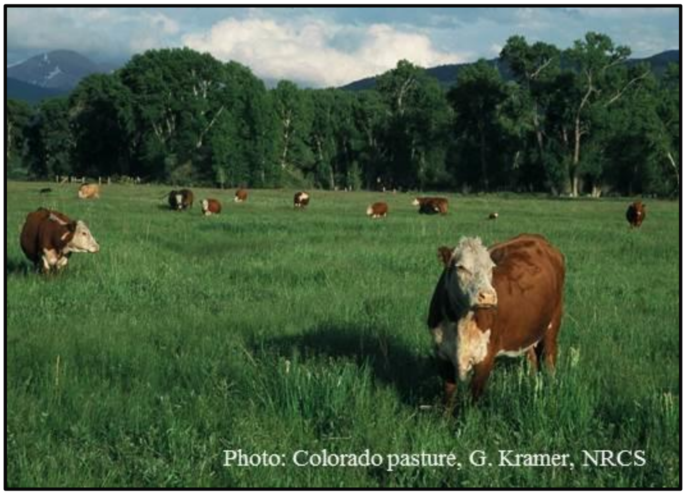
Percent Pasture

This EnviroAtlas national map estimates the percentage of land area within each 12-digit hydrologic unit (HUC) that is classified as pasture. For land use/land cover classification, the conterminous U.S. is based on the EnviroAtlas hybrid 2016 Cropland Data Layer (CDL) – 2016 National Land Cover Dataset (NLCD). Alaska is based on the 2016 NLCD; Hawaii is derived from the 2005–2011 National Oceanic and Atmospheric Administration's Coastal Change Analysis Program (C-CAP) data, Puerto Rico from 2010 C-CAP, and the U.S. Virgin Islands from 2012 C-CAP data.



Why is percent pasture important?

The land cover information offers a broad-scale view that is useful for national and regional land management, climate change research, and environmental assessments. Pasture includes areas planted for livestock grazing or for the production of seed or hay crops. Pasture is distinguished from range by its more intensive management and the predominance of mostly cultivated non-native vegetation. Range is subject to less intensive management and is typically predominantly composed of native grasses and forbs.

The amount of agricultural pasture land in a watershed affects both terrestrial and aquatic habitat quality and biodiversity. Pasture condition depends on topography, hydrology, stocking density, and time spent grazing on the allotment.[1] With high densities and long residence time, grazers can remove preferred species entirely and trample vegetation. Heavy grazing pressure opens areas of bare soil that can increase plant species diversity but also promote the establishment of invasive species.[1] In upland areas, livestock traffic can compact soil, reducing infiltration and causing increased water runoff. In riparian areas, livestock expose stream banks to erosion through direct trampling and elimination of riparian vegetation. For example, cattle favor riparian shrubs such as willow and tree seedlings; over time, browsed shrubs and young trees are eliminated, leaving solitary older trees.[1] In associated wet areas, pathways in compacted wet soil can create mounded microtopography that can change local hydrology and alter available wildlife habitat.[2] Sedimentation from eroding streambanks can have serious long-term effects on aquatic biota either through direct elimination of sensitive species or changes in community structure.[3]

Animal manure and the application of stored manure for pasture fertilization can send excess nitrogen, phosphorus, and microorganisms (e.g., *E. coli*) in surface runoff to nearby waterbodies. Excess nutrients entering waterbodies may produce algal blooms and abundant aquatic plant growth (eutrophication). The breakdown of decomposing aquatic plants can create an oxygen deficit that negatively affects the health and productivity of aquatic animal species.[4] The application of fertilizers also affects air quality through the emission of fine particulates and greenhouse gases such as nitrogen oxides, sulfur compounds, ammonia, and methane.[5]

Best Management Practices (BMPs) implemented for pastureland include stream riparian area fencing, grazing strategies to reduce animal densities in pastures, and nutrient management (manure application level based on pasture crop needs).[4,6] A study of 4 streams in Arkansas found 35–75% declines in ammonia and organic nitrogen runoff when BMPs were established.[4] 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.[7] Trees also absorb and process a number of air pollutants. For more information on riparian cover, see EnviroAtlas national and community data layers covering stream and lake buffers.

How can I use this information?

Knowing the distribution of pastureland is important for locating and prioritizing candidate areas for sediment capture, nutrient filtration, and groundwater recharge. Comparing this

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map to other EnviroAtlas maps of wetlands, stream buffers, and wet areas can help identify major source areas to target best management practices (BMPs) to improve water quality. An area can be more thoroughly investigated by increasing the transparency of the map and adding data for streams and water bodies (NHDPlus, found under Hydrologic Features), National Wetland Inventory wetlands, or assessed and impaired waters to an aerial imagery base map. Pasture and stream 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 of the aerial imagery shows land cover along streams and reveals where upstream areas may be contributing to water quality problems in downstream waterbodies. One also might explore the patterns of national and regional nitrogen deposition relative to areas of intensive agriculture.

How were these data created?

These data were generated from the EnviroAtlas hybrid 2016 CDL-NLCD for the conterminous U.S., 2016 NLCD for Alaska, 2005–2011 C-CAP for Hawaii, 2010 C-CAP for Puerto Rico, and 2012 C-CAP for the U.S. Virgin Islands. The land cover data was used in the landscape assessment tool, Analytical Tools Interface for Landscape Assessments (ATtILA). ATtILA is a tool created by EPA to calculate many commonly used landscape metrics. Landcover data were summarized by 12-digit HUC boundaries taken from the NHDPlusV2 Watershed Boundary Dataset (WBD Snapshot) for the conterminous U.S., Hawaii, Puerto Rico, the U.S. Virgin Islands, and the November 24, 2016 WBD for Alaska.

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 and C-CAP were created through the classification of satellite imagery. Classification of landcover types that have a similar spectral signature can result in classification errors. As a result, NLCD and C-CAP are a best estimate of actual landcover. Very low-density development (one dwelling unit per two acres or more) with extensive lawn may be mistaken for pasture in the NLCD classification. 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 the land cover patterns may have changed. Crop types and distribution also change depending on climate, management, and market influences. Accuracy information for the NLCD and C-CAP can be found on their respective websites.

How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded. The NLCD, CDL, C-CAP, NHDPlusV2, 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?

References related to agriculture, grazing, and environmental condition are listed below. For additional information on how the data were created, access the metadata for the data layer from the layer list drop down menu on the interactive map. 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

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Selected Publications

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