Percent Urban Area

This EnviroAtlas national map estimates the percent of urban, or developed, land within each subwatershed (12-digit HUC) in the contiguous United States. For this map, urban land includes various types of development, such as parks, golf courses, single family homes, multifamily housing units, retail, commercial, industrial sites, and associated infrastructure. This definition is based on the 2006 National Land Cover Database (NLCD) characterization of developed land cover and is not based on metropolitan area or population density.

Why is urban or developed land important?

Urban areas are where people live, work, and play. These activities demand infrastructure such as roads, sewers, storm drains, pipelines, houses, stores, office buildings, and other constructed amenities. The building of towns and cities, and the networks that connect them, often changes the landscape and the land cover of an area. There is an increasing recognition of the impacts urban land has surrounding ecosystems and the benefits they provide.

Development of an area can greatly affect surrounding ecosystems by increasing the volume and rate of air and water pollution, which may reduce air quality and water quality in these areas. Natural vegetation, especially forests, helps mitigate air pollutants and store carbon, which helps maintain a balance between carbon storage and carbon emissions. The loss of natural vegetation, combined with pollution associated with urbanized areas can reduce air quality. Additionally, increases in impervious surfaces, such as roads and rooftops, can raise the temperatures in these areas. Higher temperatures may contribute to the chemical reactions that produce ground-level ozone and smog, which can affect human health and well-being.

In terms of water quality, the daily activities in urban areas create sediment, nutrients, harmful bacteria, pesticides, and other pollutants. Most storm drains located in parking lots and streets flush directly into streams and rivers with no filtration or treatment. Historically, they have been designed to remove water quickly downstream to prevent flooding. The unintended side effects of this type of construction resulted in altered stream flow and velocity, which lead to greater erosion and sedimentation. To minimize the impacts of stormwater on downstream areas, development has begun to focus on detaining and filtering stormwater runoff on-site.

Photo credit: *Lynn Betts, NRCS*

These efforts help provide better flood control, improved water quality, and groundwater replenishment.

Increased urbanization can also impact both terrestrial and aquatic wildlife. Development can break up large areas of natural vegetation into smaller lower-quality habitat. It can also force animals to cross large roadways in order to migrate or find shelter. Additionally, the loss of vegetation from urban development can expose waterways to the sun and increased stormwater runoff. Both these impacts may increase water temperatures. Heightened temperatures in streams and rivers decrease the dissolved oxygen, making it difficult for fish and other aquatic animals to survive.

How can I use this information?

This map, Percent Urban Area, provides a static estimate of development within a region. Used in conjunction with other land cover maps, such as percent forest or percent wetlands these data can be used to evaluate the balance of land cover types within a subwatershed.

The processes through which these data were generated could be applied to other land cover data, such as the 2001 NLCD data. Using data from different time periods may help determine if an area has experienced significant change in development over this time period. Significant change in land cover over a period of time may suggest implications for regional ecosystems and the services they provide.

How were the data for this map created?

For this map, the percent urban area within each subwatershed (12-digit HUC) was calculated by inputting the 2006 National Land Cover Database (NLCD) and the March 2011 Watershed Boundary Dataset (WBD) into EPA's landscape assessment tool, Analytical Tools Interface for Landscape Assessments (ATtILA). The four "developed" categories (classes 21-24) in the NLCD were aggregated, resulting in the percent urban land cover, or percent urban area. As with all the land cover metrics in EnviroAtlas, water was excluded from the total area in the percentage calculation. For more information on the calculation, please see the ATtILA User Guide. For more detailed information on the processes through which this data was generated, see the layer's metadata.

What are the limitations of these data?

All national data layers, such as the NLCD and WBD, are inherently imperfect; they are an estimation of the truth based on the best available science. Calculations based on these data are, therefore, also estimations. The NLCD is estimating land cover based on a classification of satellite imagery; the process of classifying imagery into land cover types is not 100% accurate. The mapped data are by no means perfect and can only be used to inform further investigation. Accuracy information for the NLCD and the WBD can be found on their respective web sites. Information on ATtILA and its limitations can be found on its website or in the ATtILA User Guide.

How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded. The National Land Cover Database and the Watershed Boundary Dataset can be downloaded at their respective websites. The EPA ATtILA tool is accessible through the EnviroAtlas website under Tools and Resources.

Where can I get more information?

There are numerous resources on the impacts of urbanization and development on ecosystems and the services they provide; a small selection of these resources is below. The EnviroAtlas website lists a number of related websites and resources on its related links page. EnviroAtlas also provides resources on the relationships between urban ecosystems, public health, and well-being in the Eco-Health Relationship Browser. For information on how the data was created or its limitations, see the metadata. For specific questions about the NLCD or WBD data or the ATtILA tool, please visit their respective websites. To ask specific questions about this map contact the EnviroAtlas Team.

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