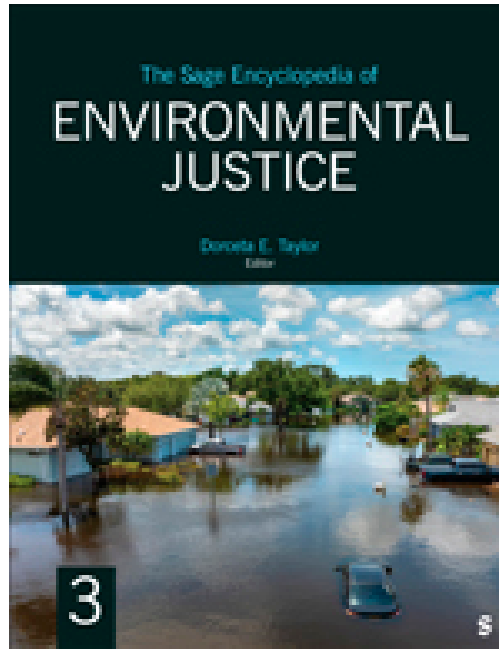


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Tree Equity and Urban Tree Canopy

Urban tree canopy (UTC) measures the spatial extent of the layer of leaves, branches, and stems of trees that cover the ground when viewed from above. It provides a measure of coverage, often expressed as a percentage of land area. The spatial distribution of urban tree canopy is heterogeneous: neither uniform nor random. Trees provide ecosystem services, and the uneven distribution of trees results in the uneven and inequitable distribution of ecosystem services and environmental, economic, and social benefits of urban trees.

Although there are many ways to measure tree canopy cover in urban areas, high-resolution ($\leq 1\text{m}^2$), high-accuracy ($\geq 95\%$) tree canopy maps are the industry standard, providing the best measure of coverage and exposure, while ensuring comparability across areas. This entry details types of inequity and spatial variation in urban tree canopy, the role of land use and social institutions in exacerbating these inequities, and pathways to mitigate inequities in urban tree canopy.

Types of Inequity and Spatial Variation

There are at least two ways urban tree canopy may represent an environmental injustice. Urban tree canopy provides ecosystem services such as absorbing stormwater and reducing increasingly lethal summertime temperatures. The uneven distribution of tree canopy and these ecosystem benefits represents a “distributional inequity” because the communities with more tree canopy receive more of those benefits. There are also *procedural inequities* that explain the social processes by which the distributional inequities occur. In this way, social systems affect the spatial distribution of urban natural resources, and the concordant flow of ecosystem services is unevenly distributed across space and across members of different socioeconomic and racial groups.

Urban tree canopy cover varies ecologically by climate. However, ecological drivers of variation intersect with human agency to produce different outcomes. For example, urbanization in the temperate northeastern United States often means removing forests to make way for roads, buildings, and other infrastructure. Cities in that climate have less tree canopy cover than their surroundings. In arid and semiarid climates, urbanization means the addition of street trees, trees in private yards, in public parks, and other spaces. These human subsidies mean that urbanization in those climates increases tree canopy. Climate explains, in part, city-to-city variation in tree canopy cover.

Role of Land Use and Social Institutions

Tree canopy varies significantly within cities by land use and across neighborhoods composed of different social groups. The public right of way has street trees, which are typically managed by municipal agencies. In some cities, more public investment has been given to street trees in some areas rather than others, often across racial and class lines. Volunteers also steward street trees in some of these areas. As individuals may have limited capacities to volunteer, inequities may be further exacerbated by reliance upon volunteers. Both factors lead to distributional inequities in street tree stocking and care. The same can be true of parks and open space, which may affect the extent of tree canopy in these land uses. The ability of some community members to access power that diverts investment to street trees and trees in public parks—and their maintenance—is an example of procedural injustice.

In urban areas, the dominant land use is usually residential. Higher income residents may have less dense housing with more space for trees and more discretionary income for maintenance. Again, both procedural and distributional inequity combine to create a spatially and socially unequal distribution of urban tree canopy.

Institutionalized racism is a major driver of social inequity, especially in cities. Institutional racism by way of housing segregation is one of many symptoms of institutionalized racism that creates long-term dynamics of procedural and distributional environmental inequities and continues to have environmental impacts in a variety of forms. Research shows that the Home Owner's Loan Corporation's historic redlining rank order of neighborhoods from A to D matches the rank order of tree canopy cover today in many cities. Unsurprisingly, areas demarcated as lower value, in part due to the racial makeup of its inhabitants, did not receive the same type of investment and federally backed home loans and insurance, and as such, suffer from lower tree canopy cover and higher summer temperatures, representing another distributional inequity with increasing health consequences under a changing climate.

Mitigating Inequity and Looking Forward

Trees can live for long periods of time. The distribution of urban tree canopy often reflects decisions made (or not made) decades in the past. Within U.S.-based urban forest management plans, equity is seldom mentioned in urban forest management plans, and when the topic is mentioned, it is usually brief and lacking

depth. Urban tree canopy plays a pivotal role in mitigating various environmental challenges, it is important to consider how these benefits reach all segments of society.

See also Green Infrastructure; Redlining; Tree Equity Score; Urban Green Space

Further Readings

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