Percent Tree Canopy Cover

This EnviroAtlas national map estimates the percent of land area that is covered by tree canopy within each 12-digit hydrologic unit (HUC) in the conterminous U.S, Hawaii, Puerto Rico, and the U.S. Virgin Islands using the 2016 National Land Cover Database – Percent Tree Canopy dataset.

Why is tree canopy cover important?

Percent tree canopy cover records the proportion of land surface that is covered by tree tops. Tree cover helps reduce the potential adverse health and environmental effects of air pollutants and particulates by removing pollutants from the air. Trees can remove significant amounts of air pollution in metropolitan areas. Gaseous air pollutants are taken in primarily through the leaf surface.[1] Trees remove particulates by directly intercepting airborne particles. Some particles can be absorbed into the tissues of the tree, though most particles are retained on the tree surface. Vegetation is a temporary retention site for many atmospheric particles because particulates may be resuspended back to the atmosphere, washed off by rain, or dropped to the ground with leaf and twig fall.[2]

Tree cover is a major contributor to climate change mitigation. Carbon dioxide is the dominant greenhouse gas (GHG) released into the atmosphere as a result of human activities.[3] Trees are composed largely of carbon and they continue to take in carbon as they grow. By fixing carbon during photosynthesis and storing it as biomass, growing trees act as a sink for CO_2. However, the loss of existing trees from disturbances such as land use change and fires can release this carbon back into the atmosphere, increasing the levels of atmospheric carbon.[4] Maximizing tree canopy carbon storage is important for maintaining a stable climate.

The proportion of tree canopy cover relative to cropland in agricultural areas and impervious surfaces in communities influences the quantity, quality, and speed of stormwater runoff entering waterways. Besides providing shade and cooling water temperatures, tree cover in riparian buffers slows and stores floodwater and filters significant quantities of sediment, nutrients, and heavy metals from agricultural fields and urban runoff. For example, studies have shown that sediment removal by trees ranges from 60–90% depending on buffer area, slope, and the volume and velocity of runoff.[5] Toxic substances adhering to sediment particles may be modified by soil microorganisms into less harmful forms and made available to plants.


Photo: Mt. Washington, New Hampshire

In addition to national map layers covering percent tree canopy cover in 12-digit HUCs and land cover in stream and lake buffers, EnviroAtlas also features maps for select communities that quantify the amount of pollutants removed, carbon stored, and annual runoff reduced by tree cover.

How can I use this information?

This map layer was derived using the NLCD Percent Tree Canopy dataset. Percent tree canopy records the proportion of land surface that is covered by tree tops within every 30 m^2 pixel. This approach differs from a land cover classification that classifies an entire 30 m^2 pixel as forest or other land cover type. Tree canopy cover is a useful measure of intermittent tree distribution in agricultural and urban areas and in riparian buffers.

The map layer, Percent Tree Canopy Cover, may be used to evaluate the potential value of ecosystem services provided by tree canopy. The map indicates which 12-digit HUCs may benefit from additional tree cover. This information can be used to determine areas with a high or low potential for wildlife habitat connectivity, carbon storage, air and water pollutant reduction, and flood storage.

The density and extent of tree cover can be more thoroughly investigated in EnviroAtlas by increasing the transparency of the map over an aerial imagery base map and adding the NHDPlus Flowline data for streams and water bodies. For

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more information on riparian tree cover, see EnviroAtlas national and community data layers covering stream and lake buffers.

Though this is a national EnviroAtlas map, it may be used with community EnviroAtlas map layers such as removal of pollutants by trees, reduction in annual runoff by tree cover, and tree cover per capita to characterize the extent of tree canopy in the broader landscape surrounding the community.

How were these data created?

These data were generated by using the 2016 National Land Cover Database (NLCD 2016) – Percent Tree Canopy dataset with the NHDPlusV2 Watershed Boundary Dataset (WBD). The mean percent 2016 NLCD tree canopy cover was calculated and recorded for each 12-digit HUC.

What are the limitations of these data?

Though EnviroAtlas uses the best data available, there are limitations associated with the data. The NLCD percent tree canopy data are generated by the United States Forest Service (USFS). The USFS derives canopy cover from both spectral information in Landsat imagery and other available ground and ancillary information and as such there are inherent errors associated with the data. The USFS includes a standard error for every pixel ranging from 0 to 45 percent and a user can investigate these errors by accessing the NLCD data.[6]

How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded. The NLCD and NHDPlusV2 data are accessible through their respective websites.

Where can I get more information?

A selection of resources related to tree canopy cover is listed below. For additional information on how the data were created, 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 this data layer, please contact the EnviroAtlas Team.

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