

Urban Forest Assessment for the City of Denver

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In 2006 the Metropolitan Denver area took an ambitious step towards more sustainable development by launching the Mile High Million (MHM) Tree Initiative. The MHM goal is to plant one million trees by 2025. Thus far 250,000 trees have been planted. There is growing recognition that trees provide long-term environmental, economic, and health benefits critical to vibrant and livable cities. To affirm the relevance of Metro Denver’s urban forest a study was conducted to quantify the distribution of tree canopy cover and the value of the ecosystem services provided by its 10.7 million trees. It serves as a platform for planning the future urban forest by mapping locations of potential tree planting sites and valuing ecosystem services provided by an additional 4.25 million trees.

Metro Denver’s (Fig. 1) urban tree canopy (UTC), defined as the area covered by the leaves and branches of trees therein, covers 15.7% of the 721 sq. mile study area. It provides \$551 million in property value increases, energy savings, carbon storage, stormwater runoff reduction, and air quality benefits annually. Adding 4.25 million more trees will fill nearly one-half of the region’s vacant tree sites, increasing UTC from 16% to 31% once trees mature. The annual value of services will increase to \$1 billion. The asset value of Metro Denver’s urban forest is \$13 billion, or \$5,897 per tree, calculated at a 4.125% discount rate for 100 years. This fact sheet summarizes the results for the City of Denver.

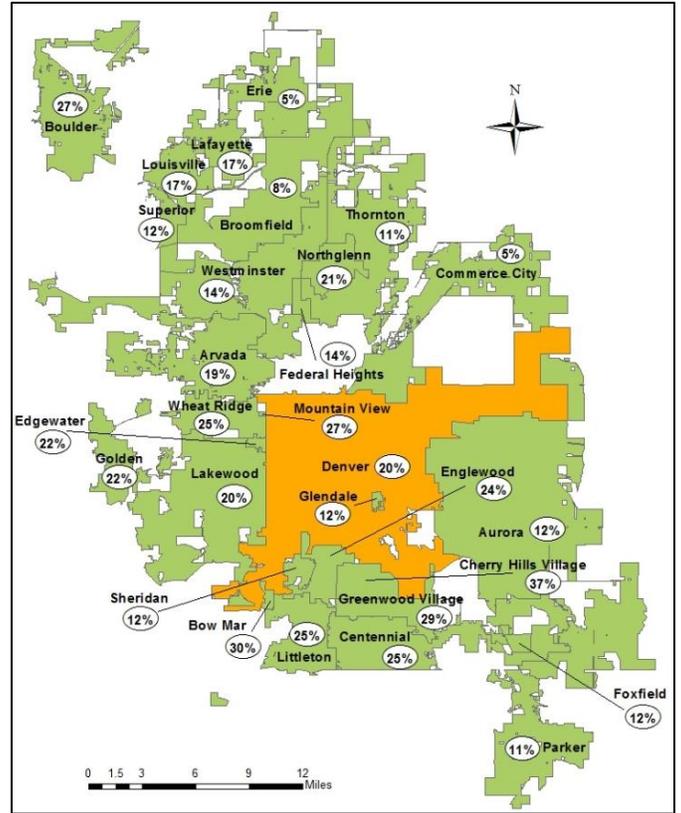


Fig 1. Study area with jurisdictions.

Category	Metro Denver	Existing Denver City	Additional Denver City	Existing + Additional
Urban Tree Canopy	16.4%	19.7%	11.4%	31.1%
Not Plantable (Buildings, Roads, Water)	39.1%	49.5%	49.5%	49.5%
Plantable (Grass, Soil)	44.5%	30.8%	19.4%	19.4%
Tree Numbers	9,640,864	2,225,124	538,743	2,763,867
Trees/capita	4.8	3.7	0.9	4.6
Trees/acre	24.4	29.2	7.0	36.1
Potential Tree Planting Site Numbers	10,015,387	1,121,838	583,095	583,095
Total Stocking Level	49.0%	66.5%	48.0%	82.6%
Urban Tree Canopy within Hot Spots	4.9%	6.5%	6.7%	13.2%
Annual Services	\$506.8M	\$122M	\$55.9M	\$177.9M
Annual Services/capita	\$250.77	\$203.28	\$93.14	\$296.42
Asset Value	\$13.1B	\$2.9B	\$3.1B	\$6B
Asset Value/tree	1,361.1	1,305	5,773	2,176

Table 1. Changes in existing and additional urban tree canopy and other variables for the City of Denver associated with planting additional tree sites that are not on agricultural land. Unincorporated areas are excluded from this table.

The City of Denver is home to 600,158 people. UTC covers 19.7% of the city, a relatively high amount (Table 1) compared to the overall average of 16.4% found for Metro Denver. Approximately 50% of the land area is impervious surfaces, like roads, buildings, water and sidewalks, while only 31% of the City is grass and bare soil that can be easily planted with trees.

The city has 2.2 million existing trees; 3.7 trees per capita, slightly below the 4.8 of the Metro Denver study area, and 29.2 trees per acre, 5 more than Metro Denver (Table 1). There are 1.1 million vacant planting sites. The City of Denver is targeted to plant 538,743 trees. Once mature, assuming an average 22.8–ft crown diameter, UTC will increase by 11.4% to 31.1% and stocking level from 66.5% to 82.6%. The City of Denver’s urban forest produces ecosystem services and property value benefits valued at \$122 million annually (Table 1 and Fig. 2). This is the highest value of benefits in Metro Denver. Aurora, a smaller city with similar tree density, has urban forests benefits valued at \$50 million annually. Planting 538,743 trees will increase annual services by \$55.9 million, from \$122.0 to \$177.9 million (Table 1). Property value increases account for 76% of the total amount, followed by stormwater runoff reduction from rainfall interception (20%) and cooling energy savings (4%). Planting 68,316 trees in 49% of the vacant sites in hot spots will help mitigate urban heat islands, thereby improving air quality and human health. The asset value of the City’s UTC is \$2.9 billion (4.125% discount rate for the next 100 years), and will increase to \$6 billion, or \$2,176 per tree when UTC reaches 31.1%.

Expanding the tree canopy in the City of Denver can insure long term environmental, economic, and health benefits to the local community and maximum return on investment in urban forest planning and management.

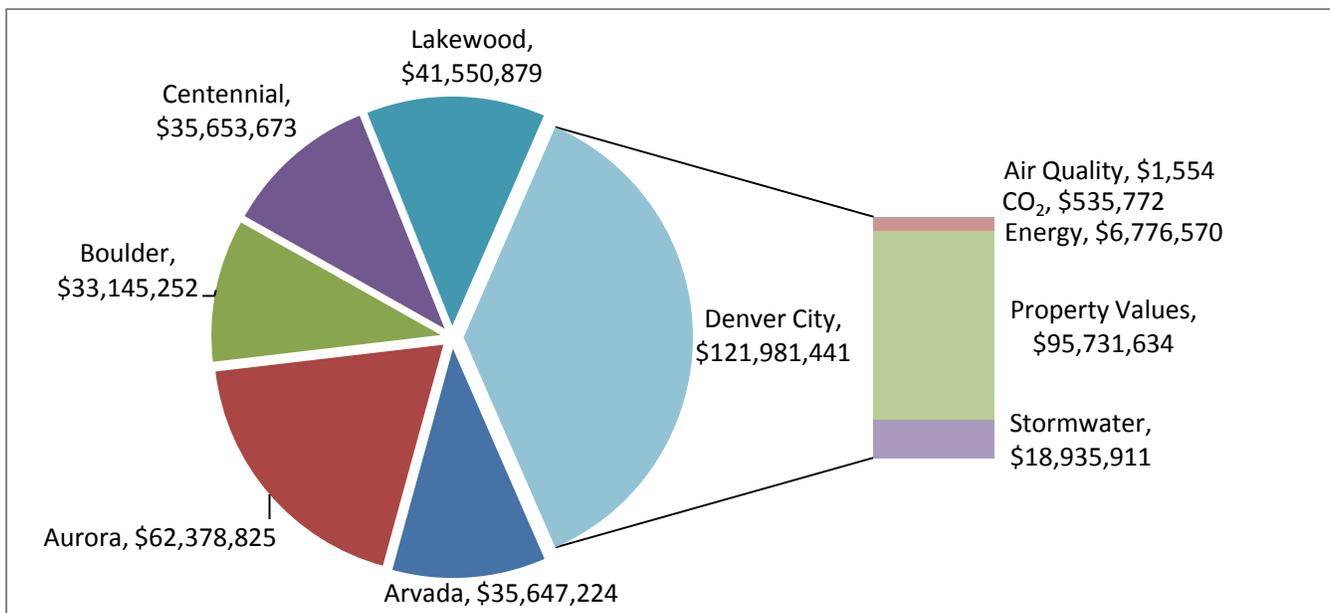


Fig 2. Annual monetary value of services from the existing urban forest for the City of Denver compared to five other jurisdictions with the highest annual monetary value.

Trees are valuable resources in combating issues from air pollution to energy conservation and climate change, but be smart and deliberate in tree selection to get the greatest benefits. For additional information on this study or the City of Denver’s urban forest, contact The Mile High Million at: million.trees@denvergov.org or call 720.913.0631.

