

## Contribution of trees to the climate of Bhopal

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### SUMMARY

Bhopal capital of Madhya prades is located at 23.03°N Well known, trees and open area are contributing well to the arrangement of artificial urban climate and of-course the urban climate is deprived of its natural characteristics in many ways. It has been seen that a small green area will lower the temperature by 3–3.5 °C and intensified the relative humidity by 5–10 per cent ventilated the overheated, dirty and polluted town centre and provide fresh air (Bernatzky, 1982) Many species inventory is an integral part of any floristic work. A species inventory is a formal surveying, sorting, cataloguing, quantifying and mapping of the occurrence. Here our findings would be contribution of tress to the climate of Bhopal area in Ahmedabad wherein 69 species of trees with major species like, *Azadirachta indica* A. Juss., *Cassia siamea* Lamk., *Delonix regia* (Bojer. ex Hook) Rafm., *Peltophorum pterocarpum* DC., *Acacia nilotica* (L.) Willd ex Delile ssp. *indica* (Benth.) Brenan, *Prosopis cineraria* (L.) Druce., *Prosopis juliflora* (Swartz.) DC., *Pongamia pinnata* (L.) Pierrre, *Eucalyptus globulus* Labill., *Alstonia scholaris* (L.) R. Br. are concerned. The area has rich vegetation involving many different types of tree species and hence would be interesting study.

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**Key Words :**

Tree, Climate, Species

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In modern health concerned, world, now a day's city/town are classified on their pollution level like air quality, noise level and temperatures during different parts of year. Due to density of population in urban area, pollution is un-avoidable. Pollution can be natural (lava, cyclone, flood, sun-heat) or created by human beings. Pollution affects our daily life and even to our human structures and hence should be controlled if cannot be stopped. Years study of science has proved that trees are one of the most important weapon to control different kind of pollution and fortunately God has given us gift of trees. While studying effects of trees, we have been to Bhopal area of Ahmedabad and our study has made some contributions.

The area of Bhopal is large and couple of trips were made during February to July-2011. All the collected plant species were identified with help of monographs of flora and plants were recorded. Photographs of some plants have been taken. Plant species

were tabulated according to the Bentham and Hooker's system of classification.

A total of 68 species of trees belonging to 26 families were recorded from Bhopal area. Out of 68 species, *Azadirachta indica* A. Juss. was dominated by 2755 individuals, followed by *Acacia nilotica* (L.) Willd (2692 individuals), *Prosopis juliflora* (Swartz) DC.(1130 individuals), *Prosopis cineraria* (L.) Druce. (811 individuals) and *Peltophorum pterocarpum* DC.(682 individuals) while among families, Mimosaceae was dominated by 9 species, followed by Caesalpinaceae 7 species, Urticaceae 6 species, Fabaceae 5 species and Aeracaceae 4 species.

Trees add beauty to their surroundings by adding colour to an area, softening harsh lines of buildings, screening unsightly views and contributing to the characters of their environment.

It has been proved that young trees absorb CO<sub>2</sub> at rate of 6 kgs per year. Of course trees give back O<sub>2</sub> which is very important for human beings. For every ton of new-wood growth, about 1.5 tons of CO<sub>2</sub> are removed from the air and

**Table 1 : Showing botanical names, vernacular names, families and number of individuals of recorded plant species**

Sr. No.	Botanical name	Vernacular name	Total	Family name
1.	<i>Annona squamosa</i> L.	Sitafal	35	Annonaceae
2.	<i>Polyalthia longifolia</i> (Sonn.) Thw. Var. <i>pendula</i>	Aasopalav, Pendula	222	Annonaceae
3.	<i>Bombex ceiba</i>	Kapok	3	Bombacaceae
4.	<i>Aegle marmelos</i> (L.) Corr.	Bili	3	Rutaceae
5.	<i>Bergera koenigii</i> (L.) Spr.	Mitho Limdo, Kadipatti	3	Rutaceae
6.	<i>Citrus limon</i> (L.) Burm. f.	Limbu	3	Rutaceae
7.	<i>Ailanthus excelsa</i> Roxb.	Moto Arduso	146	Simaroubaceae
8.	<i>Azadirachta indica</i> A. Juss.	Limdo	2,755	Meliaceae
9.	<i>Melia azedarach</i> L.	Bakan limdo	3	Meliaceae
10.	<i>Ziziphus zuzuba</i>	boradi	129	Rhamnaceae
11.	<i>Mangifera indica</i> L.	Ambo	225	Anacardiaceae
12.	<i>Moringa oleifera</i> Lamk.	Saragavo, Mitho Saragavo	279	Moraceae
13.	<i>Bauhinia racemosa</i> Lamk.	Kasotri, Asotri, Apto, Asondaro, Rakta kanchnar	4	Caesalpiniaceae
14.	<i>Cassia fistula</i> L.	Garmalo	64	Caesalpiniaceae
15.	<i>Cassia renigera</i> Wall. ex Benth.	Pink cassia	16	Caesalpiniaceae
16.	<i>Cassia siamea</i> Lamk.	Kasid	498	Caesalpiniaceae
17.	<i>Delonix regia</i> (Bojer. ex Hook) Rafm.	Gulmohor	499	Caesalpiniaceae
18.	<i>Peltophorum pterocarpum</i> DC.	Tamraphali	682	Caesalpiniaceae
19.	<i>Tamarindus indica</i> L.	Khati amla	32	Caesalpiniaceae
20.	<i>Acacia catechu</i> (L.) Willd.	Khair	3	Mimosaceae
21.	<i>Acacia arabica</i> Willd. Babool, Gum	Babool	3	Mimosaceae
22.	<i>Acacia farnesiana</i> (L.) Willd.	Talbaval	3	Mimosaceae
23.	<i>Acacia nilotica</i> (L.) Willd ex Delile <i>indica</i> (Benth.) Brenan	Bawal, Desibaval	2,692	Mimosaceae
24.	<i>Leucaena latisiliqua</i> (L.) Gillis	Pardesi baval, Lisobaval, Subaval	112	Mimosaceae
25.	<i>Pithecellobium dulce</i> (Roxb.) Benth.	Gorasamli	164	Mimosaceae
26.	<i>Prosopis cineraria</i> (L.) Druce.	Khijdo, Shami	811	Mimosaceae
27.	<i>Prosopis juliflora</i> (Swartz.) DC.	Gando baval	1,130	Mimosaceae
28.	<i>Samanea saman</i> (Jacq.) Merr.	rain tree	49	Mimosaceae
29.	<i>Albizia lebeck</i> (L.) Benth.	Siras	69	Fabaceae
30.	<i>Butea monosperma</i> (Lamk.) Taub.	Kesudo, Khakharo, Palas	3	Fabaceae
31.	<i>Dalbergia latifolia</i> Roxb.	Sisam	72	Fabaceae
32.	<i>Derris umbellatum</i> (L.) DC.	Karanj	3	Fabaceae
33.	<i>Pongamia pinnata</i> (L.) Pierre	Karanj	604	Fabaceae
34.	<i>Terminalia catappa</i> L.	Deshi badam	3	Combretaceae
35.	<i>Terminalia cuneata</i> Roth.	Arjunsadad, Panisadad	32	Combretaceae
36.	<i>Callistemon citrinus</i> (Curtis.) Skeels	Bottle brush	53	Myrtaceae
37.	<i>Eucalyptus globulus</i> Labill.	Nilgiri	574	Myrtaceae
38.	<i>Psidium guajava</i> L.	Jamphal	15	Myrtaceae
39.	<i>Syzygium cumini</i> (L.) Skeels.	Jambu	222	Myrtaceae
40.	<i>Carica papaya</i> L.	Papayu, Papaya	3	Caricaceae
41.	<i>Neolamarckia cadamba</i> (Roxb.) Bosser	Kadam	6	Rubiaceae
42.	<i>Manilkara hexandra</i> (Roxb) Dubard.	Rayan	30	Sapotaceae
43.	<i>Manilkara zapota</i> (L.) van Royen	Chikoo	3	Sapotaceae

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44.	<i>Mimusops elengi</i> L.	Borsalli	16	Sapotaceae
45.	<i>Nyctanthes arbor-tristis</i> L.	Parijatak	10	Oleaceae
46.	<i>Salvadora persica</i> L.	Piludi	3	Salvadoraceae
47.	<i>Plumeria rubra</i> L.	Champa	55	Apocynaceae
48.	<i>Cordia dichotoma</i> Forster.	Gunda	195	Ehretiaceae
49.	<i>Gmelina arborea</i> Roxb.	Sevan	165	Verbenaceae
50.	<i>Tectona grandis</i> L. f.	Saag	3	Verbenaceae
51.	<i>Embllica officinalis</i> Gaertn.	Amla	104	Euphorbiaceae
52.	<i>Ficus amplissima</i> J. E. Sm.	Pipal	43	Urticaceae
53.	<i>Ficus benghalensis</i> L.	Vad	85	Urticaceae
54.	<i>Ficus carica</i> L.	Anjir	3	Urticaceae
55.	<i>Ficus elastica</i> Roxb.	Rubber plant	3	Urticaceae
56.	<i>Ficus glomerata</i> Roxb.	Umaro, umbar, gular	56	Urticaceae
57.	<i>Ficus religiosa</i> L.	Piplo	95	Urticaceae
58.	<i>Morus alba</i> L.	Shetur	3	Moraceae
59.	<i>Casuarina equisetifolia</i> L.	Mayurpankhi, Sharu	147	Casuarinaceae
60.	<i>Areca catechu</i> L.	Sopari	3	Aeracaceae
61.	<i>Caryota urens</i> L.	Shivjata	3	Aeracaceae
62.	<i>Cocos nucifera</i> L.	Nariyeli, Tarafoo	3	Aeracaceae
63.	<i>Phoenix sylvestris</i> (L.) Roxb.	Khajuri	3	Aeracaceae
64.	<i>Bambusa arundinacea</i> (Retz.) Willd.	Kanti vaans	158	Poaceae
65.	<i>Alstonia scholaris</i> (L.) R. Br.	Saptarni	319	Apocynaceae
66.	<i>Araucaria cookii</i> R. Br. ex D. Don	Aurocaria christmas try	3	Gymnosperm
67.	<i>Cordia sebestena</i> L.	Cordia	3	Boraginaceae
68.	<i>Roystonea regia</i> (H.B.&K.) O.F. Cook.	Bottle palm	3	Gymnosperm
	Total		13,481	

Table 2 : Dominant families of the area

Sr.No.	Name of family	No. of species
1.	Mimosaceae	9
2.	Caesalpinaceae	7
3.	Urticaceae	6
4.	Fabaceae	5
5.	Aeracaceae	4
6.	Myrtaceae	4
7.	Rutaceae	3
8.	Sapotaceae	3
9.	Annonaceae	2
10.	Apocynaceae	2

Table 3 : Dominant species of the area

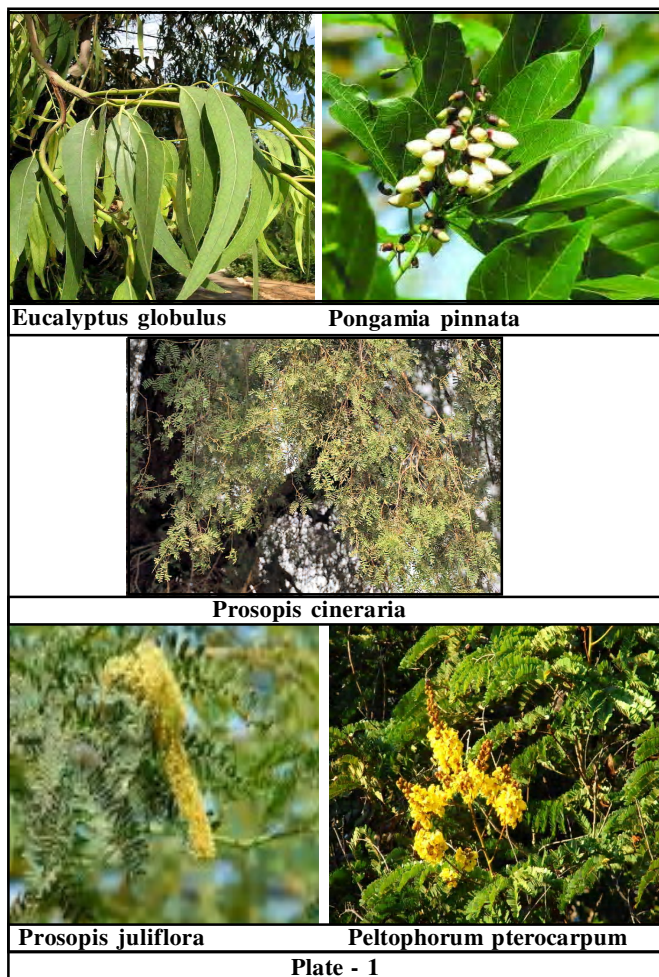
Sr. No.	Botanical name	Total
1.	<i>Azadirachta indica</i>	2755
2.	<i>Acacia nilotica</i>	2692
3.	<i>Prosopis juliflora</i>	1130
4.	<i>Prosopis cineraria</i>	811
5.	<i>Peltophorum pterocarpum</i>	682
6.	<i>Pongamia pinnata</i>	604
7.	<i>Eucalyptus globulus</i>	574
8.	<i>Delonix regia</i>	499
9.	<i>Cassia siamea</i>	498
10.	<i>Alstonia scholaris</i>	319

1.07 tons of life-giving O<sub>2</sub> is produced.( Nowak and Heisler 2010 )

Trees are helping to control pollution in four major way (Nowak and Heisler 2002) :

### Temperature:

Tree transpiration and tree canopies affect air temperature as they absorb radiation, store heat and avoid it to reach ground and hence ground temperature is reduced. They prevent cool air going up due to density difference.

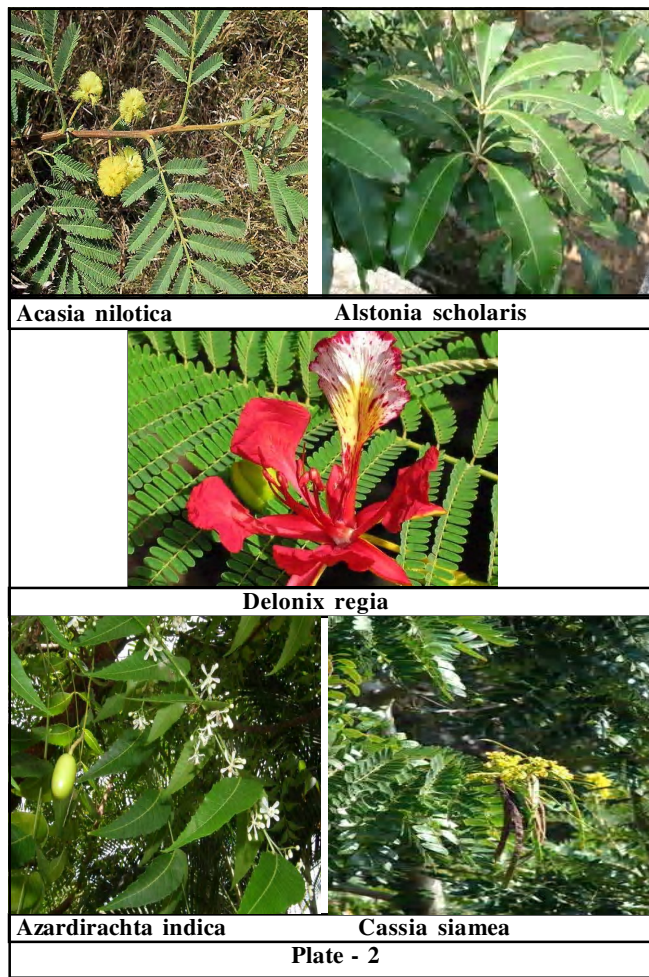


### Removal of air pollutants:

Removes gaseous air pollution via leaf stomata and plant surface. Once gas diffuses into intercellular space, later may be absorbed by water films to form acids. A study says that with 100 per cent tree cover, would help: (A) Removal of Ozone, as high as 15 per cent, (B) Removal of Sulphur, as high as 14 per cent, (C) Removal of particulate matters by 13 per cent, (D) Removal of NO<sub>2</sub> by 8 per cent, (E) Removal of Carbon monoxide by 0.05 per cent. It has also been noted that one sugar maple along a roadway removes 60 mg cadmium, 140 mg chromium, 820 mg nickel and 5,200 mg lead from the environment in one growing season.

### Emission of volatile organic compounds and tree maintenance emissions:

VOC emissions are temperature dependents and since trees generally lower air temperature, increased tree cover can lower overall VOC emissions and consequently ozone level.



### Energy effect on buildings:

Trees provide shade/shelter that reduces building temperature and also energy use to cool down building (like fan/ air conditioner). Tree may block air breeze in summer and provide shade in winter which increase energy and hence, proper placement of tree is important (Simpson *et al.*, 1998).

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