

# Supporting Connecticut Communities

Progress Report of the UConn Center for Land Use Education & Research



## About CLEAR & This Report

The University of Connecticut Center for Land Use Education and Research (CLEAR) provides information, outreach programs, tools and technical training to land use decision makers and other groups with a stake in the landscape, and the communities, of Connecticut. CLEAR was established in 2002 by a group of faculty members working together on issues related to land use, natural resource management, and geospatial technology. Since then, the Center has evolved and developed what is now a unique portfolio of programs and projects. This report is a brief update on these programs, mostly covering the five-year period 2012-2016 and focusing primarily on the newest projects, of which there are many. We've stripped it down as much as possible—light reading about some heavyweight work! We hope you find it interesting, and welcome questions and comments.

### In this Report

- 1 **About**
- 2 **CLEAR Overview**
- 3 **Right Off the Bat (Highlights)**
- 4 **Water**
- 5 **Land Use & Climate Resiliency**
- 6 **Geospatial Tools & Training**
- 7 **STEM Education & Local Conservation**
- 8 **Endnote & Contact**





# CLEAR Overview

## Mission

To provide information and assistance to land use decision makers and other audiences in support of better land use decisions, healthier natural resources, and more resilient communities.

## The Need for CLEAR

CLEAR plays a vital role in informing the land use decision making process in Connecticut, particularly as it relates to natural resource protection and management. Land use is decided primarily at the local level in the state's 169 municipalities. Although the State Office of Policy and Management and the regional Councils of Government provide important services and support, Connecticut lacks key planning infrastructure such as county government, a state Planning Office, or a state-sponsored Geographic Information Systems (GIS) center. Within this setting, CLEAR seeks to fulfill its mission by assisting Connecticut communities and other groups with outreach programs, applied research projects, mapping tools and technical training.

## Key Facts About CLEAR

|                      |   |
|----------------------|---|
| <b>Established</b>   | 2002 by the UConn Board of Trustees.  |
| <b>Academic Home</b> | Partnership of the Department of Extension and Department of Natural Resources and the Environment, both in the College of Agriculture, Health, and Natural Resources, with strong ties to the Connecticut Sea Grant College Program. |
| <b>Core Faculty</b>  | 10 (varies with funding). Core faculty spend most or all of their time on Center projects.  |
| <b>Annual Budget</b> | Varies widely but the average for the last 5 years is about \$950,000.  |
| <b>Funding</b>       | UConn investment is heavily leveraged by grants (pie chart, side bar). Almost all funding goes to supporting CLEAR faculty and staff.   |
| <b>Program Areas</b> | Water; Land Use and Climate Resiliency; Geospatial Tools and Training; STEM Education and Local Conservation.   |

## By the Numbers

**15**

years in existence

**10**

core faculty/staff



**3**

academic units partnering

**4**

program areas

**16**

national, regional, state, and university awards won by CLEAR programs 2012-2016

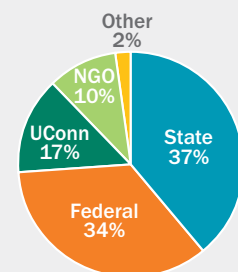


**69**

grants funded 2012-2016

**\$8.8M**

grant funding 2012-2016



CLEAR Funding Sources



# Right Off the Bat: New & Noteworthy @ CLEAR

This page highlights one major project from each of CLEAR's four program areas. So if you go no further than this page, at least you'll be up-to-date on the biggest stuff!



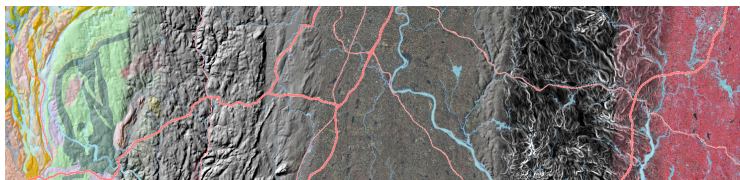
## Water

CLEAR's Water Team is partnering with the Connecticut Department of Energy and Environmental Protection (CT DEEP) on a five-year effort to provide **multifaceted support of the communities and institutions subject to the newly expanded "MS4" general stormwater permit.** The program includes a "circuit rider" outreach specialist, workshops, webinars, web tools, mapping assistance and more.



## Land Use & Climate Resiliency

The Land Use and Climate Resiliency Team is leading the effort to create the *UConn Climate Corps*, a **unique undergraduate program that combines classroom and service learning** in which students work directly with Connecticut communities on climate resilience policies and plans. Students will be drawn from the Environmental Sciences, Environmental Studies, and Environmental Engineering majors. The Corps debuts in the Fall of 2017.



## Geospatial Tools & Training

Connecticut Environmental Conditions Online, or **CT ECO**, has been **totally revamped** and loaded with several new and powerful datasets/map viewers. CT ECO is a partnership of CLEAR and CT DEEP that is used by 25,000 people per year, and is the go-to online mapping site for all statewide data on natural resources. Through a unique partnership of the Connecticut Office of Policy and Management and a consortium of state agencies and the state's nine regional Councils of Government, **CT ECO is adding statewide 2016 high resolution aerial imagery and elevation (lidar)** to its list of resources. The imagery is already available, with the lidar coming online later in 2017.



## STEM Education & Local Conservation

In 2016 CLEAR added a fourth program area focused on **Science, Technology, Engineering and Mathematics (STEM) education** for high schoolers, connecting them through natural resource science and geospatial technology to **local conservation efforts.** Two new programs are being added to the foundation of the Natural Resources Conservation Academy (NRCA), founded by the Department of Natural Resources and the Environment and entering its 6th year. The three interwoven projects, all under the NRCA umbrella, will include educational programs for students, teachers, and community-level conservation volunteers from around the state.



# Water

## Team

Chet Arnold  
 Dave Dickson  
 Mike Dietz  
 Amanda Ryan

## Focus

CLEAR's Water Team, widely known for its longstanding NEMO program, focuses mainly on the problem of stormwater management and its connections to land use and land use planning, flooding and water pollution, and climate change. The NEMO Program actually pre-dates the Center by more than 10 years, and was the hub of a national network of projects in 30 states adapted from the UConn model.

## Major Projects

### Support for MS4 Communities

NEMO's latest endeavor is a five-year partnership with CT DEEP to support the 121 municipalities and state/federal institutions affected by the newly enhanced "MS4" stormwater general permit. This support includes a full-time "circuit rider" to work with towns, workshops, technical training, webinars, an extensive website, new high-resolution data on impervious cover, and interactive online mapping tools. It's a challenging new effort and NEMO will be with the regulated towns all the way.

### Low Impact Development on Campus

CLEAR faculty are leading the effort to install innovative low impact development (LID), or green stormwater infrastructure, practices on the UConn main campus, in response to concerns about the health of Eagleville Brook and the Fenton River. Progress has been swift: as a result of this effort begun in 2009, UConn is now known across the Northeast for its extensive use of green roofs, bioretention cells, rain gardens, pervious pavements, and other LID practices. CLEAR faculty are also conducting applied research on these practices, including their maintenance needs and processing of road salt.

### Mobile Technology to Promote and Track Low Impact Development

In 2012 CLEAR's Water Team developed the smartphone application *Rain Garden*, the first "app" developed at UConn. The app covers the siting, sizing, installation, planting and maintenance of the stormwater practice known as a rain garden. With funding from USDA the app has now been expanded to cover 20 states. CLEAR also has revamped its National LID Atlas, an online map showing almost 1400 examples of various Low Impact Development practices from around the country. The Atlas is now a mobile-friendly website that allows anyone to easily enter additional sites to the map.

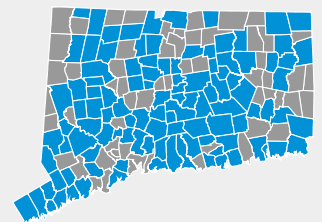
## By the Numbers

**26**

years NEMO has existed

**153**

of the 169 towns that NEMO has worked with since its inception in 1991



**11.5**

acres of impervious cover disconnected on the UConn campus

**62 million**

gallons of stormwater kept out of campus waterways

**13**

national, regional and state awards won by NEMO since its inception

**6,200 downloads**

of the Rain Garden smartphone app



**1,395**

Examples of green stormwater infrastructure in CLEAR's National LID Atlas





# Land Use & Climate Resiliency

## Team

Juliana Barrett  
Bruce Hyde  
Chet Arnold

## Focus

CLEAR's Land Use and Climate Resiliency Team operates three ongoing education/outreach programs that focus primarily on communities, and run from basic training for local land use officials to student-driven assistance for towns on climate issues. CLEAR climate programs are all done in partnership with the Connecticut Sea Grant program.

## Major Projects

### Climate Adaptation Academy

The Climate Adaptation Academy (CAA) was created in 2014 as a partnership between Connecticut Sea Grant and CLEAR, with funding provided by NOAA Sea Grant. The CAA provides information on current adaptation research, policy and practice, and serves to promote an exchange of information between municipal officials, researchers, and other professionals. Seven workshops have been held to date, with over 500 attendees. CAA's most recent focus is on local legal issues related to climate change, particularly along the coast.

### UConn Climate Corps

Debuting in the fall of 2017, the Climate Corps is designed to help municipalities develop planning and policy documents related to climate adaptation efforts, while providing a real-world service learning experience for high-achieving undergraduates. Many municipalities have not moved forward with addressing climate adaptation due to a lack of money to hire a consultant and/or a lack of staff time and expertise to do it in-house. The Climate Corps will help to address this lack of resources with students drawn from the Environmental Sciences, Environmental Studies and Environmental Engineering programs. The students will take a fall semester class on local climate resilience issues and strategies, followed by a spring semester "practicum" working with towns.

### Land Use Academy

The Land Use Academy (LUA) provides practical education for local land use decision makers. The LUA Basic Training program focuses on the fundamental knowledge and skills needed to serve effectively on a local land use commission. The LUA Advanced Training program covers several rotating topics in depth, along with updates on recent legislation and court decisions that affect local land use decisions. Over the past five years the LUA has trained over 1,800 people from 150 of the state's 169 towns. LUA partners include the regional Councils of Government, CT Bar Association, CT Chapter of the American Planning Association, and CT Office of Policy and Management.

## By the Numbers

**1,800**

Land Use Academy attendees 2012-2016

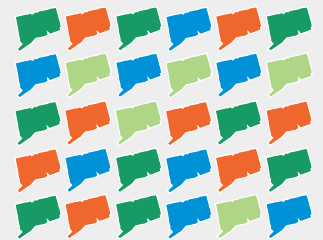


**500**

Climate Adaptation Academy attendees 2014-2016

**30**

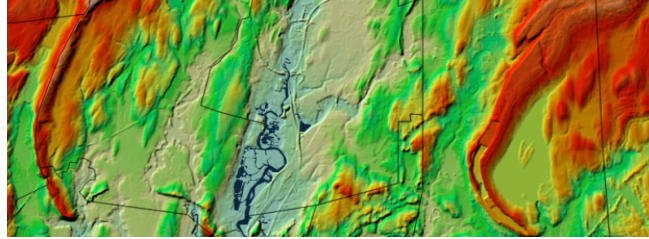
years of change documented in CT's Changing Landscape 1985 to 2015



**1**

strong partnership with Connecticut Sea Grant to conduct climate outreach for communities





# Geospatial Tools & Training

## Team

Emily Wilson  
Cary Chadwick  
Dave Dickson

## Focus

CLEAR’s Geospatial Team is the Center’s Swiss Army Knife—useful in almost any situation. In addition to providing the state’s best and most affordable hands-on training in geospatial technologies, the team develops cutting-edge online mapping tools and smartphone applications. Finally, the geospatial team provides foundational support to many of CLEAR’s other programs.

## Major Projects

### Connecticut Environmental Conditions Online (CT ECO)

CT ECO is the state’s definitive repository for natural resource-related geospatial information, and is a partnership of CLEAR and CT DEEP. CT ECO focuses on making information and maps accessible to a wide range of users of varying degrees of technological skill. CT ECO is used by about 25,000 unique individuals per year and is a much depended-on resource for towns, regional and state agencies, non-profits, researchers, and private sector firms. CT ECO just underwent a major upgrade involving new hardware, new software, a new mobile-friendly user interface, and, best of all, great new map viewers with high (3-inch) resolution aerial imagery and elevation (lidar) data.

### Geospatial Training Program (GTP)

The GTP is a hands-on training program for Connecticut’s land use decision makers and others, including state agency employees, land trust volunteers, teachers and citizens. Topics include Introduction to Geographic Information Systems (GIS), Smartphone GPS mapping and other advanced topics. The GTP, which pre-dates the formation of CLEAR, has trained over 800 people in the last five years.

### Connecticut’s Changing Landscape (CCL)

CCL is a nationally unique research program that has created a statewide dataset tracking land cover change over 30 years and seven dates (1985, 1990, 1995, 2002, 2006, 2010 and 2015). Additional analyses include studies of forest fragmentation, riparian corridors, watershed impervious cover and agricultural lands. CCL information is used by state agencies, researchers, NGOs, municipalities, regional Councils of Government, and others. The team has also made the study into a national award-winning Story Map.

## By the Numbers

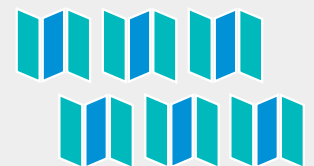
**25,000**

unique users of  
CT ECO per year



**6**

Story Maps created



**24,557**

Story Map visitors

**800**

Geospatial Training Program  
trainees 2012-2016

**23,381**

raw image tif tiles (totalling  
**8.5** terabytes) covering the  
state of Connecticut

**2**

national awards for  
CLEAR Story Maps



**14 million**

pixels making up  
the Connecticut land  
cover database





# STEM Education & Local Conservation

## Team

John Volin  
 Laura Cisneros  
 Abby Beissinger  
 Cary Chadwick  
 Emily Wilson  
 Dave Dickson  
 Chet Arnold

## Focus

CLEAR's fourth and newest program area involves a group of three interrelated projects that teach high school students, high school/middle school teachers, and community conservation volunteers about natural resource management and geospatial technology, with the goal not only of education but of catalyzing local on-the-ground conservation projects. The three projects are all grouped under the umbrella of the Natural Resources Conservation Academy (NRCA), and are a partnership of the Department of Natural Resources and the Environment (NRE), CLEAR, the UConn Center for Environmental Sciences and Engineering (CESE), and the Neag School of Education.

## Major Projects

### Conservation Ambassador Program (CAP)

The NRCA Conservation Ambassador Program (CAP), developed by NRE and now in its sixth year, immerses high school students from around the state in a week-long field experience on the UConn campus focused on natural resource management. Students are then tasked with working with a local conservation group to conduct an on-the-ground conservation project. To date, the CAP has graduated 116 students from 61 towns, and these students have completed 98 local conservation projects.

### Conservation Training Partnerships (CTP)

The NRCA Conservation Training Partnerships (CTP) is a new program kicking off in the summer of 2017 and funded by the National Science Foundation. CTP is an intensive two-day "mini-CAP" program pairing high school students with conservation volunteers from land trusts, watershed organizations and other local groups. The multigenerational participants will learn about the practical use of geospatial technology, such as online and smartphone GPS mapping, to conduct conservation projects that can benefit their communities. Then, it's on to the projects!

### Teacher Professional Learning (TPL)

The NRCA Teacher Professional Learning (TPL) program is another new program debuting in the summer of 2017, funded by USDA. Middle and high school science teachers will engage in a three-day workshop focused on the connection between land use and water resource health, using the UConn campus as a living classroom. They'll also learn about the online mapping tools available to help them explore this topic and tailor lessons to their community and students. The TPL is designed to dovetail with the Next Generation Science Standards (NGSS) recently adopted by the State of Connecticut.

## By the Numbers

**116**

high school students have attended NRCA



**61**

towns involved with NRCA projects

**98**

local conservation projects completed

**54**

local community partner organizations involved

## Endnote

CLEAR is a center focused on public service and engagement. The central question that we pose of all CLEAR programs, whether they involve applied research, tool development, extension outreach, or technical training, is this: *is our work helping to inform and improve land use planning and natural resource conservation in Connecticut communities?* We believe that the answer is an emphatic **yes**, both for individual projects and for CLEAR as a whole. 2017 marks the Center's 15th anniversary, and at this milestone we find ourselves still modest in size, working extremely hard, and invested in a wide-ranging portfolio of programs and projects that we feel is somewhat unique in the region, if not the nation. Since this summary is primarily focused on recent highlights, we invite you to further investigate our work via the CLEAR website. We also invite questions and comments, which can be sent to [clear@uconn.edu](mailto:clear@uconn.edu).



## Contact

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## By the Numbers

**75,000**

unique individuals visiting  
CLEAR websites in 2016



**clear.uconn.edu**

**1,536**

number of professionals who  
use CLEAR's 4 listservs

**2065**

live attendees of  
CLEAR webinars

**132**

CLEAR blog posts, viewed  
by **3,748** individuals



Written by Chet Arnold and designed by Kara Bonsack. The UConn Center for Land Use Education and Research (CLEAR) provides information, education and assistance to land use decision makers, in support of balancing growth and natural resource protection. CLEAR is a partnership of the Department of Extension and the Department of Natural Resources and the Environment at the College of Agriculture, Health and Natural Resources, and the Connecticut Sea Grant College Program. Support for CLEAR comes from UConn and from state and federal grants.

