



## Percent Green Space along Walkable Roads

This EnviroAtlas community map estimates the percentage of green space within an estimated pedestrian area alongside walkable roads.

### Why is green space along walkable roads important?

Green space provides many services, including air and water filtration, carbon storage, natural hazard mitigation, and pleasing settings that encourage people to spend time outdoors. Street trees in particular can reduce noise, buffer pedestrians from traffic, and cool summer temperatures, making these frequently traveled spaces more hospitable. There are many health benefits that can be gained from the natural services that green spaces provide; examples from scientific studies show improvements to mental health, and increased physical activity and social interaction.

Street greenery can promote active lifestyles by increasing the aesthetic value and comfort of walking outdoors. In urban centers, people frequent parks and garden districts to socialize, recreate, and engage with nature. Spending time in these settings has been shown to decrease stress, depression, and feelings of hostility.

Green spaces are generally cooler and more shaded than other areas in the same vicinity and thus can offer a reprieve from extreme summer temperatures. This cooling effect is created by shading and evapotranspiration and often extends beyond the green space itself, increasing with parcel size and the amount of woody vegetation. During heat events, green spaces can significantly reduce local ambient air temperatures, helping to reduce stress, hospital admissions, and mortality associated with extreme heat.

Green space further serves communities by filtering and absorbing water that flows off of impervious surfaces like roads and parking lots. Green space helps to regulate water flow through a watershed by intercepting, absorbing, and slowly releasing water. This “sponge” effect can reduce negative impacts of stormwater runoff. The lack of significant tree cover and other vegetation in and around populated areas can result in more frequent and/or severe flooding, potentially resulting in adverse health effects associated with these events.



Photo by Eric Vance, U.S. EPA

### How can I use this information?

The map, Percent Green Space along Walkable Roads, support assessments if existing “green” assets across city blocks and neighborhoods. When overlaid with the EnviroAtlas map, Percent Green Space within  $\frac{1}{4}$  km<sup>2</sup>, it indicates where street greenery can help mitigate urban heat islands. It can be combined with the EnviroAtlas Intersection Density map to target pedestrian areas for green enhancements. Demographic layers can be added to redress unequal access to health-boosting green space along streets. All of these layers may be combined with local maps, such as school sites, bus and bike routes, and greenways, to further support citizens, decision-makers, and researchers.

### How were the data for this map created?

This map is based on one-meter resolution land cover data derived for each EnviroAtlas community, and NAVTEQ road centerlines and attributes. EnviroAtlas land cover data are classified to one-meter resolution from aerial photography and supplemental data through remote-sensing methods. Land cover classes that were considered green space for this map layer included water, trees and forest, grass and herbaceous cover, shrubs, agriculture, orchards, and woody and emergent wetlands.

Only NAVTEQ roads with a speed limit less than 55 miles per hour were included to isolate potentially walkable streets. The centerlines were used to create 25-meter buffers on each side of the road. These buffers were intersected with total green space derived from the EnviroAtlas land cover data (Figure 1).

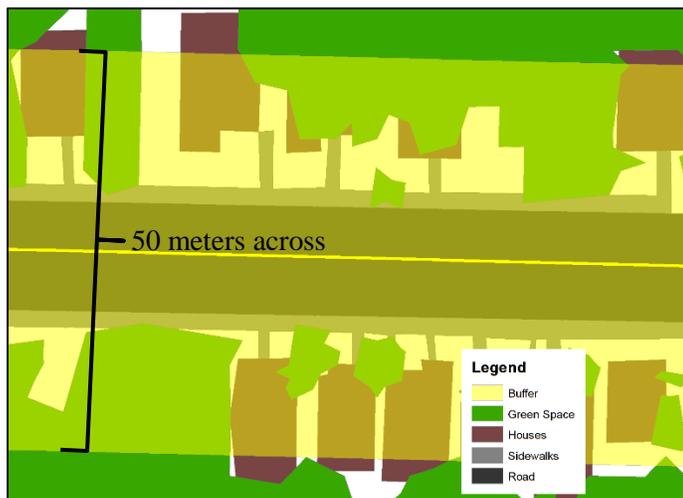


Figure 1. Illustration of the area contained in a 25-meter buffer (50 meters edge to edge) of a road centerline.

Percent green space for each city block (the distance between intersections) was then determined.

### What are the limitations of these data?

All of the EnviroAtlas community maps that are based on land cover use remotely-sensed data. Remotely-sensed data in EnviroAtlas have been derived from imagery and have not been verified. These data are estimates and are inherently imperfect.

A general definition was used to screen for walkable roads (speed limit <55 miles per hour). However, it is possible that not all of the included roads have conducive or safe walkways. Actual walkability is a product of many factors, including street connectivity and land use and the presence of sidewalks,

### Selected Publications

- Armson, D., P. Stringer, and R. Ennos. 2012. [The effect of tree shade and grass on surface and globe temperatures in an urban area](#). *Urban Forestry & Urban Greening* 11(3): 245–255.
- Bowler, D.E., L. Buyung-Ali, T.M. Knight, and A.S. Pullin. 2010. [Urban greening to cool towns and cities: A systematic review of the empirical evidence](#). *Landscape and Urban Planning* 97(2010): 147–155.
- Cohen-Cline H, E. Turkheimer, and G.E. Duncan. 2015. [Access to green space, physical activity and mental health: A twin study](#). *Journal of Epidemiology and Community Health* 69(6):523–529.
- Lindal, P., and T. Hartig. 2015. [Effects of urban street vegetation on judgments of restoration likelihood](#). *Urban Forestry & Urban Greening* 14(2):200–209.
- Maas, J., R.A. Verheij, P. Groenewegen, and P. Spreeuwenberg. 2006. [Green space, urbanity, and health: How strong is the relation?](#) *Journal of Epidemiology and Community Health* 60(7):587–592.
- Pretty, J.N., J. Barton, M. Sellens, and M. Griffin. 2005. [The mental and physical health outcomes of green exercise](#). *International Journal of Environmental Health Research* 15:319–337.
- Sugiyama, T., E. Leslie, B. Giles-Corti, and N. Owen. 2008. [Associations of neighbourhood greenness with physical and mental health: Do walking, social coherence and local social interaction explain the relationships?](#) *Journal of Epidemiology and Community Health* 62(5) online.
- Tsai, W.-L., A.J.S. Davis, and L.E. Jackson. 2019. [Associations between types of greenery along neighborhood roads and weight status in different climates](#). *Urban Forestry and Urban Greening* 41:104–117.

crosswalks, and traffic lights. Local knowledge and data are required to verify walkability.

The role of street greenery in public health is a growing field of study. Further research is needed to replicate previous findings and establish greenery thresholds for a range of health benefits.

### How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded. To find the EnviroAtlas 1-meter land cover grids created for each community, enter *land cover community* in the interactive map search box.

### Where can I get more information?

Numerous resources are available on the relationships among green space, ecosystem services, and human health and well-being; a small selection of these is listed below. In-depth information on the state of the science about urban green space and human health and well-being can be found in EPA's [Eco-Health Relationship Browser](#). For additional information on how the data were created or their limitations, access the [metadata](#) for the data layer. To ask specific questions about these data, contact the [EnviroAtlas Team](#).

### Acknowledgments

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