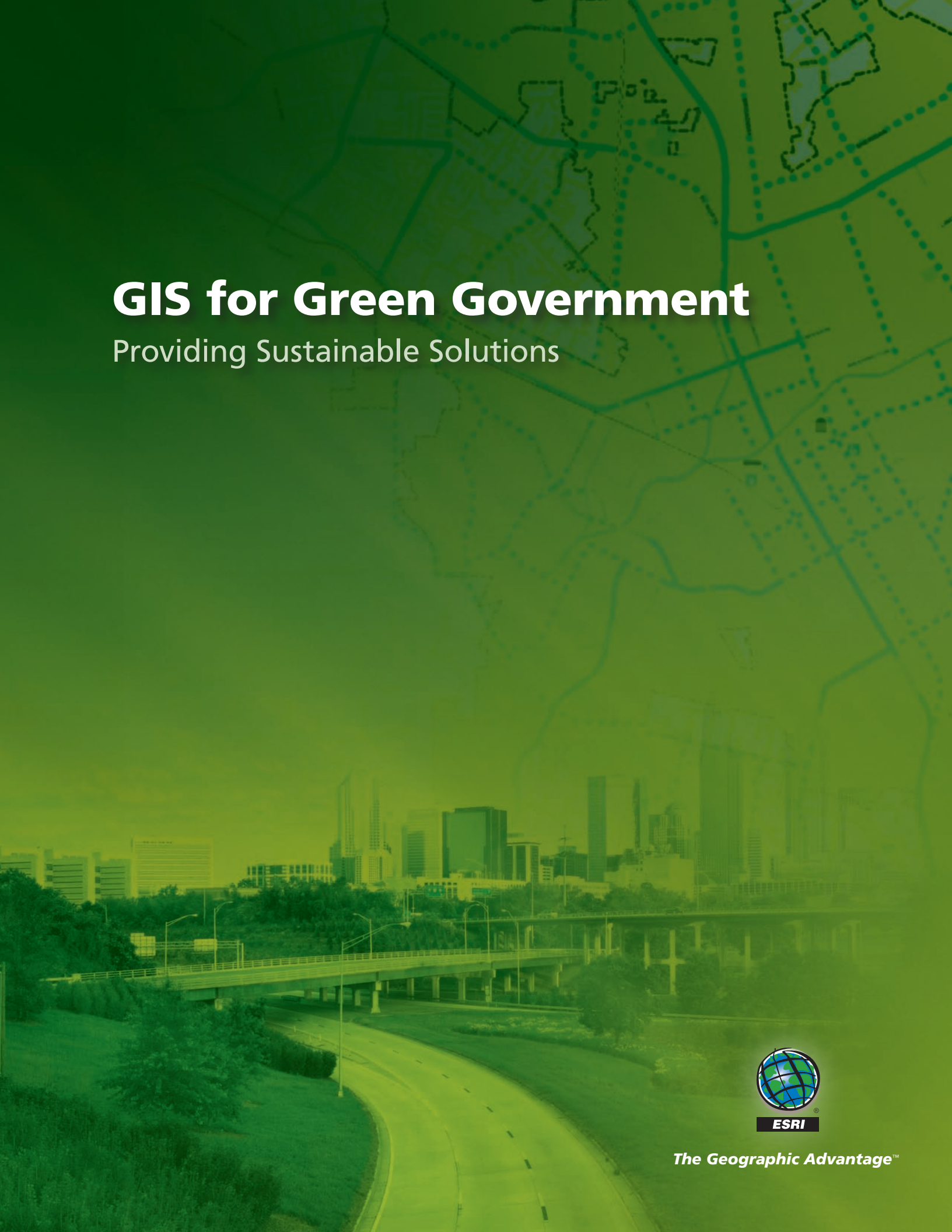
GIS for Green Government

Providing Sustainable Solutions



ESRI

The Geographic Advantage™

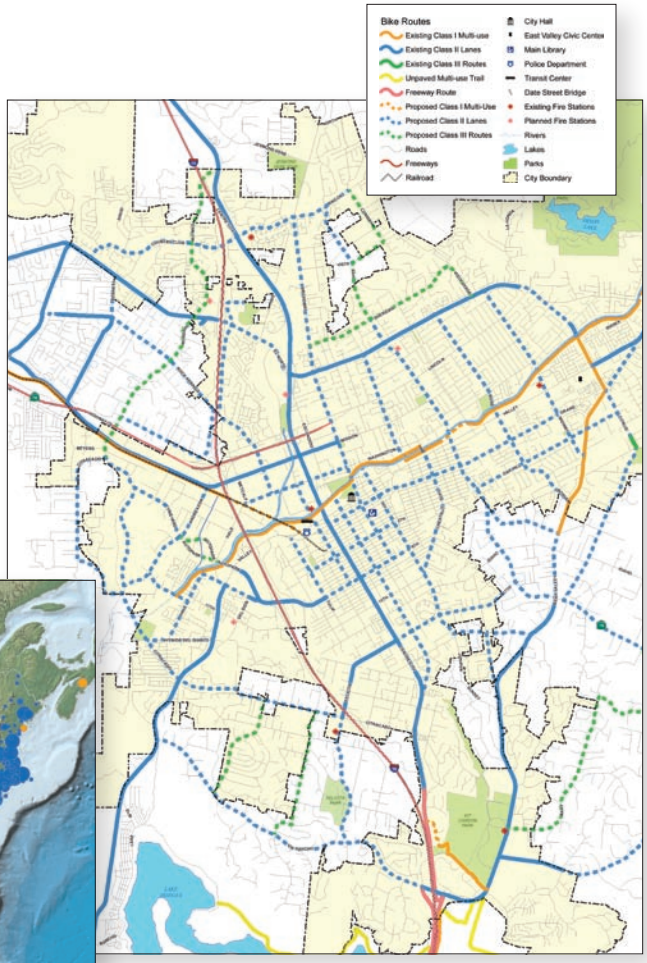
The Green History of GIS

For 40 years, ESRI has been working to advance geographic information system (GIS) technology and find solutions that foster a sustainable world. GIS provides tools for better planning, use of resources, and decision making that improve the condition of the world around us.

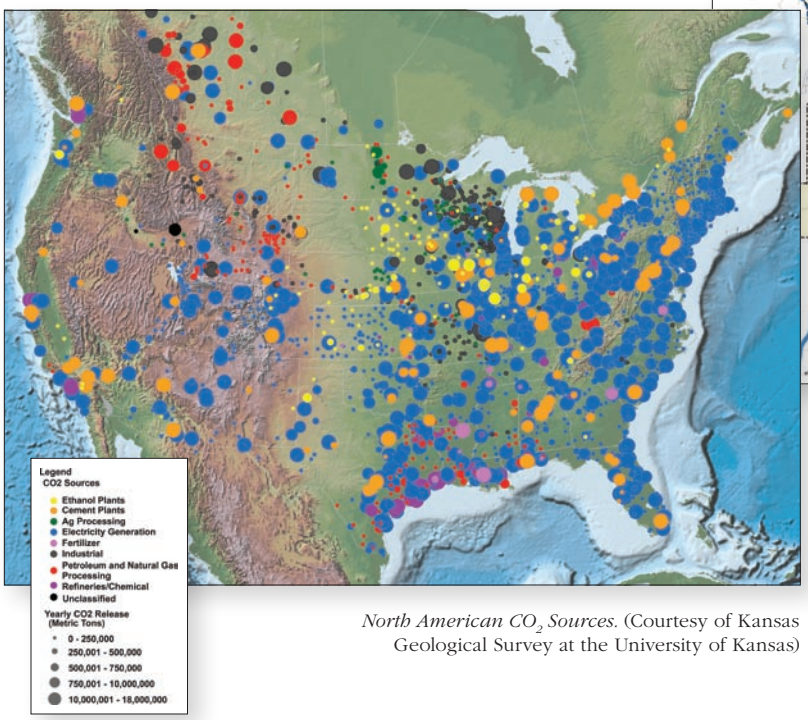
Throughout the years, GIS has been used to analyze environmental factors such as tree canopy cover and runoff; examine conservation and sustainable development plans; balance the consumption and protection of natural resources; plan urban forests, green zones, and walking paths; and much more.

Conservation and preservation of natural resources remain a top priority for ESRI and our users. Across the globe, GIS is used for resource and asset management and improved operations as well as to support government policy and community outreach.

The environment is part of the fabric and foundation of ESRI. With a strong history of supporting green projects, ESRI's ArcGIS® software is uniquely positioned to support your green government initiatives.



The City of Escondido Bicycle Master Plan identifies a bicycle facility network, both on the road (class II and III) and off-road (class I). Upon completion, the plan will create a comprehensive network of bicycle lanes, routes, and paths. (Courtesy of the City of Escondido, California)



North American CO_2 Sources. (Courtesy of Kansas Geological Survey at the University of Kansas)

The Geographic Approach to a Green World

The geographic approach uses GIS as a framework for understanding the world and applying geographic knowledge to solve problems and guide human behavior. When working toward making green decisions for your government, GIS provides the information you need, such as land use and zoning, and tools for improved operations such as vehicle routing.

Communities are looking to government to provide green services, prompting officials to search for ways to reduce their organizations' carbon footprints. Unpredictable oil prices add to the critical need to reduce fuel consumption without compromising essential services. GIS solutions based on ArcGIS software are helping governments reduce costs and environmental impact while continuing to deliver quality service to citizens.

Governments use GIS for these green activities:

- Cost-effective and service-oriented routing
- Public outreach online
- Sustainable community development
- Optimal placement of solar and wind facilities

It is important to set goals for green initiatives and equally important to measure performance. GIS allows you to track the progress of your green projects, quantify resource and cost savings, and communicate status to government leaders and the community.

Five Ways to Go Green with GIS

Alternative Energy

With GIS, you can determine the best locations for harnessing alternative energy. Mapping resources, such as wind and solar energy, supports governments and developers who want to invest in alternative fuel sources.

Green Spaces

Carbon sequestering is an important part of maintaining a green community. GIS allows you to visualize existing green spaces, analyze carbon emissions and sequestration, and make sound decisions about where to plant more trees.

Public Outreach

Citizens want to know about green government initiatives. With Web GIS, you can display maps that show the progress of green practices and also resources such as recycling centers.

Community Planning

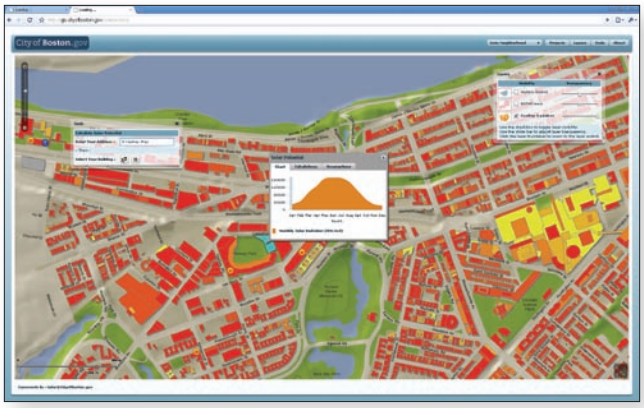
Land use, zoning, and development are some of the most important factors to consider when creating a green community. With GIS, you can analyze data related to many planning factors and determine the best way to establish cost-effective, environmentally sensitive practices.

Logistics

Vehicle emissions contribute to poor air quality. GIS provides you with tools to create efficient routes that minimize carbon emissions while improving customer service.

GIS for Alternative Energy

As governments look to increase the use of alternative energy, GIS is an important tool for planning and communication. GIS helps government leaders decide where to site alternative energy sources such as solar panels, wind turbines, and biomass supply. With Web GIS, information can be communicated to the public so they can consider private installations of green energy sources. GIS allows communities to harness the power of their natural resources.



The Solar Boston mapping application illustrates the solar potential at a specific location.

Solar

Solar Boston—Boston, Massachusetts

The Solar Boston project uses Web GIS to facilitate the goals of Solar America, a Department of Energy initiative to promote solar power use nationwide. Solar Boston's goal is to add 25 megawatts of solar power to the city's grid by 2015. To do this, developers at the Boston Redevelopment Authority (BRA) created a public Web site where investors can view existing solar installations and calculate solar power potential for their buildings.

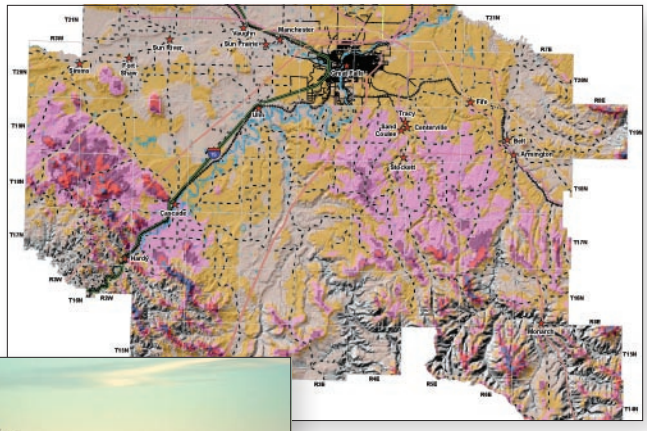
The ArcGIS API for Flex™ has been key to the project's success. Flex gave developers at BRA the capability to combine GIS-based Web services from ArcGIS Server with other Web content and display it in a fast, visually rich mapping application. It was the ideal medium to showcase the success of existing solar installations and promote the benefits of renewable energy to the city's real estate sector. "Combined with the speed of the Flex API, server GIS is a simple, powerful tool to chart what we've accomplished and where we want to take solar energy in the future," says Brad Swing, director of energy policy for the City of Boston.

Wind

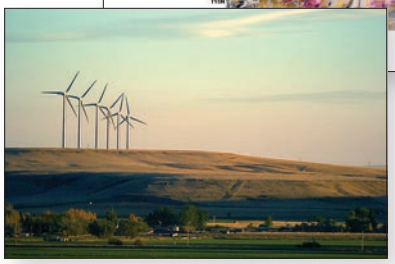
Cascade County, Montana

Cascade County is using GIS to help developers interested in investing in wind power easily research parcels available for lease and the wind resources that exist on those parcels. GIS allows the county to show developers wind speeds across the county as well as locations of transmission lines.

"Along with that, we have data such as topography, so it's very easy for someone to see that a wind farm would not be on the top of a pristine mountain," Cascade County commissioner Peggy Beltrone notes. "This saves developers from having to fly in and be on the ground to see these things for themselves, and it saves them from having to go to the courthouse to search for landownership documents. Instead, they can access all this information in one place on a computer anywhere in the world."



Cascade County's wind power map created with ArcGIS Desktop software, shows wind power potential.



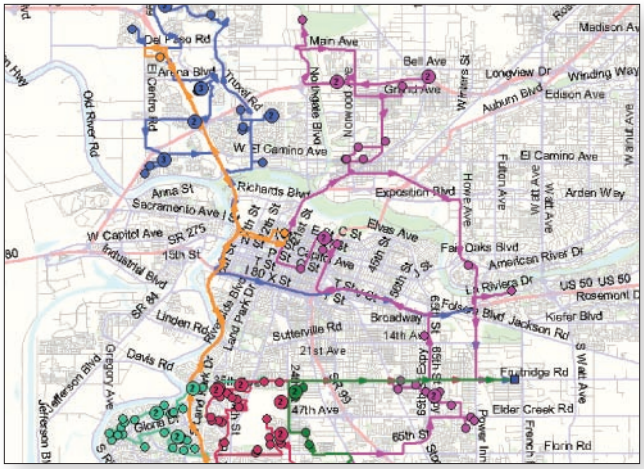
Horseshoe Bend Wind Farm in Cascade County, Montana. (Source: John Godwin)

Using GIS to Reduce Dependency on Fossil Fuels

Many governments are incorporating or plan to incorporate alternative fuel vehicles into their fleets to minimize dependence on gasoline and reduce carbon emissions. GIS can support your mission immediately with improved routing for your entire fleet of vehicles. ArcLogistics™ or the ArcGIS Network Analyst extension can keep your staff productive and effective while reducing fuel consumption, minimizing your government's carbon footprint, and meeting customer expectations with your existing staff and vehicles.

City of Sacramento, California

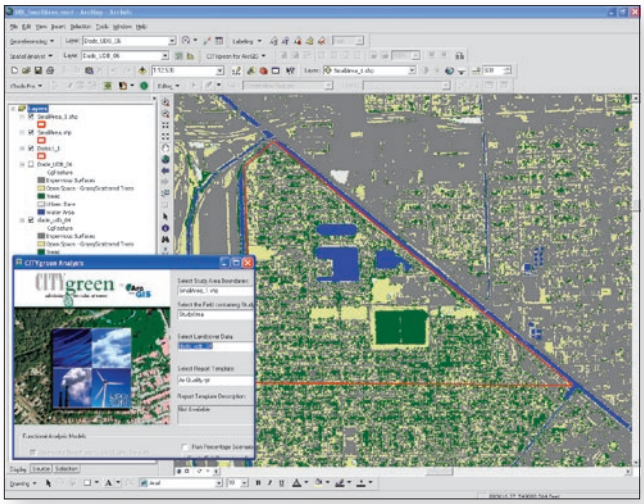
The City of Sacramento Solid Waste Division has used ESRI® software since 1998 for commercial routes that run seven days a week and service 2,500 accounts. This fleet collects illegally dumped material and neighborhood cleanup waste. It also collects used oil and universal waste and manages maintenance, delivery, and repair of garbage, recycling, and green waste bins by appointment.



Bin Maintenance Routes

GIS for Green Spaces

Trees are powerful agents for reducing carbon dioxide in the air. Green spaces and urban forests facilitate carbon sequestration that improves air quality and therefore quality of life in a community. With GIS, you can map existing and proposed green spaces, track assets, monitor maintenance, and analyze existing and potential carbon sequestration.



Between 2004 and 2006, this 460-acre area in Miami lost 14 percent of its tree canopy, resulting in 2,220 pounds of additional air pollutants and a carbon storage reduction of 844 tons.

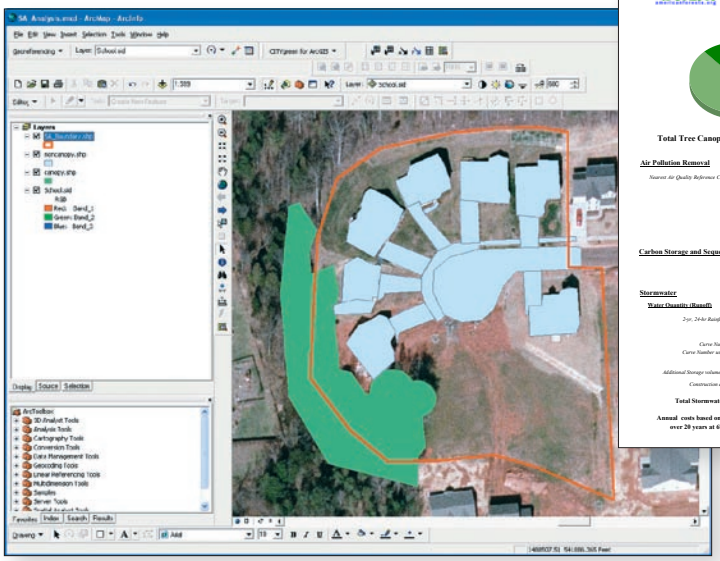
American Forests

GIS technology supports analysis that is rooted in science. CITYgreen is an example of this. It was created by American Forests, the oldest nonprofit citizen conservation organization in the United States, which has led the way in developing new approaches to conservation.

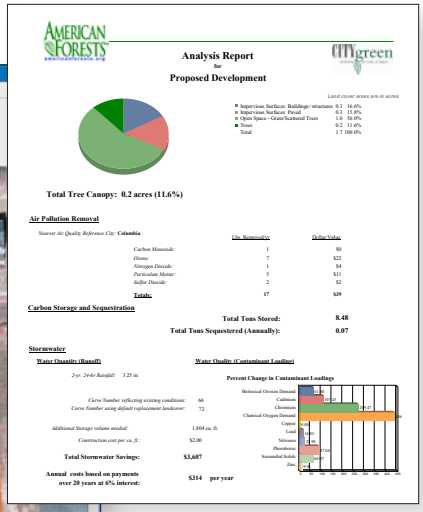
American Forests' plan encourages a grassroots approach to effecting public policy by ensuring substantial tree canopy coverage. Communities use GIS to assess their tree canopy cover, which is a proven indicator of a healthy and sustainable urban ecosystem. Informed decisions that take the value of natural resources into account can save cities money and help integrate the built environment with the natural environment.

To help cities uncover the hidden values that trees and green space provide, American Forests developed a GIS analysis technique called the Regional Ecosystem Analysis. The process uses satellite data, field surveys, and GIS software including CITYgreen.

CITYgreen software conducts complex analyses of ecosystem services, creates easy-to-understand reports, and calculates the dollar benefits for the services provided by the trees and other green space in specific areas. CITYgreen supports tree ordinance modeling, carbon offset calculations, storm water runoff modeling, air pollution removal, and land-use modeling.



Digitized Canopy (green) and Noncanopy (blue)

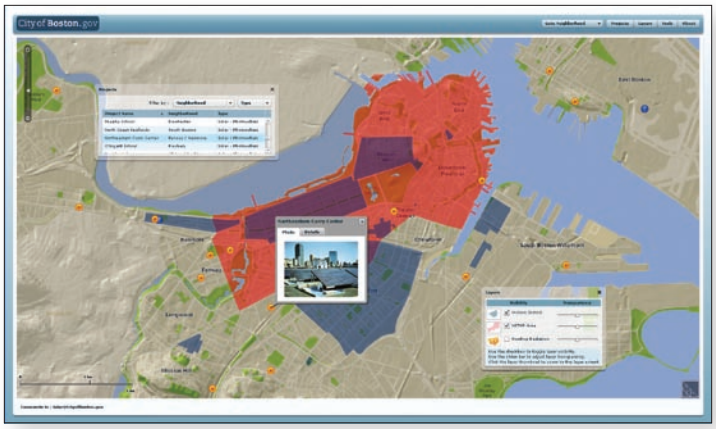


Sample CITYgreen Report for a Small Area

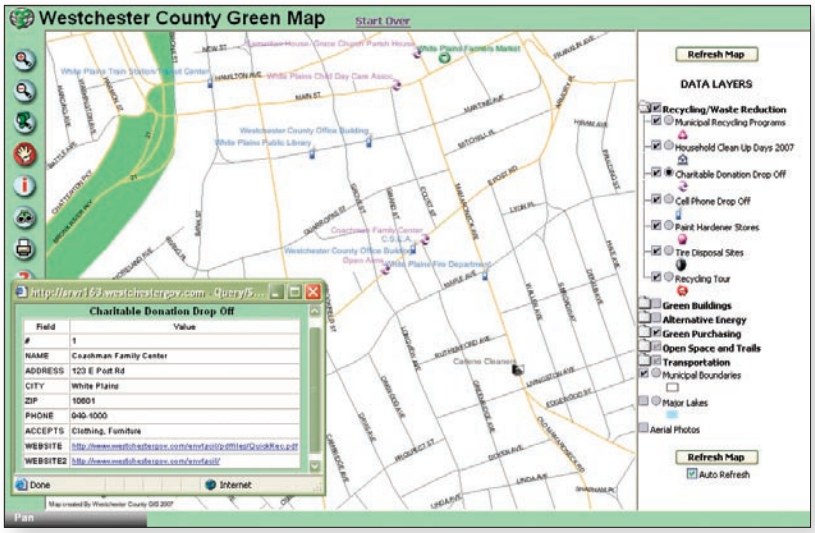
GIS for Public Outreach

Public support is a critical component of any successful government initiative. With GIS, you can publish maps on the Web to show citizens the progress of planned projects such as expanding bicycle paths and lanes for commuters.

Citizens want to know what community leaders are doing to make their community green. With Web GIS, residents can see where green initiatives are taking place and how they can get involved. Web GIS applications show sites for recycling centers, toxic waste disposal sites, and stations with alternative fuel.



The Solar Boston project uses ArcGIS Server to deliver information to customers. Site visitors can browse active solar installations throughout Boston.



Data layers in this Green Map include municipal recycling programs, household cleanup days, and charitable donation drop-off locations. Links to relevant Web sites can be accessed for more information.

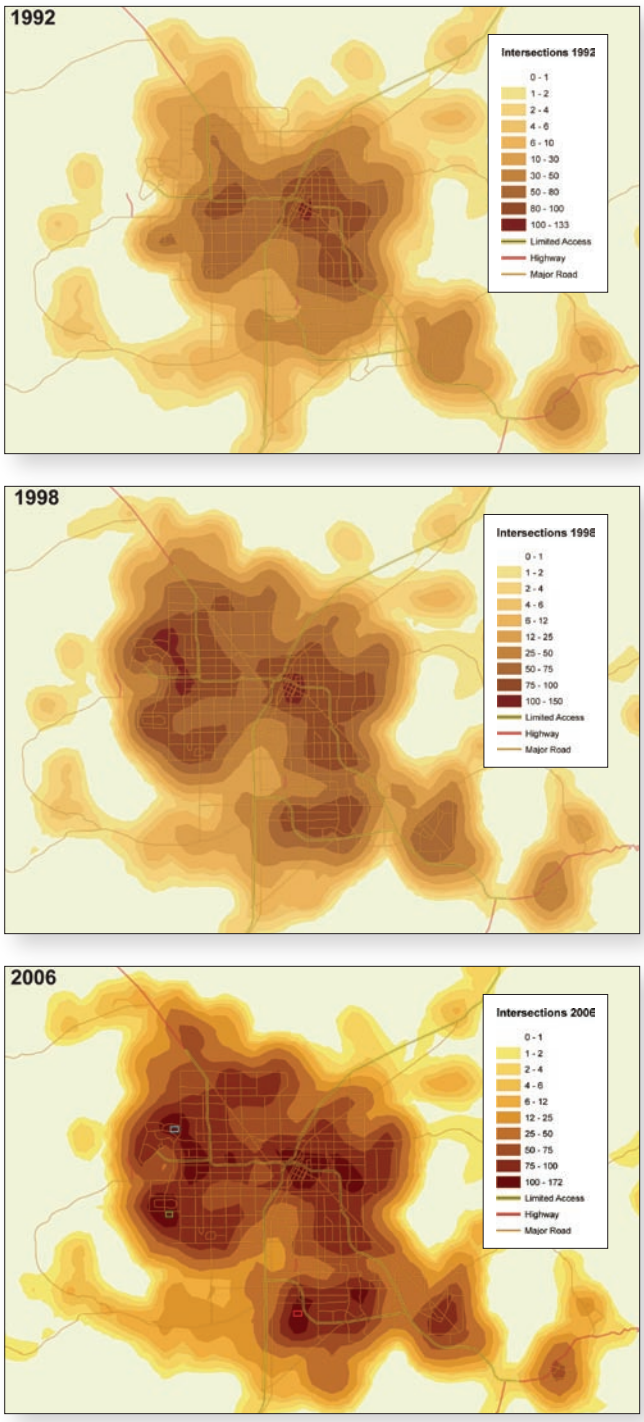
Westchester County, New York

Westchester County GIS created a Green Map (greenmap.westchestergov.com) that allows residents to visualize information about locations and activities that support green practices such as proper tire disposal. 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 awareness of local conservation opportunities.

"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.

GIS for Community Planning

Urban and regional planners have used GIS for decades to plan better communities, control urban sprawl, and develop smart growth.



Street Intersection Density in Las Vegas
(Courtesy of University of Wisconsin–Eau Claire)

As populations increase, it is important to integrate sustainable development into future land-use and transportation plans. Zoning is a critical factor in these plans and key to achieving smart growth. Developing mixed-use areas that incorporate green spaces reduces commute times and therefore emissions, encourages walking and bicycling, and improves quality of life for residents.

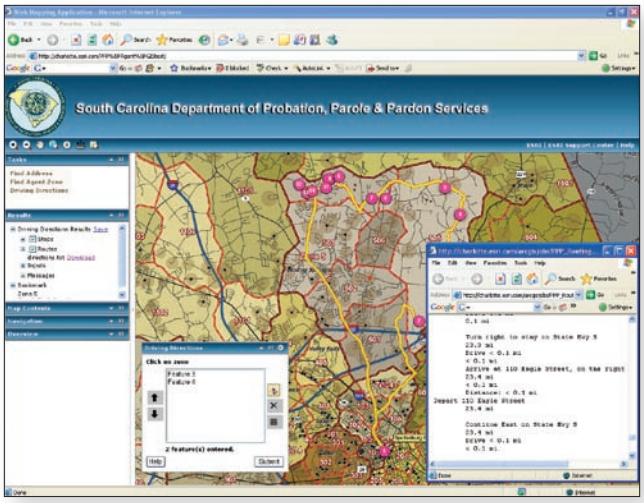
With Web GIS, you can publish maps online and help citizens understand proposed plans. Informing the public, receiving input, and garnering support for development initiatives improves your ability to serve the community.

Using Street Intersection Density to Model Urban Sprawl: The Case of Las Vegas

This project investigates the use of street intersection density to model urban sprawl in Las Vegas from 1992 to 2006. The methodology is based on four premises: (1) streets are a necessary prelude to development, (2) intersection density is a bellwether of development at the edges of a city, (3) intersections can be derived from census Topologically Integrated Geographic Encoding and Referencing (TIGER) system files using data processing routines, and (4) the updating cycle for TIGER is useful for measuring change on an annual basis. After GIS analysis, results showed that the methodology produces a pattern of urban sprawl over time acceptable for visualization and analysis.

GIS for Logistics

Most governments in the United States use ESRI GIS software. Therefore, you likely have the GIS resources you need to begin developing GIS-based green initiatives. Logistics are an important component of your organization and should be integrated into green planning. Improved vehicle routing saves money, increases customer satisfaction, and reduces carbon emissions.



Agent Zones were created by mapping several years of historical data and summarizing case type, drive time, and offender counts. A series of automated and interactive models was used to assemble 15 new Agent Zones that contained comparable historical workload even as offender population fluctuated. An agent's driving directions are featured in this image.

South Carolina Department of Probation, Parole, and Pardon Services (SCPPP)

SCPPP is using ArcGIS software, including ArcGIS Network Analyst, to improve caseload management and the efficiency of agents in the field.

In Spartanburg County, the field team has almost doubled the number of home visits they conduct each month. Agents now have more time to monitor additional cases that deserve attention, directly impacting public safety. Additionally, travel costs have been reduced significantly.

Enhance Your Green Approach

ArcLogistics

ArcLogistics is an ArcGIS Desktop extension that helps you optimize your routes and schedules based on customer needs, internal processes, vehicles, and the street network your vehicles traverse. You can build routes and schedules that reduce fuel consumption, labor hours, and vehicle use while honoring strict time windows.

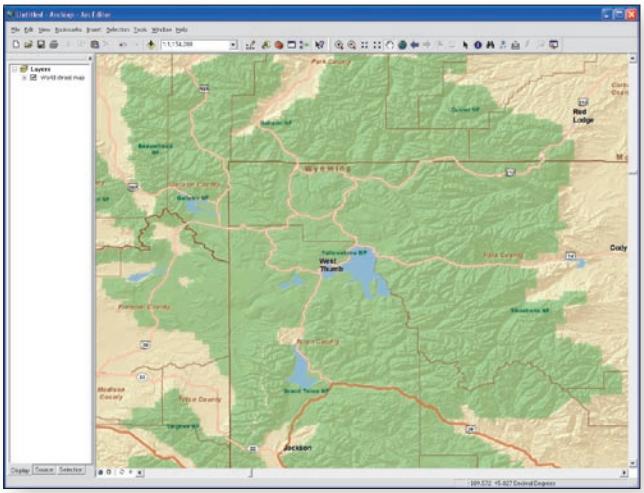
Though you may be incorporating green vehicles into your fleet, you can use ArcLogistics to minimize the carbon emissions from the rest of your vehicles so you are becoming greener with the resources and budgets that are currently in place.

ArcGIS Network Analyst

ArcGIS Network Analyst is a powerful extension that provides ArcLogistics functionality to developers who want to build their own applications.

ArcGIS

ESRI ArcGIS is an integrated family of software products that consists of desktop, server, and mobile GIS. ArcGIS is a platform for building a complete geographic information system that lets you easily author data, maps, globes, and models on the desktop; serve them to a GIS server; and use them on the desktop, on the Web, or in the field.



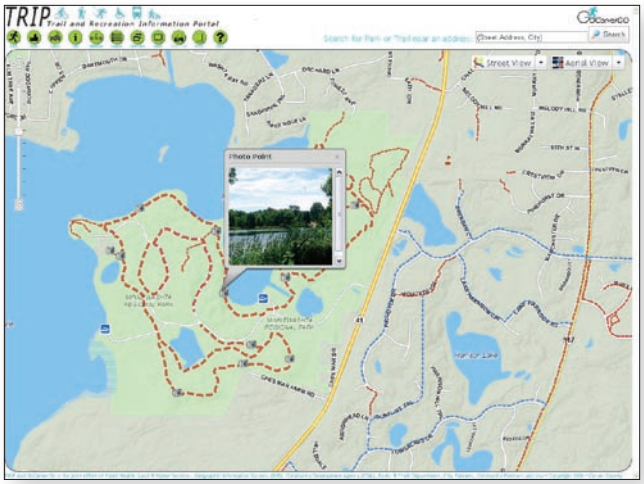
Desktop GIS

Desktop GIS is the platform for creating, editing, and analyzing geographic knowledge. It allows you to see your data on a map and analyze it to reveal patterns, relationships, and trends that are not readily apparent in tabular data, improving your decision making.

Desktop GIS includes ready-to-use data and tools that let you build process models, scripts, and complete workflows to help you better answer questions, test predictions, and examine relationships in your data. Desktop GIS consists of ArcGIS Desktop, ArcGIS Engine, and ArcGIS Explorer.

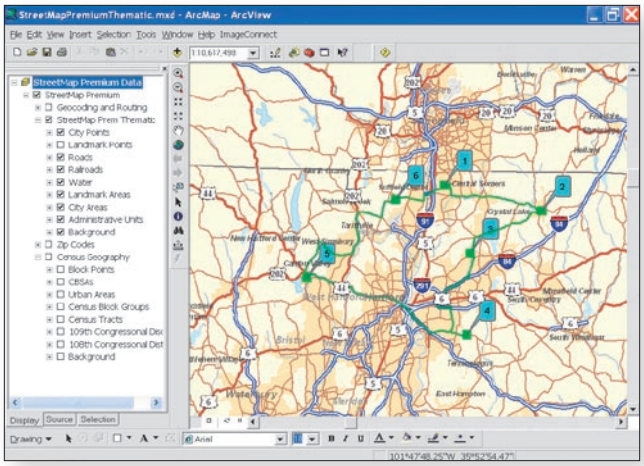
Mobile GIS

Mobile GIS technology extends GIS beyond the office and allows organizations to make accurate business decisions and collaborate in both field and office environments. Wireless connectivity, geoservices, and Web mapping applications allow field-based professionals to complete database transactions in near real time. Mobile GIS products include ArcGIS Mobile and ArcPad®.



Server GIS

Server GIS provides the means for disseminating geographic knowledge and capability throughout the organization and to large numbers of users and customers. Server GIS offers centralized management of geodata, imagery, process models, and GIS-based Web services and applications. Server GIS is scalable, interoperable, and securable. Server GIS products include ArcGIS Server and ArcGIS Server extensions.



Data

ESRI provides a full spectrum of ready-to-use, high-quality geospatial data products, as well as demographic and market data, to help you with your visualization and analysis projects. Data products include ArcGIS℠ Online Services, ArcGIS Data Appliance, Address Coder™ data, and ESRI Data & Maps.

More than 20 GB of data packaged with ArcGIS software includes imagery and basemaps.

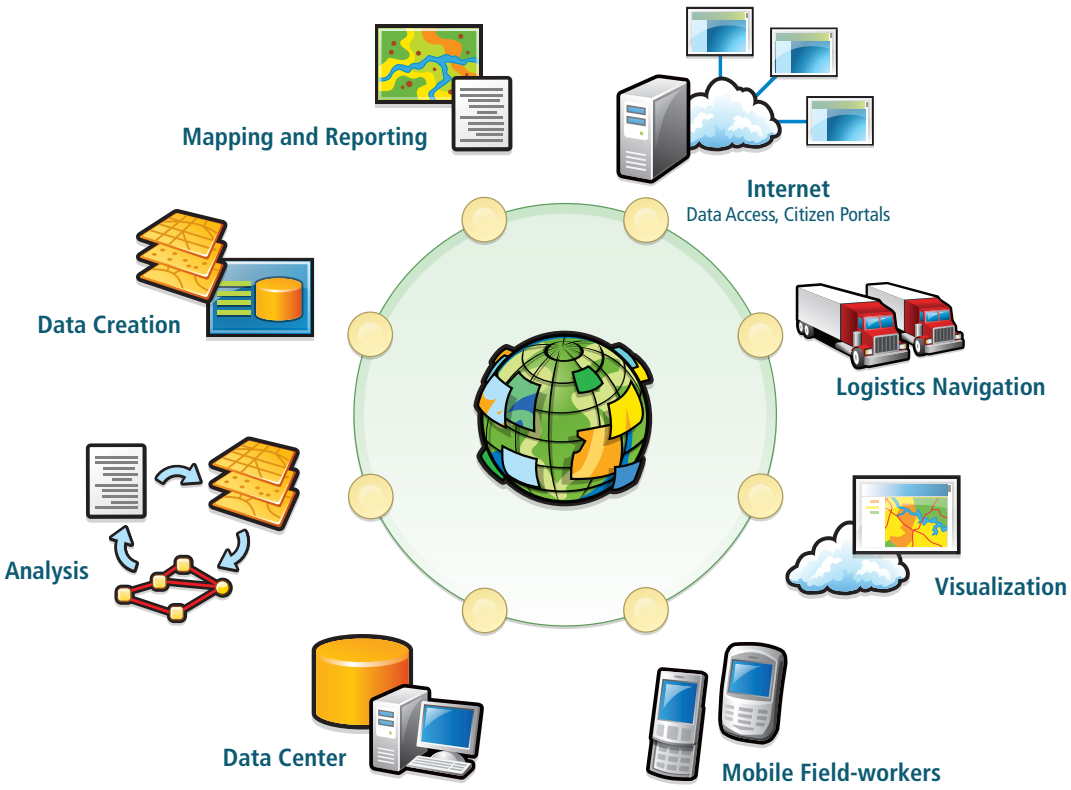
Learn more about ArcGIS at
www.esri.com/arcgis.

Developing an Organization-Wide GIS Program

GIS is a critical component in government operations. As GIS matures, it increasingly allows you to achieve your vision of a highly connected, efficient, and productive organization. With desktop, server, and Web GIS, you can provide critical geographic information to your entire staff from the front counter to the field.

GIS continues to offer the support you need for enhancing your green plans including data creation and sharing; visualizing and analyzing data; and delivering that information to office staff, field crews, and decision makers.

To more rapidly develop GIS in your government, consider an enterprise license agreement (ELA). An ELA provides your entire organization with unlimited amounts of ArcGIS software so you have the technology you need to advance your GIS.



Learn more about ESRI Enterprise License Agreement Programs at www.esri.com/governmentela.

Training and Support

ESRI instructors teach classes at company headquarters in Redlands, California, and around the world.

Learn from the World Leader in GIS

ESRI offers many types of training including instructor-led classes in both traditional classrooms and online as well as self-study online courses. Courses cover a variety of topics related to ESRI software, the theory underlying GIS technology, and applying GIS tools to find solutions in the government field. ESRI combines hands-on experience, interactivity, and instructional support to create an effective learning environment. For more information, visit www.esri.com/training.

ESRI also has books and workbooks published by ESRI Press to supplement your learning. Our extensive library, the largest GIS library on the Internet, gives you access to the latest conference proceedings and publications. For more information, visit www.esri.com/esripress.

Additionally, ESRI professionals can help you evaluate your organization's needs, decide which products will help your department reach its GIS goals, and support your efforts after implementation.

Professional Services

ESRI GIS professionals offer consulting, design, programming, and implementation services as well as database design and assistance in data publishing. For more information, visit www.esri.com/consulting.

ArcGIS Maintenance Program

The ArcGIS maintenance program is a cost-effective way to receive software updates, technical support, and many other benefits. Maintenance is offered as an annual subscription, making it easy to plan for the cost of support and software updates. You can subscribe to maintenance to receive 12 months of technical support and all software updates occurring during those 12 months. For more information, visit www.esri.com/maintenance.

Technical Support

ESRI offers a rich array of technical support and user community resources to help you meet your GIS challenges. From 24/7 technical support to online user groups and a variety of self-help resources, ESRI has the tools to make you successful. For more information, visit www.esri.com/support.

About ESRI

For four decades, ESRI has been helping people make better decisions through management and analysis of geographic information. Our culturally diverse staff work with our business partners and hundreds of thousands of people who use GIS to make a difference in our world.

A full-service GIS company, ESRI offers support for implementing GIS technology from the desktop to enterprise-wide servers, online services, and mobile devices. GIS solutions are flexible and customizable to meet the needs of all our users.

Our Focus

At ESRI, we focus on promoting the value of GIS and its applications throughout the world and pay close attention to our users' needs. Our software development and services respond to our customers with products that are easy to use, flexible, and integrated. Our technology is multidisciplinary, productive, and valuable to our users.

We have a strong commitment to educating our customers through ESRI's various training programs. ESRI is a socially conscious business and invests heavily in issues regarding education, conservation, sustainable development, and humanitarian affairs.

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