

JOSH KOVER &  
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tiny forests...

# BIG MYSTERIES



RUTGERS-NEW BRUNSWICK  
School of Environmental  
and Biological Sciences



Image: Josh Kover

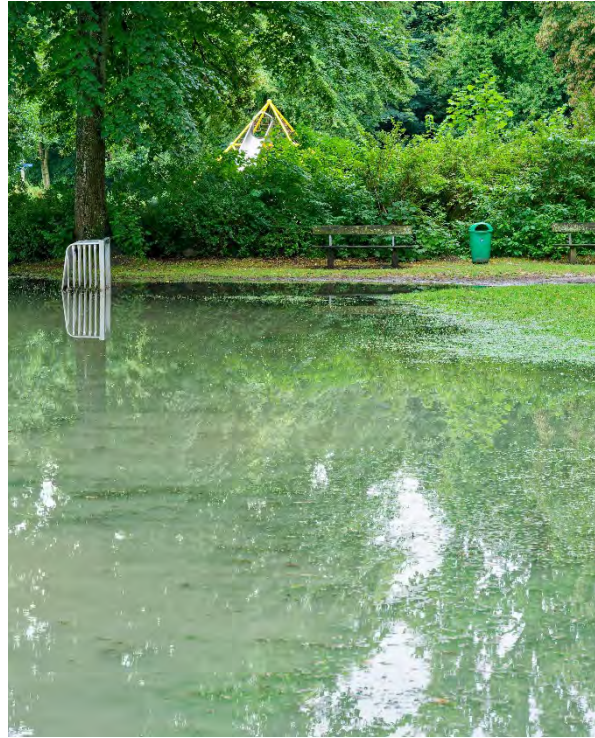


# LESSON (1)

## Benefits of Trees



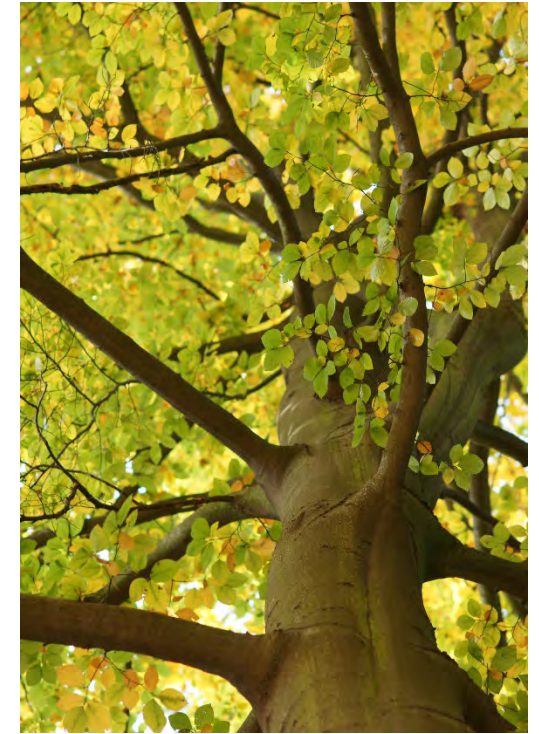
Cooling



Stormwater  
Management



Air Pollution  
Mitigation



Carbon Sequestration

Benefits of trees increase with size and health of each tree.

# LESSON (2)

## Challenges of Urban Trees

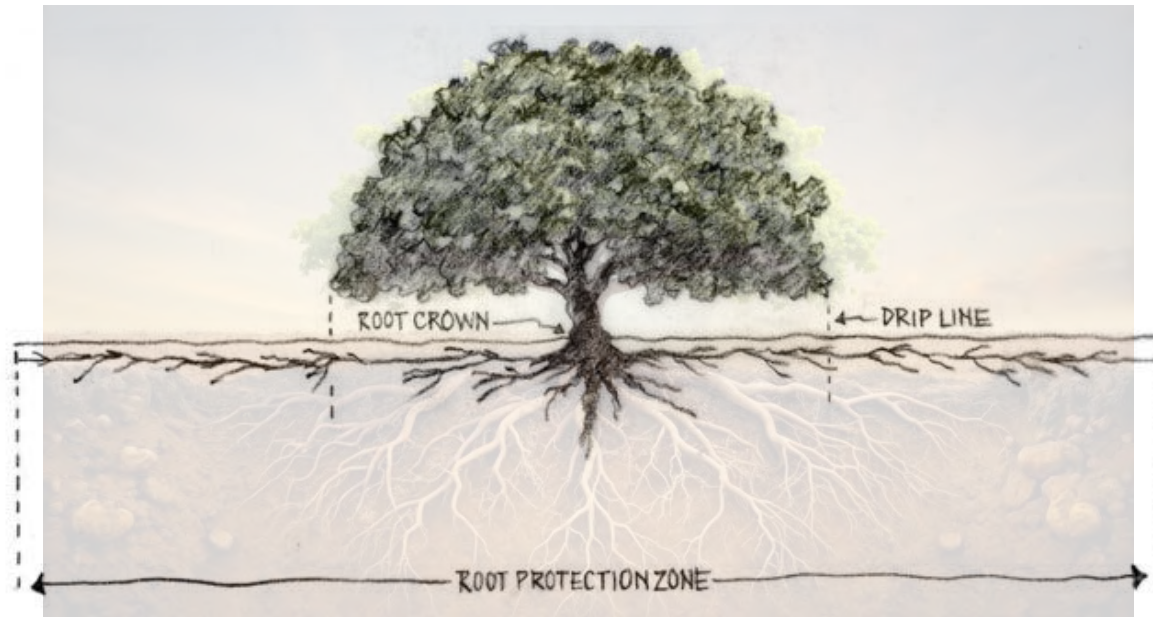


The urban environment is a challenging growing environment.  
The soil is poor, there is little room for the tree to grow, and usership is harsh.



# LESSON (3)

## How Tree Roots Grow



We are often led to believe that tree roots grow mirroring the above ground canopy. In reality, 90% of tree roots are in the **top 6" of the soil** where there is an abundance of water & oxygen and extend far beyond the edge of the canopy (the dripline).

# LESSON (4)

## Types of Nursery Stock



Balled and burlapped (B&B)

90% of Roots get cut to transplant



Container

Leads to girdled roots



Bare Root

Often only smaller stock available



# LESSON (5)

## Transplant shock kills trees.



Transplant failure rates are frequently 30% to 70% during the first few growing seasons in the urban environment (Hirons & Thomas, 2018).

Studies show that this hurts people's faith in trees (Costello et al., 2001).



# LESSON (7)

## Reforestation vs Afforestation



Reforestation — planting vegetation where there was an existing forest. (Think of a forest that was just cut down for timber or burned down from wildfire)



Afforestation — planting a vegetation where there was NOT an existing forest for a significant amount of time.



# Afforestation Examples





*tiny*  
**Forests  
101**

Miyawaki's work is the foundation of the Tiny Forest.

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**BIG MYSTERIES**



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# NJ Tiny Forests

- Summit
- Elizabeth
- Hainesport
- Princeton
- Merchantville
- Rahway
- Rutgers Piscataway (Coming spring 2026...)
- Rutgers New Brunswick (Coming spring 2026...)



Summit Tiny Forest, 2022 and 2025

Photos: [cityofsummit.org](http://cityofsummit.org)





# A **BIG** number of names for a *tiny* forest

"Miyawaki forest"

"Sugi forest"

"Pocket forest"

"Tiny forest"

"Micro forest"

"Mini forest"

"Healing forest"

A method of densely planted trees that resemble a forest.



# How do we actually do this?

1. Find a steward
2. Find some land
3. Design it
4. Determine plant community
5. Amend the soil
6. Plan the Festival
7. Maintenance and Stewardship

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## BIG MYSTERIES



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# 1. Finding the steward(s)

Determine who is going to maintain it (the steward)...  
without a steward the project will fail or not get off the ground.

Ideas:

- School grounds
- Local Department of Public Works (DPW) staff
- Parent, teacher, or school staff
- Students, or school club (with faculty or parent management)

Look to local organizations...

- Master Gardeners and gardening clubs
- Environmental commissions
- Your local Native Plant Society Chapter
- Shade tree commissions



Photo: Princeton Planting Day (J. Kover)

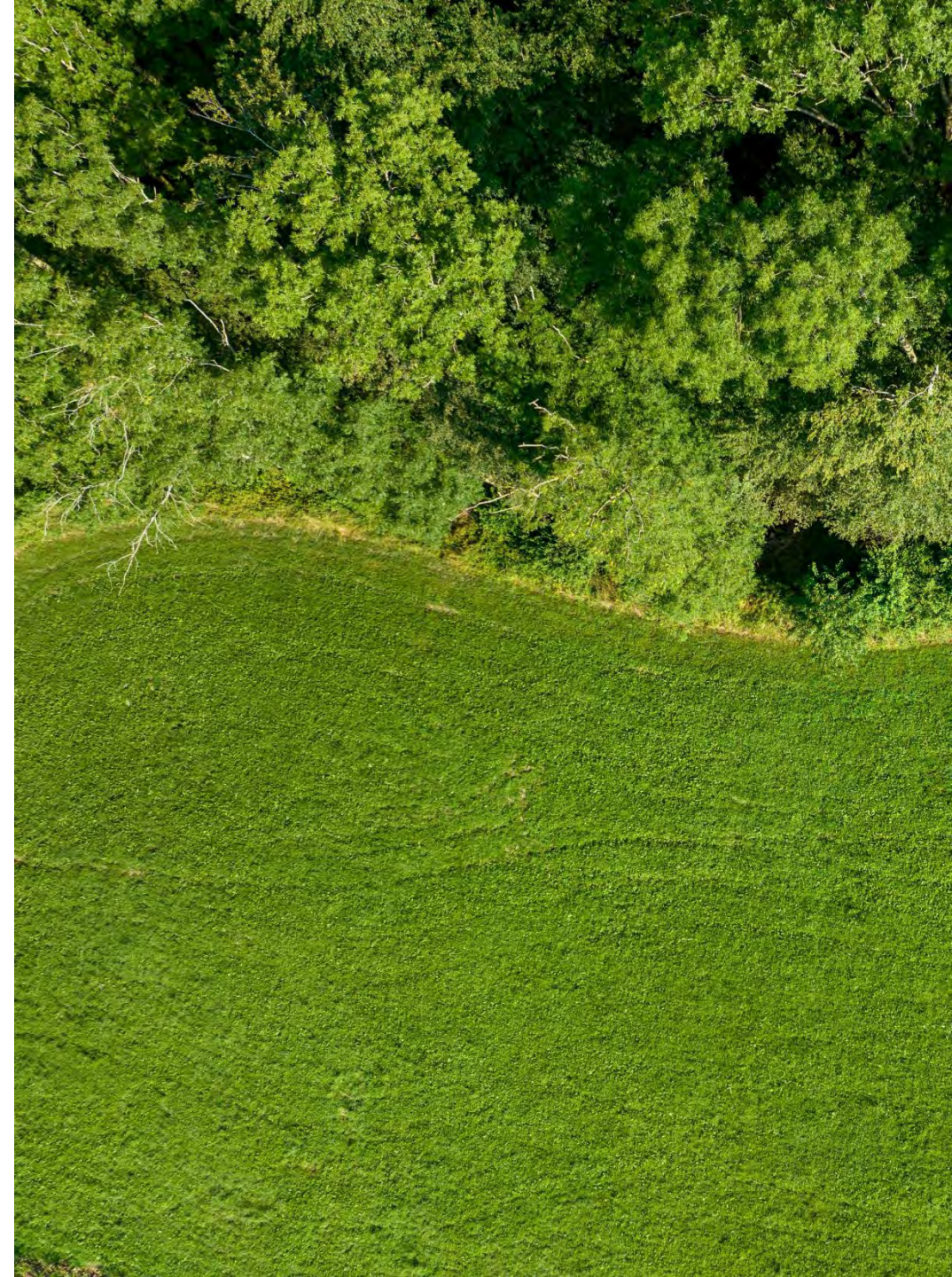


## 2. Finding Land

2. Find some land (that works for the steward) and funding.

Land should be in proximity to school but also should be accessible to the steward.

Land should have water access.





# 3. Designing

3. Determine the maintenance capacity and plan accordingly.

Maintenance should determine design, not the other way around.

Consider Deer population. Do you need a fence? Can the local DPW build one?

Please consult an expert for help with amending your soil, designing your plant community, and for fencing assistance.



Photo: Deer at Rutgers Site (Courtesy of Lily Fillwalk)



# 4. Plant Community

Plant communities are determined by soil and native range. So, the first step is to do a soil test of the site.

Rutgers has a soil testing lab.

Once soil type is established, determine which native plants will thrive in that location. When designing your plant community, consider all the layers of the forest...

- Herbaceous – flowers, grasses, ferns
- Shrubs – spicebush, azalea, rhododendron
- Understory – dogwood, redbud
- Canopy layer – oaks, tulip poplar, pines



Photo: Forest Community (Plant NOVA Communities)



# 5. Amend the Soil

The soil test will not only tell you what plants will thrive, but it will also tell you what nutrients and organics are missing. (it will likely be organic deficient).

Amending the soil does not mean remove and replacing it... that's expensive, unnecessary and bad for the environment. Instead, simply add what is deficient through compost or other fertilizers.

Beyond the soil test, one should measure **soil compaction** (your soil will most likely will be overly compacted impeding plant growth), how rocky the soil is, and how well it drains. There are remediations for all these problems.

Don't forget to cover the soil with mulch, compost, or leaf litter to retain moisture and protect the soil.

Amending soil is critical to a Tiny Forests success.



Photo: Rutgers Site Soil (Courtesy of Lily Fillwalk)



# 6. Plan the Festival

Tiny forests are a community driven effort. While their claimed ecological benefits are unproven, the social benefits are remarkable.

Invite your community!

- Students
- Parents
- Neighbors
- School staff
- Local government & DPW

Include celebration within the grant application. (Food, music, etc.) Make it fun and memorable.

This is great publicity! Invite a journalist.



Photo: Princeton Tiny forest Planting Day (from J. Kover)



# 7. Maintenance

- Trees need care – especially for the first 3 or so years
  - Watering is critical to help them survive
  - Protection from deer
  - Weeding around their root systems to prevent *unwanted* competition

This is great opportunity to teach the difference between good weeds and bad weeds.



Photo: Deer Fence at Rutgers Site (J. Kover)



# Citizen & Student Science

Tiny forests are the perfect tool to be able to articulate the importance of *scientific inquiry and critical thought*. Only time and research can tell us the true benefit.

Experiments should reflect the mysteries!

- Wildlife potential
- Cooling benefits
- Different Levels of Soil Amendment
- Social benefits
- Different sized stock
- Etc.





# Citizen & Student Science

## 1. Experiment! How fast do trees grow?

Plant a balled & burlapped tree next to the Tiny Forest and measure height, diameter at breast height (DBH), and health metrics (drought damage, leaf discoloration, defoliation, herbivore browse) every year to compare. Graph your results and discuss. These parameters can be used to determine ecosystem benefits. MS-LS2-5 & RST.6-8.7



# Citizen & Student Science

## 2. Experiment! Microclimate Measurements.

Measure the temperature under the canopy of the Tiny Forest, under a single planted tree of similar size, and in a parking lot.

Compare these temperatures. Discuss how trees help to cool the environment. HS-LS4-6





# Citizen & Student Science

## 3. Experiment! Animals Abound.

Measure animal diversity in an area with native trees and plants, such as a Tiny Forest, and another without native plants trees (a grass lawn, non-native ornamental planting, or parking lot). Count the species of different animals including mammals, reptiles, amphibians, birds, and insects, and how many individuals of each type. Display the data on a chart that compares the different locations. MS-LS2-1, HS-LS2-7, RST.6-8.7



# Citizen & Student Science

## 4. Or do them all!

Combine these three to meet a different standard: WHST.9-12.7  
This comprehensive research project focuses on the question:  
How does a tiny forest affect biodiversity, soil health, or microclimate compared to a nearby lawn or landscaped area?





# State Standards

- MS-LS2-5:
  - Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
- MS-LS2-1:
  - Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- HS-LS2-7:
  - Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- HS-LS4-6:
  - Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
- WHST.9-12.7:
  - Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-LS2-7)
- RST.6-8.7:
  - Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-LS2-1)



# Suggested Readings / Sources.

[Jersey Friendly Yards \(Plant Database for NJ\)](#)

Plant Communities of NJ – Anderson (Forest Communities)

Applied Tree Biology – Hiron & Thomas (Tree biology)

Mini-Forest Revolution – Hannah Lewis (Culture of Miyawaki)

Trees in the Urban Landscape – Trowbridge & Bassuk (Design Process Guide)

The Nature of Oaks – Douglas Tallamy (Native Plants)

American Canopy – Eric Rutkow (History and Culture of Urban Trees)

[The Trees for Schools program \(Planting and species info\)](#)

<https://www.cityofsummit.org/878/Tiny-Forest> Tiny Forest Technical Info & Blog



# Identifying Grants or Funding

- [Trees for Schools](#) — Sustainable Jersey



## Trees for Schools Partners

The Trees for Schools program is administered by the Sustainability Institute at The College of New Jersey in collaboration with Sustainable Jersey. It is made possible through the support of the New Jersey Department of Environmental Protection.



THE COLLEGE OF NEW JERSEY  
SUSTAINABILITY INSTITUTE

- National Environmental Education Foundation: <https://www.neefusa.org/what-we-do/grants/grants>
- North American Association for Environmental Education: <https://naaee.org/programs/seec/funding>
- Bowman's Hill Wildflower Preserve Grant: limited counties in NJ, <https://bhwp.org/plant-grants/>
- Ask your community for donations.

# Thanks! Questions?

## Keep in touch!

- If you decide to add a Tiny Forest in your community, please let us know about it.
- The Rutgers Urban Forestry Program will be maintaining a list of Tiny Forests in New Jersey.
- The resources and links mentioned in this presentation are available on our website.

<https://urbanforestry.rutgers.edu/outreach-program/>



Rutgers Urban Forestry Program  
[Urbanforestry.rutgers.edu](http://Urbanforestry.rutgers.edu)

For fun forestry findings... follow us!  
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