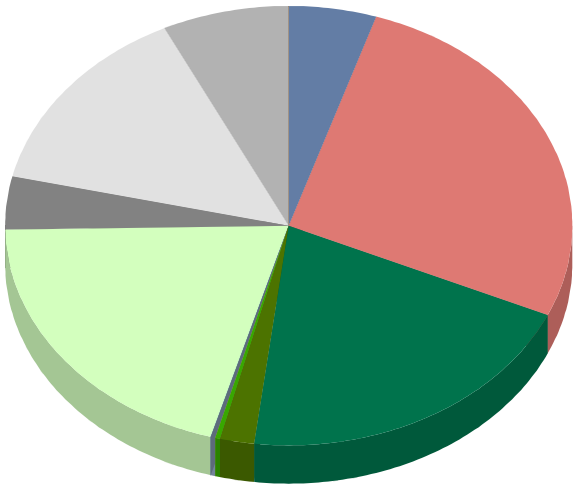
The City of Springfield, TN
Rapid Ecosystem Analysis for 2001



Cropland: Cultivated Crops	382.9	4.9%
Cropland: Pasture/Hay	2,093.3	26.9%
Forest: Deciduous Forest	1,567.9	20.1%
Forest: Evergreen Forest	148.5	1.9%
Forest: Mixed Forest	23.1	0.3%
Grasslands/Herbaceous	10.1	0.1%
Naturally Bare Rock, Sand or Clay	6.9	0.1%
Open Water	17.1	0.2%
Shrubland: Short Shrub	0.5	0.0%
Urban: Developed Open Space	1,573.9	20.2%
Urban: High Intensity	297.5	3.8%
Urban: Low Intensity	1,116.8	14.3%
Urban: Medium Intensity	550.8	7.1%
Wetlands: Emergent Herbaceous Wetland	1.8	0.0%
Total:	7,791.1	100.0%

Land cover areas are in acres

Total Tree Canopy: 1,740 acres (22.3%)

Air Pollution Removal

By absorbing and filtering out nitrogen dioxide (NO2), sulfur dioxide (SO2), ozone (O3), carbon monoxide (CO), and particulate matter less than 10 microns (PM10) in their leaves, urban trees perform a vital air cleaning service that directly affects the well-being of urban dwellers. CITYgreen estimates the annual air pollution removal rate of trees within a defined study area for the pollutants listed below. To calculate the dollar value of these pollutants, economists use "externality" costs, or indirect costs borne by society such as rising health care expenditures and reduced tourism revenue. The actual externality costs used in CITYgreen of each air pollutant is set by the each state, Public Services Commission.

Nearest Air Quality Reference City: **,**

	lbs. Removed	Dollar Value
Carbon Monoxide:	4,652	$1,985
Ozone:	52,721	$161,802
Nitrogen Dioxide:	18,607	$57,107
Particulate Matter:	52,721	$107,948
Sulfur Dioxide:	12,405	$9,292
Totals:	**141,105**	**$338,405**

Carbon Storage and Sequestration

Trees remove carbon dioxide from the air through their leaves and store carbon in their biomass. Approximately half of a tree's dry weight, in fact, is carbon. For this reason, large-scale tree planting projects are recognized as a legitimate tool in many national carbon-reduction programs. CITYgreen estimates the carbon storage capacity and carbon sequestration rates of trees within a defined study area.

Total Tons Stored: 74,771

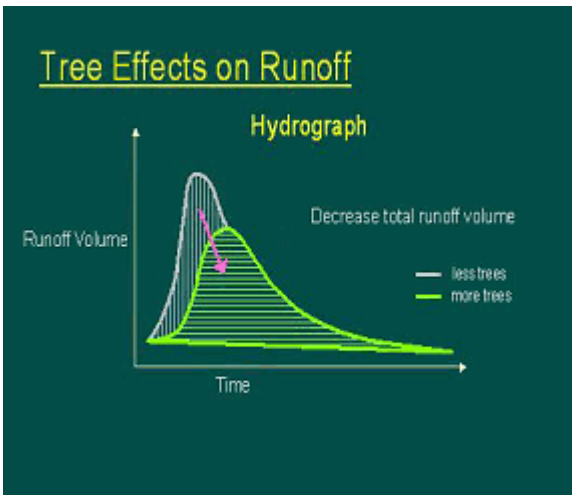
Total Tons Sequestered (Annually): 582

Stormwater

Trees decrease total stormwater volume and slows peak flow; both help cities to manage their stormwater and decrease detention costs. CITYgreen assesses how land cover, soil type, and precipitation affect stormwater runoff volume. It calculates the volume of runoff in a 2-year 24-hour storm event that would need to be contained by stormwater facilities if the trees were removed. This volume multiplied by local construction costs calculate the dollars saved by the tree canopy. The anaysis uses the TR-55 model developed by the Natural Resource Conservation Service (NRCS) which is very effective in evaluating the effects of land cover/land use changes and conservation practices on stormwater runoff. The TR-55 calculations are based on curve number which is an index developed by the NRCS, to represent the potential for stormwater runoff within a drainage area. The higher the curve number the more runoff will occur. This analysis determines a curve number for the landcover conditions in 1992 and generates a curve number for the conditions if the trees are removed and replaced with urban landuse. The change in curve number reflects the increase in the volume of stormwater runoff.

Water Quantity (Runoff)

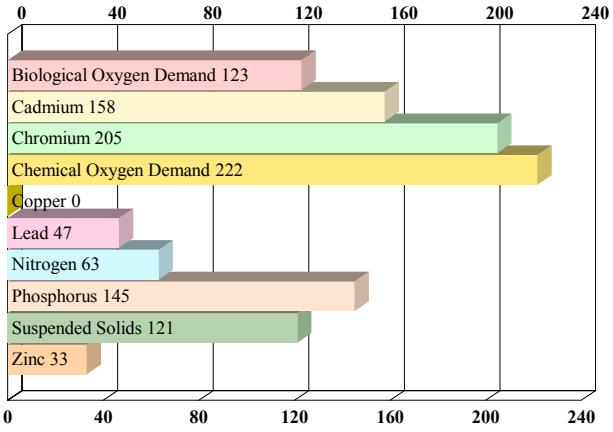
2-yr, 24-hr Rainfall:	3.25 in.
Curve Number based on 1992 Landcover:	**75**
Curve Number reflecting landcover if trees are removed and replaced with urban:	**98**
Additional Storage volume needed (to mitigate the change in peak flow):	53,434,493 cu. ft.
Construction cost per cu. ft.:	$2.00
Total Stormwater Savings:	**$106,868,985**
Annual costs based on payments over 20 years at 6% interest:	**$9,317,325 per year**



Water Quality (Contaminant Loading)

Cities must comply with Federal clean water regulations and develop plans to improve the quality of their streams and rivers. Trees filter surface water and prevent erosion, both of which maintain or improve water quality. Using values from the US Environmental Protection Agency (EPA) and Purdue University's L-thia spreadsheet water quality model, The Natural Resources Conservation Service (NRCS) developed the CITYgreen water quality model. This model estimates the change in the concentration of the pollutants in runoff during a typical storm event given the change in the land cover. This model estimates the Event Mean Concentrations of Nitrogen, Phosphorus, Suspended Solids, Zinc, Lead, Copper, Cadmium, Chromium, Chemical Oxygen Demand(COD), and Biological Oxygen Demand (BOD). Pollutant values are shown as a percentage of change.

Percent Change in Contaminant Loadings



The City of Springfield, TN

Rapid Ecosystem Analysis

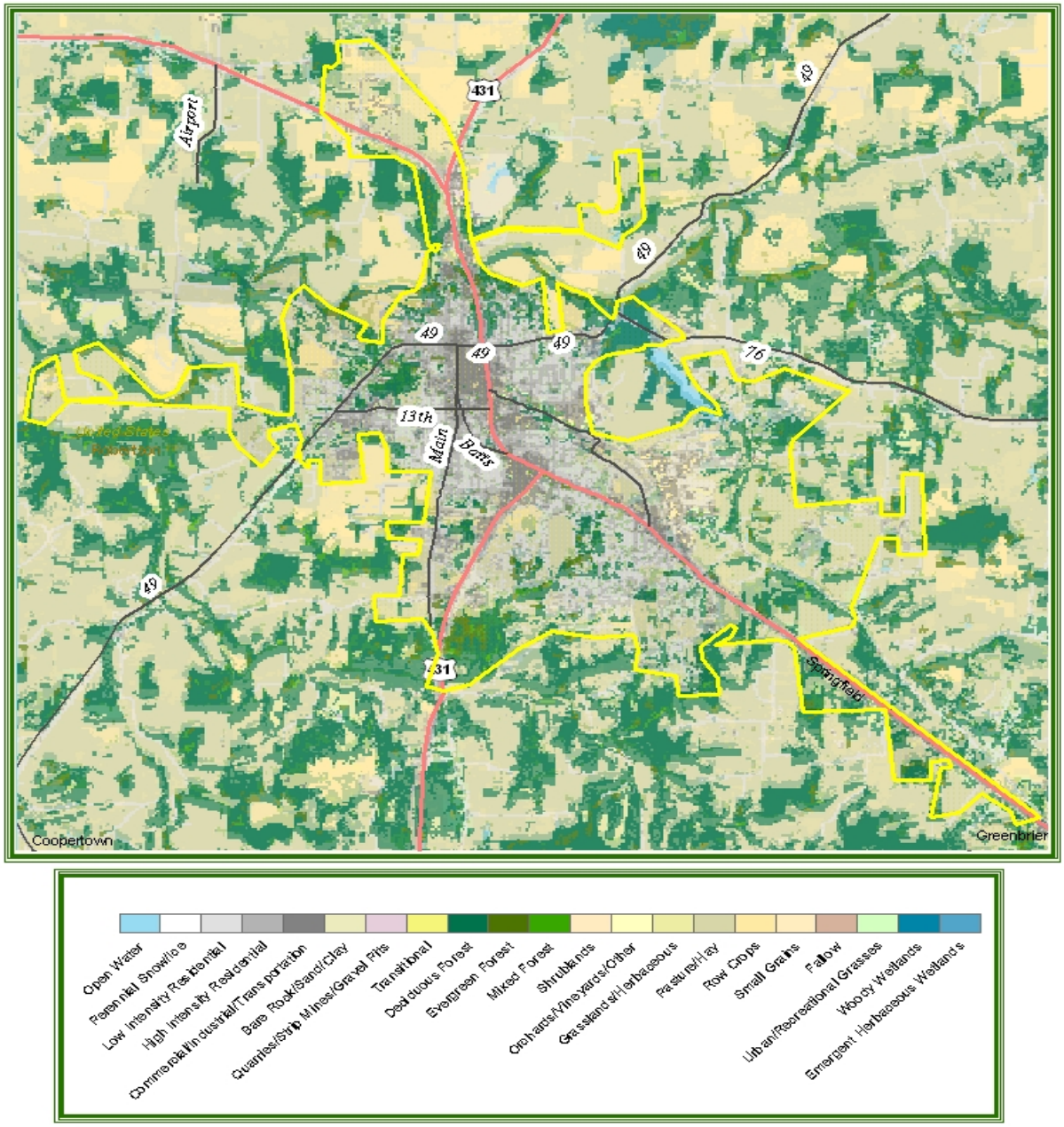


Image Data: National Land Cover Data 1992
30-meter resolution
Source: U.S. Geological Service (USGS)