

SRIDHARA M.V

Avenue Greenery and Sustainable Development of the City of Mysore, India

KRISHNE GOWDA**SRIDHARA M.V.**

***Abstract:** Mysore is not only a city of palaces and heritage structures but also of parks, trees, sylvan avenues and boulevards. This has been so for long; from the time of Wodeyar Kings since early 19th century to the time of independence and even now. Though the tree population, its variety, grandeur, hugeness and its numbers are often coming to be destroyed in the name of city development as is been often highlighted by the media, the people and the administration are generally committed to improve the city's arboreal culture and considerably to replenish the losses. The roads, in the traditional areas as well as in the newly formed extensions are getting endowed with trees in all their variety and sylvan beauty. Provision of saplings is an important precondition and there are significant efforts including newspaper advertisements in place regarding these supplies. The urban forestry efforts should become coordinated with all the other development and service departments. Urban green administration is becoming more and more diversified and complex, demanding many techno-scientific inputs. The choices of proper or suitable saplings, their production are all to be undertaken in an informed manner. As of now, we do not have suitable technical people to accomplish these tasks. It requires a program of training; and of a training of trainers too.*

Coordination between many cognate departments of government is necessary. These departments have to have a healthy liaison between them. Otherwise, cost to the exchequer as well as to the citizenry will be high; doing and undoing of things will increase and will become a nuisance to city life. Recording of coordinating experiences will itself be a new area of research and will become an important element in urban studies. Since this involves public education, the role of media is infact increasing.

Keywords: *Tree planting, Avenue greenery, Sustainable development, Heat island effects, Aesthetic content, Ecological upgradation.*

Authors: **GOWDA, Krishne.**, Professor of Urban & Regional Planning, Institute of Development Studies, University of Mysore, Manasagangotri, Mysore-570 006, India. mail:krishnegowda@hotmail.com & **SRIDHARA M.V.**, Professor (Retd.), University of Mysore, 561, P&T Block, 10th Cross, Kuvempunagar, Mysore-570 023, India. Email: srishabh561@gmail.com

SRIDHARA M.V

INTRODUCTION

Raising and preserving green areas are a part of our ancient culture within urban settlements. They continue to be life sustaining even today. Well maintained green areas constitute a necessary input for civilization. Indians, from ancient times, have revered trees as manifestations of the Almighty. Plants and trees are in fact worshipped even today; for example, Tulsi, Shami and Aswatha trees.

Trees and plants can actually clear the air of not just carbon dioxide, but also particulate pollutants, and obnoxious gases. Besides, trees can alleviate water pollution, noise and light pollution (glare) too. Trees and shrubs, particularly when they are dense spread over significantly large areas, can contribute to prevent soil erosion and increase fertility.

Mysore City has to grow in an orderly and environment friendly way and should provide aesthetic experiences with parks, public squares, pretty sidewalks, waterfront promenades and green concourses. Avenue plantations are trees found along roadsides. Apart from avenue trees, coconut trees are prominent within residential slots.

The main function of avenue greenery is to provide a canopy increasing the proportion of forests and reducing heat island effects. Tree lined avenues, streets and roads along with green medians and traffic islands are spread all over the city adding to its arboreal grandeur. Aesthetics of trees, flowering seasons, and the range of uses it can be put to, their medicinal value, planting techniques and tree care all add value to urban living. There is evidence that properly designed greenery in avenues can create a better quality of life while providing a platform for long term economic development. It will create value, civic pride and improved quality of life for residents.

It is grim news for the 'Greens'. The widening of roads in the city is being planned. The full grown trees along those roads are being uprooted and carted away. Widening of roads must accompany planting of suitable trees on roadsides to conserve greens and their ecology. In this regard, newspapers of the city have contributed constantly in rising people's consciousness and photo journalism also has played a vital role.

This study is mainly limited to different types of road side or avenue greenery in the city of Mysore. The focus has been to assess the existing situation and suggest ways for the prospective development of avenue trees. Photo journalism can be of great value in exploring the sylvan beauty of Mysore environs.

SRIDHARA M.V

THE STUDY AREA - Mysore City

Mysore is known for its magnificent palaces and majestic buildings, sprawling gardens and tree lined boulevards. The 'City Royale' always figures in the tourist's itinerary. The City has to grow in an orderly and environment friendly way and should be endowed with aesthetic content in the form of parks, public squares, pretty sidewalks, waterfront promenades and green concourses. Mysore is currently undergoing extensive urban expansion. There is need for a strategic vision involving adaptive and realistic policies and new urban planning practices.



Majestic View of Mysore Palace, Mysore

Mysore city's population is more than a million at present (0.98 million as per the 2011 Census). Based on the JnNURM forecasts, Mysore's population by 2020 will be around 1.5 million with a medium growth rate of 3.5 percent and 1.9 million with a high growth rate of 4.5 percent. This works out to 2.21 million with a medium growth of 3.5 percent by the year 2030 and 2.95 million with a high growth rate of 4.5 percent. Here, we should note that urban population growth has already outgrown general population growth in India. Urban growth is due to both intrinsic population growth and migration from the surrounding and other areas and absorption of rural enclaves into the nearby urban centers. Increase in population and unbridled urbanization of Mysore city has nibbled away green spaces as the city continues to expand horizontally.

a) Location of the City

Mysore is located at an altitude of 770 meters above mean sea level and situated in the larger south central part of the Indian Deccan Plateau at 12° 18' North latitude and 76° 12' East longitude. The gradient within the city ranges from 1 to 100 m to 1 to 50 m. Its situation amidst

SRIDHARA M.V

beautiful sylvan surroundings with majestic Chamundi Hill (1085 m) in the south east as a backdrop is indeed unique. The northern part of the city drains into the river Cauvery and the southern part into the river Kabini, a tributary of the Cauvery.

b) Climatic Factors

The climate of Mysore can be described as 'tropical monsoon type'. Mysore manifests a very hospitable climate all through the year, where temperatures vary between 20°C and 30°C. Neither too hot nor too cold, it's always pleasant although some climatic changes have become visible as the surrounding forest areas have become greatly depleted. The city lies in the rain shadow region of the Western Ghats and, therefore, receives not more than 850 mm rainfall per annum mainly between the months of April and November. Even in the rainy season, relative humidity does not exceed 60 percent. April and May are the hottest months. Being located on an undulating terrain, the city and its surroundings have large tracts of land suitable for forests and pastures. Its forests are describable as deciduous and not evergreen.

c) Land Use Pattern

In order to promote health, safety and the general well being of the community, it is necessary to enforce reasonable and facilitatory norms on the use of land for buildings and other constructions. This is to ensure that the most appropriate economical and healthy development of the city takes place in accordance with a land use plan. For this purpose, the city is divided into a number of user Zones, such as residential, commercial, industrial, public, semi-public, etc (see Fig. 1 & Table 1). Each zone has its own regulations and features as the same set of regulations cannot obviously be applied to all of them.

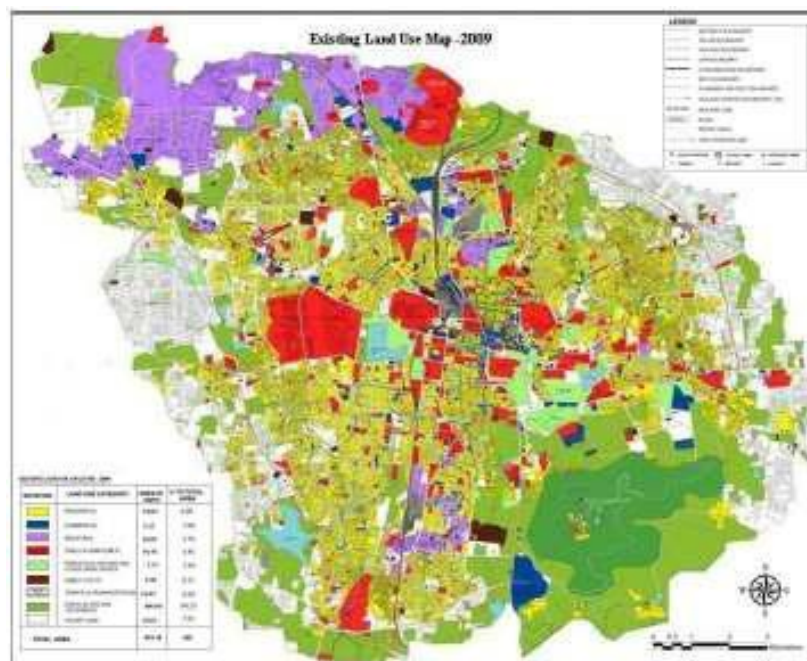


Fig. 1 Existing Land Use Map of Mysore City. *Source: MUDA, Mysore*

SRIDHARA M.V

The objectives of land use planning may in brief be summarized as: improving physical environment, strengthening urban economy, ecological up-gradation and fostering of social values.

Table 1. Land use in Mysore 1995 and land use analysis for 2011 AD

No	Land Use	Area (ha)		% Developed area	
		1995	2011	1995	2011
1	Residential	3075.30	6097.87	40.40	43.45
2	Commercial	182.23	344.07	2.41	2.45
3	Industrial	1021.01	1855.05	13.40	13.22
5	Public/ Govt. Offices	856.45	1180.78	11.32	8.41
6	i. Parks and Open Spaces	415.77	1055.05	5.49	7.52
	ii. Chamundi Hill	-	1634.82	-	-
7	Traffic and transportation	1530.73	2380.56	20.22	16.96
8	Water Bodies	182.68	178.95	2.41	1.27
9	Public Utility	37.26	43.35	0.49	0.31
10	Agricultural purpose	285.34	898.99	3.73	6.41
	Total Area	7568.77	15,669.49	100.00	100.00

Source: MUDA, Mysore.

An analysis of the land use pattern of Mysore shows a thrust towards residential development which covers a greater portion of the city, and this is expected to increase in the next few years.

Importance of Trees

Plants and trees have a capacity to absorb not just carbon dioxide but also poisonous odorous gases like sulphur dioxide. Growing trees like Neem as avenue trees also bestows economic benefits, as the entire tree twig, bark, leaves and flowers has economic value. Neem twigs are bactericidal, Neem oil is a bio-pesticide, Neem fruit and bark are used in Ayurveda. Trees should be planted alternatively on both sides of the avenue and branches can be pruned as required depending on the growth pattern. This pruning can contribute to the provision of bio-fuels and green manure. All these are aspects of organized eco-maintenance.

Broad leaf trees reduce noise pollution too. There is apparently a 7 decibel noise reduction per 100 square feet of forest by reflecting and absorbing sound energy by the trees. Moreover, the 'white noise' or the noise of the leaves and branches in the wind reduces the impact of manmade

SRIDHARA M.V

jarring sounds like honking and whirring of automobiles. The trees also block and reflect sunlight and artificial lights to minimize eye strain and also the ambient summer heat.

a) Avenue Plantations

The role of greenery in arresting pollution, acting as dust-busters, by reducing noise pollution and muffling the sounds of urban living has been long established. Their cooling effect on the city heat island is well known.

There is a widespread assault on scenic old trees and strings of flowering bushes, grassy patches and roadside greenery. At the same time a series of callous green cover activities are unfolding in the public domain on regular and routine basis. Trees wither and crash due to lack of aeration and water supply to the roots, as a result of unimaginative concrete pavements (**see Plate 2**). For widening of roads



Plate 2 . *Lack of Aeration and Water Supply to the Roots - Saraswatipuram Residential Area*

and drains or laying of underground cables, the anchorage area of long existing trees get destroyed. Streets are frequently littered with branches and leaves following the mayhem they are subject to by chopper wielding state electricity gang men clearing the way for overhead electric lines (**see Plate 3**).

SRIDHARA M.V



Plate 3. Avenue Trees are chopped by Electricity gang men clearing the way for overhead lines - Manasagangotri Campus

The continuous assault on green cover has already resulted in an unhealthy rise in surface temperatures and related changes in climate like heightened toxic content in air and noise pollution. It is no surprise that incidents of stress, road rage, tense and nervous pedestrians, and other psychic and medical problems are mounting among road users. Sparrows and other birds have long become scarce and we are witnessing the natural endowments of wholesomeness giving way to a plethora of pharmacies, clinics, and hospitals in the landscape.

b) Cultivation of Trees

The cultivation of trees in an urban environment requires careful thought and planning. A wide range of horticultural management skills is warranted, from appropriate arboricultural treatment of individual trees to ensuring effective overall management of a city's tree cover. Optimality and appropriateness in respect of tree planting are to be ensured.

While some trees in urban environments regenerate naturally and get to grow, a large majority are usually deliberately planted. Tree planting sub serves different objectives. Key attributes to be considered are ornamentation shade, wildlife habitat, noise and air pollution reduction, production of fodder, fuel wood and timber.

Different stakeholders or agencies will have different perspectives on the choice of species to be planted. One determining factor is of course the ownership of land on which the planting is to take place. Again this is based on whether planting occurs on public space or private land. An individual while planting a tree on private land is unlikely to consult a professional. For example

SRIDHARA M.V

"affluent localities with a strong element of indigenous culture" had a high proportion of indigenous ornamental species, while the "westernized upper class localities" had a high number of exotic ornamental trees. Fruit trees dominated the species assemblage in poorer areas, where few avenue trees existed. Media intervention has increased awareness among some sections of people.

In Mysore, according to few elders of the city, there was a time when the entire city would look festive during spring. It is sad that now we just have a handful of such streets. However, it is up to sensitive citizens, and the district administration to take care of what we are left with and improve on them.

All the roads and streets do not manifest avenue trees significantly as some do in the city. Only the older parts of the city with high density population are absolutely devoid of avenue trees. The new layouts with relative lower density have roads accommodating trees. Otherwise in some parts of residential areas avenue trees are absolutely scarce.

In Mysore, Urban forestry had been taken up to some extent by the Forest Department. During 1992-93, the government initiated a new scheme called "Greening Urban Area and Urban Forestry" for taking up afforestation in urban centers. Well-developed trees exist along major roadsides and the authorities are endeavoring hard to maintain these trees and they have been planted one in every 10 meters (see Plate 4). Of these newly planted tree saplings of different varieties, substantially many are surviving and the authorities are attending to the problem of preserving planted saplings - the avenue trees as well as the ones in open space. A variety of trees such as teak, silver oak, jacaranda, bauhinia, pent flora, etc., have been planted, fenced, well protected and watered by students during summer. Ornamental and economical value of these has been well recognized.



Plate 4. Greening Urban Areas: Afforestation program in newly developed extension area - Vijayanagar 3rd Stage.

SRIDHARA M.V

The network of roads and streets in Mysore follows a hub and spokes pattern with arterial roads originating from the centre of the city i.e., the Palace area. There are four main arterial roads, namely, highway connecting Bangalore and Ooty, highway connecting Kanakapura with Mysore (Bannur road), highway connecting Mysore with Mangalore (Hunsur road) and highway connecting Mysore with (Mananthavady road) Kerala. Most of the roads in the city are broad and straight with regular footpaths on either side. Narasimharaja Boulevard and Mirza road are notable examples. As the city grows, with increase in per capita income, the ownership of the vehicles coupled with traffic on roads has increased.

The total road network in the city was 335 kms in 1971. It increased to 432 kms in 1981, which accounts for 29 percent increase over a decade. There are 48 main roads in the city covering a total length of around 58 kms. Many layouts have been developed between 1981-1991 consequently increasing the total road network to 600 kms. The road capacity in older parts of the city has remained the same while the quantum of traffic has increased significantly. Now, the total municipal roads have increased to more than 1093 kms (see Fig. 2). The road network of the city includes three ring roads, viz. outer ring road, intermediate ring road and inner ring road and also arterials roads, sub-arterial roads, collector roads, and others. The three ring roads not only collect traffic from other roads but also act as bypass roads at their respective locations in order to reduce congestion especially at the core of the city.

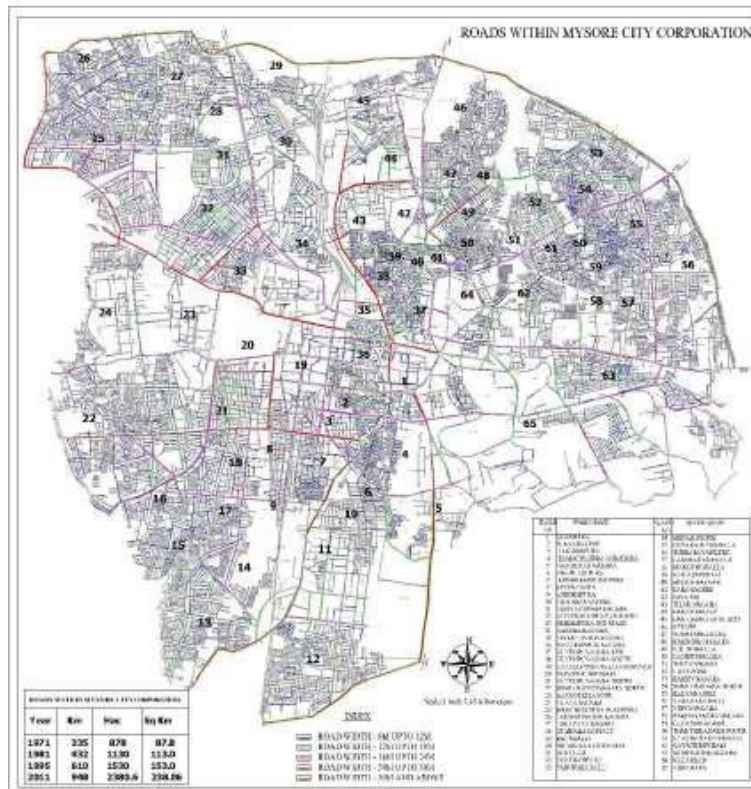


Fig. 2 The Network of Roads and Streets in Mysore city
The Outer Ring Road is 45 meter wide and is helping

SRIDHARA M.V

decongesting traffic in the city. The Intermediate Ring road is not a new road. It is conceived along with the existing roads only. But, it is proposed to increase its width to 30 meters. It starts from new Kantharaje Urs road and passes through Vishwamanava Double road, Bogadi road, Open Air theatre road, Hunsur road and Gokulam road. The existing road in Manjunathapura in front of Ideal Jawa runs up to Highway Circle and then passes through Bannimantapa, old Bangalore-Mysore road, Hyderali road, Karanji Tank Bund road, Race Course road, Bangalore-Nilgiri road, J.L.B. road and joins Kantharaje Urs road. The width of this intermediate ring road along Kantharaje Urs road has been retained at 24 meters as many structures have come up on either side of this road.

The Inner Ring Road is also not a new road but its alignment is proposed along the existing roads and its existing width is proposed to be widened to 30 meters. Its width along the Seshadri Iyer road and Sawday road is 24 meters whereas in other parts it has been proposed to have 30 meter wide roads. The inner ring road starts from Sawday road and passes through Bangalore-Nilgiri road, Chamaraja Double road, J.L.B. road, Seshadri Iyer road and then joins Sawday road.

c) Streets - The streets are some of the most important public spaces in urban areas. Apart from the original purpose of enabling people and vehicles to move, it is used as a place to do business/trade/ work/ manufacture/service/socialize and in some cases to live. New uses are manifest on streets and sidewalks, 'often temporary and sometimes more lasting'. The street side "cobblers, bicycle repairer, key makers depend on fair weather for their livelihood". With fast escalating rents of formal premises, these skilled labourers have resorted to doing business on streets. Streets are also venues for protests and rallies. Several of the main streets have developed into major commercial and entertainment areas, particularly in the CBD and such other busy areas.

History of Avenue trees and important Roads

Since early 20th century, visionaries such as *K Seshadri Iyer, Jamsetji Nusserwanji Tata, Sir M Visvesvaraya, and Sir Mirza Ismail* emphasized rather reemphasized the importance of trees, parks and green recreational spaces beyond their visual contribution in a cityscape. But, in our hurry to "modernize" through rapid economic growth and the expediency of ever increasing types and intensity of land use, urban aesthetics and environmental upkeep and enhancement are being sidelined (Janardhan Roye, 2009).

The Mysore Maharajas, right from *Krishnaraja Wodeyar III* up to *Jayachamaraja Wodeyar*, the last ruler of the Mysore *Yadu* dynasty, took great care in promoting the aesthetics of city roads and streets by planting the choicest avenue trees (**see Plate 5 & 6**).

SRIDHARA M.V



Plate 5. *Well Grown Avenue Trees in Mysore - Vinoba Road*



Plate 6. *Old Avenue Trees in Mysore - Western part of CFTRI*

Road Even up to the 1950s, the city had a rows of lush green trees rich with enchanting flowers, in their successive seasons. It was a pleasure to walk on these streets those days, with almost no automobile traffic. They planned the selection of trees so well, it hindered neither the beauty of the great buildings the Maharajas built for various purposes, nor the traffic, which of course was not as dense as it is today. The main thoroughfare, Sayaji Rao Road, had flowering trees growing straight and tall, obstructing none. The long white flowers (you find one such tree behind the Chamundi Guest House on Dewan's Road) spread a beautiful aroma all around and those who most enjoyed its fragrance were the visitors to the Cauvery Handicrafts emporium, then known as Chamarajendra Technical Institute.

These trees were home for thousands of beautiful parrots, which fluttered and flew, now no longer to be seen. One of the complaints that were often heard in the City Corporation meetings then was that these birds were dirtying the Sayaji Rao Road with their droppings - white patches all around!

SRIDHARA M.V

Another famous road known for its beautiful avenue trees was the 100 feet road or the Chamaraja Road, now a double road. On either side are thick and lush grown rain trees, with wide-spread green canopies, not allowing any sunshine on the road even during the hottest of summer days!

The small hairy white and red flower bunches were a pleasure to be seen and admired. Only a tree or two are left on this road now. So also the Boulevard Road now called the Lalitha Mahal Road. The majestic road from the Race Course almost up to the Lalitha Mahal Palace had a series of huge rain trees, giving shelter to men and horses which often passed on this road. It was a pleasure to take an evening walk on this road after resting a while on the stone benches in the precincts of Karanji Tank. One would often come across the Mysore Palace Guards moving on horseback.

Another royal road from the hind entrance of the Palace to the Jagan Mohan Palace, called the Jagan Mohan Palace Road, had rows of beautiful Jacaranda trees with full of bell-shaped blue flowers. The adjacent Seetha Vilasa Road had an excellent row of well-grown Neem trees, now a treasured variety for its herbal value. The deserted Jhansi Lakshimibai Road then had a row of Honge trees, spreading a unique pleasant fragrance during its flowering season.

The avenue trees - each variety for each street and each place-were planted right from the days of Krishnaraja Wodeyar III (AD 1799 to AD 1868) who built the first five Agraharas outside his Palace Fort. The new extensions developed subsequently received similar patronage from Chamaraja Wodeyar, Krishnaraja Wodeyar IV and Jayachamaraja Wodeyar, great lovers of flora and fauna. Soon after Independence, when the then Governor-General Rajaji's "Vana Mahotsava" call caught up with the people, the Rama Vilas Road became the venue for tree planting. A series of Gul Mohars or May Flower Trees were planted on either side of the road. During May-June, the trees spread a carpet of fiery red and golden color flowers on this road.

Avenue trees are found along the sides of major roads in the city. Apart from avenue trees, coconut trees are prominent within residential plots in Saraswathipuram, V.V.Mohalla, Jayalakshmi puram, Vidyaranyapuram and the promising areas for trees are Lalithadri Nagar, Shanthaveri Gopal Gowda Nagar, Vidya Nagar and Rabindranath Tagore Nagar, Vijayanagar IV Stage, Metagalli and Yelwal, Hootagalli and Dattagalli, Sathagalli, JSS Layout, Police Layout, KC Layout, Roopa Nagar, JP Nagar, University Layout, Sriramapura, BEML Layout, Rajarajeshwari Nagar, Vasanth Nagar and Ambedkar Nagar among many others.

Cutting Avenue Trees for widening the Roads

Nearly two dozens of giant trees were felled on the Krishnaraja Sagar Road to make space for broadening the railway bridge and widening the underpass near the railway station (see **Plates 7, 8 & 9**).

SRIDHARA M.V



Plate 7. *Cutting Avenue Trees for Road Widening in Krishnaraja Sagar Road*



Plate 8. *Cutting Avenue Trees for Road Widening in Lalitha Mahal Road*



Plate 9. *Loading Log from Avenue Trees for Road Widening*

These included widening of the railway bridge to lay three pairs of tracks to facilitate trains coming from Chamarajanagar and Nanjangud to switch tracks, before entering the platform at the Mysore railway station. Officials also stated that the bridge had to be lowered by 1.2 m to 1.4 m as the existing gradient of the track on the Mysore-Chamarajanagar line was steep; as per the new safety norms of the Indian Railways, the gradient had to be reduced from 1:190 m to 1:260 m. Because of this, the road underneath had to be re-laid at a lower level. The existing gap between the road and the bridge was reckoned to be around 4.5 m and if the bridge is lowered by 1.4

SRIDHARA M.V

meters, the gap would be reduced further and safety would be compromised. But officials pointed out that there were water pipelines criss-crossing the road at lower depths and hence if the pipes were to be overhauled, the trees on the surface had to be felled. The existing road under the bridge would also be widened to accommodate four lanes to cope with the increase in traffic. It was inevitable that the trees had to be removed, the officials added.

Another example of a victim of urbanization - the leaves have been turning yellowish and branches gradually wilting - a slow but sure death for the tree and the cause for this are the grievous injuries inflicted on its roots some time ago by the workers who dug up the tree's base to rectify the water supply pipeline. The authorities concerned in the water works department say that these incidents are common when it comes to providing amenities in urban areas and have to be accepted by the people for augmenting their amenities.

The pipelines, installed several decades ago, have to be repaired, replaced and maintained under JnNURM scheme to revamp the existing water supply system in the city and as such, it is inevitable to clear the pipelines of the entwined tree roots as they grew deeper in search of moisture and nutrients. Roots of big trees have a tendency of growing deeper and farther in search of moisture. The small leaks in the pipelines attract the feeder-roots that are capable of penetrating into the smallest holes in the pipeline and then grow in size within the pipe, causing blockages and ruptures which eventually hinder water supply. The water authorities pointed out the necessity of chopping down such roots that posed a threat to the pipelines. This emphasizes the need for imaginative coordination between the water supply and urban forestry authorities.

Moving Towards a Greener Mysore

Tree Plantation Program - The Mysore City Corporation (MCC) has joined hands with the Forest Department in a drive to turn the entire city green. Together, they have embarked upon the welcome idea of planting about 65,000 saplings throughout the city (City to go Green, 2010). As part of the plan, flower and fruit bearing saplings have been planted. The MCC planted 30,000 saplings in the year 2010 but not many have survived, according to officials. The saplings would be planted alongside roads (see Plate 4). "While the cost incurred thereby was borne by MUDA and the Forest Department, many residents have looked after the plants' growth". Based on a field survey, it is said that 60 percent of the plants are in good condition and have survived (The Hindu, 2010, Mysore residents become 'green activists'). The publishing and researching for such people oriented news items in the regional and national press contribute to enhancing civic consciousness and commitment to general good.

SRIDHARA M.V

Plans for tree planting over the next ten years such as avenue trees along urban arterial roads, residential streets, parks and green spaces, private properties and special ecological zones have to be made operational. In this connection, local residents have already organized themselves into groups in support of urban tree planting and maintenance. This kind of sympathy and understanding based program should be integrated with planning in the energy, water supply, urban infrastructure, waste disposal and other municipal services, food and agriculture and transportation sectors.

Avenue plantations should entail planned, integrated, coordinated and systematic management of trees in urban areas. Any successful incorporation of trees into the physical and social fabric of towns and cities clearly requires integrating forestry into overall urban planning. Given the potential involvement and uncertainties of numerous and varied professional personnel, government and nongovernment agencies, community groups and individual urban residents, this is indeed difficult to achieve. This involves considerable effort in persuasion and dissemination of experiences and knowledge. Media should sensitize the people about the significance of urban green management.

Municipal services must be well planned and developed to cope with proper management of street trees and trees elsewhere on public lands. Trees are generally planned, planted and tended poorly and many become public hazards. Adequate and constant attention is needed to tend trees properly equipped with clear roads and storm water drains of tree debris, and dispose of tree wastes. The commitment to tree planting must be matched with the financial and human means of providing such services on a sustainable basis. Tree planting, wherever it takes place, should be accompanied by a provision for rain water absorption suitably. Paving of sidewalks has to be studded with patches providing scope for rain water convergence and absorption. In fact, proper tree planning and tending may indeed become an important source of manure, fodder and fuel. This dimension of urban forestry must be seriously worked upon. Urban forestry development is a difficult area particularly in the context of growing primacy of markets, privatization of services and the so-called private-public-partnerships. Conscientious and concerned citizens, who have persuaded their neighbors in Kuvempunagar to plant on roadsides, recommend Honge, Neem, Tachoma and other flowering trees that look beautiful during flowering seasons. Trees, including avenue trees provide a habitat for birds and their nests, adding a natural aesthetic dimension to urban living.

SRIDHARA M.V

Availability of planting stock

Plant Nurseries in Mysore- Planting material may be produced in nurseries run by public bodies (Departments such as Urban Forestry, Horticulture or others) (**see plate 10**), in private nurseries (more than

20. (see plates 11), or by all major individual institutions for their own use. Trees planted on public access lands are often obtained from nurseries run by the Department of Urban Forestry in Mysore Division. The problem here is that only limited species are available in public nurseries. Private nurseries exist in many places in Mysore city; they work on a smaller scale and concentrate on selling of saplings in high demand. As they are often engaged in the production of ornamental and fruit tree species, they may add significantly to the total available choice of species. Avoidance of mono culture in tree plantation is an item of ecological value worthy of pursuit.

Plate 10. Urban Forestry Plant Nurseries - Next to Kukkarahalli Lake-

Experts identified a few species that were considered favorable to Mysore's climatic conditions and soil. According to them, species such as champaka, pongamia pinnata, cassia spectabills, assia javanica



and jacaranda can be planted. As Mysore is fast developing and many new areas are coming up, there is scope for tree plantation to forestall and minimize environmental pollution and soil erosion and to promote ground aquification. That way, tree plantation can almost always be clubbed with rain water conservation and harvesting and maintenance of storm water drains.

SRIDHARA M.V

Budgets for Afforestation Program

MCC had allocated Rs. 2.8 million for afforestation in the city during 2010 budget and saplings purchased then are being planted now. This year, the allocation will be increased further for such schemes. In addition, there are a number of public and private institutions with allocations to make their campuses green.

Although every year certain allocation is made in the MCC's budget, it is highly insufficient for development or maintenance of avenue trees. Moreover, there is no adequate staff within the department to work in the city. Given that infrastructure development, maintenance and other activities have gained priority in budget allocations, the allocation available for the greening of the city has been very limited. Due to various developmental works, the tree cover is being reduced, and hence the proposal to plant a tree for every tree cut requires implementation. Tree planting has also been taken up under various other programs. Despite the growing interest, understanding and allocation for this sector, the paucity of specialized staff and training therefore is indeed a problem.

Future Plans

Mysore is poised to launch its new Master Plan aimed at beautifying and further greening the city. It is appropriately called 'Sundara Mysooru' (beautiful Mysore) Plan. Rs. 3000 million would come from the JnNURM of the Central government, Rs. 500 million from the Central Ministry of Tourism and Rs. 3000 million from the Asian Development Bank and World Bank. Work has also started on drawing up an urban forestry strategy and an information pamphlet on this strategy through the efforts of the Forest Department and NGOs is being circulated. Certainly, raising and maintenance of avenue trees is a part of beautification of the city.

Suggestions, Recommendations and Conclusions

a) Suggestions and Recommendations

MCC's permission mechanism may not forestall threats from road diggers, public works department on road-widening work, the power supply and telephone people, and those who lay underground water supply and sewage pipes. It is necessary to coordinate with the authorities on the choice of trees to plant and on how to take care of them. Those planting trees on roadside and other public space should be enjoined to file a compliance report to the authorities online.

SRIDHARA M.V

Compliance reports by residents should furnish details of the trees planted, their number, variety and location. Such information would help keep a record of trees planted in the city at citizens' initiative.

The trees should not be planted too close to the compound wall, foundation, water and sanitary connections and electric wires. Even if the entire area is concreted or asphalted, optimal space can be provided for planting between trees. This is necessary for water, air and nutrition to enter into tree roots.

Mysore has 1093 kms of roads including arterial roads and connectives. Still there are 60 percent of the streets remaining unplanted. So, there is considerable scope for furthering avenue plantation. The type of trees to be chosen for this purpose has to be left to the forestry and horticulture experts and should not be done capriciously or arbitrarily. In this tree plantation effort, the cooperation of electricity, telephone, water supply and sewerage authorities have to be duly enlisted. In addition to this, there will be more scope for planting and maintaining avenue trees in the newly developed layouts within the LPA boundary.

The government has decided to make it mandatory for every new relatively bigger house coming up (in urban centers) in the city to provide adequate space for two trees. It is being made compulsory by amending the Karnataka Municipal Corporation Act 1979. Once the amendment comes into force, separate space for two trees requires to be mandatorily earmarked. Unless, the building plan specifies spaces for trees, it should not be approved as it would be violative of the prescribed policy. Similar to the idea of floor area ratio (FAR), we should develop tree person ratio (TPR) while sanctioning licenses to multi-storied apartments. The height of adult trees may be sought to be correlated to the height of multistoried apartments.

It is strongly recommended that tree maintenance and suitable lopping of branches are attended to for the upkeep of the tree in later years to prevent snapping of branches and unexpected and dangerous uprooting of trees in the avenue areas.

The Department of Horticulture at MCC attends to the complaints as expeditiously as possible. If the matter is serious that has to be dealt with by the Forest Department and MCC draws its attention immediately.

SRIDHARA M.V

The MCC regularly evaluates trees based on the complaints they receive from the general public and send the report to the Department of Forests. "The MCC is not supposed to trim the branches or do anything unless the tree has collapsed and is obstructing the traffic flow. Forest department sends report on a regular basis so on the need to carry out the trimming job".

Wherever electric wires run above, suitably dwarf canopy seedlings such as Pongamias, Bahunias, Bilvapatre, Cassia Fistula (Indian Lebernum), Buteafrandosa, etc have to be preferred. It is better to use shock proof insulated cables and this new practice has to be introduced early and universally.

The Storm Water Drainage cleaning mechanism as of now is perceived to be inadequate as there have been complaints of defunct drains and overflowing of drains. These drains should be remodeled, increasing the coverage of storm water drainage network, delinking the sewerage system from the storm water drainage system by completing missing sewer links and de-silting to clean up the storm water drains and properly planned for planting trees which are suitable to these places in order to make them green.

Greater focus on indigenous trees and matching suitability of species to the potentiality of respective sites and also increasing urban nursery capacity and efficiency is required.

Avenue trees, often well grown, are getting felled in the name of widening of roads to erect new buildings in many places in the city. 'If these trees are felled, then their loss must be well compensated by mass planting of tree in and around the city'. There is still another option available. In the place of the present old, unwieldy and dying trees new species of dwarf, ornamental trees can be planted which would grow considerably in just 2 to 3 years. A specialist horticulturist could be drafted to advise the forest officials. Regarding location and number of trees, the idea of tree person ratio TPR comes into play.

As Mysore is fast developing and many new localities are coming up, there is scope for tree plantation to achieve environmental improvement.

Tree plantation program has to be undertaken on either side of the roads in residential areas, suitable vacant grounds at schools, hospitals and burial grounds.

SRIDHARA M.V

Experts have identified a few species that are considered favorable to the Mysore's climatic conditions and soil. According to them, species such as champaka, pongamia pinnata, cassia spectabilis, assia javanica and jacaranda can be planted on either side of the roads.

Priority has to be given to fruit production and valuable trees thereof in most parts of the city. Local varieties should be chosen for cultivation that is disease resistant and less nutrient demanding. Designing and laying of pavements should be coordinated with tree maintenance.

The use of indigenous plant varieties and inventive planting systems can contribute to energy efficient landscapes and reduced consumption of natural resources. By planting trees at right locations, water can be conserved. Water consumption can suitably be reduced. Heat island effects can be minimized.

Since urban green is a people supported project, media and public play a major role. Specialist green reporters may be appointed.

CONCLUSION

People in urban areas need a break from their busy, tiring and often unhealthy and unpleasant modes of work and routine. As everyone cannot go to distant National Parks or forests, it should be possible for the government to bring a part of nature closer to city dwellers. This can best be achieved by developing pieces of land in or near cities as parks, gardens, open spaces and mini-forests including maintenance of water bodies in and around the urban area. These green patches and open spaces should be evenly distributed in the city of Mysore to function as city lungs. A larger area can be planted with suitable trees, shrubs and creepers to provide a forest atmosphere and operational cost may be contained. In green belt area, flowering trees, shrubs and creepers have to be additionally planted. The existence of water sheets or water bodies is an important asset to the environment and has a beneficial effect on the microclimate of the city. The tank beds could also serve as outdoor recreational areas which are very much needed for the city dwellers. These tank beds must be freed from the covetousness of land grabbers and their supporters among administrators and politicians. The nearest forest or tree area is the avenue with trees nearby. Green reporting and green statistics may be made an integral part of media space.

SRIDHARA M.V

REFERENCES:

- Apuurva, M. S. (2011), Boulevard of blossoming trees, Star of Mysore, 16th April, p. 8.
- Aravind, H. M. (2007), Boulevard that evokes sepia memories, Times of India - Times City, 11th Feb. p.2.
- Gowda, Krishne, Sridhara, M. V. and Mahendra B. (2010), Greenery Aspects of Urban Environment: A Study of Mysore City in India, Nakhara: Journal of Environmental Design and Planning, Vol. 6, October, Bangkok, Thailand, pp.19-30.
- Gowda, Krishne and Sridhara M. V. (2009), Planning and Management of Green Areas in Mysore City, Scientific Annals of the Department of Forestry and Management of the Environment and Natural Resources, Democritus University of Thrace, Greece, pp. 149-163.
- Gowda, Krishne & Sridhara, M. V. (2009), Open Space and Green Areas in Mysore City: Planning Strategies for the 21st century, Shelter, A hudco-shmi Publication, Vol. III No 1, 3 July, New Delhi, India, Pp. 7-12&22.
- Gowda, Krishne, Sridhara, M. V. and Rajan, S. (2008), Planning and Management of Parks and Green Areas: The Case of Bangalore Metropolitan Area, Management of Environmental Quality: An International Journal, Emerald Group Publishing Limited, Vol. 19 No. 3, pp. 270-282.
- Gowda, Krishne & Sridhara, M. V. (1987), Urban Forestry and Its Impact on Environment: A Case Study of Mysore City, Ecology of Urban India, Vol. II (Ed). Ashish Publishing House, New Delhi, India, pp. 169-182.
- Gowda, Aravind (2003), "Trees losing out to development in city", Times of India, July 18.
- Hariprasad, Sreemathi (2010), Tree-cutting by MCC: MGP's objections, Star of Mysore, 11th November, p. 13.
- Karnataka Gazette (1975), The Karnataka Parks, Play-Fields and Open spaces (Preservation and Regulation) Act, 1985, Govt. of Karnataka, Bangalore.
- Miller, W. Robert (1997), Urban Forestry, Planning and Managing Urban Greenspaces, New Jersey, Prentice Hall, Inc.
- Roye, Janardhan (2009), Assault On Urban Green Cover. <http://www.deccanherald.com/content/Mar272008/panorama2008032659604.asp>.
- Star of Mysore, (2010), City to go Green, Star of Mysore, 21st May, p.1.
- Star of Mysore, (2009), Trees Felled For Road Development, Star of Mysore, 16th December, P. 4.
- The Hindu (2010), Two dozen trees brought down on KRS road, The Hindu, Mysore Edition, 29th April, p. 3.

SRIDHARA M.V

- (2010), Mysore residents become 'green activists', The Hindu, Mysore Edition, 5th May, p. 2.
- (2010), Officials, NGOs discuss tree-felling incident, The Hindu, January 13, p. 3.
- (2009), Forest Department facing pressure to withdraw decision against tree-felling, The Hindu, 21st June, p. 3.
- (2009) Corporation plan to axe 123 trees on Lalitha Mahal Road, The Hindu-Mysore, 31st May, p. 3.
- Vattam, Shaym Sunder (2011), City's green canopy under threat, Deccan Herald - CityHerald, 4 June, p. 1.