RUTGERS
THE STATE UNIVERSITY OF NEW JERSEY

Urban Forest Inventories

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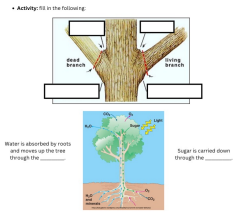
1

How to Use the Worksheets

- Answer questions as we go along to put what you're hearing on paper
- Answer the questions after listening to the lecti to practice using what you just heard
- Come back to the worksheet later to review what you've learned



2

Think about the neighborhood where you live …

- How many plantable spaces are there where you could put new trees?
- What species would you put in those spaces that would be new to your neighborhood?
- How many of those trees need maintenance?

How confident are you of those answer?

What would make you more confident?

3

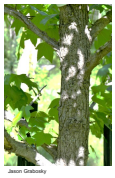
We need to know what we have to take care of the urban forest

- Inventory = a collection of information about trees in a community or a city
- Sort of like a census
- Who are your tree neighbors? What do they need? Who's missing?

4

Tree Inventories and Tree Diversity

- One of the most important things we can use a tree inventory for is ensuring species diversity in the urban forest

5

Dutch Elm Disease

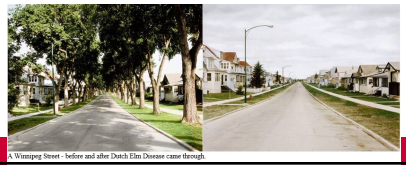
- Fungal infection that can kill elm trees, spread by a bark beetle
- Arrived in US in 1928
- Elms were a popular shade street tree
- Estimated 77+ million elm trees lost
- Removal cost a lot of money
- Changed feel of many neighborhoods

An elm-lined street in Detroit in 1971 (top), and the same view in 1984 after a Dutch elm disease pandemic.

6

Preparing for future outbreaks

- Since Dutch Elm Disease and other outbreaks, we use tree inventories to identify species that are very common in communities
- We can plant many other species instead to reduce the risks of having too much of one species
- Diverse tree species = resilient urban forest



A Winnipeg Street - before and after Dutch Elm Disease came through.

7

Uses of tree inventories

- Choosing new species to plant and increase diversity
- Identify places that need trees
- Tracking how many trees need care or removal
- Quantifying ecosystem services

8

Ecosystem Services

- Ecosystem services = many different benefits that trees provide

- We often assign a dollar value to those benefits

9

Professional Inventories

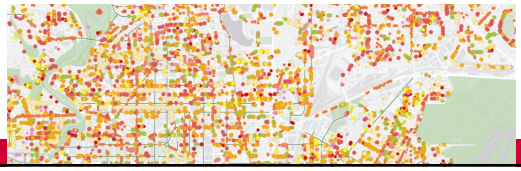
Can work for …
- Municipality
- Soil Conservation Districts
- State government
- Tree care companies and foresters (small and large companies)

Skills
- Tree ID
- Tree measurements
- Organized and detail oriented
- Teamwork

10

Data

- **Facts or information we can use to summarize, analyze, or plan something**
- Inventories are based on data that we collect, not guesses



11

Let's inventory the class

- Use stickers to mark your answer on the poster papers around the classroom.

Let's summarize the results of each poster.

Do the results vary by ward?

12

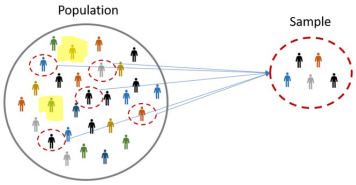
Samples

- **A small group that is part of a larger population**
- Usually inconvenient to measure every individual in a population
- Take a sample, then make an estimate for an entire population
  - Example: your team's height chart is a sample of the heights of people in your neighborhood

13

Accurate data

- **Sample measurements correctly reflect the actual population**
- Do you think our data accurately reflects the ward?



14

Bias (in data)

- **A systematic distortion in the data**
- Could be caused by:
  - bad measurement methods (bad tape measure)
  - Sample doesn't reflect population (maybe only tall people are interested in tree planting)
  - Sample is just too small (we didn't capture all the possible variability in the population)
- When we collect data, we try to minimize bias

15

Precise data

- **Is very very specific**
- Example:
  - We measured everyone's height to the 0.001 foot (5.342 feet tall)
- Only measure as precisely as is useful

16

In the West Ward, if we measured 100 street trees versus 1,000 street trees, which set of data do you think would produce more accurate estimates?

Why would we prefer to measure 100 versus 1,000 trees?

17

Decision making

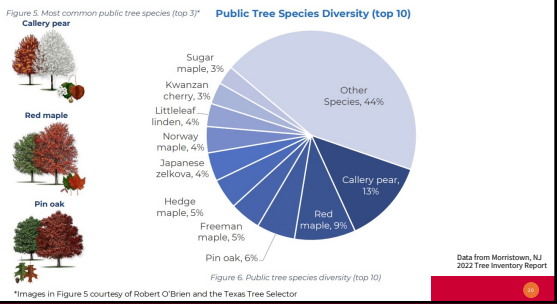
- [example graph – what species do you not want to plant more of?]
- [example graph – does a neighborhood likely have more younger trees or older trees?]
- [example map – how much space is available for new trees?]
- [example graph – what neighborhood has more maintenance needs?]
- [example graph – what neighborhood is missing ecosystem services?]

18

Examples of Inventory Data

19

What species do you not want to plant more of?



20

What age class of trees are lacking?

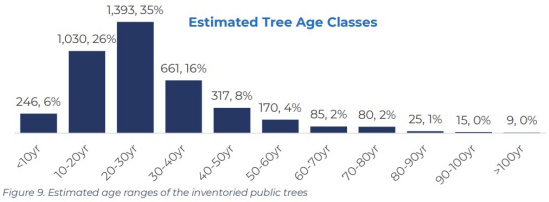


Figure 9. Estimated age ranges of the inventoried public trees

Data from Morristown, NJ 2022 Tree Inventory Report

21

What problems might you prioritize remedying?

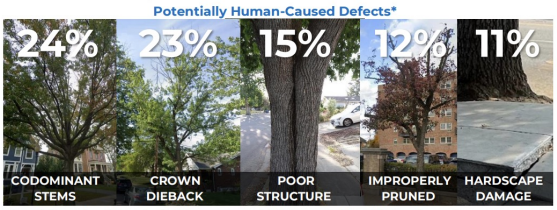


Figure 11. Examples of the potentially human-caused defects seen in the public tree observations

Data from Morristown, NJ 2022 Tree Inventory Report

22

Where are problems occurring?

Data from Morristown, NJ 2022 Tree Inventory Report

Figure 16. Map displaying the recommended management priorities

23

How do we set up a tree inventory?

Multiple approaches, depends on what you need to know

24

On the ground or from the sky?

Ground-based

- People observe trees by visiting them and making measurements
- Very specific description of individual trees & locations
- Time-consuming, a lot of legwork

25

On the ground or from the sky?

Aerial-based

- We use photos and other data from planes, drones, and satellites
- Big picture – how much ground is covered by trees (canopy cover), where is there canopy cover
- Software speeds up process, can cover large areas

26

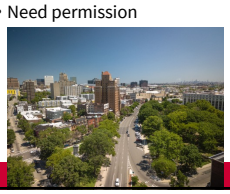
Public Only or Public And Private Trees?

Public trees only

- Data relevant to trees city actually manages

Public and private trees

- Gives bigger picture of whole community
- Need permission



27

How many trees should we include in an inventory?

Complete Inventory
- All trees under jurisdiction
- Allows for tracking of individual trees
- High degree of certainty
- More time & $$

Sample Inventory
- Portion of trees
  - 3-6% of street segments
- Make estimates about entire population with some error
- Easier for larger areas

28

What data should you collect?

What you need to know:	Minimum data collection:
Most situations	Species
New trees to plant now	Plantings spaces Neighborhoods lacking trees
New trees to plant in the future	Tree size/age + condition Neighborhoods lacking trees
Trees that need maintenance	Tree condition Location Size of tree
Ecosystem services provided by trees	Tree size Size of crown

29

Recording Data - Species

- Sometimes can be difficult to tell some very closely related species apart or identify cultivars
- May just record genus

Sargent Crabapple

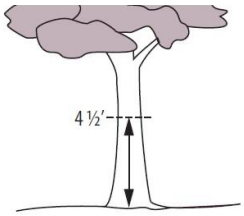
Frettingham Victoria Crabapple

Just record crabapple

30

Recording Data - DBH

- DBH = trunk diameter at breast height
- 4.5 feet above the ground



31

Benefits of measuring trunk diameter

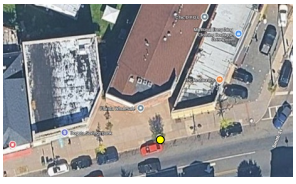
- Trunk size generally correlates to tree age
- Easy to measure
- Predict other aspects of tree size from DBH
- Height can change based on other factors (pruning, storm damage)

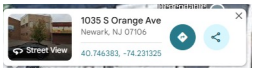
< Diameter tape Calibrated to report diameter instead of circumference

32

What data do we record?

Location
- Street address
- GPS coordinates (preferable)
  - Phone
  - Specialty equipment

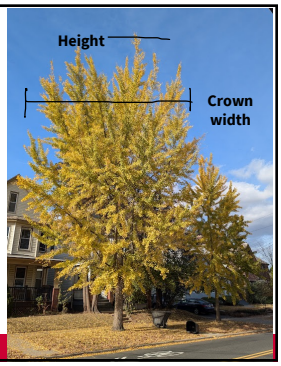




33

What do we measure?

Optional
- Height
- Crown dimensions
- Tree health
- Potential problems (hanging limbs, large decay pockets, lifted sidewalk)
- Plantable space



34

How do we record data?

Mostly personal/team preference.

Paper
- Cheap & easy
- Flexible
- No batteries
- Need to scan or take photo at end of day for back up copy
- Have to type in data later

Digital
- More expensive
- Data immediately into usable tables
- Consistency
- Limited by battery life and glare

35

Let's practice collecting inventory data

- Identify species
- Measure DBH
- Look for plantable spaces

36

Go outside

37

What did you think?

38

Inventory Summary

- Understanding our tree population helps us make informed decisions
- There are many ways to conduct a tree inventory, can be really simple or really complex
- The type of decisions we need to make influence the data we collect

- Questions?

39