

**Ecosystem Vulnerability & Water Resources Themes** 

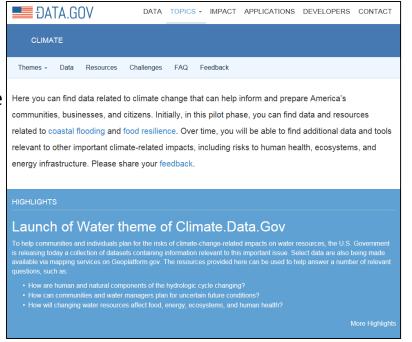
A Community on Ecosystem Services

ACES 2014

## Climate Action Plan (CAP)

- The purpose of the CAP is to cut carbon pollution, prepare communities for the impacts of climate change, and lead international efforts to address this global challenge.
- A key component of CAP is the Climate Data Initiative (CDI), a broad effort to leverage the Federal Government's extensive, freely-available climaterelevant data resources to stimulate innovation and private-sector entrepreneurship in support of national climate-change preparedness.
- The CDI is being launched by theme, with the ecosystem vulnerability and water resources portion launching yesterday. Coastal resilience and food security were launched earlier this year.
- The CDI will reside at data.gov, whose purpose is to increase public access to high value, machine readable datasets generated by the Executive Branch of the Federal Government.





### **Ecosystem Vulnerability**

www.climate.data.gov/ecosystems

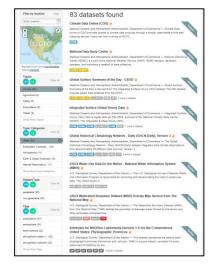
- Focused on:
  - Wildfire
  - Ecological water resources
  - Biodiversity
  - Invasive species
  - Carbon sequestration
  - Oceans and coasts
- Contributions from multiple agencies
- Informed by the National Climate Assessment and the National Fish, Wildlife and Plants Climate Adaptation Strategy
- Key component is the Ecoinformatics-based Open Resources and Machine Accessibility (EcoINFORMA) initiative
- 141 datasets
- 22 highlighted tools
- 19 highlighted maps



### Water Resources

## www.data.gov/climate/water/

- Focused on
  - Hydrologic cycle
  - Future uncertainties in supply
  - Impacts on
    - Food,
    - Energy,
    - Ecosystems
    - Human health
- Contributions from multiple agencies
- Informed by the National Climate Assessment
- 118 datasets
- 12 highlighted tools
- 13 highlighted maps







## Townhall Schedule

- 12:15 12:20 Introduction (Olivia Ferriter DOI)
- 12:20 12:30 Water Theme (Nate Booth USGS)
- 12:30 12:50 EcoINFORMA (Stinger Guala USGS and Anne Neale EPA)
- 12:50 1:00 Global Ecological Land Units (Roger Sayre USGS and Dawn Wright ESRI)
- 1:00 1:10 Stakeholder Engagement (Mary Klein NatureServe)

# Climate Data Initiative Water Theme





## **Water Theme: Framing Questions**

- How are human and natural components of the hydrologic cycle changing?
- How can communities and water managers plan for uncertain future conditions?
- How will changing water resources affect food, energy, ecosystems, and human health?





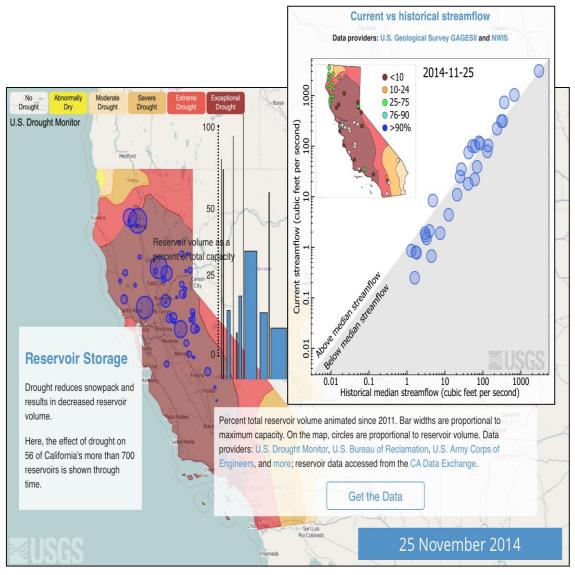
## **Water Theme: Contributions**

- 118 datasets from data.gov
- Featured content including data, maps and tools
- Private sector and NGO commitments





# California drought insights with open data



### California drought, vizualized with open data

http://cida.usgs.gov/ca\_drought



### Time period

2011-present weekly data represention

### Data sources and methods

Dataset sources and methods used are briefly described on the page below. Follow links indicated below to access public data repositories. To access the specific datasets visualized at <a href="http://cida.usgs.gov/ca\_drought">http://cida.usgs.gov/ca\_drought</a>, follow this link <a href="https://github.com/USGS-CIDA/CIDA-Viz">https://github.com/USGS-CIDA/CIDA-Viz</a> and access repositories (e.g., reservoir datasets are found in ca\_reservoir folder), or use the links below.

### **Drought data**

- Data are plotted for the conterminous U.S. and for the State of California in the background map
  of the site.
- Site data and shapefiles from U.S. Drought Monitor: http://droughtatlas.unl.edu/Services/DroughtMonitor/Timeseries/
- Dataset and detailed methods can be found at https://github.com/USGS-CIDA/CIDA-Viz/tree/master/ca\_drought

### Reservoir data

- Reservoir capacities (State of California jurisdiction): http://www.water.ca.gov/damsafety/docs/Jurisdictional2014.pdf
- Reservoir capacities (Federal jurisdiction):
   http://www.water.ca.gov/damsafety/docs/Federal2010.pdf
- Reservoir time series data: http://cdec.water.ca.gov/cgi-progs/queryDaily. Reservoirs with daily
  observational data in the State of California are visualized; weekly averaged reservoir storage as a
  percent of total storage capacity is plotted through time.
- Reservoir area: Map depicts change in water area at Trinity Lake and Shasta Lake is based on Landsat satellite imagery collected on August 8, 2011, and August 16, 2014. Imagery were processed using algorithms presented in Xu (2007): http://info.asprs.org/publications/pers/2007journal/december/2007\_dec\_1381-1391.pdf. Map
  - http://info.asprs.org/publications/pers/2007journal/december/2007\_dec\_1381-1391.pdf. Map produced by Dr. Jamon Van Den Hoek (jamon.vandenhoek@nasa.gov) at the NASA Goddard Space Flight Center.

## **Water Theme: Future**

- Climate Resilience Toolkit
- Innovation Challenges
- Additional datasets and tools



## **Water Theme Demonstration**

Immediately following this session, see a Water Theme Tools demo for **accessing** and **analyzing** large remote water/climate/land use data for your **area** of interest.

1:30-3:30 in the Jackson Room





# Concept to Reality ECOINFORMA

### Dr. Gerald "Stinger" Guala

USGS Core Science Systems, Core Science Analytics and Synthesis

Branch Chief: Eco-Science Synthesis

**BISON Lead and Director of ITIS** 

Co-Chair: CENRS-SES Working Group on Biodiversity and Ecosystem Informatics (BioEco)

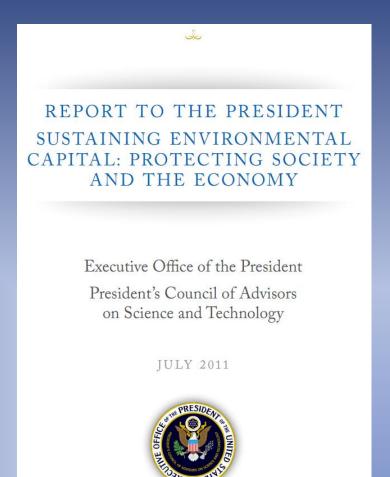
### Anne Neale

EPA Office of Research and Development, RTP, NC EnviroAtlas Project Lead

Co-Chair: CENRS-SES Working Group on Ecosystem Services

## **EcoINFORMA Concept**

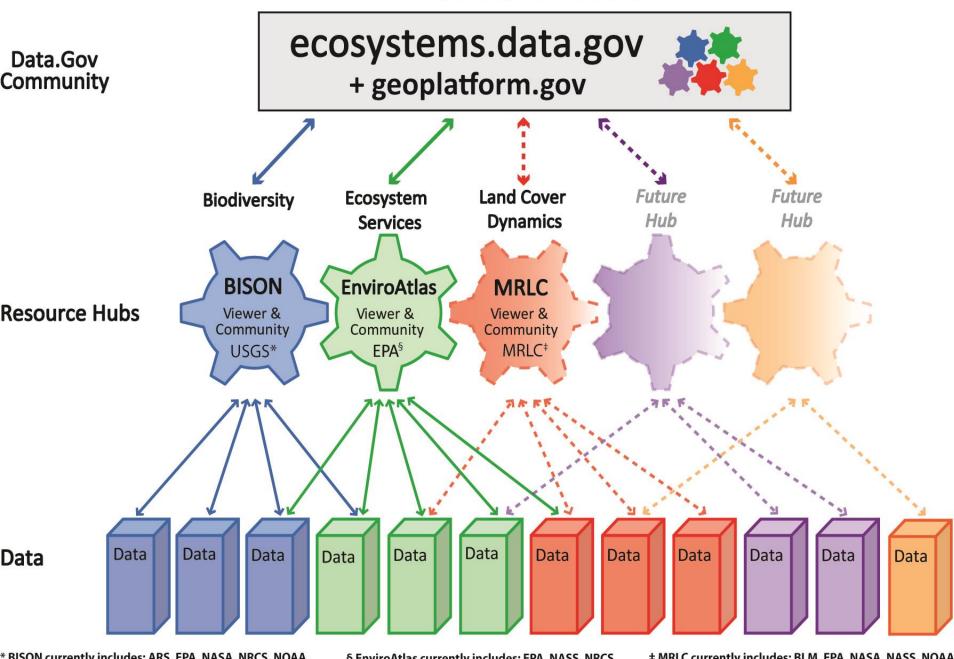
- EcoINFORMA
   (Ecoinformatics-based
   Open Resources and
   Machine Accessibility) is:
- The national data system for managing and sustaining environmental capital.



## **EcoINFORMA Plan**

- The hierarchy of the NSTC is leveraged to break barriers to mobilization and guarantee collaboration.
- Broad overview through Data.gov and geospatial component through the Geospatial Platform.
- A handful of thematic hubs to organize communities and their data with efficiencies of scale and provide thematic tools and visualizations.
- BioEco does the initial interagency coordination.

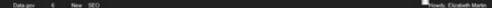
## **EcoINFORMA**



<sup>\*</sup> BISON currently includes: ARS, EPA, NASA, NRCS, NOAA, NPS, NSF, USFS, and USGS among others.

§ EnviroAtlas currently includes: EPA, NASS, NRCS, USFS, and USGS.

**# MRLC currently includes: BLM, EPA, NASA, NASS, NOAA, NPS, USACE, USFS, USFWS, and USGS.** 





DATA TOPICS - IMPACT APPLICATIONS DEVELOPERS CONTACT

### **ECOSYSTEMS**

EcoINFORMA Data Hubs Data Catalog Map Viewer Related Communities



Discover and explore data resources on ecosystems and biodiversity, including ecosystem components, functions, and services.



Biodiversity Information Serving Our Nation



EnviroAtlas



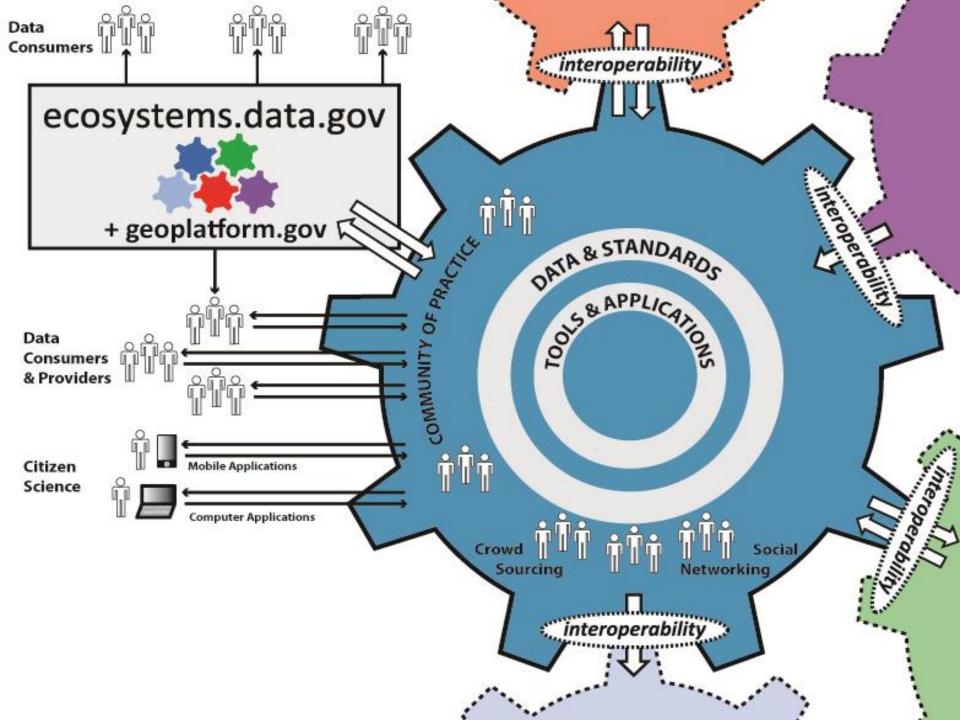
### UPDATES

### Formal Release of EcoINFORMA, Ecosystems.data.gov, and Two New Themes of Climate data gov

On December 9th, the secretary of the U.S. Department of the interior, Sally Jewell, formally announced during the plenary session of A Community on Ecosystem Services (ACES) 2014 conference the launch of the U.S. Ecoinformatics-based Open Resources and Machine Accessibility ... Continued

### Ecosystems.data.gov and EcoINFORMA

The Ecosystems Community (Ecosystems data gov) is now publicly available in Data gov and provides access to ecosystem and biodiversity-related data. This community is the central web portal of the U.S. Ecoinformatics-based Open Resources and Machine Accessibility (EcolNFORMA) initiative. Visit the EcolNFORMA section ... Continued





DATA TOPICS - IMPACT APPLICATIONS DEVELOPERS CONTACT

### **ECOSYSTEMS**

EcoINFORMA

Data Hubs

Data Catalog Ma

Map Viewer

Related Communities

### Data Hubs

EcoINFORMA's Resource Hubs are data hubs that serve as primary entry points for access and visualization of data around common ecosystem-related themes and their corresponding communities of practice. Established resource hubs of EcoINFORMA can be accessed below.

### Biodiversity Resource Hub

Biodiversity Information Serving Our Nation



Biodiversity Information Serving Our Nation (BISON) is a web-based information system allowing users to find, explore, and download biological occurrence data for species (e.g. plants, animals, fungi) that occur at a particular location and time in the United States (U.S.) and Territories. BISON, a product of the U.S. Geological Survey (USGS), offers over 168 million species occurrence records from a large collection of datasets provided by participating institutions.

Learn More

### Et system Services Re ource Hub

EnviroAtlas



Learn More



EnviroAtlas is a web-based decision -support tool consisting of maps, graphs, analysis tools, and interpretive information about ecosystem services and their role in maintaining sustainable and healthy communities of the contiguous United States (lower 48 states). EnviroAtlas is a collaborative project developed by the U.S. Environmental Protection Agency (EPA) in cooperation with the U.S. Geological Survey (USGS), the Natural Resources Conservation Service (NRCS), the U.S. Forest Service, and LandScope America.

### Land Cover Dynamics Resource Hub

Multi-Resolution Land Characteristics Consortium



The Multi-Resolution Land
Characteristics Consortium (MRLC)
provides land cover and land cover
dynamics information at the national
scale for a wide variety of
environmental, land management,
and modeling applications. MRLC is
composed of a group of federal
agencies that coordinate and
generate nationally complete,
current and consistent land cover
information products.

Learn More

# Biodiversity Information Serving Our Nation - (bison.usgs.ornl.gov)

- National Clearinghouse
- US Node of GBIF
- 168+ Million records & growing
- Nearly all species
- Every state and county
- 55 environmental layers
- Who, what, when, where
- Data from 314 global providers across Federal, State, and local Gov'ts, NGOs and Academia.
- Extensive web services to connect seamlessly with other resources and enable open development



**Customers Love BISON!** 

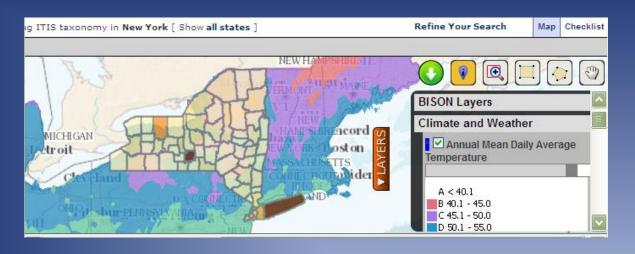
"...we're really excited at [BISON's] performance in producing and mapping extremely large search-result sets (I generated one with 1.8 million hits in a matter of seconds)."

Scott L. Cross, Ph.D. NOAA National Oceanographic Data Center/National Coastal Data Development Center, Charleston, SC.





## Maps & Checklists

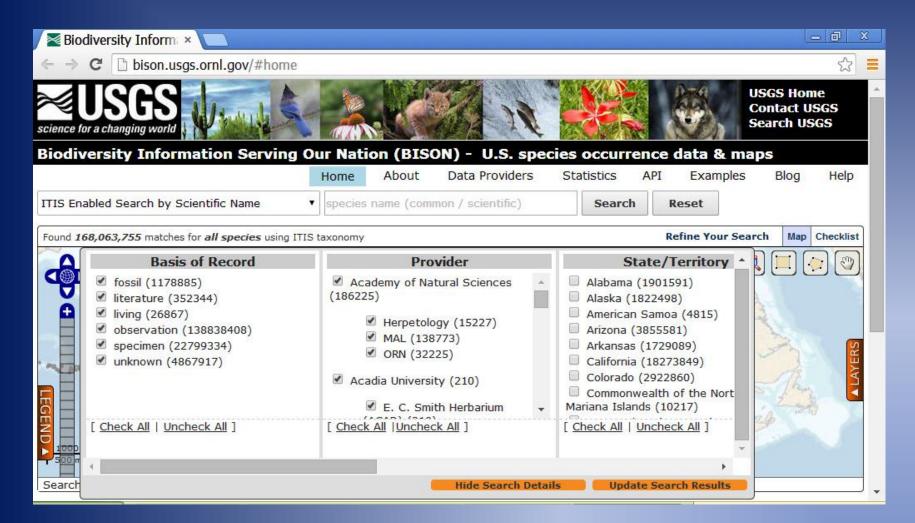


Found 9,070,998 matches for all species using ITIS taxonomy in New York [ Show all states ] 9,070,998 georeferenced	
Animalia	7974656
Chromista	10808
Fungi	2651
Plantae	454729
ITIS Scientific Name	Count
Abies balsamea	12807
Abies balsamea balsamea	28
Abies homolepis	2
Abies magnifica	1
Abies procera	1
Abietinella abietina	5
Abutilon theophrasti	39
Acacia baileyana	1
Acacia cultriformis	1
Acacia ligulata	1

For Any Area

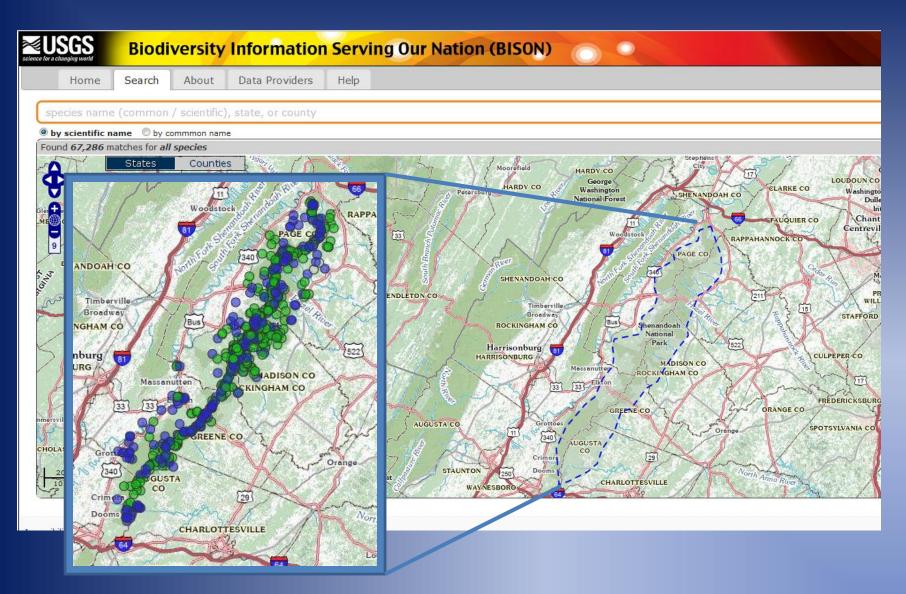
## Search & Refine

Basis of Record Provider State/County Higher taxa Year range Centroids

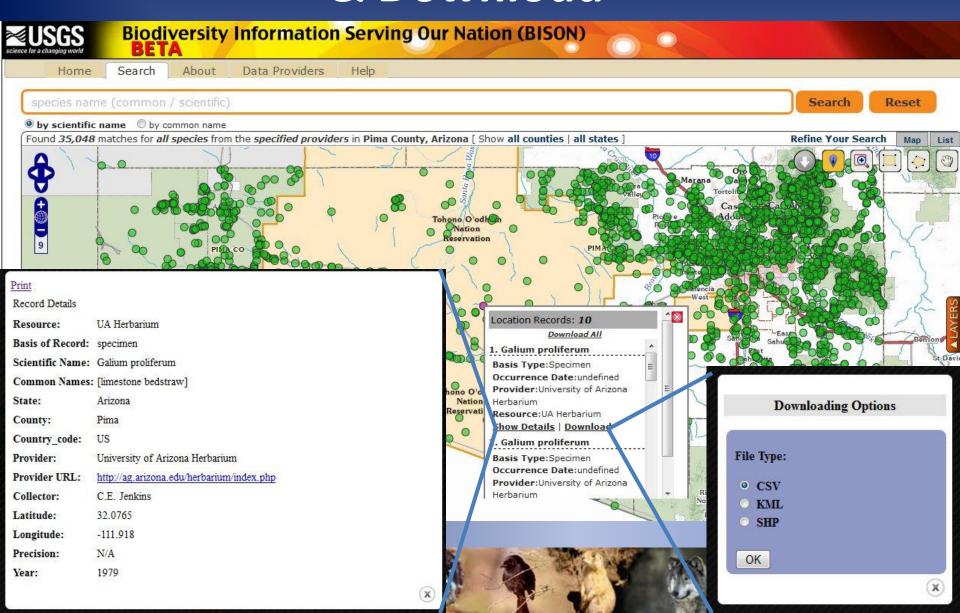




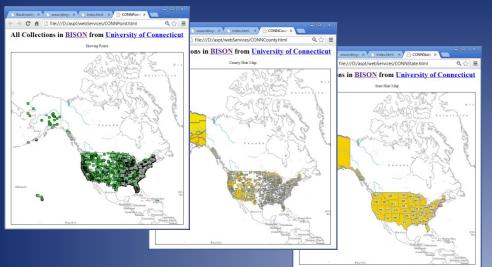
## Define your own polygon



# Documentation with a Click & Download



## Products from Extended Web Services



### **Output Formats**

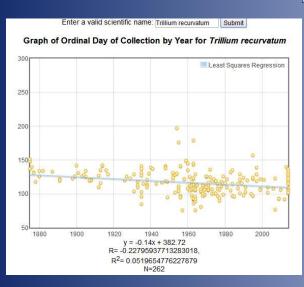
(Direct Solr & API)

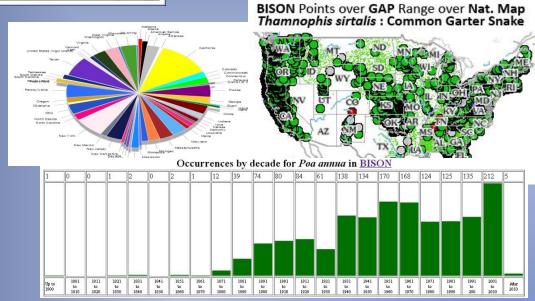
JSON, JSONP, XML, SHP, CSV

+ WMS services

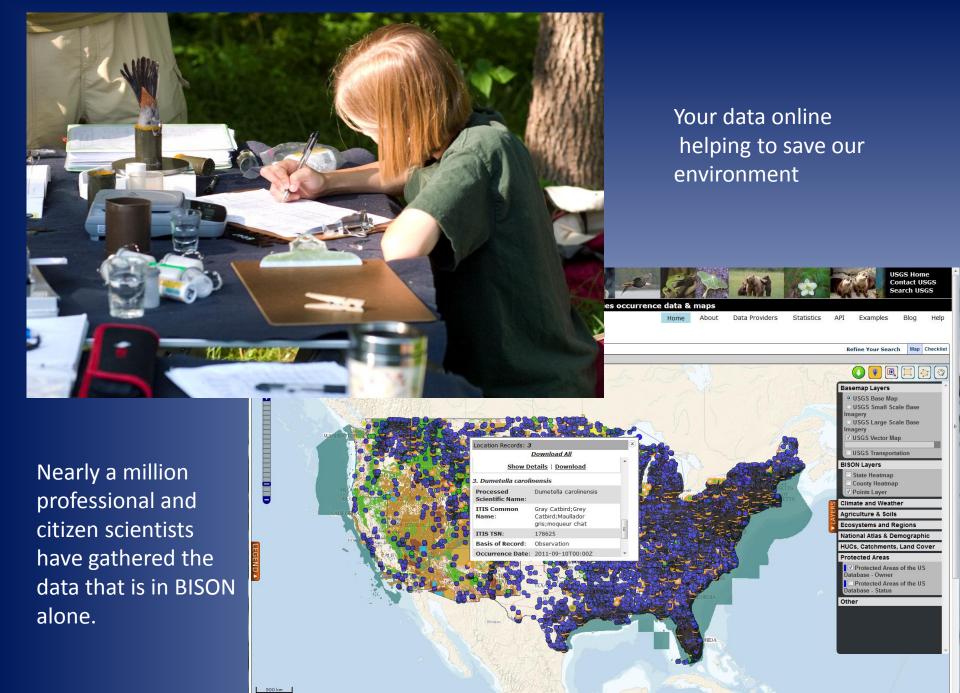
BATCH COMPARE PROVIDED COUNTY STATE & COUNTRY TO LAT/LON

BATCH COMPARE YOUR TAXONOMY
TO ITIS











DATA TOPICS - IMPACT APPLICATIONS DEVELOPERS CONTACT

### **ECOSYSTEMS**

EcoINFORMA

Data Hubs

Data Catalog

Map Viewer

Related Communities

### Data Hubs

EcoINFORMA's Resource Hubs are data hubs that serve as primary entry points for access and visualization of data around common ecosystem-related themes and their corresponding communities of practice. Established resource hubs of EcoINFORMA can be accessed below.



Biodiversity Information Serving Our Nation (BISON) is a web-based information system allowing users to find, explore, and download biological occurrence data for species (e.g. plants, animals, fungi) that occur at a particular location and time in the United States (U.S.) and Territories. BISON, a product of the U.S. Geological Survey (USGS), offers over 168 million species occurrence records from a large collection of datasets provided by participating institutions.

Learn More

EnviroAtlas is a web-based decision -support tool consisting of maps, graphs, analysis tools, and interpretive information about ecosystem services and their role in maintaining sustainable and healthy communities of the contiguous United States (lower 48 states). EnviroAtlas is a collaborative project developed by the U.S. Environmental Protection Agency (EPA) in cooperation with the U.S. Geological Survey (USGS), the Natural Resources Conservation Service (NRCS), the U.S. Forest Service, and LandScope America.

Learn More

The Multi-Resolution Land
Characteristics Consortium (MRLC)
provides land cover and land cover
dynamics information at the national
scale for a wide variety of
environmental, land management,
and modeling applications. MRLC is
composed of a group of federal
agencies that coordinate and
generate nationally complete,
current and consistent land cover
information products.

Learn More

## What is EnviroAtlas?

An online decision support tool giving users ability to view, analyze, and download geospatial data related to ecosystem services (nature's benefits)

- Geospatial indicators and indices of the supply, demand, and benefits of ecosystem services
- Indicators of drivers of change
- Reference data (e.g., boundaries, land cover, soils, hydrography, impaired water bodies, wetlands, demographics)
- Analytic and interpretive tools

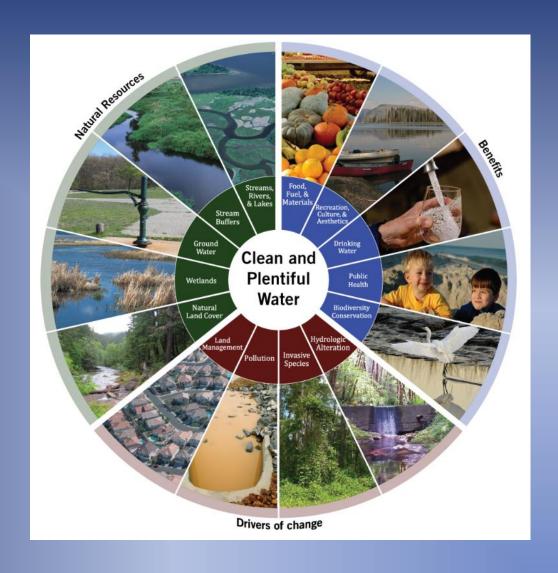
Developed through cooperative effort amongst multiple Federal agencies and other organizations





## Nature's Benefit Categories in EnviroAtlas

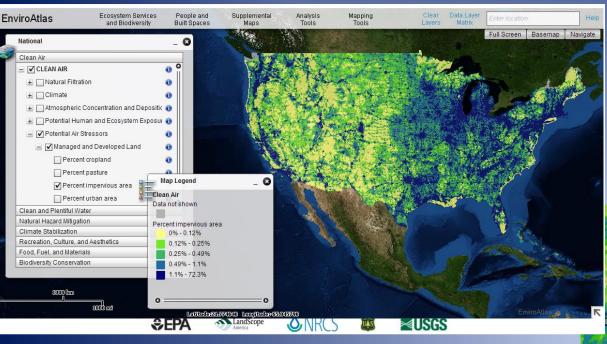
- Clean Air
- Clean and Plentiful Water
- Natural Hazard Mitigation
- Climate Stabilization
- Recreation, Culture & Aesthetics
- Food, Fiber & Materials
- Biodiversity Conservation





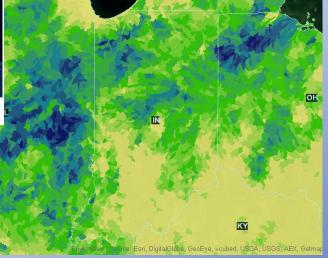
## The EnviroAtlas is multi-scaled

National: Wall-to-wall coverage for coterminous US;
 summarized by medium-sized drainage basins (12-digit HUCs)



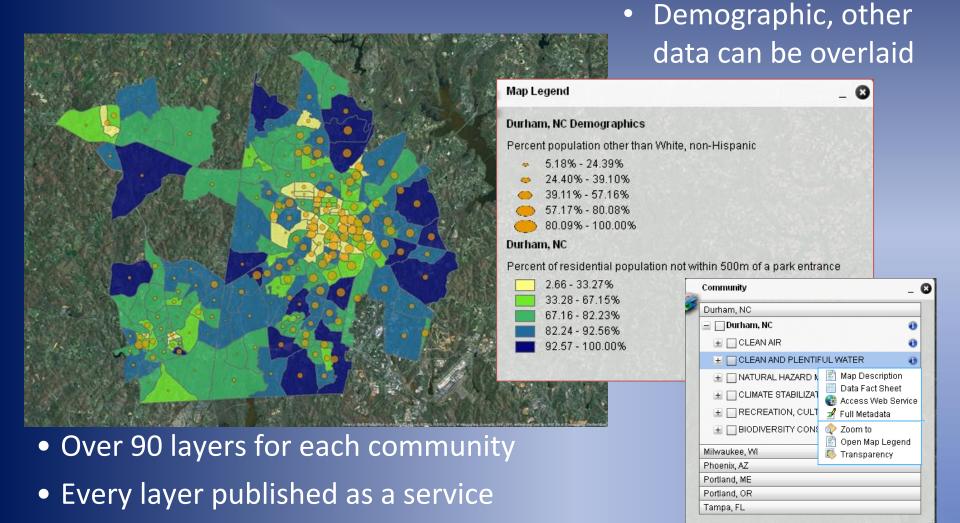
 Demographic, other data can be overlaid

- Over 160 data layers
- Every layer published as a service



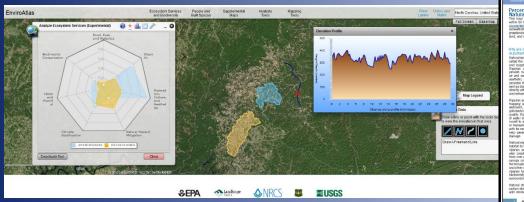
## The EnviroAtlas is multi-scaled

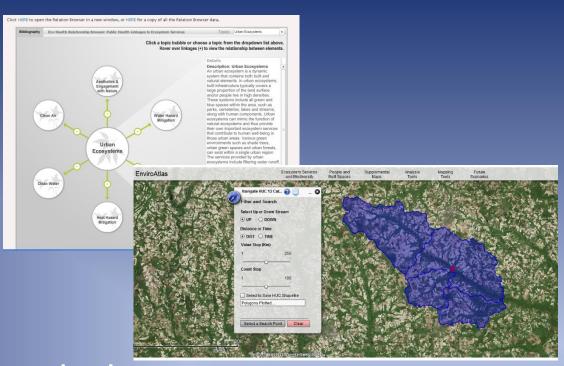
Community: High resolution component for 50 populated places;
 summarized by US census block groups



## **EnviroAtlas – More than Data**

- Eco-Health Browser
- Mapping and Analysis Tools
- User can add data
- Ecosystem Services Analyzer
- Downloadable GIS Toolboxes
- Interpretive Fact Sheets for every data layer







Percent Stream Buffer Zone as Natural Land Cover this map portings the percent of naturally covered is within 50 meters of direction, mere, and other judicings contacted, weeksoodies within each 12-digit. It subwillenment featural land cover includes breafly, aim growslends, and welfands, it would be supplied provisiteds, and welfands, it would be supplied to the control of the control of the control of provisions, and welfands, it would be supplied to the control of the control of the control of provisions, and welfands, it would be provided to the control of the control

ry are naturally vegetated stream buffers

reformalisation dower editionen to anternama and viera, connellmen caudied the inpaina area or come, helpe profet waiter quality and supply for desiving, excression, and squarks habital popularia mans after and since sitematers and supply popularia the second popularia and popularia to popularia popularia and popularia and popularia popularia sitemate and popularia and popularia si and waiter benoprationes, and con cread an appendiaria popularia sitemate popularia and popularia and popularia sitemate popularia popularia sitemate popularia popularia sitemate popularia popu

Expansa areas intercept and filter dominater and runoff. By propagating and processing particles registration can present administ, surfering harmful backering particles, and offer processing the processing particles and an administration of surfering particles and an administration of the surfering and processing the processing and processing processing and processing and processing processing and processing with the processing processing and processing with the processing processing and with the processing processing and processing processi

turnivegetaton in atexam butters povides critical wildline tata for readent and migratory openies that depend on retrain senso for overly, took, and washer. These butters or create critical conditions for wildlife to safely move on one was to suitcher. Relatatin segletation can provide to one was to suitcher. Relatatin segletation can provide to sensor the sensor sensor sensor sensor sensor beingenature of the water protecting the habitation railes fother important apaids file. The benefit of appoint and prise habitation that the sensor sensor sensor sensor sensor for the properties of sensor sens

al steam butters can provide additional air quality, n storage, climate stabilization benefits as well and can

contains additional research on the accetal benefits from many other maps.

The quantity and quality of benefits provided by riperism areas in any particular area depend on local conditions

ties can I use this Information? the map can help identify potential sees for setcration or protection. Understanding the composition of sparsa land cover within a subvalended can inform water quality conceins such as estimentation, instituting periodics, or biological impairment, and where potential buffer setcration species may improve water quality.

in area can be more thoroughly investigated by overrighe transposmory on this may and adding the supplementals talked for detains and velocities an usual range or too may the complishing of these layers depict on the complishing of these layers depict of the complishing of the c

Influence and also miss in where special areas may be thought to concern in downstream communities, sy states have developed guidelines for riparian buffer management practices and may locked recommended fer widths. Envirolitas uses a 50m buffer width because is the size of the side of one National Land Cover Data created?
p was calculated by inputting the 2006 For more technical details about the limitation

Envirol/flas data are available as web services so that users can access the data without having to download them The user can also download the data from the Envirol/flas website. The 2006 National Land Cover Data and the National Hydrography Dataset are accessible through their respective websites.

Where can't get more information? Additional recovers on stems buffers and their benefit are isted in the selected publications below. These and only a small selection of resolution selection or the control of the co

Activisele digements
Environthia is a collaborative effort by the US EPA, its
contraction, and project partners. Donald Ebert of the
EPA Landscape Ecology Branch developed this map for
EPA Landscape accreded by Jessical Jahre,
Student Services Contractor to US EPA, Anne Neele and
Consid Ebert, EPA Landscape Ecology Branch, and Genisid

Selected Publications
Selected Publications
Selected Publications
Selected Publications

aker, ME, DE Welker, TE. Jordan 2006. Improved methods for quantitying potential nutrient interception by rigarian buffer endocape Ecology, 21(8): 1327-1346

rtrug, G. 2006. Concervicio better: design guicelinos bribettes, contidos, and gesenways. Gen. Tech. Rep. 5 RS-109. Achaville, Opentement of Surc. dutus, Feoris Service, Southern Resourch Station 1. Tech. Intes., A. 2008. Land Use Policy: Lossors from Water Quality Markets. Choices: The Magazine of Food, Ferm, and Resource Issues

yer, PM, Sr Reynolds, MD McCrub han, and 17 Contakal. 2008. Riper in butter width, segatables cover, and infragon sensival cheeses A review of cruentic-biases and regulations. Contains, OH, U.S. Enricemented Prefetching Agency, ESPARIORIO R-GCIB. Her, PM, All Todd, J.A.Olley, and VA. Devies. 2010. Introduction to the Para Publish of Objection on Riperian Ecosystems & Butters.

DE, ME Baker, TE Jordan. 2011. Empirical fasts for effects of riperian buffers on watershed nitrate discharges. Ecolo Rose 2161:1679-1696.

SEPA EUSCS E ANRO



DATA TOPICS - IMPACT APPLICATIONS DEVELOPERS CONTACT

### **ECOSYSTEMS**

**EcoINFORMA** 

Data Hubs

Data Catalog

Map Viewer

Related Communities

### Data Hubs

EcoINFORMA's Resource Hubs are data hubs that serve as primary entry points for access and visualization of data around common ecosystem-related themes and their corresponding communities of practice. Established resource hubs of EcoINFORMA can be accessed below.

### Biodiversity Resource Hub

Biodiversity Information Serving Our Nation



Biodiversity Information Serving Our Nation (BISON) is a web-based information system allowing users to find, explore, and download biological occurrence data for species (e.g. plants, animals, fungi) that occur at a particular location and time in the United States (U.S.) and Territories. BISON, a product of the U.S. Geological Survey (USGS), offers over 168 million species occurrence records from a large collection of datasets provided by participating institutions.

Learn More

Ecosystem Services Resource Hub

EnviroAtlas



Resource Hub

Multi-Resolution Land
Characteristics Consortium

Land Cover Dynamics



EnviroAtlas is a web-based decision -support tool consisting of maps, graphs, analysis tools, and interpretive information about ecosystem services and their role in maintaining sustainable and healthy communities of the contiguous United States (lower 48 states). EnviroAtlas is a collaborative project developed by the U.S. Environmental Protection Agency (EPA) in cooperation with the U.S. Geological Survey (USGS), the Natural Resources Conservation

Service (NRCS), the U.S. Forest

Service, and LandScope America.

The Multi-Resolution Land
Characteristics Consortium (MRLC)
provides land cover and land cover
dynamics information at the national
scale for a wide variety of
environmental, land management,
and modeling applications. MRLC is
composed of a group of federal
agencies that coordinate and
generate nationally complete,
current and consistent land cover
information products.

Learn More

Learn More

## Multi – Resolution Land Characteristics Consortium (MRLC) National Land Cover Database (NLCD)

Created by a consortium of federal agencies
Definitive land cover map of the Nation
Encompasses all 50 states
Moderate resolution – 30m pixels
Four epochs of data:
1992, 2001, 2006 and 2011

### Consists of:

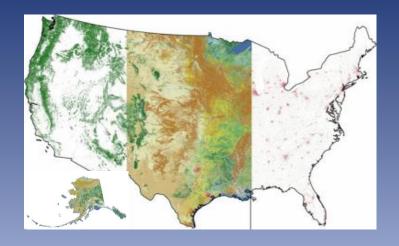
Thematic land cover classes
Percent impervious surface
Percent tree canopy

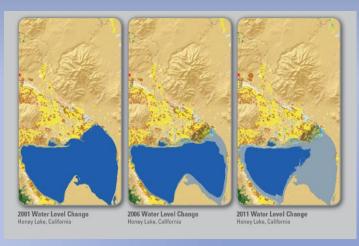
Published accuracy assessments

Monitor and assess land cover change

On-line tool:

Evaluation, Visualization and Analysis (EVA) Tool www.mrlc.gov



























DATA TOPICS - IMPACT APPLICATIONS DEVELOPERS CONTACT

### **ECOSYSTEMS**

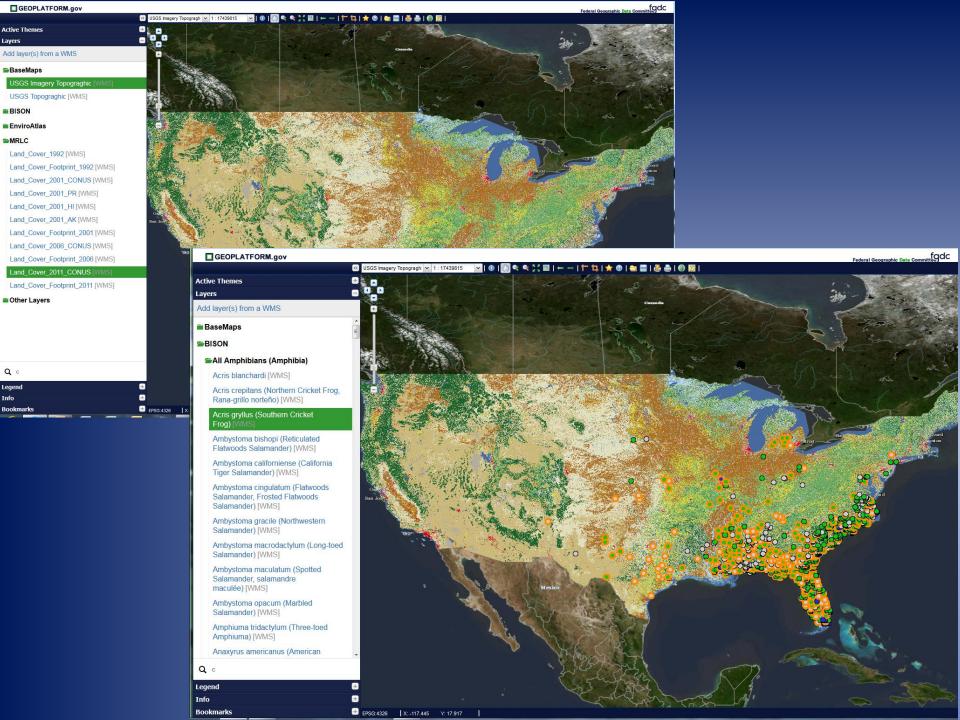
EcoINFORMA Data Hubs Data Catalog Map Viewer Related Communities

### EcoINFORMA Map Viewer

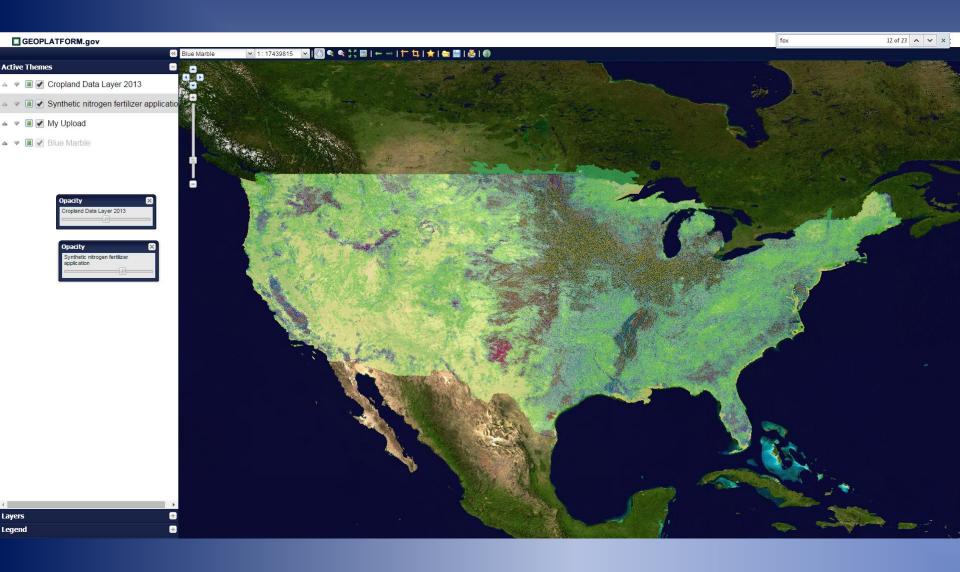
View maps and overlays of spatial data related to ecosystems, including the living (biotic) and non-living (abiotic) components that make up ecosystems, and factors that impact ecosystems. The EcoINFORMA Map Viewer is provided by the GeoPlatform.



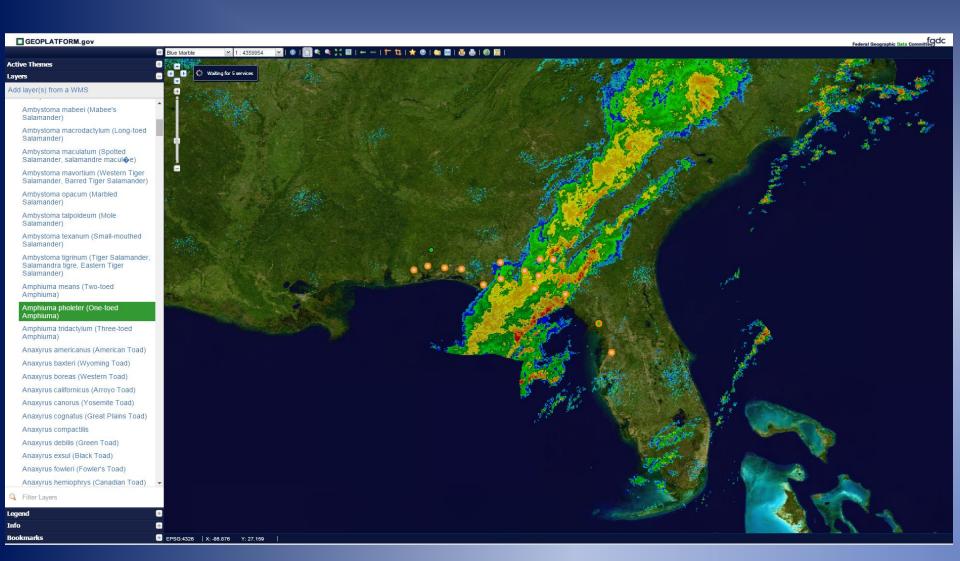
Go to EcoINFORMA Map Viewer



Amount of synthetic nitrogen fertilizer use (EnviroAtlas) superimposed on the 2013 crop layer from Cropscape Showing a correlation with corn.



Watching a severe thunderstorm passing over populations of rare salamanders in real time. NEXRAD radar from NOAA with One-Toed Amphiuma points from USGS BISON





## A New Map of Global Ecological Land Units

Roger Sayre, PhD
Senior Scientist for Ecosystems
U.S. Geological Survey



Dawn Wright, PhD Chief Scientist esri



## **GEOSS Task EC-01-C1**

### EC-01-C1: Global Ecosystem Classification and Mapping

Develop a standardized, robust, and practical global ecosystems classification and map for the planet's terrestrial, freshwater, and marine ecosystems.



GEO BON GEO ECO

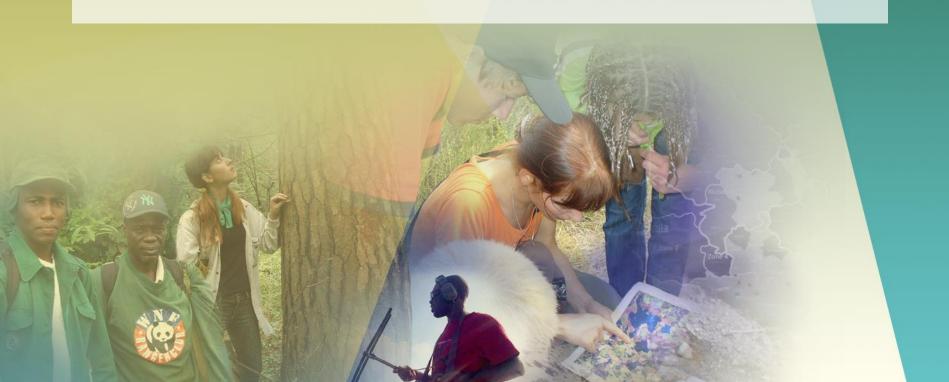
## Why Do We Need A Global Ecosystems Map?

Catalyze: Science → Planning → Management

**Provide Globally Comparable** 

Understanding of: Changes, Impacts, Resilience

Value: Economic, Social, Goods & Services



## How Were The Global Ecological Land Units (ELUs) Developed?





Landform

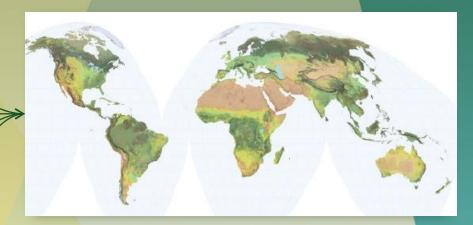


Lithology



**Land Cover** 



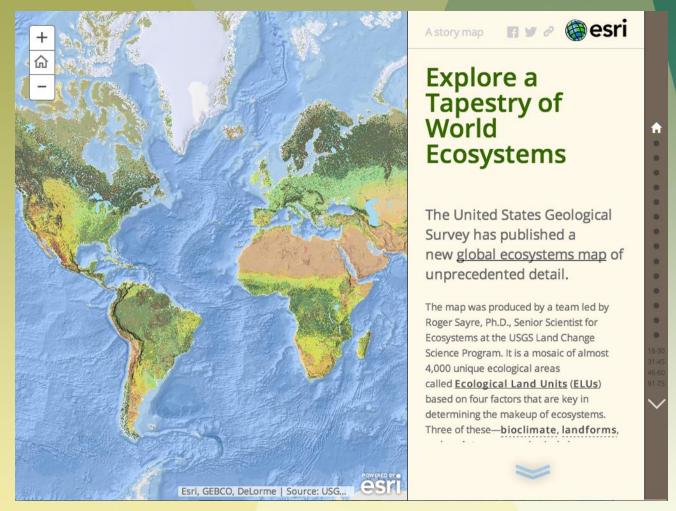


3,923 ELUs Mapped

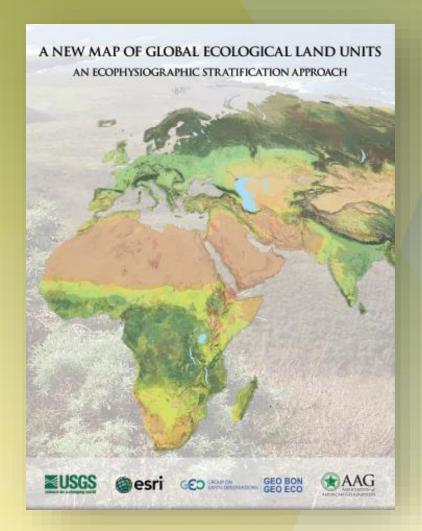
## The Data Will Be Served As ArcGIS Online Content

Landscape Resource Geodesign **Public Ecologists** Managers **Planners** AGOL **Workflows Authoritative** Classifications **Updated** Classifications Data **Tools** 

## Value Added Applications Are in Development



## **The Anchor Publication**





## The ACES Special Exhibit on ELUs

