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Composition and Diversity of Tree Species in Selected Region of Ulhasnagar

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Abstract: ***Urban green space has been recognized as one of the issues, which seems particularly important in the upbringing of countries with developing economies. Green spaces within residential areas provide important contributions to the sustainability of urban systems. UNEP's foresight report links biodiversity with urban sustainability and resilience. The city of Ulhasnagar is spread over an area of 13 sq km, divided into various camps regions viz Camp I, II, III, IV, and V. In the present study tree species composition, diversity and abundance in Camp III region of Ulhasnagar was assessed. The trees were accounted by further transecting the region into gardens, institutes and roadside-residential areas. The data were analysed for relative density (RD), relative abundance (pi), Margalef's species index (d) and Shannon - Wiener index (H). Results revealed a total of 3617 trees belonging to 31 different families with 66 genus and 76 species in the whole of Camp III region. The members of families Annonaceae (873), Leguminosae (607) and Palmae (445) were higher than other tree species. In general Polyalthia longifolia, Terminalia catappa, Samanea saman and Roystonea regia were the most abundant species. The Shannon - Wiener index (H) values for gardens, institutes and roadside-residential areas were 2.697, 2.9984 and 3.1766 respectively. The tree species composition and distribution indicates Ulhasnagar being an unplanned city; and the urban tree distribution is strongly influenced by the developmental history of the region.***

Keywords: Diversity, Camp III, Shannon-Wiener index, urban, Polyalthia longifolia, Samanea saman.

I. INTRODUCTION

Urban biodiversity is an important factor of an urban ecosystem as it provides multiple service and environmental benefits to human society and the city. These environmental benefits may include conservation of energy, reduction in effect of urban heat island; improve air and water quality, carbon sequestration and biodiversity conservation (Nowak, D.J. *et al*, 2006). Urban forest also provides some social and economic benefits such as reduce psychological stress, quick recovery from illness thereby reduces health cost, improve the quality of microclimate and increase the property value (Maco and McPherson, 2003). Most of the city dwellers think that urban forest has significant contribution to make the urban environment safe for city peoples and improve the better quality of life. Despite the dependence of various economic sectors on biodiversity, such as agriculture, human health, business and industry etc., its global loss is considered to be one of the major environmental challenges of this century (Coder and Nim, 1996). The vegetation in urban area is a highly altered ecosystem in which structure and composition of species is determined by human actions (Ramage and Roman, 2013). Urban greenery that includes streets with trees, parks, educational institutions play vital role in conservation of tree cover, environment as well. It can decrease the urban island heat effect (Chow & Roth 2006). Though urban forest very often is small in area, they tend to be characterized by high levels of diversity and microhabitat heterogeneity, with large proportions of exotic species (Zao *et al*, 2010). Besides the ecological status they also have medicinal values and they help to a greater extent in controlling pollution. Government has realized the importance of tree cover its protection and extension, therefore has made it compulsory to go for tree census once in five year (Nowak *et al*, 2008).

A century ago, just about one tenth of the global population lived in the cities, which has now exceeded to 50% (Singh *et al.*, 2010). In context of rapid urbanization and growing environment problems, there is need of social awareness campaign for the governance of urban systems that counters the menace of defacement of patches of tree cover and sensitizes the issue of environment. Cities constitute a habitat and home for an increasingly large proportion of the world's population, playing a critical role in maintaining ecological, economic and social well-being. In India, at the time of Independence more than 75% of population was village based and the country was oriented towards agriculture. With the industrialization and development, people migrated towards the industrialized cities. The small towns and cities also developed and become large towns or cities by establishment of industries. Nowadays more people live in cities and towns than in rural areas. As more people choose to live in towns and cities, the quality of the urban environment becomes increasingly important. The present study area Ulhasnagar, a rehabilitation camp region since the post partition period is today a growing city with five camp regions. This paper assesses the composition and distribution of trees in Camp III region of Ulhasnagar city.

II. MATERIALS AND METHODS

1) *Study Area:* Ulhasnagar city is located at 19.22°N 73.15°E, approximately 60 kilometres northeast to the city of Mumbai, in the district of Thane, Maharashtra. It has an average elevation of 19 meters (62 feet). Ulhasnagar of today comprises of five military camps that were set up for the rehabilitation of Sindhi refugees and later developed into being recognized as Ulhasnagar I, II, III, IV and V. The town covers an area of 13 square kilometres.
2) *Data collection and Analysis:* A systematic survey was conducted for about one year during 2016-17. Trees with a trunk diameter of six inch and more were considered, counted physically and identified using Flora (Almeida, 2001; Cooke, 1958). To study the composition and distribution pattern of the vegetation, the data were analyzed for relative density (RD), relative abundance (pi) (Ogawu *et al*, 2016), Margalef's species index (d) (Margalef, 1958) and Shannon - Wiener index (H) (Shannon and Wiener, 1949). All computation was carried out on XLStat Software package.

III.RESULTS AND DISCUSSION

Trees are useful for analysis of species-area and species-individual relationships because they are easy to locate precisely and to count. Documentation of existing green cover of the urban environment is important to determine existing resources and to set target for future improvements (Miller 1996). Since no documentation has been initiated either by neither the government body nor the citizens, an attempt has been made by the authors in this context. Ulhasnagar city comprises of five zones, popularly known as the Camp I, Camp II, Camp III, Camp IV and Camp V; with a total of 13,667 trees put on records in the whole of Ulhasnagar city indicating the distribution of the green was not uniform (Menon, G., & Gharge, S. 2018). In Camp III region of Ulhasnagar trees growing in the eleven gardens earmarked on the city development plan covering 8.04768 ha, sixteen institutions, along the roadside and in the residential areas were recorded to be 3617 trees, that belongs to 31 families, 66 genus and 76 species, accounting for 26.5% of the total green cover in a city. Highest number of trees was from family Annonaceae (873) followed by Leguminosae (607) and Palmae (445). Total trees recorded were further categorized at per their location into gardens, institutes and roadside - residential (private) region (Fig 1).

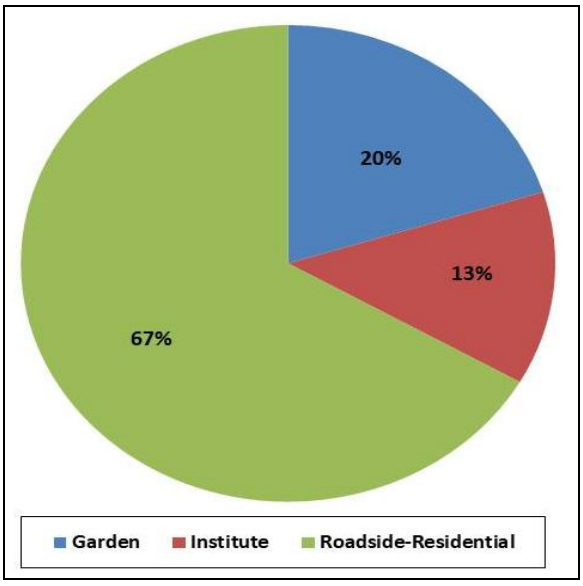

Fig 1: Distribution of trees (%) in different areas of Camp III region

In this region, there are eleven garden (4.957 ha) with a green cover of 729 trees belonging to 15 families, viz Anacardiaceae, Annonaceae, Apocynaceae, Araucariaceae, Casuarinaceae, Combretaceae, Cycadaceae, Euphorbiaceae, Leguminosae, Lythraceae, Meliaceae, Myrtaceae, Palmae, Sapotaceae and Urticaceae. Family Palmae showed 206 trees (5 genus each with single species (Borassus, Caryota, Cocos, Livistona and Roystonia) followed by Annonaceae 181 trees belonging to Polyalthia and Annona. Among the total 729 trees, Polyalthia longifolia was abundant (24.28%) followed by Roystonea regia (23.73%), Terminalia catappa (5.35%) and Samanea saman (4.25%). Araucaria sp, Ficus benghalensis, Madhuca indica were some of the least abundant species (Fig 2).

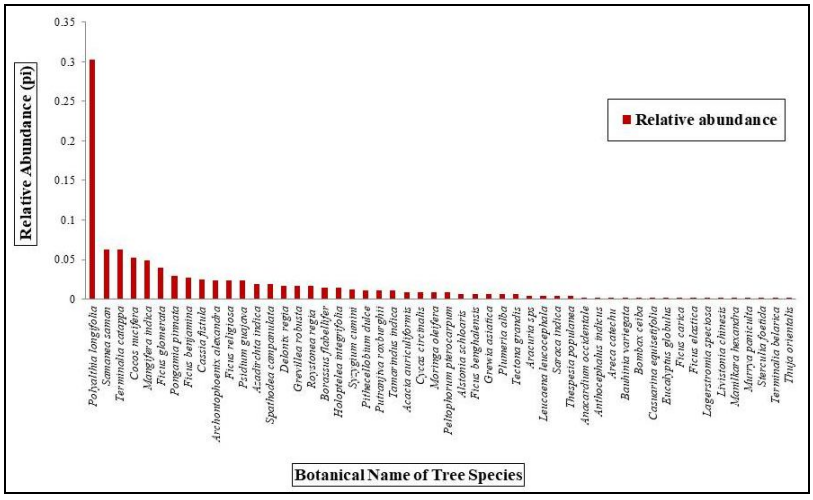

Fig 2: Relative Abundance of tree species in Gardens of Camp III region

There are 475 trees in all the sixteen institutes of the region. The trees belonged to 24 families, viz Anacardiaceae, Annonaceae, Apocynaceae, Araucariaceae, Bignoniaceae, Bombacaceae, Casuarinaceae, Combretaceae, Cycadaceae, Euphorbiaceae, Leguminosae, Lythraceae, Malvaceae, Meliaceae, Moringaceae, Myrtaceae, Palmae, Rubiaceae, Rutaceae, Sapotaceae, Sterculiaceae, Tiliaceae, Urticaceae and Verbenaceae. As observed in other regions member of family Annonaceae (Polyalthia) represented highest number (144) followed by Leguminosae 87 trees with 11 genus represented by single species each (Acacia, Bauhinia, Cassia, Delonix, Leucaena, Peltophorum, Pithecellobium, Pongamia, Samanea, Saraca and Tamarindus). Polyalthia longifolia accounted for about (30.31%) of the relative abundance, followed by Samanea saman (6.31%), Terminalia catappa (6.31%), Cocos nucifera (5.26%) and Mangifera indica (4.84%). Many tree species had least relative abundance viz. Murraya paniculata, Manilkara hexandra, Thuja orientalis, etc (Fig 3).

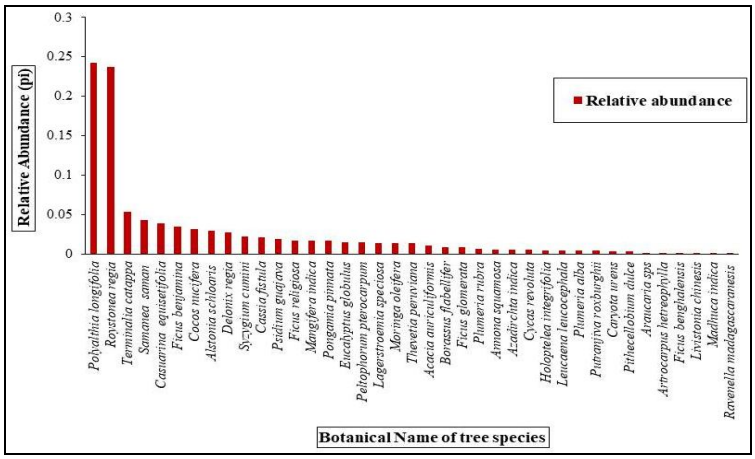

Fig 3: Relative Abundance of tree species in Institutes of Camp III region

The vegetation along the roadside-residential areas constituted 2413 trees, almost 67% of the green cover in the study area. There are 57 genus with 63 species found in this region, family Annonaceae displayed highest number (548) with 2 genus (Polyalthia and Annona), both represented by single species; followed by family Leguminosae with 12 genus and 13 species (Acacia, Albizzia, Bauhinia, Delonix, Erythrina, Leucaena, Peltophorum, Pithecellobium, Pongamia, Samanea and Tamarindus (Cassia- 2 sp). The species with highest number was Polyalthia longifolia (535) with relative abundance of 22.17%, was followed by Terminalia catappa (9.20%) and Alstonia scholaris (7.29%) (Fig 4). Bombax ceiba, Ceiba pentandra, Erythrina indica, Ficus carica, Jatropha curcas, Manilkara hexandra, Madhuca indica, Michelia champaca, Millingtonia hortensis, Morinda pubescens, Ravenella madagascariensis, Putranjiva roxburghii, Saraca indica, Tectona grandis, Terminalia belarica, Cycas revoluta are few distinct species at the Camp III site.

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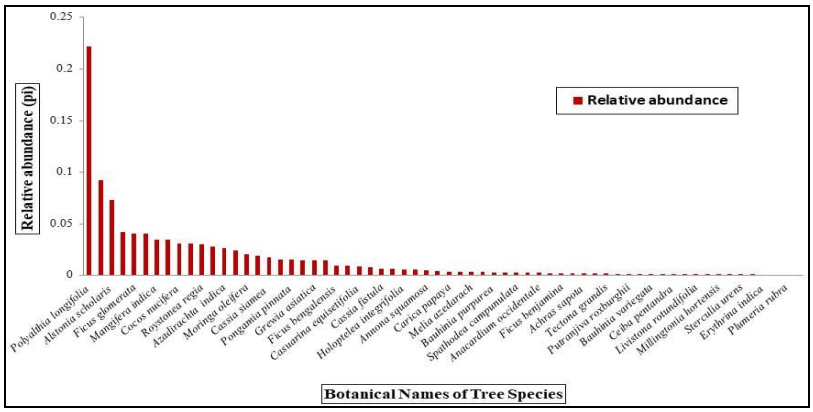

Fig 4: Relative Abundance of tree species in Roadside-Residential areas of Camp III region

Margalef's species richness index (d) indicates species richness of the area. Roadside-residential areas assessed showed richness index 4.62, followed by Institute (4.38) and least in the gardens (3.34). The Shannon diversity index (H) is another index commonly used to characterize species diversity in a community. H index was also highest at roadside-residential areas (3.17) followed by Institute (2.99) and lowest at gardens (2.70). The physiognomic status of the region were more or less uniform, though slightly higher percentage of evergreen trees were recorded in the roadside-residential areas followed by gardens and Institutes (71.87%, 71.8 and 71.15 respectively). Introduced tree variety was observed to be abundant in gardens than native tree species. Similar pattern was also observed along roadside-residential areas, though in institutes both native and introduced forms were almost equal in number (51.6%, 56.4% and 50%) (Fig 5 and 6).

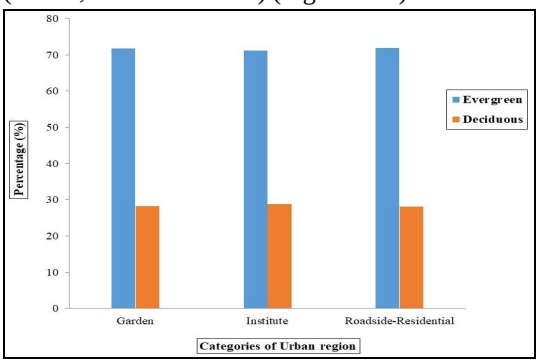

Fig 5: Physignomic status of tree species of Camp III region

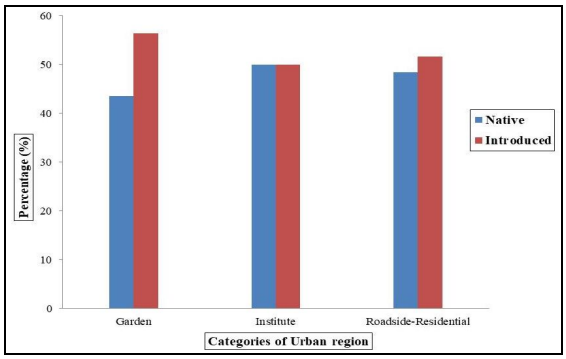

Fig 6: Native and Introduced tree species in Camp III region

This study has documented the taxonomy, diversity and environmental relevance of tree flora in the Camp III region of Ulhasnagar. A total of 76 species belonging to 66 genus representing 31 different families indicated a large number of species variety in all the three different transect areas of Camp III region. Urban trees can increase the aesthetic value, thereby increasing the real estate value too (Kielbaso, 1990). Urban parks, gardens and natural landscapes are better known for their non-market or intangible benefits than market or tangible benefits. They also contribute greatly to the health and welfare of everyone who lives and works in the environment.

As an important component of green infrastructure, trees can provide several social, communal, psychological, economic and environmental benefits. They also contribute greatly to the health and welfare of everyone who lives and works in the environment. The diversity of tree species in Ulhasnagar showed irregular green cover, with highest diversity in the Camp III region as compared to other region. Moreover the tree flora of most of the Camp regions of Ulhasnagar is largely under threat from anthropogenic activities like urbanization (G. Menon and S. Gharge, 2018). Many researchers have reported the adverse effect on plant communities of habitat destruction, over exploitation, pollution and species introduction that have been anthropogenically disturbed (Sumina, 1994). As human population continue to grow, land use intensity increases and the negative effects of deforestation are likely to worsen (Chazdon, 2003). Over exploitation of trees and sustainable management techniques are required to maintain the biodiversity and productivity of ecosystems (Reddy *et al.*, 2008).

IV. CONCLUSION

Ulhasnagar being a city of migrants has never given priority to the quantum of green cover which appears to be thoroughly overlooked, with no attention given by the government body and the citizens. Camp III region of Ulhasnagar has many gardens and institutes which are largely neglected in terms of green cover. The study yielding the above said relevant information will thus help to bring awareness and seek solution for sustainability of green cover in this region. Also a planned effort can be made to improve the life of vegetation cover especially with the plantation of native tree species in the gardens and educational institutions. The data generated from the study thus can act as a guideline towards any future attempt for a green tomorrow.

REFERENCES

[1] Almeida, M.R. Flora of Maharashtra, Orient Press, Mumbai, 2001.
[2] Chazdon, R..L., "Tropical Forest Recovery: Legacies of Human Impact and Natural Disturbances", Perspectives *in Plant Ecology*, vol. 6, 51-71, 2003.
[3] Chow, WTL., & Roth. M, "Temporal dynamics of the urban heat island of Singapore", *International Journal of Climatology*, vol. 26, pp. 2243–2260, 2006.
[4] Coder, D., Kim, D, "Identified benefits of community trees and forests", Ph.D. Dissertation, University of Georgia, 1996.
[5] Cooke, T. Flora of the Presidency of Bombay, vol. I-III, B.S.I., Calcutta, 1958.
[6] Kielbaso, J. J., "Trends and issues in city forests", *Journal of Arboriculture*, vol. 16, pp.69-73, 1990.
[7] Maco, S.E.; McPherson, E. G., "A practical approach to assessing structure, function and value of street tree populations in small communities" *J. Arboriculture*., vol 29, pp. 9-84, 2003
[8] Margalef, R. "Temporal succession and spatial heterogeneity in phytoplankton", *In: Buzzati-Traverso (ed.). Perspectives in Marine biology*, University of California Press, Berkeley, pp. 323 – 347, 1958.
[9] Menon, G. and Gharge, S., "Diversity of Tree Species in Urban Green Spaces of Ulhasnagar" *International Journal of Applied and Pure Science and Agriculture (IJAPSA)*, vol. 04, Issue 1, pp. 21-25, 2018.
[10] Miller. R, W., Urban Forestry: Planning and Managing Urban Green spaces. Prentice-Hall, Englewood Cliffs, 502, 1996.
[11] Nowak D. J., Crane, D.E.; Stevens, J.C., "Air pollution removal by urban trees and shrubs in the United States", *Urban For. Urban Green*, vol. 4, pp. 115-123, .,2006
[12] Nowak, D.J.; Daniel, E.C.; Robert, E.H.; Jeffrey, T.W.; Jerry, B. "A Ground-Based Method of Assessing Urban Forest Structure and Ecosystem Services", *Arboricul. Urban* 437, vol. 34, 347–358, 2008.
[13] Ogwu, M.C., Osawaru, M.E. and Obayuwana, O.K., "Diversity and Abundance of Tree Species in the University of Benin, Benin City, Nigeria," *Applied Tropical Agriculture*, vol. 21, No. 3, pp. 46-54, 2016.
[14] Ramage, B.S.; Roman, L., "Relationships between urban tree communities and the biomes in which they reside", *Applied Veg. Sci*. vol.16, pp. 8–20, 2013.
[15] Reddy, C. S., Shilpa, B., Giriraj, A., Reddy, K. N. and Rao K. T, "Structure and floristic composition of tree diversity in tropical dry deciduous forest of Eastern Ghats, Southern Andhra, Pradesh, India", *Asian Journal of Scientific Research*, vol. 1(1): 57 – 64, 2008.
[16] Shannon, C. E. and Wiener, W., The mathematical theory of communication, Urbana, University of Illinois Press. 177, 1949.
[17] Singh V.S., Pandey, D. N., Chaudhry, P. Urban forests and open green spaces: lessons for Jaipur, Rajasthan, India. RSPCB Occasional Paper No. 1/2010, Rajasthan State Pollution Control Board, Rajasthan, India, 2010.
[18] Sumina, O.I., "Plant communities on anthropogenically disturbed sites on Chukotka Peninsula, Russia", *Journal of Vegetation Science*, vol. 5, pp. 885–896, 1994
[19] Zhao, M.; Escobedo, F.J.; Staudhammer, C.L., "Spatial patterns of a subtropical, coastal urban forest: implications for land tenure, hurricanes, and invasive", *Urban Forestry and Urban Greening*, vol. 9, pp. 205–214, 2010.