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Connecticut GIS Day 2013 in Review

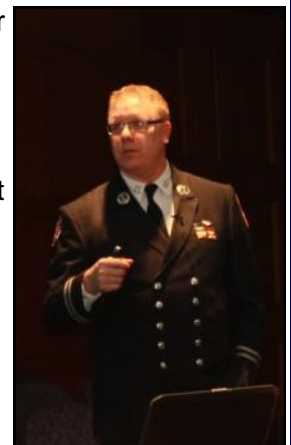
By Meghan McGaffin

On November 20th over 60 GIS professionals from across Connecticut and beyond celebrated GIS Day at the Legislative Office Building (LOB) in Hartford. Tyler Kleykamp of OPM opened the day with a review of state activities. Major changes on the horizon include the consolidation of 14 Regional Planning Agencies and Councils of Government down to 8 or 9 Councils of Government. These COGs will see a major increase in funding from the state and should be pursuing a significantly greater role in developing GIS capabilities for their member towns.

Tyler was followed by Shane White, RI GIS Coordinator, who provided an overview of the State of Rhode Island's GIS system. White heads a 27-member Executive GIS Committee that coordinates GIS activities throughout the state – including developing and updating a statewide planimetric layer that feeds the state's singular 911 dispatch center.

Lieutenant Chris Renshaw of the UConn Fire Department and his co-presenter Officer Tom Hine of the UConn Police Department shared their lessons learned from the development of GIS in a public safety capacity for the UConn Campus and their interactions with surrounding jurisdictions. Storrs alone holds 40,000 student and staff, plus contractors in a 2 square mile area. They are developing a "spatial scheduling" program to create more efficiency for students to navigate across campus.

A presentation by Steven Pollackov of the New York Fire Department showed some intense images of the 8-alarm Breezy Point fire where over 110 homes burned during Hurricane Sandy.



Steven Pollackov,
NYFD



Dr. Grinstein presenting on
Weave

GIS is an integral part of New York City's emergency response efforts, aiding in evacuation routes, hydrant location, pre-planning and assessing damage post-event.

Next the keynote speaker, Dr. Georges Grinstein, turned toward the future with a presentation on Weave, an open-source data visualization software that integrates data and mapping in an innovative way. While installation of the current version of Weave requires support from your IT staff, a desktop application will be available in early

Continued on page 3

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- Jokes
- Cartograms
- Book reviews
- Playlists
- Random facts
- Events
- Compliments
- Suggestions

We like short pieces. 150-500 words is great. Think of readers and use an active voice and short sentences. This isn't an academic journal. Photos or graphics are practically required. Headshots are encouraged. You're beautiful. Or handsome. Smart too.

We don't accept:

- Ads, blatant or not
- Money
- Plagiarism

These rules can and probably will change. Email ctgeofocus@gmail.com

Out With the Old, In With the New

Happy final days of 2013! As the mercury falls and the holiday decorations fade it may be instinctual to want to wrap oneself up and hibernate until the joy and promise of spring start to appear.

But I have a better idea. (I always have ideas. Do you need an idea? Just ask, I'll come up with *something*).

Rather than fret over chilly toes and bills big enough for kindling take that happy, joyous attitude of gratitude and think about the changes and developments we have seen in our profession in these last few years. Data is freer, spatial technology is in-demand and on the rise and the State of Connecticut is working hard at re-organizing regionalization AND providing funding for our regional Councils of Governments. There's been a lot of work done at various COGS to create regional GIS. COGs will be receiving a massive increase flat funding and now will receive per-capita funding. We have a new state-wide aerial flight and the Office of Policy and Management is using their new authority to coordinate GIS across all levels of government.

If these changes bring you hope and optimism for the future of GIS capabilities in the state then dig out a leftover holiday card and send it off to your elected officials, thanking them and reminding them that GIS is an invaluable asset.



Thank you,
Meg McGaffin
Vice President, CT GIS User to User Network

<http://ctgis.uconn.edu/>

Check to make sure you have the newly updated User to User Network website bookmarked! For the past year the User to User Network Steering Committee has been working Emily Wilson's fingers to the bone on an updated website, with lots of help from Andrew Bowne & Cary Chadwick. The new site still has links to all of our meeting notes, information about the Steering Committee, the Network bylaws and more!

We are always looking for content that is useful to our members, especially education opportunities and links to data sources Please let us know if you would like to contribute anything to the website or the newsletter. These forums are for your benefit and we want to hear from you! Suggestions are always welcome.



Scott Roberts of South Windsor talks to Lt. Chris Renshaw of the UConn FD

2014 from iWeave.org. As Dr. Grinstein pointed out “The goal of analysis is to make knowledge for decision making” – an accurate summation of the role of GIS. He urged the audience to be aware of “the task you’re going to solve” as there’s often a gap between human interfaces and machines.

During the break for lunch, the LOB promenade was the place to view dozens of

posters submitted by GIS professionals. Votes were cast for People’s Choice and the winners were announced over the List Serv. First Place went to Jason Hawley and Paul Rego of DEEP for *Black Bear Research in Connecticut Using GPS Technology*, Second Place went to Betsy Nagurney for *Middle Schoolers “Get” GIS* and Third Place went to Beth Stewart Kelly of the CT Military Dept for *The “Heavies”: Connecticut Volunteer Heavy Artillery Regiment*.

Following lunch Dave Taylor and Robert Higgins shared insights on their work as GIS staff for Priceline.com where 215,000 hotels across need to be geocoded for users across 180 countries. That data need to constantly be live as well as up-to-date.

The afternoon was rounded out by lightning talks from Alfredo Frauenfelder of Esri, New England GeoSystems and Applied Geographics.

GIS Day events are coordinated by the CT GIS User to User Network Steering Committee with significant help from Peter Sandgren of DEHMS and Beth Stewart Kelly CT Military Dept, Emily Wilson

and Cary Chadwick of UConn/CT ECO. If you would like to help plan next years activities, schedule a presentation time slot or reserve table space please contact ctgisu2un@gmail.com. ■



Bryan Plavik, CT Department of Public Safety enjoys the poster gallery in the LOB

Connecticut GIS Day 2013 Poster Gallery Winners

On the following pages are all the Poster Gallery Winners, starting with the First Place Winner for People's Choice as counted by the votes cast on GIS Day. The User to User Network Steering Committee then voted on the following categories: Environmental, Land Use, Health and Public Welfare, Emergency Management/ Public Safety, Special Interest, Municipal Use of GIS, State Agency Use of GIS, RPA/COG Use of GIS and Historic. Thank you to all who entered posters, we look forward to seeing your work next year!

People's Choice First Place Winner
Black Bear Research Using GPS Technology
By Jason Hawley and Paul Rego
CT Dept. of Environment and Energy Protection
Wildlife Division

Black Bear Research in Connecticut using GPS Technology
Jason Hawley and Paul Rego
Connecticut Department of Environment and Environmental Protection
Wildlife Division

Black bears began disappearing from the northeastern corner of Connecticut through range expansion from Massachusetts during the mid 1900's. A resident population became evident in the 1960's as numerous sightings of adult female cubs with cubs were reported in 7 Central Wildlife Districts. Since then, the state's population of black bears has continued to increase in numbers and ranged in range. The Wildlife Division has collected bear sightings from the public for over 50 years. These public sightings have been a valuable index of black bear population growth and range expansion to date. In 2007, the Wildlife Division initiated a bear research project to determine population growth rates, reproduction and survival and how bear range characteristics. Initially, this research included monitoring and monitoring a sample of 15-25 new fitted with Very High Frequency (VHF) radio-collars. Collar data were used to determine range characteristics. Initially, this research included monitoring and monitoring a sample of 15-25 new fitted with Very High Frequency (VHF) radio-collars. Collar data were used to determine range characteristics. Initially, this research included monitoring and monitoring a sample of 15-25 new fitted with Very High Frequency (VHF) radio-collars. Collar data were used to determine range characteristics.

Resource Selection
A statewide habitat suitability analysis was performed for black bears using 2011-2012 GPS data from collared female bears and 2004 Connecticut land-use cover data from the USGS. Sample range maps were obtained from Connecticut Department of Environmental Protection (DEP) for collared bears using a fixed kernel density estimator with data-sphere correction and for statewide distribution using kernel density estimation. Resource selection indices (RSI) were calculated for each bear using the 2011-2012 data. Resource selection indices (RSI) were calculated for each bear using the 2011-2012 data. Resource selection indices (RSI) were calculated for each bear using the 2011-2012 data.

ENVIRONMENT

Long Island Sound Sea Floor Mapping

by Kevin O'Brien, Dept. of Energy & Environmental Protection
Long Island Sound Study (DEEP LISS)

Long Island Sound Seafloor Mapping: Ongoing Exploration of The Ocean In Our Backyard

Project Leaders: CT Dept. of Energy & Environmental Protection, NY Dept of Environmental Conservation, U.S. EPA, and the CT & NY Sea Grant programs
Primary Partners: NOAA National Centers for Coastal and Ocean Science (NCCOS) & Office of Coast Survey (OCS), University of Connecticut (UCONN), and Columbia University's Lamont Doherty Earth Observatory (LDEO)

1. The Problem:
Managers and researchers often do not have the necessary knowledge of seafloor habitats required to protect resources and sustain human use. In many cases data are inadequate to make wise decisions concerning Infrastructure Planning, Species & Habitat Management, and General Coastal & Ocean Management issues.

2. The Solution:
A multi-state/multi-agency collaborative is guiding efforts to develop improved benthic data products. A settlement resolving a permitting dispute from two electrical cable crossings in the Sound created a Research and Restoration Fund focusing on benthic mapping.

In order to most effectively use the funds, regional stakeholders conducted a spatial prioritization assessment to identify areas of greatest need. Their input addressed factors including ecological value, multiple uses, and development pressure. From the priority areas, a pilot

was selected to serve as an operational test-bed. The mapping is being led by experts from NOAA, UCONN, & LDEO. Work began in Summer 2012 and will conclude in Spring 2014. Products will include spatial data on:
• Benthic Habitats & Ecological Processes
• Acoustic Intensity & Seafloor Topography
• Sediment Texture, Grain Size Distribution, & Sedimentary Environments
• Physical & Chemical Environments

3. Preliminary Results:
• Some of the spatial prioritization techniques developed for the LIS effort are now being used to conduct similar assessments in the state of Washington.

• Advanced sonar processing techniques were used to increase the resolution and quality of older data and allow them to be combined with recently acquired hydrographic data.

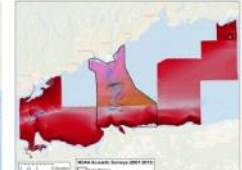
• The benthic habitat and ecological analyses are

showing areas once thought relatively stable in terms of community composition are now declining in certain populations. In other areas, organisms in similar habitats show highly variable communities and significantly greater diversity when compared to historic sampling.

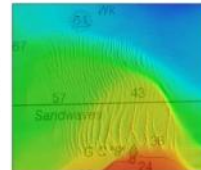
4. Next Steps:
As the final pilot data are delivered and evaluated, a work-plan to guide future efforts will begin. The next phase of data collection and analysis will concentrate on the Eastern LIS priority area. While there is no official start date as yet, the work will try to leverage potential bathymetric and other data collection efforts planned by the partners and other Federal agencies.



▲ Figure 1: Priority mapping areas. The green shows the current pilot area, the red areas are targeted for past-pilot efforts. These resulted from a spatial decision making framework that analyzed input from a variety of stakeholders.



▲ Figure 2: Hydrographic data indicates the depth to the seafloor. Dark red indicates a shallow area, while blue indicates a deeper area. These data were collected in 2012 & 2013 by the NOAA ship Thomas Jefferson.



▲▲ Figures 3 & 4: An example of sand waves using the 2012 multi-beam bathymetry (above) and backscatter (left). The multi-beam data describes the depth and topography; the backscatter helps describe the type of materials (sand, mud, rocks, etc.) that make up the seafloor. The two are used together to help characterize seafloor environments.



▲ Figure 5: Changes in seafloor habitat from 1991-2012. *Haliclona oculata*, *Astrangia pocolata*, *Mytilus edulis*, and branching bryozoa were historically reef dominant. In 2012-2013, *Haliclona* (the long, finger-like organisms) is absent from reef fauna.

Logos for participating organizations: Long Island Sound Study, Sea Grant Connecticut, Sea Grant New York, NOAA, UCONN, Lamont-Doherty Earth Observatory, Columbia University Earth Institute. QR codes and website information for seafloor mapping.

LAND USE

Central Naugatuck Valley Residential Build-out Analysis

by Aaron Budris, Council of Governments Central Naugatuck Valley (COGCNV)

Central Naugatuck Valley Residential Build-Out Analysis - 2013

I. INTRODUCTION

A residential build-out analysis estimates the potential number of residential dwelling units that can be built in a given area, taking into account of known constraints to development and current zoning regulations. Residential build-outs can be a powerful tool for municipalities to assess zoning rules and regulations, and how they affect future development. Build-out analyses can also help prepare municipalities for future population increases and may lead to a better understanding of future demands on government services.

This residential build-out analysis for the Central Naugatuck Valley Region in Connecticut was conducted on a municipality-by-municipality basis using the Community's extension for ESRI ArcGIS 10.1 Geographic Information System (GIS) software. The Build Out Wizard, a module in the Community's program, calculated the number of dwelling units that can be placed on each developable parcel, guided by specific information about zoning regulations and constraints to development entered by the user. The number of dwelling units was then used to calculate potential additional population that each municipality could ultimately expect to add if current regulations remained in place and all available land was developed.

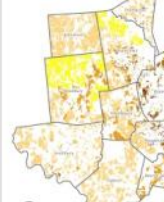
II. METHODS

1. Each municipality's build-out began with a complete inventory of parcel layers. Municipalities are asked to demonstrate.
2. Areas that have previously been developed or are considered open space were removed.
3. Non-residential zoned areas were removed.
4. Areas with environmental constraints, a 2% slope, wetlands, waterbodies, and areas within the 300 year flood zone, were all removed.
5. Buildable residential land remained when all constrained areas were removed.
6. Municipal zoning regulations were used to guide the build-out.
7. For each zoning category, allowable density (units/acre), building separation distance, minimum lot size, and an efficiency factor were entered into the Community's Build-Out Wizard.
8. Guided by specific zoning specifications for each zone, buildings were placed at appropriate densities with appropriate setbacks on buildable residential land.

III. RESULTS

The results are totals for all 13 region municipalities were aggregated to arrive at region totals.

Municipality	Buildable Residential Land (Acres)	Buildable Residential Units
Bloomfield	1,200	1,200
Cheshire	1,500	1,500
Colchester	1,800	1,800
East Granby	2,000	2,000
East Hampton	2,200	2,200
Eastford	2,500	2,500
Eastford	2,800	2,800
Eastford	3,000	3,000
Eastford	3,200	3,200
Eastford	3,500	3,500
Eastford	3,800	3,800
Eastford	4,000	4,000
Eastford	4,200	4,200
Eastford	4,500	4,500
Eastford	4,800	4,800
Eastford	5,000	5,000
Eastford	5,200	5,200
Eastford	5,500	5,500
Eastford	5,800	5,800
Eastford	6,000	6,000
Eastford	6,200	6,200
Eastford	6,500	6,500
Eastford	6,800	6,800
Eastford	7,000	7,000
Eastford	7,200	7,200
Eastford	7,500	7,500
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Eastford	18,800	18,800
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Eastford	19,500	19,500
Eastford	19,800	19,800
Eastford	20,000	20,000



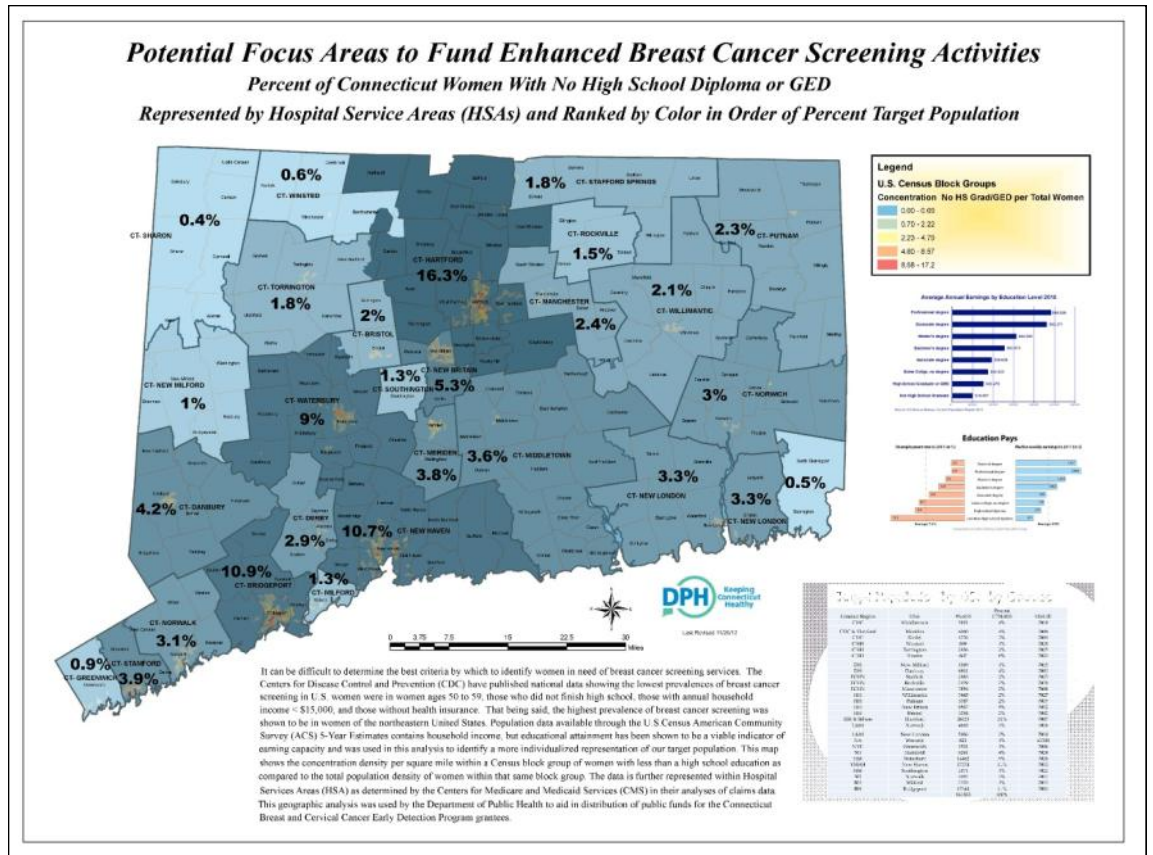
ALLOWABLE DENSITY (ZONING) OF BUILDABLE RESIDENTIAL LAND

There are over 80 distinct zoning designations in the region representing 31 allowable residential densities. To more easily understand and compare the densities on a regional level, buildable land was classified into 5 residential land use density categories. (East (less than 5 DUs/acre), Suburban Medium (5 to 10 DUs/acre), Urban Medium (10 to 20 DUs/acre), and Urban High (over 20 DUs/acre). Most buildable residential land in the region is zoned with a Suburban Low density (2.0 DUs/acre), followed by Urban Medium (18.5 DUs/acre), Urban Medium (17.2 DUs/acre), and Urban High (1.7%).

HEALTH AND PUBLIC WELFARE

Focus Areas for Breast Cancer Screening

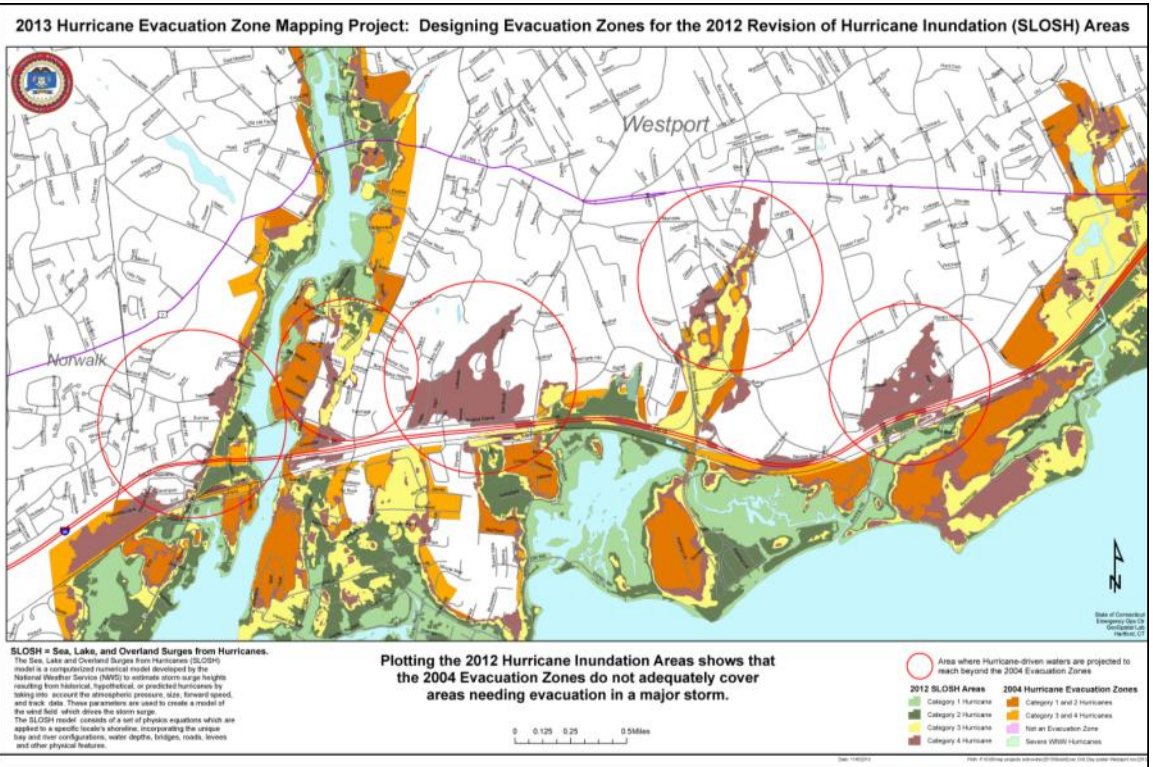
by Susan Yurasevecz, CT Dept. of Public Health



EMERGENCY MGMT/PUBLIC SAFETY

2013 Hurricane Evacuation Zone Mapping Project

by Peter Sandgren, Dept. of Emergency Services & Public Protection (DESPP)



SPECIAL INTEREST

North Arrows Through the Years

by David Scherf, Torrington

North Arrows Then and Now

30 YEARS OF DIGITAL DESKTOP MAPPING AND DRAFTING SOFTWARE

With the advent of desktop drafting and mapping software in the early 1980s, drafting and mapping technicians had the choice of using pre-drawn north arrows from a selection offered by the software.

The basic north arrow offerings from ESRI's Geographic Information System software and Autodesk's Computer Aided Drafting (CAD) software are familiar to most GIS and CAD software users. Some of these users have been working with these software packages for 30, or, more years.

Before the 1980s, almost all drafting and map making were done by hand. For the most part, hand drawing no longer used energy for hand-drawn sketch looking plans and rendering used in landscape architecture and planning.

The north arrows shown at right, under the "Sampling of North Arrows Circa 1880 - 1930" are representative of a time when personally your work often meant drawing a sketch of a north arrow on your map or plan. The old north arrows are taken from records on file in the City of Torrington's Engineering records, and are 8 1/2 x 11 1/2 size.

This poster highlights the work of drafters and mappers from the past, and offers a comparison of their north arrow styles with styles of the present.

The samples displayed suggest that north arrows were drawn with precision, elegance, and artistic flourish. These arrows represent a high level of craftsmanship and attention to detail that helps give the "art" in cartography.

ArcGIS 10.1 North Arrows

AutoCAD Civil 3D 2010 North Arrows

Sampling of North Arrows Circa 1880 - 1930

MUNICIPAL USE OF GIS

How Does Construction Grade Relate to Storm Damage

by Meghan McGaffin, Milford

How Does Construction Grade Relate to Storm Damage?

Irene Damage
% of Structure Damaged

- 0 - 24.9%
- 25 - 49.9%
- 50 - 74.9%
- 75 - 100%

Sandy Damage
% of Structure Damaged

- 0 - 24%
- 25 - 49.9%
- 50 - 74.9%
- 75 - 100%

Combined Damage
% of Structure Damaged

- 0 - 24.9%
- 25 - 49.9%
- 50 - 74.9%
- 75 - 100%
- 100.1% - 100%

How Does Construction Grade Relate to Storm Damage?

After Irene hit and Sandy passed the houses on hand lot were serious structural damage. Most of the houses were built in the 1950s and 1960s and were built to code. The houses were built to code and were built to code. The houses were built to code and were built to code.

When working in the City of Milford Hazard Mitigation Plan it was noted that city conduct a field visit to determine the extent of construction code compliance. One method was to determine what happened during the last few years. By looking at the results of the field visit the city was able to determine the extent of construction code compliance. The results of the field visit showed that 25% of the houses had construction grade.

Grade 4 Damage

Grade 3 Damage

Grade 2 Damage

Grade 1 Damage

Grade 0

Grade 1

Grade 2

Grade 3

Grade 4

Grade 5

Grade 6 or Less

Over 15% Damage by Grade

Over 20% Damage by Grade

Over 25% Damage by Grade

Over 30% Damage by Grade

Over 35% Damage by Grade

Over 40% Damage by Grade

Over 45% Damage by Grade

Over 50% Damage by Grade

Over 55% Damage by Grade

Over 60% Damage by Grade

Over 65% Damage by Grade

Over 70% Damage by Grade

Over 75% Damage by Grade

Over 80% Damage by Grade

Over 85% Damage by Grade

Over 90% Damage by Grade

Over 95% Damage by Grade

Over 100% Damage by Grade

What Can We Do With What We Learned?

Shown here are all the homes in Category 1 and a SLOSH zones that have a construction grade of 6 or less. This type of analytical result can guide the City of Milford when taking actions for planning and zoning, property assessments, flood and sea level rise risk, and most importantly, where to look to mitigate hazards and concentrate emergency preparedness activities.

Submitted by:
Meghan McGaffin
GIS Analyst
City of Milford CT

STATE AGENCY USE OF GIS

Public Health Indicators - Interactive Map

by Karyn Backus, CT Dept of Public Health



Public Health Indicators Now Available Using an Interactive Town Map

The Department of Public Health is using an interactive dashboard to display health indicators by town. The first health indicator available is Leading Causes of Death for 2001-2005 and 2006-2010. Users can compare one town or several towns to the State for significant differences in health outcomes. DPH will expand the health indicators available in this format over time.

Although town-level mortality comparisons have been available as published reports for several years, this is the first time these rates are displayed using an interactive map. The dashboard provides health indicator information by geography using 1) a map and bar chart, 2) a table displaying town rate values, and 3) trend lines when multiple time periods are available. The dashboard also provides buttons to directly download the data, to access the methodology, and to print the dashboard as displayed.

Visit www.ct.gov/dph/mortality to access the map.

Indicators: Select from several mortality indicators.

Bar Chart: Another way to view the rates.

Significance Testing: This dialogue box provides details about the significance testing used for the analyses and the color-coding of the towns.

Trend Lines: See time trends for selected towns and the state.

Print Button: Prints the dashboard as it is displayed on-screen.

Data Table: See the rates in the dashboard with color coding - or - download the dataset for the entire map.

Methods: Click the button to access the methodology for the analyses.

Methodology: Leading Causes of Death Data in Connecticut

Leading Causes of Death
Cause of death subject to an inner range of ICD-10 categories chosen by the Office for Disease Control and Prevention System Center for Health Statistics. The 10 leading causes of death represent the year's leading causes.

Age-Adjusted Mortality Rates (AMR)
AMR is the number of deaths per 100,000 population, adjusted for differences in the age structure of the population between the study area and the standard population.

Authors: Karyn Backus, Joan Foland, Loyd Mueller, CT Dept of Public Health HSS section, SAR unit

BEST USE FOR ANALYSIS Central Naugatuck Valley Residential Build-out Analysis - 2013

by Aaron Budris, Council of Governments Central Naugatuck Valley (COGCNV)

Central Naugatuck Valley Residential Build-Out Analysis - 2013

I. INTRODUCTION
A residential build-out analysis estimates the potential number of residential dwelling units that can be built in a given area, taking into account all factors constraints to development and current zoning regulations. Residential build-out can be a powerful tool for municipalities to assess zoning rules and regulations, and how they will impact future development. Build-out analyses can also help prepare municipalities for future population increases and may lead to a better understanding of future demands on government services.

II. METHODS
1. Each municipality's build-out began with a complete inventory of parcel-level information used to demonstrate...
2. Areas that have previously been developed or are considered open space were removed.
3. Non-residentially zoned areas were removed.
4. Areas with environmental constraints, such as steep, wetlands, watercourses, and areas within the 100-year flood zone, were all removed.
5. Buildable residential land remained when all constraints were removed.
6. Municipal zoning regulations were used to guide the build-out.
7. For each zoning designation, allowable density (Dwellings), building separation (setbacks), minimum lot size, and an efficiency factor were entered into the Community Build-Out Model.

III. RESULTS
The results and totals for all 13-region municipalities were aggregated to arrive at regional totals.
BUILD-OUT DWELLINGS AND POPULATION
The Regional Build-Out Analysis indicated that there will be an additional 24,528 dwelling units built on 42,676 acres of buildable land if the region was completely built out under current zoning regulations. Using current household size (2.68) for each municipality as a multiplier, an additional 65,703 residents can be expected at build-out, a 33.5% increase in population.
COMMON IMPACTS
Using national averages, Community also estimated some potential impacts that the additional 65,703 residents could have on the Region. These figures can help municipalities and the region prepare for future growth.
ALLOWABLE DENSITY (ZONING) OF BUILDABLE RESIDENTIAL LAND
There are over 100 zoning categories in the region representing 31 alternative residential densities. To more easily understand and visualize the densities on a regional level, buildable land was classified into 5 residential land-use density categories: Urban (over 5 DUs/Acre), Suburban Low (3 to 5 DUs/Acre), Suburban Medium (1 to 3 DUs/Acre), Urban Medium (2 to 3 DUs/Acre), and Urban High (over 8 DUs/Acre). Most buildable residential land in the region is zoned with a Suburban Low density (3 DUs/Acre), followed by Urban Medium (2 DUs/Acre), Suburban Medium (2.5 DUs/Acre), Urban Medium (2.5 DUs/Acre), and Urban High (7 DUs/Acre).

CURRENT LAND USE OF BUILDABLE RESIDENTIAL LAND
The 42,676 acres of buildable residential land in the region can be classified into four land-use categories. 72.7% is currently undeveloped land, typically wooded land or overgrown. An additional 24,528 dwelling units would be built on 42,676 acres of buildable residential land. Residential build-out would increase the proportion of residential buildable land in the region, 4%.

COUNCIL OF GOVERNMENTS CENTRAL NAUGATUCK VALLEY

RPO/COG *Second Place People's Choice

New Britain's Urban Forest

by Mike
Towle,
Central CT
RPA

New Britain's Urban Forest

GIS Mapping and the Status and Future of the Trees in the City

Trees of New Britain

Trees are key to a healthy city. A flourishing urban tree canopy provides a host of benefits and services, including:

- Environmental services - stormwater mitigation, air quality mitigation, ecological balance.
- Social enhancement - improved mental and physical health, a nurtured community, a sense of place.
- Economic growth - increased housing prices, amplified commercial income.

This analysis examines the City of New Britain's tree canopy cover including tree canopy cover, tree counts, and estimated benefits. In addition, the analysis also quantifies tree planting potential within the city and the benefits and costs of such a plan.

Category	Current Tree Canopy	New Canopy Scenario	Tree Canopy Ratio
Green Space	\$12,100,000	\$12,100,000	\$12,100,000
Urban Development	\$75,000,000	\$65,000,000	\$86.7%
Total	\$87,100,000	\$77,100,000	\$88.6%

Category	Current Tree Canopy	New Canopy Scenario	Tree Canopy Ratio
Green Space	\$12,100,000	\$12,100,000	\$12,100,000
Urban Development	\$75,000,000	\$65,000,000	\$86.7%
Total	\$87,100,000	\$77,100,000	\$88.6%

Quantifying Tree Canopy Benefits

- A tree canopy LIDAR derived line layer was provided from an outside consulting company.
- The polyline data was reclassified and then vectorized to create a polygon tree canopy feature while eliminating topographical areas and structures.
- Percent Canopy cover per block was derived for the whole city and then validated against canopy cover % per block values interpreted from ortho photography. Results from both methods yielded a 32% canopy cover for New Britain.
- The Canopy cover polygon was classified into three categories:
 - Core Forest:** Areas of canopy with an Area > 0.037 acres were extracted. A reverse buffer of 20ft was then applied to form fringe forest.
 - Tree Canopy:** The fringe forest which was thinned using the reverse buffer in the processing of core forest defined this class.
 - Island Trees:** Remaining canopy cover with areas < 0.037 acres.
- Canopy covers for individual trees for each class were defined in the literature, thus allowing for the calculation of total trees for a given class.
 - Total trees per class = C x I
 - where C is the total canopy cover for a given class and I is the canopy cover for a single tree within that class. Total trees equals the sum of the trees for all three classes.
- Tree benefits were calculated using tree canopy cover and Tree View software for three scenarios of canopy cover. The results are summarized in figures 7 and 8.

HISTORIC *Third Place People's Choice

The Heavies CT Volunteer Heavy Artillery Regiment

by Beth
Stewart-Kelly,
CT State
Military
Department

The "HEAVIES"

Connecticut Volunteer Heavy Artillery Regiment

November 23, 1863 to August 18, 1865

A map of the CT Heavy Artillery Regiment battle Engagements was developed using GIS

Engagements of the Heavy Artillery

- Spotsylvania, Va. May 22-24, 1864
- Tolopotomy, Va. May 28, 1864
- Hanover Court House, Va. May 30, 1864
- Cold Harbor, Va. June 1, 1864
- Cold Harbor, Va. June 2-12, 1864
- Petersburg, Va. June 20-26, 1864
- Winchester, Va. Sep. 19, 1864
- Fisher's Hill, Va. Sep. 22, 1864
- Cedar Creek, Va. Oct. 19, 1864
- Hatcher's Run, Va. Feb. 6, 1865
- Petersburg, Va. March 25, 1865
- Petersburg, Va. April 2, 1865
- Little Sailor's Creek, Va. April 6, 1865

Account of Second Lieutenant William H. Cogswell Company B, Second CT Volunteer Heavy Artillery, Native American, Schaghticoke Tribe Kent, CT

In November 1863, the Nineteenth Connecticut was re-designated the Second Connecticut Volunteer Heavy Artillery. At that time, additional men were recruited, and William's cousin Newton W. Cogswell signed on. Heavy artillery regiments, whose men were trained as both infantrymen and artilleryists, primarily garrisoned forts around Washington, D.C.

The Second, however, exclusively performed infantry duties, a detail to which it was again assigned on 17 May 1864, when the unit was redeployed from defensive fortifications to the Army of the Potomac, where it would participate in what came to be known as the Wilderness campaign. By 5 March 1864, First Sergeant William Cogswell had been promoted to the rank of second lieutenant. He, along with one other second lieutenant, was the third highest ranking man in his company with authority over all the sergeants, corporals, and privates in Company B.

On 1 June, the Second Connecticut "Heavies" saw their first major action and suffered their most severe casualties of the war at Cold Harbor, Virginia. William weathered the ordeal, but among the 322 killed and wounded was his cousin Newton, who had been shot in the arm. Following the Battle of Cold Harbor, the regiment hunkered down in trenches and rifle pits through the end of July to do its part to hold the federal line at Petersburg, Virginia. On 19 September 1864, the Second was called into action to check the advance of Jubal Early's forces, which had broken through Union lines at Winchester, Virginia. During this battle, Cogswell received a wound to his leg, which required amputation. Succumbing to the effects of the operation, he died on 7 October 1864.

THE BATTLE OF COLD HARBOR was fought from May 31 to June 12. It was one of the final battles of Union Lt. Gen. Ulysses S. Grant's Overland Campaign, and is remembered as one of history's bloodiest, most lopsided battles. Thousands of Union soldiers were killed or wounded in a hopeless frontal assault against the fortified positions of Confederate Gen. Robert E. Lee's army.

United States Civil War Division in 1864 - All blue areas represent Union states, including those admitted during the war; light blue areas represent Union states which permitted slavery; red areas represent Confederate states. Unshaded areas were territories before or during the Civil War. Note: West Virginia became a state during the Civil War.

July 7th 1865, the remaining members of the original Nineteenth Regiment were mustered out, and left for home.

Poster by: Beth Stewart-Kelly, GIS - CT National Guard

Book Review: *Cartographer's Toolkit* by Gretchen Peterson

By Sharon Benjamin

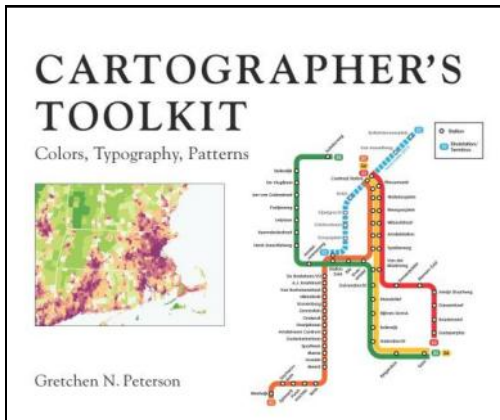


Image: Amazon.com

map composition. The book reflects the same wit and wisdom on cartography today as her eponymous blog. The slim binding belies a substantial array of ideas to inspire cartographers in their map design. In the last few weeks I have turned to Ms. Peterson's book for various reasons while building maps. Owing to the nature of my work at NOAA's National Marine Fisheries Service with social scientists and economists, I tend to build maps in a more formal style, and Ms. Peterson's book offers many points of wisdom that aid my creativity in working within these parameters.

The book is comprised of three chapters on Color, Typography, and Composition Patterns. The author gives notes in each section's introduction on the conventions and language for each topic, as well as a guide to how best to use the chapter. The excellent printed quality of the book, with its lively color guides and sample maps, make it all but irresistible to flip through the vibrant pages and pick out a favorite palette.

While a very useful reference, I felt that the *Cartographer's Toolkit* showed some inconsistent organization in the third section, regarding composition patterns. The section on color palettes provides a wealth of information on chromatic choices in a sophisticated and carefully-designed page layout, while the section on typeface goes to great pains to describe tried-and-true fonts, and organ-

Gretchen Peterson's recently published *Cartographer's Toolkit* is a helpful quick-reference guide to color, font choice, and

ize them by availability to help facilitate using the book as a quick-reference. The third chapter is ostensibly organized so that included mapping techniques move from the foundational design concept of signal-to-noise ratio, to the use of complexity. The chapter covers an excellent range of valuable map design ideas between these two concepts, but without particular organization. For novice map designers, the section may be improved by distinguishing between the map layout schemes (small multiples, discontinuous frames), the design elements (vignettes, flourishes, illustration, sketch), and common map types (choropleth, diagrammatic, heat map, animation).

In summary *The Cartographer's Toolkit* serves

well both as a teaching primer and as an organized quick-reference guide to ideas and techniques, and I think would be useful to map-makers with varying levels of experience. More advanced cartographers will find the fine-tuned color palettes and careful display of scores of typefaces to be a welcome inspiration to try new ideas. Ms. Peterson's conversational yet didactic tone encourages novice map-makers to consider dozens of diverse maps and advanced design concepts. As the author insists, we don't have to "reinvent the wheel" each time we begin a project. The *Cartographers Toolkit* can help readers jump-start their maps with a versatile portfolio of options. The guide fosters an innovative approach to well-used cartographic standards, and empowers readers to refine their maps and build their skillset. ■

Read an interview with Sharon Benjamin on pg 11



Image: Amazon.com

Meet a Contributor: Sharon Benjamin

Sharon responded to a call for submissions to GeoFocus via the CT GIS List Serv. In communicating with Sharon about her book review of **The Cartographer's Toolkit** (page 8) I decided that a brief interview to introduce one of the contributors to GeoFocus would be a nice addition to the newsletter. Enjoy!

What is your background in GIS?

I was trained in spatial analysis through my Master's program in Coastal Environmental Management at Duke University's Nicholas School of the Environment. We covered a wide range of topics in database management, spatial analysis techniques, cartography, and an introduction to using the Python language and ArcPy, in ESRI's ArcGIS suite.

Where do you work now?

I am the GIS and Fisheries Specialist contracting with the Social Science Branch (SSB) of the National Marine Fisheries Service's Northeast Fisheries Science Center, based in Woods Hole, MA. I manage spatial data for scientists in the branch, including fisheries economists, anthropologists, and other social scientists.

What is a fisheries economist?

As part of the NEFSC, research at the SSB is focused on how New England uses and manages our fisheries resources, in both commercial and recreational enterprises, using economic and socio-cultural data.

What kind of on-the-water spatial issues do you work on?

There are several interesting challenges where the social sciences intersect with fisheries. The economic and social science data for recreational and commercial fishing activity is generally based entirely on land; for example, the ports where fish are sold from the boat to a fish dealer, or from where recreational fishing boats, such as charter party boats, leave for a day at sea. There is some limited data available on areas of concentrated fishing effort that fishermen provide to the fisheries service, as mandated by federal law. Part of my work as the GIS specialist is to collaborate with fisheries economists to translate their research into a format accessible to policy makers and the public.

What are your favorite kind of maps?

I enjoy a well designed map, as I always try to pick up on what the cartographer did to tell the data's story. Some of my favorites are the flow-distribution maps by Charles Joseph Minard. His famous maps of Napoleon's march and England's 19th century coal exports are wonderful examples of intuitive communication of data through cartography and clever charts.

What's a useful tool or shortcut you rely on?

The Python programming language has been a valuable tool to greatly reduce the amount of time spent on iterative processes, like buffering several dozen files or pulling a certain value from a set of results tables. ■



CLEAR's Geospatial Training Program Goes Global

By Cary Chadwick, CT ECO Reprinted with permission from <http://blog.clear.uconn.edu>

When an email from Dr. Yahaya Umar at the Nigerian Defence Academy came across my desk last July indicating interest in CLEAR's hands-on workshop on Geographic Information System (GIS) technology, I was initially a bit skeptical. Why would anyone from the other side of the world want to

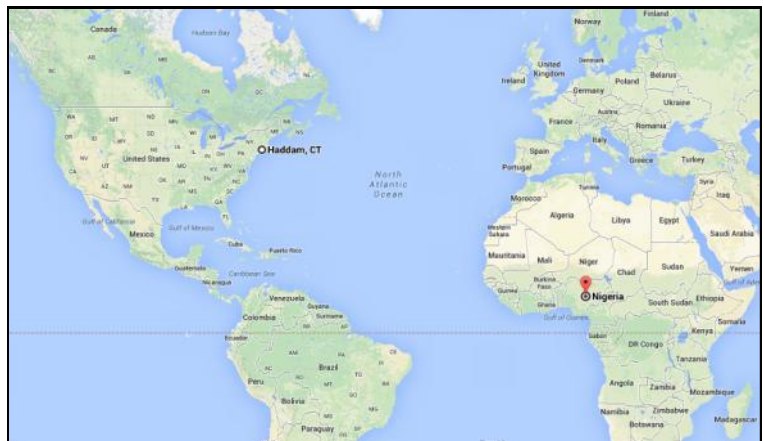


Cary Chadwick and Emily Wilson with Dr. Umar and Dr. Maikaje during the Introduction to GIS training

travel all the way to UConn to take a three-day workshop? Surely there were other GIS training opportunities in Nigeria, or at least, on the continent of Africa. Right? And sure enough, there were. But Dr. Umar insisted that CLEAR's training was exactly what he and his colleague, Dr. Dominic Maikaje were looking for to get them started on mapping parasitic disease outbreaks in their home state of Kaduna, Nigeria. So sure enough, after travel visas were secured and international flights were booked, Dr. Umar and Dr. Maikaje found themselves 5,200 miles from home, sitting in our classroom, shivering on a cold morning in December, introducing themselves to our other course participants and explaining how

GIS was the tool they thought could transform the way their nation tracks, contains and predicts outbreaks of zoonotic (diseases transmitted from animals) disease.

Dr. Maikaje, a specialist in protozoology, and Dr. Umar, who specializes in molecular parasitology, are conducting epidemiological studies about the incidence of trypanosomiasis, a parasitic disease more commonly known as 'sleeping sickness' that affects both animals and humans, and liver fluke, a parasite carried by snails that live in fresh water supplies frequented by cattle and other animals. They came to the class with their research data in hand, hoping to be able to map the locations of field sample stations and identify patterns in environmental factors which might explain why different species of host snails are found in some



Nigeria is a long way from Haddam! Image: Google Maps



Workshop attendees

within and among the features being mapped.

“CLEAR’s training was exactly what we were looking for,” said Dr. Umar. “It provided us with a fundamental understanding of what the technology can do and how we can apply it to our research. We are excited to return to Nigeria and use our new skills and continue our new collaboration with CLEAR.”



Locations of freshwater dams in Kaduna, Nigeria where snails carrying parasitic diseases have been identified

In addition to spending three days learning GIS, Dr.’s Umar and Maikaje extended their trip by a few extra days in order to work with CLEAR’s geospatial trainers, tour the UConn campus and of course, do a little

sightseeing. “It was my first trip to the States, I just had to go see New York City. And wao, was it spectacular!” said Dr.

Umar.

I’ll tell you what else is spectacular, Dr. Umar – your and Dr. Maikaje’s enthusiasm, determination and dedication to helping make Nigeria a safer place to live. It was a pleasure to meet you both. Everyone here at UConn is eager to see what is in store for you. There is little doubt in my mind that GIS technology can make a real difference in your country and there isn’t anyone better to head up the effort than you two. And “wao!” that sure is spectacular. ■



Cary wearing a traditional Nigerian Buba.

areas and not others.

“Our goal is to gain a true picture of where the disease exists now and where it is likely to be found tomorrow. GIS can help us devise a method of containment that we hope will eventually lead to eradication of some of these diseases,” said Dr. Maikaje.

CLEAR’s *Introduction to GIS* training is a three day intensive, hands on training. By the end of the third day, participants are able to create their own customized maps and work with geographic data and tables to begin analyzing spatial patterns

Tips & Tricks: Using Feature Templates in ArcGIS

By Patrick Ladd, City of Meriden

One of the things I truly enjoy about teaching is when I learn something new – either from my students or from the course material itself. Such an incident happened recently in the “Basic Principles of GIS” course I was teaching for the first time as part of the GIS Certificate program at CCSU - *shameless plug*. I was preparing a lesson on editing GIS data, including a discussion of the Feature template. While I’ve always understood the Feature template as an editing tool for creating new features, what I didn’t realize, and stop yourselves from reading this if you were already aware, is that you can set default attribute values through the Feature template - now I’m wishing I had paid closer attention to

Mark Scott’s presentation during ESRI’s rollout of “What’s new in ArcGIS 10.”

Some of you may wonder why a college instructor would admit to not knowing such a simple fact – “If he’s teaching this course, isn’t he supposed to know all this stuff?”

On the contrary, teachers are merely facilitators of knowledge, and this little gem was so

helpful to me at my day job, I just had to put my reputation out on a limb and pass it along to you as well.

I guess this is so 9.3 but I always used ArcCatalog to set my default values – and it was a pain to change the values because you had to save your edit session, save and close ArcMap, open ArcCatalog, make the changes and then re-open ArcMap. Using the Feature template tool to do this is so much easier, convenient, and efficient. In fact, it’s so easy to do, once you try it, you too will want to write an article to share this insight. Here’s how it works:

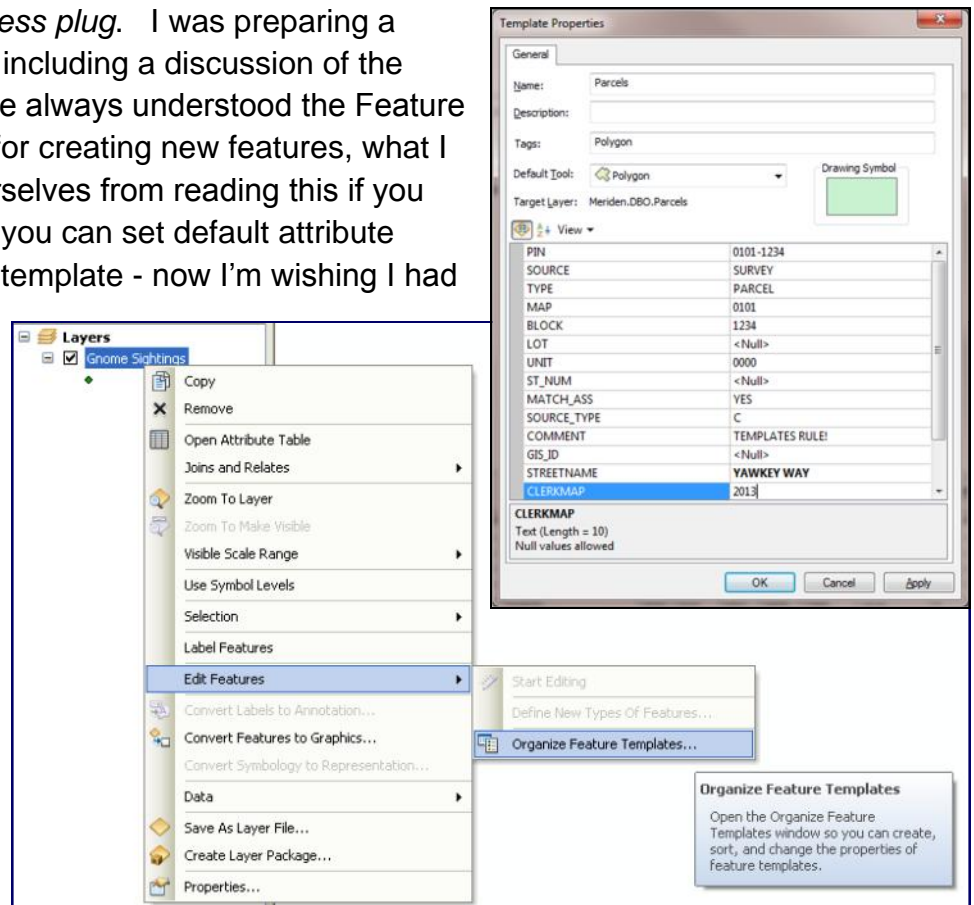
In ArcMap, right-click on a layer

Select Edit Features > Organize Feature Templates

Click on Properties (if it’s disabled, first click on New Template to create a template for that layer)

The Template Properties window lists all of the fields in your attribute table for that layer. Go through this list and set as many default values as you wish.

It’s that simple. ■

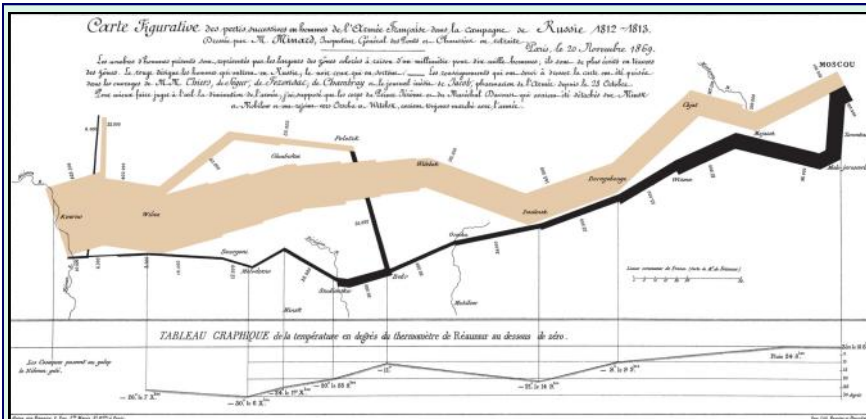


Geo Tidbits

"Everything is related to everything else, but near things are more related than distant things."
Tobler's First Law of Geography

An Example of Fine Cartography By Joseph Minard

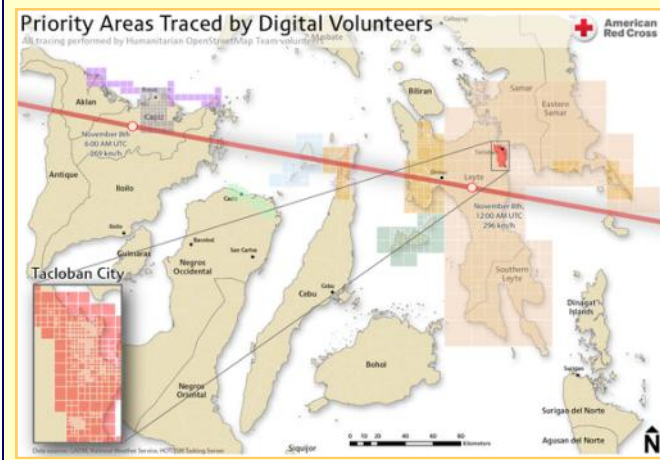
Napoleon Bonaparte began his ill-fated 1812 invasion of the Russian Empire with 422,000 men. With each step further into Russian territory, more and more soldiers died or deserted. By the time it reached Moscow, Napoleon's army had dwindled to 100,000 men—already less than a quarter the size it



had been at the start. During their disastrous retreat out of Russia, temperatures plunged to -37.5°C . Nearly half the remaining survivors of the invasion were killed during the botched crossing of the Berezina River. Of the 422,000 men who set out on the invasion, barely 10,000 of them returned alive as shown in the chart map above. The lines, each millimeter of width approximating 10,000 soldiers, shows how the force was diminished. Read more about this amazing map at : <http://cartographia.wordpress.com/2008/04/30/napoleons-invasion-of-russia/>

How Online Mapmakers Are Helping the Red Cross Save Lives in the Philippines

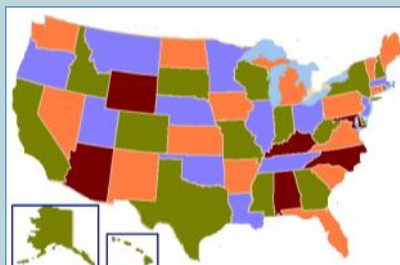
"While Open Street Map has been used [in humanitarian crises before](#), the super typhoon Haiyan is the first time the Red Cross has coordinated its use and the volunteer effort around it."



Read more here: <http://tinyurl.com/redcross-maps>

Four Color Theorem

From Wikipedia, the free encyclopedia



In mathematics, the four color theorem, or the four color map theorem, states that, given any separation of a plane into contiguous

regions, producing a figure called a *map*, no more than four colors are required to color the regions of the map so that no two adjacent regions have the same color. Two regions are called *adjacent* if they share a common boundary that is not a corner, where corners are the points shared by three or more regions.^[1] For example, in the map of the United States of America, Utah and Arizona are adjacent, but Utah and New Mexico, which only share a point that also belongs to Arizona and Colorado, are not.

The Evolution of GIS Application Development

By Matt Sheehan, WebMapSolutions

GIS was once a niche technology. It was expensive, and used largely by those who had geospatial training. Today that picture is changing. GIS is undergoing rapid evolution. The increasing popularity of cloud computing, and mobile devices: tablets and smartphones, have helped broaden the appeal and reduced the cost of location technology.

Cloud Computing

The move of GIS from a desktop only product to the Internet in the 90's heralded a dramatic change in access to the technology. Maps and GIS functionality became available in web browsers.

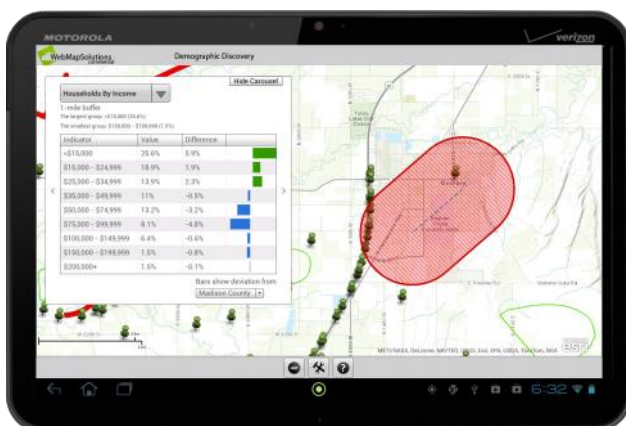
Organizations with IT staff were now able to set up computers which ran GIS servers such as Esri's ArcIMS and the open source MapServer and later GeoServer. GIS development companies began building custom web GIS applications providing a range of GIS services. These apps were largely targeted at GIS staff, and included a range of different geo-tools in one application: buffering, measure tools, spatial querying. Internet GIS was largely the bastion of organizations with deep pockets. Setting up, maintaining and hosting GIS servers, licensing, and custom application development were costly endeavors.

All this changed with cloud computing. Today it is possible to 'rent space' on servers maintained and hosted by dedicated providers. The need for costly internal IT infrastructure to support GIS is gone.

Maintenance, software updates, load balancing is all now handled by these third-party providers. The result has been dramatically reduced costs. A number of GIS focused organizations have released cloud based GIS products. Esri's ArcGIS Online and GIS Cloud are two notable examples of low cost, cloud based GIS platforms. Now both large and small organizations can leverage GIS.

Mobile Computing: Location, Location, Location

As the cost of GIS has fallen, so has the demand for the location-based services provided by GIS. The mobile revolution is upon us; smartphones and tablets are low cost mobile computers with built in GPS. The popularity of software which combines location technology with geolocation has skyrocketed. Apps which include maps, and/or show who and what is near have become very popular. A new non-GIS trained audience has emerged, who is demanding functionality provided by GIS. Indeed, many GIS



Mobile mapping on an Android tablet

companies have begun to promote themselves as providers of location services in place of GIS. Today, these companies are building and promoting simple, intuitive, focused applications which require no training or knowledge of GIS.

As a GIS development company, we have seen our business and client base change. Today we build complementary Web and mobile GIS applications which leverage cloud based platforms. It is worth illustrating the changes underway in GIS with two case studies:

Case Study: Field Data Collection in Transportation

Field data recording is a requirement in many organizations. Location is a key component of this collected/edited data. But the cost of rugged mobile handsets such as Trimble devices, and complexity of available software such as ArcPad has meant many organizations still rely on pen and paper while in

the field. Today's low cost smartphones and tablets, which combine GPS with camera and note taking mechanisms, provide a new, affordable way to use mobile technology. Two key challenges are present when building mobile GIS apps for field data collection and editing: disconnected mode and simple workflows. Much work done in the field is in areas which lack wi-fi connectivity, offline GIS is thus an important requirement. Mobile apps for use in the field need to provide simple workflows; no need for special training. Simplicity is key.

WebMapSolutions have been approached by a number of US State Departments of Transportation requesting mobile data collection apps which run on both Android tablets and iPad's. In each case the need has been to provide the ability to collect and edit data relating to transportation assets: culverts, mileposts, traffic lights etc. Data access needed to be controlled, the data should be stored centrally, the mobile app needed to provide online and offline capabilities and be designed for maintenance workers.

Within each organization data collection was key, but an additional component to this effort was the ability to collaborate and share the collected data. Thus GIS analysts, executives and other staff should have access to the data using other desktop and Web apps. Cost was a key consideration.

Building an offline GIS data collection app which provided data access across organizations would have been a daunting and expensive undertaking only a few years ago. We elected to build the mobile app leveraging Esri's cloud based ArcGIS Online platform. A low cost platform which provides authentication, and cross organizational data access. With a rich set of development tools, and map publishing mash ups known as web maps, application development was greatly simplified. The resulting app is simple to use, works online and offline and has dramatically improved the efficiency of work done in the field.

Case Study: New Retail Store Site Selection

Choosing new locations for stores is a critical component in the growth of any expanding retail organization. Senior executives are often involved in the process of site selection - visiting prospective sites, and poring over site analytics. Field visits usually involve working through binders of generated paper reports and images. This can be a painstaking process.

WebMapSolutions have been approached by a number of retail organizations inquiring about using mobile and cloud technology combined with location services to improve the site selection process. The challenge was to provide one application which could be used by different staff both in the office and in the field: on PC's, tablets and smartphones. Integration was another important component - combining location technology with a file hosting service. Again historically this could have been a very expensive undertaking: setting up and accessing file sharing services combined with GIS technology. Using cloud based services WebMapSolutions integrated Dropbox with ArcGIS Online. A simple Web application was built using responsive design, allowing the app to look good and be useable on all devices. The application integrates a GIS map viewer with Dropbox panel.

When on site executives and site location staff can now view potential site locations on their iPhone, iPad or Android device. Starting with a map with interactive point feature overlays, and leverage GIS technology to generate dynamic data using location analytics. Through Dropbox field staff can read prepared documents related to each site, also images and video. In future versions of the application notes and images taken while in the field will also be stored in Dropbox.

These are exciting times for those involved with GIS. Cloud and mobile computing have helped reduce the cost of applications which provide location services. These new technologies have also broadened the appeal of the output from GIS systems. It is now possible to integrate GIS with other services, to develop new ways to solve problems and improve efficiency. ■