



# High Resolution is not Enough: 30-meter Land Cover Studies, Models and Tools

of the

University of Connecticut

Center for Landuse Education and Research

Emily Wilson

Chet Arnold

# Center for Land Use Education and Research

## CLEAR's Mission:

To provide information, education and assistance to **land use decision makers** in support of balancing growth and natural resource protection.



## University of Connecticut

- Dept. of Extension
- Dept. of Natural Resources and the Environment
- Connecticut Sea Grant



# CLEAR's Target Audience

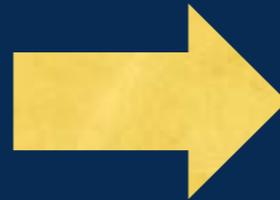


# Ground to cover



## Emily

- **CLEAR's 30 meter land cover**
- **Derived products**
  - Forest and Fragmentation
  - Riparian (streamside) Areas
  - Farmland



**Emphasize access**  
*to maps, data and information*  
**Not the results themselves**

## Chet

- **Why 30m data?**
- **How is it being used**

# clear.uconn.edu

HOME ABOUT CLEAR PUBLICATIONS NEWS CONTACT



College of Agriculture & Natural Resources

## Center for Land Use Education & Research



RESEARCH
OUTREACH EDUCATION
IMAGERY & DATA
TOOLS



Riparian Corridors Study

Land cover change along CT's streams.

This study looks at land cover change along the state's environmentally critical streamside, or riparian, corridors, during the 21 year period from 1985 to 2006. [LEARN MORE](#)



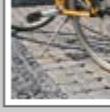
**Riparian Corridors Study**  
Land cover change along CT's streams.



**Impervious Cover TMDL**  
The first "IC-TMDL" in the nation. Now what?



**Ag Fields & Soils Study**  
Land cover change over CT's best agricultural soils.



**The National LID Atlas**  
A compendium of Low Impact Development sites.

CLEAR provides information, education and assistance to Connecticut's land use decision makers, community organizations and citizens on how to better protect natural resources while accommodating economic growth. [Read More](#)

### PROGRAMS

- CT NEMO
- National NEMO Network
- Land Use Academy
- Geospatial Training
- Forestry
- Green Valley Institute
- LERIS

### POPULAR

- Statewide Riparian Corridors Analysis
- Impervious Cover TMDL
- Agricultural Fields and Soils Analysis
- Connecticut's Changing Landscape
- Low Impact Development Atlas
- Forest Fragmentation Study
- CT Environmental Conditions Online (CT ECO)
- Community Resource Inventory

### EVENTS & INFORMATION



**CLEAR Calendar**

2011 CLEAR Webinar Series

All webinars are FREE!

- April 19 - Rain Gardens** - read abstract
- May 10 - Free Google Tools for Creating Interactive Mapping "Mashups"** - read abstract
- June 14 - Planning for Brownfields** - read abstract

View Full Schedule

### VIDEOS

- [CLEAR Webinar Library](#)
- [CLEAR Video Library](#)



Join CLEAR on Facebook



# The Mother Ship

## Connecticut's Changing Landscape

<http://clear.uconn.edu>

University of Connecticut | College of Agriculture & Natural Resources  
Center for Land Use Education & Research

HOME ABOUT CLEAR PUBLICATIONS NEWS CONTACT

RESEARCH OUTREACH EDUCATION IMAGERY & DATA TOOLS

Type Search Here Search

**Riparian Corridors Study**  
Land cover change along CT's streams.  
This study looks at land cover change along the state's environmentally critical streamside, or riparian, corridors, during the 21 year period from 1985 to 2006.  
LEARN MORE

**PROGRAMS**

- CT NEMO
- National NEMO Network
- Land Use Academy
- Geospatial Training
- Forestry
- Green Valley Institute
- LERIS

**POPULAR**

- Statewide Riparian Corridors
- Impervious Cover TMDL
- Agricultural Fields and Soils
- Connecticut's Changing Landscape**
- Low Impact Development
- Forest Fragmentation Study
- CT Environmental Conditions (CT ECO)
- Community Resource Invent

**CCL Website**

- CCL Home
- About the Project
- Statewide Information
- Your Town
- Your Watershed
- Interactive Map
- Download Data
- What We're Measuring
- Related Projects & Commentary

**Welcome to Connecticut's Changing Landscape**

Connecticut's Changing Landscape provides basic land cover information about changes to developed, forest and agricultural lands during the period 1985 to 2006. Five directly comparable land cover datasets, from 1985, 1990, 1995, 2002 and 2006, allow us to look at, and quantify, landscape change in our state.

**This is Version 2 and includes:**

- a new date: 2006
- a new class in all dates: Agricultural Field
- improvements to all classes in all dates! This means that previously released land cover data (we call it version 1) cannot be compared to this land cover data (version 2)

For further explanation, visit the FAQ "How is Version 2 different from Version 1?"

**How much have we developed, and at what rate? Browse this website to find out...**

version 2 Connecticut's Changing Landscape

CLEAR Home TEXT-ONLY Disclaimers, Privacy, & Copyright  
© University of Connecticut

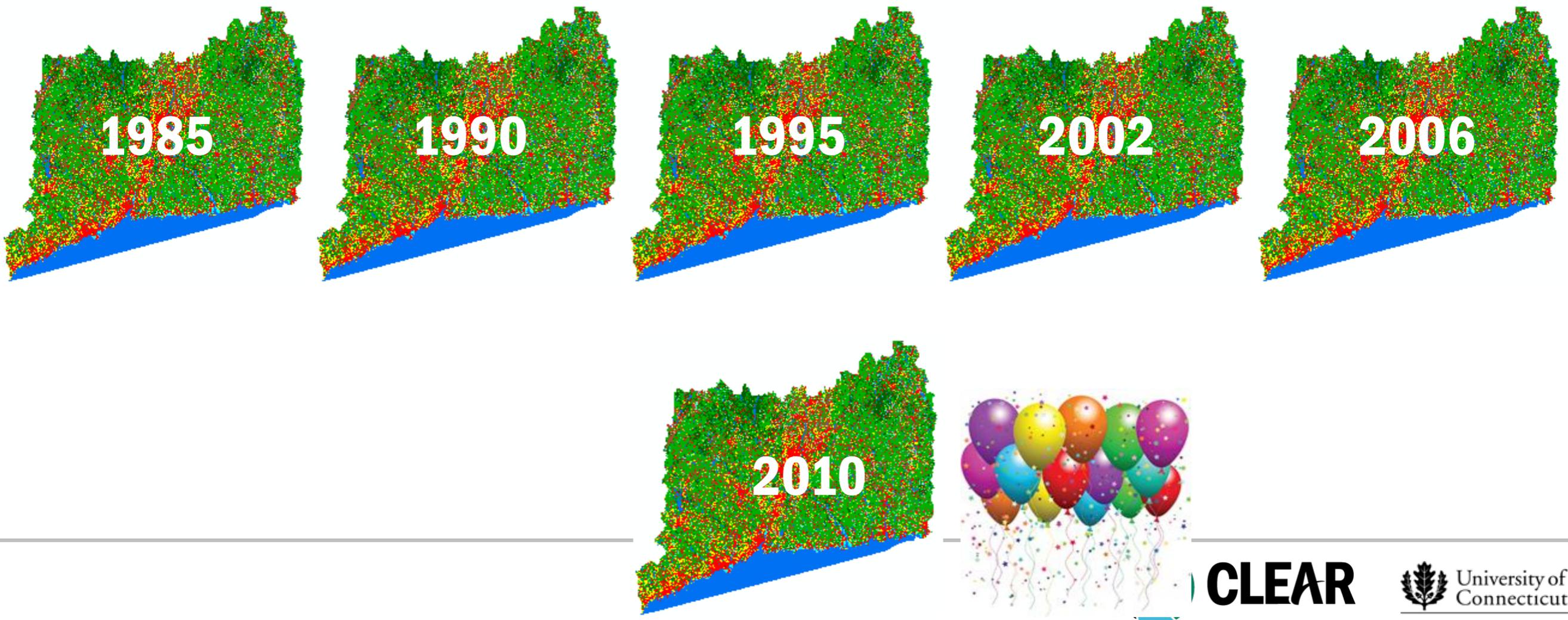
Contact CLEAR  
Phone: 860-345-4511  
Email: [clear@uconn.edu](mailto:clear@uconn.edu)

# Connecticut's Changing Landscape V 2

- **5 dates of consistent land cover**
- **12 classes**
- **Designed for change analysis**

## Version 1 Land cover

- Four dates (1985, 1990, 1995 and 2002)
- 11 classes (missing Ag field!)



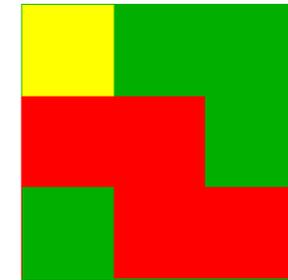
**CLEAR**

# Satellite Images ...

**..are the start – here, Landsat images**

**..are comprised of pixels**

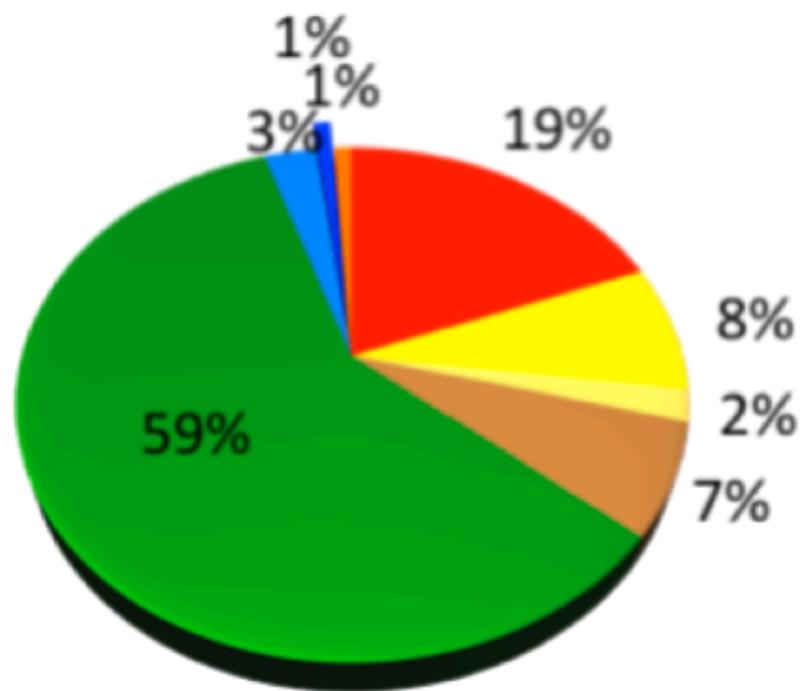
- Each pixel is 30 meters by 30 meters
- Which is about 100 feet by 100 feet



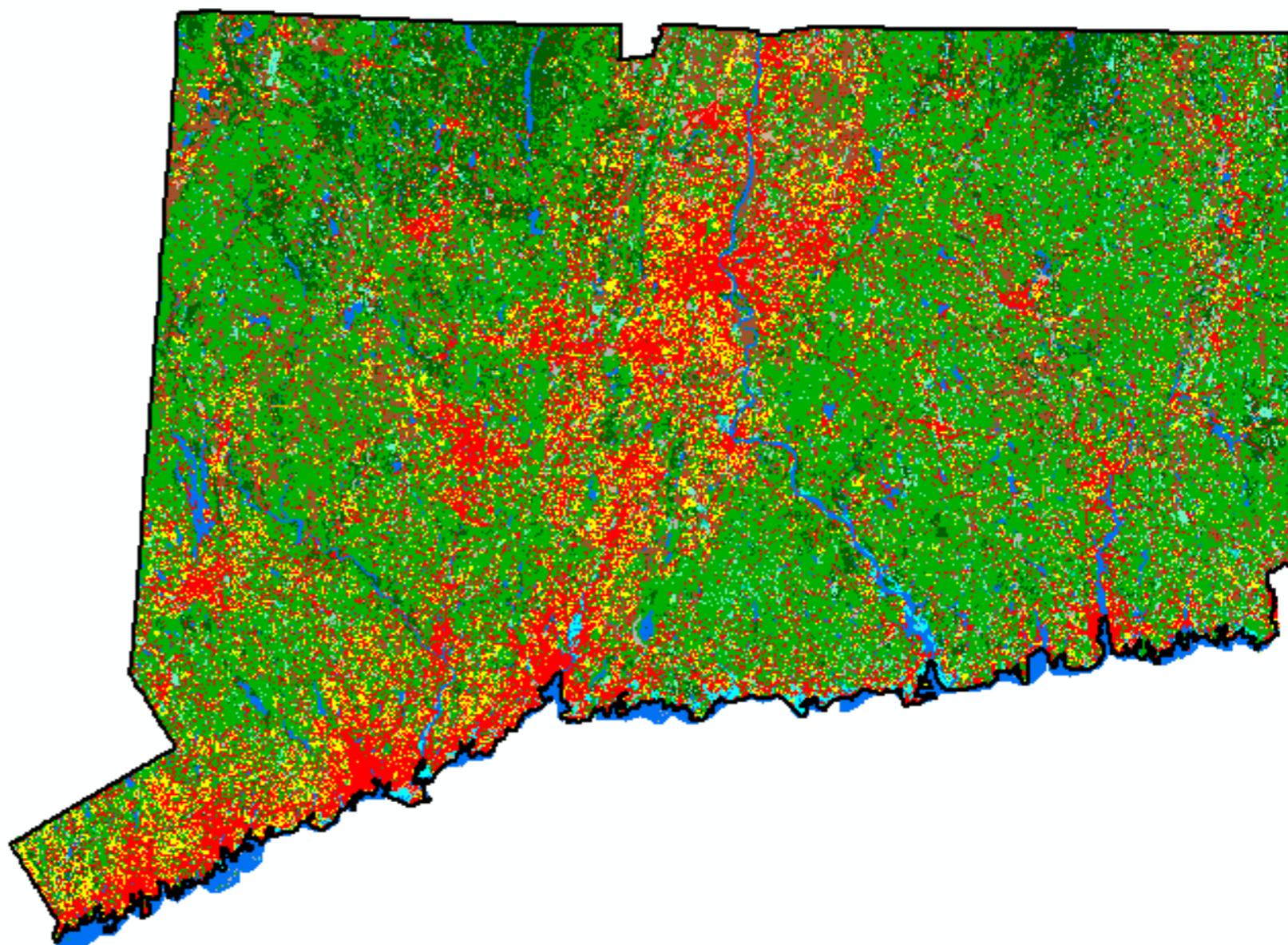
**..have enough detail for regional analysis**

**..have the advantage of covering large areas and the ability to compare to the past**

# Land Cover 2006



- Developed
- Other Grass
- Forest
- Wetland
- Turf/Grass
- Ag Fields
- Water
- Barren

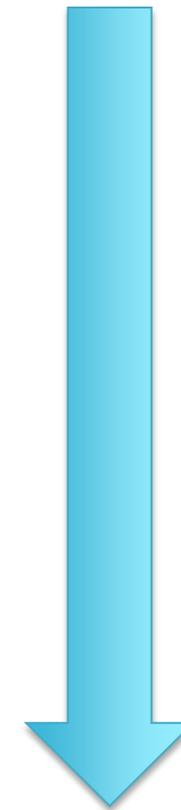


# We don't stop there ... Value Added

## More than just GIS files available

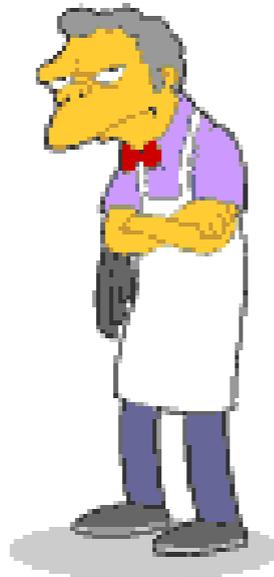
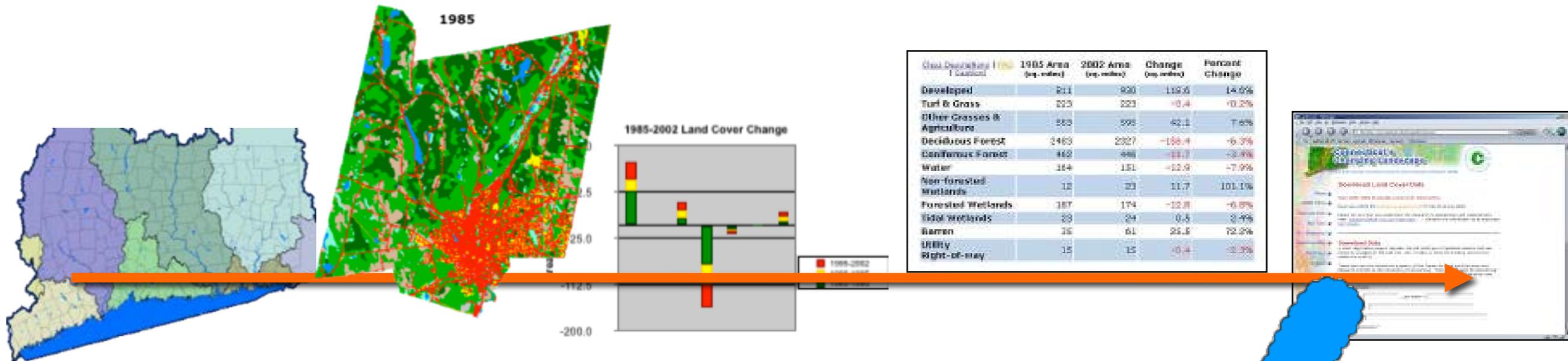
- **Explanations and graphics**
- **Simple:**
  - **statewide maps and graphics**
  - **statewide tables**
  - **town-specific maps and tables**
  - **watershed-specific maps and tables**
- **Interactive map**
- **Data download**

basic



advanced

# Creating access for all users = success



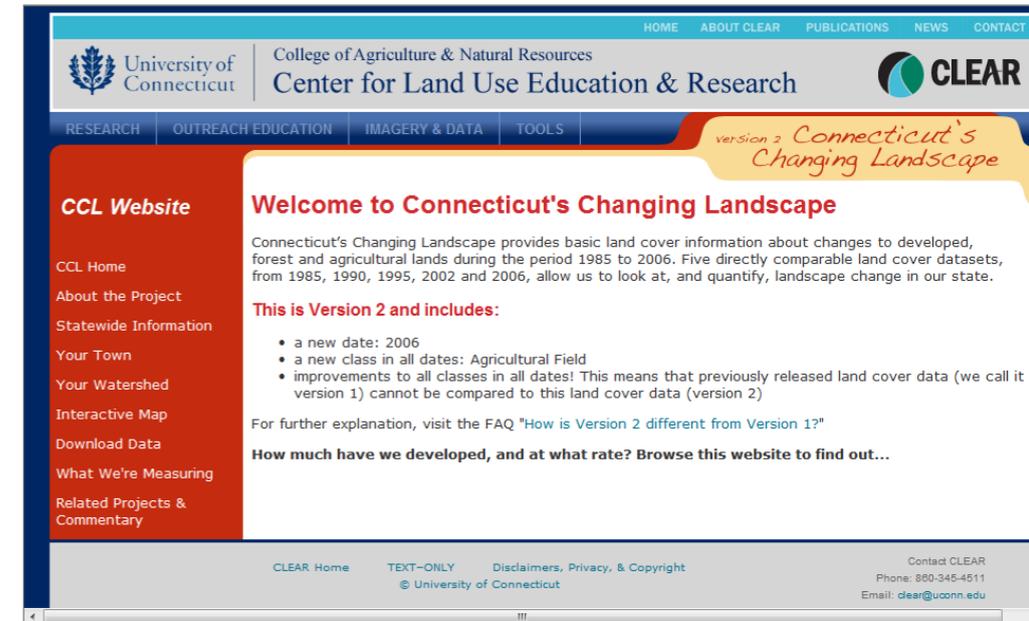
# Web Tour: Land Cover

**Statewide maps, charts and data**

**Your Town: suite of maps and data**

**Your Watershed: suite maps and data**

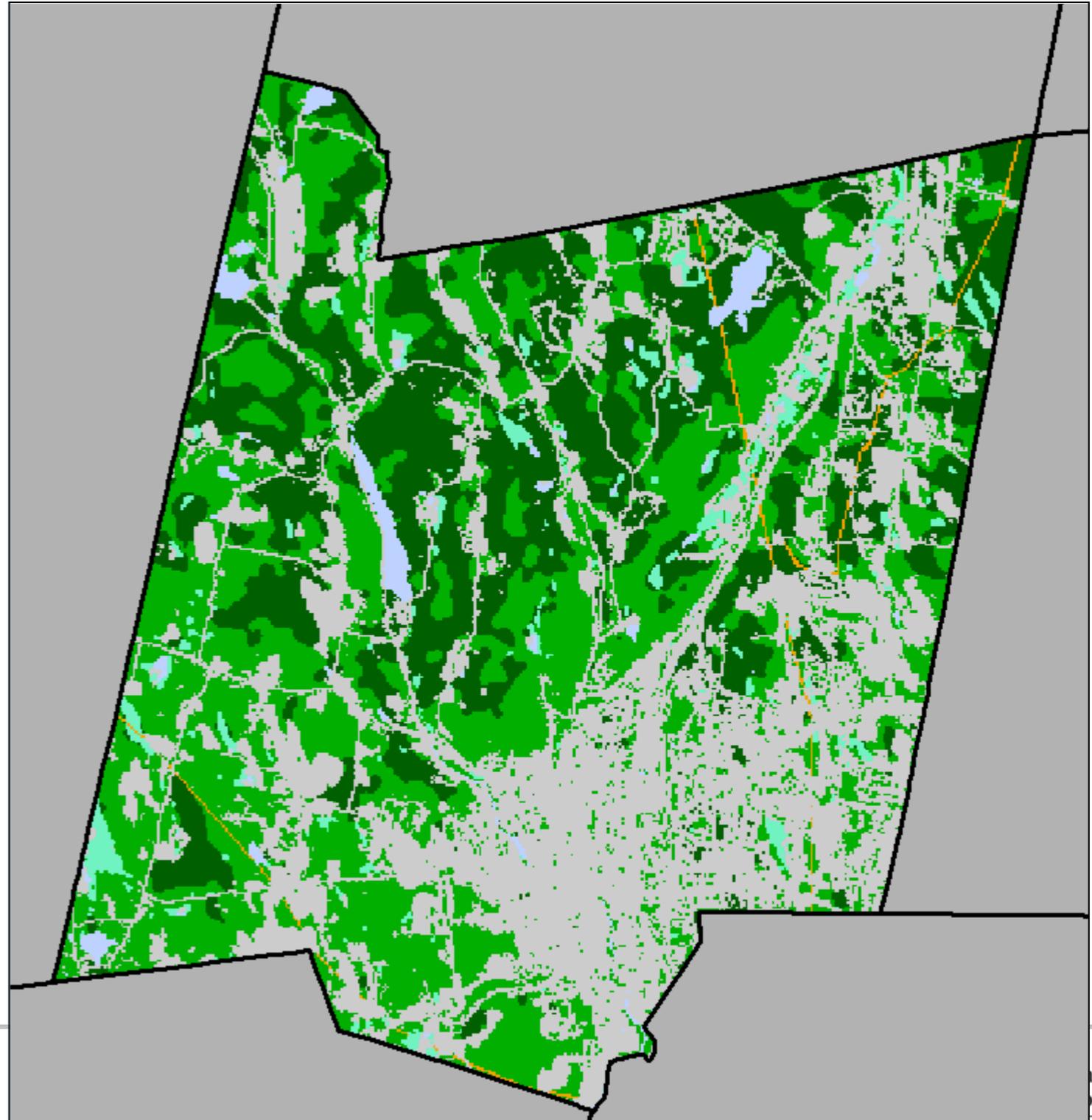
**Interactive map**



<http://clear.uconn.edu/projects/landscape>

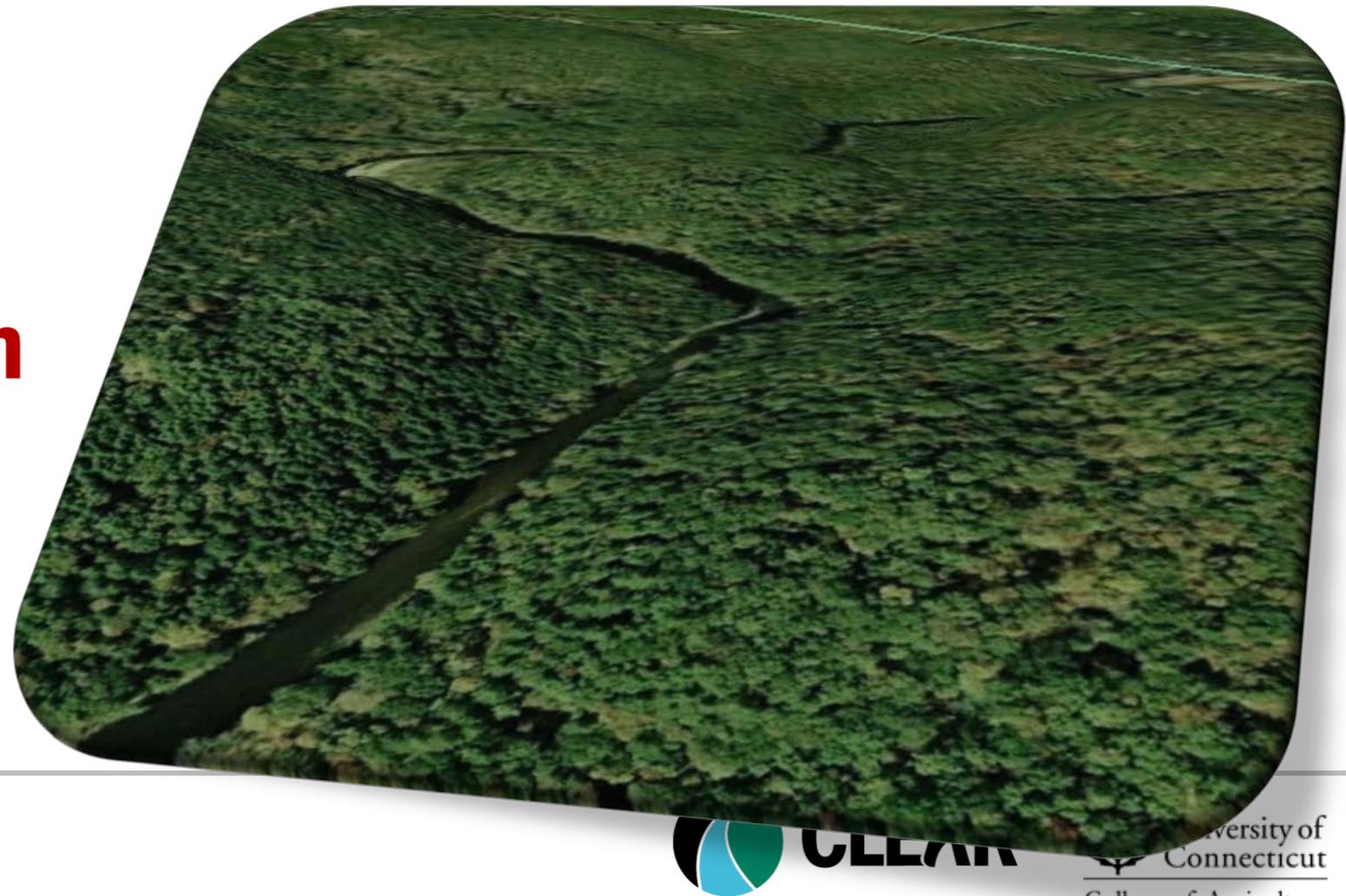


# Breaking down the land cover: **Forest**

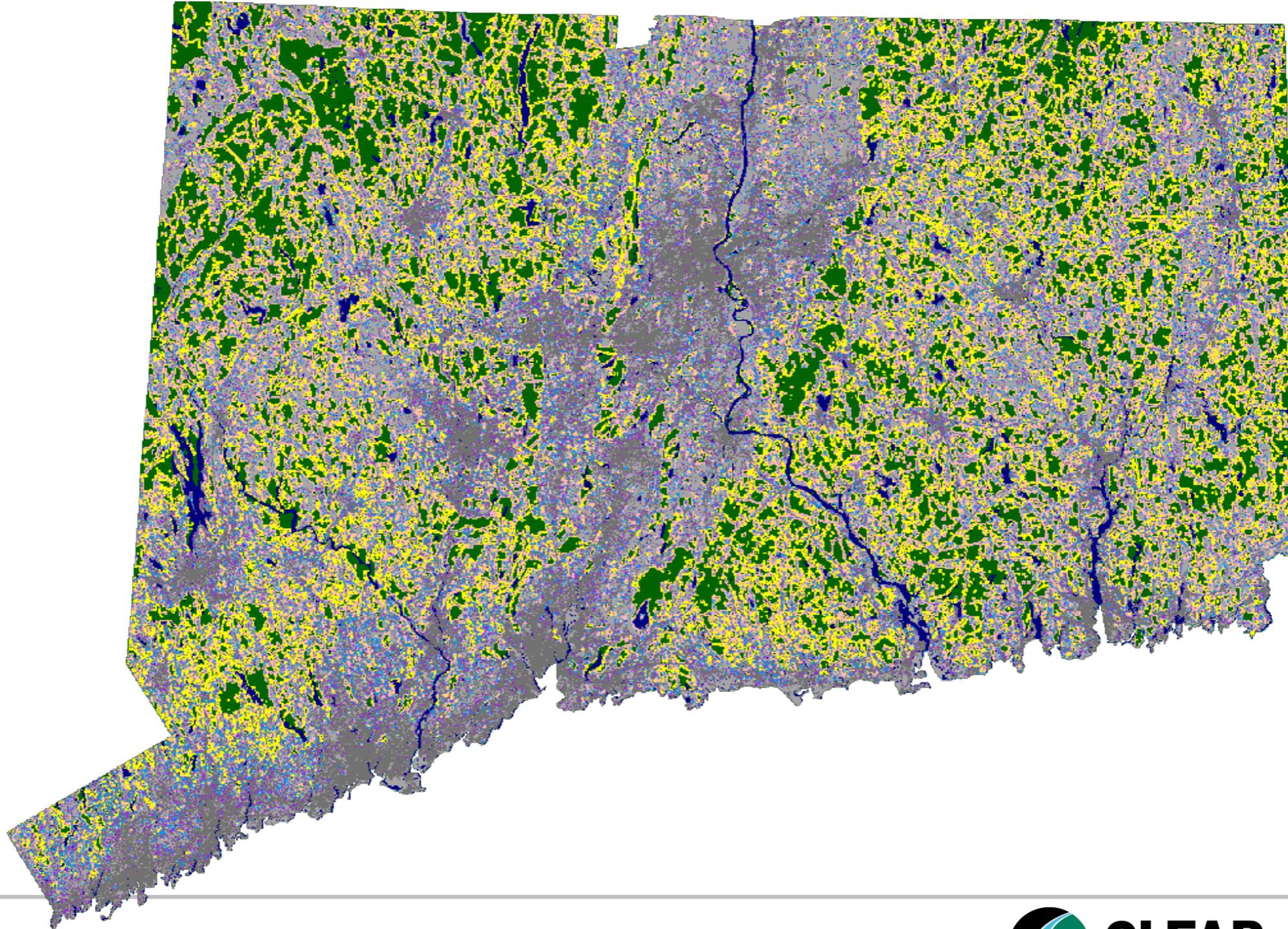


# The Value of Forested Land

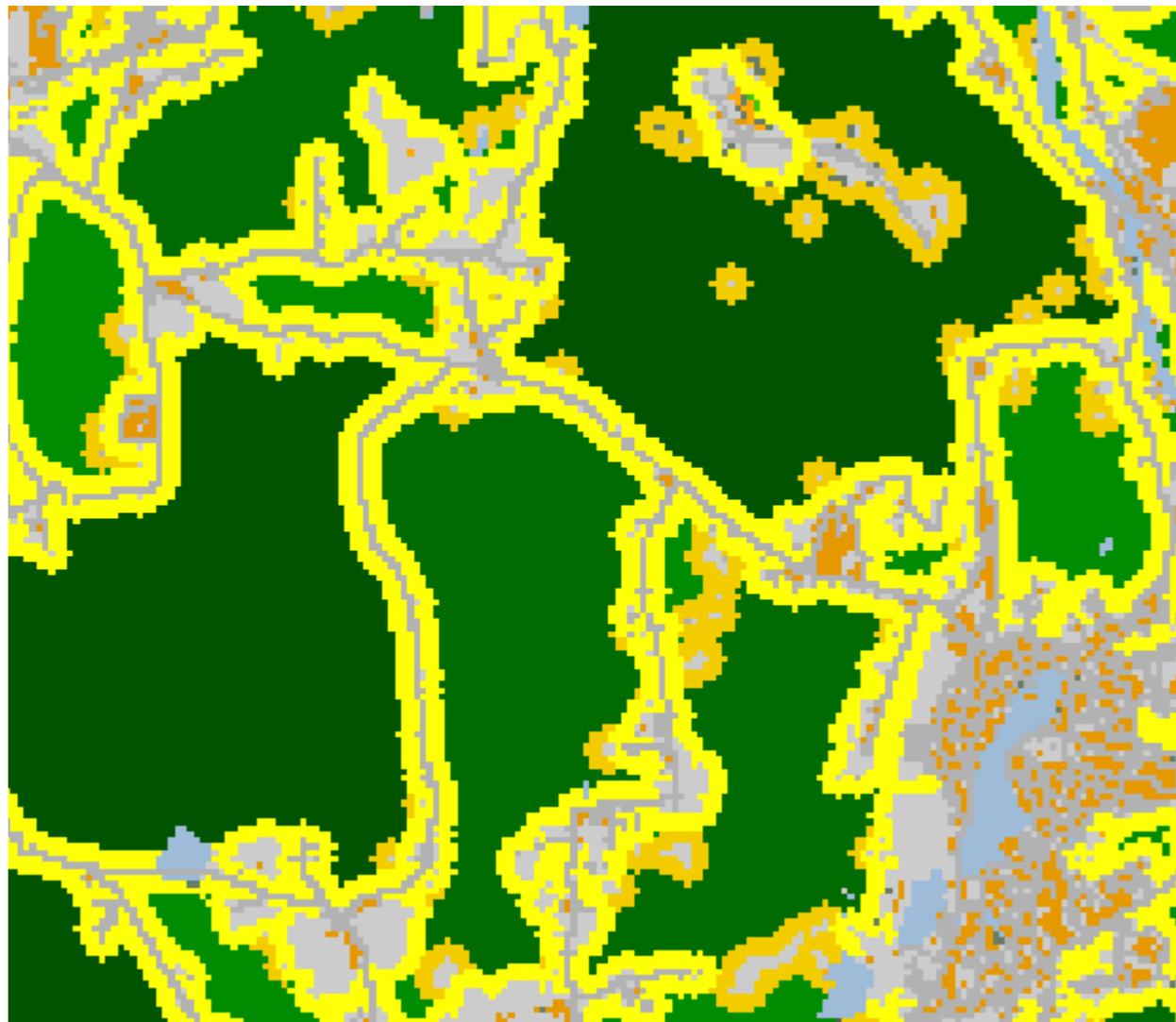
- **Water resource protection**
- **Wildlife habitat**
- **Carbon sequestration**
- **Air quality**
- **Soil stabilization**
- **Stormwater retention**



# Forest Quantity vs. Quality... Enter Forest Frag Model



# Closeup of Forest Frag Model



**Using 300 ft. Edge Width**

-  **Non-forest**
-  **Patch Forest**
-  **Perforated Forest**
-  **Edge Forest**
-  **Core Forest < 250 ac.**
-  **Core Forest 250-500ac.**
-  **Core Forest > 500 ac**

# Web Tour: Forest Fragmentation

**What we're measuring**

**Your Town: maps and data**

**Your Watershed: maps and data**

**Data Download**

University of Connecticut | College of Agriculture & Natural Resources  
Center for Land Use Education & Research

RESEARCH | OUTREACH EDUCATION | IMAGERY & DATA | TOOLS

Forest Fragmentation  
derived from Connecticut's Changing Landscape

Forest Frag Home  
About the Project  
Statewide Information  
Your Town  
Your Watershed  
Interactive Map  
Download  
What We're Measuring  
Connecticut's Changing Landscape Land Cover Website

**Welcome to CLEAR's Forest Fragmentation Analysis Project**

This portion of the CLEAR Research site provides information on the results of our forest fragmentation analysis. By applying CLEAR's forest fragmentation tool to the five remote sensing-derived land cover datasets of the Connecticut's Changing Landscape study (1985, 1990, 1995, 2002, 2006), we can get a better sense of the health and function of one of our state's most important natural resources.

As shown in Connecticut's Changing Landscape, about 60% of our state is classified as "forested," i.e., covered with trees (green and dark green, below left). However, the quantity of the forest is not necessarily equal to the quality of the forest, which is greatly impacted by proximity to non-forested areas. Over the time period covered by our study, 1985 - 2006, the amount of "core" forest, which is relatively undisturbed by development, has decreased (green areas, below, right).

View the [Forest Fragmentation Research Summary \(4 page pdf\)](#)

2006 forest cover where green is forest.

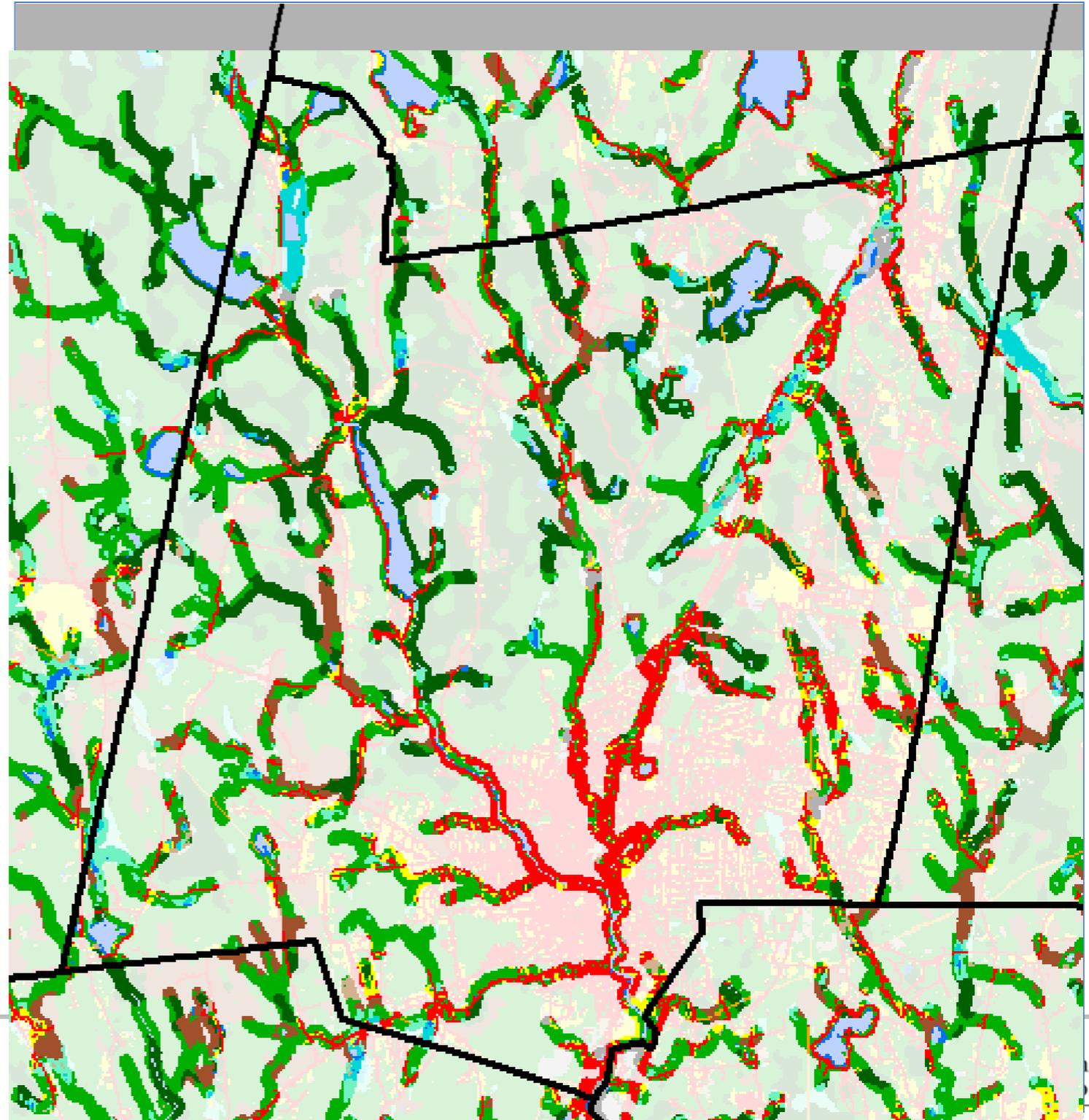
2006 forest fragmentation where dark green is core forest and yellows and oranges are fragmented forest.

What does the forest look like in your town or watershed and how has it changed? Browse this website to find out...

<http://clear.uconn.edu/projects/landscape/forestfrag>



# Breaking down the land cover: Riparian (streamside) areas



# Riparian areas/corridors/buffers

- **Bank stabilization**
- **Temperature regulation**
- **Supply of “woody debris”**
- **Pollutant and nutrient processing and removal**
- **Wildlife habitat**



## Satellite Images ...

**..are the start (here, Landsat )**

**..are comprised of pixels**

- Each pixel is 30 meters by 30 meters
- Which is about 100 feet by 100 feet

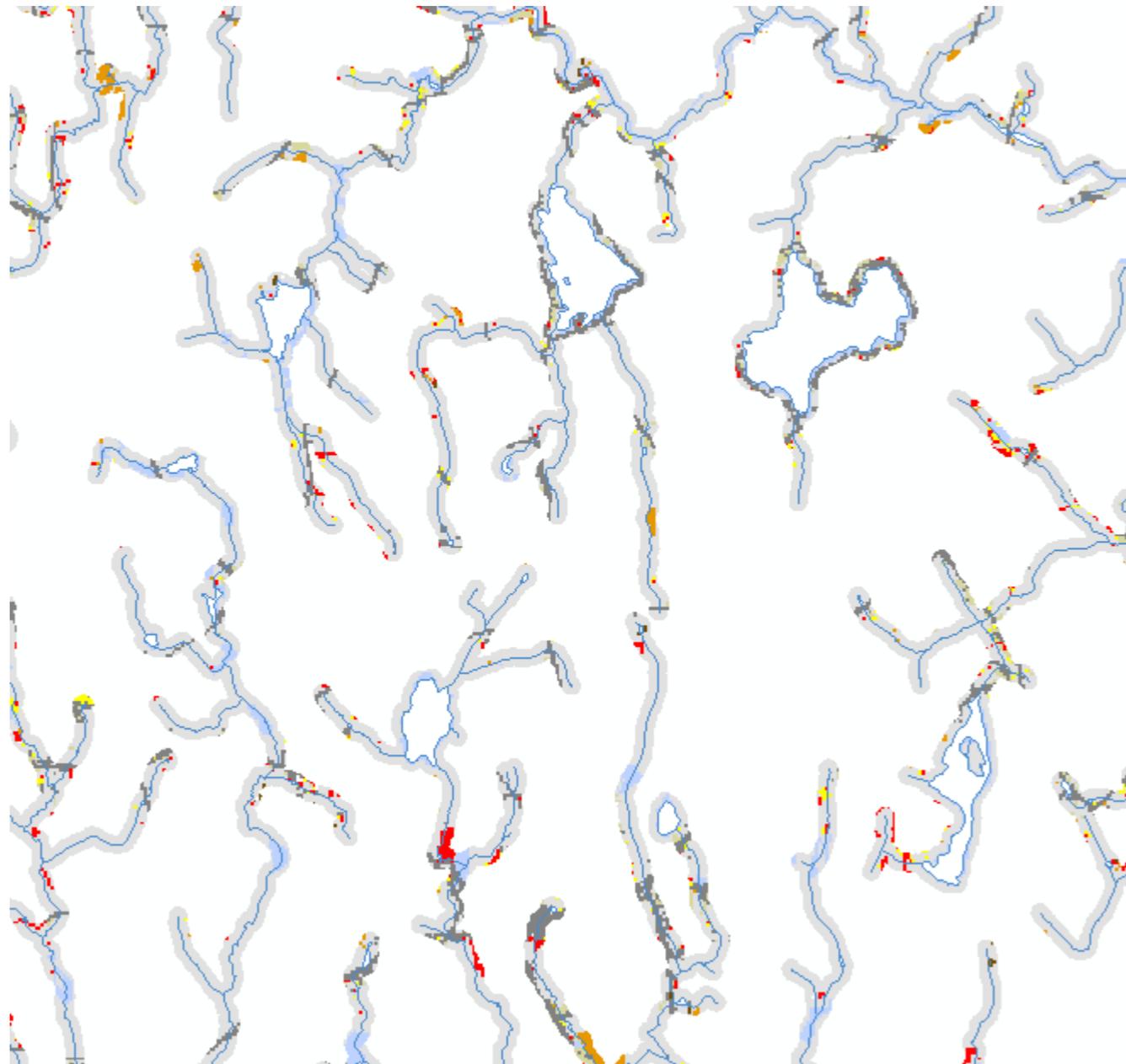


**We feel the 100 foot zone pushes the appropriate use of the data. It was retained in the analysis because many towns work with review zones that are 100 feet or less.**

**..have enough detail for regional analysis**

**..have the advantage of covering large areas and the ability to compare to the past**

# Riparian Areas: Methods



- Land Cover**
- Developed
  - Turf & Grass
  - Other Grass
  - Agricultural Field
  - Deciduous Forest
  - Coniferous Forest
  - Water
  - Non-forested Wetland
  - Forested Wetland
  - Tidal Wetland
  - Barren
  - Utility Right-of-way (Forest)

- Change Classes**
- to Developed
  - to Turf & Grass
  - to Other Grass
  - to Agricultural Field
- No Change Classes**
- Vegetated\* No Change
  - Developed No Change
  - Turf and Grass No Change
  - Water
  - Other\*\*

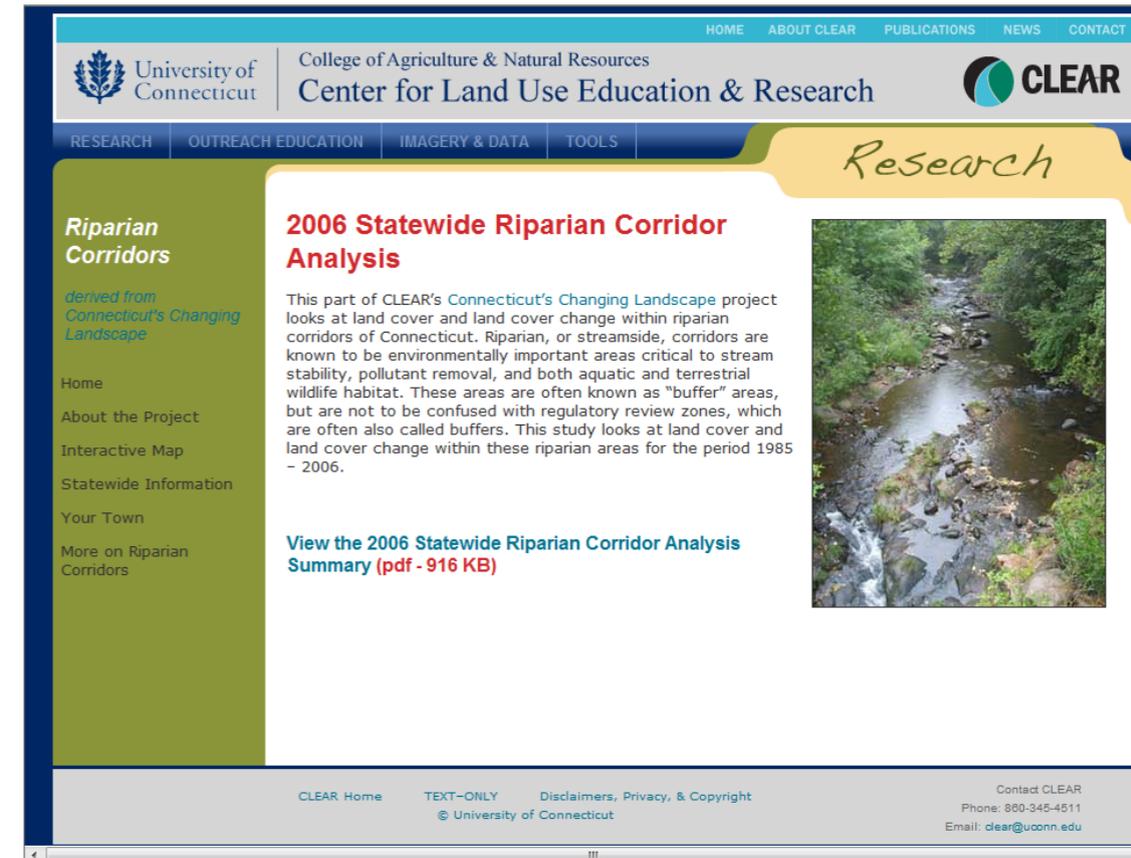


# Web Tour: Riparian Corridors

**Your Town: maps and data**

**Statewide**

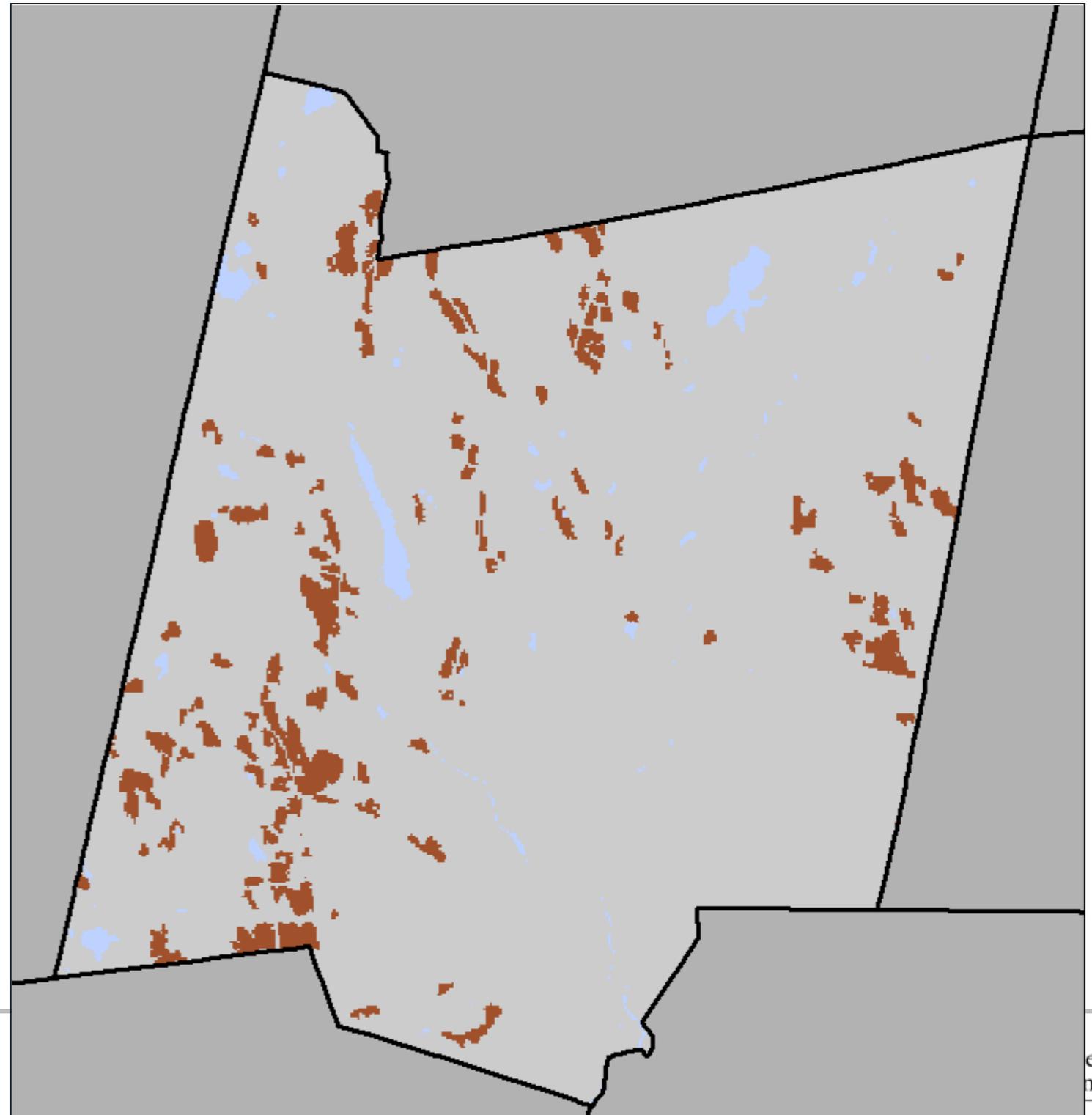
**Interactive map**



<http://clear.uconn.edu/projects/riparian>



# Breaking down the land cover: **Agricultural Fields**



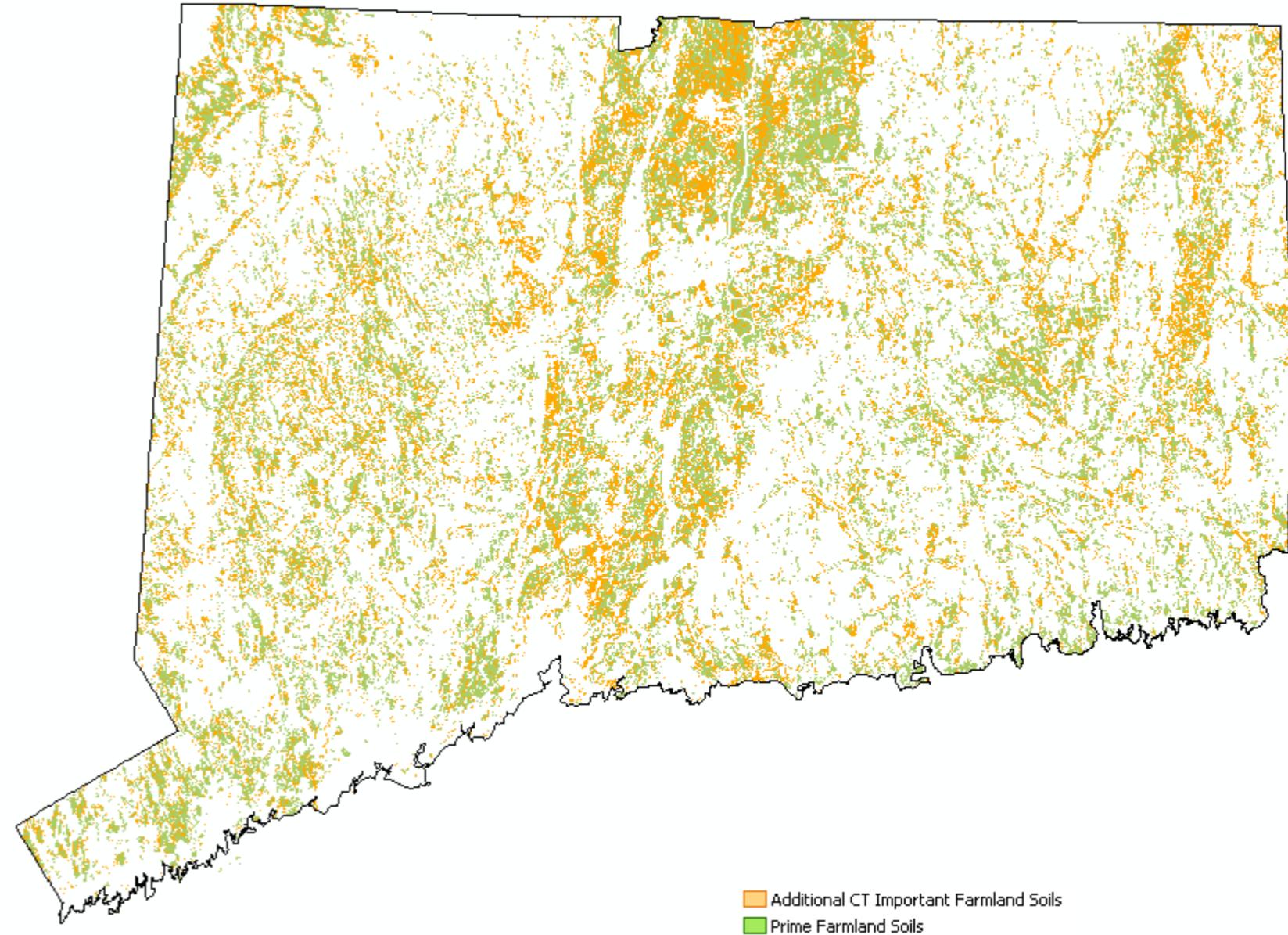
# Agricultural Field ..

- .. is a land cover class.**
- .. includes lands that have spectral qualities that correspond to land in active agriculture, such as crop fields and pasture.**

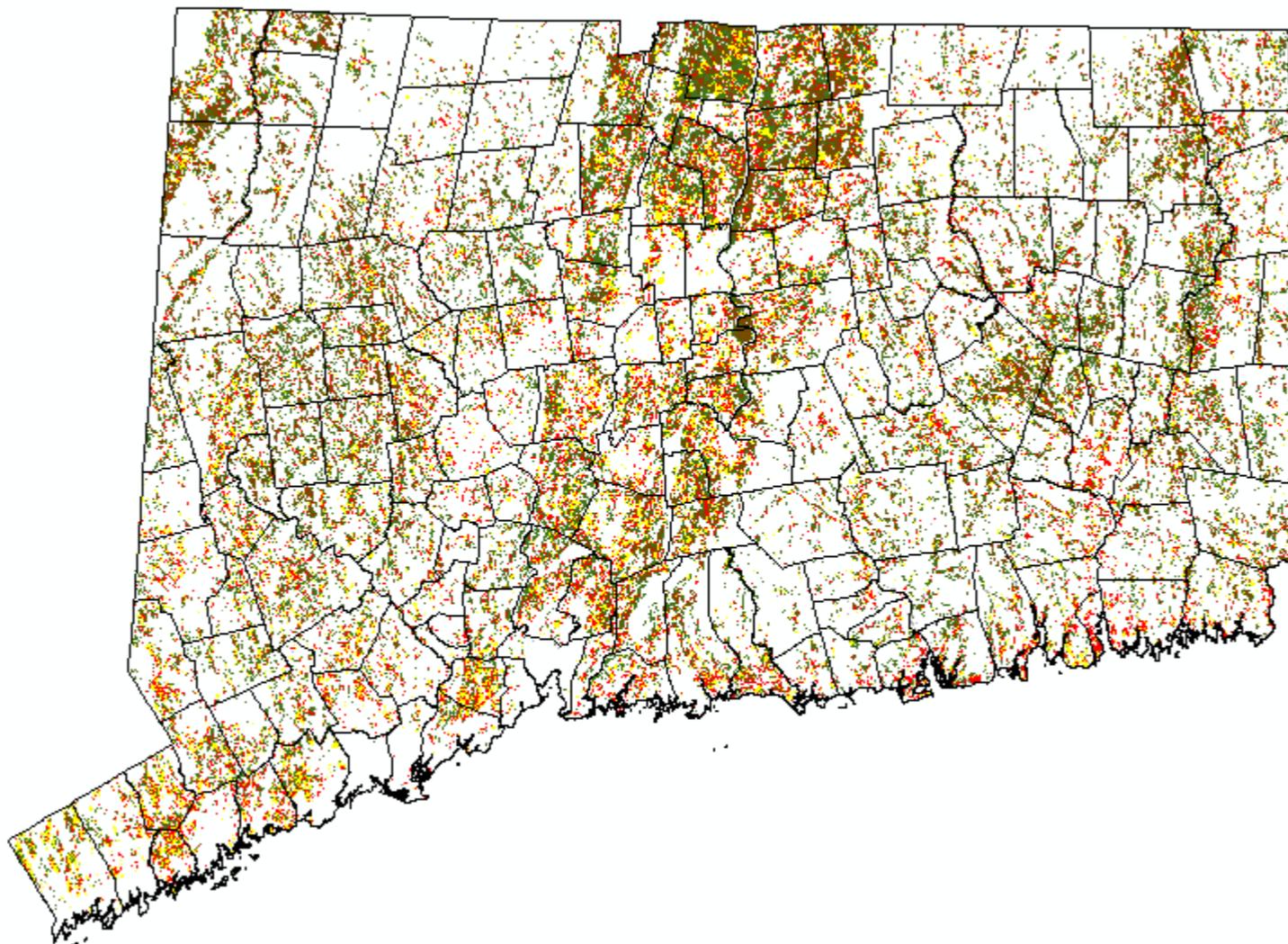
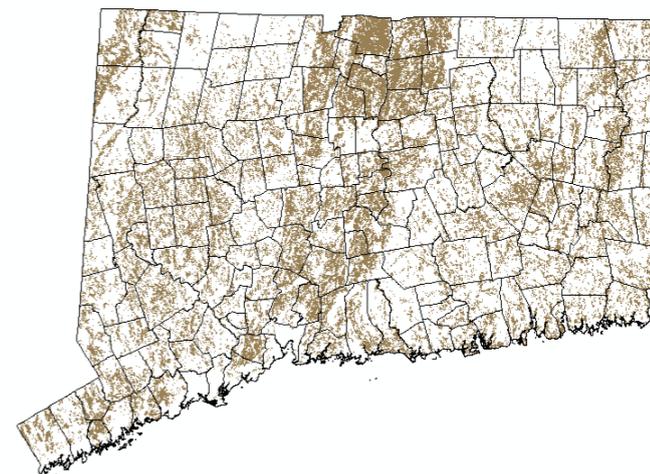
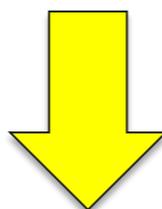
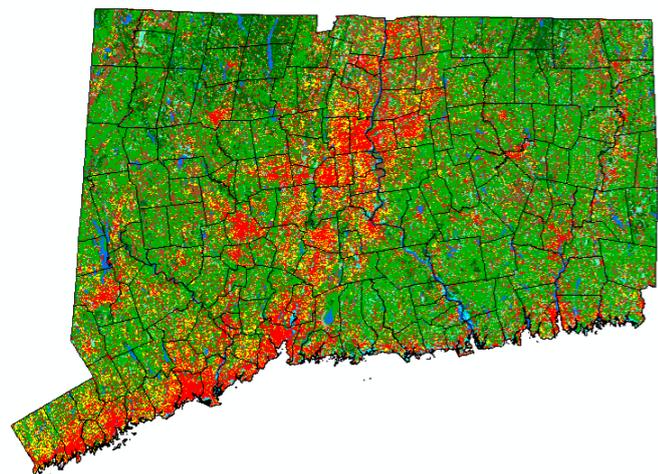


# Agricultural Soils

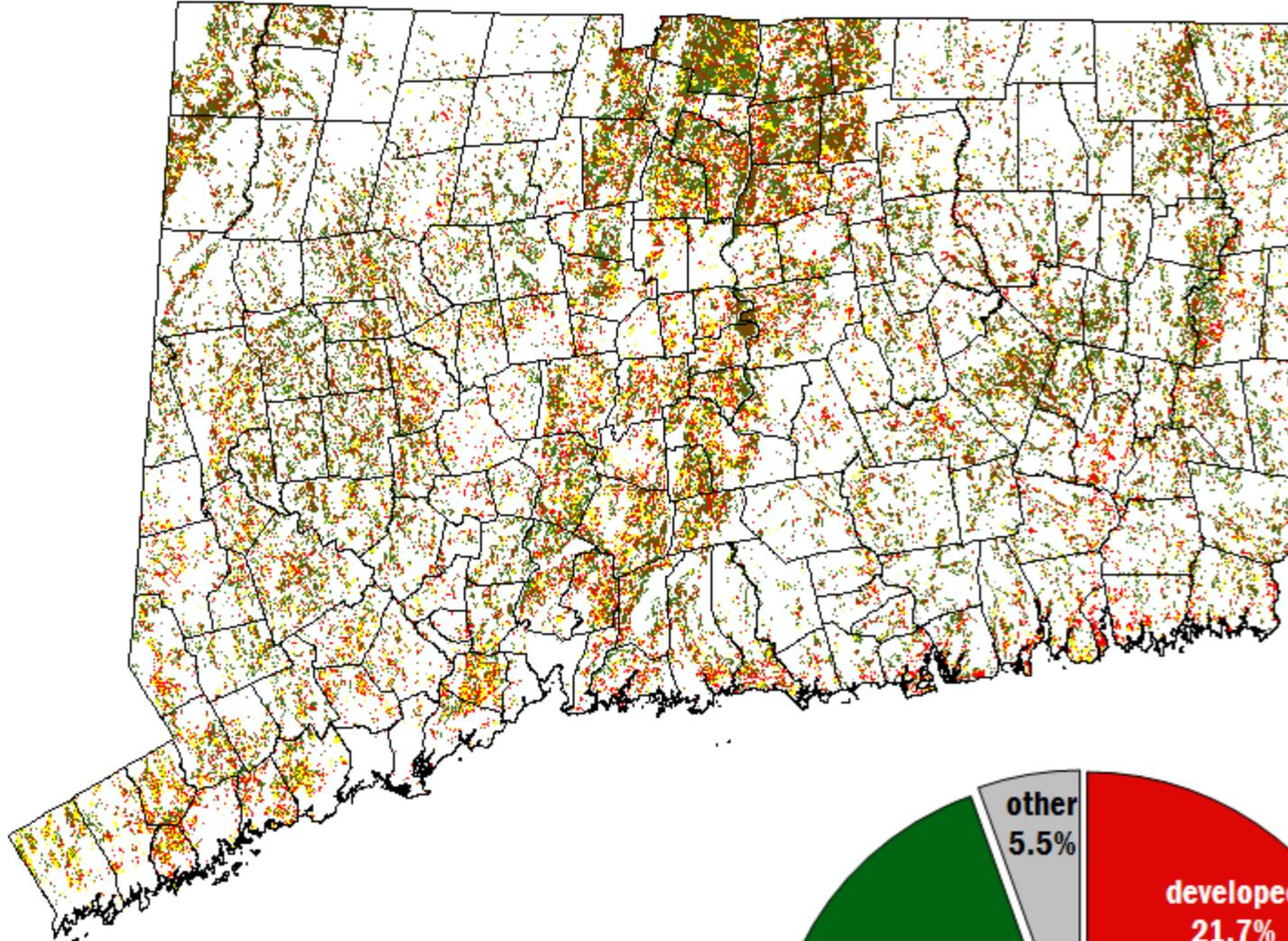
- **NOT derived from land cover**
- **USDA NRCS**
- **Prime and important ag soils cover 27.1% of the state**



# Land Cover Meets Farm Soils

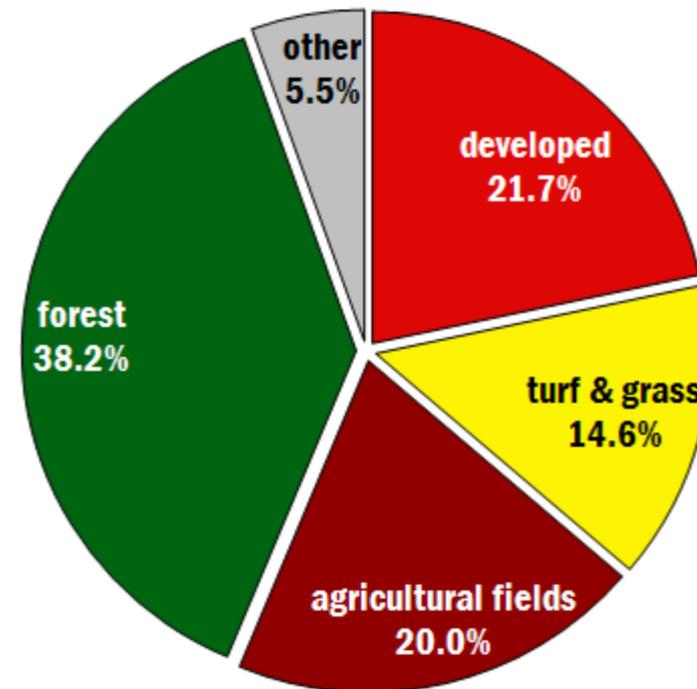


# Land Cover over Farm Soils 2006



## CT Farm Soils

- 1) Forest
- 2) Developed
- 3) Ag. Fields



# Web Tour: Agricultural Fields and Soils

**Statewide maps, charts and data**

**Your Town: maps and data**

**Your Watershed: maps and data**

**Interactive map**



<http://clear.uconn.edu/projects/ag>

A screenshot of the CLEAR website. The header includes the University of Connecticut logo, the College of Agriculture & Natural Resources, and the CLEAR logo. The main content area is titled "Agricultural Fields and High Quality Agricultural Soils" and features two maps of Connecticut: one showing agricultural fields from CCL Land Cover and another showing high quality agricultural soils. The page includes a sidebar with navigation links and a footer with contact information.

University of Connecticut | College of Agriculture & Natural Resources | Center for Land Use Education & Research | CLEAR

RESEARCH | OUTREACH EDUCATION | IMAGERY & DATA | TOOLS | Research

### Agricultural Fields and Soils

derived from Connecticut's Changing Landscape

Home  
About the Project  
Interactive Map  
Statewide Information  
By Town

#### Agricultural Fields and High Quality Agricultural Soils

The latest version of CLEAR's *Connecticut's Changing Landscape* (CCL) project was not only an update (to 2006), but an upgrade - CCL Version 2 now includes a new land cover class, agricultural fields. This site summarizes an analysis of the status and trends of agricultural fields in Connecticut, and how they relate to the statewide data on agricultural soils of importance.

Click here to see the [Research Summary \(6Mb pdf\)](#) for this analysis.

Agricultural Fields from CCL Land Cover.

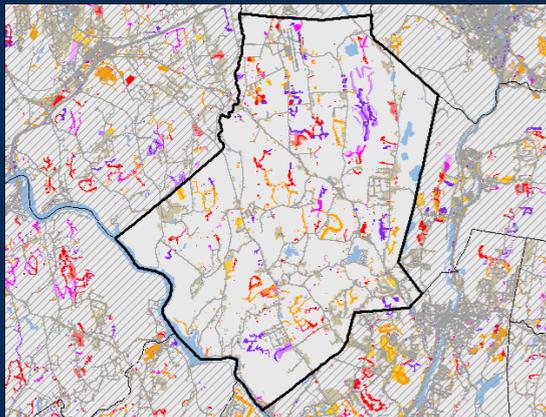
High Quality Agricultural Soils. Dark orange areas are classified as Prime Farmland Soils by the US Department of Agriculture, Natural Resources Conservation Service. Light orange areas are classified as Additional CT Important Farmland Soils.

See [Statewide Information](#) page for larger views of these maps and many more.

CLEAR Home | TEXT-ONLY | Disclaimers, Privacy, & Copyright | © University of Connecticut | Contact CLEAR | Phone: 860-345-4511 | Email: [clear@uconn.edu](mailto:clear@uconn.edu)

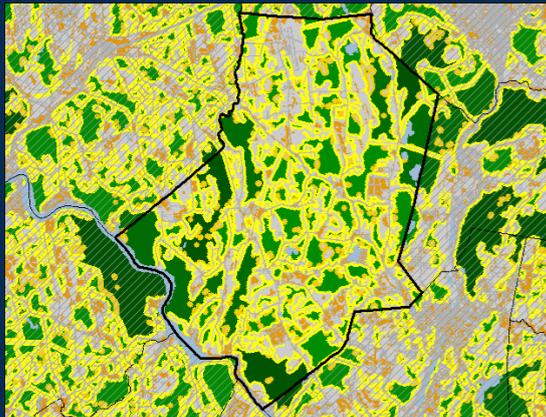


# Looking Deeper into Land Cover Classes



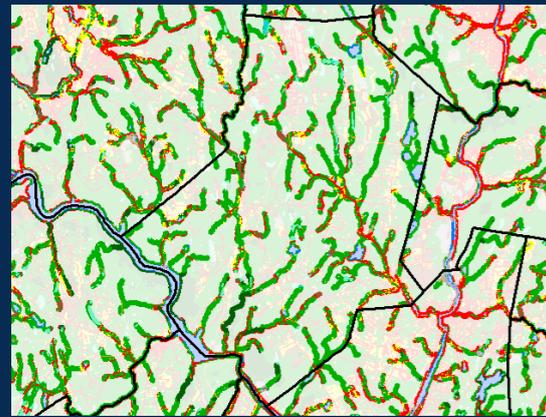
## Developed Land Cover

<http://clear.uconn.edu/projects/landscape>



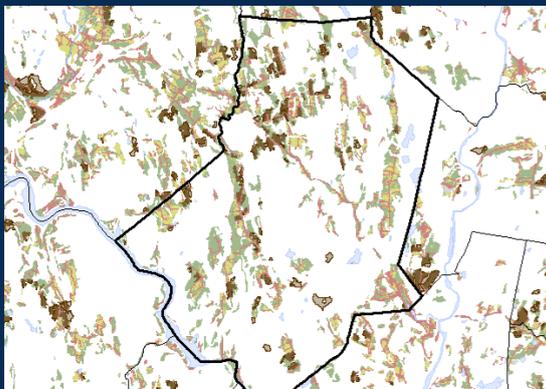
## Forest Cover via Forest Fragmentation

<http://clear.uconn.edu/projects/landscape/forestfrag>



## Riparian Corridors

<http://clear.uconn.edu/projects/riparian>



## Agricultural Lands

<http://clear.uconn.edu/projects/ag>

# Ground to cover

## Emily

- Land Cover
- Forest and Fragmentation
- Riparian (streamside) Areas
- Farmland

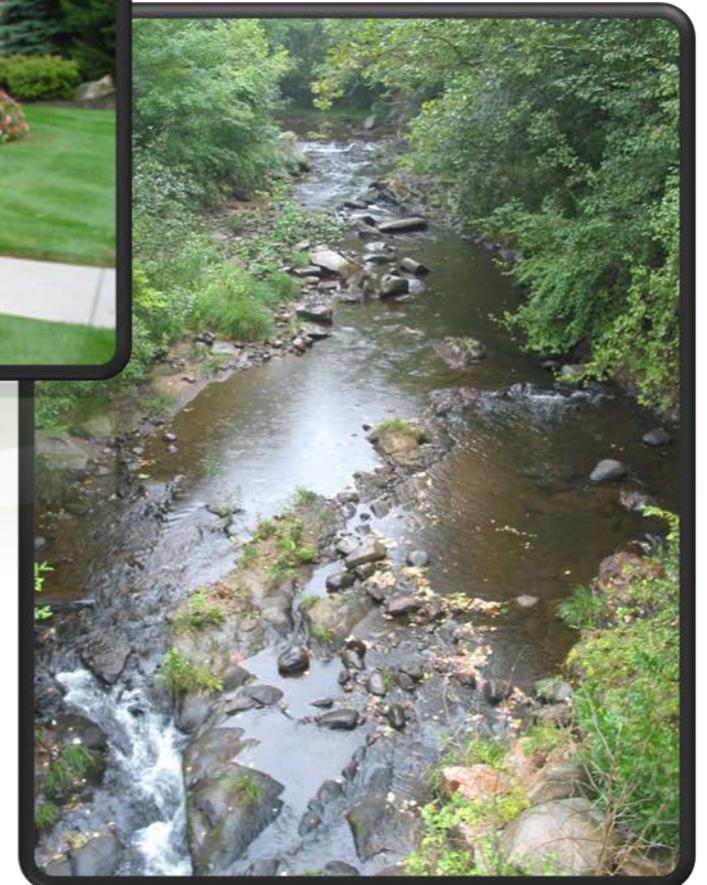
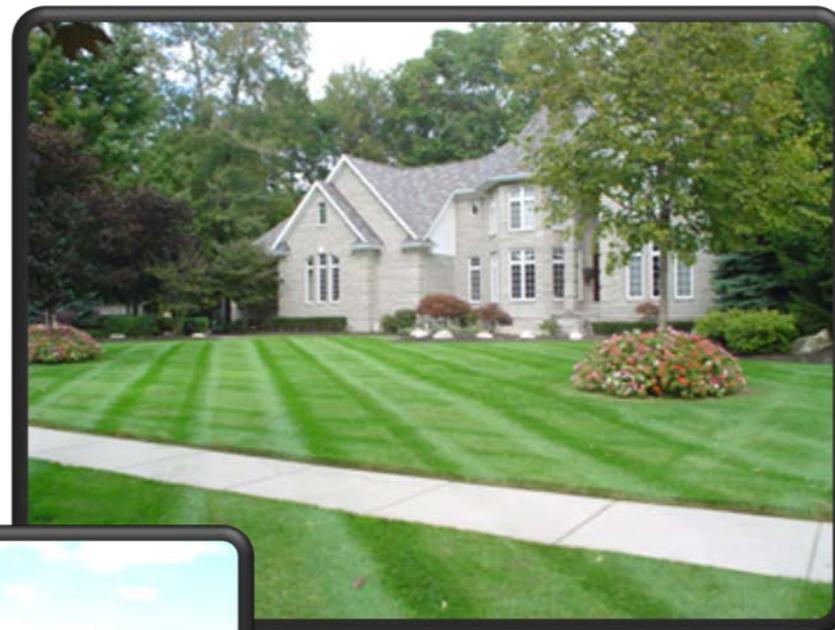
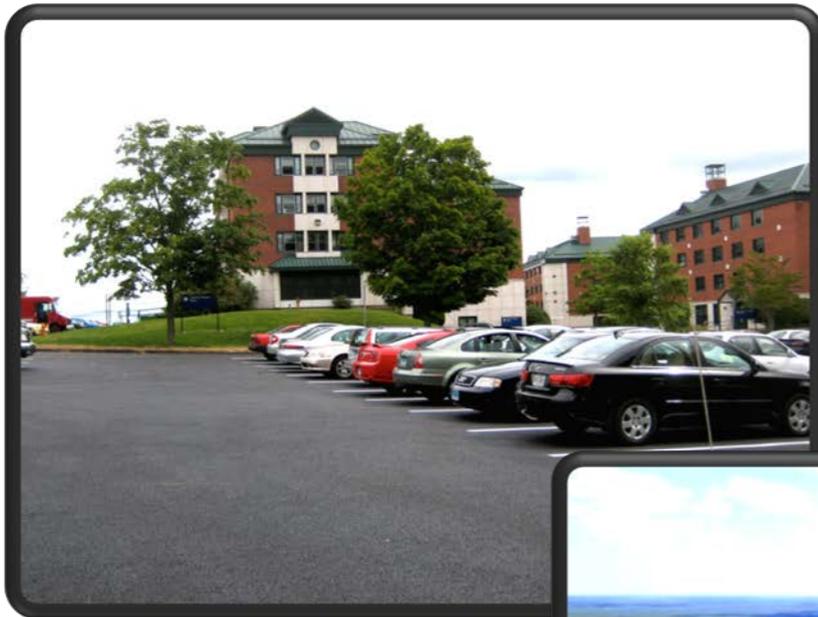
## Chet

- Why 30m data?
- How is it being used



# Why 30 meter land cover?

- 1. Because we can (geographic coverage; price range)**
- 2. Because it relates to environmental health**



# Why 30 meter land cover?

## 3. Because it's useful for our target audience

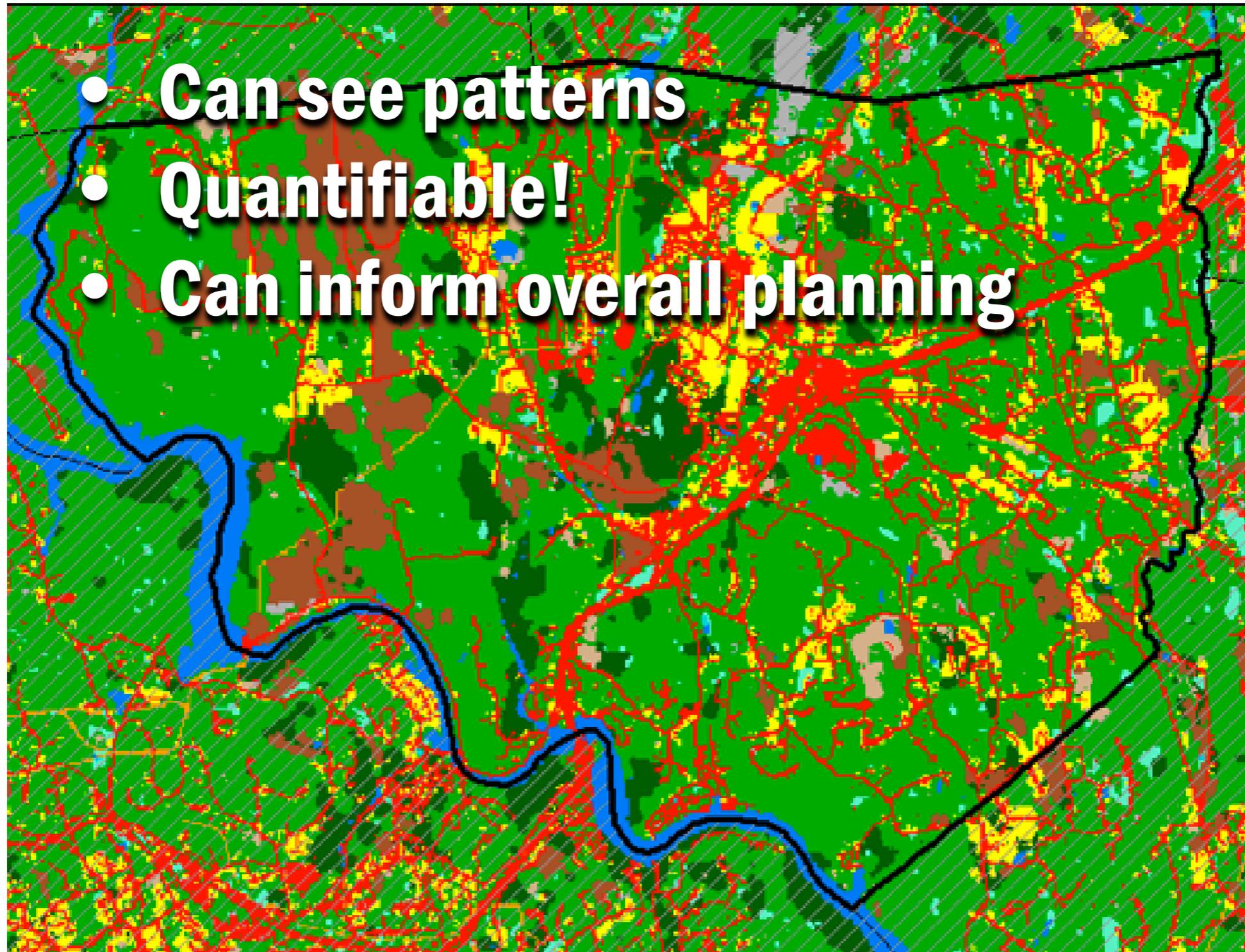
(They don't  
*know* they  
need it...)



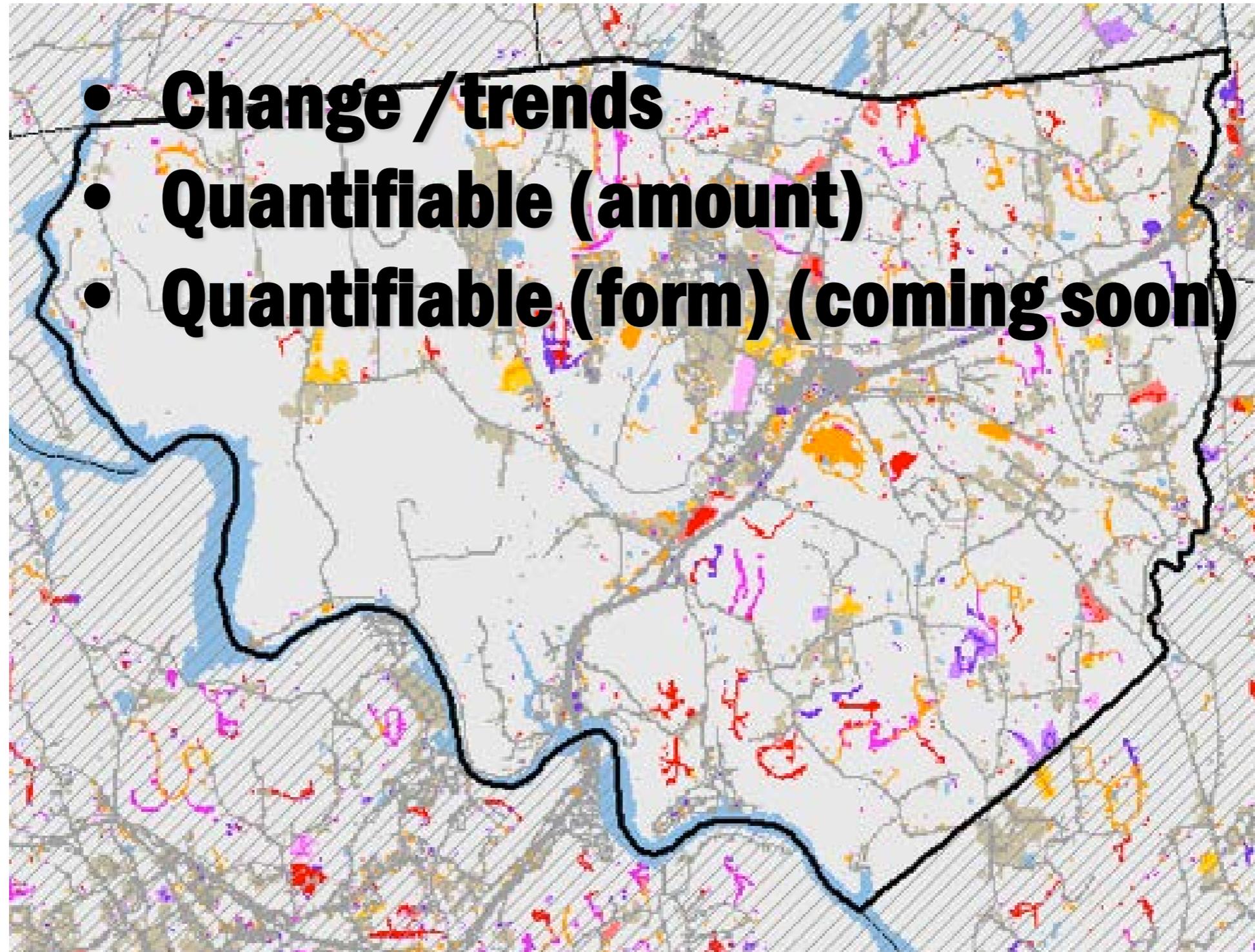
# Southbury, CT: 2010 NAIP Orthophotography



# Southbury, CT: Land Cover 2006



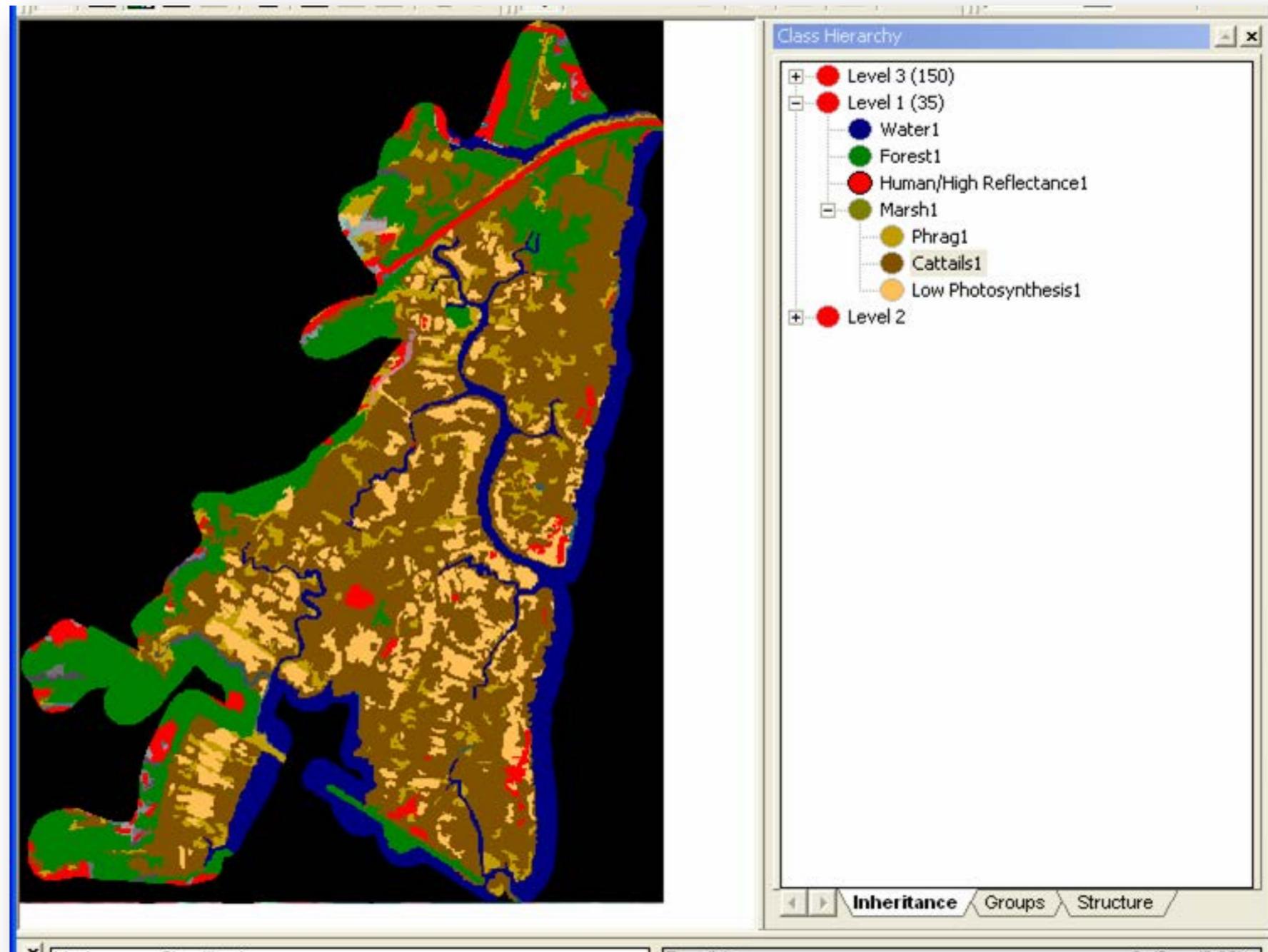
# Southbury, CT: Land Cover Change 1985 - 2006



# Do you want to see the forest, or the trees?

**What resolution is best for what you want to study or convey?**

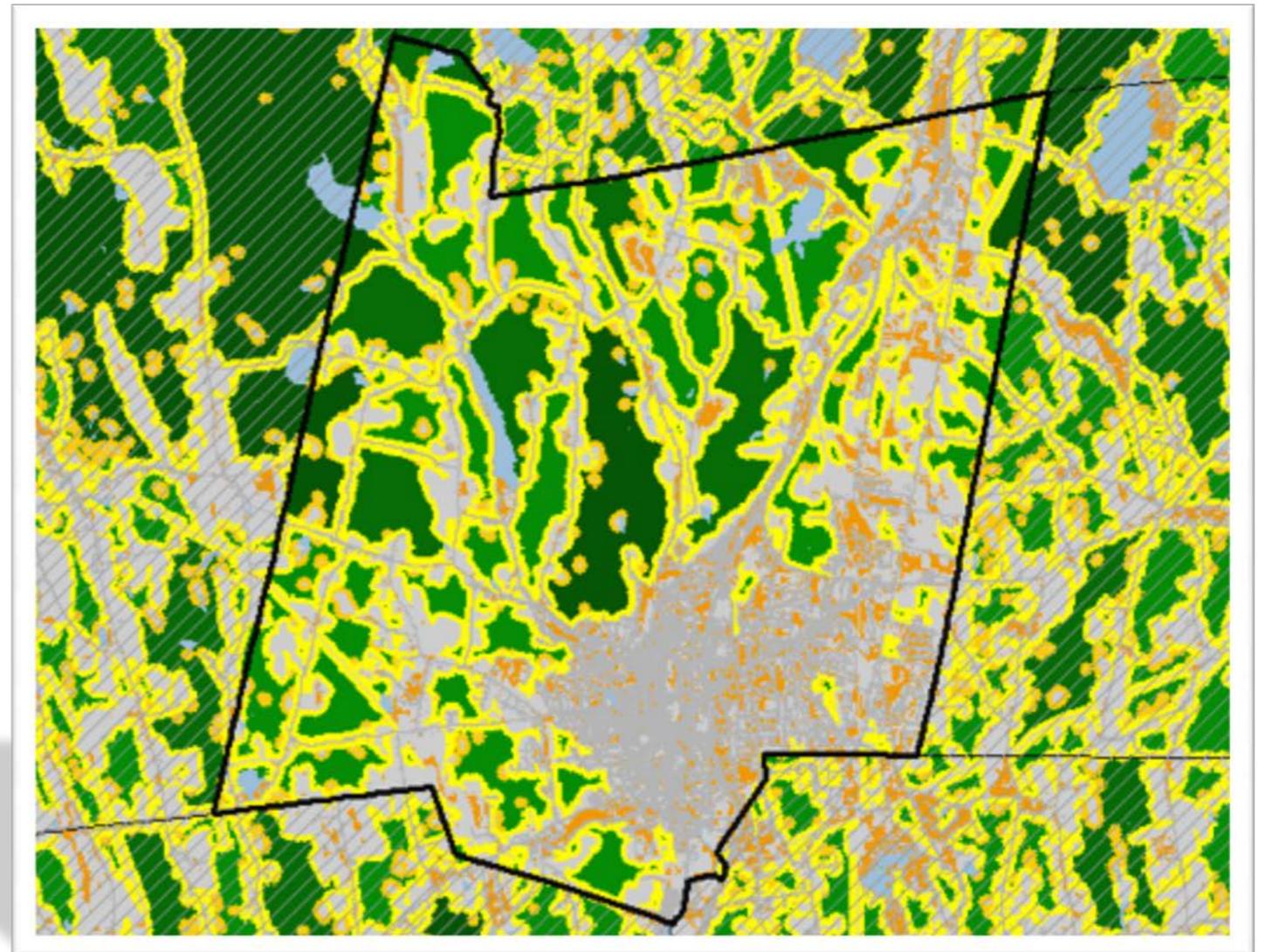
**Marsh species composition:**  
**eCognition high resolution land cover**



# Do you want to see the forest, or the trees?

**What resolution is best for what you want to study or convey?**

**Habitat protection:**  
**Large forest blocks**



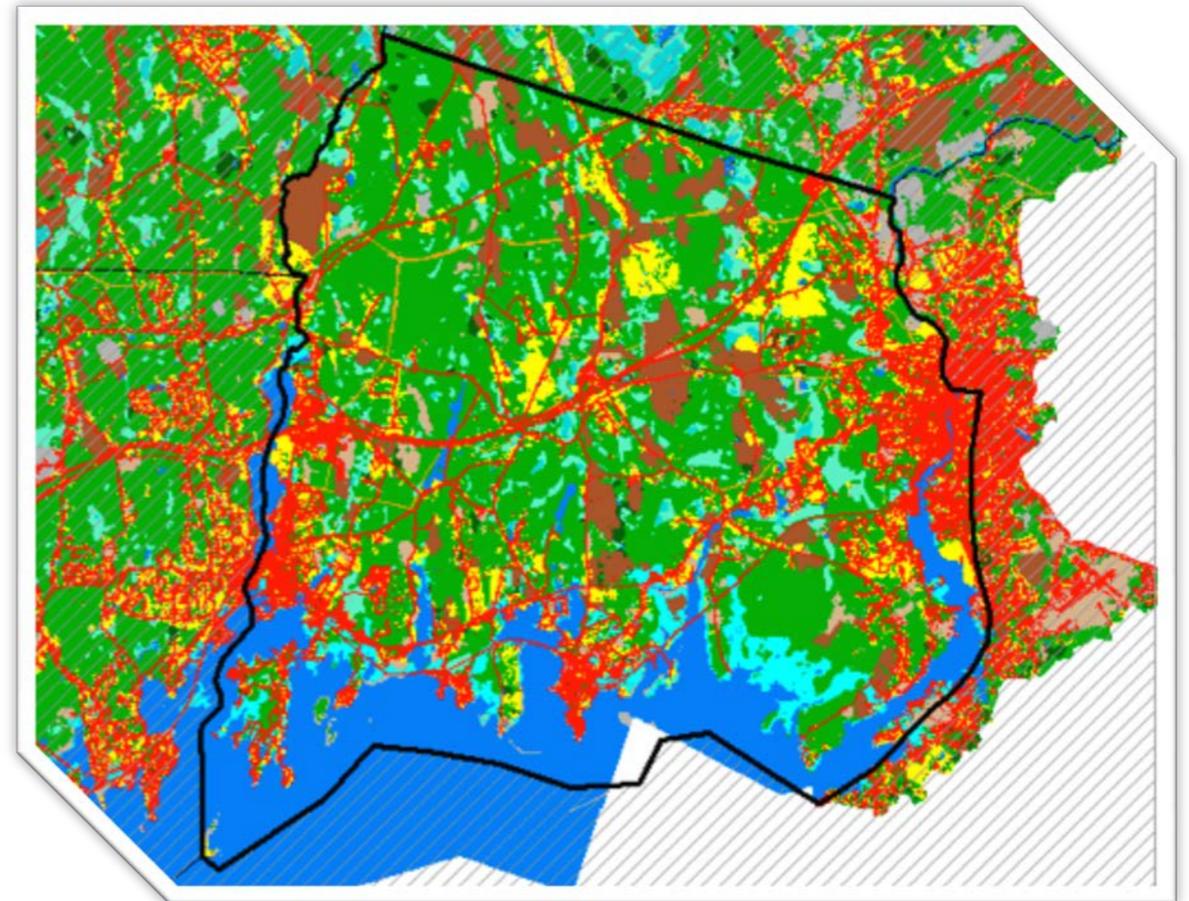
**So, does anyone use it?**



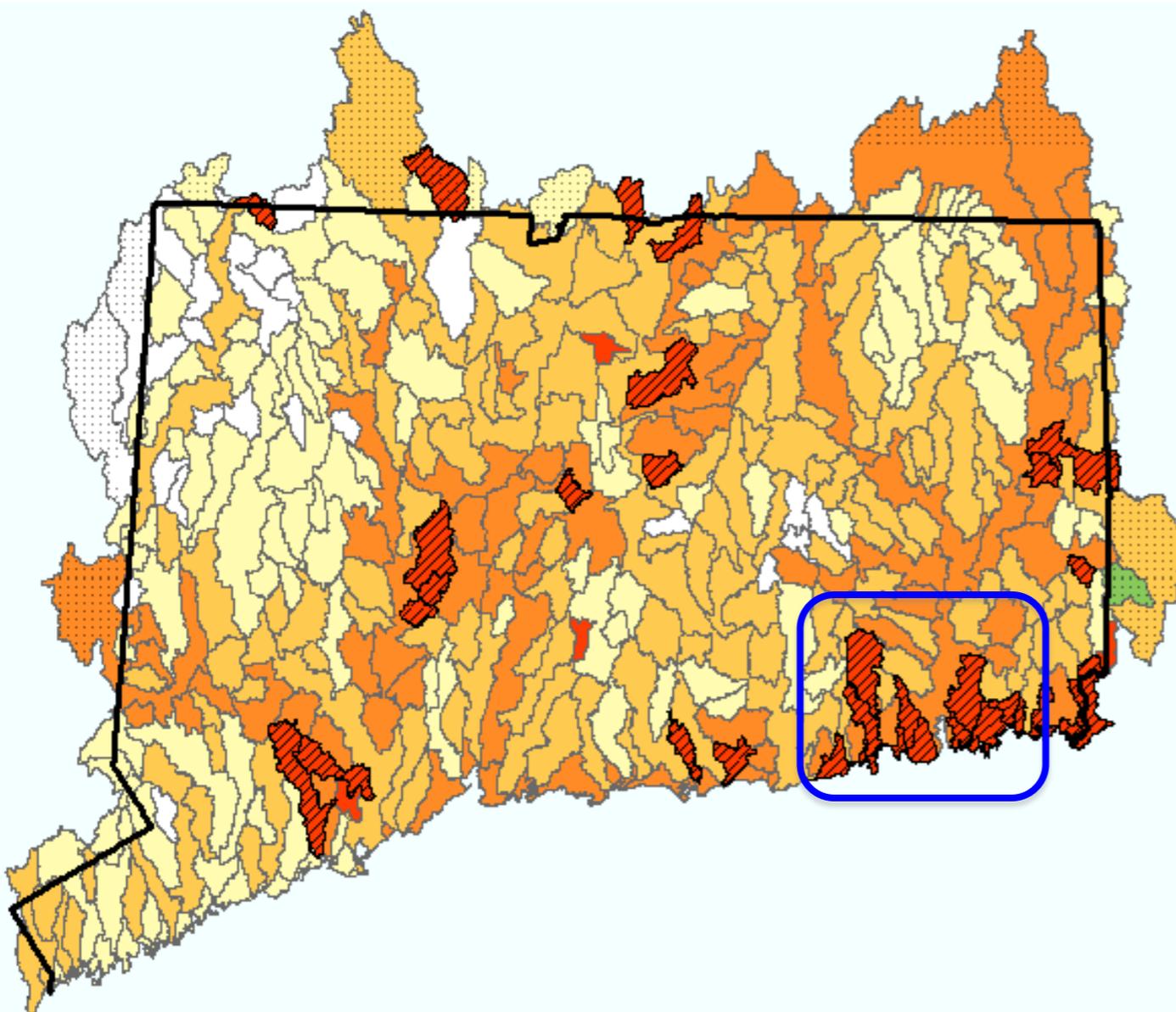
**...and if so, for what?**

# 1 (a). WE use it (to inform outreach programs)

- **Comprehensive planning**
- **Stormwater management**
- **Open space planning**
- **Smart growth**



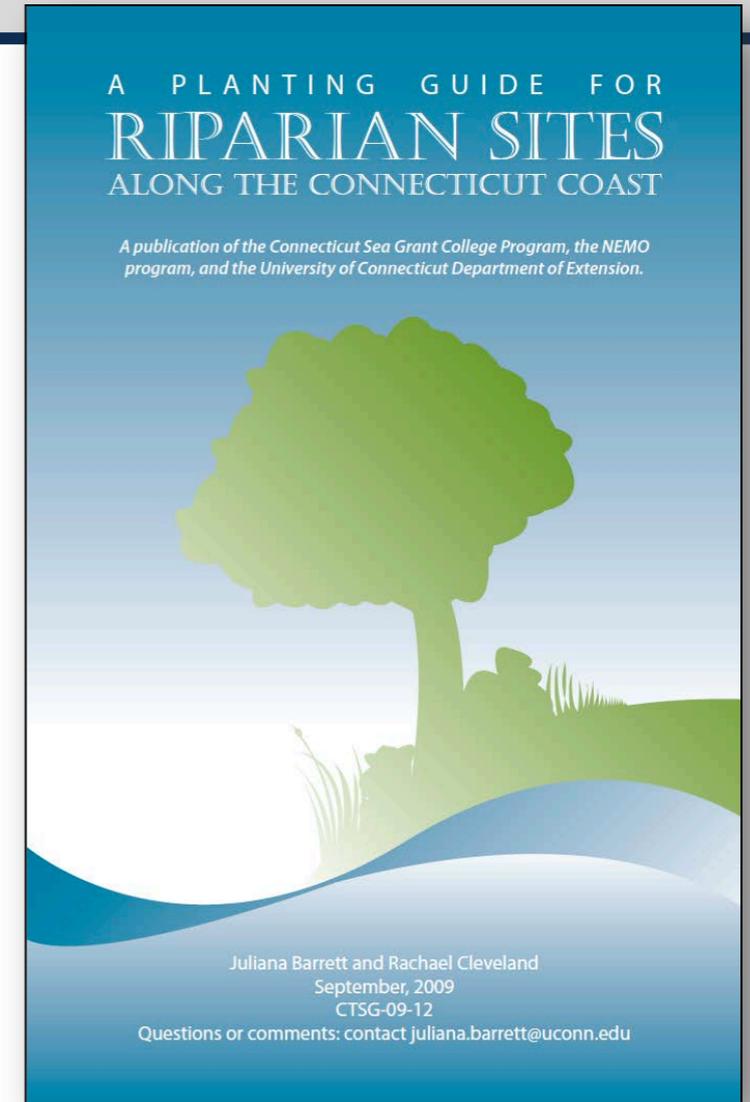
# 1(b). WE use it (to target outreach programs)



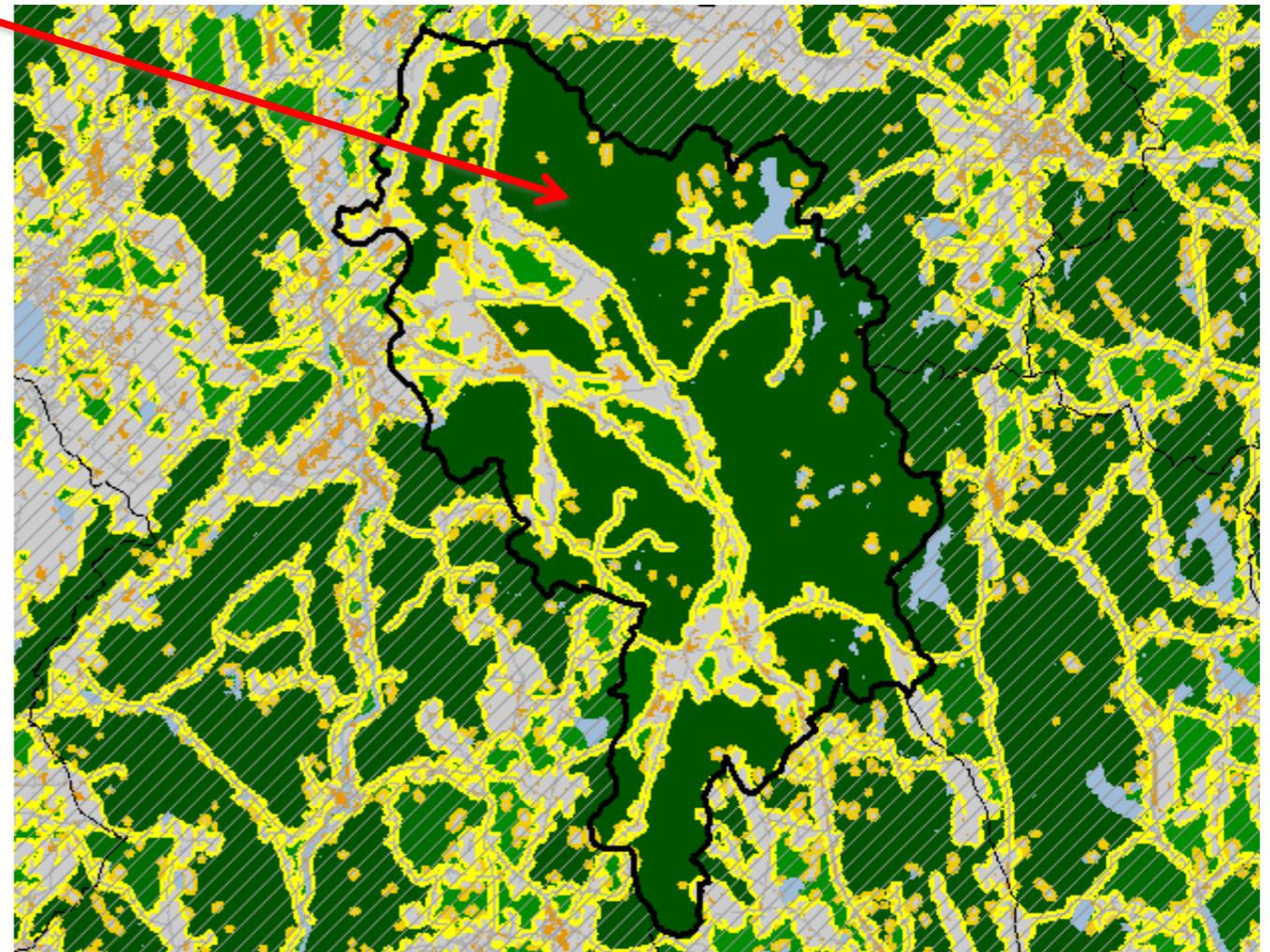
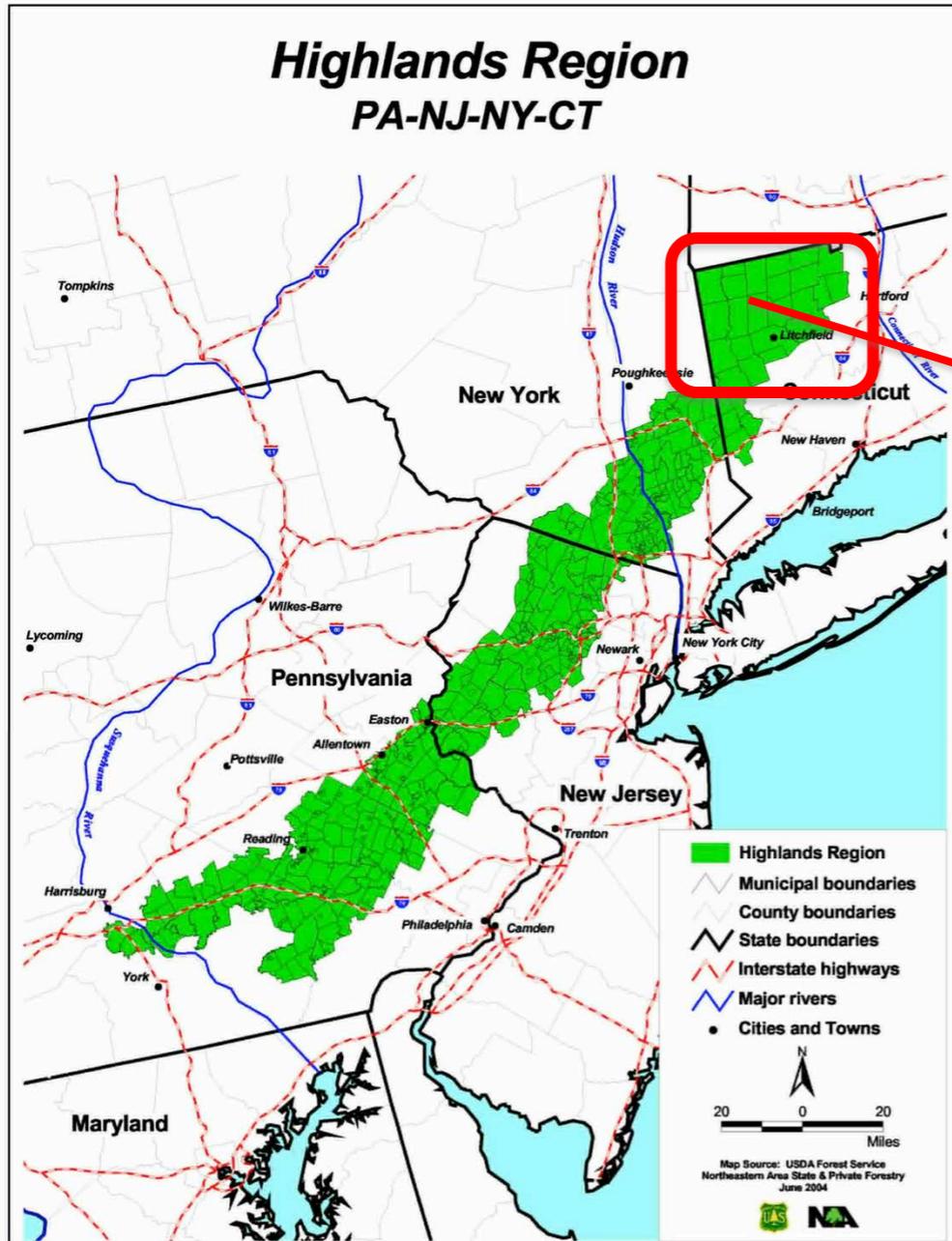
## 1985-2006 Change in Percent of the Forested\* Portion of the 300 ft Zone

Each sub-regional basin is colored based on the change in percent of the forested\* area in the 300 ft riparian zone.

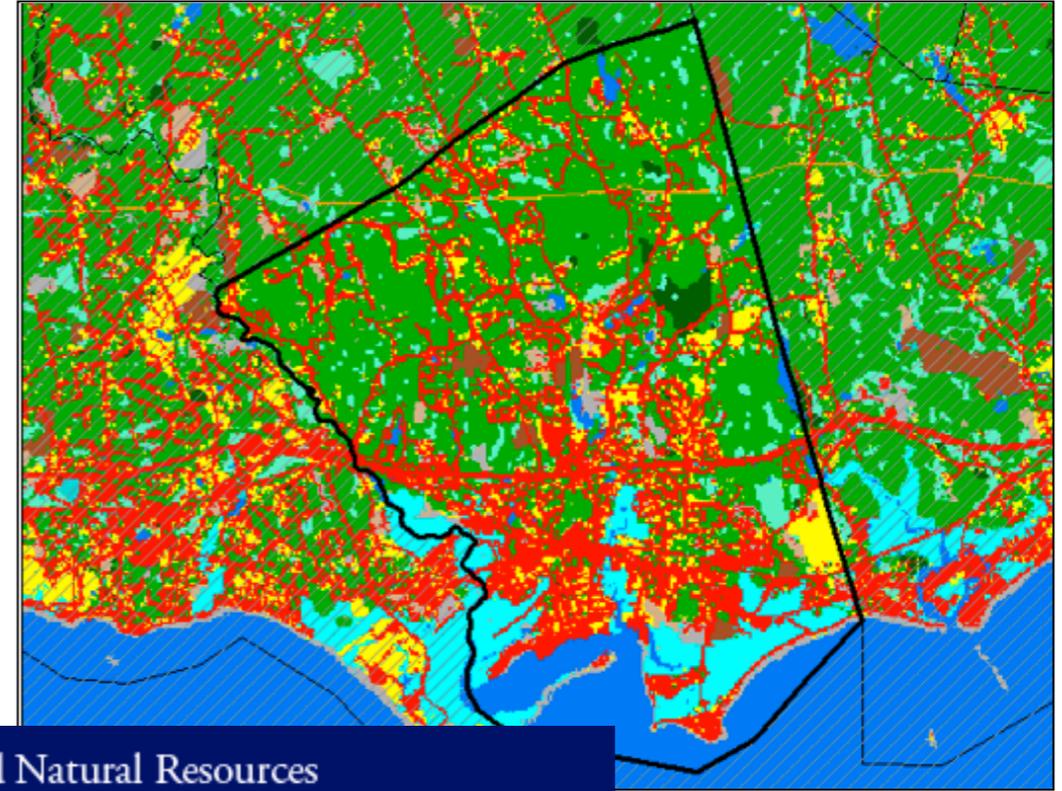
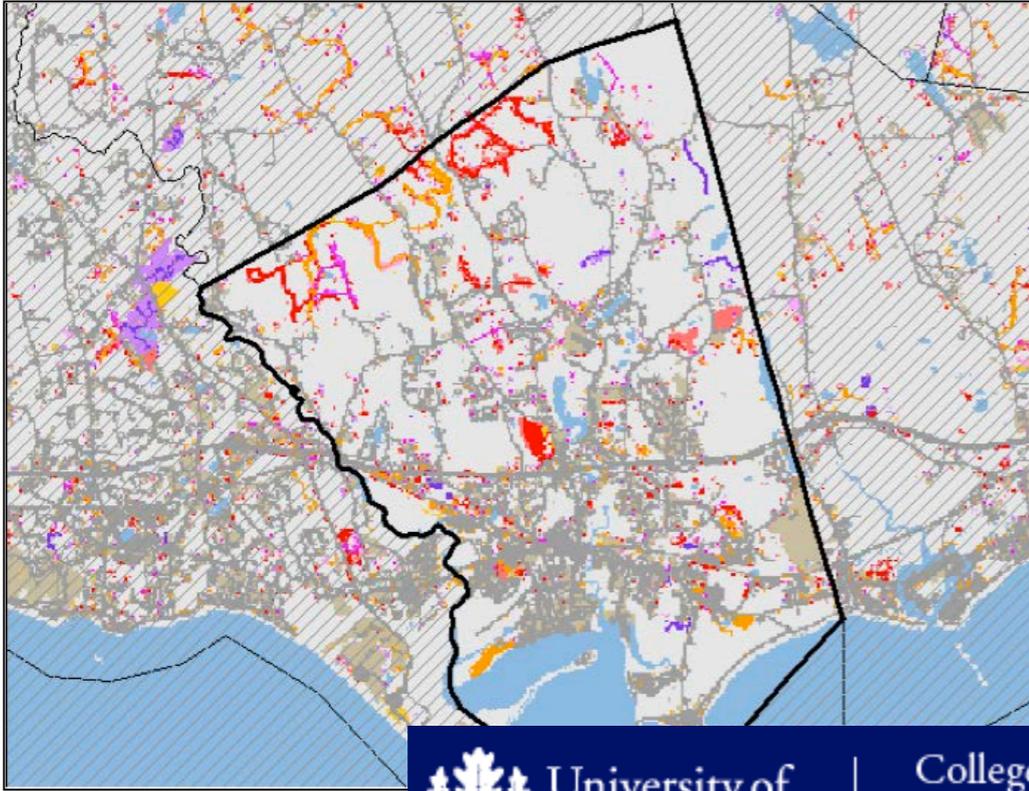
- Top 25 basins experiencing the greatest percent loss of forest
- Change in percent forest
  - 12% or greater
  - 11% to -6%
  - 5.9% to -4%
  - 3.9% to -2%
  - 1.9% to -0.5%
  - 0.5% to 0.5%
  - 0.6% to 2%
- Area not covered by land cover. Only the
  - portion of the basin
  - covered by land cover
  - in the riparian areas was included in the percent.



# 2. Research: Yale Forest Stewardship Study

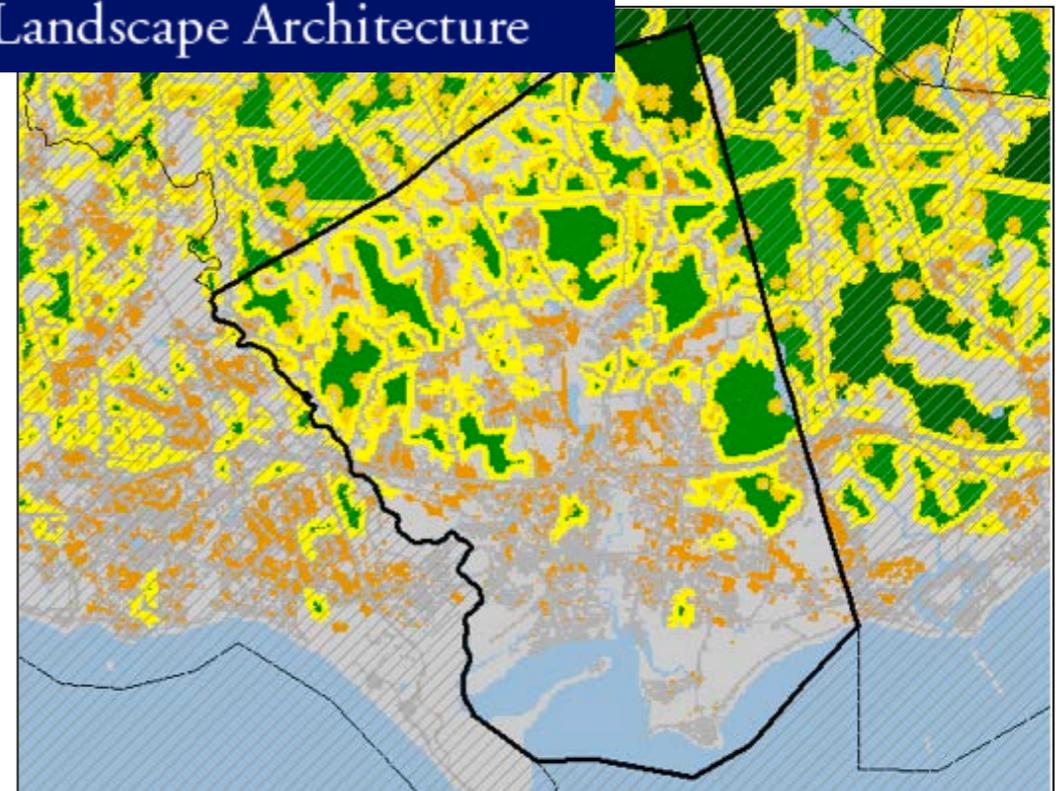
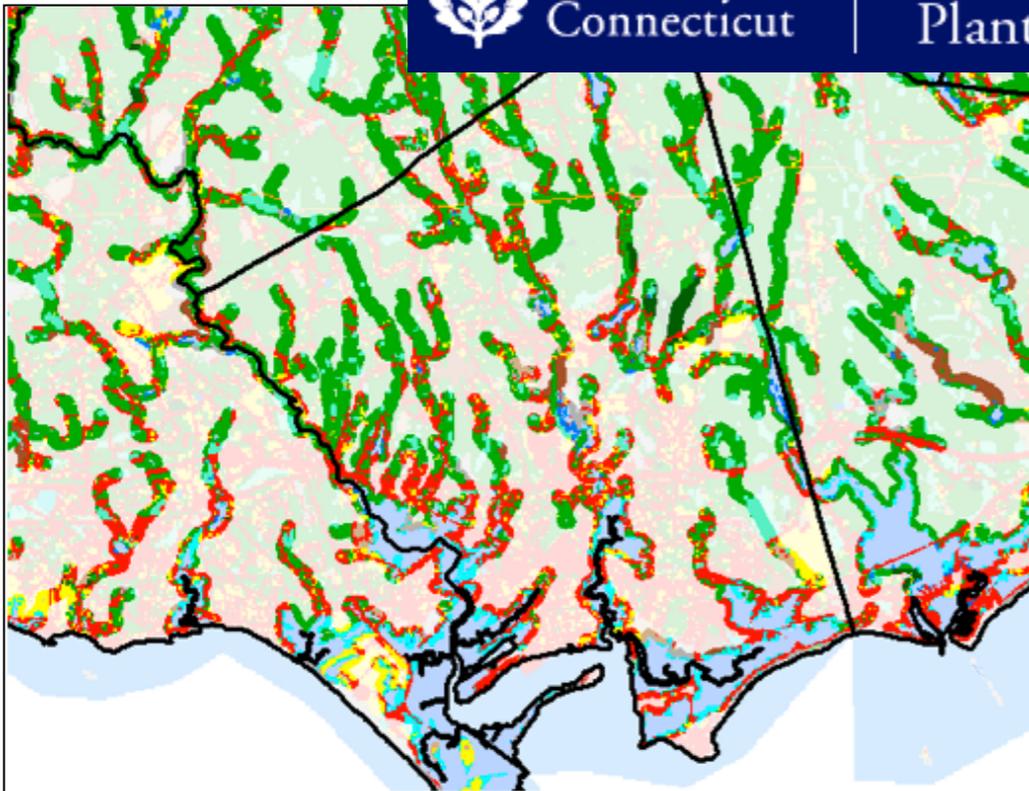


### 3. Teaching: *Is there sprawl in your home town?*



University of  
Connecticut

College of Agriculture and Natural Resources  
Plant Science and Landscape Architecture



# 4. Long term monitoring & assessment

LAND AND WATER

www.longislandsoundstudy.net

## { ALTERED LANDSCAPES }

### SOUND POINTS

✦ Water quality of a stream, river, lake or estuary, such as the Sound, declines when there is an increase in development within the watershed.

✦ Development increased by 18.1% in Connecticut from 1985 to 2006 and by 2.7% in New York from 1985 to 2002.

Find links to CLEAR's reports on development in Long Island Sound and fragmented forests at [www.LIShealth.net](http://www.LIShealth.net).

THE SOUND'S subwatersheds are more developed in the western Sound region (left), but subwatersheds in the eastern Sound region are showing the greatest percent increase in development since 1985 (right).

Many visit Long Island Sound to swim, fish, boat, or just to relax and enjoy the views. Millions more live and work near the Sound, exacting a price on this body of water sometimes referred to as the *Urban Sea*. Four hundred years after European explorers first came to the Sound to trade with American Indians, people still are moving to the coast, enriching the bi-state area economy, but altering the natural landscape and, in turn, the Sound and its tributaries.

From 1980 to 2006, the population in the New York and Connecticut portion of the Sound's watershed increased from 6.3 million to 7.2 million (the population of the entire watershed, which extends into parts of Massachusetts, New Hampshire, Vermont, and Rhode Island, increased from 7.8 million to 8.8 million). Population growth leads to development that adds parking lots, rooftops, streets, and other hard surfaces to the "built" environment. Hundreds of studies around the U.S. suggest that water quality and overall stream health decline when impervious surfaces exceed 10 percent in a watershed (the area of land that drains into a body of water). When the impervious area in a watershed exceeds 25 percent, stream conditions become severely degraded. In many of the local subwatersheds surrounding the western basin of the Sound, developed land exceeds 51 percent, and can be as high as 89 percent. Without vegetation and healthy soils filtering pollutants, stormwater runoff can carry pesticides, pathogens, motor oil, debris, and excess nutrients into storm drains and streams. These pollutants eventually flow into the Sound.

Development now is spreading to more sparsely populated areas of the region, which could affect the area of the Sound with the best water quality. A study by UConn's Center for Land Education and Research (CLEAR) shows that watersheds in eastern Connecticut experienced higher relative rates of development, between 41 and 85 percent, from 1985 to 2006, compared to central and western watersheds. In total, the area of developed lands in Connecticut increased by 18.1 percent (144.7 square miles) from 1985 to 2006. The amount of developed area in the New York watershed increased by 2.7 percent (6.5 square miles) from 1985 to 2002.

While inland areas have gained in population, about 4.6 million people still live within 15 miles of the coast, the area with the greatest impact to the Sound. The most densely developed areas, including New York City, are in the western Sound, the region that also has the poorest water quality.

FORESTS ARE being converted to "fragmented" forests, or to developed areas, including near the Barn Island Wildlife Management Area, a Stewardship Initiative site.



### Forest Loss in CT

FROM THE EARLY to the mid-20th century forests were replacing abandoned farms in Connecticut as populations moved to the cities. Today, forests cover more of the state than other types of land use.

But with increases in development, the state is beginning to lose some of its forests again. According to research by CLEAR, 185 square miles of forest were converted to non-forest from 1985 to 2006—a six percent loss. The forested area totals 2,922 square miles, about 59 percent of the state.

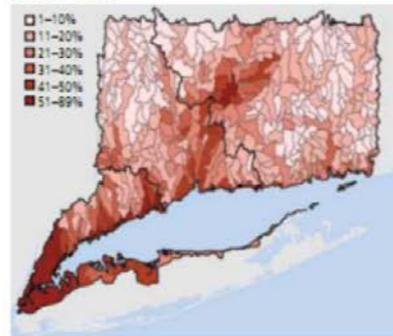
The lost area is more than the size of Greenwich, Stamford, Darien, New Canaan, Norwalk, and Wilton combined. The CLEAR study also revealed that about two-thirds of the forested land that remains is "fragmented"—defined as the division of large forest tracts into smaller areas bounded by roads and other development. Unfragmented forests consisting of at least 250 acres in size are called "core forests."

Connecticut's coastal communities also faced the same rate of forest decline as the entire state, losing about five square miles. Some of these areas were close to public lands designated as Long Island Sound Stewardship Initiative sites. For example, within one mile of the boundaries of the Barn Island Wildlife Management Area in Stonington, 405 acres of core and fragmented forest were lost, and 200 acres of core forest were converted to fragmented forest. Within one mile of the boundaries of the internationally recognized Connecticut River tidal wetlands complex, 1,476 acres of core and fragmented forest were lost, and 1,501 acres of forest were converted from core forest to fragmented forest.

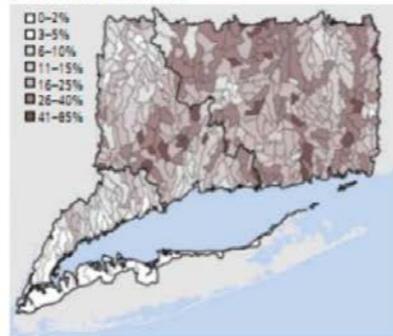
Connecticut's coastal forests are dominated by oaks, hickories, tulip poplar, black cherry, and sassafras, and they provide critical habitat for wildlife, including birds.



Percent of Developed Area (NY 2002, CT 2006)



Change in Developed Area (NY: 1985-2002, CT: 1985-2006)



# CCL expanding to include NY portions of LIS watershed

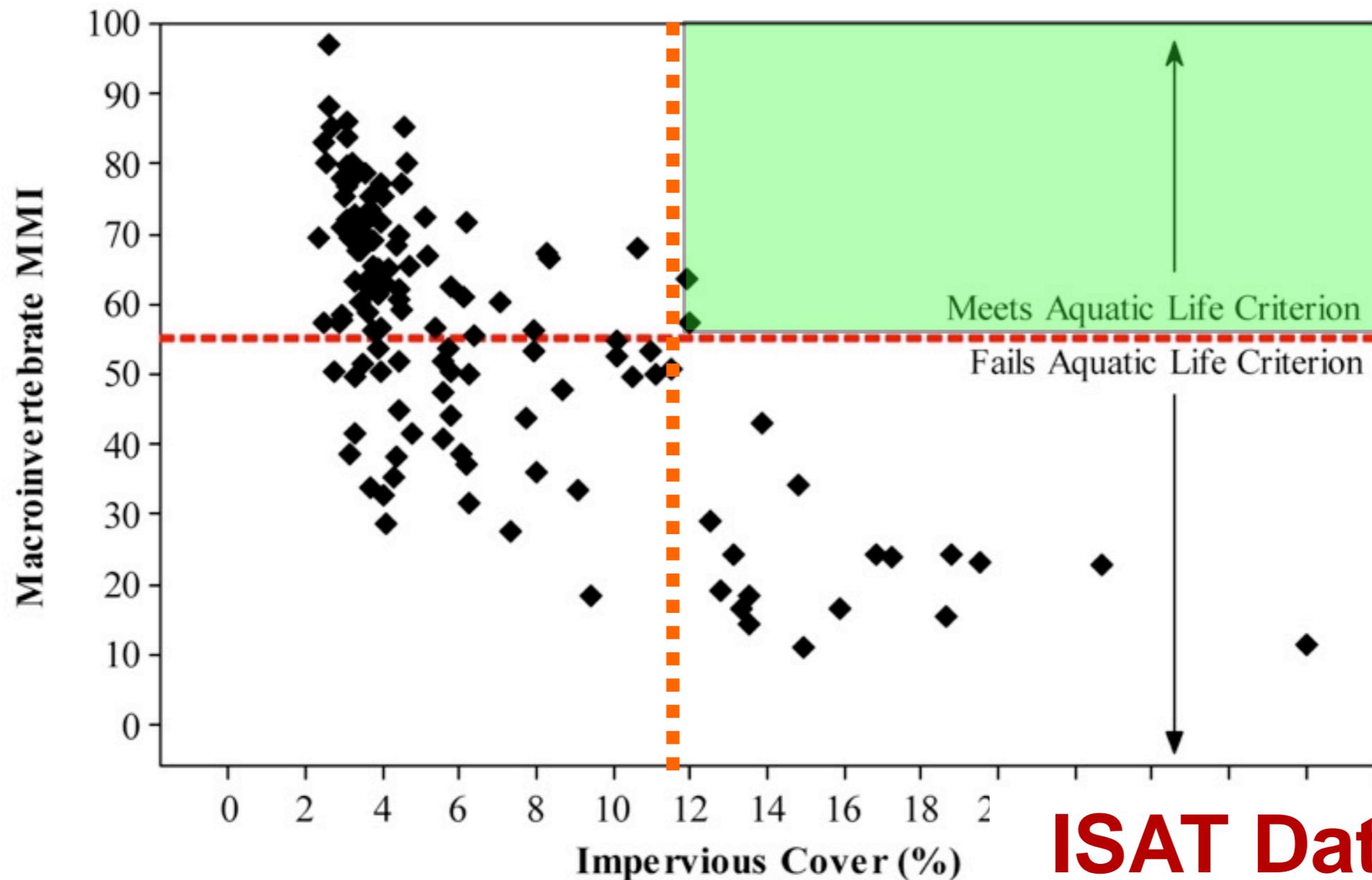




# 5a. State Policy: Environmental Regulations



## Linking the Bug Data with Impervious Cover Data

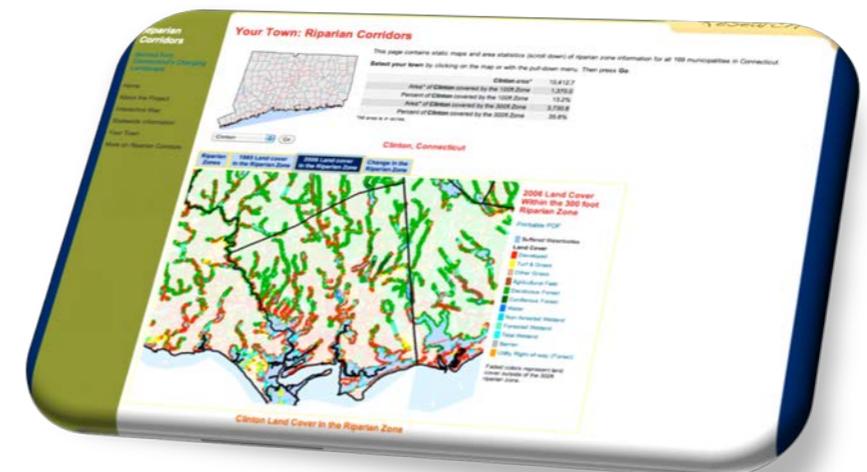


**ISAT Data**

## 5(b). State Policy: Enabling Legislation



**Sec. 3. (NEW) (Effective October 1, 2011) (a) Except as provided in subsection (b) of this section, when considering an application for a proposed regulated activity, a municipal inland wetlands agency may prohibit the destruction of natural vegetation within one hundred feet of a wetlands or watercourse...**



# 6. Local land use plans



KENT CONNECTICUT  
2011 PLAN OF CONSERVATION AND DEVELOPMENT  
STATE OF OUR TOWN  
CONDITIONS AND TRENDS

June 2010

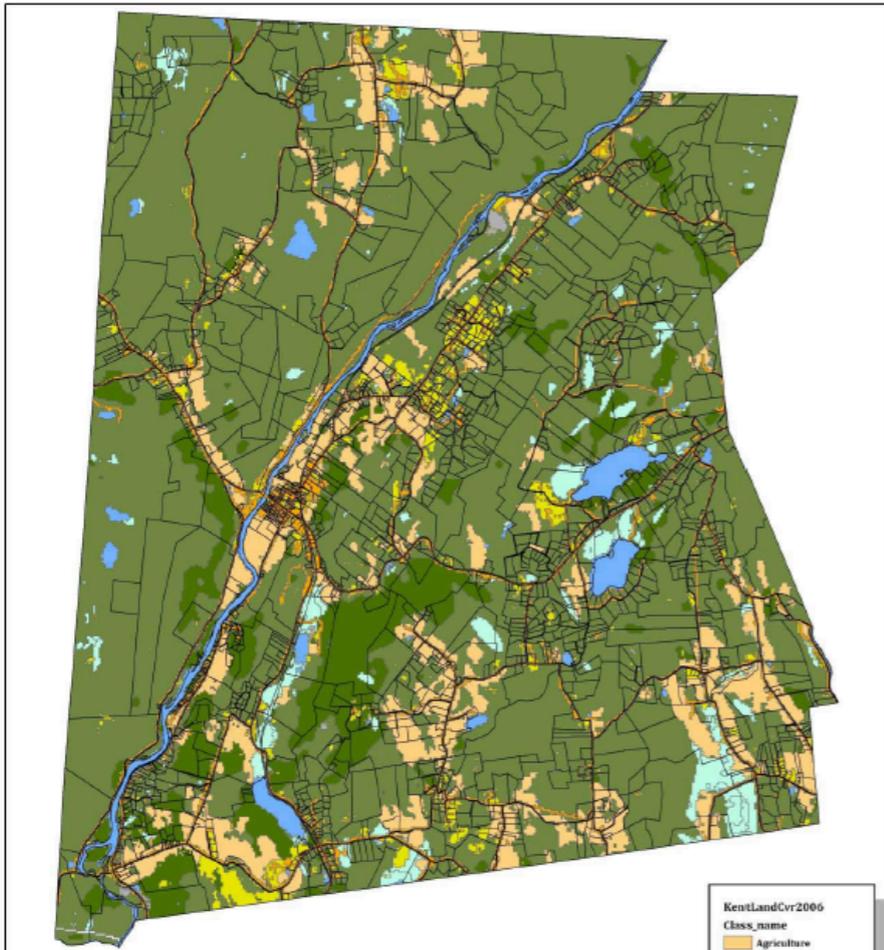


KENT PLANNING AND ZONING COMMISSION

Staff  
Wood Planning Associates, LLC  
Jennifer Calhoun, Land Use Administrator

KENT: THE STATE OF OUR TOWN

Figure 11: Land Cover - Town of Kent

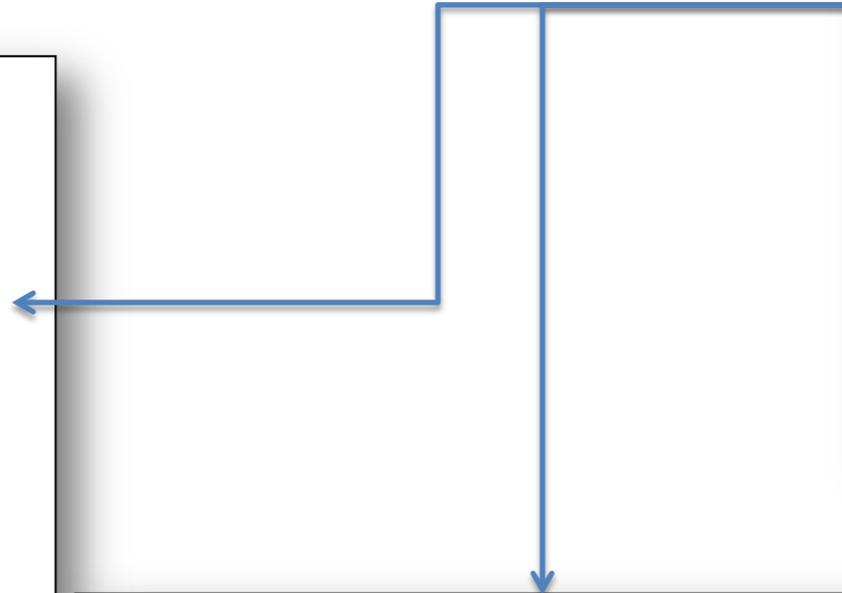


Kent, Connecticut

Center for Land Use Education and Research - Land Cover 2006



KentLandCvr2006	Class_name
[Light Green]	Agriculture
[Light Blue]	Barren Land
[Dark Green]	Coniferous Forest
[Medium Green]	Deciduous Forest
[Orange]	Developed
[Light Blue-Green]	Forested Wetland
[Light Green]	Non-forested Wetland
[Yellow-Green]	Other Grasses
[Light Green]	Turf & Grass
[Blue]	Water



KENT: THE STATE OF OUR TOWN

Table 25: Land Cover and Land Cover Change - Town of Kent

Category	1985		1995		2006		1985 - 2006 Change	
	acres	% of town	acres	% of town	acres	% of town	acres	% change
<b>Developed</b>	1612	5.1%	1752	5.5%	1809	5.7%	196.2	12.2%
<b>Turf &amp; Grass</b>	569	1.8%	630	2%	762	2.4%	193.2	34%
<b>Other Grasses</b>	225	0.7%	230	0.7%	232	0.7%	6.9	3.1%
<b>Agricultural Field</b>	3207	10.1%	3121	9.8%	3062	9.6%	-145.2	-4.5%
<b>Deciduous Forest</b>	21479	67.5%	21400	67.3%	21293	66.9%	-185.2	-0.9%
<b>Coniferous Forest</b>	2759	8.7%	2752	8.7%	2734	8.6%	-25.4	-0.9%
<b>Water</b>	977	3.1%	935	2.9%	915	2.9%	-61.4	-6.3%
<b>Non-forested Wetland</b>	162	0.5%	174	0.5%	177	0.6%	14.9	9.2%
<b>Forested Wetland</b>	793	2.5%	771	2.4%	774	2.4%	-18.9	-2.4%
<b>Tidal Wetland</b>	0	0%	0	0%	0	0%	0	0%
<b>Barren</b>	17	0.1%	36	0.1%	42	0.1%	24.9	147.1%
<b>Utility (Forest)</b>	8	0%	8	0%	8	0%	0	0%

\* as a percentage of the 1985 land cover area  
Source: Connecticut Center for Land Use Education and Research (<http://clear.uconn.edu/>)

# Web stats: four year (2007-2010) monthly averages

- **4686 unique visitors to CLEAR**
- **949 visits to Your Town**
- **348 visits to Your Watershed**
- **281 monthly visits to Forest Frag (since 10/09)**

**CCL Website**

CCL Home  
About the Project  
Statewide Information  
Your Town  
Your Watershed  
Interactive Map  
Download Data  
What We're Measuring  
Related Projects & Commentary

**Your Town**  
**Torrington, Connecticut**



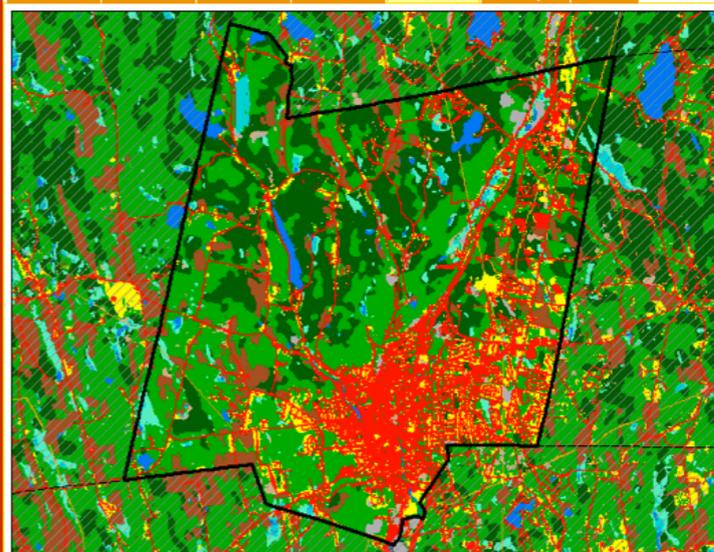
Torrington

Select your town by clicking on the map or with the pull-down menu. Then press **Go**.

This page contains static maps and area statistics (scroll down) for all five dates of land cover and for all 169 municipalities in Connecticut.

The 1985 and 2006 land cover maps, as well as both change maps, have pdfs for viewing, saving and printing.

Don't miss the [Interactive Map](#) where you can view all the maps and control the zoom and extent of your view.

1985 Land Cover	1990 Land Cover	1995 Land Cover	2002 Land Cover	2006 Land Cover	Change To Developed	Change From
						
<p><b>2006 Land Cover</b></p> <p><a href="#">Printable PDF</a></p> <p><b>LAND COVER</b></p> <ul style="list-style-type: none"> <li>Developed</li> <li>Turf &amp; Grass</li> <li>Other Grass</li> <li>Agricultural Field</li> <li>Deciduous Forest</li> <li>Coniferous Forest</li> <li>Water</li> <li>Non-forested Wetland</li> <li>Forested Wetland</li> <li>Tidal Wetland</li> <li>Barren</li> <li>Utility (Forest)</li> </ul>						

**Torrington Land Cover and Land Cover Change**

	1985		1990		1995		2002		2006		Change	
	acres	% of town	acres	% change								
<b>Developed</b>	4904	19.1%	5383	20.9%	5516	21.4%	5728	22.2%	5840	22.6%	935.4	19.1%
<b>Turf &amp; Grass</b>	1268	4.9%	1297	5%	1417	5.5%	1471	5.7%	1593	6.2%	325.5	25.7%
<b>Other Grasses</b>	226	0.9%	214	0.8%	262	1%	246	1%	281	1%	35.1	15.6%
<b>Agricultural Field</b>	1744	6.8%	1697	6.6%	1601	6.2%	1505	5.8%	1498	5.8%	-246.7	-14.1%
<b>Deciduous Forest</b>	9350	36.2%	9046	35.1%	8942	34.7%	8838	34.3%	8650	33.5%	-700.3	-7.5%
<b>Coniferous Forest</b>	6578	25.5%	6400	24.8%	6321	24.5%	6256	24.3%	6158	23.9%	-419.3	-6.4%
<b>Water</b>	505	2%	470	1.8%	480	1.8%	450	1.7%	444	1.7%	-60.3	-11.9%
<b>Non-forested Wetland</b>	207	0.8%	214	0.8%	213	0.8%	216	0.8%	217	0.8%	10.1	4.9%
<b>Forested Wetland</b>	741	2.9%	701	2.7%	691	2.7%	691	2.7%	684	2.7%	-56.5	-7.6%
<b>Tidal Wetland</b>	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
<b>Barren</b>	134	0.5%	240	0.9%	239	0.9%	264	1%	321	1.2%	187.5	140.1%
<b>Utility (Forest)</b>	138	0.5%	132	0.5%	131	0.5%	129	0.5%	127	0.5%	-10.6	-7.7%

# 7. Who knows?

home | contact | my account  
order online or call **1.866.953.1400**

placeways

COMPANY PRODUCTS SERVICES PURCHASE SUPPORT **COMMUNITYVIZ**

Home > Products > Land Frag Tool

**Products**

- CommunityViz
- Scenario 3D
- Scenario 360
- » LandFrag Tool

## Landscape Fragmentation Geoprocessing Tool™

*A geoprocessing tool that allows communities, researchers and others to chart the impact of development on forest resources.*

Placeways and the University of Connecticut Center for Land Use Education and Research ([CLEAR](#)) have collaborated to create a new computer tool to measure the impact of new roads, buildings and other development on the natural landscape.

Fragmentation - the breaking up of the natural landscape into ever-smaller pieces - is widely considered by researchers to have negative impacts on ecosystem health, wildlife, and water quality. In much of the country, the landscape being fragmented is forest. "Forest fragmentation not only has a direct impact on wildlife through its altering of habitat," notes UConn Extension Forester Tom Worthley, "but it affects the critical 'ecological services' that healthy forests provide, such as clean air and clean water."



# 7. Who knows?

[Home](#) [Data](#) [Tools](#) [Training](#) [Approaches ▾](#) [In Action](#)

## Tools

### Landscape Fragmentation Tool (LFT)

University of Connecticut Center for Land Use Education and Research

[Overview](#) [Requirements](#) [In Action](#) [Support](#) [Get It Now](#)

**Overview**

The Landscape Fragmentation Tool maps four types of fragmentation present for a specified land cover (i.e. forest). These value-added map layers can be used to quantify and assess the amount of fragmentation present in a landscape and evaluate potential habitat impacts. "Core" regions are solid nondegraded areas of specified land cover, "edge" and "perforated" occur along the periphery of core areas, and "patch" regions make up small fragments that are completely isolated from core areas. Additionally, the core regions are split into three size classes.

**Features**

- Analyzes** types of fragmentation present in a land cover feature of interest
- Quantifies** the amount of each fragmentation category that can be related to the potential impacts of fragmentation on habitats
- Creates** value added data layers for fragmentation present in the geography of interest

**Digital Coast Partnership Group**

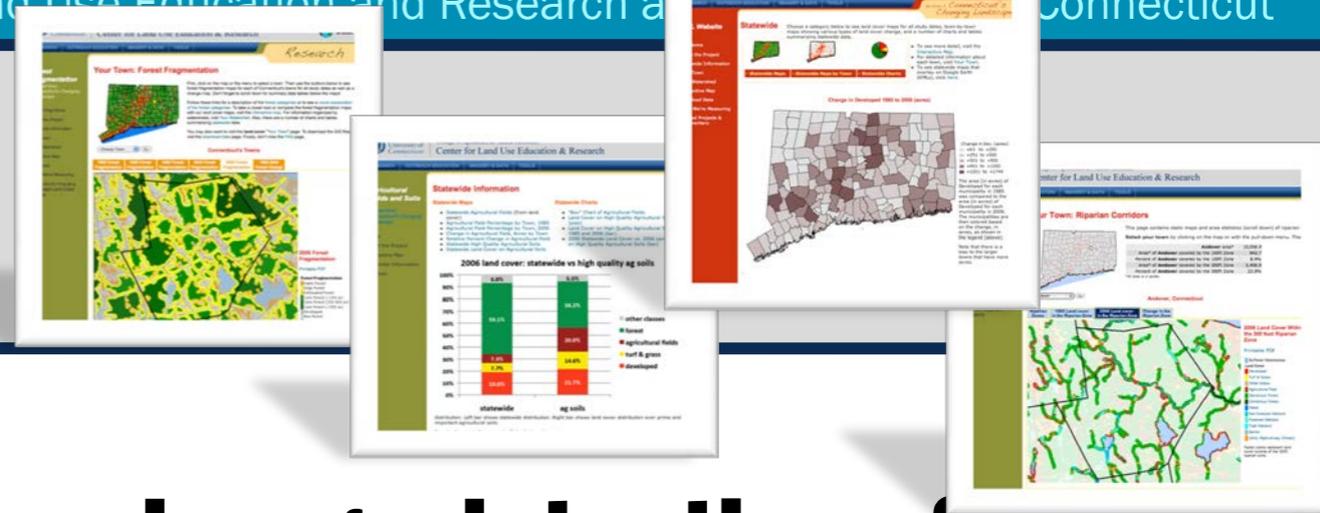
- [NOAA Coastal Services Center](#)
- [American Planning Association](#)
- [Association of State Floodplain Managers](#)
- [Coastal States Organization](#)
- [National Association of Counties](#)
- [National States Geographic Information Council](#)
- [The Nature Conservancy](#)

**Contact the Digital Coast**

[Privacy Policy](#) [National Ocean Service](#)  
[Link Disclaimer](#) [National Oceanic and Atmospheric Administration](#)  
[USA.gov](#) [United States Department of Commerce](#)

**NOAA Coastal Services Center**  
LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

# Our penultimate slide...



- 1. It's well-suited for long-term change detection of large geographic areas**
- 2. It relates to the literature on environmental health**
- 3. It gives people a unique view of their community**
- 4. It's used by researchers, regulators, legislators, nonprofit organizations, citizens, and local land use decision makers**
- 5. Ergo, i.e., e.g. and ipso-facto: it's having an impact!**

# An unpaid (not to mention unprofessional) endorsement

THE REPTILE CAPITAL OF THE WORLD

# ALLIGATOR Adventure

Barefoot Landing

TRACK THE ADVENTURE

Be a fan on Facebook

Follow our Twitter

[Animals](#) [Live Shows](#) [Park Info](#) [Get Tickets](#)

## AMAZING animals!

- Alligators
- Snakes
- Galapagos Tortoises
- River Otters
- Beavers
- Frogs, Lizards and Turtles
- Tropical Birds
- Crocodiles
- Tigers and Cats
- Lemurs

## ALLIGATORS

Alligator Adventure is the proud home to over 800 alligators that range in size from eight-inch infants to 15-foot adults that weigh 500 to 1,000 pounds. In the main alligator exhibit pool, more than 300 large adults wait patiently while skilled lecturers explain the fascinating life history of these ancient creatures. The talks are highlighted with staff members feeding the large reptiles by hand.

During your visit to the park, you will encounter beautiful natural swamps and marshes with an amazing array of reptiles, lizards, turtles, giant frogs, and exotic birds from around the world! Click the animal names above to get a small taste of the animals featured at this extraordinary zoological park! When you are done, be sure to check out our [Live Shows...](#)



**Thank You**

**[clear.uconn.edu](http://clear.uconn.edu)**

**Emily Wilson [emily.wilson@uconn.edu](mailto:emily.wilson@uconn.edu)**

**Chet Arnold [chester.arnold@uconn.edu](mailto:chester.arnold@uconn.edu)**