

# CURRENT SITUATION OF THE URBAN FOREST IN MEXICO CITY<sup>1</sup>

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**Abstract.** The establishment and maintenance of urban trees and greenspace in Mexico City is not easy. The main problems in the management of the urban vegetation (vandalism, nontechnical pruning, bad selection of species and placement, deficiency of maintenance, etc.) are discussed. The percentage occupied by greenspace is only 8.91% of the urban area, while the percentage occupied by roads (avenues and streets) is 27.55%. Some perspectives on arboriculture and its history in Mexico City are described.

Mexico City is the capital of the Mexican Republic and it is located in the south central part of the country. The city is situated in the geographical area named as Valle de Mexico, which was formerly a lacustrine region conformed by five lakes. The valley is surrounded by various ranges of mountains.

The geographical location of the city (downtown) is 19°26' North latitude and 99°08' West longitude, at an elevation of 2240 m. The weather of the area, according to the Koeppen System is BSK wg for the north part of the city (situated on the flat portion of the valley) with annual precipitation between 44 and 60 cm and an annual temperature of 16° C; for the south part of the city (near the mountains) the weather is Cwbg with an annual mean temperature of 15° C and a precipitation of 80 to 110 cm per year (4,8).

The city was founded in 1325 by the Aztecs or Mexicas and given the name Mexico-Tenochtitlan. It was situated on a small island in the lake of Texcoco. The Aztecs had a special interest in ornamental plants. They built large gardens inside the city and in other areas near to it. For example, gardens in Chapultepec, Iztapalapa and Xochimilco (now inside the modern city) and in Oaxtepec contained tropical species of the Kingdom.

After the Spanish Conquest (1521) the indigenous city was completely destroyed and the

current city was built in the same site with a European design. During the colonial period (3 centuries) the interest in construction and conservation of green areas and the establishment of trees did not decrease. One of the first additions carried out by the government was the declaration in 1530 of the Bosque de Chapultepec (Chapultepec Forest) as a public place. Many gardens were constructed, especially in the courts of churches. Some public parks were also built, for example, "La Alameda" constructed in 1529. This park was the largest in the city until the end of the 19th century. Other activities throughout that period were the planting of trees along avenues and "paseos" (boulevards), e.g. Bucareli and La Piedad (4).

In 1764 there was an inventory of urban trees in the city and 13,450 trees of various species were registered (4). In 1800 there were 1596 ash (*Fraxinus udhei*), 200 willows (*Salix bonplandiana*) 98 poplars (*Populus* spp.) and trees of 14 different species in La Alameda park. De Quevedo (3) estimated that 14% of the city in 1794 was occupied by greenspace and open areas. During the colonial period and after the War of Independence (1810 - 1821) growth of the city was slow. In the first 40 years after independence, the activities in the management of the urban forest were maintenance of the constructed parks and gardens and occasionally, the planting of trees along new paseos and in some gardens.

With the French Military Intervention (1864 - 1867), a new concept in the design of parks, gardens and boulevards was introduced to Mexico. Examples were the remodeling of La Alameda and the construction of the present Paseo de la Reforma. The French influence lasted until the beginning of the 20th century.

Since 1900, the city has experienced substan-

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tial population growth motivated by the establishment of industries in the area and the improvement of communication facilities, which stimulated the emigration of rural people to the city. De Quevedo (3) stated that 2.8% of the city was occupied by green space in 1910 compared with 14% in 1794. There is a small proportion of green areas in Mexico City in comparison with other cities of Europe and the USA.

After the Mexican Revolution, the interest for improving the green areas and groves of the city did not diminish, but the economical resources designated for that activity were not sufficient to meet the demands. De la Vega (2) reported that the number of street trees in the 1920's was not enough to cover the needs of the city. Over 200,000 more were required but only 50,000 were planted. Shortly thereafter, of these trees, 20,000 died, 15,000 were dying, and 10,000 were in poor condition. Only 5000 trees were functioning satisfactorily.

From 1940 an explosive population growth has taken place in the city, and since 1960, there has been a big population growth in the neighboring suburbs to the north and northeast of Mexico City. At this time the population in those cities is larger than in Mexico City itself.

### Present Situation

In the metropolitan area of Mexico City there are 15 million inhabitants, i.e. 20% of the total population of the country in 1/1000th of its space. In the metropolitan area there are 2.9 million motor vehicles, which consume 7,000 million liters of gasoline each year.

The city has a serious problem with atmospheric pollution, mainly due to the large number of vehicles (responsible for 70% of the toxic emissions). In addition, a large number of industries (30,000) are situated in this area and are responsible of the 17% of the atmospheric pollutants (9). The problem is accentuated by the various ranges of mountains which surround the valley and the frequent thermic inversions in the winter.

### Present Problems of the Urban Forest in Mexico City

Notwithstanding that urban trees have been planted in the city for hundreds of years, some

problems persist with their management. The main current problems in the urban forestry of Mexico City are:

- a) There is not a proper selection of tree species for the place of planting. Commonly, the crews of the operative offices of parks and gardens in each delegation, plant the trees in inadequate places, for example, *Jacaranda mimosifolia* and *Erythrina coralloides* (with superficial root growth habit) in small planting holes; large species like *Eucalyptus camaldulensis*, *E. globulus*, *Fraxinum udhei*, *Casuarina equisetifolia*, under utility lines; evergreen species like *Pinus* spp., *Cupressus lindleyi* or *C. benthami* along the sidewalks of avenues with intensive traffic. This causes major maintenance problems.
- b) Too close planting (principally in green areas) which causes excessive competition and abnormal growth in the trees.
- c) Frequently, the pruning of trees situated under utility lines is not practiced in a technical way, and the wounds are not protected. Very often the trees lose their aesthetic value and are predisposed to pest attacks or diseases.
- d) It is common in the sidewalks to open planting holes rather than planting strips, and even more, the size of the planting holes are frequently small (40 to 60 cm long each side), which causes damage to the sidewalks by the roots of trees.
- e) An inadequate mixture of trees species which causes a decrease in the aesthetic value of streets or public places.
- f) Each political unit has its own office of parks and gardens, and is responsible for the management of the urban trees and green areas in their territory. They work in an isolated way and there is little communication between them or a coordination office for them. This causes a great diversity of tree species to be planted and management decisions differ when the same avenue or street passes from one delegation to another.
- g) Not all the offices of parks and gardens have an urban tree inventory. There is no information on species, size and condition of trees so that lack of basic knowledge in those delegations makes

correct management and improvement of the urban forest difficult. The personnel of these offices see urban forestry programs as reforestation campaigns, not as pruning and maintenance of trees in green areas. Frequently when a delegation's crew fells a declining or dead tree, it is in answer to a request by some interested citizen, not the result of a sanitation program.

- h) Commonly, the inhabitants in the new neighborhoods plant the tree species they prefer, without supervision or regulation by authorities. People often plant improper trees species.
- i) There are no regulations or ordinances to control the space requirement for planting, management of trees, or the use of proper tree species.
- j) In many green areas, a common problem is the excessive use of the area by the population for recreation and rest purposes. An example is the Bosque de Chapultepec, which receives every year almost 80 million visitors.

These problems exist because of the lack of specialists and qualified crews in the management of the urban forest. Also, the scarcity of economical resources to attend this activity is critical, due in part to the continual growth in a city where the population demands public services like schools, hospitals, roads, drainage systems, utility lines, etc.

### Extension of Green Areas in Mexico City

At the present time, the percentage of green space and open space is 8.9% of the Greater Mexico City area. In contrast, the percentage occupied by roads (streets and avenues) is 27.5% (5), *i.e.*, the area designated for motor vehicles is as much as three times higher than the area designated for comfort and recreation of people. The city has 3310 ha (33.1 km<sup>2</sup>) of green areas, of this, 60.4% is in parks, 18.3% in gardens, 12.3% in sporting areas and the rest ( $\pm 10\%$ ) in green areas along avenues, boulevards and rotaries of traffic circles (4).

The number of tree species used in Mexico City is large. The most common are ash (*Fraxinus udhei*), eucalyptus (*Eucalyptus canaldulensis* and *E. globulus*), privet (*Ligustrum lucidum*), jacar-

anda (*Jacaranda mimosifolia*), sweet gum (*Liquidambar styraciflua*), casuarina (*Casuarina equisetifolia*) and colorin (*Erythrin coralloides*).

Of the species, 70% are exotic species and a low percentage are species native to the valley of Mexico. Some reasons for the former are the lack of production of some species at nurseries (*E. camaldulensis*, *C. equisetifolia* or *L. lucidum*): use of fashionable trees in some years (*J. mimosifolia*, *Ulmus parviflora* or *Schinus terabentrifolius*) or selection of trees by whim or pleasure of people (*L. styraciflua*, *Ficus microcarpa*).

### Perspectives

The improvement of the urban forest management in Mexico City is necessary, because, according to the projections of population growth, the metropolitan area of Mexico City will have, in the year 2000, almost 30 million inhabitants (5) with the consequent aggravation of problems if they are not solved. It is expected that 3 of 4 inhabitants of Mexico will reside in urban areas, *i.e.* almost 80 million people (5). The arboricultural experiences obtained in Mexico City will assist other cities of the Mexican Republic and also benefit other developing countries.

Some steps have been initiated to improve the situation of Mexico City. Of these, the following are relevant:

- a) Decentralization of some governmental dependencies to small cities.
- b) The transference or establishment of industries outside the metropolitan area, especially those with high consumption of water or that produce elevated pollution levels.
- c) To reduce the atmospheric pollution, the city government has ordered a restriction in the use of motor vehicles, with a permanent campaign with the name of "Hoy no Circula" (Today you do not circulate) according to the last digit of the vehicle license.
- d) An intensive urban reforestation campaign began in the summer of 1990, with the objective of planting 1 million trees in the rural and urban zones of D.F. The President of Mexico and the government of the city actively participated. This campaign was named "Cada Familia un Arbol" (Each Family a Tree), and

over 1.5 million trees were planted. A survival rate of 80% is expected by the local authorities, but a more realistic value may be 50 to 60%.

Urban forestry as a concept for management of all vegetation in the urban zones is a new idea in Mexico. Consequently, it is necessary to develop this discipline, encourage the training of the operative personnel, and provide research in this area. There are few institutions in the country that have research programs related to vegetation in urban places. The National Institute of Forestry, Agriculture and Cattle Research is the only institution that has a research program to generate recommendations for the correct management of urban trees to the operative offices.

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