ABSTRACT:
Species diversity and ecosystem regeneration can stage a comeback if aided by human endeavor. Efforts are on, world over, towards restoration of devastated ecosystems as a means to mitigate climate change. These efforts have largely neglected urban ecosystems although cities and urban activities are at the heart of the challenge of climate change. Cities cover nearly 40 per cent of land surface and produce large amount of greenhouse gases. Green plants, particularly, trees are major carbon sinks and play a vital role in regenerating ecosystems. Clearly, one important means to mitigating climate change is driving sustainable cities with green built environments and trees must consequently become integral part of city landscapes. Urban managers have to necessarily seek to maximize the environmental benefits provided by trees. While doing so, they must know the way city spaces are managed. Selection of trees based on their characteristics is crucial while planting trees. It is the concern of many enlightened citizens that we should be helping to maintain our native woodland species in the cities which are suffering a continuous process of attrition in the name of development. Proliferation of exotic trees has also to be blamed for species erosion. Green canopied native species contribute a better habitat for other urban species, sequester greater amounts of carbon, contain more above ground biomass and provide more effective removal of air particulate pollution, greater shade and more effective cooling.

KEYWORDS: Urban ecosystem, Landscape, Native, Exotic, Sequester
improvements in air, water quality, building energy conservation, cooler air temperatures, reduction in ultraviolet radiation, and many other environmental and social benefits. One of the most significant means by which trees can help improve the urban environment is by affecting the local microclimate.

Urban areas often create what is known as the ‘urban heat island’ where urban surface and air temperatures are higher than the surrounding rural areas. These increases in urban air temperatures can lead to increased energy demand in summer (e.g. to cool buildings), increased air pollution, and heat-related illness. As part of the urban structure, trees also affect local and regional temperature and precipitation. Trees can alter urban microclimates and can help mitigate heat island effects and reduce energy use and consequent power plant emissions. Trees can also indirectly influence local climate by affecting global climate. Urban trees can potentially affect global climate change by altering carbon dioxide concentrations. Trees through their growth process can sequester significant amounts of carbon in their biomass. Clearly, the answer to mitigating climate change is driving sustainable cities with green-built environments.

**URBAN GREENING EFFORTS:**

**a) Integration of Natural Vegetation in Urban Design:**

Preservation of the original natural vegetation with a view to making it a part of the green infrastructure when new city areas are developed provides aesthetical, social, functional, biological and economic advantages. When cities grow, they usually spread to the rural surroundings. The existing original vegetation in these surroundings represents an opportunity for its use as parts of the urban green infrastructure in the new city regions. The vegetation can be natural or semi-natural, developed over time with little or no human intervention. Vegetation types such as natural and semi-natural forests and woodlands, scrub, meadows, pastures, heaths, bogs and wetlands may be preserved. The original natural vegetation may be preserved as small remnants close to buildings and roads as well as larger areas within the development areas or at the urban fringe.

The concept of preserving a functioning biotope or ecosystem is a part of a viable model for the sustainable development of towns and cities, including the reduction of energy use, natural consumption of carbon dioxide production. Socially, the natural vegetation usually offers exciting areas for children to play, can provide areas for recreation such as picnics or taking a walk, and may form part of the natural and cultural heritage (e.g. Bannerghatta National Park, Bangalore). Functionally, the most important aspect of preservation is that the vegetation is already mature with fully grown-up trees when the first residents move in. This is especially important in areas with poor vegetative growth. Biologically, the natural vegetation and the natural soil usually have much greater biodiversity than plantations. In some cases, it is also possible to preserve vegetation types that are becoming rare in the rural landscape. From financial viewpoint, the costs of establishing these green areas are low, and they are usually less expensive to maintain than planted areas. Properties in built-up areas close to preserved vegetation have also been shown to have a higher economic value than those without adjacent natural vegetation.

**b) Urban Wastelands - A Chance for Biodiversity in Cities:**

It is possible to develop new qualities for biodiversity in cities by including urban forests, wilderness and succession areas of wastelands into urban green systems. Wastelands are particularly for urban green systems because with their various stages of vegetation they are able to provide a broad habitat mosaic and, with this, opportunities to increase biodiversity.

Wastelands are often perceived by residents as signs of decay and decline and the wild spontaneous nature often regarded as a sign that the city is not being run well. Waste, wilderness and the fear of crime are negative associations, leading to feelings of threats caused by wastelands. For ecologists, urban wastelands provide an opportunity to create a habitat or wilderness in the heart of densely built-up cities. As a result of human activities on urban wastelands, special areas have developed, which are, because of their ecological structures and sites, very similar to natural habitats.
The idea of integrating wastelands into urban green structures is coming increasingly more into the focus of planning institutions in Europe.

c) Task Ahead For Native Species to Find Place in Urban Spaces:

It is the concern of many enlightened citizens that we should be helping to maintain our native woodland species in the cities which are suffering a continuous process of attrition in the face of modern developments. Stately old native trees were felled to make room for public buildings, housing, offices and shops. Road widening and flyovers to accommodate an increasing number of vehicles took their toll of roadside trees. In general, native species are more reliable and have certainly proven their adaptability because of their long presence on the land and fit best into the landscape and support existing wild populations. Also from the point of view of design, native species harmonize well with our landscape.

Flora in India belongs to diverse vegetation types. Virtually every kind of vegetation supports tree species, small and big, deciduous and evergreen. A general belief is that these hundreds and thousands of native tree species are adapted to such specialized natural conditions and are unsuitable for translocation, particularly for planting in urban environs. Contrary to this belief, we have, in our experiments (Mini-forest experiment at IISc, Bangalore) observed that trees have remarkable ability to adapt to change in locations which are totally alien to them. It is therefore possible to bring different wild native tree species for planting in city confines.

The impending danger of climate change is likely to affect some of our native tree species in their natural setting. It might therefore become necessary to bring different native trees to city confines where they have better opportunity under a watchful eye (Ex situ conservation).

Urban managers have to necessarily seek to maximize the environmental benefits provided by urban trees. For this purpose, they need to preserve, protect and enhance existing environmental assets around the city while planning infrastructure. Further, for effective long term management of the city’s green spaces, the urban managers have to necessarily phase out the alien trees (Proliferation of exotic trees has also to be blamed for species erosion as they pose a potential threat to the integrity of our landscapes, biodiversity and ecosystems) and make space for our valuable native biodiversity to persist in the city landscape. The present ongoing tree planting, in fact, provides the best opportunity to bring in more of our native trees into the city confines.

CONCLUSIONS:

The presentation emphasizes the need to maximize urban greening as one important means in our efforts to mitigate climate change and draws attention to integrating human dimensions of urban forestry and urban greening with the aim of green infrastructure supplementing grey infrastructure. It also calls for more research on different tree species and their functions in an urban setting.