Hixon Center for Urban Sustainability

CASE STUDY

Urban Forest Tree Diversity

Green City

Climate Issue: Urban Tree Diversity

Urban forests are important resources for cities. Urban forests purify the air, provide cooling shade, assist in stormwater management and provide recreational spaces. However, urban forests can be threatened by:

- Invasive pests
- Harmful pathogens
- Tree diseases
- Climate change.

Urban forests with high species diversity are more resilient against these threats. To protect these invaluable resources, cities must prioritize increasing tree diversity.

Tree Diversity: What is it?

"Tree diversity" refers to the mixture of tree species found in a forest. Tree diversity is often calculated byincorporating two elements:

- **Richness:** the number of different tree species
- **Evenness:** the number of trees of each species, compared to the total number of trees in the forest.

A highly tree-diverse forest would have many different species of trees *and* relatively even numbers of trees for each species.

Threats to Urban Forest Diversity

Tree diversity in urban forests can be threatened by:

- Soil and air pollution
- Urban sprawl
- Aesthetic or utility-related choices (such as hedges)
- Forest fragmentation.

Tree Diversity in Raleigh, North Carolina

Raleigh has high tree diversity at the whole-city scale, with over 225 different species. But at smaller scales, urban tree populations have less diversity. For example, a single park, or a single neighborhood, could have many trees, but few species. This means that the trees are extremely vulnerable, and a single threat (such as an invasive insect) could decimate the local tree population.

Species diversity means
more resilience
in urban tree populations

IN A NUTSHELL

- In urban forests, tree diversity equals resilience
- Urban forests with lower tree diversity are more vulnerable to threats like pests, diseases, and climate change
- To increase resilience, cities can prioritize greater tree diversity by incorporating it into strategic plans and helping homeowners make informed choices around tree planting, maintenance, and removal.

WHAT CAN YOUR CITY DO?

INCLUDE a tree diversity strategy in the City Comprehensive Plan and codify tree species diversity

PROVIDE incentives to homeowners to maintain high levels of tree diversity on their properties

EVALUATE tree diversity at both large scales, like the whole city, and small scales, like individual parks, to understand the full picture

EDUCATE the public on why tree diversity matters. Create resources on planting, maintenance and removal approaches that increase species diversity.

ACTIVELY MANAGE aggressive species via initiatives like Raleigh's Invasive Species Program

To find out more information on this case study,contact **Tristan Irwin** at **tristan.irwin@yale.edu**. This research was supported by a Hixon Fellowship.