Hixon Center for Urban Sustainability

FACT SHEET

Oak Regeneration in Urban Forested Areas

Green City

Climate Issue: Urban Stressors for Oaks

In their natural environment, oak trees must overcome many challenges to reach the canopy layer. These include low light availability, high deer populations, and competition with other species. Challenges are magnified in urban forests as a result of:

- Water and air pollution
- Soil compaction
- Reduced genetic diversity
- Human activity, including foot and vehicle traffic

Elevated stress levels in urban environments can also make oak trees more vulnerable to pests and disease. Understanding how to support oak trees in cities can preserve their critical ecological functions.

The Value of Urban Oak Forests

Oaks play a critical role in the functioning of urban forests in the Northeastern United States (US). They support more life forms than most other tree species, providing nesting, shelter, and food to a wide variety of birds, mammals, reptiles, and insects. Their wide canopies also provide dramatic shading and cooling benefits, which can be important in fighting urban heat. Moreover, because they are large, long-lived trees, oaks are especially effective at sequestering carbon. Underground, the roots of oak trees also absorb pollutants such as fertilizers, protecting nearby water quality. Finally, healthy urban oak forests can provide recreational opportunities and foster connection with nature. But to thrive, they require specific conditions.

What Do Oaks Need for Regeneration?

- Acorn production and regrowth from stumps and roots are the main regeneration strategies of oaks
- Once sprouted, oak seedlings need access to light in order to reach maturity and produce acorns
- Oak seedlings need access to growing space, which is often created by disturbances. Events like tornados, windstorms, and fire help create these gaps in the canopy
- Because oak trees grow slowly, effective management is necessary to ensure the long-term health of urban oak populations.

Evolving Management Strategies

Historically, oak forests in the Northeastern US were managed through controlled fires set by indigenous peoples. Land clearing by European settlers led to today's managed second-growth forests. To promote regeneration, urban areas can begin to apply silvicultural prescriptions typically used in rural areas.

- **Shelterwood** systems partially remove mature trees over time, allowing more light to reach young saplings
- **Seed Tree** systems remove all trees except a few healthy trees that will provide seeds for the next generation
- **Single Tree Selection** removes individual trees at regular intervals, preserving a mix of tree ages and sizes
- **Group Selection** removes small clusters of trees to create different-sized gaps in the canopy, creating opportunities for regeneration.

IN A NUTSHELL

- Oak regeneration is more challenging in urban environments due to increased stressors and vulnerabilites.
- Oak trees are valuable to urban environments because they provide ecosystem services, as well as social and cultural benefits.
- Oak regeneration can be managed using different strategies across even-aged and uneven-aged stands.

WHAT CAN YOUR CITY DO?

ASSESS the health of natural regeneration in your forested natural area

IDENTIFY the dominant canopy species in the forest area

EVALUATE factors preventing natural regeneration strategies

DEVELOP a long-term managment plan for your urban forest to ensure diversity and management goals are met.

To find out more information on this fact sheet, contact **Cindy Cifuentes** at **cindy.cifuentes@yale.edu**. This tool was supported by a Hixon Fellowship.