

changes in flow and recharge rates are the other important considerations. In this regard Central Ground Water Board (CGWB) has taken up several pioneering studies for groundwater development and management in the hydrogeologically and physiographically complex areas including the Thar desert, Andaman and Nicobar Islands, Lakshadweep, Leh, Ladakh including Siachin glacier. The National Aquifer Mapping Programme to be launched by CGWB is a follow-up action in the XII plan involving the states and stake holders, which will address many of the

aforesaid aspects.

Apart from scientific development of available resources, proper ground water resources management requires to focus attention on the equitable sharing and judicious utilization of the resources for ensuring their long-term sustainability. Ownership of groundwater, need-based allocation and pricing of resources, involvement of stake holders in various aspects of planning, execution and monitoring of projects and effective implementation of regulatory measures wherever necessary are the important

considerations with regard to demand side groundwater management.

There is need for coordinated efforts from various Central and State Government agencies, non-Governmental and social service organizations, academic institutions and the stake holders for planning and implementing management strategies suitable for the prevailing situations to ensure the long-term sustainability of groundwater resources in the country.

*Summary of the K.R. Karanth Endowment Lecture delivered on 27<sup>th</sup> December 2011*

## **Trees and Flowering Plants of Bangalore and their Role in Preserving the Ecosystem – Sadananda Hegde, Bangalore (Email: sadanandhegde@indiatimes.com)**

Bangalore district of erstwhile Mysore state was known for its thick canopy of abundant huge trees and shrubby thickets. The district was once rich in native flora with about 980 species in 542 genera under 133 families (Ramaswamy and Raji, 1973, Flora of Bangalore District, University of Mysore, Mysore). Due to the impact of development, the district lost the green patches turned the vegetation into a dry deciduous type. However, the city of Bangalore, the present State Capital of Karnataka, with the concerted efforts of earlier rulers and the governments, has been able to develop greenery by introducing large number of exotic trees and flowering plants along the road side, and in Parks and Gardens. Neginahal (2006, Golden Trees, Green Spaces and Urban Forestry, Bangalore) enumerates 142 tree species which are grown in Bangalore urban area and these species have been naturalized over a period of time giving an environment and ecosystem of its own. Similarly, large numbers of flowering and non-flowering plants – shrubs and herbs, annuals and perennials, have also been introduced for gardening and floriculture. Thiruvady Vijay (2012, Heritage Trees, Bangalore Environment Trust, Bangalore) enumerates 140 trees of Lalbagh Botanical Gardens introduced over the last 150 years and have become our Heritage Trees.

Some of our important wild trees of Bangalore are: *Alstonia scholaris*,

*Artocarpus heterophyllus* (Jack fruit), *Azadirachta indica* (Neem), *Bombax cibebe* (Red silk cotton), *Butea monosperma*, *Ficus bengalensis* (Alada mara), *F. religiosa* (Ashwatha), *F. mysorensis*, *Gmelina arborea*, *Kigelia pinnata* (Sausage tree), *Lagerstroemia speciosa* (Pride of India), *Mangifera indica* (Mango), *Madhuca longifolia* (Mehwa or Ippe), *Melia composita* (Malabar Neem), *Michelia champaca*, *Neolamarkia kadamba* (Kadamba), *Pogonia pinnata* (Honge), *Pterocarpus marsupium* (Honne), *Syzgium cumini* (Jaamun), *Saraca indica* (Seeta Asok), *Swetenia* sp (Mahogani), *Terminalia arjuna* (Arjuna), *T. bellerica* (Tare), *Tabebuia spectabilis*, etc.

Some of the gracious exotic trees are: *Delonix regia* (Gulmor), *Enterolobium saman* (Rain tree), *Parkia biglandulosa* (Badminton ball tree), *Peltophorum pterocarpum* (Copper pod), *Spathodea campanulata* (African Tulip tree), *Tabebuia spectabilis*, etc.

Besides, some flowering shrubs and medicinal plants are: *Withania somnifera* (Ashwagandha), *Hibiscus* sp (Dasavala), *Lawsonia inermis* (Goranti), *Aloe vera* (Lolesara), *Andropogon citrate* (Nimbe Hullu), *Asparagus racemosus* (Shatavari), *Tinospora cordifolia* (Amruta balli), *Gymnema sylvestris* (Madhunasha), *Vetiveria zizanioides* (Lavancha), *Cyperus rotundus* (Thunge hullu), etc.

All these have added beauty to the

landscape and enhancing the quality of life and the environment. Besides, large numbers of lakes and water bodies have added beauty creating a pleasant environment and an ecosystem of its own. However, today, most of them have become rare in the wild due to cutting of wood for firewood and timber and other developmental activities. Further, with the emphasis on industrialization and the resultant increased population and traffic, the garden city, became a victim of development due to expansion of the city, widening of roads, metro works, real estate business, etc. In that process, large number of avenue trees, woodlots and green spaces and water bodies – lakes, ponds & puddles, streams and rivers, were lost disturbing the environment and ecosystem. Existing lakes have become sewerage tanks and rivers highly polluted or dried up.

An attempt will be made to trace the native plant wealth of Bangalore and its surroundings which have added beauty and created a unique eco-system. Role of trees in maintaining the eco-system and environment will be discussed. Impact of development on the trees and other flowering plants of Bangalore will be presented. Measures to restore and rejuvenate the environment and eco-system will be suggested.

*Summary of the lecture to be delivered at the monthly meeting of the Geological Society of India on 31 October 2012*