Agricultural Land per Capita

This EnviroAtlas community map estimates the square meters of land managed for agriculture, per person, within each U.S. Census block group. Agriculture includes hay, pasture, and cultivated crops.

Why is agricultural land per capita important?

The metric Agricultural Land per Capita (m^2/person) is derived from 1-meter resolution land cover data created by EPA for select EnviroAtlas communities. High resolution urban land cover maps provide a base layer for the development of community metrics and allow users to view the distribution of developed land and open space within individual census block groups. Census block groups with greater amounts of agricultural land per capita are generally located on the urban fringe where development pressure may be high.

Though agriculture provides a number of benefits to communities, it can produce negative environmental effects. The presence of agriculture in a watershed can degrade both terrestrial and aquatic habitat quality and native biodiversity. Maximizing farm acreage reduces wildlife habitat and movement corridors. Farm cultivation increases soil loss, alters local drainage patterns, and disperses chemicals that can be toxic to beneficial insects and aquatic species. Excess nutrients entering waterbodies may produce algal blooms and abundant aquatic plant growth (eutrophication) that can negatively affect the health and productivity of aquatic animal species.[1] Heavy grazing pressure opens areas of bare soil that can promote the establishment of invasive species.[2]

On the other hand, communities benefit from the conservation of regional agricultural land. In the early 2000s, more than half of U.S. farm production came from urbanizing counties.[3] Besides the economic benefits of local food, livestock, and nursery products, farms can provide ecosystem services such as green space, stormwater retention, groundwater recharge, wildlife habitat, and air filtration. Simply having views of farmed landscapes contributes to community residents' sense of well-being.[4] Incorporating existing farmland into community planning helps manage growth by retaining undeveloped buffers between urban centers and outlying communities.

Broad expanses of level land that traditionally supported agriculture are also attractive for urban development. Urbanization can create cascading effects that hasten the destruction of farmland. Farmers may face rising taxes, changes in regulations, increases in nuisance complaints, and an inability to expand or invest in farm improvements.[3] These pressures induce some farmers to sell their land, while others may try to adapt by changing crops to higher-value products such as specialty crops, herbs, cut flowers, and nursery stock.


Photo: Iowa, L. Betts, NRCS

Seventeen percent of U.S. farmland is considered urban-influenced.[5] As development encroaches into agricultural landscapes, land values increase to reflect potential commercial and industrial uses. The US Department of Agriculture reported in 2000 that average farmland value in urban-influenced areas was three times the national average.[5] Farm preservation programs have been created to relieve some of the development pressure and retain landscape diversity at the urban fringe. These programs include agricultural zoning, conservation easements, right-to-farm legislation, and outright purchase of development rights. One of the more effective methods of farm preservation is tax assessment of farmland at its agricultural use value rather than at its potential development use value.[3]

How can I use this information?

This community map estimates the agricultural land area per capita within U.S. Census block groups. Block groups with greater amounts of agricultural land per capita have benefits as outlined above, but these areas also represent the most active areas of present or future development. Examining agricultural land cover at the urban fringe may suggest areas to focus efforts to maintain local food production, greenspace, and farmland protection.

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This agriculture data layer, along with other community map layers, such as Percent Tree Cover, Percent Wetlands, 15 and 50 meter stream and lake buffers, and runoff metrics, can be used to assess the possible mitigation of urban stormwater runoff effects and pollutant load in receiving waterbodies. Knowing the distribution of riparian buffers and the contributions of trees to annual pollutant reductions can help users evaluate where agricultural best management practices may improve nonpoint source pollution or flood protection near populated areas. By increasing the transparency of the EnviroAtlas map layers to view an aerial imagery base map beneath, users can add habitat connectivity data to examine existing natural areas and potential wildlife corridors.

How were the data for this map created?

This map is based on land cover data derived for each EnviroAtlas community at 1-meter spatial resolution. These data were generated from digital image processing, aerial photo interpretation, and supervised classification of aerial photography from the United States Department of Agriculture (USDA) National Agricultural Imagery Program (NAIP). Machine-learning, automated feature extraction software was used in supervised classification to identify five common land cover classes: impervious surface, soil-barren, grass-herbaceous, tree-forest, and water. The method for deriving the landcover data was similar for each community, with differences in the numbers and types of land cover classes depending on the community's location, character, and land use activities. An agriculture class was added when farmland comprised more than 10% of a community's total land area. Agricultural land cover (m^2) was summarized by 2010 U.S. Census block group. Dividing agricultural area for each block group by total block group 2010 population resulted in agricultural land per capita.

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. Human classification of different landcover types that have a similar spectral signature can result in classification errors. An accuracy assessment was conducted in each EnviroAtlas community using approximately 100 photo-interpreted reference points per class. The land cover maps used in the community component of EnviroAtlas typically have an overall accuracy of between 80 and 90 percent. This level of accuracy means that there is a probability of at least 80 percent that the land cover reported at any given point on the map is correct. The land cover maps will be updated over time; updates may improve accuracy as data and classification methods improve.

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?

A selection of references relating to agriculture, its ecosystem effects, and the ecosystem services it provides to communities is listed below. For additional information on the data creation process, access the metadata found in the layer list drop-down menu for map layers in the EnviroAtlas interactive map. Further information on the relationships among elements of green space and human health and well-being can be found in EPA's Eco-Health Relationship Browser. To ask specific questions about this data layer, please contact the EnviroAtlas Team.

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Selected Publications

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