

The Tree Project

Integrated Urban Environmental Improvement
Through Tree Selection and Management



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THE TREE PROJECT INTEGRATED URBAN ENVIRONMENTAL IMPROVEMENT THROUGH TREE SELECTION AND MANAGEMENT UPDATE – May 2007

The goal of The Tree Project is to identify how trees can be used to enhance energy and water conservation, carbon sequestration, and air quality. The project will assess how the urban greenscape, through optimal tree selection, management and planting, can achieve significant improvements to the environment. The objectives are to reduce air pollution (e.g., ozone levels), outdoor water consumption, infrastructure costs, and energy consumption, and to improve stormwater quality, flood management, and habitat. Planting trees and other vegetation is often suggested to achieve multiple benefits; however, a multidisciplinary scientific analysis is needed to evaluate the actual improvements, long-term costs, and resource use to integrate the scientific results across environmental media (air, water, soil, energy).

The Tree Project field study will begin in the City of Golden with data collection conducted by teams of tree specialists and volunteers, June 18 to 20. The data being collected include:

1. *i-Tree*

Field Measurements in Golden

- 120 Plots
- Permission Plan: letter, flyer, phone call, signage
- *i-Tree* will provide:
 - Environmental Assessment (carbon, energy, stormwater, air)
 - Forecasting for Golden

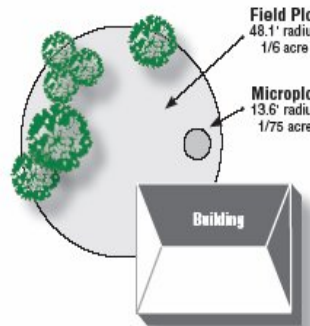


Figure 1
Sample Field Plot Dimensions

Field Survey Data Items

PLOT LOCATION

- Plot Number
- Date
- Crew ID
- Slope/Aspect

PLOT COVER / LAND USE

- Number of actual land uses
- Actual land use
- Percent of plot in each use
- Plot tree cover
- Plot shrub cover
- Percent plantable space
- Ground cover percent (each cover type)
- Number of shrub-genus types
- Shrub layer height (each genus)
- Shrub layer percent of area (each genus)
- Shrub layer percent leaves (each genus)

TREE DATA VARIABLES

- Tree direction
- Tree distance
- Species or genus
- Diameter
- Total height
- Height to crown base
- Percent impervious surface under tree
- Percent shrub cover under tree
- Street tree (Y/N)
- Crown width (two measurements)
- Foliage absent
- Dieback
- Transparency
- Crown light exposure
- Building direction
- Building distance
- Condition (roots, trunk, branches, twigs, leaves)
- Utility conflict
- Leaves condition
- Utility conflict



2. Energy

The objective is to evaluate how much energy can be conserved in various types of buildings with trees as opposed to without. Key measurements include canopy cover, distance and direction of the tree from building, total square footage, and wall and window dimensions. The energy impacts of trees can be determined by applying a computer energy simulation model (Energy Plus), taking field measurements, or both. IES has requested collaboration and technical support from the National Renewable Energy Laboratory (NREL) in Golden.

3. Water

The objective of the first-generation water analysis is to determine the extent to which trees can contribute to water conservation. Does planting more trees mean an increase in overall water consumption or will trees conserve water by providing shade and increased soil porosity? IES will identify the water conservation potential of different tree species by conducting field measurements on plots with turf grass, and with trees and without trees. Each plot will be divided and measurements will be taken in areas shaded by trees, and in unshaded areas. Data pertaining to soil moisture, tree characteristics, precipitation, plot slope, irrigation method and other attributes will be collected and included in the evaluation.

Because trees also conserve water by intercepting rainfall and reducing stormwater runoff, IES will include individual tree and total urban forest stormwater measurements from the i-Tree program when evaluating the overall potential of trees and their ability to contribute to water conservation in urban areas.

4. Carbon

There are many opportunities for IES partners undertaking urban forestry projects to be recognized and compensated for providing a carbon offset. Trees in the urban landscape can sequester carbon as they grow. Trees can prevent the release of carbon dioxide and other greenhouse gases from fossil fuel-burning power plants by reducing energy demand through shading and temperature moderation. IES plans to conduct impact studies using existing modeling knowledge to assist municipalities or other entities in designing and registering their carbon offset projects.

The chart on the next page summarizes some of the existing carbon offset approaches.



Carbon Project Options	Pros	Cons
City project (no transaction)	Simple. No exogenous standards. Good PR.	City bears total cost (operation & publication)
Utility/city partnership (utility offset project)	Fairly simple. No exogenous standards. Good PR for utility and city. Utility shares cost.	Urban forests reduce energy demand (utility buy-in?).
Private carbon neutralizing organization offset project	Could potentially count energy savings. Flat rate paid for carbon sequestered. Wide publication; good PR. Few restrictions.	Must apply. Some standards (i.e., may require verification).
Chicago Climate Exchange offset project	Best regarded and most widely known.	Strict standards. Requires verification. No mechanism for trading offset from reduced energy demand.

NEWS AND EVENTS

PROJECT PLAN UPDATE

- Full plan available for review (45 pages)
- Split site approach
- Audience = city foresters, parks and recreation department, city council, landscape architects, urban planning committees, city councils, developers, and the tree industry (nurseries, arborists). Water utilities and power utilities will also be interested.
- How will results be used?
 - Inform tree planting and maintenance
 - Plan/improve environmental tree-scape design
 - Develop better city ordinances
 - Educate on environmental benefits/trade offs
 - Improve/protect the environment
 - Improve investment in the urban forest
- What are the end products (output):
 1. Report
 2. Strategic Plan: **environmental** improvement potential, social potential?
e.g., Potential for 1,000 new additional trees / x years = reduction in gallons/year city



QA/QC PLAN

Our quality assurance and quality control plans need to be finalized. Quality assurance refers to the monitoring, evaluation and modification of the project *process*. Quality control refers to ensuring the validity and precision of project deliverables. The QA/QC plan is being formulated by working backwards from end products to determine where the process needs to be monitored. Approaches include roaming monitors, and repeat measurements on the same plot with different teams. We are working with Andy Bardwell (Bardwell Consulting), a professional statistician and data analyst.

DEVELOPMENT

We are looking for three more cities or towns in the Denver metropolitan area and Colorado Front Range to implement expanded Tree Projects. If you are interested, please contact IES.

We are looking for additional grant funding support to advance The Tree Project environmental analysis. Please let us know if you have any contacts or suggestions. Current grant efforts include:

- Hyland R. Johns Grant Program (TREE Fund) grant application, May 2007
- STePP Foundation: Cemex (Lyons, CO) violation state settlement funding \$4.5 million available for projects (located in Boulder County, especially air pollution mitigation). We are looking for partners to work with in the Town of Lyons and in Boulder County
- McStain-Hoyt Foundation

CITY OF GOLDEN, COLORADO – THE TREE PROJECT PILOT CITY

- Collaboration with Parks & Recreation, City Manager's Office, Mapping/GIS
- Field measurements will begin mid-June
- Thanks to the City of Golden for the new project logo!

Thanks to The Tree Project funders and IES supporters! Generous grants have been provided by the City of Golden, City of Boulder (Water Conservation), Colorado Department of Public Health and Environment (Pollution Prevention Advisory Board), Xcel Energy Foundation, SmartWool Advocacy Fund, Considine Family Foundation, Brownstein Hyatt Farber Schreck.

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May 2007

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