



Effects of Urban Street Trees on Human Health Interaction and The Future Prospects in Hyderabad

*Anitha Devi. U¹, Vijaya.S²

¹Dept. of Botany Indira Priyadarshini Govt College for Women (A), Hyderabad

²Department of Botany, Tara Govt. College (A), Sangareddy, Telangana,

*Email: anithadevidr@gmail.com

ABSTRACT:

A survey was conducted in the central region of Hyderabad, in Nampally near Priyadarshini Degree College approximately five kilometers away, making use of random plots to identify species composition, structure, possible conflicts with infrastructure, and environmental benefits; however, only a small number of plants were found to affect human health. There has been a sharp increase in the contamination of one of the most important abiotic factors of the environment, namely the air. This is due to the rapid increase in urbanization which has been followed by an increase in industrialization, which the ever-expanding population has compounded in the past few decades. Under these conditions, it is unavoidable to implement clean and environmentally friendly strategies for monitoring and controlling air pollution. One of these indices, known as the Air Pollution Tolerance Index (APTI), indicates the degree to which different kinds of plants can survive air pollution. This comprises the investigation of physiological and biochemical characteristics such as the total chlorophyll content, the ascorbic acid content, the pH of the leaf extract, and the relative water content of the leaves. For this investigation, the mature tree species located in and around Hyderabad, Telangana India, such as *Polyalthia longifolia*, *Putranjiva roxburghii*, *Alstonia scholaris*, *Delonix regia*, and *Peltophorum pterocarpum* were chosen to serve as the study's plant subjects. The values that make up the Air Pollution Tolerance Index (APTI) allow for the categorization of plants as tolerant, intermediate, sensitive, or severely sensitive to air pollution. The following is a list, in decreasing order, of the plants' tolerance, according to the study: *P. roxburghii* > *P. pterocarpum* > *D. regia* > *P. longifolia* > *A. scholaris*. After being selected according to their APTI values, some species can subsequently be utilized as bio-indicators of air pollution and reduce that pollution through the construction of green belts in metropolitan areas.

Keywords: Air pollution; Air Pollution Tolerance Index (APTI); Bio-indicators; Urbanization

Aim

The Urban Forestry Wing was established within HMDA (which was formerly known as HUDA) in the year 1986 to bring open spaces under greenery by raising various types of plantation models such as block plantations, avenue plantations, tree parks, colony parks, and gardens. This was done to improve the overall environment of Hyderabad to provide a higher quality of life for its residents. You may view the HMDA's Urban Forestry initiatives in the photo gallery by clicking Here.

Objectives:

- Reducing the number of pollutants in the air, noise, and water through greening the HMDA area.
- The transformation of barren terrain into lush vegetation to provide profitable job opportunities.
- Work to increase the amount of firewood and fodder that is available to the local people.
- The ability for women's organizations to generate income via the practice of raising nurseries.
- identify the daily differences in urban thermal comfort and human physiological conditions on different streets; and,
- Explore the quantitative relationships between urban thermal comfort and human physiological indices. Our study can provide useful information on the design of urban streets to improve urban thermal environments.

Review of Literature:

A program called Haritaharam is being implemented by the government of Telangana to increase the state's tree cover. At the Chilukur Balaji Temple on July 3, 2015, Telangana State Chief Minister Kalvakuntla Chandrasekhar Rao performed the ceremonial ceremony that marked the

beginning of the Haritaharam 2015 festival. This initiative was developed by the government of Telangana to reforest and green the entirety of Telangana, which accounts for 33 percent of the state's total geographical area. By alone, the year 2016 saw the planting of 46 crore trees.

On July 3, 2015, the initiative was officially kicked off by Mr. **K. Chandrashekar Rao**, who serves as the Chief Minister of Telangana. Rejuvenating damaged forests is one of the flagship programs in the state of Telangana, and this program is also tasked with preserving those woods from a variety of dangers, including smuggling, encroachment, fire, and grazing. It implemented stringent procedures for soil and moisture conservation based on the concept of watershed management.

In the areas that were not already covered by forest, there were going to be extensive reforestation efforts carried out. These efforts were going to be focused on areas such as roadside avenues, river and canal banks, barren hills and foreshore areas, institutional premises, religious places, housing colonies, community lands, municipal and industrial parks, and housing colonies. The Indian government's National Forest Policy calls for a minimum of 33 percent of the country's total geographical area to be covered in forest in order to preserve environmental stability and ecological balance.

The urban street is the most common and easily accessible form of public space found in cities (Astor 2019). According to Araldi and Fusco 2019 and Astor 2019, the percentage of a city's total public space that is made up of roadways can reach above 80 percent. People of all ages use streets for a variety of important activities, including strolling, sitting, cycling, and conducting business. Streets are important spaces (Jin et al. 2019). According to Ginner et al. (2015) and Lee and Mayer (2018), the urban thermal environment is primarily connected to the features of streets to produce an engaging environment that guarantees comfort and enjoyment. According to Chatzidimitriou and Yannas (2017), Sharmin et al. (2017), and Qaid et al. (2018), the urban thermal environment may be fundamentally shaped by street geometry. Street geometry includes factors such as street direction, building height-to-width ratios, and sky view factors. During the warm summer months, street trees provide much-needed shade, which cuts down on the amount of direct sunshine that hits people and buildings along the streets and saves electricity (Qaid et al. 2018).

According to Wang and Akbari (2016), the presence of trees along city roadways is critical for reducing the severity of the urban heat island effect and enhancing the quality of the urban environment. As a result, planting trees along streets has been one of the primary tactics that have been utilized to improve the thermal environment of urban areas (Revelli and Porporato 2018; Gebert *et al.* 2019).

This study investigates the effects of street trees on urban thermal comfort and human physiological indices in a highly urbanized and intensively populated city. Hyderabad is a city with a temperate climate, rapidly urbanizing, and increasing summer temperatures.

Materials and methods:

Study site This study was carried out in Hyderabad city, the capital of Telangana State India. Within downtown Hyderabad, there is a 650 km² area with a 33% vegetation cover, with a population of 10,534,000 at the end of 2020. It has a temperate climate, with annual precipitation of 567 mm, and an average summer temperature of 24 °C. The temperatures have increased by 1.9 °C over 60 years from 1951 to 2020.

Analysis & Finding:

Plants under study and samples were identified.

The following species

- 1) *Polyalthia longifolia* Sonn.,
- 2) *Alstonia scholaris* (L.) R.Br.,
- 3) *Delonix regia* (Boj. ex Hook.) Raf.,
- 4) *Putranjiva roxburghii* Wall.,
- 5) *Peltophorum pterocarpum* (DC.) Backer ex
- 6) *Cono carpus* were abundant in the areas selected for the study and were feasible to collect hence selected for the study. The plant samples i.e., mature twigs with leaves were collected from Nov to Dec first week with all precautionary measures for further study.

The once feared task of driving through major thoroughfares in a variety of Urban Local Bodies (ULBs) located around the state is now something that may be looked forward to as a result of the vegetation that has been established along the highways. In addition to the large flora along the roadside, other departments are currently concentrating their efforts on Multi-. This program contributes to the planting of more seedlings in confined areas. As part of the MLAP program, blooming plants and shrubs will be planted in a certain arrangement according to different categories. This will be done on medians and roadways. Several stretches of road, particularly those that lead to district headquarters and state highways, are getting plantations of flowering plants and shrubs. Depending on the location, space, and feasibility of the project, these plantations can have one, two, or even more rows of flowering plants and shrubs.

Considering this, the Department of Municipal Administration and Urban Development (MAUD) is launching a comprehensive MLAP push across the state. As part of this programme, a total of 521 road segments spanning 818 kilometers have been located around the state. The MLAP project has been finished for the time being, and it has covered a total of 446 kilometres spanning 325 road lengths across the state.

The *Cono carpus* tree is being targeted due to the possible dangers posed by its roots and pollen. Because it requires so little care, this kind of tree is frequently used for the beautification of roadways and gardens all over the world. It is native to certain regions of North and South America as well as some regions of Africa; nevertheless, different governmental agencies in India have utilized it as a kind of landscaping for road medians, along roadways, and in public gardens. According to an amateur botanist named Shrikant Ingahlalikar, countries in the Arabian Peninsula have utilized the plant to regulate pollution and prevent sandstorms caused by desert storms.

In this survey, we identify a few trees that are among the most dangerous to people living in urban areas. These trees are among the plants that were planted as part of the Haritharam programme. The overwhelming number of negative impacts caused by *Cono carpus* led the government of Telangana to prohibit the plant. The officials were given strict instructions not to plant any of these plants in any of the grassy areas. On the other hand, it is not being implemented at the local level. Many individuals choose to get their gardening done during the wetter months. Additionally, the government of Telangana runs an annual tree-planting initiative called the Sapling Program. In addition to that, it motivates a big number of individuals to plant trees. On either side of the highways, flowers, fruits, and trees used for timber are planted beside one another. The environment and our children are not harmed in any way by trees, yet trees offer no advantages. But the presence of only one green plant is raising alarm among everyone.

Cono carpus is the name of this plant. To improve the appearance of several sites in Hyderabad, the state of Telangana, *Cono carpus* plants are now being planted. These trees are being planted more and more between the roadways to improve the amount of greenery. They quickly attain an upright vegetative growth pattern. The towns become lush with vegetation because of planting on both sides of the highways as well as in the center of the roads. The environmental community, on the other hand, is concerned about these plants. In general, environmentalists are worried about the practice of deforestation. But now that they have seen so many *Cono carpus* plants, they are completely taken aback. mainly because they are extremely hazardous. Not only is this harmful to the environment, but it also has negative effects on people.

Conclusions

The purpose of this study was to quantify the effect that urban street trees have on human thermal comfort levels and physiological indices, as well as their relationships with one another. Measurements of urban thermal parameters and human physiological conditions were taken in Hyderabad city, in which had a different tree cover. Several findings of significant import have been established. The street that had the most tree cover also had the lowest air and mean radiant temperatures, the highest relative humidity, and the lowest physiological equivalent temperatures.

It is crucial to include biodiversity in urban planning and development to ensure a sustainable future. Green spaces and natural ecosystem preservation a pillar of sustainable urban development, and both the Comprehensive Master Plan and the "**Greening Hyderabad**" project demonstrate Hyderabad's dedication to this goal. The findings of this research provide strong evidence for making biodiversity conservation and urban planning top priorities in Hyderabad. This dedication will not only make the city's environment healthier and more robust, but it will also improve the quality of life for its residents. Preserving and incorporating Hyderabad's natural heritage with the city's ongoing development and expansion is crucial to creating a sustainable and environmentally friendly metropolitan for present and future generations.

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