# EnviroAtlas maps the benefits of ecosystems by watershed and census block group

## Issue

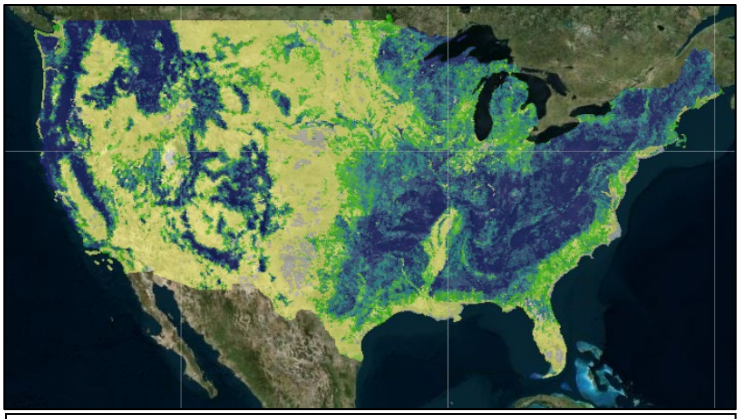
Ecosystems such as forests and wetlands provide many essential benefits, including clean air and water, food, fiber, and recreational opportunities. These and other benefits from nature, referred to as "ecosystem services," are often intertwined and can be difficult to quantify because of their complexity. Human interaction with ecosystems can impact these benefits in both positive and negative ways, affecting human health and well-being, the economy, and the sustainability of natural resources. Understanding and quantifying ecosystem services is challenging because the demand for these services must be considered along with their supply. Stressors add an additional level of complexity.

The people that benefit from an ecosystem service can be miles away from where the service is actually produced. For example, clean water that starts from a protected source may travel for miles across land, through streams and rivers, before being used downstream. As it travels over land and through waterways, this water can become polluted, diluted, cleansed or filtered by vegetation. People downstream may benefit from services produced far upstream or may pay the costs of decisions made somewhere along the way.

Due to this complexity and a lack of information, planning efforts often discount the impacts of decisions on the full suite of ecosystem services. To help fill this information gap, EPA and its partners seek to effectively measure and communicate the type, quality, and extent of services that humans receive from ecosystems so that their true value can be considered in decision-making. These research efforts are incorporated into EnviroAtlas, a web-based tool that combines maps, analysis tools, and interpretive information on ecosystem services. Data are provided for sub-watersheds across the contiguous United States and at a higher resolution for selected communities.

Through EnviroAtlas, EPA and project partners are developing the following data, tools, and resources:

- Science to quantify ecosystem services and their societal benefits across the contiguous U.S and at higher resolution for hundreds of U.S. communities;



This EnviroAtlas national map shows the percent of land within 45 meters of water bodies that is covered by forest throughout the conterminous United States. This map can be used to identify areas of water quality concern that could benefit from restoration.

- Research to relate ecosystem services to public health outcomes;
- An easy-to-use, accessible mapping application to support decision-making at all levels of government, research, and environmental education;
- An Eco-Health Relationship Browser that explores the literature on the linkages between ecosystems, the services they provide, and their impact on human health and well-being; and
- Interactive tools and resources for dynamic analysis and deeper understanding of ecosystem services.

## Science

EPA researchers and partners are developing and incorporating the best available science to map and analyze indicators of the production of ecosystem services and the people who benefit from them. Research efforts also focus on drivers that may change the production or demand for these benefits, such as land use changes, point and non-point source pollution, impervious surfaces like roads and parking lots, resource restoration, population growth, transportation and energy development potential.

Ecosystem services data included in EnviroAtlas are organized into the following societal benefit categories:

- Clean Air

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- Clean and Plentiful Water
- Natural Hazard Mitigation
- Climate Stabilization
- Recreation, Culture and Aesthetics
- Food, Fuel, and Materials
- Biodiversity Conservation

These broad benefit categories incorporate more specific ecosystem services information. For example, under the food, fuel, and materials category, data related to pollination and fertility maintenance can be found.

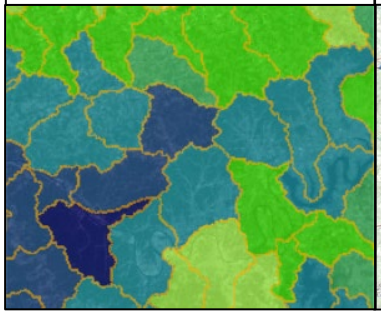
## EnviroAtlas Data

EnviroAtlas presents data at two primary extents: national and community. The national component of EnviroAtlas primarily summarizes data for the 48 mainland U.S. states by 12-digit hydrologic unit codes (HUC), as well as some non-summarized raster and feature layers. Data for Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands are being added where possible. There are about 97,000 HUCs in the United States. Each HUC covers approximately 40 square miles.

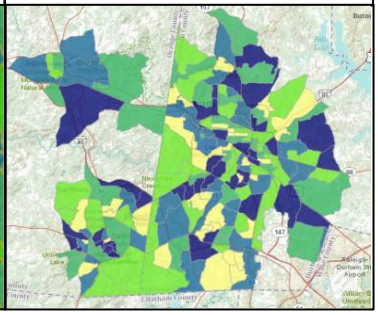
The community component of EnviroAtlas summarizes data layers by census block group, providing data at a very fine resolution that can be compared across selected communities. These data layers are created from Meter Scale Urban Land Cover (MULC) developed by EPA and partners. Census block groups range in size and are typically smaller in the center of a community where it is more densely populated. Non-summarized maps are provided for both national and community extents where possible and appropriate.

By selecting consistent extents at which to summarize and display the data, EnviroAtlas allows for statistical analysis of multiple ecosystem services within a selected area, and for comparisons across geographic areas. Each summary unit in EnviroAtlas provides different advantages for visualizing and understanding ecosystem benefits. HUCs provide a convenient reporting unit that reflects drainage patterns and allows users to navigate and explore an entire watershed. Census block groups allow researchers to use U.S. census data to investigate connections between ecosystems, people, and well-being. There are over 400 national and community data layers in EnviroAtlas.

A national map illustrating biological nitrogen fixation in natural & semi-natural ecosystems within each subwatershed in central Tennessee. The orange lines outline the 12-digit HUCs.



A community map of the Durham, North Carolina area. This map shows the number of people that live within 300 meters of a busy road with < 25 percent tree buffer.



The EnviroAtlas Interactive Map also incorporates demographic and supplemental data to help users better understand the context of ecosystem services within specific populations, environmental conditions, or geographic areas. Supplemental data layers include ecological, watershed, and political boundaries; conservation areas; EPA assessed and impaired waters; and other available national datasets. Much of the data found in EnviroAtlas is downloadable.

## Application and Impact

EnviroAtlas is designed for staff from all levels of government, environmental and public health professionals, researchers, educators, non-governmental organizations, and anyone else with an interest in ecosystem services and their role in sustainable and healthy communities. EnviroAtlas allows users to visually interpret ecosystem services and understand how they can be conserved and enhanced.

EnviroAtlas provides a way to screen and understand the potential implications of planning and policy decisions, and provides information to help raise awareness of the importance, capacity, and fragility of natural systems. In addition to informing planning decisions, EnviroAtlas can help guide where best to preserve or restore ecosystems. This includes the restoration of natural systems and the use of constructed ecosystems such as wetlands. EnviroAtlas data can also inform methods for the valuation of and payment for ecosystem services, which may also inform restoration decisions and project locations.

A forest's capacity to remove particles from the air and water, provide shade and stabilize the climate, store water and create habitat, depends on its health, surrounding environment, and the stresses placed on it. EnviroAtlas can help users better understand how individuals and communities can support ecosystems and the natural processes that provide these critical benefits to society.

EnviroAtlas is a collaborative effort led by EPA in partnership with the U.S. Geological Survey (USGS), the U.S. Department of Agriculture's Forest Service and Natural Resources Conservation Service (NRCS), and LandScope America. Other organizations, including local governments, universities, and non-profit organizations also contribute to EnviroAtlas.

EnviroAtlas was publicly launched in May 2014. Subsequent updates take place as more data and analytic tools become available. For more information, visit www.epa.gov/enviroatlas or email specific inquiries to EnviroAtlas@epa.gov.

EPA | USGS | USDA | NRCS | LandScope America

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