Street trees and a pop-up bike lane in Berlin, where a tech nonprofit has launched a digital platform that helps residents learn about local tree-watering needs. Credit: IGphotography via iStock/Getty Images Plus.

Tree-Watering Apps for the Urban Canopy

AS CITIES GROW and the effects of climate change become more apparent, the importance of the urban tree has also grown. Trees provide much-needed shade, remove air pollution, absorb carbon, and even increase property values. But one element often gets overlooked: it's one thing to plant a lot of trees—but it's something else to maintain them.

For years, technology has played a role in efforts to track, map, and quantify the big-picture impacts of urban treescapes, from the environmental to the economic— a topic covered in this column in 2018. But new technologies have emerged and evolved since then, and some of the most intriguing are focused not just on high-level policy impacts but on the crucial issue of long-term mainte-nance. Adequate and timely watering, especially for younger trees, must be part of planning if the urban tree population is to endure. And increasingly, cities are leveraging sophisticated data tools to encourage and enable citizen engagement with urban tree maintenance.

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Consider a set of ongoing projects originating with CityLAB Berlin, a tech innovation nonprofit in Germany that applies data to urban problems. In recent years, Berlin—one of the more tree-rich cities in Europe—lost 20 percent of its trees thanks to high temperatures and a dearth of rain. That's partly because monitoring and maintain-ing individual trees can be a complicated and heavy burden for municipal governments. So in 2020, CityLAB launched *Gieß den Kiez* (Water the Neighborhood), a digital platform that made government tree data available and accessible to the public. This made it possible for citizens to learn about local tree-watering needs, and to commit to helping out. "The application was developed based on the needs of our community," said Yannick Müller, the organization's head of strategic partnerships, via email.

The amount of available data was a revelation: government projects had previously detailed and mapped hundreds of thousands of trees. CityLAB—a project of Technologiestiftung Berlin funded by the Berlin Senate Chancellery—combined this with other data, such as rainfall figures, to create a map that cross-matches watering activity with species-specific needs for trees across the city. Feedback from a tree-engaged segment of the citizenry helped shape the platform's development. Some people had already adopted and started maintaining particular trees. "They feel like it's their own tree," said CityLAB Berlin manager Julia Zimmermann. Citizens also had ideas about utilizing the city's existing water pump system and making it more accessible.

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Residents of Berlin use the city's water pump system to help maintain the urban canopy. Credit: Florian Reimann.

"A chat tool enables interaction between users, groups, and initiatives and allowed us to communicate and collect feedback," Müller explained. Aside from resolving smaller bugs, this inspired new features, like one that displays the location and status of water pumps. It also helped support the designation of "caretakers" for specific trees, who commit to monitoring and watering on a regular basis. "This small added feature allows citizens to make use of their resources in a more targeted manner," he said.

In 2021, the city of Leipzig adopted the tool, and a few more German municipalities have followed, according to Müller. User numbers are increasing continually, with more than 3,500 registered citizen caretakers watching over 7,500 adopted trees.

That said, the efforts of *Gieß den Kiez* remain an adjunct to public policy. "However, the platform succeeds in raising awareness for climate adaptations in the light of future heat waves," Müller maintains. In Berlin, for example, "it ignited a debate between different local district authorities as to what extent citizens should be involved in taking care of city trees and if that's a good use for water." (It is, Müller argues, considering the costs of planting new trees and the many proven environmental and health benefits of a robust urban treescape.)

One of the inspirations CityLAB Berlin has cited is the NYC Tree Map, a digital tool with roots reaching to 2016 that now maps nearly one million trees. "The NYC Tree Map is the most comprehensive and up-to-date living tree map in the world," the Department of Parks and Recreation declared in a 2022 press release. "Integrated directly with Parks' forestry database, the map gives citizens the same real-time access to the urban forest that Parks Foresters have on the ground." This enables New Yorkers to "digitally interact" with the city's tree population across the five boroughs—for instance, they can monitor a tree's most recent inspection, with the date and inspection ID.

"Our NYC Tree Map allows casual tree lovers to easily identify trees, flag concerns, and report
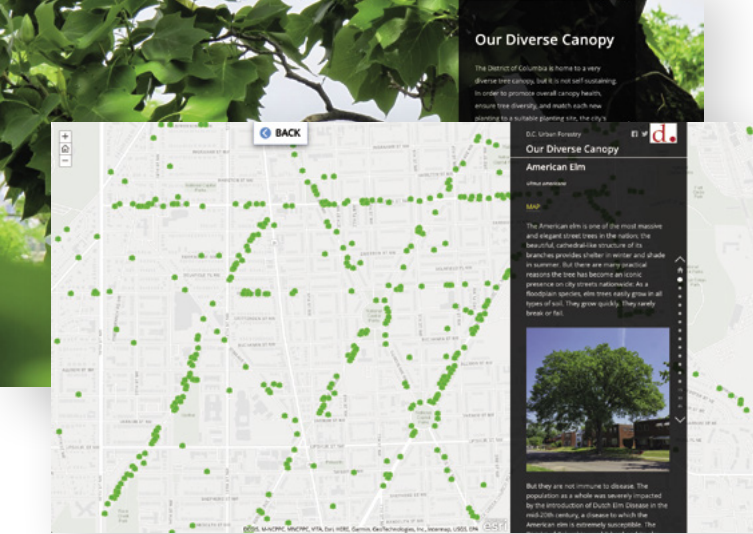
Washington, DC, residents can use the city's Tree Tool to locate trees by neighborhood—sorting them by species, age, and the care they need—and to report issues. Credit: District Department of Transportation (DDOT).

on their care," NYC Parks Director of Stewardship Nichole Henderson said via email. "Groups and individuals log their tree care activities—like watering, litter removal, soil cultivation, and mulching—into the map."

Several groups use the map to coordinate more ambitious stewardship and maintenance efforts. As examples, Henderson mentions the Jackson Heights Beautification Group, an arts and environmental organization in Queens; Trees New York, a longstanding professional organization that trains "citizen pruners," among other engagement activities; and the Gowanus Canal Conservancy, whose projects include "community science" efforts such as experiments in capturing and using rainwater. And the tree map is key to NYC Parks' own broader Let's Green NYC campaign, which posts "citywide street tree care activities with community partners and allows volunteers to see the visible impact, how they are directly contributing to caring for the urban forest," Henderson said.

Similar initiatives are playing out in other major cities. The District Department of Transportation (DDOT) in Washington, DC, maintains a digital tree map that encourages citizen involvement (including reporting browning leaves or insect damage, as well as trees in need of watering). The tree map launched with a special

focus on maintaining 8,200 trees planted in 2017. Elsewhere, the Adopt-A-Tree app in Athens enables citizens to take responsibility for watering individual city trees during dry summer months. And entities like CityLAB Berlin continue to innovate: its new Quantified Trees (QTrees) project aims to develop a prediction system supported by artificial intelligence, drawing on databases and sensors to identify urban trees at risk from drought. A prototype is already in testing, and launch is planned for this year.

Zimmermann, of CityLAB Berlin, concedes that it has been difficult to precisely demonstrate the impact of these efforts. "This is due to the nature of nature," she said. Trees adapt slowly, so gauging the effects of watering programs could require years of monitoring growth and health. But the project's data dashboard does illuminate watering patterns—and has shown that watering amounts have increased since the program started, almost certainly countering drought effects. "So the project leads at least to a better understanding and caretaking of urban green," she said. In some cases, it has inspired local governments to support volunteers by providing material and guidelines for optimal watering practices.

"Trees are the new polar bears, the trending face of the environmental movement," the historian and author Jill Lepore observed recently, in a survey of humans' surprisingly long-lived appreciation for the arboreal. Now we have the science and technology to understand and quantify the value of trees beyond aesthetics. "If our ancestors found it wise and necessary to cut down fast forests, it is all the more needful that their descendants should plant trees," landscape architect Andrew Jackson Downing wrote in 1847. "Let every man, whose soul is not a desert, plant trees." Fair enough. But we have the obligation—and the technology—to maintain them, too.

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