

# Urban biodiversity of Thyagaraya road and Panagal park, Chennai, Tamil Nadu

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## Abstract

Conservation of biodiversity in urban landscapes is a challenging and daunting task especially where rapid growth in human population and the concurrent infrastructure to sustain a diverse community of people and their livelihoods are evolving at an unprecedented rate. The present study was carried out in an area of stretch 1.45km in the heart of the Chennai city from Teynampet Signal to Panagal Park Road. We found that this area is rich in floral and faunal diversity, as 37 species of 367 individual trees, 8 species of Butterflies, 5 species of Herptofauna, 13 species of Birds and 6 species of Mammals are recorded in three locations. Even though there is heavy disturbance by traffic and other human activities, the area has good diversity of flora and fauna. We suggest that the Chennai corporation can go for more planting of trees wherever space is available which will help to improve the diversity of flora and fauna in this urban landscape.

**Key words:** conservation, biodiversity, human disturbance, species diversity, urban landscape

## INTRODUCTION

The association of biodiversity and urbanization usually impacts urban biodiversity. Biodiversity concepts can easily be applied to the urban ecosystem as well. As more and more people live in cities, restoration, conservation, preservation and

enhancement of biodiversity in urban areas become important. Concepts related to biodiversity management such as scale, hierarchy, species identity, species values, and fragmentation can be used to manage urban biodiversity. Application of these concepts in such artificial ecosystems may yield important insights for the management of natural ecosystems. Birds are highly visible and quite sensitive to changes in habitat structure and composition. Bird species richness in urban ecosystems is influenced both by local and landscape characteristics and so a multi scale approach is essential to its proper management. Enhancement of biodiversity in urban ecosystems can have a positive impact on the quality of life and education of urban dwellers and thus facilitate the conservation of biodiversity in natural ecosystems. On the other hand the urban development is directly impacting the species diversity and species richness. There are many suggestions that urban development has impacted many species extinction. For example, we have evidence that the house sparrow once it common in the city of Chennai, now has become rare or extinct in some places of the city due to infrastructure development.

Chennai is the one among the mega cities of the country, holding a population of about 4.8 million people living in and around the Chennai (Erstwhile Madras) city. The Chennai sustain a diverse community of people and their livelihoods are evolving at unparalleled speeds. Due to infrastructural facility, industrialization and real estate development many wetland and scrub forests have been destroyed in and around Chennai. The present survey was carried out in one of the busiest roads (Thiyagaraja Road) of Chennai, to record the present status of biodiversity of the region.

## METHODS

Systematic walk was done along the both sides of the Thiyagaraja Road to record the floral and faunal diversity. Observations were carried out early in the



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morning (between 6 to 7am) before the crowd starts on the road, and few night surveys were also carried out to record the nocturnal animal movements. For fauna we used both direct and indirect method. As some of the animals are elusive in nature and difficult to see them directly, we used indirect evidence for the presence of species and secondary information collected from the local people residing around the area. A team of biologist consisting of a Botanist and a Zoologist and an assistant walked the 1.45km stretch to record the flora and fauna diversity. Fifty meter on either side of the road stretch were surveyed to record the species. The study area was divided into three zones: 1. Panagal Park to Annasalai Road, 2. Compound wall area, and 3. Panagal Park, to record the diversity of species.

## RESULTS AND DISCUSSION

### Floral Survey

A total of 37 species comprising of 367 individuals were recorded along the road side survey. Of which nearly 28 species are found in the above three locations. They are indirectly supporting good wildlife as well as recreational outlet for the public. Because of the floral diversity, the birds and small mammals are utilizing the entire stretch from Teynampet Signal to Panagal Park Road (1.45 km). Trees along the 1.45 km are predominantly high canopy (shade) trees, providing roosting and perching grounds for birds and some mammal species as well. Among the species recorded in Thiyagaraya road *Albizia saman* (22.27%), followed by *Peltophorum pterocarpum* (16.60%) and *Ficus religiosa* (11.74%) were most dominant species. On the other hand in the campus area *Polyalthia longifolia* (13.56%) and *Albizia saman* (8.47%) were the most dominant



species found in the compound wall area (see table.1). *Albizia saman* is the one of best shade trees and it act as a roosting sight for many of the birds in that area. We also found number of holes in most of the *A.Saman* species indicating the species accommodating roosting sight for the hole nesting birds in that area.

On the other hand species diversity were also investigated in Panagal Park, it shows the high diversity of 34 species of 232 individuals (see table.2). Among the flora recorded *Polyalthia longifolia*, *Albizia saman* and *Delonix regia* were the most abundant species recorded in the Park. In view of the species diversity the compounded area has high diversity of species when compared to that of the road between Panagal Park to Annasalai. At the same time the road side trees are more matured trees compared to that of compounded.

Butterflies are the indicator species for the diversity representing particular vegetation/habitat. Butterflies are sensitive to the changes in habitat and climate, which influences their distribution and abundance. This ultimately leads to the migration in butterflies. Butterflies are economically important as agents of pollination. The caterpillars of some butterflies eat harmful insects. A few species are pests because in their larval stages they can damage domestic crops or trees. Butterflies' life cycle consists of four parts, egg, larva, pupa and adult. Most species are diurnal. Butterflies have large, often brightly coloured wings, and conspicuous, fluttering flight. India has a rich butterfly fauna comprising of 1501 species out of 16, 823 species recorded from all over the world (Gaonkar, 1996). During the survey we have recorded eight species of butterflies (see table.3), most of them sighted in the compounded area. There are chances of sighting more diversity of butterflies after the monsoon, as many plants are in flowering stage then, chances of sighting more number of butterflies during that time is more.

### Amphibians and Reptiles Assessment

Presences of Amphibians are indicator of healthy environment. They are mostly found in wet areas and render incalculable service in controlling agriculture pests. Frogs are considered as a natural predator of many insects. Majority of frogs feed on insects. These frogs are the potential biological control agents for preventing undue growth of insect particularly mosquitos population and their breeding grounds. In urban scenario frogs are playing vital role in controlling mosquito menace. Moreover, they are staple food items for several fishes, reptiles, snakes and birds in the wild. Amphibians play an important role in the food chain. They are therefore useful biological indicators of a healthy environment. Amphibians are considered as indicators of pollution and disturbance

**Table. 1.** List of plant species recorded in study zone of Thyagaraya Road

S.No.	Common Name/ Species name	No. of individuals (Left and right side of the road)	No. of individuals (inside the compound wall)	Value	Remarks
1	Rain Tree ( <i>Albizia saman</i> )	55	10	Avenue	All of them are very old trees, they offer nesting, perching for birds.
2	Vaagai ( <i>Albizia lebbek</i> )	1		Commercial	R4 Police station Campus
3	Copperpod ( <i>Peltophorum pterocarpum</i> )	41	4	Avenue	
4	Peepal tree ( <i>Ficus religiosa</i> )	29	4	Religious	Many building have young sapling which indicate the plant animal interaction.
5	Neem ( <i>Azadirachta indica</i> )	20	6	Medicinal	
6	Indian Beech tree ( <i>Pongamia pinnata</i> )	14	2	Commercial	
7	False Ashoka ( <i>Polyalthia longifolia</i> )	12	16	Avenue	
8	Indian ash tree ( <i>Lannea coromandelica</i> ) <i>Odina wodier</i>	10	2	Medicinal	
9	Gulmohar ( <i>Delonix regia</i> )	7	2	Fast growing avenue tree	
10	Indian tulip tree ( <i>Thespesia populnea</i> )	6	6	Avenue	
11	Malai poovarasu ( <i>Hibiscus tiliaceus</i> )	3		Avenue	
12	Java Olive ( <i>Sterculia foetida</i> )	3	6	Avenue	
13	Banyan tree ( <i>Ficus benghalensis</i> )	3		Religious	
14	<i>Markhamia lutea</i>	2	2	Nectar	
15	Crown Flower ( <i>Ervatamia coronaria</i> )	2	4	Religious	
16	Lettuce tree ( <i>Pisonia alba</i> )	2	6	Medicinal	
17	White lead-tree ( <i>Leucaena leucocephala</i> )	2	2	Fodder	
18	Custard Apple ( <i>Annona squamosa</i> )	1	2	Medicinal	
19	Palmyra palm ( <i>Borassus flabellifer</i> )	1		Tamil Nadu State Tree	Along the Pedistrain plaza of the Holly Aengles Convent.
20	African Tulip Tree ( <i>Spathodea campanulata</i> )		2	Behind the Petrol Bunk	
21	Red Cassia ( <i>Cassia roxburghii</i> )	1	1	Ornamental	
22	Indian plum ( <i>Ziziphus jujuba</i> )	1		Fruit	Outside of the Tamil Nadu Information Commission office.
23	Neer Matthi ( <i>Terminalia arjuna</i> )	1		Religious	R4. Police Station
24	Singapore cherry ( <i>Muntingia calabura</i> )	1		Fruit	GRT Grand Road side Park
25	Mango tree ( <i>Mangifera indica</i> )	1	4	Fruit	
26	Wild Date Palm ( <i>Phoenix sylvestris</i> )	1		Fruit	
27	Rosy Trumpet ( <i>Tabebuia rosea</i> )	1		Ornamental	GRT Grand Road side Park
28	Sea Almond Tree ( <i>Terminalia catappa</i> )		6	Fruits	
29	Coconut ( <i>Cocos nucifera</i> )		12	Fruits, stem and leaf are economical value.	
30	Drumstick ( <i>Moringa oleifera</i> )		2	Medicinal	Holly Angels School Campus
31	Gauva ( <i>Psidium guajava</i> )		1	Fruit	Holly Angels School Campus
32	Teak ( <i>Tectona grandis</i> )		6	Timber	Holly Angels School Campus
33	Bamboo ( <i>Bambusa</i> Sp.)		Cluster	Ornamental	GRT Grand Road side Park
34	Cuban Royal Palm ( <i>Roystonea regia</i> )		6	Ornamental	Chella Mall, GRT Residency.
35	Dwarf Date Palm ( <i>Phoenix</i> sp.)		Cluster	Ornamental	GRT Residency
36	Weeping Fig <i>Ficus benjamina</i>	26	4	Ornamental	Planted along the median of the road.
37	<i>Duranta variegata</i>	>200 plants less than 1.5 ft.height.		Ornamental	Along the median of the road from Teynampet signal to Residency Towers signal
	<b>Total No. of trees</b>	<b>247</b>	<b>118</b>		

**Table.2.** List of plants recorded in the Panagal Park

S.No.	Common Name/ Species name	No. of individuals	Remarks
1	False Ashoka ( <i>Polyalthialongifolia</i> )	28	Ornamental
2	Rain Tree ( <i>Albiziasaman</i> )	20	Avenue Tree
3	Gulmohar ( <i>Delonixregia</i> )	18	Avenue Tree
4	Copperpod ( <i>Peltophorumpterocarpum</i> )	11	Avenue Tree
5	Neem ( <i>Azadirachtaindica</i> )	11	Medicinal
6	Indian Laburnum ( <i>Cassia fistula</i> )	10	Avenue Tree
7	Royal Palm ( <i>Roystonearegia</i> )	10	Ornamental
8	Rosy Trumpet ( <i>Tabebuiarosea</i> )	10	Ornamental
9	Chinese Fan Palm	10	Ornamental
10	Cannon Ball Tree	5	Ornamental
11	Indian ash tree	8	Medicinal
12	Quick stick ( <i>Gliricidiasepium</i> )	8	Ornamental
13	Sea Almond Tree	6	Medicinal
14	Purple Orchid Tree ( <i>Bauhinia</i> )	4	Ornamental
15	Sausage Tree ( <i>Kigeliapinnata</i> )	4	Ornamental
16	Quick stick ( <i>Gliricidiasepium</i> )	8	Ornamental
17	Indian Beech tree	5	Medicinal
18	Kapok Tree ( <i>Ceibapentandra</i> )	6	Economic
19	Bougainvillea ( <i>Bougainvillea</i> )	6	Ornamental
20	Indian Medlar ( <i>Mimusopselengi</i> )	4	Medicinal
21	Gauva ( <i>Psidiumguajava</i> )	6	
22	Coral Tree ( <i>Adenanthrapavonina</i> )	4	Ornamental
23	Wood Apple ( <i>Limoniaacidissima</i> )	4	Edible
24	Indian Cork Tree	4	Ornamental
25	Custard Apple ( <i>Annonasquamosa</i> )	3	Edible fruit
26	<i>Ficusbenjamina</i>	4	Ornamental
27	Peepal tree ( <i>Ficusreligiosa</i> )	4	Religious
28	Jamun ( <i>Syzigiumcumini</i> )	2	Edible fruit
29	Madras Tamarind	1	Edible fruit
30	Casuarina ( <i>Casuarinaequisetifolia</i> )	1	Ornamental
31	Terminalia sp.	1	
32	Caesalpinia sp.	6	
33	Alamanda (Woody climber)	Cluster	Ornamental
34	Bamboo	Cluster	Ornamental
	<b>Total No. of trees</b>	<b>232</b>	



**Table.3.** List of Butterflies recorded during the survey in the study region

S.No	Name of the Species	Frequency of Sightings
1	Common Indian Crow ( <i>Euploea core</i> )	Common
2	Blue Tiger ( <i>Tirumalalimniace</i> )	Common
3	Common Bluebottle ( <i>Graphiumsarpedon</i> )	Common
4	Crimson Rose ( <i>Pachliopta hector</i> )	Common
5	Common Mormon ( <i>Papiliopolytes</i> )	Common
6	Peacock Pansy ( <i>Junoniaalmana</i> )	Common
7	Lime Butterfly ( <i>Papiliodemoleus</i> )	Common
8	Common Grass Yellow ( <i>Euremahecabe</i> )	Common

**Table.4.** List of Herptofauna Recorded during the survey in the study region

S.No	Name of the Species	Frequency of Sightings
1	South Asian Waif Gecko ( <i>Hemidactylusfrenatus</i> )	Common
2	Common Skink ( <i>Mabuyacarinata</i> )	Common
3	Garden Lizard ( <i>Calotesversicolor</i> )	Common
4	Common Indian Toad ( <i>Bufo melanostictus</i> )	Common during Night hours
5	Common Tree Frog ( <i>Polypedates maculates</i> )	Occasional

to the habitats as they are the first to disappear from a changing habitat. Over the last few years the amphibian population has been reported to be declining in a number of geographical locations throughout the world. In particular unplanned and uncontrolled dumping of municipal solid waste playing a major havoc in the reproductive pattern of frogs and toads. Normally these species communicate through vocal calls for finding its mates. Due to solid waste dumping they got soaked in plastic waste, hence they are unable to communicate. Herpetologists, climatologists, researchers and other environmental experts discuss the cause of disturbance in climatic change and the amphibian population. Some of the

Table.5. List of Bird species recorded during the survey in the study region

S. No.	Common name/ Species name	Frequency of sighting.	Remarks
1	Blue Rock Pigeon ( <i>Columba livia</i> )	Common (Roost along the high roof building)	Granivorus
2	Rose-ringed Parakeet ( <i>Psittaculakrameri</i> )	Common (Hole nesting birds)	Frugivorus
3	House Crow ( <i>Corvussplendens</i> )	Common	Omnivorus
4	Jungle Crow ( <i>Corvusmacrorhynchos</i> )	Common	Omnivorus
5	House Sparrow ( <i>Passer domesticus</i> )	Occasionally visitor	Granivorus
6	Common Myna ( <i>Acridotherestrictis</i> )	Common	Omnivorus
7	Asian Koel ( <i>Eudynamysscolopacea</i> )	Common	Near Holy Angel School
8	Little Swift ( <i>Apusaffinis</i> )	Common	
9	Common Tailorbird ( <i>Orthotomussutorius</i> )	Common	Common in Garden and Panagal Park
10	Oriental Magpie Robin ( <i>Copsychussaularis</i> )	Rare	
11	Loten's Sunbird ( <i>Nectarinialotenia</i> )	Common	Common in Garden area and Panagal Park
12	Black Kite ( <i>Milvusmigrans</i> )	Common	Hovering near the Holy Angel School
13	RufousTreepie ( <i>Dendrocittavagabunda</i> )	Rare in the city	One sighting was near Panagal Park

Table.6. List of Mammals recorded during the survey in the study region

S.No	Name of the Species	Frequency	Remarks
1	Three-Striped Palm Squirrel ( <i>Funambuluspalmarum</i> )	Common	Very common encountered most of the places
2	Short-nosed Fruit Bats ( <i>Cynopterus sphinx</i> )	Rare	Nocturnal, Near T.Nagar Social Culb
3	Indian Flying fox ( <i>Pteropusgiganteus</i> )	During fruiting season ...	Nocturnal T.Nagar Social Culb
4	Bandicoot Rat ( <i>Bandicotaindica</i> )	Along the drainage canal	Dumping yard
5	House Rat ( <i>Rattusrattus</i> )	Dumping yard, along the waste bin.	
6	House Shrew ( <i>Suncusmurinus</i> )	Common	

species become more extinct locally due to habitat fragmentation and the developmental activities. During the survey we found 5 species of herptofauna in the study region.

### Avian Diversity Assessment

Birds are important for humans because they not only provide food, but also perform innumerable services like pollination, seed dispersal and pest control. The major threats for the birds are removing the trees for infrastructure development and habitat fragmentation. The common Urban birds are Crows, Babblers, Bulbuls, Sparrow and some of the tiny bush birds are found in most of the urban area.

During the survey we have recorded 13 species of birds in and around the study region (See table.5). Among the faunal community birds diversity was high when compared to that of other faunal community found in the area. Species such as *Columba livia*, *Psittacula krameri*, *Corvus splendens* and *Corvus macrorhynchos* were the most common species found in the study area. *Psittacula krameri* and *Corvus splendens* roost at *Albizia saman* trees, which are predominantly distributed along the road side.

### Assessment of Mammalian Diversity

Mammals have played various important roles as pets, modes of transport and food resources in human society. This relatively small group consists of the tiny mice to the large magnificent elephants and the 'big cats'. In spite of such diverse features, specializations and habits, they all are grouped together based on a set of common characteristics that are unique to them. Remnants of Chennai's wild mammal diversity are now preserved locally in few places in Chennai, namely Guindy National Park, IIT-M campus, Madras Christian College Campus and Theosophical Society Campus has good diversity of mammals found. During the survey of 1.45km stretch we encountered six species of wild mammals including Striped Palm Squirrel, Short-nosed Fruit bats, rats (see table 6). Apart from above the carnivorous mammals including the free - ranging domestic dogs and domestic cats were also recorded. We did not encounter any endangered mammals during our survey. At the same, amidst the entire disturbance, still the existence of the mammals here is an interesting observation. Those mammals are adapted themselves to survive in that area. There is a likely chance that we might have missed out some of the mammals especially the nocturnal mammals.

### CONCLUSION

Based on the survey conducted in the 1.45km road (Panagal Park to Annasalai) and surrounding area, there are three packets of diversity region found along the 1.45km road viz., 1. Holly Angles School, 2.

Ramakrishan Mission School and 3.Pangal Park. Our observation showed that the high diversity of flora maintained here. The diversity of fauna co existence is interlinked with the flora diversity of Thiyagaraya Road.

The long presence of trees with sprawling canopies have encouraged birds like the rose-ringed parakeets that are both nesting and roosting colonially; further birds like Asian Koel and Rufous Treepie are strictly canopy birds that is not so common inside the city are found here. Other birds of interest are the Blue Rock Pigeon and under canopy birds like Lotens Sunbird and Common Tailor Bird. It is remarkable that these birds that have largely disappeared from the city are still found beside the busy Thiyagaraya Road.

It is interesting to see the number of saplings found on the walls and tree bark indicates that the plant animal interaction in that region. As such there is no schedule species of flora and fauna found on the road, except the schedule timber *Tectona grandis* which is located inside the Holy Angel School campus. It is recommended that further research can be carried out without causing any disturbance to the existing biodiversity.

For conserving or maintaining the biodiversity, Greater Chennai Corporation (GCC) can put sign boards showing the species diversity of Pondy Bazaar Road (both flora and fauna). To protect the tree species, sign boards with common and scientific name of the tree species kept on each tree would help the public to understand the ecological significance of the region. Similar effort can be taken even for the Parks, since parks also maintaining the good diversity of flora which is attracting a number of birds species. Efforts can be taken to plant native trees wherever spaces are available, as it will help to maintain the greenery on the roads as well.

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