

In recognition of the health, social, environmental, aesthetic and monetary value of the urban forest, the State of Wisconsin is developing the Wisconsin Urban Forest Inventory and Analysis program. To learn more go to dnr.wi.gov and search "urban forest inventory."

Taking good ideas from rural Wisconsin

A STATEWIDE URBAN FOREST INVENTORY IS UNDERWAY FOR COMMUNITIES BIG AND SMALL.

TRACY SALISBURY

Katherine Esposito

Back when northern Wisconsin was facing the forest cutover of the early 1900s, the U.S. Forest Service began measuring what was left.

Starting in the 1930s, field workers ventured into the woods to count trees, one by one, collecting data on everything from species to size to health. To select plots, a lattice-like framework was laid over the land, and small sections were purposefully identified and then sampled and re-sampled at regular intervals. Over decades, their work helped mill owners know what to expect, and also allowed forest researchers to determine whether the burgeoning forest was headed in a healthy direction.

Now, the Department of Natural Resources and the U.S. Forest Service are teaming up to give municipal lands in cities and villages across Wisconsin the same ground-level scrutiny that our rural forests have long received, beginning an ongoing process that will help answer these questions.

Called the Urban Forest Inventory and Analysis, it is being carried out using much the same protocol used for its rural counterpart. Last spring, crews began visiting selected areas in Milwaukee and Madison to collect data on tree cover, or, in many cases, lack of tree cover. For each of the next six years, they'll visit new areas, and then in the seventh year, they'll circle back to the first ones measured in

2015 to evaluate gains and losses.

In 2002, Wisconsin partnered with the U.S. Forest Service to initiate a pilot program to inventory urban trees, which the Department of Natural Resources repeated, with modifications, in 2012. The Forest Service then partnered with the cities of Baltimore in 2013 and Austin in 2014 to begin inventorying those cities. In 2015, the Forest Service partnered with six more metro areas, including Madison and Milwaukee to start a national urban forest inventory effort.

Soon, the Department of Natural Resources will extend the inventory to establish permanent sample plots all over Wisconsin, something no other state is doing.

Eventually, the inventory will cover about 1,250,000 acres of urban Wisconsin, with the Village of Oostburg being the smallest at 650 acres. The inventory will be conducted in urban areas from Superior to Beloit, and Green Bay to La Crosse, as well as other communities large and small throughout the state.

Later, the department will combine ground surveys with aerial imaging and street tree data to give the most complete picture possible of what is happening in our urban forests.

For 80 years, rural tree data has pow-

ered the state's timber economy, buoying large industries and small, providing thousands of paychecks. It still does.

In return, forest growth powered tourism, bringing millions of visitors to the Northwoods for scenic beauty, recreation and hunting. It provided serene cool nights, refuges from frantic day jobs, and shelter for birds and bears. More recently, scientists have appreciated that masses of trees also keep the air cleaner by absorbing pollution and trapping carbon.

It is a trove of data that Wisconsin resource managers now want to replicate for the urban forest, for similar reasons: attractive landscapes, improved public health, wildlife habitat, cooler temperatures, and, with the reality of trees dying from various causes, timber value as well. In a world where numbers count more than sentiment, the department hopes that quantifying the changes in the urban forest will help citizens, forest managers and elected officials to recognize patterns and what, if anything, they might want to do about them.

U.S. Forest Service scientist David Nowak has studied urban trees for two decades, developing ever-more sophisticated computer models to quantify how much they affect pollution levels, how much they trap carbon, and whether they are holding their own in the face of pressure from pests, diseases and development. The pool of information is growing rapidly. And now Wisconsin will add its rich new set to the mix.

"DNR is cutting-edge," Nowak says.

It's something State Forester Paul DeLong has heard before. When he attends national conferences, he hears compliments about the urban forestry program.

"Wisconsin is very highly regarded for its urban forestry program and management," he says.

A focus on private trees, not just public

Wisconsin's population is slowly increasing, and with it, the amount of urban land is rising as well. In 1990, the percent of urban land in Wisconsin was estimated at 3 percent; by 2050, it's projected to grow to 8.3 percent.

That means pressure on city trees, whether owned publicly or privately.

Richard Rideout, DNR's Urban Forestry Partnership specialist, doesn't wring his hands over the loss of some city trees. The urban inventory data will afford a chance for citizens, municipal managers and even corporations to step

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back and think deeply about the overall picture.

"The inventory will be the first step to help people to preserve and replant, to use better species, and make a more resilient forest," he says.

Canopy: a word that's been used to describe the Amazon rain forest, a place where mysteries abound, where millions of trees and other leafy plants shelter wildlife and trap carbon dioxide, one very helpful factor in the struggle against a changing climate.

From England to Baltimore to Australia, it's also a word being invoked by urban foresters, designers, planners and policy makers anxious to avoid, or to reverse, the scenario of hot cities jammed with ever more people, more buildings, more concrete, but with landscape trees only a casual afterthought.

In Wisconsin, urban foresters have

had their eyes on the canopy for some time, but much assistance has focused on helping municipalities start and improve their public tree programs. Many have done so, often aided by DNR grants of up to \$25,000. Many have gained "Tree City USA" status, given after certain conditions are met, ranking Wisconsin second in the nation with 196 Tree Cities.

But privately owned trees were always somebody else's responsibility.

The new inventory will envelop the entire forest, whether public or private. The community-by-community, plot-by-plot inventories will include commercial parking lots, subdivision backyards and university dormitory front yards. If there are no trees in those places, well, that's part of the research, too.

"We want to get data to answer some questions we have no answers for," says Andy Stoltman, DNR Rural and Urban

Forest Inventory analyst. "We all know that if you develop an area, you're probably losing canopy. But how much, and for how long?"

In Wisconsin, emerald ash borer is a recent culprit. Estimates are that the state is home to about 725 million ash trees, with five million in urban areas. Some communities could lose as much as one-half of their street trees to this pest.

Urban streets are particularly hard-hit because ash was deliberately — and somewhat misguidedly — planted in force after it was viewed as useful for difficult urban settings. But street trees comprise only a fraction of the whole canopy — averaging only 5 percent, overall. By far, most trees are found in backyards and near highways and byways. That's one reason why the recent emphasis on overall canopy — street trees plus all else — is so important.

What does canopy do for us? In the last two decades, research on the benefits of standing trees has exploded.

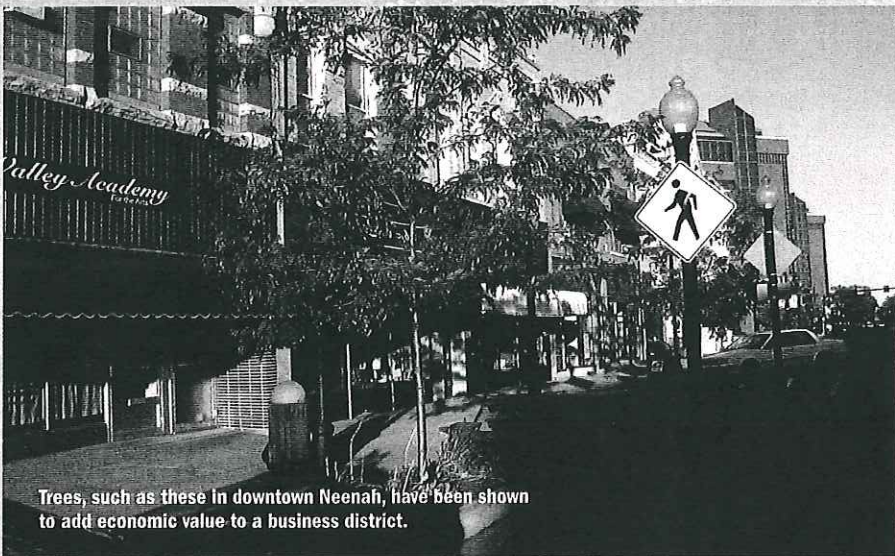
At the macro level, trees everywhere bind carbon as they grow, releasing it when they are turned into mulch or burned for fuel. City trees are no exception. Recent research using state-of-the-art satellite imagery shows that urban trees currently store 700 million tons of carbon, just over 3 percent of the total stored by all forestland. Meanwhile, these same trees absorb a range of pollutants: carbon monoxide, nitrogen dioxide, ozone, lead, sulfur dioxide and fine particles, which are culprits in common urban health problems such as bronchitis and asthma and can also result in death.

The urban forest contribution is significant, according to Nowak, because nowadays, most people live in cities, not in the country. Using sophisticated computer models, plus pollution and health cost data, scientists calculated that deaths and illnesses from respiratory diseases were avoided by the thousands because of the cleansing effect of the urban forest.

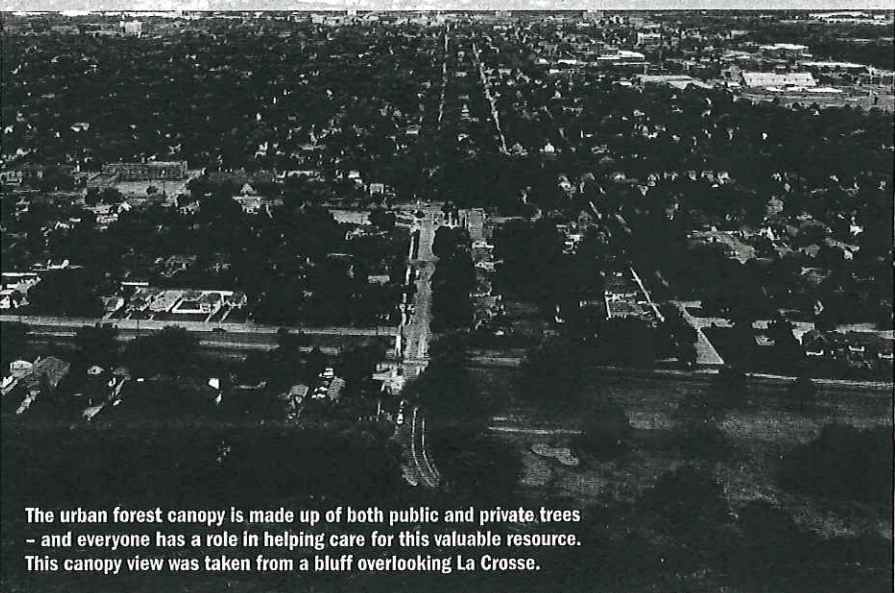
And there's so much more. Remember the last time you took shelter under a tree in a deluge? Trees cushion the impact of rainstorms, lessening stormwater runoff to streams and sanitary sewers. Trees provide critical shade, leading to cooler temperatures and reduced air conditioning needs.

"Urban trees are 3.6 percent of all trees, but in that 3.6 percent is over 80 percent of the population," says David Nowak.

On a more personal level, trees soften the landscape, perhaps even change human behavior. At the University of



Trees, such as these in downtown Neenah, have been shown to add economic value to a business district.



The urban forest canopy is made up of both public and private trees — and everyone has a role in helping care for this valuable resource. This canopy view was taken from a bluff overlooking La Crosse.

OLIVIA WITTHUN

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Washington's College of the Environment, social scientist Kathleen Wolf and staff from the U.S. Forest Service created a website, *Green Cities, Good Health*, summarizing two decades of national research on the effects of urban trees and green landscapes on human perception and behavior. Some studies have focused on shoppers' responses to trees in retail districts and on home values in neighborhoods with larger trees, finding that shoppers spend more time on streets with canopy and that homes are valued more highly.

"Savvy community planners realize that trees are part of the equation for community vibrancy," Wolf says.

In Baltimore, a recent study of crime patterns using advanced tree imaging techniques and geographic coordinates for crime data found that a 10 percent increase in larger canopy trees was associated with a 12 percent decrease in crime, mostly on public lands. The study was conducted by researchers from the University of Vermont and the U.S. Forest Service, who concluded that forestry programs should consider public safety when planting city trees and involve police departments, too.

Partners in tree care

The urban forest analysis will not only help nurseries learn what trees to grow, but will provide data on what's dead and dying. And, if a nonprofit group in Madison is any indication, it may also offer ideas as to how canopy data can be used to teach residents about trees.

The new information will guide professional landscape managers as well as decision makers in their long-term planning for tree replacement and maintenance, says John Gall, a certified arborist with Wachtel Tree Science in Merton.

"Statistics will filter down to the nursery industry as well," he says. "Right now, we're struggling to get enough trees to deal with emerald ash borer [removals]."

Meanwhile, there's a growing movement to make the best of a bad situation: the thousands of ash trees being removed due to emerald ash borer and other city trees being cut down for other reasons. In the past, these were often chipped for mulch, burned or sent to the landfill. A new nonprofit, Wisconsin Urban Wood, has created a network of businesses that find creative uses for these trees from furniture to flooring, lumber and more. WUW member Baraboo Woodworks in Madison now operates a lumber mill

and woodworking business on Madison's East Side.

"We come in if a tree has to be downed," says Josh Rice, a manager there. "But instead of having a walnut chipped or burned, we give it a second life."

The value of education

After receiving his master's degree in landscape architecture at the University of Wisconsin-Madison, Evan Slocum, who'd also worked as an arborist in New York City, decided he wanted to educate people about trees instead of simply planting, pruning and removing them. Assisted by a DNR Urban Forestry grant, in 2011 he founded the Urban Tree Alliance, which not only offers tree pruning and planting, but also pruning workshops, free tree plantings to underserved areas, and a new Citizen Forester program, to reach people who may never have considered the urban forest.

"Homeowners don't think that their trees contribute to the urban forest


canopy," Slocum says. "Even an arborist doesn't think about the canopy as an entity, which it is. It's a shared resource."

Last spring, the UTA debuted the Madison Tree Map, an "open-source" inventory of trees in Madison and the first of its kind in Wisconsin. It builds upon prior public and private inventories to create a single online map that can be easily accessed and is constantly updating as homeowners add their own trees. It also uses iTree, a U.S. Forest Service computer modeling program developed by David Nowak and others, to estimate the benefits of the urban forest.

"The goal is to have people engaged in urban forestry, to get people involved," Slocum says.

Getting people engaged statewide is exactly what Andy Stoltman would love to see.

"What are our values?" he asks. "What is the price tag on a tree?"

Over the next 10 years, as plots are resurveyed and the data roll in, a picture will emerge: This is the urban forest we have. Is it what we want? 



Evan Slocum

KATHERINE ESPOSITO

A DAY IN THE FIELD

The men and women counting trees for the urban forest inventory go wherever the research darts land, always getting permission from the owners before stepping foot on private property.

On June 16, one landed in a city park, in a manicured recreation field. In the randomly picked 48-foot circle, there was only one tree, a Norway maple.

Seen from a distance, it looked good. Fifty-three feet tall, about 50 years old, surrounded mostly by mown grass, a few neighbor birches and an ash just outside the study area, and a basketball court where a dozen young adults were energetically exercising.

It was a plain Jane, ordinary maple that likely never got a second look in its life until the morning the inventory crew, Terry Schreiber and his assistant, Erick Fruehling, showed up.

On closer examination, it didn't look so good. A root had emerged from the ground and was circling the base. A cavity had opened and the tree's inner core was exposed.

On a list of 20 variables, the rot was duly noted as tree damage. Others included ownership (the city); ground cover (grass); sidewalk-root conflict (none); improper planting (likely); and crown dieback (dead branches up high).

"That tree's got a big seam full of rot in it," Schreiber said. By the time the crews return in seven years, "it won't be here."

The next dart landed along a bicycle trail near a busy street, where Schreiber and Fruehling found four trees — three locusts and a Japanese tree lilac — within the circle. They then made their way to a campus, where the plot finally encountered a dense stand of trees, including locust and white oak, some quite large.

All told, the two men were given 35 plots in Dane County to survey that included typical urban land types, from mown grass (two schoolyards, three golf courses) to untended invasive weeds (drainage ditches along the state highway) to the middle of Lake Mendota (they got a pass).



Terry Schreiber

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