



## Percent Cropland

This EnviroAtlas national map portrays the percentage of land area within each 12-digit hydrologic unit (HUC) that is classified as cropland in the EnviroAtlas hybrid 2011 Cropland Data Layer (CDL) - 2011 National Land Cover Dataset (NLCD). For this map, EnviroAtlas used all crop types listed in the U.S. Department of Agriculture Cropland Data Layer (CDL).

### Why is percent cropland important?

Cropland is one of 16 land cover classes delineated in the 2006 National Land Cover Database. The land cover classes offer a broad-scale view that is useful for national and regional land management, climate change research, and environmental assessments. Monitoring cropland type and extent may suggest management changes to better protect natural resources.

Commercial croplands provide the vast majority of food in the U.S. Besides the obvious benefits of food, fuel, and materials provided by agriculture, communities in watersheds that are experiencing development pressure benefit from the conservation of regional farmland. In addition to the provision of local food, livestock, and nursery products, well-managed farms 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.<sup>1</sup>

Agriculture also has the potential to produce negative environmental effects, including impacts on wildlife habitat, air quality, and water quality. The amount of agriculture in a watershed affects both terrestrial and aquatic habitat quality and biodiversity. Maximizing farm acreage reduces wildlife habitat and movement corridors. Farm cultivation also increases soil loss, alters local drainage patterns, and disperses chemicals that can be toxic to beneficial insects and aquatic species. Excess nutrients from fertilizers entering waterbodies may produce algal blooms and abundant aquatic plant growth ([eutrophication](#)) that can negatively affect the health and productivity of aquatic animal species.<sup>2</sup> Sedimentation can have serious long-term effects on aquatic biota either through direct elimination of sensitive species or changes in community structure.

Farming operations such as cultivation and the application of fertilizers also affect air quality through the emission of fine



soil particulates, nitrogen oxides, sulfur compounds, ammonia, and methane. These compounds react with each other to form fine particulates (< 2.5 micrometers) that are transported by the wind and re-deposited through dry deposition or precipitation. These air pollutants affect human respiratory health, increase the eutrophication of water resources, and accumulate in the atmosphere to contribute to climate change.<sup>3</sup>

Alternative cropping systems such as stripcropping (see photo above) and contouring have reduced soil erosion by water and wind on cropland. The Natural Resources Conservation Service recorded a steady decrease in windborne soil from 3.0 to 0.7 tons/acre/year between 1982 and 1997 in Iowa, a state that has more than 70% of its land area in cropland.<sup>4,5</sup> The conservation or restoration of trees and other natural land cover adjacent to streams and rivers ([riparian area](#) or [riparian buffer](#)) helps protect terrestrial and aquatic wildlife habitat and water quality by slowing and storing floodwater and filtering significant quantities of sediment, nutrients, and heavy metals from agricultural fields.<sup>6,7</sup> Best management practices (BMPs) implemented for cropland help to protect both air quality and water resources.

### How can I use this information?

This map, Percent Cropland, gives a national and regional perspective of the distribution of cultivated agriculture and could be used in conjunction with the EnviroAtlas map Acres of Crops That Have No Nearby Pollinator Habitat. Comparing this map to other EnviroAtlas maps of wetlands,

stream buffers, and wet areas can help identify areas to target best management practices (BMPs) to improve water quality. An area can be more thoroughly investigated by increasing the transparency of this map and overlaying data for streams and water bodies (NHD), impaired waters, or wetlands (NWI) from Supplemental Maps to the aerial imagery base map. Cropland and buffer maps may be compared with EPA impaired waters data to assist in planning to maximize filtration capabilities when implementing [Total Maximum Daily Loads](#) in streams. Wet areas and riparian buffers restored between source areas and streams may help reduce sediment and nutrient loads to streams. Detailed examination shows land cover along streams and reveals where upstream areas may be contributing to problems downstream. One also might explore the patterns of national and regional (dry and wet) nitrogen and sulfur deposition (found in EnviroAtlas under Clean Air: Atmospheric Concentration and Deposition) relative to cropland distribution.

### How were these data created?

These data were generated by using an EnviroAtlas hybrid 2011 Cropland Data Layer (CDL) - 2011 National Land Cover Dataset (NLCD) in the landscape assessment tool, Analytical Tools Interface for Landscape Assessments (ATtILA). [ATtILA](#) is an Esri ArcView extension created by EPA that calculates many commonly-used landscape metrics. EnviroAtlas used all crop types listed in the U.S. Department of Agriculture Cropland Data Layer ([CDL](#)) for this map. Landcover data were summarized by 12-digit HUC boundaries taken from the Watershed Boundary Dataset ([WBD](#)).

### What are the limitations of these data?

Though EnviroAtlas uses the best data available, there are limitations associated with the data. The landcover classes

found in NLCD are created through the classification of satellite imagery. Human classification of landcover types that have a similar spectral signature can result in classification errors. As a result, NLCD is a best estimate of actual landcover. Periodic updates to EnviroAtlas will reflect improvements to nationally available data. Each version of NLCD is released several years after the date of the satellite imagery, meaning that land cover patterns may have changed. Crop types and distribution also change depending on climate, management, and market influences.

### How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded. The [NLCD](#), [CDL](#), [NHD](#), [NWI](#), and [WBD](#) data are accessible through their respective websites. NLCD data are updated every 5 years to enable change detection research.

### Where can I get more information?

A selection of resources related to agriculture and environmental condition 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. For more information on the metric calculation, see the [ATtILA User's Manual](#). To ask specific questions about this data layer, please contact the [EnviroAtlas Team](#).

### Acknowledgments

EnviroAtlas is a collaborative effort led by EPA. Donald Ebert, EPA, developed this map for EnviroAtlas. The fact sheet was created by Sandra Bryce, Innovate!, Inc.

### Selected Publications

1. Levi, D., and K. Sperry. 2007. [Agriculture at the urban interface: Attitudes of new rural residents](#). *Focus* 4:37–45.
2. D.R. Edwards, T.C. Daniel, H.D. Scott, J.F. Murdoch, M.J. Habiger, and H.M. Burks. 1996. [Stream quality impacts of best management practices in a northwestern Arkansas basin](#). *Water Resources Bulletin* 32(3):499–509.
3. Aneja, V.P., W.H. Schlesinger, and J.W. Erisman. 2008. [Farming pollution: Commentary](#). *Nature Geoscience* 1:409–411.
4. Natural Resources Conservation Service. 2000. [Summary Report 1997 Natural Resources Inventory](#). Natural Resources Conservation Service, Iowa State University Statistical Laboratory, Ames, Iowa.
5. Heitke, J.D., C.L. Pierce, G.T. Gelwicks, G.A. Simmons, and G.L. Siegwarth. 2006. [Habitat, land use, and fish assemblage relationships in Iowa streams: Preliminary assessment in an agricultural landscape](#). *American Fisheries Society Symposium* 48:287–303.
6. Bentrup, G. 2008. [Conservation buffers: Design guidelines for buffers, corridors, and greenways](#). General Technical Report SRS-109. U.S. Forest Service, Southern Research Station, Asheville, North Carolina. 110 p.
7. Mayer, P.M., S.K. Reynolds, M.D. McCutchen, and T.J. Canfield. 2006. [Riparian buffer width, vegetative cover, and nitrogen removal effectiveness: A review of current science and regulations](#). EPA/600/R-05/118. U.S. Environmental Protection Agency, Cincinnati, Ohio.