

Reforestation in urban landscapes

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Credit: Tifft Nature Preserve

Decades after abandonment as a residential and industrial dump, the Tifft Nature Preserve in Buffalo, New York, is not regenerating itself with canopy trees native to Western New York. Research reported in "Canopy trees in an urban landscape—viable forests or long-lived gardens?" appeared in the journal *Urban Ecosystems*.

Robert J. Warren II and Daniel Potts, both associate professors of biology, conducted the study with then-graduate student Adam Labatore of Buffalo State and David Spiering, a doctoral student at UB.

"Buffalo is an older city with post-industrial sites," said Potts, a botanist. "So it's a really interesting place to study urban ecology. The

experiments are already in place; we're just looking at the results."

To survive, forests depend on a variety of trees perpetually replacing themselves or being replaced by outside seeds. The only native tree thriving at Tiffit is *Populus deltoides* (Eastern cottonwood), one of the first trees to populate disturbed areas, and it is not currently replacing itself. The 264-acre site was once a rail yard and, later, a dump for city refuse. Aerial photos show that the cottonwoods began to populate the site in the 1950s. Tiffit was transformed to a nature preserve in the early 1970s with clay enclosure of the waste, the addition of topsoil cover, and topography alterations.

In a natural forest at this site, the cottonwoods would be succeeded by other native trees, but those trees have not established themselves without human help. The lack of sufficient seedlings to sustain the forest indicates that tree seedlings are not arriving (via wind, insects, and bird droppings), or they are arriving and not surviving.

"Urban forests are like islands in an ocean of urbanized landscape," said Warren, a global change ecologist. To test the hypothesis that native tree recruitment failure is due to limited seed availability, researchers used 24 seed traps and collected seeds every two weeks from May to October. Four species of woody plants were found in the seed traps, all from species growing at Tiffit, indicating that no early successional trees were immigrating to establish a self-perpetuating forest.

The lack of seed immigration explained part of the story. The question remained, however: Why are the current trees not replacing themselves? That is, can [native tree](#) seeds be introduced at Tiffit? To find out, the researchers created 12 experimental grids with *P. deltoides* (cottonwood), an early-stage colonizer; *Pinus strobus* (white pine native to Eastern forests), an early- and mid-successional tree; and *Acer saccharum* (sugar maple, New York's state tree) a late-successional species. They used

burning and deer exclusion treatments to test whether tree seedlings are being killed by either thick plant cover made up largely of invasive species, or by intense deer browsing.

"Native tree recruitment...required localized burning and herbivore exclusion," the authors note. Burning eliminated competing plants and keeping rodents and deer away from the seedlings allowed them to grow. "The damage done by white-tailed deer is well-documented," Warren said.

Whereas wildland forests have been studied extensively, less is known about an urban system. "If a forest isn't replacing itself, it's a garden," said Warren. "Just standing back and letting [trees](#) grow is not going to work."

More information: Adam C. Labatore et al. Canopy trees in an urban landscape – viable forests or long-lived gardens?, *Urban Ecosystems* (2016). [DOI: 10.1007/s11252-016-0601-x](https://doi.org/10.1007/s11252-016-0601-x)

Provided by Buffalo State

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