



Lesson: Exploring Novel Ecosystems: Field Trip to an Urban Forest Patch

By Heidi Scott, SESYNC | October 3, 2022

Overview:

Forest remnants persist in cities despite the intensive land use transformations of the last century. Some small forests are old-growth areas set aside as intentional preserves, some are neglected spaces seen as difficult for development because of riparian or topographical concerns, and others are secondary forest communities that grew in successive stages after farmlands or industrial centers fell into disuse. Whatever the history of these forest patches, they represent a major resource of natural capital that humans will continue to manage and develop as we become increasingly urban dwellers in the 21st century.

This lesson is the first in a two-part series on Urban Forest Patches (UFPs). In this lesson (which requires two class sessions), UFPs are considered novel ecosystems. Here, we define novel ecosystems as those that support a unique community, including native and non-native species. They also display historical impacts of both human use and ecological succession. Learners will go on a local field trip to explore elements that challenge the resilience of small forest patches (*Note: an online alternative to a field trip is also provided*). They will be asked to consider the unrealized potential and value of UFPs that may be unnecessarily derided as weedy, trashy, or dangerous. The lesson will require student access to a UFP of at least one acre. The second lesson will explore the socio-environmental dynamics of UFPs by integrating both human needs for access to nature and levels of ecosystem services provided by UFPs, with concerns of governance, maintenance, and resilience.

Assumed Prior Knowledge:

Appropriate for undergraduate, graduate, and higher-level learners. Advanced groups may interpret community dynamics revealed by quadrat samples and dive into philosophical and governance issues while completing the basic ecological work of this lesson.

Learning Objectives:

- Learn theory and terminology related to UFPs as distinct ecosystems.
- Use basic ecological research methods to sample and evaluate the health of a real UFP.
- Synthesize ecological with aesthetic and philosophical elements of UFP governance.
- Consider how ecosystem services and human benefits may both emerge from healthy UFPs (explored in more detail in Lesson 2: Socio-Environmental Services of UFPs).

Key Terms and Concepts:

edge effects; novel ecosystems; historic ecosystems; urban green space; invasive species; native species; non-native species; biodiversity; succession; alternative stable states; competitive exclusion; governance

The “Hook” (suggestions for quickly engaging students):

Spend 5 minutes recalling a forest you visited as a child. Was it a large, protected area like a national or state forest? Was it a remnant left behind while the surrounding forest was developed? Then ask yourself: What did you enjoy about spending time there? Did you feel any aversions or fears? And if you have the experience to compare a large forest with a small one, what were some distinctions between them, both ecological and emotional? Make a list that compares the two sylvan experiences.

Teaching Assignments:

1. Field Trip: Exploring the Ecology of Your Community’s UFP (75-min. active learning time, plus travel time)

Assign the following article by Johnson et al. (2020), “Conceptualizing social-ecological drivers of change in urban forest patches,” to be read prior to either the field trip or the online alternative to the field trip. Instruct learners to pay special attention to the highlighted sections and the socio-ecological model components that are related to landscape configuration, biophysical factors, and forest patch condition. If the group is participating in the field trip, review considerations such as: appropriate attire, e.g., closed toe shoes; if it will be hot, cold, rainy, etc.; water; and if they will need to bring lunch.

**For those unable to participate in a field trip see classwork instructions in italics. Note that these learners will also benefit from the PowerPoint included in the first bullet below.*

[Johnson et al. \(2020\).pdf](#)

- (10 min.) In class, review the ecological elements of UFPs using the PowerPoint below:

[UFP Lesson 1 PowerPoint.pptx](#)

- (5 min.) Provide an overview of a UFP that is accessible from your location and which you have permission to enter. The overview might include the land use history; existing species both native and non-native; biophysical elements such as edge effects and waterways; and, human pressure like runoff pollution, dumping, or development priorities. Note that many of these spaces will be secondary growth forests that may have dense thickets, trash, and poison ivy.

- (60 min.) Divide the class into 3-person groups and give each group a 2-meter length of rope with a knot tied in the center. They will use this rope to form a square quadrat of 1-m sq. for sampling. Release students to the field site after providing them with these instructions:
 - Detail in written notes your sensual impressions, including the aesthetics, smells, sounds, textures, and even tastes of the UFP. These sensory impressions can convey information both about ecosystem health and whether this forest provides socio-environmental services to visitors, such as meditation, food, and beauty.
 - Randomly sample 5-10 quadrats (toss the rope and array it in a square, sample the species and quantity within the 1-m space) and record species composition. For aid in later identification, take a photograph of each quadrat and label it.
 - Note the evidence of any animals that live or pass through the UFP, including sightings, tracks, and scat.
- As homework, have the groups finish their detective work on sampled quadrats by listing the species identified, their quantities, and whether the species is native to the region. Have each group post a summary on a class discussion board.
- **Alternative to field trip: Profile the UFP called Guilford Woods in College Park, MD. The websites [Friends of Guilford Woods](#) and [Save Guilford Woods](#) have information on native and invasive species, hydrology, and governance disputes. This UFP can serve as the model ecosystem in Lesson 2, as well. If the lesson is limited to online research of Guilford Woods, learners can benefit from this case study in several ways: 1) as a case of urban development dispute, where needs for urban housing vie with the need to preserve greenways, habitat, and functional hydrodynamics; 2) as a case of invasive species effects on native species assemblages and ongoing regimens of invasive plant removal, especially English Ivy; 3) as a case of preserving riparian land for flood regulation, as Guilford Woods has a stream that absorbs much excess runoff from surrounding hardscapes; 4) as an example of a novel ecosystem, where a unique species assemblage and even a unique endemic species of carnivorous worm has been identified; and, 5) as a critical resource for ecology and ecopsychology instruction adjacent to a large college campus. Ask learners to:*
 - *List the ecosystem services they see at work in this UFP and explain how those services would be affected by development.*
 - *List the ecological problems associated with this space: edge effects, invasive species, pollution, or trampling.*
 - *Describe potential solutions to absolve some of these pressures common to UFPs?*

2. Analyze and Share Findings (75 min. class period)

- (15 min.) In the next class, begin by clearing up any unidentified species or mystery animals. Unless the unidentified species is highly prevalent, small gaps in knowledge are okay.
- (30 min.) As a whole class, share compiled information about the plant and animal communities found in each quadrat and sense analysis. Summarize the state of the ecological community by evaluating:
 - The prevalence of invasive species (non-natives that dominate quadrats)
 - Sense impressions of the landscape and the condition of any waterways
 - Other biophysical factors like vertical distribution—including herbaceous, shrub, understory, and overstory layers; and, edge effects like adjacent roads or buildings
 - States of succession: Is this community filled with fast-growing, colonizing species like invasive ivy; slow-growing, mature species like trees; or, some mixture?

- Speculate on how historical human uses and natural succession of ecological communities have both influenced the state of the UFP as you found it.
- (30 min.) Conclude this lesson by asking learners to advise on how this UFP could be governed to maximize both ecosystem health and human ecological benefits. You might ask:
 - Are interventions (trash or invasive species removal) needed before this UFP could be considered an appealing public space?
 - What ongoing stressors (like pollution) or threats (clear cutting) make explicit governance and advocacy part of the process to maximize this UFP’s potential?
 - What ecosystem and human services will this space provide if it achieves its maximum potential? Along that optimal path, what might the UFP look like in 50 years?

Background Information for Instructor

1. Ecological networks in urban forest fragments reveal species associations between native and invasive plant communities

- This article posits that urban forest patches consist predominantly of non-native and invasive species that “coexist with resilient native congeners and purposefully introduced flora.” The authors argue that these invasive-native assemblages provide significant ecosystem services within their urban homes and therefore, to understand their complex compositional patterns is of utmost importance for making appropriate management and conservation decisions.
- Chauhan, S., Yadav, G., & Babu, S. (2022). Ecological Networks in Urban Forest Fragments Reveal Species Associations between Native and Invasive Plant Communities. *Plants*, 11(4), 541. <https://doi.org/10.3390/plants11040541>

2. Human and biophysical legacies shape contemporary urban forests: A literature synthesis

- This synthesis article discusses some of the major human and biophysical drivers throughout history and their associated legacy effects as expressed in present urban forest patterns.
- Roman, L.A., Pearsall, H., Eisenman, T.S. et al. (2018). Human and biophysical legacies shape contemporary urban forests: A literature synthesis, *Urban Forestry & Urban Greening*, 31, 157-168. <https://doi.org/10.1016/j.ufug.2018.03.004>

3. Nature is Everywhere—We Just Need to Learn to See It

- Environmental Writer Emma Marris reflects on the importance of recognizing that nature is all around us. She argues we don’t need to go to special preserves to enjoy the benefits of nature—just go outside your door. She stresses we should not define nature as that which is untouched; instead, novel ecosystems are all around us and may become the norm. She believes we should embrace that.
- Marris, E. (2016). Nature is everywhere—we just need to learn to see it. TED. https://www.ted.com/talks/emma_marris_nature_is_everywhere_we_just_need_to_learn_to_see_it?language=en

3. “Novel Ecosystems” are a Trojan Horse for Conservation

- This opinion article argues that ecology’s acceptance of the concept of “novel ecosystems” and their proposed benefits can only lead to increased environmental degradation. For

example, if people erroneously believe ecosystem restoration is futile and novel ecosystems provide more benefit, policy-makers may be more willing to allow environmentally damaging projects and the public might exert less pressure to prevent habitat destruction.

- Simberloff, D., Murcia, C., & Aronson, J. (2015). Opinion: “Novel Ecosystems” are a Trojan Horse for Conservation. *Ensaia*. <https://ensia.com/voices/novel-ecosystems-are-a-trojan-horse-for-conservation/>

Related SESYNC Content:

- Scott, H. (2022, October 3). *Socio-Environmental Services & Management of a Novel Ecosystem: Urban Forest Patch Case Study*. SESYNC. <https://www.sesync.org/resources/socio-environmental-services-management-novel-ecosystem-urban-forest-patch-case-study>
- Morzillo, A., Campbell, L.K., King, K.L. et al. (2022). A tale of urban forest patch governance in four eastern US cities. *Urban Forestry & Urban Greening*, 75: e127693. <https://doi.org/10.1016/j.ufug.2022.127693>
- Ogden, L.A., Aoki, C., Grove, J.M., et al. (2018). Forest ethnography: An approach to study the environmental history and political ecology of urban forests. *Urban Ecosystems*, 22, 49-63. <https://doi.org/10.1007/s11252-018-0744-z>
- Roman, L.A., Conway, T.M., Eisenman, T.S. et al. (2020). Beyond ‘trees are good’: Disservices, management costs, and tradeoffs in urban forestry. *Ambio*, 50, 615-630. <https://doi.org/10.1007/s13280-020-01396-8>
- Palmer, M.A., & Scott, H. (2022, August 18). *Network Methods to Understand Complex Systems, Part 1: Ecological Networks*. SESYNC. <https://www.sesync.org/resources/network-methods-understand-complex-systems-part-1-ecological-networks>