), followed by *sport fields* (65 percent), *trees and shrubs* (64 percent), *playground equipment* (56.3 percent), *picnic area* (39.7 percent), and finally *walking and bicycle path* (32.7 percent). Selection of attributes depends on interest of more frequent visitors, and males are the ones who visit more parks per year. Although *gardens and flowers beds* got the first preference, *sport fields* (second preference) received many recommendations. The most important was the utilization of sport fields, such as football, basketball, and baseball. Generally, males are

the ones who choose these kinds of fields. One additional recommendation was that some of the sports fields presently in parks need to be repaired, because they are in bad condition.

Table 15. Types of park attributes desired by residents of Puebla city.

Park attributes	Frequency	Percent	Park attributes	Frequency	Percent
Gardens and flower beds	230	76.7	Playground equipment	169	56.3
Sport fields	195	65.0	Picnic area	119	39.7
Trees and shrubs	192	64.0	Walking and bicycle path	98	32.7

There are some correlations between socio-economic classification and respondents' assessments of characteristics of parks (Table 16). Although these kinds of correlations do not give an absolute value about the dependence of one characteristic upon another, they do indicate a kind of casual link. The highest correlation was between the level of education and age (.451).

Table 16. Correlation between socio-economic characteristics and parks features.

Characteristic	Education level	Age	Gender	parks importance	Parks visits	Who visits parks more	Tree's condition	City maintenance
Education level	1.00	-.451**	.150*	.012	.042	-.133*	-.017	-.014
Age	-.451**	1.00	.015	.001	.102	.028	.063	-.103
Gender	.150**	.015	1.00	.090	.083	-.144*	.156**	-.013
parks importance	-.012	.001	.090	1.00	.302**	-.133*	.016	.265**
Parks visits	.042	.102	.083	.302**	1.00	.033	.68	-.002
Who visits a park	-.133*	.028	-.144*	-.133*	.033	1.00	.014	.007
Tree's condition	-.017	.063	.156**	.016	.068	.014	1.00	.268**
City maintenance	-.014	-.103	-.013	-.265**	-.002	.007	.268**	1.00

** correlation is significant at the 0.01 level

* correlation is significant at the 0.05 level

This implies, that it is important to consider people' age, and the level of education than have the residents. Some other correlations are: *opinion of park tree's condition* and *city maintenance* (.268), *how important are the parks* and *city maintenance* (.265), *resident of the city* and *opinion of trees park condition* (156), *level of education* and *native of the city* (.150), *native of the city* and *who visits a park in the family* (.144), *how important are the parks* and *who visits a park in the family* (.133).

1.7. Species Preference, Planting more Trees and Urban Scenary.

1.7.1. Urban Scenary.

Urban scenery is very important for residents of Puebla city. Among respondents, 61.4 percent consider that government provided wooded areas are *very important* (Table 17), 27.6 percent consider them *important*, and 11 *not important*. Also, 46.5 percent consider *tree lined street* as very important, and 64 percent consider *open parkland* very important. This implies, that parkland is the most important urban scenery for the residents.

Table 17. Importance which the government provides to wooded areas, parkland and tree lined street.

Places		Frequency	Percent
Wooded areas	Very important	151	61.4
	Important	68	27.6
	Not important	27	11.0
Tree lined street	Very important	114	46.5
	Important	108	44.1
	Not important	23	9.4
Open parkland	Very important	171	64.0
	Important	75	28.1
	Not important	21	7.9

City resident respondents consider trees and shrubs between *very important* and *important* (1.24 to 2.31) (Table 18). Since the mean was rated from 1 (very important) to 3 (not important), *trees and shrubs in parks* received the highest value (1.24), and 80.4 percent of respondents chose it as very important. Trees in *downtown and plazas*, *shopping areas*, and *residential streets* were selected as important (53.1, 46.2, 42.3 percent respectfully). *Trees and shrubs in front yards* were selected not important (45.7 percent) by the residents.

Table 18. Importance of trees and shrubs in some city places.

Places	N	Mean rating*	Degree of interest in percent		
			Very important	Important	Not important
City parks	265	1.24	80.4	15.3	4.3
Industrial areas	244	1.76	40.8	42.9	16.3
Downtown and plazas	254	1.77	35.1	53.1	11.8
Along residential streets	256	1.78	39.8	42.3	17.9
Back yards	255	1.93	32.5	42.4	25.1
Shopping areas	250	2.15	19.5	46.2	34.3
In and around parking lots	248	2.19	21.1	38.6	40.4
Front yards	262	2.31	14.8	39.5	45.7

* Rated on a 3 point scale from very important (1) to not important (3).

N= Total sample

1.7.2. Place of Planting.

When respondents were asked whether or not more trees should be planted in the city, 85.9 percent of respondents answered positively (Table 19); however, 14.1 percent answered negatively. Some of the recommendations of people who answered negatively were that “there are enough trees in the city and they need more care,” or, “planting more trees is only for justify, in many cases, budget or political issues.” However, 237 persons of 276 feel that more trees are needed in the city.

Table 19 . Frequency of planting more trees and preference for a specific tree.

Characteristic		Frequency	Percent
Planting more trees	Yes	237	85.9
	Not	39	14.1
	Total	276	100
Preference for specific tree	Yes	153	51.9
	Not	94	38.1
	Total	247	100

Respondents had the opportunity of choosing places where they think that more trees need to be planted. From 633 choices made of places for planting, 204 were in favor of planting more trees *in the parks* (Table 20). That represents 68 percent. In contrast, planting trees in *front* or *back yards* received only 60 and 61 responses, which each represent around 20 percent. This kind of choice of places for planting more trees is totally consistent with activities of people and the design of the majority of houses in the city. Generally, people spend more leisure time in parks, and there is very little area in front of the houses, and in many instances the houses reach totally to the border of the streets. Therefore, the selection of planting more trees in parks and less in front of yard is appropriate.

Table 20. Preference for a specific place for planting the trees.

Place of planting	Frequency	Percent
In the parks	204	68.0
Along the streets	149	49.7
In the downtown	92	30.7
In comercial centers	67	22.3
In the back yards	61	20.3
In the front yard	60	20.0

1.7.3. Preference for Specific Species.

Among respondents who desire more trees, 51.9 percent expressed a preference for a specific tree (Table 20). They had the opportunity of choosing which species they prefer among 11 species (Table 21).

Table 21. Preference for specific species for planting.

Species	Frequency	Percent
Eucalyptus (<i>Eucalyptus</i> sp)	81	27.0
Laurel de la India (<i>Ficus</i> sp)	77	25.7
Fresno (<i>Fraxinus</i> sp)	73	24.3
Cedro blanco (<i>Cupressus</i> sp)	67	22.3
Palma (<i>Phoenix dactilifera</i> and <i>Euprichardia pacifica</i>)	60	20.0
Frutales	56	18.7
Trueno (<i>Ligustrum japonicum</i>)	44	14.7
Alamo (<i>Populus tremuloides</i>)	42	14.0
Pirul (<i>Schinus molle</i>)	33	11.0
Acasia (<i>Acasia</i> sp)	28	9.3
Casuarina (<i>Casuarina esquisetifolia</i>)	18	6.0

From the 11 species proposed, *Eucalyptus*, *Laurel de la India* and *Fresno* received the highest numbers of selections: 81, 77 and 73 respectively, from the total of 579 selections made. Since *Eucalyptus* is the most abundant species in the city's parks, probably many people know it, and that may have influenced the high selection of this species. *Casuarina*, *Acacia* and *Pirul* had the lowest scores (18, 28 and 33 respectively). *Alamo*, *Frutales*, *Palma* and *Cedro blanco* received medium scores (42, 56, 60, 67 respectively).

Although the questionnaire asked, for each of the proposed species, whether people *like them very much*, *like*, *not like*, or they *do not know*, there were no answers for that question. Probably, this question was so specific that it required more knowledge of the species than respondents had for the comparison with others. Therefore, it was too

difficult to answer. In many cases, the people only know that there are different trees, but they do not know the name of specific trees, and it was difficult to decide among the choices.

There are some correlations between planting more trees, and species preferences and some socio-demographic characteristics (Table 22). The highest was between level of education and *age* (.451), followed by *age* and *native of the city* (-.264), *preference for specific tree and planting more trees* (.223), *level of education and native of the city* (.222), and *age and preference for specific tree* (.132). Therefore, it is important to consider this kind of correlation in targetting urban programs.

Table 22. Correlations between socio-economic characteristics as well as planting more trees and species preferences.

	Planting more trees	Preference for specific tree	Level of education	Age	Gender	Native of Puebla
Planting more trees	1.00	.223**	-.039	.035	.107	.083
Preference for specific tree	.223**	1.00	-.070	-.132*	-.06	.043
Level of education	-.039	-.070	1.00	-.451**	.150**	-.222**
Age	.035	-.132*	-.451**	1.00	.015	-.264**
Gender	.107	-.062	.150**	.015	1.00	-.056
Native of Puebla	.083	.043	.22**	-.264**	-.056	1.00

** correlation is significant at the 0.01 level

* correlation is significant at the 0.05 level

4.8. Combination of Attitudes Variables.

A selection of some important attitude variables was done using convined scales.

They included problems residents have with urban trees, perceptions of positive and

negative characteristics, as well the importance of trees and shrubs in some areas of the city. Table 23 shows the reliability of the respective scale combination.

Table 23. Reliability of attitude questions

Question	Reliability
Problems with urban trees	.79
Perceptions of positive attitudes	.80
Perceptions of negative attitudes	.67
Importance of shrubs and trees in some city areas	.74

Some means were statistically significant (Table 24). Combination of negative characteristics that respondents perceived regarding urban trees were the important ones. The means of these combinations depended on which variables were taken in account. Among the social groups, students (14.95) have higher perception than householders (13.60) and teachers (13.82). This may be related to the level of education. In the case of the householder income, people with no salary have higher perception (14.96) than poor (14.12), middle (13.42) and wealthy (13.58) householders. Between level of education, respondents which have college education have the higher perception (14.51) than people with no college education (13.71).

Table 24. Means of combined attitudes.

variables	Problems	Positive	Negative	City place importance
Level of education				
No college	.81	24.72*	13.71*	12.10
College	.83	26.03*	14.51*	12.49
Household income				
Poor	.78	25.50	14.12*	12.25
Middle	.89	25.18	13.42*	11.76
Wealthy	.51	25.03	13.58*	13.87
No salary	.90	25.62	14.96*	12.31
Social group				
Students	.86	25.59	14.95*	12.39
Householdes	.90	25.20	13.60*	12.32
Teachers	.56	25.56	13.82*	12.11

* P< .05

There were significant means differences between positive characteristics and level of education (Table 24). Respondents that have college education have a higher perception (26.03) than respondents with not college education (24.72). It implies, even though respondents recognized negative trees characteristics, they recognize also the positives.

4.9. Interest in Tree Related Programs and Community Environmental Services.

4.9.1. Attitude Toward Tree Programs.

Survey participants indicated a very high interest in participation in tree-related programs. From 275 respondents, 225 agreed to *participate (81.1 percent)*. The highest rated program by respondents was *environmental education (69.8 percent)*, (Table 25). It was followed by *adopt a street tree (68.7 percent)*, *ecological programs (67.6 percent)*, *arbor day (42.8 percent)*, and finally, *voluntary service (29 percent)*.

Table 25. Participation interest in tree related programs.

Programs			Degree of interest in percent		
	N	Mean rating*	Yes	Maybe/do not know	No
Ecological	216	1.38	67.6	26.4	6.0
Environmental education	212	1.38	69.8	22.2	8.0
Adopt a street tree	233	1.40	68.7	22.7	8.6
Arbor day	215	1.68	42.8	46.0	11.2
Voluntary service	221	1.91	29.0	51.1	19.9

*Rated on a 3-point scale from yes (1) to no (3).

N= Total sample

Although the mean for participation in tree programs is between *yes* and *maybe* (1.38 to 1.91), the *willing to pay* is between *no* and *no opinion* (2.00 to 2.22) (Table 26). That indicates the good possibilities for participation, but with no voluntary payment.

However, *environmental education* received the highest percent of *voluntary payment*

(37.1 percent), while *ecological program*, *arbor day*, and *voluntary service* have a high percent in *no payment*. It implies the inclusion of city tree programs which include environmental programs, and could have voluntary participation (Table 25) of Puebla citizens.

Table 26. Willing to pay for more community services.

Programs	N	Mean rating*	Degree of interest in percent		
			Yes	No	Maybe
Environmental education	194	1.95	37.1	30.4	32.5
Voluntary service	195	2.02	29.2	39.5	31.3
Arbor day	235	2.08	27.7	36.6	35.7
Ecological	224	2.21	18.3	42.4	39.3
Adopt a street tree	199	2.22	22.6	32.7	44.7

*Rated on a 3-point scale from yes (1) to maybe (3).

1.9.2. Improvement of Public Services in the Neighborhood.

Respondents were asked to select from a list of 12 public services (Table 27) in terms of the condition of each one. The question was, “In your neighborhood, is the condition *excellent*, *good*, *poor* or there is *no service*. The mean in the range of the services was from 2.49 to 2.94. In general, the services were rated between 2 and 3; therefore services are between good and poor in condition. There are services where the condition of the majority of them are clasified as poor, such as *water and services* (60.7), *law enforcement* (60.1), followed by *trash pick up* (58.6), *public transportation* (51.9), *trash in parks and plazas* (49.3), *public schools* (48.7), and *sewage* (46.4).

There are other services where a high percent is clasified as *good*, such as *street trees* (53.2), followed by *traffic control* (52.4), *road repair* (46.9), *sidewalk* (46.4), and *recreational programs* (35.2). There were no services where the high percent was *excellent*. The range was from 2.3 to 0.4 percent. *Public transportation* received 2.3

percent, and *trash in parks and plazas, recreational programs, road repair, sidewalk, and sewage* had 0.4 percent. Nine of the twelve services evaluated had less than one percent.

Table 27. Improvement of public services in the neighborhoods in Puebla city.

Public Services	N	Mean rating *	Degree of opinion in percent			
			Excellent	Good	Poor	No services
Traffic control	254	2.49	0.8	52.4	44.1	2.8
Street trees	278	2.52	0.7	53.2	39.6	6.5
Trash pick up	268	2.58	1.9	38.8	58.6	.7
Water and services	285	2.59	1.4	37.9	60.7	
Road repair	275	2.60	0.4	46.9	45.5	7.3
Public schools	267	2.64	0.7	42.7	48.7	7.9
Trash in parks and plazas	274	2.66	0.4	42.0	49.3	8.4
Sidewalks	261	2.66	0.4	46.4	39.8	13.4
Law enforcement	273	2.71	0.7	33.3	60.1	5.9
Public transportation	266	2.71	2.3	35.3	51.9	10.5
Sewage	252	2.75	0.4	38.5	46.4	14.7
Recreational programs	270	2.94	0.4	35.2	34.1	30.4

*Ranged on a 4-poin scale from 1 (excellent) to no services (4).

N= Total sample

There are neighborhoods in Puebla city where there are no services, such as *recreational programs* (30.4), followed by *sewage* (14.7), *sidewalk* (13.4), *public transportation* (10.5), *trash in parks and plazas* (8.4), *public schools* (7.9), *street trees* (6.5), *law enforcement* (5.9), *traffic control* (2.8) and finally *trash pick up* (.7).

Seven of the twelve public services were clasified in poor condition, and five in good condition. Nine of twelve received less than one percent as excellent, and ten out of twelve do not have services. Water is a service that is in the whole city; however, a high percent (60.7) is in poor condition. Therefore, water needs to be improved, since it is basic for the majority of things. There are no recreational programs in many parts of the city. However 81.1 percent of the respondents agree to participate in programs, but only 18.3 percent are willing to pay for improvements of those programs. That implies that, people may volunteer for the implementation of programs but they can not pay.

2. Municipality Urban Management.

The face-to-face interview was the method of data collection utilized regarding the management of green areas in Puebla city. The questionnaire was administered to six persons in charge of different offices for maintenance of urban vegetation, (Parks and gardens, north and south zone). They have the responsibility of doing the maintenance and care of about 95 percent of green areas in the city. The places for maintenance and care are parks, open green land, street trees, downtown, green area around the monuments and statues, green area in residential places, and boulevards, among others.

2.1. Green Spaces in Puebla City.

Since Puebla is a tourist city, it has many urban trees in parks, streets, avenues, commercial plazas, downtown, and camellones. However, the majority of trees are in parks, avenues and streets. About 710 parks, 84 boulevards, 7 historic places, many avenues, streets and boulevard medians are classified. Table 28 shows some examples of parks, their size, and their address.

Table 28. Some important parks in the city of Puebla.

Park's name	Size (M ²)	Address
Kuri	25,628.80	Cda. Ignacio Zaragoza and Gral. Francisco Lamadrid
La Mora	44,187.54	Prol. 14 sur la Mora
Paseo Bravo	8,877.31	3 Poniente y Reforma
Cuescomate	8,458.20	2 Poniente and 2 Norte
Parque	10,212.88	Bugambilias y Canella
Federico Escobedo	10,678.88	Avenue Juan de Palafox and Mendoza
Las Ninfas	13,410.58	17 Sur entre 25 and 27 Poniente
La Flor	33,388.40	Cerrada de Vicente Guerrero
San Jose	10,788.77	Paseo de San Jose

2.2. City Maintenance.

The maintenance of green area in the city of Puebla is mainly administrated by the municipality, although a low percent is by the state or private companies. Therefore, the municipality has under its responsibility the maintenance and care of about 95 percent of green areas. Parques y jardines (parks and gardens) is the institution in charge.

2.2.1. Parks and Public Gardens Administration: flow chart

Parks and gardens is an organization dependent on the municipality. It is divided in two zones for the maintenance of green areas in the city: north and south (figure 2). However, there is a general coordinator who has the total responsibility of maintenance. Zone north has one coordinator, 3 supervisors and 7 team workers (5 for ornamentals and integrals and 2 for tree activities). In general, there are 150 persons employed in north area. Zone south has one coordinator, 4 supervisors, and 8 team workers (6 for ornamentals and integrals, and 2 for tree activities). In total, the south zone has 200 persons employed.

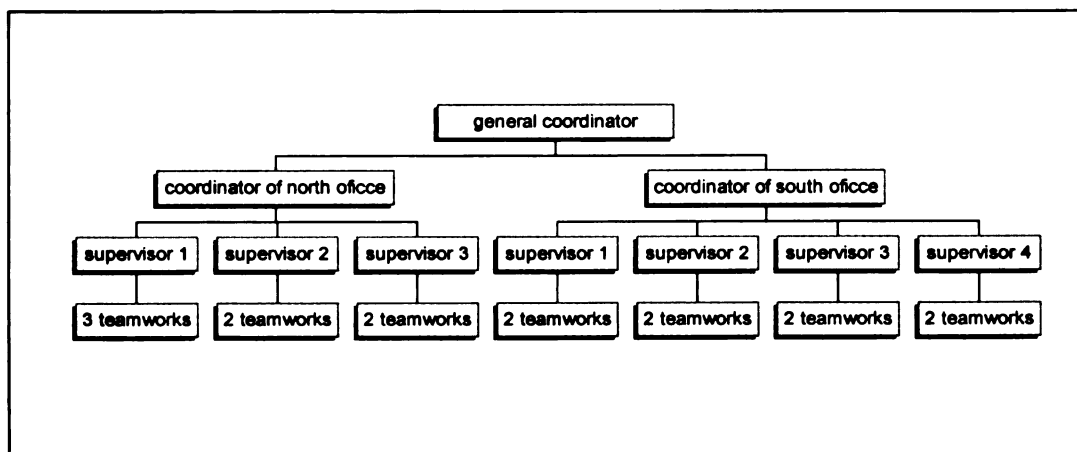


Figure.2. Parks and public gardens; organization chart.

Parks and gardens have different equipment and machinery for doing the required maintenance and care activities (figure 3).

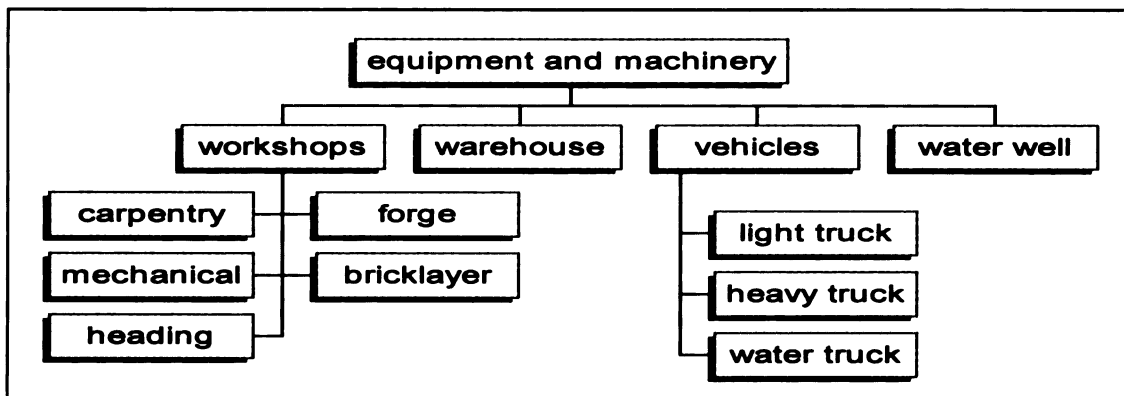


Figure 3. Equipment and machinery from parks and gardens.

There are 5 workshops, 2 warehouses, 50 vehicles, one water well and two nurseries. According to the general coordinator's opinion the equipment and personnel are enough for maintaining green areas in acceptable condition. However, others had the opinion that the maintenance could be better if there were more personnel and equipment. There are also tools such as pruning saws, machetes, brooms, and mechanical saws, among others. These help with activities of cleaning parks, avenues, and streets.

2.3. Management of Urban Programs.

There is not an official urban management program in the organization of parks and gardens. The way they maintain green areas is by performing routine activities such as watering, pruning, fertilizing, limestone application, pruning grass, cleaning, repairing games, and so on. However, the new administration (1999) has been creating a new project that relates to other existing programs and projects as follows:

1. PRONARE (National Program of Reforestation). This is a national program that provides economic resources for the propagation of plants and the salary of workers, while parks and gardens provide surface, water, and supervision.
2. Maintenance of habitation houses. This program is in coordination with other organizations such as public work, electricity, and garbage collection.
3. Schedule of activities for festivities.
4. Reforestation program of 11 South Avenue, which has an extension of 11 kilometers. It is a new project that includes activities of plant propagation, some of which are fruit species.

Parks and gardens have priorities for the schedule of maintenance and care activities. They are in described in Table 29.

Table 29. Criteria for the maintenance of green areas in Puebla city.

Priority	Criterion
First	Boulevards that are in main entrances to the city, downtown, and parks that are requested for important or historic events.
Second	Parks that have long been maintaining and are the most beautiful of the city
Third	Parks that are in important locations and have many visitors daily
Fourth	Parks that have an important extension
Fifth	Parks that are small, and have low numbers of visitors
Sixth	Small green areas in small neighborhoods

With these established priorities, some parks receive frequent maintenance by the municipality. But some other parks receive maintenance one time a year or almost never.

2.4. Urban Tree Species.

There are many species of trees in parks, streets, and avenues of the city. For many years the selection of the species for planting or reforesting has been done

depending on the selection criteria of the person in charge of each administration.

Generally, the new trees are the trees that are available in nurseries, but when the city’s administration changes, the general coordinator changes too. Therefore, the new person in charge has new idea of how to maintain green areas, and how to select new species.

As a consequence, the city has many species that are not native of this place; for example, the eucalyptus that are in many parks and streets.

The forest species most utilized in parks, streets and boulevards are: pirul (*Schinus molle*), eucalyptus (*Eucalyptus* sp), cedro blanco (*Cupressus* sp), trueno (*Ligustrum japonicum*), amate (*figus* sp), jacaranda (*Jacaranda mimosaeifolia*), fresno (*Fraxinus* sp), laurel de la india (*Ficus* sp), colorin (*Erythrina* sp), palmas (*Phoenix dactilifera* and *Euprichardia pacifica*), yucas (*Yucca* sp), among others.

2.5. Maintenance Activities.

There is a high diversity of activities, and in many cases the activity depends on the kind of maintenance place. However, the most common activities are: pruning, watering, grass cutting, calcetado⁴, pest control, painting of protection fences, repair of children’s toys, and trash pick up, among others (Table 30).

Table 30. Maintenance activities in parks by parks and gardens.

Maintenance activities	
	Pruning
	Watering
	Grass cutting
	Calcetado
	Pest control
	Painting of protection fences
	Repair of children’s toys
	Trash pick up

⁴ Calcetado is the action of painting the base of tree with a mix of lime, salts, and oil.

2.6. Main Problems.

There are many problems in the maintenance and care of Puebla's green area. One of the main problems in the parks or in green areas is vandalism. Mainly teenagers who paint graffiti in seat places; writing on tree trunks with knives, and walking on new plants do this. These greatly big damage the park. Another problem is the lack of communication with other organizations such as the Electric Company or the Phone Company. Because they prune trees without any specifications, trees lose their ornamental form. Huge quantities of garbage (especially after festivities) are another problem. There is no conscience about putting garbage in the appropriate place, and people generally throw it over the grass or streets.

5. CONCLUSIONS, AND RECOMMENDATIONS

Conclusions

1. Puebla citizens consider the environment where they live and knowledge about it to be very important. Moreover, they believe that urban trees improve quality of life in the city. From the three groups analyzed the *housekeeper group* considered the environment very important followed by *students* and *elementary teachers*.
2. Residents of Puebla city placed a high rating on the values that urban trees and parks represent for them. These are: *shade that urban trees provide, sensation of feeling nature close, aesthetic attribute, fruit producers, attractors of animals* and the *economic value*.
3. *Gender* influences the consideration of importance of the environment. *Males* considered the environment more important than *females* and *elementary teachers* did. *Income* also had influence on the consideration of importance of the environment. *Poor people* considered the environment more important, followed by *wealthy people, middle income people* and *people with no salary*. However, the three social groups considered that it is important to know about the environment.
4. Out of 13 positively analyzed characteristics; *give shade* and *bring nature close* received the highest rating compared to *increase property values* and *increase privacy*, that received the lowest rating. Therefore, *give shade* and *bring nature close* are the two positive characteristics which are important for Puebla residents.

But, other characteristics such as: *pleasing to the eye, flowers on trees, recreation activities, slow wind speed, and filter dust from air*, represented values highly appreciated, too.

5. The main concern of Puebla's residents regarding negative features of urban trees is related to night safety. *Darken street at night* was the negative characteristic that received the highest mean rating, followed by *sidewalk damage, insects and disease, flowers parts fall, fruit or seed fall, falling branches, falling leaves in fall* and *block visibility*.
6. Almost 90 percent of the residents consider that more urban trees should be planted in the city of Puebla. The places that received the highest rating for planting, are parks and trees along the streets. In contrast, planting trees in front and back yards got the lowest preferences. The selected species by the respondents are eucalyptus (*Eucalyptus sp*), laurel de la India (*Ficus sp*) and fresno (*Fraxinus sp*).
7. Eighty percent of the respondents are interested in participating in tree related programs. *Environmental education* was selected as the first priority followed by *adopt a street tree program, ecological programs, arbor day and finally voluntary service*. However, although they agree to participate in tree programs, they are not willing to pay, or prefer not to give their opinion.
8. Almost 50 percent of residents consider parks as very important. The *housekeeper* group gave the highest importance, followed by *students*, and finally *elementary teachers*. Males consider parks lightly more important than females and they are who visit parks more frequently parks with their children. Males

consider the condition of parks to be better than females. This result was a surprise, considering that females are traditionally the ones who take care of gardens, trees, and children, among other activities in the house. However, it indicates the trend in a middle size city such as Puebla, where residents planted more than 50 percent of the street trees and they are also taking care of them.

9. As a desired attribute in local parks, *gardens and flowerbeds* received the highest percentage of selection as compared to *walking* and *bicycle path*, which received the lowest percentages. However, there are other attributes of parks which are appreciated, too, such as *sport fields, presence of trees and shrubs, playground equipment, and picnic area*.
10. Residents planted more than 50 percent of the street trees, and they are taking care of them as well. City foresters are more concerned with the management of trees in parks, plazas, and downtown and main entrance boulevards. However, park trees are in the worst condition. This implies that a better schedule of activities probably needs to be performed in parks that are more frequently visited. As a complementary activity a display of visitors rules in visible park's places is also needed.
11. Scale combination of negative urban trees have strong perception by respondents from different level of education, different household income and different social group. Respondents that have *college education, no salary*, and the *students* group have the strong perception. However, a combination of positive characteristics had strong perceptions between the respondents with different level

of education. Respondents with college education have strong perception that not have it.

12. *Traffic control public service* ranked at the top, as the service in the best condition, from a list of 12 public services. It was followed by *street trees, trash pick up, water and services, road repair, public schools, trash in parks and plazas, sidewalks, law enforcement, public transportation, sewage, and recreational programs*. There are neighborhoods where there are not public services, or they are far away. The top three are recreational programs, sewage, and sidewalk. In general, seven public services were classified in poor condition, and five in good condition.
13. The institution responsible for doing the care and maintenance of 95 percent of green areas in the city is Parks and Gardens. It depends on the municipality management plans. However, there are private urban companies and state companies too.
14. About 710 parks, 84 boulevards, 7 historic places, many avenues, many streets and camellones are classified. For management, they are divided in north and south zones, each having a coordinator, supervisors and teamworkers. However, a general coordinator, who is changed when the municipality administration changes, administers both north and south.
15. According to respondents, there is enough equipment and machinery for the maintenance of green areas in the city. However, there are priorities for the maintenance of green places. There are green spaces that are maintained frequently, there are others that are maintained once at year, and there are others

not classified as important, which are almost never maintained. This implies that more personnel and equipment are required, since Puebla City is classified as a tourist historic place. Not only are the appearance of entrance boulevards and historic places important, but also all green areas are necessary for the maintenance of the image of the whole city.

16. The main maintenance activities are *watering, pruning, fertilizing, limestone application, pruning grass, cleaning, planting new trees, repairing game fields, and sometimes collection of trash*. These activities are being done when required, and when the coordinator considers that planting more trees is needed, they do it. However, there is no specific criterion for the selection of urban species because they follow the current species in the park, or plant the species that are in the nurseries. There is not a management plan.
17. The *pen-and-pencil* method, using elementary and middle schools as managers of questionnaires, was an appropriate method for doing the survey for the evaluation of urban trees attitudes among Puebla residents. It was an effective means of administration, since it helped to have questions answered with more responsibility and timely returns.
18. On the other hand, *face-to-face* was an excellent method for gathering information on the institution in charge of maintenance and care of green areas in the city of Puebla (parks and gardens).
19. There were no differences in return rates among the population samples (*poor, middle and wealthy classes, elementary and middle schoolteachers and college students*). However, college students returned the questionnaires most quickly.

20. More time was invested in administering questionnaires *face-to-face* than *pen-and-pencil*. But that was necessary because the population living close to parks and gardens was so small and some parts of the questionnaire, such as the budget section, required a special kind of introduction or modification. And, sometimes, the interpretation of the responses varied with the body expressions of the person being interviewed. However, this method was accepted because all of the persons interviewed by *face-to-face* method were friendly and showed responsibility.

Recommendations

1. *Elementary teachers* gave the lowest mean rating to *considers parks very important* compared to *student* and *housekeeper* groups. In addition, *elementary male teachers* considered the environment as *somewhat important*. Therefore the implementation of a special educational program that will provide more environmental tools that help this group is recommended, since they are educating our children. On the other hand, *students* and *housekeeper* groups are agreed that it is important to know about the environment. They will help the city forestry managers to implement environmental programs, since they consider participation in these programs as a first priority.
2. Although park trees received more maintenance by the city, they are in the worst condition. It could be because there is more direct touch between them and the frequent visitors and sometimes they are doing vandalism things. Therefore, some type of normative rules that help to guide park visitor behavior is necessary.

More than 50 percent of the visitors are males, and they are the ones taking care of children. Therefore, the specification of appropriate sanctions is recommended.

3. Since the main concern of the residents is that trees darken streets at night, in future management plans, it is important to consider the selection of urban species and an appropriate density and pruning to provide more light.
4. Under the study conditions, *pen-and-pencil using elementary and middle school as research administrators* was a good method for gathering information about resident's attitudes about urban trees, and *face-to-face* was a good method for gathering information from administrators of green areas.
5. When it is necessary to interview municipality management foresters, it is recommended to include a sample of employees mid-to-low level positions. It will create a different view of some issues.

Further Implications.

The management of urban vegetation in middle or high population cities is not an easy task. Basically, it needs the integration of two components: who is taking care of the urban vegetation, and who is living in touch with the urban vegetation.

According to the interviews in this study with city foresters in the city of Puebla, the first component is working in acceptable conditions. However, the present management of both day-to-day and future activities does not contemplate any participation or preferences from Puebla's residents. Therefore, some possible alternatives for a better administration of green areas could be the following:

1. First of all, the creation of a management plan that integrates citizen's preferences shown in this study. It could include among others:

a) Since city parks represent a recreational place, it is important to consider that they are the only place where many Puebla residents pass their free time.

Therefore, there should be comfortable rest places.

b) Planting more trees in public parks and along streets, and with species such as eucalyptus, laurel de la India, and fresno. Removal of old, sick and dead trees should also be considered.

c) A wide variety of species should be considered and tested

d) Adequate density and size of the species of urban trees is required too.

Citizens prefer tall shade trees for parks, and medium or tall size trees with no low branches for the streets. These kinds of preferences are related to safety. Therefore, it is very important to consider which species are recommended and planted.

e) Planning the addition of more gardens and flower beds and sport fields, which are the two attributes that the residents prefer to see in the parks.

f) Add the maintenance, by the city, of small parks not now considered as important. This implies more personnel, tools, machinery and budget.

g) Since the interviewed people expressed positive environmental attitudes, it is important to implement such environmental activities as: adopt-a-street- tree, arbor day, ecological programs, voluntary service, and environmental studies, among others.

2. Some ways to achieve a genuine involvement of people in some activities of the city management plans may be:

- a) Holding informal neighborhood meetings, listening to what people want, their preferences, necessities and suggestions about maintenance and care of green areas.
- b) Trying to motivate them, offering the species that they want and some educational environmental programs.
- c) Forming advisory committees to encourage citizen participation.
- d) If the people feel that green spaces are their property, they will help with the maintenance, the cost of municipality management will decrease, and the city will be greener.

Recommended Future Research for Managing Forest in Puebla City

1. The implementation of an urban inventory. This study will consist of a recognition of frequency and valuation of urban trees, classification of parks in the city according to frequency and kind of visitors, main activities, size, historic value, and location, among others. This kind of study will help to the municipality administration for the implementation of future and more suitable management plans.
2. Recognition of the requirements of the most used urban tree species and selection of greater variety. This study will search what are the main requirements for the appropriate development of the urban species in the city. It will help the urban foresters in Puebla to classify which species are more appropriated for the new

reforestation in the city. Moreover, will be so important to consider people's species preferences showed in this study.

APPENDICES

APPENDIX A

**Questionnaire English Version
Urban Tree Attitude in the city of Puebla, Mexico.**

COVER LETTER USED IN THE SURVEY

MICHIGAN STATE UNIVERSITY URBAN TREE ATTITUDE STUDY IN PUEBLA CITY

April 16, 1998

Dear Sir (Sirs).

Thanks for your participation in this survey. This questionnaire will be used to determine how the dwellers of Puebla city in Mexico feel about the street trees, and public parks. The results are designed to be used by managers and professionals to help provide better services on tree selection and maintenance the public demands. You have been chosen completely at random and the answers will be kept anonymous and strictly confidential. No names appear on this survey, and your names will not will used in the report.

The questionnaire includes all the instructions that you will need to fill it out; you can start on it any time. If you would like information, or a summary of these study results, please feel free to contact me at the address given bellow. The questionnaire will take approximately 30 minutes to complete. Your answers are so important and necessary for the successful completion of the survey. I want to thank you for giving me your time and cooperation.

Sincerely

**Rosa Garcia-Nunez
Student in Michigan State University.
913 C Cherry Lane
East Lansing MI 48823**

CONSENT FORM

1. I consent to take part in a survey of attitudes toward urban trees in Puebla city,
conducted by a student of Michigan State University in cooperation with the
department of Parks and gardens of Puebla city.
2. The objectives of the study have been explained to me and what my participation will
involve.
3. I understand that I do not have to answer all the questions and that I am free to
discontinue my participation in the moment that I want during the interview.
4. I understand that my answers will be treated in strict confidence and that I will remain
anonymous in all the phases of the study.
5. I understand that my participation in the study does not guarantee any benefit for me.

Signed _____

Date _____

QUESTIONNAIRE

URBAN TREE ATTITUDE SURVEY IN THE CITY OF PUEBLA, MEXICO

SECTION I. Urban neighborhood information.

The following questions refer to the trees growing along the **street in your neighborhood** and in your house.

1. Do you ever notice the trees in this area? ☐ Yes ☐ No

2. If you do, what interest has you about trees and shrubs? CHECK THOSE THAT APPLY.

☐ a) Their economic value

☐ d) Attraction of wild animals

☐ b) Their aesthetic value

☐ e) Feel the nature close to you

☐ c) Recreational value

☐ f) Fruits

Other: _____

☐ g) Shade

3. What is your overall opinion of the condition of the street trees in your neighborhood streets?

CHECK ONE

☐ excellent

☐ very good

☐ good

☐ poor

4. Who planted the street trees?

☐ resident people

☐ city foresters

☐ both

☐ no one

5. Who is taking care of the street trees?

☐ resident people

☐ city foresters

☐ both

☐ no one

6. How well do you think that the city is maintaining the street trees?

CHECK ONE ☐ excellent ☐ very good ☐ good ☐ poor

7. Do you think that the trees along streets are appropriate for that space?

☐ Yes ☐ No

8. The pruning of street trees in your neighborhood is:

CHECK ONE ☐ excellent ☐ very good ☐ good ☐ poor

9. If you had a choice, what size of street trees would you like to have lining your street?

CHECK ONE

- ☐ a) Large shade trees over 25 feet high ☐ c) Smaller trees that flower in the spring
☐ b) Smaller trees under 25 feet high ☐ d) A combination of a & c
☐ e) No trees

10. Do you have any problem with the street trees in front of your house?

☐ Yes (go to part b) ☐ No

b). Which kinds of problems have you in the trees in front of your house?

CHECK THOSE THAT APPLY

- ☐ a) Are the trees too tall ☐ d) Problems with the sidewalk
☐ b) Are the tree short in size ☐ e) Attraction of animals
☐ c) They create too much shadow around the house ☐ f) Production of too much
garbage
☐ g) Other: _____

11. Who does most of the yard work? CHECK ONE

___ husband ___ wife ___ son ___ daughter ___ gardener ___ other

12. Which kind of activities do you do in the trees and shrubs? CHECK THOSE THAT APPLY.

___ a) Watering

___ d) fertilizing

___ b) Pruning

___ e) Other _____

___ c) Weeding

13. Here are some public services. Please check bellow the condition of them in your neighborhood.

Public services	Excellent	Good	Poor	No services
Water and services				
Public transportation				
Trees in parks and plazas				
Recreational programs				
Trash pick up				
Public schools				
Traffic control				
Street trees				
Law enforcement				
Road repair				
Sidewalks				
Sewage				
Other _____				

SECTION II. Public parks information

The following questions refer to the **trees growing in the public parks.**

14. How do you consider the parks in the city of Puebla?

___ very important ___ important ___ not important

15. How often do you or your families visit a park?

____ frequently ____ regularly ____ rarely ____ none

16. Generally, who visits more frequently the parks in your family?

____ mother ____ father ____ other (specify)

17. What type(s) of attributes would you like to see more of in your local parks? CHECK
THOSE THAT APPLY.

____ a) Sport fields

____ e) Playground equipment

____ b) Picnic area

____ f) Gardens and flower beds

____ c) Walking and bicycle path

____ g) Other _____

____ d) Trees and shrubs

18. What is your overall opinion of the condition of the trees in your local parks?

CHECK ONE

____ excellent

____ very good

____ good

____ poor

19. How well do you think that the city is maintaining the parks? CHECK ONE

____ excellent

____ very good

____ good

____ poor

SECTION III. General information about trees.

20. How important is for you the environment where you live?

____ very important

____ somewhat important

____ no important

21. Do you think that trees on the city are important for improving the environmental quality of life?

___yes

___no

22. Here there are some possible features of the street trees. Please check below the degree of benefit that you receive from these trees. CHECK ONE ON EACH LINE

Positive tree characteristics	No benefit	Some benefit	Very great benefit	Not answer
Bring nature close				
Give shade				
Attract animals and birds				
Pleasing to the eye				
Increase privacy				
Increase property values				
Flowers on trees				
Recreation activities				
Release stress				
Reduce noise				
Slow wind speed				
Filter dust from air				
Give a sense of pride				

Other: _____

23. Here are some possible negative features of street trees. Please check below the degree of annoyance that you receive from these trees? CHECK ONE ON EACH LINE

Negative tree characteristics	No an annoyance	Some annoyance	Very great annoyance	Not answer
Insect/disease in trees				
Fruit or seed fall				
Flower parts fall				
Falling leaves in Fall				
Falling branches				
Darken street at night				
Block visibility				
Sidewalk damaged				

Other: _____

24. Do you feel that more trees should be planted in the city?

___Yes (Answer question b)

___No

b). Do you prefer a specific place for more trees planting. CHECK THOSE THAT APPLY

- ☐ a) In the streets
 ☐ d) In the back yard
☐ b) In the Parks
 ☐ e) In the downtown
☐ c) In the front yard
 ☐ f) In commercial centers
☐ g) Other _____

25. Do you have preference for specific tree?

- ☐ Yes (go to question b)
☐ No

b) What is your feeling about the following species of trees?

Tree specie	I like it very much	I like it	I do not like it	I don't know
a) Eucalyptus				
b) Casuarina				
c) Trueno				
d) Fresno				
e) Cedro				
f) Palma				
g) Pirul				
h) Acacia				
i) Alamo				
j) Laurel de la India				

k) Other: _____

26. Are you interested in participating in some tree programs?

- ☐ Yes (go to question 27)
☐ No

27. Would you be willing to participate in these programs if available? CHECK ONE
ON EACH LINE

	Yes	May be/don't know	No
a) Ecological programs	___	___	___
b) Arbor Day programs	___	___	___
c) Environmental education programs	___	___	___
d) Voluntary service	___	___	___
e) Adopt a street tree program	___	___	___

28. Would you be willing to pay (a fee or tax) for more of the following community services? CHECK ONE ON EACH LINE

	Yes	No	No opinion
a) Recreational programs	___	___	___
b) Parks	___	___	___
c) Environmental education	___	___	___
d) Street trees	___	___	___
e) Bicycle path	___	___	___
f) Other: _____	___	___	___

29. How important to you are trees and shrubs in the following areas? CHECK ONE ON
EACH LINE

	Very Important	Not Important	Important	No opinion
a) In a city park	___	___	___	___
b) In downtown and plazas	___	___	___	___
c) Shopping areas	___	___	___	___
d) In front yards of homes	___	___	___	___

- | | | | | |
|-------------------------------|-------|-------|-------|-------|
| e) Along residential streets | _____ | _____ | _____ | _____ |
| f) In and around parking lots | _____ | _____ | _____ | _____ |
| g) In industrial areas | _____ | _____ | _____ | _____ |
| h) In back yards of homes | _____ | _____ | _____ | _____ |

30. How important is it for you that the local government provides the following for its resident constituencies? CHECK ONE ON EACH LINE.

- | | Very
important | Important | Not
important | Not
answer |
|----------------------|-------------------|-----------|------------------|---------------|
| a) Wooded areas | _____ | _____ | _____ | _____ |
| b) Tree lined street | _____ | _____ | _____ | _____ |
| c) Open parkland | _____ | _____ | _____ | _____ |
| d) Other | _____ | _____ | _____ | _____ |

31. How important is for you to know about the urban environment where you live?
CHECK ONE.

- _____ a) Very important
 _____ b) Important
 _____ c) Not important
 _____ d) Not answer

32. How interested are you in the management, care and maintenance of trees and forests in the city? CHECK ONE.

- _____ a) Very interested
 _____ b) Interested
 _____ c) Not interested
 _____ d) Not answer

33. In your opinion which are the most important urban environmental problems in Puebla city? _____

34. What are other comments that you want to include? _____

SECTION III. Socio-economic Characteristics

The following information will be used in the statistical analysis. You will not be identified.

35. What is your main activity or profession? _____

36. How old are you? _____

37. Are you? ___ Male ___ Female

38. Are you native of the city of Puebla? ___ Yes ___ No

39. What is the highest year of schooling that you have completed? CIRCLE THE NUMBER OF YEARS.

Elementary school	1	2	3	4	5	6
Middle school	1	2	3			
High school	1	2	3			
College	1	2	3	4	5	6 +

40. What is your approximate monthly household income? CHECK ONE

☐ 1-5 min wage ☐ 11-15 min wage ☐ 21-25 min wage
☐ 6-10 min wage ☐ 16-20 min wage ☐ 26 +

41. Is your building? : CHECK ONE

☐ a house ☐ an apartment ☐ shared housing ☐ a place of
business

42. How long have you occupied this house/building? _____ Years

43. Do you own or rent? ☐ Own ☐ rent

44. Which is the name of your neighborhood or street?

APPENDIX B

Questionnaire English Version Municipal tree care

MUNICIPAL TREE CARE QUESTIONNAIRE

General Information

1. As person responsible for city tree care please indicate your title? _____
2. What is the area that urban trees are covering in the city? _____
3. How many parks are in the city? _____
4. How do you classify the parks and the street trees? _____
5. Which kind of activities do you plan to do in the urban trees? _____
6. Which percentage of the planned activity do you achieve?

Activity	% finished
_____	_____
_____	_____

Geographical information of your municipality

- 7) How many square kilometers are within your jurisdiction? _____
- 8) On how many kilometers of street and other roadways are you responsible for tree care? _____
- 9) Which is the number of parks that you are responsible? _____
- 10) How do you classify the maintenance of parks and street trees? _____
- 11) Could you give some examples of parks of first, second and third priority?

First _____

Second _____

Third _____

12. Is some other governmental agency also responsible for tree care within your jurisdictional area? _____

Manpower- Who gets the job done?

13. How many full time public employees, including managers, are involved with tree care? _____
14. Approximately what percent of there total time is spend on tree care activities? _____
15. How many seasonal employees are involved with the tree care? _____
16. What is the average number of months a seasonal employee works in a year? _____
17. Are there volunteers? _____
18. What are your concerns about manpower? _____
19. What are your suggestions _____

Equipment- What do you do tree work with?

20. Could you write a list of the main equipment that you require? _____
21. Does your department has available all this equipment? _____
22. Which are the general conditions of the equipment? _____
23. Which kind of equipment are you likely to purchase in the next 1-4 years? _____
24. What are the main difficulties that you have with the equipment? _____
25. What are you suggestions? _____

Budget-The money picture

26. Please indicate the position of the tree care within the governmental structure?

27. What is the total municipality budget? _____
28. What is the total annual parks and recreation budget? _____
29. What is your total annual tree care budget? _____
30. What percent of your above tree care budget is used in each of the following general areas?

Street trees	_____ % or \$ _____
Parks	_____ % or \$ _____
Nursery maintenance	_____ % or \$ _____
Public grounds	_____ % or \$ _____
Other (specify)	_____ % or \$ _____

31. What are the main concerns that you have related to budget? _____

32. What are your suggestions? _____

Trees: how many, which ones, etc

33. How many street trees are located in your jurisdiction? _____

34. How was the number determined?

_____ Survey by volunteers
 _____ Survey by city employees
 _____ Estimate
 _____ Records
 _____ Other (specify)

35. Do you keep tree records? _____ Yes _____ no

36. If yes, are they computerized? _____ Yes _____ no

37. Is the value carried on the city books as a city asset?

___ Yes _____ No _____ Don't know

38. List the 5 most commonly occurring tree species or varieties; if known, their number and percentage of total city trees.

Species	#	%
_____	_____	_____
_____	_____	_____

39. How many street trees were planted in your municipality?

1987 _____

1988 _____

40. List of species most commonly planted

Species

#

41. Who choose the species? _____

42. What was the criterion for the selection of this species? _____

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