EnviroAtlas

www.epa.gov/enviroatlas

Teaching with Technology: Using EPA's *EnviroAtlas* in the classroom to empower tomorrow's decision-makers

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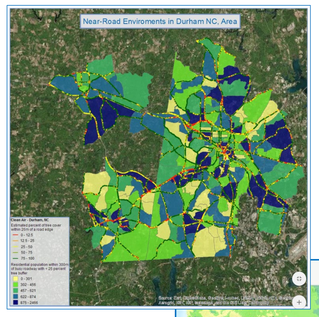
Introduction to *EnviroAtlas*

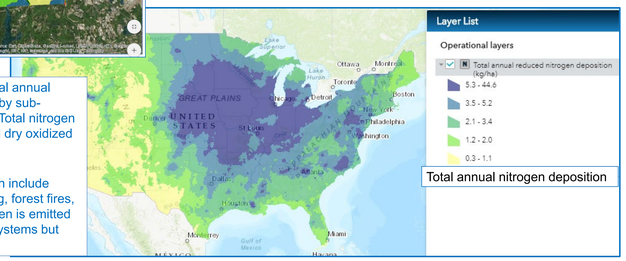
EnviroAtlas is a web-based tool developed by the EPA and its partners which provides interactive tools and resources for users to explore the benefits people receive from nature, often referred to as "ecosystem goods and services."

Using *EnviroAtlas*, users can access, view, and analyze diverse information to better understand the potential impacts of decisions on natural resources and the services they provide. EnviroAtlas provides two primary interactive tools, the ***Interactive Map*** and the ***Eco-Health Relationship Browser***, as well as GIS and analysis tools and informational resources.



Providing over 400 maps, the *Interactive Map* allows users to investigate various ecosystem elements (i.e. land cover, pollution, and community development) and compare them across localities in the United States. Available maps range from fine-scale community extent (left) to broad-scale national extent (below).

Left: Community map of Durham, NC at the Census block-group resolution shows the estimated percent of tree cover and population for the near-road environment. Studies indicate that the capacity of trees to filter air may reduce the health impacts of vehicular pollution. *EnviroAtlas* currently has datasets for 18 U.S. communities available.



Right: A National map of total annual nitrogen deposition (kg/ha) by sub-watershed (12-digit HUC). Total nitrogen deposition includes wet and dry oxidized and reduced nitrogen.

Sources of oxidized nitrogen include burning fossil fuels, lightning, forest fires, and bacterial decay. Nitrogen is emitted primarily from agricultural systems but also from automobiles.

Total annual nitrogen deposition

EnviroAtlas tools and resources are well-suited for educational use, as they are freely available and do not require specialized software to use. To use *EnviroAtlas* requires only a computer and an internet connection.

Goals: Make it fun, relevant, and useful

The *EnviroAtlas* educational curriculum has been designed to align to the **Next Generation Science Standards (NGSS)**, which were released in 2013 and have been adopted or adopted with adaptations by many states. The lesson plans are also aligned to State educational science standards by grade and topic.

The lesson plans have been designed to be universal so that teachers anywhere in the US can use them for their specific course curricula.

Relevant classroom courses

Biology
Health

Earth Science
Environmental Science

Geography / GIS
City Planning

EnviroAtlas Tools: The *Interactive Map* & The *Eco-Health Relationship Browser*

The EnviroAtlas curriculum makes use of the two primary interactive tools in *EnviroAtlas* to introduce students to concepts such as watershed geography and management, the water cycle, biodiversity, and connections between the environment and human health.

EnviroAtlas Interactive Map

Allows for student exploration of ecosystem services within their communities

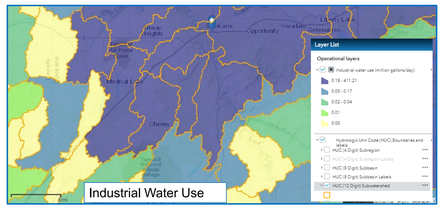
Has the power to visually display ecosystem services and demographic variables

EnviroAtlas Eco-Health Relationship Browser

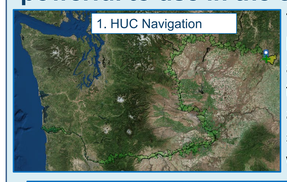
Highly interactive; shows visual connections of the eco-health relationship

Uses existing scientific literature on the linkages between the environment and human health to display connections

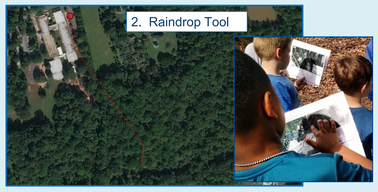
The tools and resources in the *Interactive Map* allow for analysis of relationships between people and the environment. Below is an example of the types of elements that can be mapped using *EnviroAtlas.*



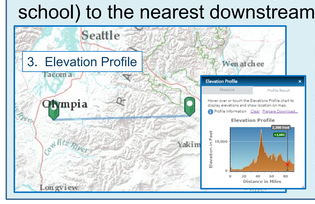
Tools in the Interactive Map can be powerful to use in the classroom



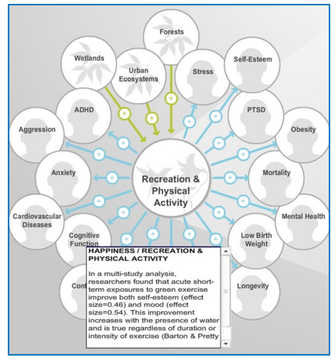
The **HUC Navigation Tool** allows students to navigate up- and down-stream along waterways.



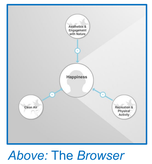
The **Raindrop Tool** allows students to follow the path of a raindrop from any point (like their school) to the nearest downstream waterbody.



Elevation Profile tool can be used to explore local topographic variation.

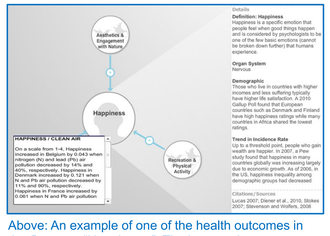


Students can use the *Eco-Health Relationship Browser* to explore relationships or research certain health outcomes in more detail. The *Browser* contains information from 500+ peer-reviewed articles.



Above: The *Browser* shows how "Happiness" is connected to three ecosystem services.

Above: A family engaging in "Recreation and Physical Activity" and "Aesthetics and Engagement with Nature."



Above: An example of one of the health outcomes in the *Browser*, "Happiness." The browser has peer-reviewed journal articles published through Dec. 2014.

Lesson Plans available using *EnviroAtlas* (K-Adult)

All lesson plans were developed and reviewed by teachers and experienced educators.

Grades K-6: *Exploring Your Watershed*!

- Includes a hands-on portion where students model a wax paper watershed, a portion where students analyze their school's watershed using the *Interactive Map,* and an outdoor, exploratory portion.
- Available with or without internet, in English and in Spanish, for ESL classrooms, and with adaptations for grades K-3.
- Engages students with their local environment.

Grades 4-12+: *Connecting Ecosystems and Human Health*

- Includes technology portion using the *Eco-Health Relationship Browser* and a hands-on "connectivity" portion that uses string to connect human health outcomes to environmental conditions.
- Promotes discussion of human health outcomes that can have personal significance to students and their families; involves evidence from existing scientific literature; establishes role of ecosystems in human health.

Grades 9-Undergraduate: Building a Greenway Case Study

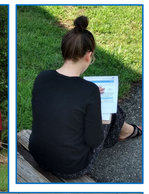
- Puts students in the decision-making role for whether or not to accept a proposed section of greenway for a town given a suite of factors.
- Intended to showcase ways in which *EnviroAtlas* can support decision-making with maps, analysis tools, fact sheets, and downloadable data.

All materials are FREE here:

bit.ly/EPAEnviroAtlasED

Impact of *EnviroAtlas* Curriculum #EPAEnviroAtlasEd

- **2,687 Total Participants**
  - 1,159 Elementary students
  - 203 Middle School students
  - 229 High School students
- **72% of students from low-income/low-resource schools**
- **1,096 teachers, educators, and professional staff**
- **3 formal training workshops**
- **17 formal Conference presentations (NSTA, ESA, NCSE, EENC, etc.)**
- **20+ teacher** collaborators (K-5, including ESL & AIG, 6-8, 9-12, including High School AP & High School IB, and K-12 Science Education Professionals with UNC Institute for the Environment)
- **54 classroom visits**



Above: Students and teachers of all ages engage with the EPA *EnviroAtlas* Educational materials.

Acknowledgements

EnviroAtlas is a collaborative project developed by the US Environmental Protection Agency, in cooperation with the US Geological Survey, the US Department of Agriculture's Natural Resources Conservation Service and Forest Service, and Landscape America. *EnviroAtlas* develops and incorporates data from federal, state, community, and non-governmental organizations, under an approved quality assurance plan.

 This research was supported in part by an appointment to the Research Participation Program for the U.S. Environmental Protection Agency, Office of Research and Development, administered by the Oak Ridge Institute for Science and Education through an interagency agreement between the U.S. Department of Energy and EPA.