

# TREES

## The Benefits of Trees

Trees provide a multitude of benefits. Unfortunately, the general public is not well educated on the subject. By increasing the awareness of the benefits relating to trees, the public can utilize current scientific evidence to help resolve many difficult problems and improve the livability of our cities. Proper tree care and sound forest management programs are crucial to the health, longevity, and sustainability of our urban forests, as well as being a wise investment in our future.

*A listing of the benefits, in no particular order, would include at least the following.*

### 1. Air Temperature and Energy Consumption

- Trees decrease air temperature and help to offset the "heat island" effect of hardscapes by providing shade and by transpiration (the release of water vapor into the air). By properly selecting and planting trees, energy savings can exceed 40%. Three mature trees placed strategically around a house can cut air conditioning bills by 10% to 50%.
- A single large tree can release up to 400 gallons of water into the atmosphere each day. Water from roots is drawn up to the leaves where it evaporates. The conversion from water to gas absorbs huge amounts of heat, cooling hot city air.
- Dallas area neighborhoods with mature trees can be up to 11 degrees cooler than new neighborhoods without trees. A one-degree rise in temperature equals a 2% increase in peak electricity consumption.
- Cities are 5 to 9 degrees warmer than rural areas and 3% to 8% of summer electric use goes to compensate for this urban "heat island" effect.
- One simulation found that planting 500,000 trees in the Tucson area would lower the "heat island" effect by 3 degrees and lower overall cooling costs by up to 25%.
- The National Arbor Day Foundation calculates that 100 million additional mature trees in the U.S. cities would counteract the "heat island" effect and can save \$2 billion annually.

### 2. Air Quality

- Trees produce oxygen and store carbon dioxide (just opposite of humans), which helps to clean and restore our air. They also trap pollutants, such as greenhouse gases, ozone, and particulate matter (dust, smoke, pollen, etc.). By storing carbon dioxide, cleaning particulate matter, and generating oxygen for our urban spaces, the AMERICAN FORESTS organization's studies foresee the value to American cities at 10 billion dollars! (That is in these three categories alone!)
- One acre of trees produces enough oxygen for 18 people every day.
- One acre of trees absorbs enough carbon dioxide per year to match that emitted by driving a car 26,000 miles.
- A single, fully-grown Sycamore tree can transform 26 pounds of carbon dioxide into life-giving oxygen every year.
- Large trees remove 60-70 times more pollution than small trees. Only a small portion of the Dallas area tree population exceeds 24" in diameter.
- For every ton of wood a forest grows, it removes 1.47 tons of carbon dioxide and replaces it with 1.07 tons of oxygen.
- A typical tree removes 25-45 pounds of carbon from the air each year.
- Emissions of isoprene, a natural product of trees, which contribute to natural ozone formation, are increased due to the urban "heat island" effect. A study of Atlanta's urban forest showed that total isoprene emissions were actually lower before

intense urban development caused the loss of much of Atlanta's urban forest and found an increase in urban temperatures.

- An EPA study in Chicago showed that the 23.2% of canopy cover in the Lincoln Park neighborhood adjacent to downtown annually filters 43.9 tons of particulate matter, 14 tons of carbon dioxide and 12.4 tons of nitrogen oxides, giving the urban forest an estimated pollution abatement value of \$625,000 per year.

### 3. Water/Soil

- Planting trees along streams, wetlands, and lakes, helps control water and soil runoff, removes sediment, reduces flood damage, and increases water quality, by reducing the pollution of water runoff by as much as 80%.
- Healthy, vegetated stream buffer zones reduce the total suspended solids phosphorus, nitrogen and heavy metal transfer between urban areas and streams by 55% to 99%.
- Numerous studies have correlated the reduction of loss in streamside trees and vegetation with the reduction of aquatic diversity and up to an 86% decline in the total fish population.
- One square mile of forestland produces 50 tons per year of sediment, whereas one square mile of farmland produces 1,000 to 50,000 tons per year of sediment and one square mile of land prepared for construction can produce 25,000 to 50,000 tons per year of sediment.

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- Tree canopy, in one study, reduced surface runoff from a one-inch rain over 12 hours by 17%.
  - In natural watersheds with trees and vegetation, 5% to 15% of stream flow is delivered as surface storm runoff. In highly developed areas, over 50% of the stream flow is from surface runoff.
  - The runoff of water on land decreases as impervious cover increases to nearly a 1 to 1 basis.
  - As much as 50% of the sediment in some streams results from stream channel erosion attributable to streamside vegetation removal practices and channelization.
4. Trees provide food and shelter for wildlife.
5. Numerous trees and plants have proven useful in phytoremediation or removal of toxic materials.
6. Trees can become living witnesses to our history and evidence of our cultures. Without a cultural history, people are rootless. Preserving historical trees offers lingering evidence to remind people of what they once were, who they are, what they are and where they are. It feeds our sense of history and purpose.
7. Economic, Health, and Psychological Benefits
- Studies from all across the nation show that residential home prices increase from 3% to 20% due to the presence of trees, depending on the type of trees, scarcity of tree lots and the maturity of existing trees.
  - One widely reported study showed that viewing trees through a window during surgery recovery cut the average recovery time by almost one whole day compared to patients with a view of a blank wall.
  - People turn to the urban forest, preserved by humans as parks, wilderness, or wildlife refuges, for something they cannot get in a built environment. The quality of human life depends on an ecologically sustainable and aesthetically pleasing physical environment. The surge of interest in conserving open spaces from people motivated by ecological and aesthetic concerns is growing.
  - There is growing recognition that the key to curtailing health care costs lies in prevention of illness so it does not have to be treated by the expensive medical system. Trees contribute to this end by facilitating positive emotional, intellectual, and social experiences.
  - Environmental stress may involve both psychological emotions, such as frustration, anger, fear and coping responses, and associated physiological responses that use energy and contribute to fatigue. It is experienced daily by many who live or commute in urban or blighted areas. Trees in urban setting have a restorative effect that releases the tensions of modern life. Evidence demonstrating the therapeutic value of natural settings has emerged in physiological and psychological studies. The cost of environmental stress in terms of work days lost and medical care is likely to be substantially greater than the cost of providing and maintaining trees, parks, and urban forestry programs.
8. Trees are a source of food for humans, i.e. Pecans, Walnuts, Almonds, etc. On a large scale, they require less fertilizer and keep the soil healthier than any other crop.
9. Trees can screen objectionable views, offer privacy, reduce glare and light reflection, offer a sound barrier (acoustical control), and help guide wind direction and speed.
10. Trees offer aesthetic functions such as creating a background, framing a view, complementing architecture, and bringing natural elements into urban surroundings.
11. Trees offer unlimited climbing challenges and good physical activity opportunities such as tree swings and tree houses.
12. Trees can attract wildlife to an area and help support a biodiversity of animals as well as habitat.
13. Bioremediation the use of biological agents, such as bacteria or plants, to remove or neutralize contaminants in polluted soil or water.



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