Benefits of Trees

"To know something about trees - about even one tree - is to know something important, something fundamental, something profound about the nature of the world and our place in it."

Trees perform environmental services that directly benefit people living in urban areas. These local benefits are in addition to the aesthetic or conservation values that some people place on trees. They include:

Improving Air Quality
While the reactions that create air pollution are complex, a major element in the formation of pollution is air temperature. Temperature is critical to the production of smog, and ozone in particular. Trees help reduce the production of ozone by reducing air temperature through shading and evapotranspiration (American Forests, April 1996). Additionally, trees reduce air pollution by intercepting airborne particulates and by absorbing gaseous pollutants. A major study of Chicago estimated that trees in that city annually removed 15 metric tons of carbon monoxide, 84 tons of sulfur dioxide, 89 tons of nitrogen dioxide, 191 tons of ozone, and 212 tons of small particulates. The estimated value of this pollution removal was $1 million for trees in the city itself and $9.2 million for the entire Chicago area (Nowak et. al.,1994).

Removal of Other Chemical Ground and Water Pollutants
Research at the Universities of Iowa and Washington indicate that trees (e.g., poplars), and their symbionts can breakdown pesticides and carcinogenic groundwater contaminants, such as atrazine and trichloreoethelene, into harmless compounds (Black,1995). Trees are now being planted on landfill caps to help reduce pollutants while improving the environment.

Carbon Sequestration
Trees in urban areas reduce the amount of carbon in the atmosphere in two ways. First, they store carbon as they grow. Second, they reduce the energy needed for urban heating and cooling, which in turn reduces the amount of carbon dioxide produced by fossil-fuel power plants. In the Chicago study, trees annually sequestered the equivalent amount of carbon emitted from all forms of transportation in one week (Nowak et al. 1994). With some additional tree planting, it was estimated that this could be increased to the amount of carbon emitted by two months of transportation use in Chicago. The tree canopy cover of Dade County, Florida, is estimated at 10%, which sequesters approximately 5,245 tons of carbon annual value of $4.8 million (American Forests, April 1996).

Cooling Urban Areas
Shade provided by trees is a welcome relief in hot climates and has a direct cooling effect on high temperatures. Moreover, water vapor released by trees through evapotranspiration also has a cooling effect on the microclimate. Parks, and trees properly placed to cool urban heat-islands, can lower the temperatures as much as 5 degrees F (American Forests, 1995a). Tree-lined streets not only have an aesthetic value, but the trees provide cool comfort for pedestrians on hot days.

Energy Conservation
By producing shade in warm climates, trees help conserve energy as they intercept radiant heat. They also block the wind, which can save energy in cold climates as well by reducing heat dissipation. In Chicago, increasing tree cover by 10% (which is equivalent to adding three trees in optimal locations per building) could reduce total energy use for heating and cooling by 5 to 10% (Nowak et. al., 1994). Elsewhere, it is possible that trees could reduce summer energy consumption by up to 20% and winter consumption by up to 30%. In Dade County, Florida, over half of the residential energy consumed is for air conditioning. Trees currently provide direct energy savings of 3.3%. Adding one mature tree in the right location at each home would give an additional 6.4% energy savings (American Forests, April 1996). The exact location of trees is obviously important, for a tree planted for shade will be ineffective if planted too far from the building it is to cool.

Dark materials absorb more heat from the sun -- as anyone who has worn a black t-shirt on a sunny day knows. Black surfaces in the sun can become up to 70 degrees F hotter than the most reflective white surfaces. When the sun beats down on buildings with dark colored or tin roofs, some of the heat collected by the roof is transferred inside, causing inside temperatures to rise considerably. Simply painting these roofs white can lower inside temperatures several degrees. Roads and parking lots paved with dark materials also contribute to the heat island effect. Using concrete rather than asphalt greatly reduces the heat island effect. This effect can also be reduced by using a white crushed-rock with the asphalt rather than that made from darker rock (DOE, 1996).

Securing Water Supplies
Planners need to note that urban forestry can play an important role in securing water supplies for the growing urban population. There is a great need to reforest watersheds to maintain an adequate and consistent flow of potable water. Without an adequately forested watershed for sources of city water, large quantities of water flush and disappear downstream when it rains. As a result, little water infiltrates into the soil to provide a reserve and a consistent supply of water during the dry season. Moreover, trees reduce runoff pollutants by increasing ground water infiltration. This process helps purify the water, and recharge aquifers, which results in a more consistent flow and quantity of potable water.

Biodiversity
Urban forestry can greatly contribute to the increase and conservation of biodiversity. Strategically placed plantings of trees, combined with shrubs, grasses and other food sources provide habitats for a diverse population of birds, mammals and insects.

Urban Forestry By-Products
Branches, leaves and fruits can be beneficial by-products of urban forestry. Pruned branches and fallen trunks can be used for low-cost construction materials, fuelwood or converted to charcoal, while leaves can be turned into compost for landscaping and gardening, or used for fodder. These materials are in short supply in many urban settings in developing countries.

Fruit and other species of trees can be a valuable source of both human food and animal feed for urban households, and can be planted as part of urban tree planting programs. In many developing countries leaves, pods and fruits of urban trees serve as a source of fresh fruit, leafy green vegetables, spices, potages, and a source raw materials for cottage industries to supplement household nutritional intake and income. In some communities, individual households are given tree tenure, and have the responsibility for the maintenance of a tree or trees, including cleaning any debris, in return for the right to harvest its fruits. Fruit and other products that are not consumed can be sold in the market or processed, providing additional income to the household.

Noise Reduction
Trees and shrubs can be effective buffer in screening-out urban noises, especially when planted in contiguous rows in widths of 16 feet or more. The physical bulk of trees dull or soften sound waves that attempt to pass through them, and further dampen these sounds by adding noises of their own, a phenomenon called "masking." A row of trees can cut the ambient noise level approximately in half (The National Arbor Day Foundation, nd).

Erosion Reduction
Trees, combined with shrubs and grasses [e.g., vetiver, (National Research Council, 1993)], are very important in soil stabilization. While groundcover holds the topsoil in place, the roots of trees secure large blocks of soil, which is particularly important on steep slopes (USDA Forest Service, 1995). This could be extremely important in stabilizing slopes in urban areas prone to landslides. In addition, streamside buffers, comprised of trees, shrubs, and grasses, filter out surface and shallow subsurface pollutants before they enter watercourses. These filter strips also help control bank erosion, protect and enhance aquatic environments, provide wildlife habitat and recreational sites, and increase biodiversity. These systems can reduce both the sediment and the pollution load of streams which run through urban areas. Trees, by increasing water infiltration into the ground, decrease storm water runoff loads on urban drainage systems, thus reducing costs for maintenance. At a South Miami Residential study site, a 21% existing tree canopy reduces stormwater runoff by 15% (American Forests, April 1996).
1) Leaves trap dust and particulate matter from the air, improving the quality of the air we breathe. According to the U.S. Forest Service, each tree traps up to 40 pounds of dust from the air each year. Trees Atlanta planted and distributed 3,500 trees in 2010/2011. That means that over 134,000 pounds of dust and particulate matter were cleaned from Georgia's air last year instead of landing in the lungs of citizens.

2) Trees produce oxygen and improve ground level ozone. A single tree produces $625 worth of oxygen per year. Humans require fresh, clean oxygen to breathe. Cleaner, cooler air means fewer ozone alert days during the summer.

3) Trees filter ground water to help ensure that cleaner water enters our natural waterways and watersheds, the source of Georgia's drinking water. Trees also slow the rate of storm water runoff, lessening stress on urban sewer structures and maximizing absorption of rainfall. Trees are natural allies for water management, especially during times of drought.

4) Shade trees provide UV Ray protection. Studies in the U.K. show that a street heavily lined with shade
trees provide protection of up to SPF30. Delicate human skin needs maximum protection from Georgia's intense summer sun.

5) Tree cover reduces the urban heat island effect in heavily paved areas. According to studies by NASA, urban trees shade and cool hot asphalt and pavement, reducing ambient air temperature. Cooler temperatures make Georgia's cities more comfortable for citizens and visitors.

6) Well placed shade trees help keep our homes and workplaces cooler. One properly placed shade tree can provide the cooling capacity of 10 air conditioners. Large shade trees drastically reduce summer cooling costs. In the winter, many trees shed their leaves allowing sunlight through to warm our homes and businesses. Trees with leaves form a wind break for buildings, helping keep heating bills affordable.

7) Trees reduce stress. Studies at the University of Washington have proven that patients heal more quickly when presented with a view of trees as opposed to looking out on a brick wall. They also found that trees make people feel more relaxed and willing to talk calmly. Trees planted by citizens in a community give neighbors a sense of pride and have a direct impact on lowering urban crime.

8) Trees are good for business and the economy. Studies in Seattle, Washington and Athens, Georgia have proven that trees in retail areas help increase sales by up to 12%. Trees improve the visual appeal of urban areas, promoting tourism, trade, and the establishment of new businesses and jobs.