



K-12 Schools with <25 Percent Green Space in Viewshed

This EnviroAtlas community map summarizes the number of K-12 schools in each census block group that have <25% of [green space](#) in the area within a 100-meter radius around the center of the building. This measure is intended to estimate a potential lack of window views of green space from some or all of the classrooms. Green space may include trees, lawns and gardens, crop land, and forested wetlands.

Why is green space important?

Viewing nature from a window can be both a relaxing and pleasurable experience. Humans have a natural affinity for nature, and thus they are generally happier in the presence of aesthetically pleasing and interesting green spaces. Nearby green spaces can also help filter harmful air pollutants, such as ozone, particulate matter, and nitrogen oxides, from the environment. Reducing these air pollutants can decrease respiratory symptoms and their negative effects on sensitive populations.

Views of green spaces from windows have been linked to numerous positive health effects, including reductions in stress and blood pressure, decreased healing times, and increased attention and cognitive functioning. Even viewing photos of nature is associated with reductions in anxiety and blood pressure. Though window views are not direct engagement with nature like relaxing in the park or running along a tree-lined street, simply being able to view green spaces from indoors has its own set of rewards.

Several studies have documented the positive effects that having a green window view can have on students of all ages. Vegetated and other interesting views from school



windows have been linked to increased student performance and testing success. Viewing nature from home and dormitory windows can also have positive effects, particularly on attentional capacity and cognitive functioning. Other benefits from having natural window views, such as increases in feelings of overall satisfaction and well-being, have also been observed.

Though not all green spaces are effective at removing air pollutants, vegetated green spaces such as urban campuses may help improve air quality. Trees and other vegetation can remove harmful air pollutants such as nitrogen oxides, particulate matter, and ozone from the atmosphere, improving local air quality and reducing respiratory symptoms and asthma cases. The absence of these green spaces near people's homes, schools, and workplaces reduces the potential gains received from these natural benefits.

How can I use this information?

The map, K-12 Schools with < 25 Percent Green Space in Viewshed, could be used by citizens and planners to identify schools with low levels of green space in their immediate vicinities. Given the potential benefits of having green window views, this map could be used to identify priority areas for greening projects. This knowledge can also inform the selection of priority areas for public-health outreach and intervention, as well as for continued research on the associations between green space and public health.



How were the data for this map created?

This map is based on the [land cover](#) data derived for each EnviroAtlas community. It was created from one-meter aerial photography through remote-sensing methods. Land cover that is considered to be green space includes all land that is vegetated; it excludes barren land, water, and impervious surfaces. The locations of school buildings were identified using the Homeland Security Infrastructure Program (HSIP) database; 100-meter buffers were created around these points and percent green space was calculated. The number of K-12 schools with less than 25 percent green space within this buffer area was then summarized by 2010 U.S. Census block group boundaries.

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. This map is not meant to be used for inferring numbers or types of residents that are at risk for developing specific health conditions. It is not currently known what percent of green space is ideal or what represents the minimum percent required to provide various ecosystem services. For more information on the limitations of the underlying land cover data, please see the metadata associated with the land cover map for each relevant community.

Selected Publications

- Baumgardner D., S. Varela, F.J. Escobedo, A. Chacalo, and C. Ochoa. 2012. [The role of a peri-urban forest on air quality improvement in the Mexico City megalopolis](#). *Environmental Pollution* 163: 174–183.
- Giles-Corti, B., M.H. Broomhall, M. Knuiaman, C. Collins, K. Douglas, K. Ng. A. Lange, and R.J. Donovan. 2005. [Increasing walking: How important is distance to, attractiveness, and size of public open space?](#) *American Journal of Preventive Medicine* 28(2, Supplement 2): 169–176.
- Hartig T., G.W. Evans, L.D. Jamner, D.S. Davis, and T. Garling. 2003. [Tracking restoration in natural and urban field settings](#). *Journal of Environmental Psychology* 23(2): 109–123.
- Heschong Mahone Group. 2003. [Windows and classrooms: Student performance and the indoor environment](#). Technical Report P500-03-082-A-7, State of California Energy Commission, Sacramento, California.
- Nowak, D.J., D.E. Crane, and J.C. Stevens. 2006. [Air pollution removal by urban trees and shrubs in the United States](#). *Urban Forestry and Urban Greening* 4:115–123.
- Tennessen, C.M., and B. Cimprich. 1995. [Views to nature: Effects on attention](#). *Journal of Environmental Psychology* 15(1): 77–85.
- Ulrich, R.S. 1981. [Natural versus urban scenes](#). *Environment and Behavior* 13(5): 523–556.
- Ulrich, R.S. 1984. [View through a window may influence recovery from surgery](#). *Science* 224(4647): 420–421.
- Wells, N.M. 2000. [At home with nature: Effects of “greenness” on children’s cognitive functioning](#). *Environment and Behavior* 32(6): 775–795.

How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded. The EnviroAtlas land cover maps created for each community are available under the Supplemental Maps tab in the interactive map table of contents.

Where can I get more information?

There are numerous resources on green space and potential health benefits; a selection of these resources is listed below. In-depth information on the relationships between urban ecosystems, such as green space and human health and well-being, can be found in EPA’s [Eco-Health Relationship Browser](#). For additional information on the data creation process, access the metadata for the data layer from the drop down menu on the interactive map table of contents and click again on metadata at the bottom of the metadata summary page for more details. To ask specific questions about these data, please contact the [EnviroAtlas Team](#).

Acknowledgments

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