

# Building a Sustainable Urban Forest

This article was earlier published in Land Development Today (<http://www.landdevelopmenttoday.com/Article102.htm>) and several articles on or related to this subject have appeared in Arbor Age (<http://www.championtreeproject.org/ArborAge/Launch.htm>) and the Florida Urban Forestry Council Quarterly (<http://www.fufc.org/information.html>)

**In the United States it is estimated that 90 percent of the entire population now lives within the boundaries of what is commonly called the “urban forest” - a term used to describe the sum total of all vegetation growing in urban and community areas, including the city centre, city residential, suburbs and suburban fringe.**

**T**he total yearly economic value of urban forest storm water services alone is more than \$400 billion (National Alliance for Community Trees). Many other valuable services furnished by trees are now required due to various government initiatives, to promote energy conservation and reduction of atmospheric and water contaminants. In some instances, the desire for improved social and professional aesthetics is a motivating factor as well.

To achieve sustainability of our rapidly expanding urban ecosystems and deliver the maximum level of benefits to the inhabitants, the urban forest must have all of the following three components: 1) a healthy tree resource, 2) comprehensive management, and 3) community-wide support.

## HEALTHY TREES

As the engine that drives the urban forest, the healthy tree resource is the most important component in the system. As designers or implementers of the sustainable urban environment, land development professionals should be aware of the quality of trees that will be placed into their plans. The remaining tree resource criteria necessary for urban forest sustainability are canopy cover, age distribution, species mix, and soil volume and composition.

Though the ideal amount of canopy cover will vary by climate and region, there is an optimal degree of cover for every

urban area. Geographic information system technology can be used to map and analyse the workings of the urban forest. It can be demonstrated that a 65 percent loss of canopy cover in Atlanta since 1972 has led to a 9 degree rise in average urban temperature (Trees Atlanta). The city of Milwaukee, with only a 16 percent canopy cover, can point to 22 percent reduction in storm water flow and a saving in city taxes of \$15.4 million by not having to build additional storm water retention capacity. At the household level, it is now possible to determine how much canopy cover is needed to cover a family's oxygen need and offset its carbon dioxide emissions.

A mix of young and mature trees is essential if canopy cover is to remain relatively constant over time. Some level of tree inventory is necessary to monitor this. There is tremendous genetic potential for developing superior landscape trees. Unfortunately, few trees currently grown and sold as clones in the nursery trade have been purposely developed and thoroughly tested for resistance to environmental stress. And relatively few native trees have been cloned for landscape use.

Experience with species-specific pests has shown the folly of depending too heavily upon one species, no matter how good the quality. For diversity, the best clones, cultivars should be used, and seedlings of many species and genera should be distributed throughout the city either as scattered strips, uniform blocks or mixtures of individual trees along parkways and in parks. When selecting tree species, it is important to emphasise native trees, which are well adapted to the local climate and support native



Champion® Tree Project International

**National Champion Green Buttonwood shades a home in a fast growing urban ecosystem**

wildlife. *For maximum protection against unusual weather or pests, the urban forest should contain (1) no more than 10 percent of any species, (2) no more than 20 percent of any genus, and (3) no more than 30 percent of any family. This way, species-specific tree death will not cause devastation on the landscape because no more than 5 or 10 percent of the trees will likely be affected.*

## Opportunity lost?

The U.S. Department of Agriculture initiated a noble but ill-fated national project called the Urban Resources Partnership to provide a basis for recognising the value of the natural resources in urban areas and create local actions to care for them. The South Florida Community - Urban Resources Partnership was formed to assist with the restoration of the entire south Florida ecosystem. Before its demise, this four-county Urban Resources Partnership successfully crossed traditional political boundaries and embraced the need for a sustainable urban forest to help the \$8.7 billion Everglades Restoration project achieve regional sustainability. However, in spite of this isolated success, the national programme was terminated due to political bickering.

Urban trees planted in large open volumes of soil have growth and health dramatically superior to trees in contained root zones. Insufficient rooting volume in urban situations often leads to unhealthy trees and/or property damage where roots outgrow the planting pit and spread immediately below the pavement surface, eventually destroying the pavement. Emerging technologies can be utilised to increase rooting volume under pavement without damage, or to replace minerals and trace elements that have been leached away in the past due to erosion, acid rain, and chemical agriculture.

**Terry Mock**

*International Society of Arboriculture,  
Champion Tree Project International  
✉ [champtree@bigplanet.com](mailto:champtree@bigplanet.com)*



A sustainable urban forest is fundamentally dependent on the health of the tree resource. The optimal structure of urban forests, both above and below ground, remains the subject of ongoing research.

### COMPREHENSIVE MANAGEMENT

Comprehensive management of the urban forest requires a broad set of activities, including management of single trees as well as large stands, education of the community at large, and coordination between bureaucracies that are accustomed to acting independently. Principles of ecosystem management argue for a natural scale based on ecological boundaries such as entire watersheds. However, political borders do not respect biology. In the rush to make cities modern marvels, nature has been fine-tuned out of the design process, ignoring the ecosystem cycles of energy, nutrients, air and water. To build a new awareness of urban communities as ecosystems, therefore, the natural and man-made infrastructures that make up our communities, the ways they interact, and how the urban forest fits in need to be re-examined.

New policies need to be developed that promote positive environmental actions. Community leaders need better

A project called Transagency Resources for Economic and Environmental Sustainability (T.R.E.E.S.), developed by TreePeople in Los Angeles, proves that there are enormous economic, environmental and social benefits to be gained through a cooperative approach to designing our urban ecosystems as functioning watersheds. Using a sophisticated GIS-based cost-benefit computer-modelling program, T.R.E.E.S. successfully demonstrated that having public agencies, private landowners, the green industry and neighbourhood groups share the same vision of the urban forest is a crucial element of sustainability. (<http://www.treepeople.org/trees/cba.htm>)

information about the costs and benefits of their urban ecosystem: “you can’t manage what you can’t see”. Geographic information system (GIS) technology now assists in mapping and analysing the urban ecosystem and illustrating the benefits provided to the community.

Sophisticated cost/benefit analysis has been designed to produce reliable data on a range of practical, cost-effective measures with the potential to improve the environment while generating non-monetary social benefits, to describe their effects and make maximum use of the best existing information.

### COMMUNITY-WIDE SUPPORT

Trees are important in mitigating carbon dioxide emissions, air pollution and storm water runoff; reducing energy costs, crime rates and medical bills; and enhancing biodiversity by improving liveable conditions for most life forms. It is therefore no wonder that experts promote healthy urban forests as a key environmental component of regional, national, and global sustainability. And yet, USDA Forest Service experts estimate that less than 10 percent of the U.S. population understands or cares about natural resource management.

Recent advancements in tree care and best resource management practices have clearly demonstrated that there is sufficient knowledge and technology to physically build and maintain sustainable urban forests. But how do we generate the collective will to do the job without community-wide support? The simple answer is that we don’t. People take themselves seriously, but concern for oneself does not seem to expand sufficiently to embrace concern for the species — and definitely not for all species and ecosystems. This is why the urban ecosystem holds the key to global sustainability. The urban ecosystem is where the vast majority of people live. If we can’t sell the idea of sustainable urban forests to the people who inhabit them,

### ISA

The International Society of Arboriculture (ISA) is a worldwide professional organisation dedicated to fostering a greater appreciation for trees and to promoting research, technology, and the professional practice of arboriculture. The ISA has served the tree care industry for over seventy years as a scientific and educational organisation. ISA was founded in 1924 when a group of forty individuals, each engaged in a phase of tree work or research, were called together by the Connecticut Tree Protection Examining Board to discuss shade tree problems and their possible solutions. It was during this meeting that the group identified a need for gathering tree care information and for providing a means for its dissemination. The National Shade Tree Conference (NSTC) was founded soon thereafter. Due to its influence and membership spreading beyond the borders of the United States, the organisation changed its name to the International Shade Tree Conference (ISTC) in 1968. Only a few years later, in 1976, in order to more accurately reflect its broadening scope, the name was again changed, this time to the International Society of Arboriculture. ISA continues to be a dynamic medium through which arborists around the world share their experience and knowledge for the benefit of society. ISA, aligned on many fronts with other green organisations, is working hard to foster a better understanding of trees and tree care through research and the education of professionals as well as global efforts to inform tree care consumers (<http://www.isa-arbor.com/home.asp>).

then we have little likelihood of convincing others.

As a critical element of sustainability, the public must gain greater awareness and understanding of, and must be willing to support urban forests and comprehensive ecosystem management. A proactive approach is necessary that employs full-time media and marketing (<http://www.greenmediaonline.com/aa/2003/0302/0302tale.asp>). Creative and frequent messages and innovative educational methods are needed to reach the youth. Sustainable urban forestry holds the key to saving our cities.

New principles and practices have been discovered to reinvent cities in the new century. By following these principles and implementing urban-forest-based best management practices, cities can become economically and environmentally sustainable as well as aesthetically uplifting and enlivening for all who dwell there.

### REFERENCES

National Alliance for Community Trees:  
<http://www.treelink.org/woodnotes/vol5/no2/article1.html>  
Trees Atlanta:  
[http://www.earthshare.org/pr5.nsf/0/5D79230995B140D285256B02005EB79A/\\$FILE/64+Trees.pdf](http://www.earthshare.org/pr5.nsf/0/5D79230995B140D285256B02005EB79A/$FILE/64+Trees.pdf)