

# URBAN FORESTRY IN ARID REGION OF INDIA

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## **Introduction**

Trees have played an important role in human settlements throughout history. However, their full value to urban-dwellers has recently been recognized. Based on the future projections, the new millennium may rightly be termed as urban millennium. Urban areas in developing countries will account for nearly 90 percent of projected world population increase of 2700 million people between 1995 and 2030. By the year 2030, almost 85 percent of Latin Americans and 50 percent of Afro-Asians will live in cities. The most explosive urban growth is expected in Africa and Asia. Asia will have the largest urban population in the world, with almost twice as many people living in cities as in Africa and Latin America (UN, 1998). As the bulk of world's population shifts from rural to urban areas, poverty is becoming an increasingly urban phenomenon. As per the World Bank estimates, within the next 20 years more poor people will live in the cities than in rural areas (WRI, 1996).

Urban areas in developing countries have multi-faceted problems like paucity of safe water, inadequate waste management, pollution hazards, occupation and degradation of sensitive lands, flooding and soil erosion in unauthorized settlements. Seeland (2004) mentions following standard problems related to public green space management in urban areas of developing countries:

1. increasing population rate/over population
2. migration from rural areas to the large agglomerations
3. air (toxic gases,heat and dust) and water pollution
4. little problem awareness in the public
5. little/no support by politicians concerning green space& related matters
6. solid waste disposal problems
7. lack of hygiene and sanitation
8. poverty creates slum and squatter areas
9. lack of open free space in and around cities
10. encroachment of wastelands by in-migrating people from rural areas, mostly with herds of domestic animals.

Multiresource urban forest management is one of the solutions to some of these problems. For example, in Durban, South Africa, multifunctional parks are a component of slum

improvement programmes; parks are used for storm water catchments and wastewater, sewage treatment, recreation and gardening (Kuchelmeister, 2000).

### **Urban forestry & its benefits**

Many urban foresters in industrialized countries use the terms “urban greening” and “urban forestry” interchangeably (Miller, 1997). In broader terms, urban forests are regarded as the entire forest area influenced by the urban population. In a more restricted sense, urban forestry relates to trees and woodlands and emerging woodlands on vacant and derelict land (Kuchelmeister, 2000). Urban forestry is a branch of forestry with the objective of cultivation and management of trees for their present potential contributions to the physiological, sociological and economic well-being of urban society. The literature indicates that the research in urban forestry has been advancing rapidly in North America and Europe through concerted actions and significant resource allocation. The list of goods and services that urban forestry can provide is impressive. Trees and green spaces help keep cities cool, act as natural filters and noise absorbers; improve microclimates and the quality of natural resources including soil, water, vegetation and wildlife. Trees contribute significantly to the aesthetic beauty of cities, thereby helping to maintain the psychological health of the inhabitants. The tangible benefits of urban forests include availability of fruit, fuel wood and small timber, whereas intangible benefits are much more than tangible benefits.

### **Urban forestry in arid region**

Development of urban forestry models in harsh arid conditions like low and erratic precipitation, frequent drought, intense radiation, low humidity, high evapotranspiration, and poor soil conditions in Thar Desert, which is also facing maximum biotic pressure among all the World’s deserts, is really a challenging task.

Arid Forest Research Institute, Jodhpur at the request of district administration, Jodhpur took up the work of developing urban forestry models on different road sites of Jodhpur city from the year 2001-2002. Till the year 2006-2007, about 6000 plants of different species like *Dalbergia sissoo*, *Azadirachta indica*, *Pongamia pinnata*, *Cassia siamea*, *Cassia fistula*, *Alastonia scholaris*, *Tecomella undulata*, *Bauhinia variegata* and *Delonix regia* were planted and maintained over a length of about 6.50 km.in the city (Figure 1). Results have been very encouraging with survival percentage more than eighty percent. Effective barbed wire protection, sticking to correct watering schedule and protection of plants from termites etc. are the main reasons for good survival percentage. Wherever possible, sewage water was utilized for watering of plants. The relative growth of different species recorded at different road sites after plantation is given below:

*Dalbergia sissoo* > *Azadirachta indica* > *Cassia siamea* > *Alastonia scholaris* > *Pongamia pinnata* > *Cassia fistula* > *Tecomella undulata* > *Derris indica*.

At the age of 51 months, average height recorded in respect of *Dalbergia sissoo* was 883 cm, *Azadirachta indica* as 681 cm and *Cassia siamea* as 539 cm. Complete failure was recorded in respect of survival of species like *Delonix regia* and *Bauhinia variegata*. Main reason for failure seems to be the water requirement, which was perhaps higher in these species in comparison to other species mentioned below in the table giving overall picture regarding performance of main species:

Species	Average collar girth (cm)	Average height (cm)
<i>Dalbergia sissoo</i>	63	883
<i>Azadirachta indica</i>	54	681
<i>Cassia siamea</i>	39	539
<i>Alastonia scholaris</i>	40	389
<i>Pongamia pinnata</i>	34	386
<i>Cassia fistula</i>	38	385
<i>Tecomala undulata</i>	27	377

A multi-tier garden comprising small bushes, shrubs, hedges, dwarf sized and medium sized ornamental trees; was developed in the institute during 2005-07. Block plantation of big sized tree species in the open space and hedges were developed along the campus roads (Figure 3).

To prepare seedling stock of ornamental species at low cost at the institute level, cuttings were prepared from healthy mother plants of various species available in and around Jodhpur city. One prominent source of mother plants was Dada Bhagwan Sanskar Kendra, Tiwanri near Jodhpur city. It is worth mentioning that this spot is a well maintained park/picnic area as well as a spiritual centre for the local people situated at about forty kilometers from Jodhpur city. These cuttings were propagated in mist chamber under controlled conditions (Figure-2).

### **Strategies to be adopted for extension**

Proper planning is the key to success of any management task and artificial plantation development and management is no exception to it. Generally there are many government funded departments, corporations, trusts etc in big cities who can be involved in urban forestry works but their correct identification based on their available resources, strengths/ weaknesses

and their coordination with other agencies for plantation job is very essential for successful development of urban forestry models. It has been seen that after establishment of such models, maintenance is generally neglected. Following the examples of big cities where urban forestry has been developed in India like Bangalore and Chandigarh, the maintenance of green areas must be assigned to big industrial houses, newspaper groups, automobile dealers etc. who can maintain such spots and display proudly their small sized sign-boards for publicity.

Annual competitions among different schools, colleges, housing societies etc. for best maintained parks/gardens in their respective locations must be organized by the district administration or municipal corporations/councils once a year. This will go a long way in developing green attitude among citizens especially children. Town planners of the cities must ensure that partially treated sewage water must be utilized properly in parks/gardens and roadside plantations. This will ensure optimum water utilization in arid region, where water is a precious commodity.

It has been found in some studies conducted outside India that people of the city will not mind paying a nominal entrance fee to well-maintained parks or gardens and such kind of optimum entrance fees have been estimated for different protected areas, urban forests and other areas of scenic beauty by methods prescribed in the literature of environmental-economics. In our country, for urban forestry/greenery, one such kind of study has been conducted in Chandigarh city, where annual recreational use value of city's urban forestry assets was estimated as Rs. 27.50 millions from the point of view of city's residents. Mean willingness to pay (WTP) for betterment of existing landscape features in green belts and for creating new ones, was estimated as Rs. 153/- per family per year for a period of five years (Chaudhry et al, 2008). Such kinds of studies are needed to quantify the economic and social benefits of urban forestry for effective resource-allocation and to develop a scientific knowledge base in respect of a city's urban greenery. The various benefits, both the market and non-market, of the urban forests are often ignored or grossly underestimated. On the other hand, various developmental options to the area may be attractive to politicians and bureaucrats due to immediate returns from development projects. It has been observed that urban parks and open spaces left for green belt formation in future are subject to development pressure, especially in developing countries. One possible reason for this is that the planners and researchers have been unable to articulate their value in economic terms (More *et al.*, 1988). If benefits from the urban forest areas are not properly assessed, the authorities' decision may be biased to implement development activities such as construction of schools, shopping-complex, housing-flats etc. in open and green spaces. Once the monetary valuation of recreational and other non-market benefits is done, it can be introduced into public decision-making and cost-benefit analysis of the projects.

Various scientific and research institutes in the field of arid forestry like Arid Forest Research Institute, Jodhpur; Central Arid Zone Research Institute, Jodhpur and related universities of this region have to play a major role in conducting such kind of studies in addition to development of quality planting stock for proper and easy establishment of seedlings in the arid zone urban environment.

## References

- Chaudhry, P., Tewari, V.P. & Singh, B. 2008 'WTP Vs WTA for assessing recreational benefits of urban forests: a case from a modern and planned city of a developing country', *Forests, Trees and Livelihoods*, Vol. 18(3), pp.213-231.
- Kuchelmeister, G. 2000. Trees for the urban millennium: urban forestry update. *Unasylva no. 200 (special issue: Trees outside forests)*, 51: 2000/2001.
- Miller, R. W. 1997. Urban Forestry: Planning and managing green spaces. 2<sup>nd</sup> edition. Prentice Hall Inc., Upper Saddle River, New Jersey, p. 502.
- More, T.A., Stevens, T., Allen, P.G. 1998. Valuation of urban parks. *Landscape and urban planning*, 15(1-2): 139-152.
- Seeland, K.2004.Trees outside forests in an Indian urban environment, Paper presented at IUFRO sponsored international workshop on "Multipurpose trees in the Tropics: Management and Improvement Strategies" at Arid Forest Research Institute, Jodhpur (22-25<sup>th</sup> Nov,2005) pp.486-492.
- U.N. 1998. World Urbanization prospects: the 1996 revision. United Nations, New York.
- W.R.I. 1996. World Resources 1996-1997: The Urban Environment. World Resources Institute, Washington DC, U.S.A. p. 400.