

Urban Greening

A DOI Nature-Based Solutions Roadmap Fact Sheet



Urban greening is a general term used to describe efforts to re-nature urban areas by installing various types of green infrastructure. These re-vegetation strategies are often implemented with climate resilience goals in mind, but are also often cited as a way to increase mental and physical health of local residents.¹ We focus here on 3 different forms of urban greening: urban forestry, green roofs, and pollinator gardens.

TECHNICAL APPROACH

Urban forestry:

- Urban forestry projects can involve reforestation or afforestation. These projects need to be planned in coordination with the local community, to ensure that shared goals are being met.

Green roofs:

- Installing a green roof involves three primary steps. 1) Selecting the roof type: extensive, in which lighter plants are planted and little maintenance is required; and intensive, which are similar to traditional gardens but need more structural support, irrigation, and continued maintenance; 2) selecting vegetation for the roof, and 3) installing the roof.^{3,4}

Pollinator gardens:

- Installing pollinator gardens does not take a lot of technical expertise, and the major technical decision required is deciding which plants to include. There are numerous regional native-plant guides to help select appropriate plants for each U.S. region.⁵

BENEFITS

Climate Threat Reduction

- Carbon storage and sequestration (urban forestry)
- Heat mitigation (urban forestry, green roofs)
- Reduced flooding (urban forestry, green roofs, pollinator gardens)
- Improved air quality (urban forestry, green roofs)

Social and Economic

- Jobs (urban forestry, green roofs)
- Mental health & wellbeing (urban forestry, green roofs, pollinator gardens)
- Recreational opportunities (urban forestry)
- Aesthetics (urban forestry, green roofs, pollinator gardens)
- Increased property values (urban forestry, green roofs)
- Wind and noise reduction (urban forestry)
- Crime reduction (urban forestry)
- Reduce energy usage (urban forestry, green roofs)
- Food security (green roofs)
- Reduced or avoided costs (green roofs)

Ecological

- Reduced runoff (urban forestry)
- Supports wildlife (urban forestry, pollinator gardens)
- Enhanced biodiversity (urban forestry, green roofs)

SITE SUITABILITY FACTORS

- ✓ Adequate soil structure and rooting space for trees (urban forestry)
- ✓ Adequate roof size (green roofs)
- ✓ Soil and water availability (pollinator gardens)
- ✗ Excess wind, salt use, or overcrowding by other trees or overhead wires (urban forestry)
- ✗ Sloped roofs are more difficult to install green roofs on (green roofs)
- ✗ Excess use of pesticides nearby (pollinator gardens)

EXAMPLE PROJECT

The Million Trees NYC project was a large initiative by the City of New York Department of Parks and Recreation.⁶ The project had a goal of planting one million trees between 2007 and 2015. Seventy percent of trees were planted in public spaces and thirty percent were planted on private property within the city. The project’s goals were numerous, including carbon sequestration, reduced energy use, improving air and water quality within the city, and lowering summer air temperatures.



Tree planting in NYC. Photo Credit: NYC Parks and New York Restoration Project.

REFERENCES

- 1 García-Lamarca, M., Anguelovski, I., & Venner, K. (2022). Challenging the financial capture of urban greening. *Nature Communications*, 13(1), Article 1. <https://doi.org/10.1038/s41467-022-34942-x>
- 2 Vibrant Cities Lab. (2017). *Urban Forestry Toolkit*. <https://www.vibrantcitieslab.com/toolkit>
- 3 US EPA. (2008). *Reducing Urban Heat Islands: Compendium of Strategies—Green roofs*. https://www.epa.gov/sites/default/files/2017-05/documents/reducing_urban_heat_islands_ch_3.pdf
- 4 US EPA. (2014, June 17). *Using Green Roofs to Reduce Heat Islands* [Overviews and Factsheets]. <https://www.epa.gov/heatislands/using-green-roofs-reduce-heat-islands>
- 5 USDA NRCS. (2017). *Pollinator Gardens Design Guide*. <https://www.nrcs.usda.gov/sites/default/files/2022-09/PollinatorGardens.pdf>
- 6 “MillionTrees NYC - About MillionTrees NYC.” n.d. <https://www.milliontreesnyc.org/html/about/about.shtml>.

CITATION

Warnell, K., Mason, S., Siegle, A., Merritt, M., & Olander, L. 2023. “Fact Sheet: Urban Greening.” *NBS Roadmap Project*. Durham, NC: Nicholas Institute for Energy, Environment & Sustainability, Duke University. www.nicholasinstitute.duke.edu/roadmap.

KEY RESOURCES

Title and Link	Site Suitability	Design and Construction	Monitoring Guidance	Example Projects
Urban Forestry Toolkit	✓	✓	✓	✓
Green Roof Toolkit	✓	–	✓	–
Pollinator Gardens Design Guide	✓	–	–	✓

LEARN MORE

Visit the DOI Nature-Based Solutions Roadmap for more information on urban greening, other nature-based solutions, and principles and considerations broadly relevant for nature-based solutions projects. The urban greening summary includes additional details on each section included in this fact sheet, plus information on operations and maintenance, common barriers, and more resources and example projects.

Explore the Roadmap



Full Roadmap Document



Urban Greening Section

www.nicholasinstitute.duke.edu/roadmap