

Natural regeneration building urban forests, altering species composition

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In forested regions of the nation, natural regeneration may help cities achieve tree cover goals at the expense of maintaining the desired tree species.

A study by U.S. Forest Service scientists published recently in [Urban Forestry and Urban Greening](#) showed that on average, 1 in 3 [trees](#) in sampled cities were planted while two-thirds resulted from natural regeneration. However, for newly established, young trees in cities in forested regions, only about 1 in 12 trees (Syracuse, N.Y.) to 1 in 20 trees (Baltimore) were planted. The lower proportion of naturally regenerated trees in the entire city tree population may be because naturally regenerated trees have a higher mortality rate than planted trees, according to Dave Nowak, a research forester with the Forest Service's Northern Research Station and the study's principal investigator. Naturally regenerated trees typically have more competition for the water, light and [nutrients](#) that are needed for survival.

"Urban forests change constantly in response to human activities and [environmental factors](#)," said Michael T. Rains, Director of the Northern Research Station. "This study is an example of the work U.S. Forest Service scientists are doing to help cities and counties achieve healthy and sustainable urban forests."

Most of the cities included in the study are located within forested regions, where [environmental conditions](#) favor trees. The study suggests that natural regeneration may be the most cost-effective means to attain

desired tree cover levels and associated ecosystem services in forested regions, but relying on natural regeneration may alter the [tree species](#) making up a given forest.

The study included Baltimore, Chicago, Hartford, Conn., Los Angeles and Syracuse, N.Y., as well as nine cities in the Canadian province of Ontario.

The percentage of planted trees within the entire tree population ranged from a low of 11.1 percent in Hartford to a high of 89 percent in Los Angeles, according to the study. Results indicated that in cities located in grassland or desert regions, a greater percentage of the urban tree population is planted compared to cities in forested regions. The percentage of planted trees also increases with increased population density and impervious cover.

The factors that affect tree cover also play a role in natural regeneration. Precipitation, air temperatures, surrounding natural vegetation type, and the distribution of land use types in the city all influence how much seed source exists and whether seedlings grow. Land use plays a role in whether seedlings are mowed down or whether paved surfaces prevent seedling establishment, and ultimately affect a city's need for tree planting to sustain tree cover.

"Before we can say how many trees we need to plant, we need to know how many trees are regenerating naturally and how many are dying," according to Nowak. "Planting programs to sustain tree cover can be greatly improved with long-term monitoring data to show how the urban forest is changing."

Researchers evaluated the magnitude of natural regeneration or tree planting across an entire city system by randomly locating 0.04-hectare field plots in each city and recording tree measurements as well as an

estimate of whether a sampled tree was planted or occurred through natural regeneration. Crews based their estimates on surrounding conditions. For example, trees along fence lines or in unmaintained areas were generally classified as naturally regenerated, while trees in maintained lawn areas or street trees were typically classified as planted. Residential and commercial/industrial areas have the highest proportion of planted trees, 74.8 percent and 61.2 percent respectively, while trees found in parks, cemeteries, golf courses, open space/vacant land, agricultural fields and wetlands are predominately the result of natural regeneration.

The study also evaluated two cities, Syracuse, N.Y., and Baltimore, more closely. An estimated 58 percent of new trees recently established in Baltimore are native species while only 35 percent of new trees in Syracuse are native species, according to the study. Fifty-two percent of the new trees were classified as invasive species in Syracuse.

Provided by USDA Forest Service

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