

## **Carbon Storage and Sequestration**

### Summary

CITYgreen's carbon module quantifies the role of urban forests in removing atmospheric carbon dioxide and storing carbon. The carbon module multiplies a per unit value of carbon storage by the area of canopy coverage. The program estimates annual sequestration, or the rate at which carbon is removed, and the current storage in existing trees. Both are reported in tons. Economic benefits can also be associated with carbon sequestration rates using whatever valuation method the user feels appropriate. Some studies have used the cost of preventing the emission of a unit of carbon--through emission control systems or "scrubbers" for instance--as the value associated with trees' carbon removal services.

### Technical Methodology

In estimating urban carbon storage and sequestration, the study area (in acres) and the percentage of crown cover are required.

In recent studies conducted by Dr. David Nowak and Dr. Greg McPherson of the U.S. Forest Service, they have suggested that if urban trees are properly maintained over their lifespan, the carbon costs outweigh the benefits. Tree maintenance equipment such as chain saws, chippers and backhoes emit carbon into the atmosphere. Carbon released from maintenance equipment and from decaying or dying trees could conceivably cause a carbon benefit deficit if it exceeds in volume the amount sequestered by trees.

In order to maximize the carbon storage/sequestration benefits of urban trees, the U.S. Forest Service suggests that we should plant larger and longer living species in urban areas, so that more carbon can be stored, mortality rates can be decreased, and maintenance methods can be revised over time as technology improves. For more information on how to estimate urban carbon storage and sequestration, please contact the U.S. Forest Service (Northeastern Forest Experiment Station - Syracuse, NY).

## **References**

1. Nowak, David; Rowntree, Rowan A., "Quantifying the Role of Urban Forests in Removing Atmospheric Carbon Dioxide", *Journal of Arboriculture*, 17 (10). October 1, 1991. p.269.
2. McPherson, E. Gregory; Nowak, David J.; Rowntree, Rowan A. eds. 1994. *Chicago's Urban Forest Ecosystem: Results of the Chicago Urban Forest Climate Project*. Gen. Tech. Rep. NE-186. Radnor, PA: U.S. department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 201 p.