

# Environmental OBSERVER

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GIS for Environmental Management Solutions

## South Florida Gazetteer Identifies Everglades Conservation Plan Locations and Boundaries Using GIS

By Matt Freeman, ESRI Writer

The Comprehensive Everglades Restoration Plan (CERP) is the largest environmental restoration effort in the world, estimated to take more than 30 years and cost \$7.8 billion to complete. Through 80 engineering projects, CERP's goal is to save the dying Florida Everglades ecosystem by restoring waterflows that have been altered throughout the past century by urban development, agriculture, and flood control systems. To manage a restoration plan that covers 16 counties and involves federal, state, and local agencies, the CERP foundation and

its partners rely on a geographic information system (GIS)-supported gazetteer.

The Everglades is home to flourishing agriculture, industry, and urban encroachment, which rely on the same water source as the native inhabitants. Over time, people have manipulated the water supply by constructing dams, water treatment plants, canals, and floodgates. The growth of native vegetation has been interrupted by water runoff from farms, which has introduced excess nitrates and phosphates. These types of human activities have altered

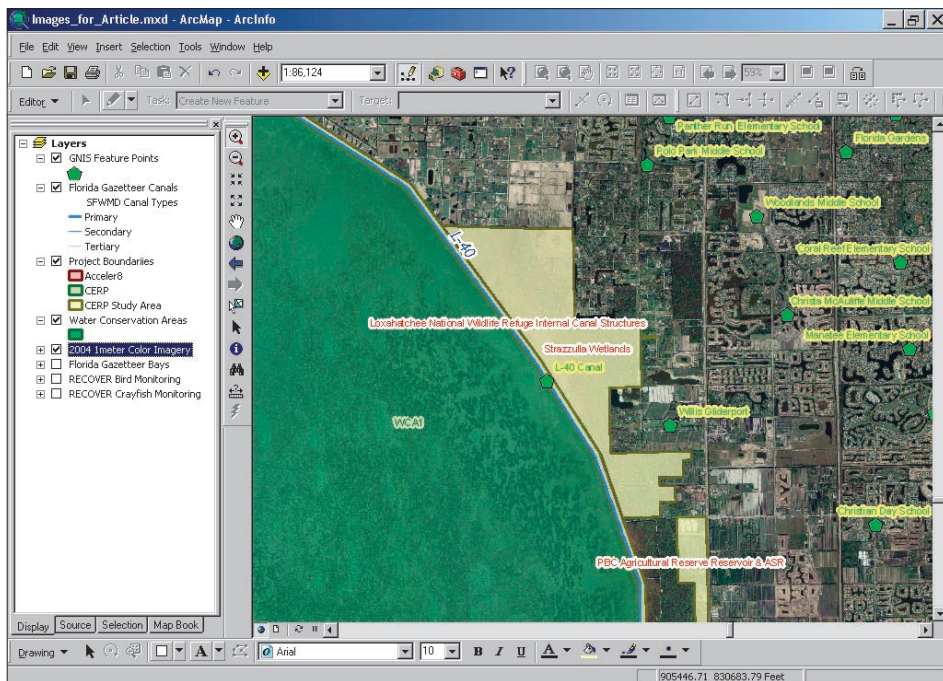
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the Everglades' natural water patterns, leaving behind a lengthy list of plants and animals on the endangered species list.

The South Florida Water Management District (SFWMD) and the U.S. Army Corps of Engineers (USACE), along with many partners, have created CERP, a unique environmental restoration effort. The program is a long-term, multibillion-dollar initiative aimed at restoring natural systems throughout the Everglades through 80 engineering and construction projects. CERP's goal is to capture freshwater that flows unused to the ocean and gulf and redirect the water to areas that need it. Most of the water is devoted to reviving the Everglades' dying ecosystem, while the remainder benefits cities and farms.

Due to the nature of the 18,000-square-mile restoration plan, the CERP foundation needed a gazetteer that would serve as an authority on project place-names and spatial footprints. Traditionally, gazetteers exist in paper form and catalog geographic information such as places, place-names, place boundaries, and the social and geographic statistics related to each place. Modern gazetteers are in a digital format, which is why the CERP foundation contracted with Photo Science, a Florida-based



CERP stakeholders can access and query project data stored in the gazetteer from an ArcGIS interface in CERPZone, CERP's information technology intranet system.

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## ESRI on the Road

### GovEnergy 2008 Conference

August 3–5, 2008  
Phoenix, Arizona, USA  
[www.govenergy.com](http://www.govenergy.com)

### 2008 ESRI International User Conference

August 4–8, 2008  
San Diego, California, USA  
[www.esri.com/uc](http://www.esri.com/uc)

### Society for Conservation GIS Conference

August 12–15, 2008  
Monterey, California, USA  
[www.esri.com/scgis](http://www.esri.com/scgis)

### IWA World Water Congress 2008

September 8–11, 2008  
Vienna, Austria  
[www.iwa2008vienna.org/i8/](http://www.iwa2008vienna.org/i8/)

### ESRI Latin America User Conference

October 1–3, 2008  
Santiago, Chile  
[www.esri-chile.com/lauc2008](http://www.esri-chile.com/lauc2008)

### ESRI Europe, Middle East and Africa User Conference

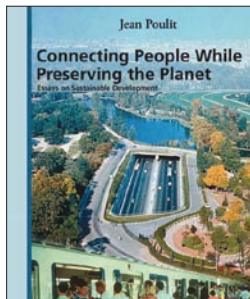
October 28–30, 2008  
London, United Kingdom  
[www.esriuk.com/emea2008](http://www.esriuk.com/emea2008)

To register for ESRI events, visit  
[www.esri.com/events](http://www.esri.com/events).

## Connecting People while Preserving the Planet: Essays on Sustainable Development

Author Jean Poulit, renowned national and regional planning expert, discusses the impacts of a variety of urban topics. For example, he contests generally accepted ideas about how transportation systems are affecting economic development and quality of life. Other issues include strategies for combating the greenhouse effect and other negative environmental problems caused by human activity. He also shares his vision for planning a sustainable balance on a living planet.

Author: Jean Poulit  
ISBN 978-1-58948-192-2  
2008  
Pages: 230  
Price: US\$29.95  
To purchase, visit  
[www.esri.com/esripress](http://www.esri.com/esripress).

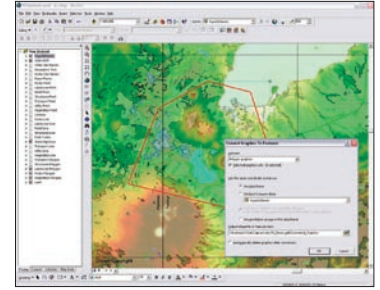


## ESRI News

### What's Coming in ArcGIS 9.3

ESRI's developers have added enhancements in the soon-to-be-released ArcGIS 9.3 that will help make users more productive. Supported on Windows XP, Windows 2003, and now Windows Vista, the new version has stronger capabilities for working in desktop, server, mobile, and geodatabase modes. For example, ArcGIS Server has new REST and JavaScript APIs that dramatically simplify the development experience so that users can deliver fast and user-friendly mashup GIS Web applications. ArcGIS Server 9.3 has improved performance, better diagnostics, enhanced security, and more documentation.

Read about the many improvements available in ArcGIS 9.3 at [www.esri.com/whats-new](http://www.esri.com/whats-new).



The new Convert Graphics to Features dialog box at ArcGIS 9.3 is used in this New Zealand topographic map that includes data layers for state highways, land cover, hydrographic, vegetation, and land.

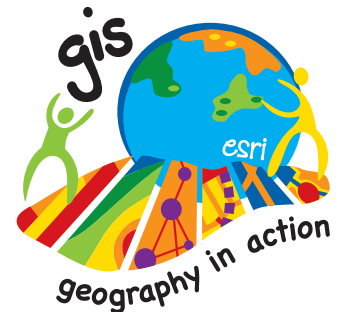
### Be Part of the Largest GIS Conference in the World

People from around the globe will gather at the ESRI International User Conference August 4–8, 2008, in San Diego, California. The largest GIS conference of the year offers an opportunity to learn new skills, share information, and discover best practices and approaches to a successful GIS.

Explore the greatest collection of GIS solutions in the world at the ESRI Showcase and Exhibit Pavilion. Test-drive state-of-the-art technology in the Hands-on Learning Center. ESRI staff dedicated to environmental management will be on hand to work through specific problems.

Join GIS users and consultants from your industry in meetings throughout the week including an array of regional and Special Interest Group meetings and one-on-one meetings at the industry solutions islands. Get fresh project ideas from your peers through industry paper sessions from the environmental track, technical workshops, social activities, and networking. Collaborate, troubleshoot, and share your own GIS experiences.

To learn more about the 2008 ESRI International User Conference and to register online, visit [www.esri.com/uc](http://www.esri.com/uc).



### Join ESRI and Transform Your Future

Are you looking for a career where you can apply your environmental expertise in a new, exciting way? Join ESRI's industry management team of sales, marketing, consulting, and project management experts. We are looking for talented professionals to share their industry knowledge, experience, and perspectives in these challenging roles:

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- Environmental Industry Solutions Manager
- Consultant/Project Manager, Natural Resources and Environmental
- Federal Marketing Specialist

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## South Florida Gazetteer Identifies Everglades Conservation Plan Locations and Boundaries Using GIS

geospatial solutions company, to develop the South Florida Gazetteer. The gazetteer has given all CERP stakeholders access to project information through CERPZone, the project's information technology (IT) system.

ESRI's suite of ArcGIS products is used extensively in CERPZone and within SFWMD and USACE. In addition, many agencies in Florida use ESRI software or can produce spatial data layers in a format suitable for ingestion into an ESRI geodatabase. Because of its commonality, the gazetteer project team designed the South Florida Gazetteer database to operate within CERPZone's ArcGIS Desktop environment. The GIS infrastructure of the gazetteer provides visual representations of project data and helps to maintain workflows and prevent boundary conflicts between SFWMD, USACE, and various other agencies and partners involved in CERP.

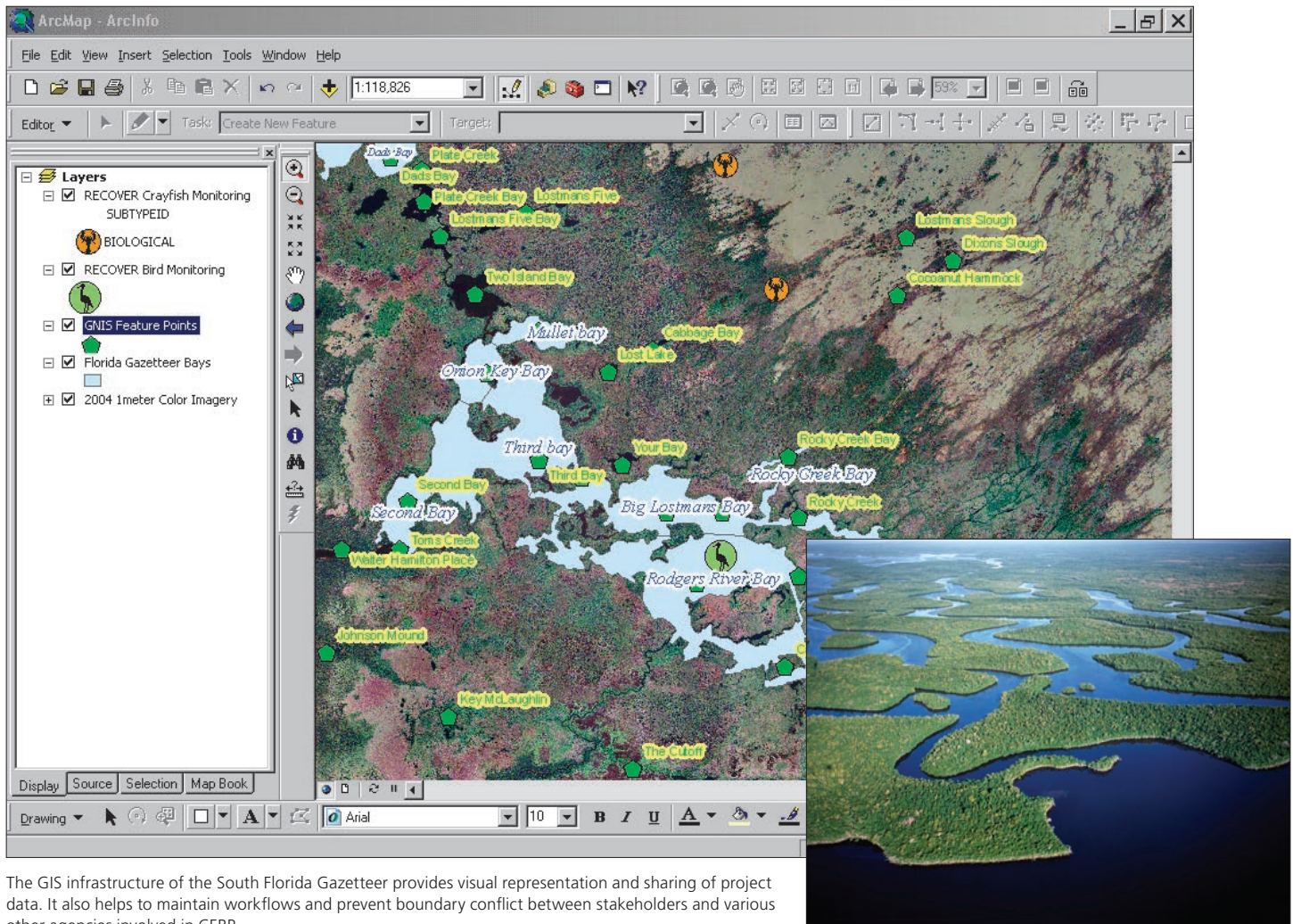
The South Florida Gazetteer has proved to be more than just a data management tool, according to CERP GIS data coordinator Heather Kostura. "Some project managers have worked in the Everglades for a very long time, and some places are known by more than one name. Capturing a place-name and storing it in a gazetteer is important because the names of places change over time, but a project manager who has been in the area for 50 years still may know a place by the name 'Joe's Farm' when someone else knows it by a different name. Giving a place an official place-name and documenting it in the gazetteer helps avoid confusion and redundancies within CERP."

Like CERP project members, the public can access official place-names stored in the gazetteer by visiting the Web-based CERP GIS Project Locator at [www.evergladesplan.org](http://www.evergladesplan.org). Through a GIS toolbar and query function, Project Locator

provides users with the ability to locate projects, retrieve project information, print custom-made maps, and view project boundaries. Those with access to desktop GIS can also extract and view metadata from the GIS Project Locator.

Since CERP is a federally funded project, the project team modeled its gazetteer place-names after the place type standards set by the United States Geological Survey (USGS) for the Geographic Names Information System (GNIS). GNIS is the official vehicle for geographic names and is used by the federal government as a source for applying names to federal maps and the *National Map*, a GIS-supported online interactive map service. A future CERP goal is to populate the South Florida Gazetteer with enough data that it will be considered for submission to the GNIS.

For more information about CERP, visit [www.evergladesplan.org](http://www.evergladesplan.org).



The GIS infrastructure of the South Florida Gazetteer provides visual representation and sharing of project data. It also helps to maintain workflows and prevent boundary conflict between stakeholders and various other agencies involved in CERP.

# NOAA's GIS-Enabled Web Site Helps Resource Managers Navigate Legislation

## Atlas Improves Collaboration, Coordination, and Decision Support

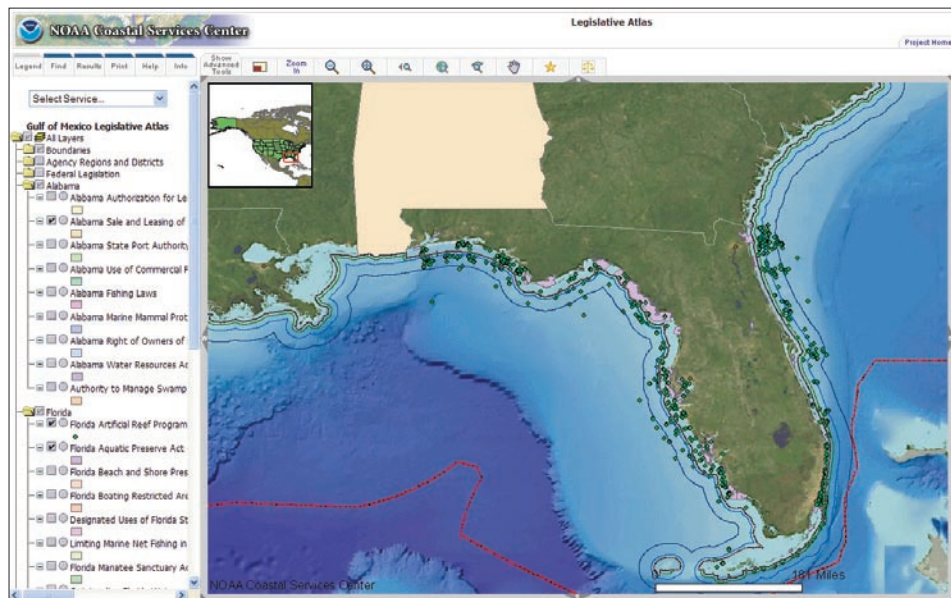
In 2004, the U.S. Commission on Ocean Policy recommended a series of fundamental changes to improve management of the United States ocean and coastline activities. These included revisions at the national level as well as the establishment of regional ocean councils to encourage collaboration. The commission also recommended forming regional ocean information programs to provide easy access to current research, ocean observations, and other information and tools to inform decision making at the regional level.

From these recommendations, the NOAA Coastal Services Center, whose mission is to serve the nation's state and local coastal resource management programs, set sail with the GIS-based Digital Coast: Legislative Atlas ([www.csc.noaa.gov/legislativeatlas/](http://www.csc.noaa.gov/legislativeatlas/)). The innovative Web site allows resource managers to better understand the complex legal jurisdictions and regulatory framework of U.S. oceans and coasts by visualizing information in a dynamic, custom-built, Web-based mapping application.

Created and managed by a team of six at the Coastal Services Center, Legislative Atlas gives users the ability to view the geography associated with ocean and coastal laws and the potential relationships that exist between these laws.

Legislative Atlas provides access to geospatial datasets that represent the spatial footprint of ocean and coastal laws. When using the atlas, resource managers can query and view the spatial relationships between legislation and other pertinent marine boundaries to analyze gaps and overlaps in a region's regulatory framework. The atlas also contains the regions, districts, and planning areas of federal management agencies with respect to ocean and coastal activities. The ability to visualize these planning areas helps resource managers identify contacts within federal agencies for a particular area of interest.

Using ArcIMS, the Coastal Services Center and Florida-based geospatial solutions company Photo Science created the atlas as an easy-to-use dynamic mapping tool for managers with



Using its ArcIMS application, the Legislative Atlas displays three different pieces of legislation on one interface: the Alabama Sale and Leasing of Sand and Gravel on Public Water Bottoms and Certain State Lands, Florida Artificial Reefs, and Florida Aquatic Preserve Act. The column on the left gives options to view more layers of legislation.

little or no exposure to desktop GIS technology. Resource managers with experience and access to desktop GIS software can download the spatial data presented online.

Legislative Atlas also features a database of relevant coastal and ocean laws that are geographically searchable. With the mapping application, resource managers can search federal and state laws and read summaries of each law via links to the supporting U.S. codes or state statutes. The search can be refined by state, region, management issue, or federal agency of interest.

Henry Norris, section leader, Information Science and Management Section, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, says, "Legislative Atlas offers one-stop shopping. We find the area that the statute applies to and then the statute itself on the same Web site. The atlas saves time by defining the statute."

In one instance, a colleague phoned Norris from an off-site meeting in search of information regarding the Submerged Lands Act, its boundary, where the boundary crossed Florida waters, and under what agency's jurisdiction it fell. Using Legislative Atlas, Norris was able to

find the boundary, link it to the legislation, and define the area as under his agency's jurisdiction. "It took a couple of minutes to find it all," says Norris. "The Legislative Atlas probably saved me about an hour in that case because, normally, I'd have to use multiple resources for all that information."

The ongoing development of Legislative Atlas relies on a collaborative effort of meetings and targeted outreach on the part of regional councils, resource managers, and NOAA. Due to the project's giant scope, new data will be added in milestones.

Currently, federal laws are available for most of the continental United States, and state laws are available for the Gulf of Mexico region. The next release, scheduled for fall 2008, will include federal laws for the entire United States, including Hawaii, Alaska, the Great Lakes, and Pacific and Caribbean Islands, and state laws for California, Hawaii, Maine, New Hampshire, and Massachusetts. State laws for other regions, including Oregon and Washington, are scheduled for release in 2009.

For more information on Digital Coast: Legislative Atlas, visit [www.csc.noaa.gov](http://www.csc.noaa.gov) or contact Adam Bode at [adam.bode@noaa.gov](mailto:adam.bode@noaa.gov).

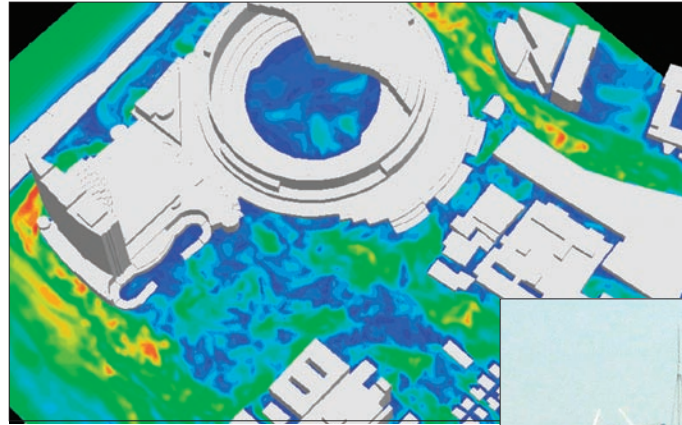
# Airflow Analysis Tool Makes Wind Generator Siting a Breeze

Making wind-movement projections is useful in preparing for wind-related disasters as well as harnessing wind power. Computational fluid dynamics (CFD) technology is one means of studying wind activity. Combining this technology with GIS allows researchers to simulate airflow around a single building or across an entire landscape.

CFD is not a new technology. It has been used for architectural evaluation, landscape design, emergency response, defense operations, and natural energy management. What is innovative is a new GIS extension that makes it easier for people to process wind energy data in a GIS environment, turning wind assessment into more practical applications.

Airflow Analyst is ArcGIS extension software that allows users to process CFD in a GIS environment. It can model data, perform complex calculations, and generate visualizations in 2D, 3D, animated, and temporal representations. With this extension, researchers can more easily perform risk management wind analysis such as forecasting diffusion of smoke, noxious gases, and other toxic pollutants.

Firefighters can use GIS-enabled CFD for wildfire management operations to determine the direction and speed of a fire, and transit au-



Urban airflow shows weak (blue) and strong (green) wind areas around a coliseum.

thorities can use it to assess how exhaust from a freeway flows through frontage neighborhoods. Architects and city planners can predict wind play around a high-rise building with arches or a domed coliseum or visualize airflow along urban corridors. Simulating a tornado's impact on various areas of a city can help disaster managers determine areas most at risk and locate refuge options. Health departments can visualize how wind is carrying pollen and publicize the most likely zones of high pollen count for people with hay fever.

Seeing how wind flows through the urban landscape, one can visualize the potential for harnessing wind from the roofs of buildings. An energy engineer can assess not only the best

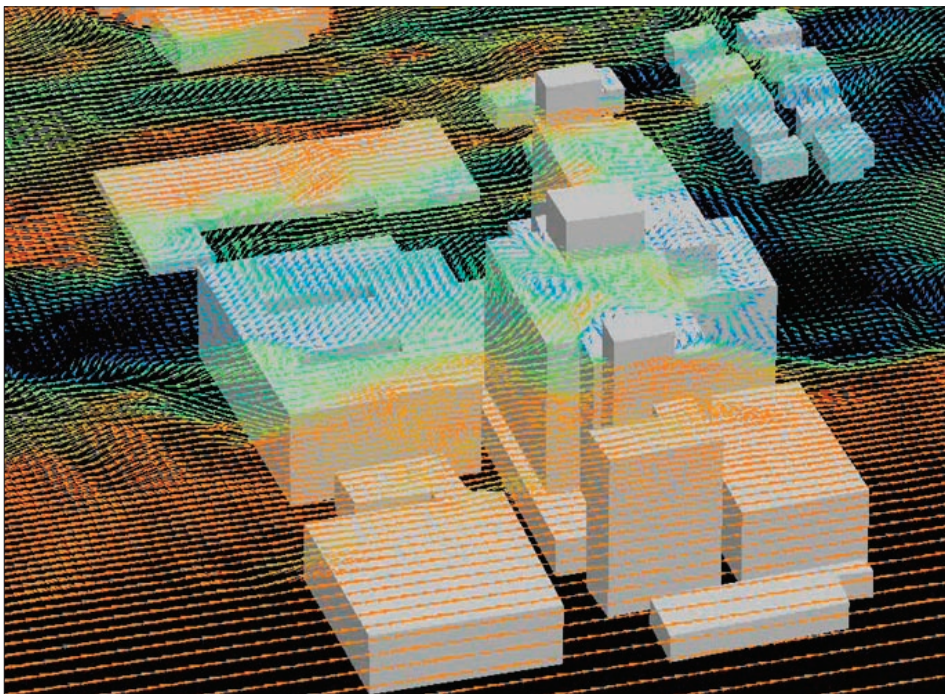


roof but the best location on the roof to place wind generators as well as predict what the energy output of the generator might be, given certain conditions.

Energy companies can apply CFD to siting transmission assets or assessing how wind will flow around certain complex shapes such as various types of power generators. Users may choose to determine a landscape's active wind corridors and combine other information, such as environmental considerations and land titles, to assess the value of a wind farm site. The user applications can range from crisis supervision to golf course management.

New to the market is RIAM-Compact, a wind study GIS application that generates quick and powerful calculations on a desktop computer. Created by professor Takanori Uchida at the Kyushu University Research Institute for Applied Mechanics (RIAM), Japan, RIAM-Compact has high forecast accuracy that has been verified by wind tunnel experiments. It can accurately forecast wind around buildings, express the movements of the wind in animations, and deliver high-speed calculations.

Send inquiries about Airflow Analyst to Environmental GIS Laboratory Co. Ltd at [araya@engisinc.com](mailto:araya@engisinc.com) or to Takanori Uchida at [takanori@riam.kyushu-u.ac.jp](mailto:takanori@riam.kyushu-u.ac.jp).



A map of wind behavior around buildings shows that a wind generator site is best in the blue area's path.

# Westchester Green Map Aids County Global Warming Task Force Plans

By Maggie Jones, ESRI

Environmentally conscious members of Westchester County GIS in New York State have found a way to facilitate global warming awareness in their community. They have created the online Green Map ([greenmap.westchestergov.com](http://greenmap.westchestergov.com)) that allows residents to visualize information about locations and activities that support green practices such as tire disposal sites. The map service utilizes ArcIMS software and technology from Green Map System, Inc. (GMS), an organization devoted to developing sustainable communities with mapmaking tools that increase citizen awareness of local conservation opportunities.

Westchester is a densely populated county neighboring New York City. With more than 900,000 residents, environmentally friendly practices are necessary for sustainable living. The county's interactive Green Map was launched as part of county executive Andy Spano's Global Warming Task Force, whose mission is to create a countywide action plan to reduce greenhouse emissions and promote sustainable development through awareness and education.

The online map was created to help residents of all ages and backgrounds find resources that

are available right in their own community. The Green Map allows viewers to select the category they wish to see, such as bus stops, tire disposal sites, farmer's markets, or green buildings, to find the nearest and most accessible locations. Users also have the option of viewing aerial imagery on the map.

Since the site is designed for easy navigation, users simply select the resources they wish to see labeled on the map, find the location most convenient for them, and zoom in until they can see the exact location (e.g., intersection or street name). Users can display or hide features on the map as well as find out more about anything that interests them just by clicking a link to source Web sites. Residents frequently visit the site to find the closest farmers' markets, cell phone recycling locations, and hazardous household chemical disposal sites. If a county resident would like to spend time outdoors, options for finding local parks and nature reserves are also represented.

The Web site also supplies community members with downloadable datasets for each of the categories represented on the map. The site provides detailed information about dates and

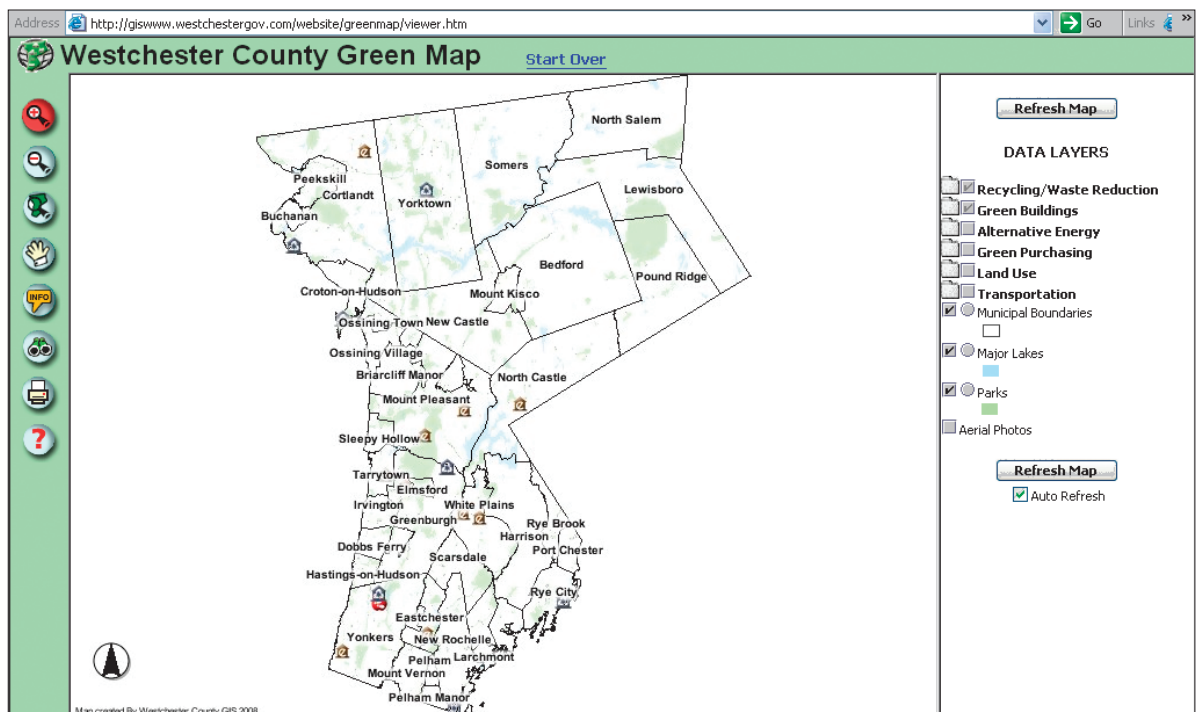
locations for household cleanup days and other green practices displayed on the map. Created to boost local involvement and action by identifying local resources, Westchester Green Map provides data that makes developing sustainable communities tangible for those wanting a healthier environment.

Based on ArcIMS, the application enables users to browse, query, and print their maps. In contrast to traditional Green Map publications in hard-copy format and/or Adobe Acrobat PDF, the online map gives users a more accessible, intuitive, and interactive look at the county and its local resources. Additionally, county GIS specialists can easily add or update features as needed and are able to display any amount of data without crowding the map or simplifying the data, which often occurs with printed maps.

"It is a resource for anyone who wants to find out how to make their household and community a more environmentally friendly place to live, work, and play," notes Cynthia Louie, GIS specialist in Westchester County, adding that public involvement in conservation practices has increased since its implementation. By taking climate-change issues into its own hands, Westchester County is leading the way for other local and regional governments that want to find a way to develop more sustainable practices.

For more information, contact Cynthia Louie at [llc4@westchestergov.com](mailto:llc4@westchestergov.com).

Westchester County's Green Map application highlights facilities, programs, and services that encourage greener living within the county.



# GIS Maps Your Environment

By Leigh Kirtley, ESRI

The U.S. Environmental Protection Agency (EPA) has created EnviroMapper, a Web-based interactive mapping tool for viewing and querying environmental information. Site visitors can zoom in to an area or enter a state, county, city, ZIP Code, or watershed to view environmental data from the EPA's Envirofacts Warehouse.

The Web-based GIS solution gives users access to a wealth of environmental information they can use in their GIS desktop projects. EnviroMapper is a powerful tool for mapping various types of environmental information including drinking water, toxic releases, hazardous wastes, water discharge permits, and Superfund sites.

Users can view this information in context by adding map features to a map. Moreover, EnviroMapper also allows users to insert dynamically created maps into their own Web pages.

Users can try EnviroMapper at [www.epa.gov/enviro/html/em](http://www.epa.gov/enviro/html/em).

EPA's EnviroMapper Web site allows the public to access mapping data they can use to make valuable decisions. This map's turquoise squares show the locations of toxic releases near Los Angeles, California.



When users zoom in to an area, the Web site shows an aerial photograph of a toxic trouble spot along with other relevant attributes.

# Protected Areas Database Uses GIS Web Technologies for New World Perspective

United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) hosts a wide range of biodiversity information and distributes it via reports, the Web, and interactive maps. The organization redeveloped its World Database on Protected Areas (WDPA) using ArcGIS Web and database technologies. The Web-enabled spatial database platform has custom data editing, downloading, and analysis facilities.

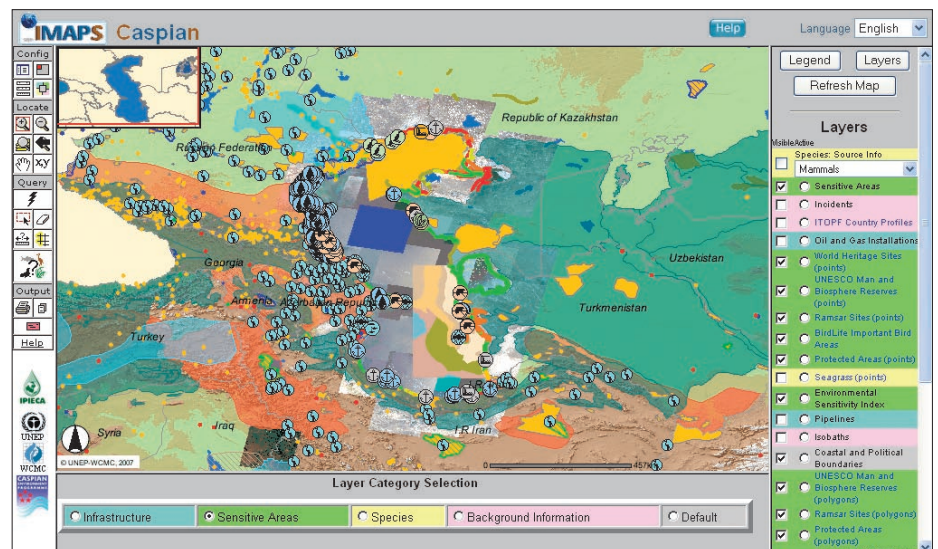
This redevelopment allows the improved management of protected areas information in a GIS form, enabling the compilation of data from around the world and providing an advanced validation and review process to control the quality of data entering the final system. It also supports the output of data and analyses in a variety of forms to the user community.

UNEP-WCMC databases have become an essential resource for people around the world. For example, the databases are frequently used in international oil-spill emergency response action and contingency planning.

This redevelopment makes use of the technolo-

gies available with ArcGIS Desktop 9.2 for internal data management and ArcGIS Server 9.2 for data upload and delivery.

Learn more about the United Nations Environment Programme at [www.unep-wcmc.org](http://www.unep-wcmc.org). Try the application at [www.unep-wcmc.org/imaps/imaps\\_index.aspx](http://www.unep-wcmc.org/imaps/imaps_index.aspx).



A UNEP-WCMC interactive map shows sensitive land areas in the Caspian Sea region.



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