The Urban Forest of Tampa: The Role It Plays in Mitigating Greenhouse Gas Emissions

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The forests of Florida are rapidly changing in part due to an increase in population and expansion of urban areas into rural forests and farmland. While this trend is not new in Florida the rate of expansion has increased and some argue we are approaching an ecological "tipping point" from which these forests will no longer provide the ecosystem services society desires. Therefore, it is necessary to quantify the forest composition, structure and function across the landscape along the urban to rural gradient. In February 2008 Tampa Mayor Pam Iorio signed the U.S. Mayors Climate Protection Agreement to reduce greenhouse gas emissions. Urban forests can significantly contribute to these policy goals and in particular can contribute to the sequestration and storage of atmospheric carbon.

To assess urban forest composition and function, we established over 200 permanent inventory plots in a systematic random sample within the City of Tampa. These plots establish both an ecological baseline for a long-term study and allow comparison of changes in forest structure and function throughout the city.

The data collected was analyzed using the **U**rban **FOR**est **E**ffects (UFORE) model. It is a relatively new tool used to quantitatively assess urban forest functions in ecological and economic terms. It is designed such that it provides analyses of tree diversity, origin, abundance, density, size, cover and leaf area by land use categories. In addition, it provides estimates of the following urban forest functions: energy savings, air pollution removal, carbon storage, carbon sequestration, and compensatory or replacement values.

Values for energy saving estimates were calculated for residential homes by using the average rate of energy consumed by residential buildings in Tampa in 2007.

The total amount of energy saved to cool residential buildings in 2007 in the city of Tampa was 34,743 Mwh's (megawatt-hours) with an associated value estimated at $3.9 million dollars. The cost of heating is primarily reduced by trees acting as windbreaks. It is estimated that approximately 2,994 Mbtu's (million British thermal unit) were saved worth a value of $100,479. A third savings is associated with the carbon emissions avoided (6,185 tons) by power plants as a result of these reduced energy needs and had a value of $125,681. Overall, the total energy savings to residential buildings in 2007 was $4.2 million dollars.

The total amount of carbon stored in the city of Tampa is 511,141 tons at a value of $10,386,389 dollars. The amount of carbon sequestered annually in Tampa is 46,525 tons per year with an associated value of $945,396 per year and with this data-set we can determine which species of trees store the most carbon. We are also able to determine rates of carbon sequestration by size class (diameter) and species.

The immediate outputs from this long-term study are being used by managers and planners to understand the functional value of forests in the Tampa Bay Watershed, to develop forest management strategies and policies for sustainable development and to meet goals of mitigating greenhouse gas emissions.

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