How to Look at Plants

You're walking around the city and you encounter some plants - maybe a park, a community garden, a street tree, abandoned lot, or even a weed growing in a sidewalk crack. There are maybe some animals, insects, and humans as well. What sort of plants are these? Why are they here? Should they be here? How do they interact with each other?

But first, why do we care about any of this?

Nature is all around us. Our city is an ecosystem, made up of plants, insects, animals, and humans. If we want to be good citizens of our city, we need to get to know all of our neighbors. Currently, we might just see a garden as collection of undifferentiated green blobs. But by observing individual plants and how they interact with each other and with animals, we begin to view our city as an ecosystem, and understand how plants affect humans, and how humans affect plants.

How can we learn about our neighbors?

Environment

First, we need to evaluate the environment. Define the boundaries of the area you're looking at. This guide will be most useful for areas smaller than around 100 square feet.

Stable factors

- Where are we? What country, state, city, and neighborhood? What is the local geography and topography?
- What is the apparent biome? Though a forested area in a park does not function exactly like a natural forest, it is a good start for our observation.
  - If land, then look at the trees around the area: low canopy coverage is a meadow, medium canopy coverage is a shrubland, and high canopy coverage is a forest.
  - If plants are partially submerged in water some or all the time, it is a wetland.
  - If aquatic, is it an estuary, river, or pond?
  - In a city, buildings might be providing shade even in the absence of trees
- What does the biome imply about sunlight, temperature and moisture levels in this plot?
- What is the human history of the space? Is it a primary or secondary forest, city park, community garden, sidewalk, or abandoned lot? Who maintains the space? What used to be here?
- What ecoregion are we in (https://bplant.org/regions.php)? New York City is in the Eastern Temperate Forests.
- What did this land look like before European colonization? See welikia.org. What plants, animals, and humans lived here?
- Which way is north? What is the path of the sun throughout the day? Is it blocked by any trees or buildings? How does it change throughout the year? See suncalc.org.

Conditional factors

- What season, month, weather, time of day?
  - You can come back at different times of day and year and redo same analysis over and over. Plants bloom at different times and some plants called spring ephemerals disappear completely after blooming in spring.
- Assess the soil.
  - Is it finely or coarsely textured? Moist or dry? Light or dark? Use a stick to measure soil compaction. How does each property affect the plants? How do plants affect each of the properties?
- Was there rain or snow recently affecting the soil moisture?
- What else is on the soil? Leaf litter, rocks, fallen fruit, etc.
- Is the land flat or sloped?

Inventory

Now we can start to inventory the organisms in the plot. At first, we don't know the names of anything, but that's fine. We can learn a lot just with our eyes and our hands, without looking anything up.

Make a list of all the plants. Describe each one. You can compare and contrast plants to other nearby plants. When you're done observing each plant, give it a name based on its characteristics (for example, tall roundleaf or purpleberry vine). Consider what each of the characteristics relate to the plant's evolutionary adaptations.

- Describe the form: tree, shrub, herb, graminoid (grass-like), vine, fern
- Leaves: margins, thickness, texture, color, hairy/smooth, shiny/matte, veins, shape
- Flowers: color, shape
- Fruits: color, size, firmness, any eaten?
- Buds: smooth/hairy, size, shape, color
- Stems or bark: color, thickness, thorns, texture
- Seedheads: Spread by wind or by animals (shake the seedhead gently)?
- Roots: Visible? Color, thickness. How far does it spread laterally?
- Habit
  - Height and width
  - Sprawling or contained?
  - Dense leaf coverage or lots of sunlight penetrating through?
  - Casting shade on other plants?
  - Spreading through self-seeding, aboveground stems (stolons), or underground stems (rhizomes)?
- Are the leaves eaten by insects, or flowers visited by pollinators? Do you see any other animals present?
- Evidence of disease such as discoloration, fuzz, or warped organs?
- Signs pointing to too much or too little moisture?
- Signs pointing to too much or too little sunlight?

- How many of this plant are there? Are they uniform in appearance or varied? How do you know they are all the same plant?
- How are the plants arranged spatially? Was it planted by humans or through self-seeding?
- Is the same plant present in the surrounding area outside of the plot?

Sketch

At this point, it can be helpful to make a sketch of the plot. Focus on general shapes, the overall configuration, and the topology, rather than the details of individual plants. Try sketching from different angles. Indicate which way is north, and include rough measurements of the plot area, as well as heights of plants. Include shade casted on the plot by nearby trees or structures.

Human Activity

Now we will look for signs of human activity.

- What are the ways humans have interacted with, managed, or maintained this plot?
- Are the borders of the plot defined by bricks, fences, wire, or asphalt?
- Are there plants that go well past the borders? How does that affect humans moving through the area?
- Is there any signage?
- Is there art or sculpture?
- Is there litter?
- Do plants show evidence of pruning? For example, cleanly cut limbs.
- Does the arrangement of plants seem deliberately placed by a human? Why?

Does the plot look like it was designed by humans? What was the goal of those designers? If not, how did the plants get here?

Does the plot look like it is regularly maintained? What is the goal of the maintainers? Is there a particular aesthetic or style the gardeners are intending?

Holistic Analysis

Now analyze the plot as a whole. How much of the plot is each plant taking up? Are some plants out-competing others?

- Are nearby plants occupying the same niche, or are do they have complementary morphologies allowing them to coexist? For example, a tall plant with thin leaves surrounded by a short plant with large leaves.
- Do some plants, such as vines, seem to be spreading so aggressively that other plants are unable to survive in the middle?
- How are insects interacting with the plants? Are they eating leaves, pollinating flowers, or burrowing in the ground underneath plants?
- Are there any plants that may be invasive? (e.g., little or no insect activity, distributed as a monoculture, vines in an urban environment)
- Is there bare soil? Why?

- Do different parts of the plot look different? What could have caused these differences?
- What might this plot look like in 1 month? In 3 months? Next year?
- After revisiting the area at a different time of the year, how have the relationships changed over time? Have spring ephemerals died back, or is a different plant now providing nectar for pollinators? What does it look like right after a rainstorm or a snowstorm?
- How does this plot differ from the areas around it?

Identification

Now that we have analyzed by ourselves, we can look at external resources. But first we need to figure out their names in order to look them up. However, all methods of plant identification are imperfect.

- Humans: Ask the gardener
  - Humans are often wrong.
- Photo identification apps: iNaturalist, Plant.net, PictureThis
  - Photo identification only look at the visuals provided, which are often not enough to distinguish between similar species (e.g., American holly vs English holly). Often you need to measure leaves, look at the underside of leaves, feel the texture, look at the habit, etc., which these apps will not tell you to do. They are often overconfident about identifications that are completely wrong.
- iNaturalist: The app lets you upload pictures of organisms to their citizen science database, and other knowledgeable people will help identify (though this may take some time).
- Books: "Identifying Trees of the East", "A Guide to Native Plants of the New York City Region", other field guides
  - Books are difficult because in an urban setting, especially in parks and gardens, many species will be non-native and won't appear in field guides. There are books that cover a more cosmopolitan range of plants but they are several thousands of pages long.
- Tree maps: NYC Tree Map, Greenwood Cemetery Tree Finder
- bplant.org has identification guides for telling apart similar species such as white/red mulberry, early/sweet goldenrod, etc. These are most reliable because they are written by botanists.
- Forums: reddit.com/r/PlantIdentification. Users can be helpful in providing suggestions but are also often wrong.
- Dichotomous keys: There are various dichotomous keys available on the internet for tree and plant identification and they are reliable, but they can be quite technical and difficult to use for amateurs.
- Invasive species lists: nyis.info

You may need to come back at a later time when flowers or fruit are available in order to identify a plant for certain.

When assessing a plant description, be aware that there can be great physical variation within the same species. Most guides do not describe how very young plants look, but their leaves are often very different from mature plants. Colorations and marking can very by geography and depending on local site conditions. Use the observations you gathered in the inventory phase to inform and validate your identification.

Once you have a guess, search for similar looking plants and how to tell the difference between them. For example, if the photo ID app says American holly, search "What is American holly confused with?", yielding "English holly." Then search for how to tell the difference between American and English holly. In parks and gardens, an additional complication is that the plants and trees may be commercial cultivars for which there won't really be any scientific information available online. In general, graminoids are very difficult to identify, especially when not flowering.

You can also try to identify the insects and animals in the plot:

- iNaturalist: either photo ID or upload pictures and have others ID them
- Bees in your Backyard book for bee identification
- Merlin app for bird identification

Research

Now that you have identified the plant, research online or in books to determine

- Origin: is it native or non-native? Is it considered invasive? Why?
- What is the native range of the plant?
- Is it an annual, biennial, or perennial? If a grass, cool-season or warm-season?
- What sunlight and moisture conditions does it prefer?
- When does it flower and fruit?
- How does the plant grow? Primarily through rhizomes/stolons or through large amounts of seeds?
- What other plants is it related to?
- What wildlife does the plant support?
- How do humans use this plant? Medicinal, culinary, ornamental, etc.
- For native plants, GrowitBuildit, Lady Bird Johnson Center, North Carolina Extension Gardener, The Plant Native, bplant.org, are all good online resources

Assessment

Can we construct a history of this area? What happened in the past? When did these plants arrive?

What are questions we can ask about this plot?

What do you think about the plants in this plot? Are they good neighbors to the other organisms around them? If you could add, remove, or modify the planting, how would you do so and why?

We can look at stewardship in the following lenses:

- Aesthetics
  - Fixing the brick border to give a sense of intentionality
  - Planting a selection of flowers that bloom throughout the year
  - Adding plants to bare soil
- Plant health
  - Aerating soil
  - Watering plants
- Biodiversity & invasive plants
  - Planting more native plants
  - Identifying and removing invasive plants
- Human needs & accessibility
  - Trimming back plants extending over the path
  - Pruning damaged or dead tree branches that may injure a human if it were to fall
- Education
  - Labels or interpretive signage
- Green infrastructure
  - Planting a tree to provide shade
  - Planting grasses to absorb stormwater and reduce erosion

Additional Testing

If you are intending to plant in this area, then it is useful to get a more thorough understanding of the environmental conditions.

- Field Soil Ribbon Test - texture of soil, sand/loam/clay (GrowitBuildit on YouTube)
- Field Compaction Test - using a soil corer (see YouTube)
- Field Soil Drainage Test (GrowitBuildit on YouTube)
- At-home Mason Jar Soil Test - more reliable way to test soil texture, takes a few days (GrowitBuildit on YouTube)
- Lab soil test - Send soil samples to Urban Soils Lab at Brooklyn College - takes a few weeks. There is sometimes free lead testing offered through the Urban Soils Institute.
- Solar map - On a sunny day, take a picture of the area every 1-2 hours and determine how many hours of sunlight it is getting. You can repeat this every month in order to get an idea of the sunlight exposure of this plot.

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