Federal GIS Connections

ESRI • Winter 2003

GIS for Federal Government

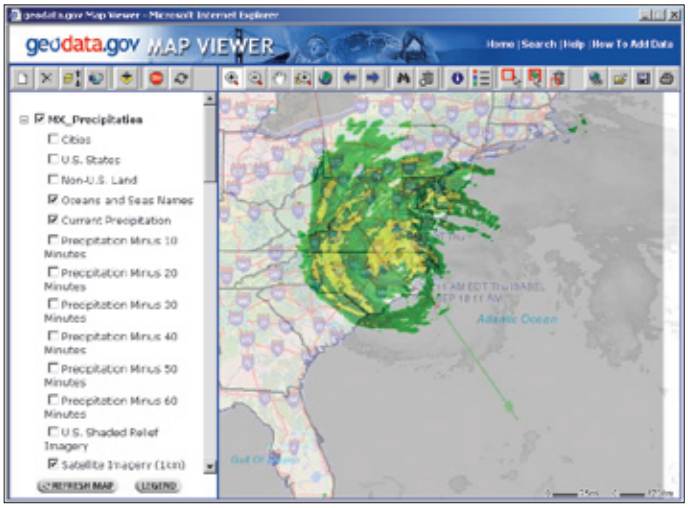
Geospatial One-Stop and Hurricane Isabel—Riders on the Storm

By Hank Garie, Executive Director, Geospatial One-Stop

Geospatial One-Stop has adopted and promoted a simple vision: to support decision making by providing easier, faster, and less expensive access to geospatial information for government officials and citizens. The centerpiece of the Geospatial One-Stop strategy is the portal (www.geodata.gov), designed to facilitate publishing and searching of metadata and enable viewing of live Web mapping services. Can the Geospatial One-Stop portal deliver on the promise to support decision making? The first opportunity to test the premise arrived on September 16, 2003, as Hurricane Isabel approached the outer banks of North Carolina. This article offers some observations and preliminary lessons learned from the experience.

Events unfolded something like this. The annual conference of the National States Geographic Information Council was underway in Nashville, Tennessee, when it became apparent that Hurricane Isabel's track would impact the East Coast, potentially affecting 50 million people. More than 200 members of the geospatial community from across the nation were gathered in one place when Geospatial One-Stop posed the question: "What do you think we can organize by working together through geodata.gov to support the response to Isabel?" The partnering network began, and over the next 24 hours contacts were made back home to federal, state, county, and private sector organizations to canvas existing map services relevant to the hurricane planning and response.

ESRI staff, who provide hosting services and development support for the current geodata.gov portal, gathered URLs supplied from contributing partner organizations and worked tirelessly to organize the services, maps, and links to relevant Web sites into a new portal channel—Hurricane Isabel. By the time the storm made landfall on September 18, 2003, the site was in production with more than a dozen services available through Geospatial One-Stop. In less than 48 hours the geospatial community responded with useful, real-time services based on data sharing. Participating government organizations included federal agencies Geospatial One-Stop (GOS)/Federal Geographic Data Committee (FGDC), National Oceanic and Atmospheric Administration (NOAA), National Aeronautics and Space Administration (NASA), United States Geological Survey (USGS), Department of Homeland Security (DHS), Department of Housing and Urban Development (HUD), and Bureau of the Census and various states (Delaware, New Jersey, North Carolina, and Pennsylvania) that cooperated with local counties. Private contributing partners included several news services, ESRI, and Meteorlogix (who offered real-time weather service).



The Geospatial One-Stop Web site simplifies finding geospatial data and enables citizens to learn about geospatial projects underway. www.geodata.gov

Users of the portal could access storm tracking, modeling, and river condition information from the National Weather Service; satellite images; and regional and local live mapping services as well as news alerts and links to disaster planning Web sites. The integrating power of geodata.gov was apparent through the availability of *The National Map* as a basemap option and the ability to overlay real-time precipitation and weather data (updated every 10 minutes) through the map services made available by Meteorlogix.

Lessons Learned

Without exception, members of the spatial data community were willing to work together

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ESRI on the Road

2004 ESRI Federal User Conference
January 20–22, 2004
Washington, D.C.
www.esri.com/feduc

GSDI 7
(Global Spatial Data Infrastructure)
February 2–6, 2004
Bangalore, India
www.gsdi7.org.in/

GDIN 2004
(Global Disaster Information Network)
March 26–29, 2004
Washington, D.C.
www.gdin.org

ACSM Taps 2004
(American Congress on Surveying and Mapping)
April 19–21, 2004
Nashville, Tennessee
www.acsm.net

Federal Planning Division Workshop (APA)
April 21–23, 2004
Washington, D.C.
http://65.23.142.31/annualworkshop.htm

American Planning Association (APA)
April 24–28, 2004
Washington, D.C.
www.planning.org/2004conference

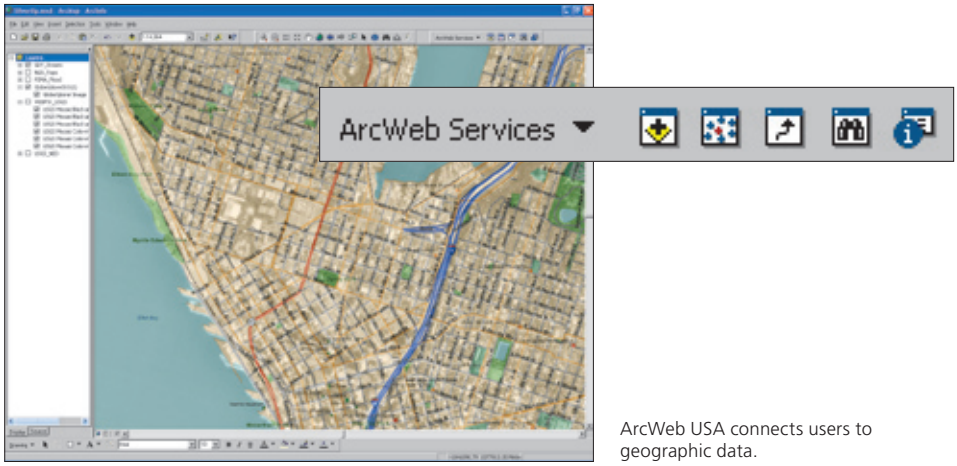
E-Gov 2004
July 13–14, 2004
Washington, D.C.
www.e-gov.com

Twenty-Fourth Annual ESRI International User Conference
August 9–13, 2004
San Diego, California
www.esri.com

For ESRI conference and registration information, visit www.esri.com/events.

ArcWeb USA—New ArcWeb Service Package for ArcGIS Desktop

ArcWeb USA gives ArcGIS Desktop users a comprehensive offering of detailed U.S. data that includes streets, high-resolution imagery, weather data, topographic data, demographic data, flood data, and more. Use the free ArcWeb toolbar to access ArcWeb USA as well as a sampler of free data. Because the data is accessed over the Web, it does not have to be stored or maintained locally. Find out more at www.esri.com/software/arcwebservices/.



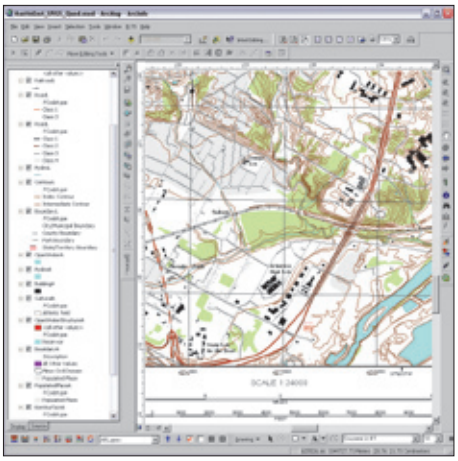
ArcWeb USA connects users to geographic data.

MapObjects—Java Edition 2

Looking for a pure Java solution for creating dynamic, custom cross platform mapping applications? MapObjects—Java Edition 2 is a powerful collection of client- and serverside components that developers can use to build mapping and geographic information system (GIS) applications for the desktop on the Web. Find out what is new and register for a no-cost evaluation online at www.esri.com/software/mojava/evaluation.html.

Production Line Tool Set

ESRI's Production Line Tool Set (PLTS) offers a new solution, the PLTS Mapping Agency Solution. The Mapping Agency Solution is designed to efficiently produce topographic basemap products. Included in the solution are four map series. Three of the series meet the specifications of the United States Geological Survey (USGS) topographic map products (1:24,000; 1:63,360; 1:100,000), and the fourth map series is designed to meet specifications of a 1:250,000-scale Joint Operations Graphic-Air (JOG-A) from the National Imagery and Mapping Agency (NIMA). Find out more at www.esri.com/software/plts/.



Mapping Agency Solution for basemap production

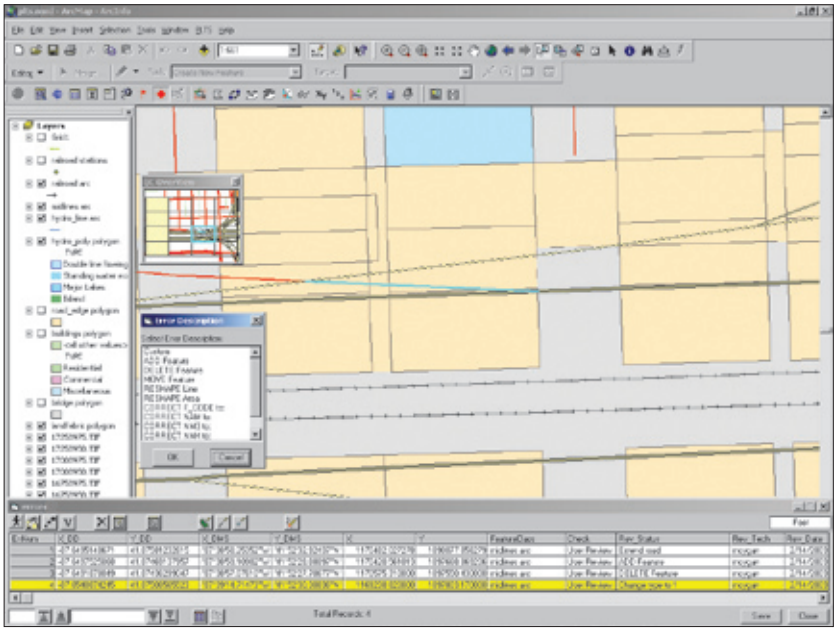
GIS Data ReViewer for Quality Control

ESRI's GIS Data ReViewer 4.2 is a data quality control management application that simplifies many aspects of automated and visual spatial data quality control tasks, resulting in a more efficient and consistent review process. GIS Data ReViewer was developed by ESRI's Production Line Tool Set (PLTS) Group to support visual review and batch validation of data. Composed of a series of buttons, tools, and context menus, GIS Data ReViewer is used to identify where corrections, additions, and deletions must be made to the spatial data and its attributes.

GIS Data ReViewer

- Extends the ArcMap application that is part of ArcView, ArcEditor, and ArcInfo
- Eliminates the paper trail associated with traditional error tracking through the centralization of the error detection, correction, and verification cycle
- Improves and organizes the data review effort
- Provides an integration framework for ArcGIS multiuser geodatabase environments

The *PLTS GIS Data ReViewer Multimedia Demonstration* CD–ROM introduces PLTS GIS Data ReViewer and its applications. It includes a demonstration that shows error detection, corrections, and verifications of spatial data. For more information, visit www.esri.com/plts, call ESRI at 1-800-447-9778, or call the nearest ESRI regional office.



GIS Data ReViewer enables centralized error detection, correction, and verification of spatial data.

ESRI Announces Participation at APA Conference

ESRI again will be actively involved in offering GIS hands-on workshops at the American Planning Association (APA) conference to take place April 24–28, 2004, in Washington, D.C. For the last 10 years, ESRI has been offering GIS workshops to planning practitioners and planning directors on the use of GIS technology as it relates to the planning profession. In addition to the workshops, ESRI will be offering a GIS Implementation Strategies Forum in which planners can discover and compare successful GIS implementation strategies. The forum topics will focus on designing, implementing, and managing a GIS. ESRI will also actively participate at the APA Federal Planning Division annual meeting that takes place three days prior to the national APA conference. To learn more about ESRI's involvement at APA, visit www.esri.com/apa or write to Milton Ospina at mospina@esri.com.

2004 ESRI FedUC

Mark your calendar now for the 2004 ESRI Federal User Conference (FedUC) to be held January 20–22, 2004, at the new Washington Convention Center in Washington, D.C. This special meeting focuses on the needs of GIS users in federal agencies and related organizations and those who use spatial analysis for knowledge sharing and policy development.

GIS tools enable any organization to access, analyze, and visualize location-based information. Whether you are interested in GIS for specific projects, deploying spatial data across your enterprise, or simply adding map services to your Web site, you will want to attend the 2004 ESRI FedUC. The conference is ideal for briefings on GIS technology, updates on current applications and data initiatives, and meeting others who are actively engaged in GIS for the federal government.

Visit our Web site at www.esri.com/feduc.

Registration Information

The registration fees to attend this conference are

- Federal Employees—Free
- State and Local Government Employees and Educators—$100
- All Others—$295

Registration includes the Defense Plenary, Defense Social, Plenary Session, keynote address, software demonstrations, breakout sessions, technical workshops, GIS Solutions EXPO, Map Gallery Social, and lunch on Wednesday and Thursday.

The easiest way to register is online at www.esri.com/feduc.

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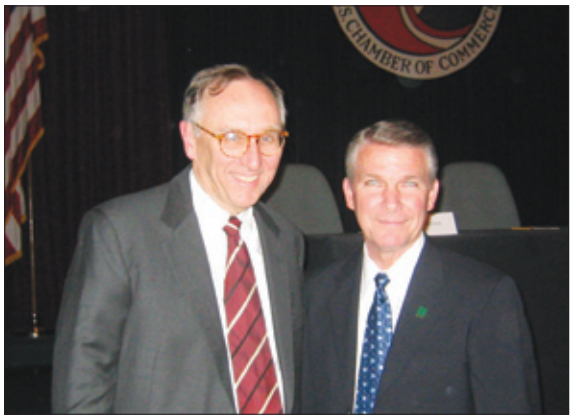
2004 ESRI Fed UC

Working Together

ESRI President Jack Dangermond Named Honorary Chair for World Standards Day 2003

ESRI President Jack Dangermond served as honorary chairman during a special World Standards Day exhibition, reception, and dinner at the U.S. Chamber of Commerce in Washington, D.C., October 14, 2003. The theme for this year's 2003 World Standards Day event was Building Global Security Through Standards. Dangermond's participation in the U.S. celebration of World Standards Day symbolizes this theme and highlights ESRI's commitment to the development and interoperability of geographic information system standards.



Jack Dangermond, president of ESRI, and James Lee Witt, CEO of ICC

"It is a tremendous privilege to serve as honorary chairman for this very prestigious, important event," said Dangermond. "ESRI and the geographic information system community as a whole are committed to designing and implementing technology and data standards. Our efforts, along with the work of others in both the public and private sectors, will help encourage the further deployment of national and international standards for security and emergency planning. This is a great opportunity to celebrate standardization efforts."

"Jack Dangermond is a visionary committed to finding solutions and creating opportunities through GIS technology," said International Code Council (ICC) CEO James Lee Witt, former director of FEMA during the Clinton administration. "His dedication to the work and his partners is reflected in the unparalleled success and respect that ESRI garners."

The goal of World Standards Day is to raise awareness of the importance of global standardization to the world economy and promote its role in helping meet the needs of business, industry, government, and consumers worldwide. This international event pays tribute to thousands of volunteers around the world who participate in standardization activities.

A planning committee consisting of representatives from industry, professional and technical societies, trade associations, standards developing organizations, and government agencies organizes the annual U.S. celebration of World Standards Day. The American National Standards Institute (ANSI) and the National Institute of Standards and Technology (NIST) cochair the group; the 2003 administrating organization is the International Code Council.

You can learn about the U.S. celebration of World Standards Day and much more by visiting the ANSI Web site at www.ansi.org.

Connecting Our World: GIS Web Services

The Internet and the World Wide Web are revolutionizing GIS and spatial data usage in fundamental ways such as allowing easier and wider distribution of data and functionality to end users and facilitating integration of data and functionality into other applications. *Connecting Our World: GIS Web Services* examines a dozen of the most innovative ways that GIS Web services are being disseminated around the world. They encompass national mapping service delivery in New Zealand, digital map creation for on-the-run journalists in the United States, and location-based services in Scandinavia. *Connecting Our World: GIS Web Services* is an essential guide for forward thinking managers in any enterprise who are interested in fully leveraging the power of spatial data and information.

Authors: Dr. Winnie Tang and Jan Selwood
ISBN: 1-58948-075-9; 2003
160 pages; $19.95
Order online directly from the ESRI Store at www.esri.com/shop or call 1-800-447-9778.

Standards and Interoperability Support Integration of Resources

Interoperability is a fundamental concept of GIS. This is because GIS technology is heavily focused on the integration of spatial data from multiple sources. This can mean integration of different data formats from different technologies such as remote sensing and global positioning systems (GPS) as well as the integration of data originating from different GIS resources.

The people at ESRI believe that an open system is key to making GIS work, and consequently, the company has a long history of supporting standards initiatives and policies. ESRI participates in several U.S. and international standards and interoperability organizations that specialize in developing policies for GIS, data, the Internet, and wireless communication.

ESRI's ArcGIS software supports activities of many standards committees and agencies including the following:

- Open GIS Consortium (OGC)
- International Organization for Standardization (ISO)
- American National Standards Institute (ANSI)
- European Committee for Standardization (CEN)
- Federal Geographic Data Committee (FGDC)
- Global Spatial Data Infrastructure (GSDI)
- International Hydrographic Organization (IHO)
- Location Interoperability Forum (LIF)
- Web Services Interoperability Organization (WS-I)
- World Wide Web Consortium (W3C)

ESRI continues to add support for new standards because users should be provided with choices to make decisions on which standards will be widely adopted. More information about ESRI's standards and interoperability initiatives can be found at www.esri.com/standards.

Fitting GIS Into the New Enterprise Computing Architectures of the U.S. Government

By Jack Dangermond, President, ESRI

Recently the U.S. federal government initiated a new enterprise computing direction based on Web services. The motivation behind this program involves the efficiency that can be gained by having more centralized, generic, and enterprise services that are delivered through standard networks to many organizations.

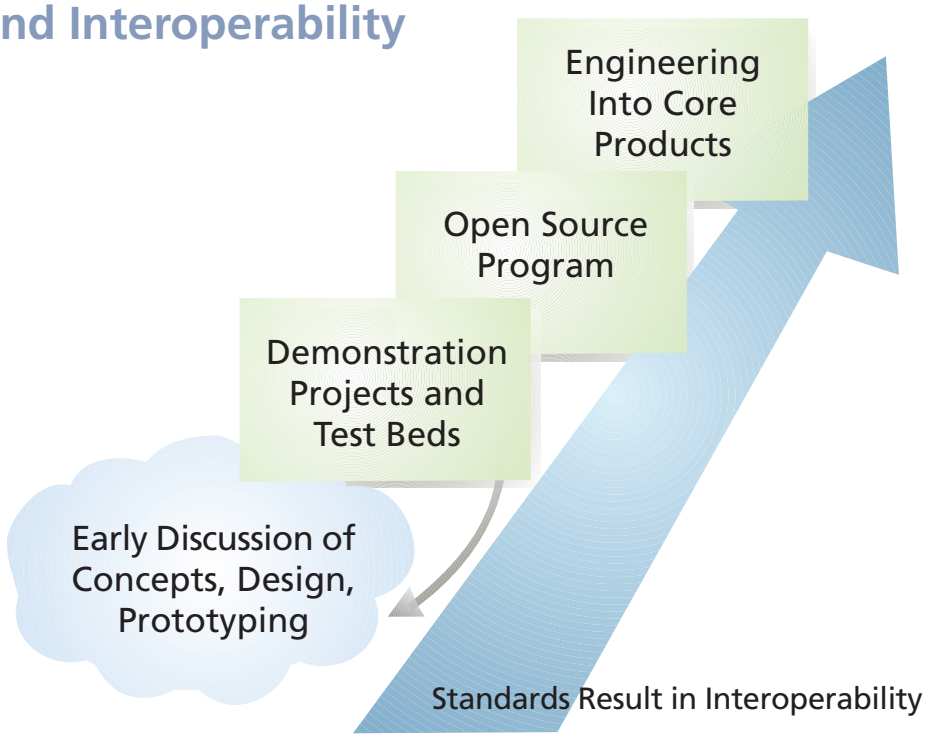
In the GIS field, this approach is particularly relevant for combining all the individual efforts made by different agencies into a GIS network of geographic information services. The cornerstone of this network has already been developed in the form of the Geospatial One-Stop portal (www.geodata.gov). This portal will point to the wide collection of data, applications, and Web services that exist or will exist in various individual agencies.

The next major step will be the development of standard geographic information services that can be used by many organizations. Under this vision, individual organizations will create and serve to other agencies standardized maps, data, and other GIS services. A few specific examples include digital orthophoto quarter quadrangle images, road maps, hydrology networks, topography, and vegetation. Each map would be served by the organization responsible to all other participating federal agencies and could also be served to state and local government agencies.

Beyond basic data, it is also conceivable that various kinds of derived GIS services could be created and made available using the same architecture. These might include *The National Map;* sensitive environments and hazardous areas maps; or special interest Web services for economic, social, or security applications.

Currently many agencies are building unique and sometimes focused GIS services that are compatible with the Web services framework and associated standards. It is expected that over time these investments in standard geographic information (GI) services will deliver efficiencies in reducing or eliminating redundant GIS data collection, processing, and work. This approach promises to bring about cost savings and provide the ability to leverage solid science and the good work of GIS practitioners within the government.

ESRI Process for Implementing Standards and Interoperability



In many ways, the more important consequence of this new architecture will be the enormous increase in the ability of agencies to use and leverage each other's information and knowledge.

It is our belief that the implementation of this architecture will mean the realization of National Spatial Data Infrastructure for the United States. The government is now working on the context standards (data models) that ensure multiuser value from the delivery of those services. Completion of these standards and ensuring they are practical and easily implemented will be other major building blocks.

Although technology is not everything, it will provide the foundation for moving ahead. ArcGIS, ArcSDE, and ArcIMS are providing users with technology to realize this vision. We now support virtually all the components that are necessary to build this framework including

- GIS portal technology
- A searchable metadata catalog server
- Server-based technology for building GI services
- Software clients that can accept and use GI services
- Methods for sharing models, scripts, data sets, data models, and maps
- Support (on client and server) for interoperability standards

With this technology, ESRI has paid particular attention to close adherence to Web services standards in an open and multivendor computing environment including support for messaging protocols (SOAP/XML); programming languages (.NET/Java); and multiple hardware platforms as well as many GIS standards for metadata, content, and relevant Open GIS Consortium, Inc. (OGC), specifications.

We see this new generation of GIS technology as more than just another release. It will add a whole series of new building blocks that will enable our users to move more fully into a Web services world and share their work more efficiently.

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ESRI

Foreign Agricultural Service Uses GIS for Crop Assessment and Data Management

The Production Estimates and Crop Assessment Division (PECAD) of the U.S. Department of Agriculture (USDA) Foreign Agricultural Service (FAS) is responsible for global crop condition assessments and estimates of area, yield, and production for grains, oilseeds, and cotton. The primary mission of PECAD is to produce the most objective and accurate assessment of the global agricultural production outlook and the conditions affecting food security in the world. Regional analysts use a GIS to collect market intelligence and forecast reliable global production numbers for grains, oilseeds, and cotton.

GIS uses several different satellite data sources, input databases, climate data, crop models, and data extraction routines for yield and area estimates to determine production (production = yield x area). FAS has a global network of attachés who provide on-the-ground reports of observed crop and contextual information. Also, FAS regional analysts travel extensively in the countries they cover to more fully develop the context and constraints within which their assessments are made. Other contextual information, such as official governmental reports and trade and news sources, plays a significant role in interpreting how these factors will affect price and policies and other econometric analyses. PECAD's final production estimate, produced by the 10th day of each month and cleared by the World Agricultural Outlook Board, is based on an all source convergence of evidence methodology. The final production estimates are used in a variety of ways.

- Official USDA statistics
- Principal federal economic indicators
- Crop conditions and early warning alerts
- Agricultural monitoring and food security
- Foreign aid assessments for food import needs
- Disaster monitoring and relief efforts related to food aid
- Commercial market trends and analysis
- Trade policy and exporter assistance

PECAD relies on remote sensing data from satellite sensors (Figure 1) as an important source of data for its GIS. Selected data sets provide daily, weekly, and targeted coverage with resolutions ranging from 1 km to less than 1 m. The data is stored on a terabyte server accessible to each analyst's workstation. The most common data formats used operationally with ArcGIS at PECAD are TIFF and compressed MrSID images.

The Crop Assessment Data Retrieval and Evaluation (CADRE) database is the main decision support tool used in the GIS by PECAD analysts. CADRE is a global grid-based, geospatial database that stores daily, monthly, and decadal (10-day) data. The sources for this data are the Air Force Weather Agency (AFWA) and the World Meteorological Organization (WMO). PECAD uses this source data to model precipitation, temperature, soil moisture, and crop stages. To measure vegetative vigor, PECAD calculates vegetation index numbers (VINs) from satellite-derived data. The data is imported into one-eighth degree mesh grid cells (Figure 2) and can be categorized by

- Time series data sets—Daily agro-meteorological data derived from station and satellite data include precipitation, minimum and maximum temperatures, snow depth, solar and long wave radiation, and potential and actual evapotranspiration. Daily and decadal VINs derived from local area coverage (LAC), approximately 1.1 km pixels, and global area coverage (GAC), approximately 8 km pixels from the National Oceanic and Atmospheric Administration (NOAA)–advanced very high resolution radiometer (AVHRR) satellite series
- Normal baseline data sets—Normal precipitation, temperature, potential evaporation, and elevation values; soil water holding capacity based on the United Nations Food and Agriculture Organization's (FAO) Digital Soil Map of the World at 1:5M scale; and decadal VIN normals or averages for the GAC data set
- Crop information and models—Crop type and average start of season, average yield and area planted, percent crop production within a country, two-layer soil moisture algorithm, crop calendars based on growing degree days, crop stress or alarm models for corn and wheat based

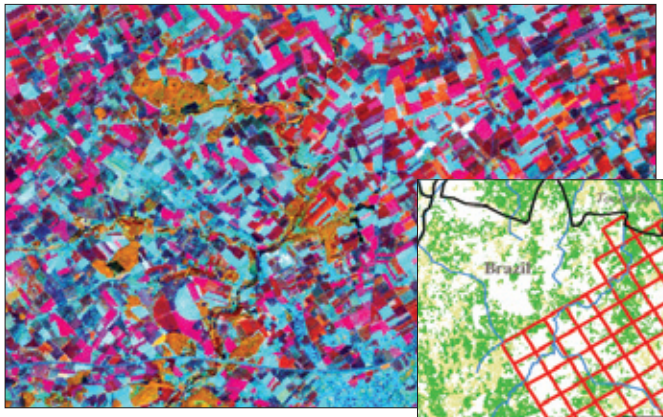


Figure 1
False color Landsat™ image in central France taken on May 29, 2003. Red colors indicate vegetation.

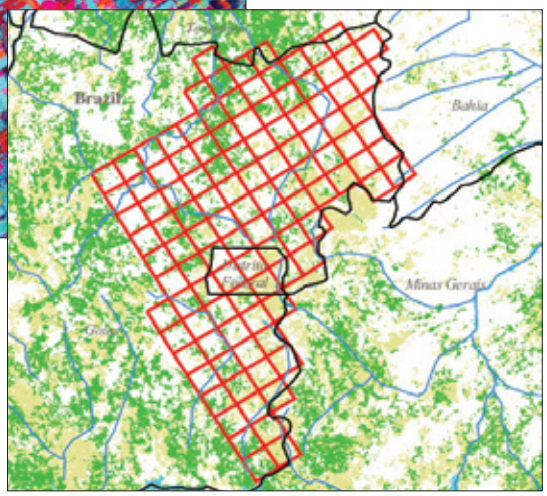


Figure 2
Polygons outlined in red are selected AFWA grid cells for the crop producing region in Brazil. The average grid cell size is 40 km.

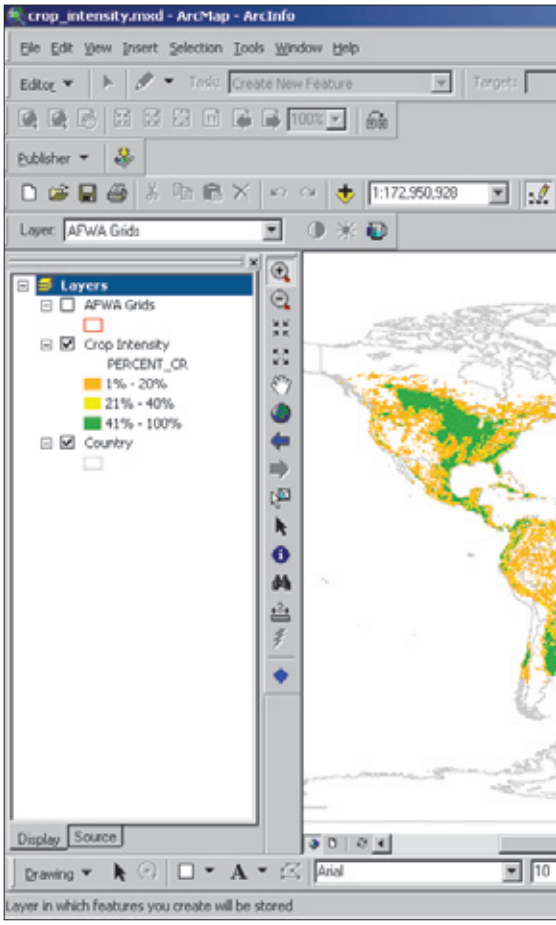


Figure 3
ArcMap project depicting global crop land and crop intensity distribution

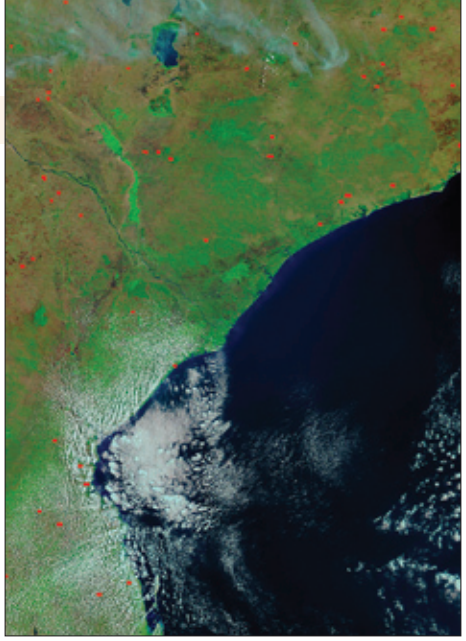
on soil moisture and temperature thresholds, crop water production functions to estimate relative yield reductions (yield reduction models), and crop stage models by Ritchie (1991)

ArcGIS is essential in managing the geospatial data from CADRE and various other data sources used at PECAD. Much of the baseline data sets are stored as shapefiles (Figure 3) on PECAD servers. ArcMap is used to geographically combine the varied data sets in a visual assessment to determine a "convergence of evidence" analysis. Commodity production is then estimated from the yield and area parameterization. Although analysts have a disparate array of region specific data sources and crop growth models at their disposal, PECAD's GIS allows analysts to spend less time on repetitive analysis tasks and more time on utilizing all available data for monthly crop production assessments. ArcIMS is being used by PECAD to automate these tasks and make data model results and ancillary data more accessible.

The Crop Explorer Web application features near real-time global crop condition information based on the satellite imagery and weather data processed by PECAD. The Web mapping application uses ColdFusion, Java, ArcIMS, SQL Server, and ArcSDE to manage and store the geospatial data. ArcSDE relationships are set up between PECAD "regions" and the various feature classes used by the maps (e.g., rivers, administrative boundaries). The Crop Explorer ArcIMS Map Service is built using these same ArcSDE features. During a map generation request, the grid cell layer feature class is joined to the appropriate attribute data such as precipitation, soil moisture, or temperature. Java is used to build the necessary AXL code to make the request to ArcIMS. ColdFusion manages the map display in the Web browser.

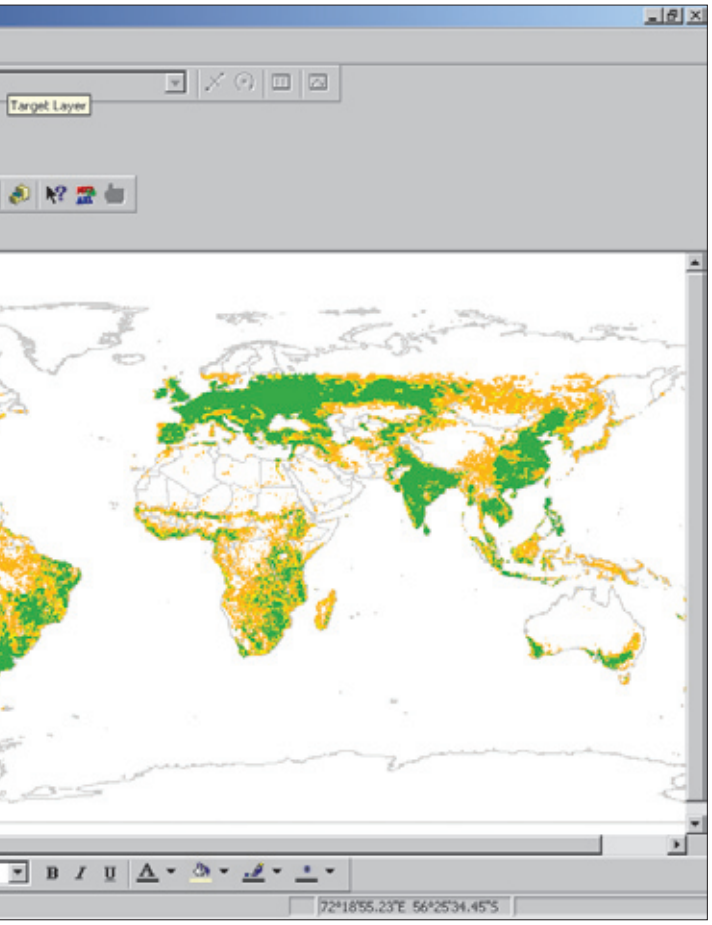
Thematic maps of major crop growing regions depict vegetative vigor, precipitation, temperature, and soil moisture (Figure 4). Time series charts depict growing season data for specific agrometeorological zones. Regional crop calendars and crop area maps are also available for selected regions. U.S. producers, traders, researchers, and the public can use Crop Explorer to visualize this information with a Web browser.

Regional droughts or excessively wet conditions can be easily identified by the amount of ground surface "greenness" as depicted by the Normalized Difference Vegetation Index (NDVI), a measure of vegetative vigor derived from AVHRR satellite imagery. In addition, daily satellite image composites originating from the National Aeronautics and Space Administration (NASA) Moderate Resolution Imaging Spectroradiometer (MODIS) Rapid Response System are now directly linked to selected agricultural regions within Crop Explorer. Learn more online at www.pecad.fas.usda.gov/cropexplorer.



MODIS Terra satellite image of Mozambique on October 16, 2003. False color image with bands 7,2,1 (Short Wave Infrared, Near Infrared, Red); 1 km resolution.

For more information, contact
Bob Baldwin, USDA–FAS–CMP–PECAD
Phone: 202-720-1860
E-mail: bob.baldwin@usda.gov



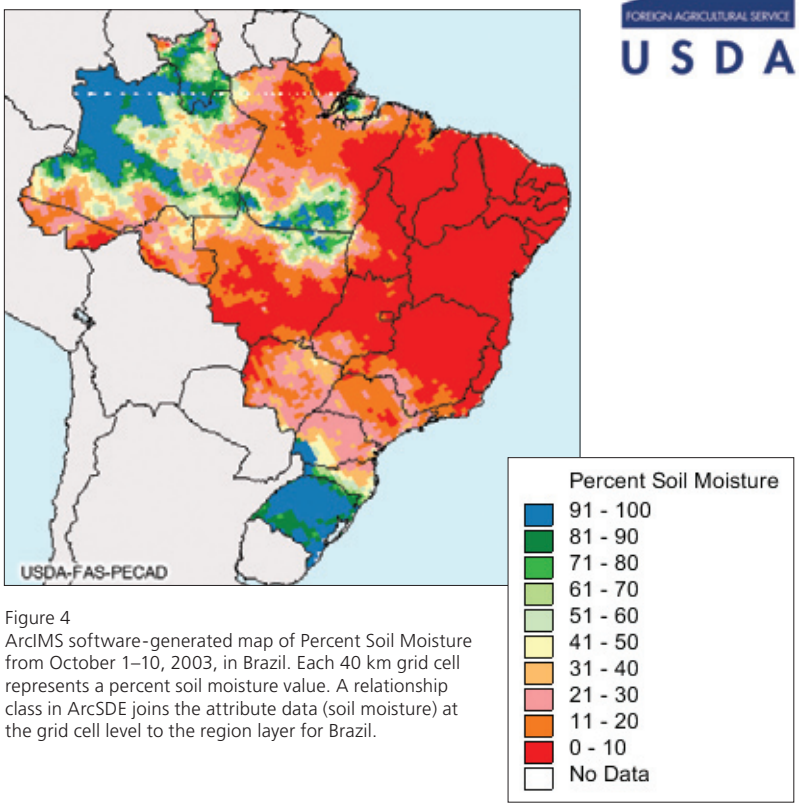


Figure 4
ArcIMS software-generated map of Percent Soil Moisture from October 1–10, 2003, in Brazil. Each 40 km grid cell represents a percent soil moisture value. A relationship class in ArcSDE joins the attribute data (soil moisture) at the grid cell level to the region layer for Brazil.

Health and Human Services Command Center

To monitor events and threats to the nation's health on an ongoing basis, Tommy Thompson, secretary of the U.S. Department of Health and Human Services (HHS), had a command center created in his conference room following the events of September 11, 2001, and the anthrax releases in October 2001. The original command center and the cutting edge technology of the present command center are strikingly different. The renovated Secretary's Command Center (SCC) became operational in January 2003. Located in the headquarters of the U.S. Department of Health and Human Services, this center is open 24/7, 365 days a year.

GIS is an essential core of the analysis prepared for impending threats, such as Hurricane Isabel, and the potential outbreak of Severe Acute Respiratory Syndrome (SARS) as well as the periodic exercises conducted for homeland security such as TOPOFF2 and Global Mercury. The high-definition plasma screens and panels around the room are a showcase of GIS maps created for day-to-day monitoring of the West Nile virus, SARS, modeling plumes of railway accidents, and real-time weather. An incident management application from E Team, an ESRI business partner, is also a critical component of SCC operations. SCC also has the capacity to record hundreds of television stations around the world, including Al Jazeera, on a 22 terabyte Storage Area Network looking for news of events occurring in real time.

The mission of SCC is to be able to quickly determine the status and potential risk to public health from natural and man-made events. With this information, decisions are made about whether to deploy field teams to affected areas. ArcInfo is used for spatial analysis to better understand the threat and the populations that might be affected. ArcSDE is being designed to organize all geographic information. ArcIMS development will include interfacing and sharing information with other HHS agencies as well as other federal and international agencies and organizations.

Visit www.hhs.gov for more information.

Command Center Maps

Tracking SARS in China

Tracking the infectious disease SARS moved to the center of international health focus in 2003. Mapping areas of outbreak, predicting possible occurrence, and creating fast response plans are vital management activities for affected countries. In the southern regions of China, where tight quarantine actions were in place, citizens watched the news daily for restrictions and new outbreaks. A GIS Web site helped keep the people of China informed about the epidemic.

ESRI China (Hong Kong) Limited went online with its SARS GIS Web site, which is available to the public. The Web site helps the community by providing timely information regarding the cases and distribution of SARS in the country and around the world.

To track the outbreak of SARS and closely monitor its spread, ESRI China (Hong Kong) used information released by the Department of Health (DOH), Hong Kong SARS team. GIS workers mapped the progression of the epidemic within local regions. They also used international SARS information published by the World Health Organization (WHO) to create the Web site's international maps.

China had the world's worst outbreak of the disease, and authorities in Beijing closed more than 100 dormitories and restaurants believed to be health threats. Citizens and officials sought constant news about disease updates. Offering its support, the SARS GIS Web site presents more than maps; it links visitors to information about infectious disease control, situation reports on SARS, WHO's travel advisory reports, health services available, and health advice for self-protection.

To track SARS, ESRI developed a basemap of Hong Kong showing all its streets, buildings, utility lines, and other details. Government address data on SARS cases was geocoded to obtain the exact latitude and longitude of the infected sites, then those spots were displayed on the basemap.

The GIS-enabled maps showed increasing degrees of detail as Web site visitors zoomed in on a map's neighborhoods and farther in to individual buildings showing SARS-infected residents. It also pointed out buildings that once had a SARS

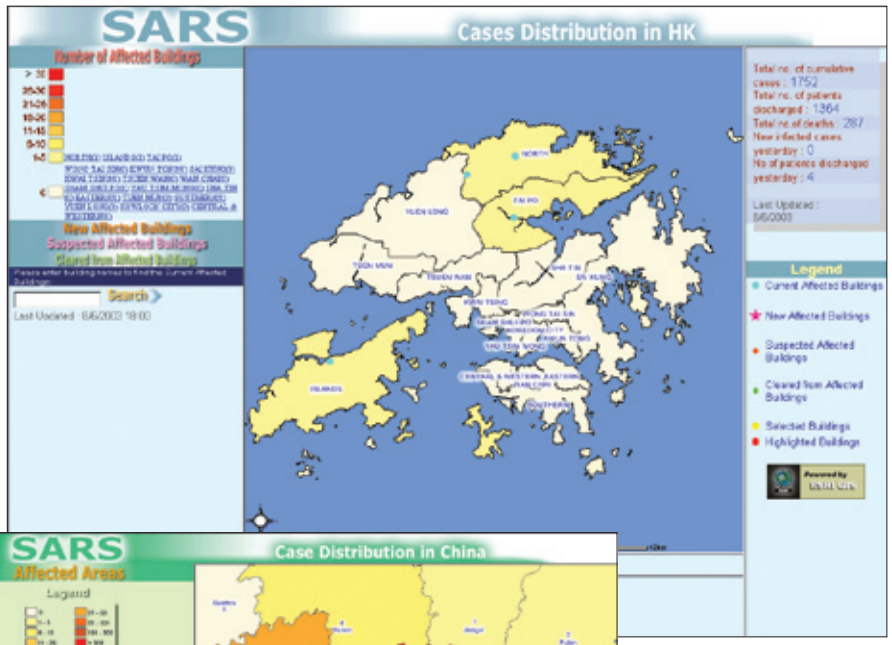


Figure 1
Hong Kong SARS infected districts

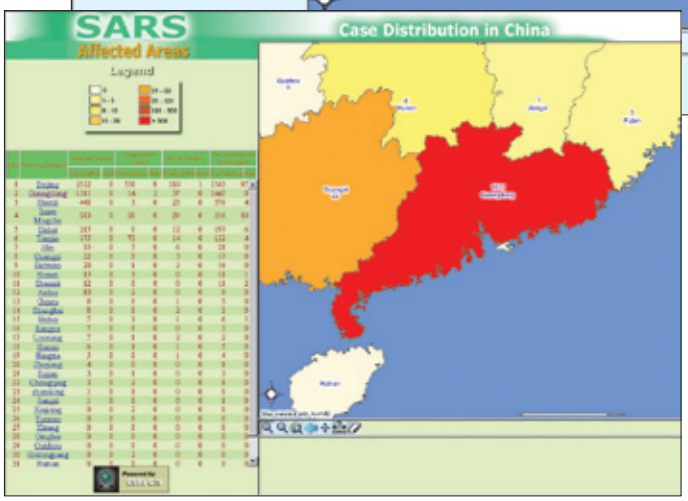


Figure 2
China SARS case distribution

problem but were later declared safe.

The Hong Kong SARS map (Figure 1) shows the distribution of buildings with infected residents in the 18 districts of Hong Kong, individual buildings with infected residents, newly added buildings with infected residents, and those that have been removed from the DOH list. Besides the common map navigation functions, the SARS mapping Web site also offered many other functions for the visualization of the proximity of individual buildings with infected residents to the home buildings of the users. These included measuring distance between any two buildings and showing 50 m and 100 m areas of a building with infected residents.

The China SARS map (Figure 2) details the case distribution in China including infected cases, suspected cases, number of deaths, and number of discharged patients from each province. The four categories are divided into both cumulative and new cases for a clear picture of the SARS distribution in the region.

The Web site's world SARS map showed all countries in a global map with their number of infected people, which keeps travelers informed and helps them plan their trips. The ESRI China (Hong Kong) SARS Web site has done much to keep Chinese citizens informed and alleviate their fears during the crisis.

Visit the ESRI China (Hong Kong) Web site at www.esrichina-hk.com.

Web Site Gives Health and Human Services Professionals GIS Perspective

ESRI's Health and Human Services Web site provides users with ideas and contact information for implementing GIS into their own projects. Get current Health and Human Services User Group news and discover GIS innovations in the industry, across the nation, and around the world. For example, learn how government public health services can use GIS for real-time outbreak and disease surveillance (RODS). From the site, open up an online edition of ESRI's newsletter *Healthy GIS* and read about the healthy and unhealthy places in America or how Toledo, Ohio's human services uses GIS to plan senior meal sites. Be inspired. Visit the Health and Human Services Web site at www.esri.com/health.

Continued from page 1

Geospatial One-Stop and Hurricane Isabel—Riders on the Storm

and, with Geospatial One-Stop, make their information available through the geodata.gov portal in response to Hurricane Isabel. Each participating organization, public and private, is to be commended for its willingness to set aside other priorities and contribute.

State geographic information (GI) coordinators were key to establishing data sharing partnerships in response to this event and are critical sources of knowledge about local mapping services. An ongoing and trusted network between local, state, and federal agencies will be a key component in the long-term success of geodata.gov.

Federal and state GI organizations can respond quickly to a common goal when technology makes sharing easy. In the case of Hurricane Isabel, publishing existing agency map services and data was easy through the geodata.gov portal.

There are many existing mapping services that can be accessed easily and quickly to support disaster planning, response, and recovery. The Geospatial One-Stop portal is an effective tool to search and view these services and maps when the services are published in the portal. The technology is reliable and worked well under crisis conditions.

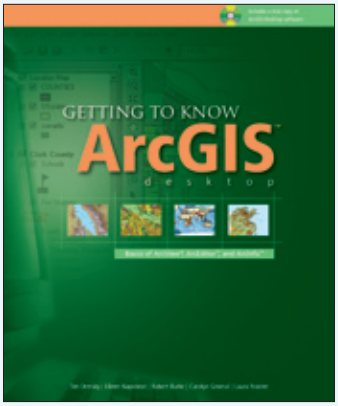
It is much more effective to publish and organize map services and data before an event occurs. Time is needed to effectively organize content, instructions for users, etc., to maximize the utility of services for citizens and decision makers.

Next Steps

The experience with Hurricane Isabel proved the utility of Geospatial One-Stop as a source for geospatial information in support of a natural disaster. More important, it is apparent that the geodata.gov portal can potentially support all kinds of activities and decisions. The limiting factor is the amount and quality of mapping services and data sets that are searchable through the portal. The geodata.gov portal needs to be populated aggressively with metadata describing mapping services and GIS data sets if we as a community are to fully experience its value. That value—the ability to show decision makers at all levels the power of geospatial information to support their needs—can be available to all through Geospatial One-Stop. Mapping services are important assets, strategic assets that can be magnified by sharing their presence with others through the geodata.gov portal.

Become a publisher! Register your GIS data and Web services now at the www.geodata.gov Web site. Click on the login link under the Publish Data heading, then follow the instructions for registering your metadata.

For more information, contact Hank Garie, executive director, Geospatial One-Stop, U.S. Department of the Interior (tel.: 703-648-5569, fax: 703-648-5755, e-mail: hgarie@usgs.gov).



Getting to Know ArcGIS Desktop: Basics of ArcView, ArcEditor, and ArcInfo

Getting to Know ArcGIS Desktop is a workbook for learning ArcGIS. The three GIS products that comprise ArcGIS are ArcView, ArcEditor, and ArcInfo, which are built on a common interface and core capability. Each product offers a different level of functionality. Richly detailed illustrations and step-by-step exercises teach basic GIS tasks from mapmaking to spatial analysis as well as database creation. Readers learn to use the software that forms the building blocks of ArcGIS: ArcMap, for displaying and querying maps; ArcCatalog, for managing geographic data; and ArcToolbox, for setting map projections and converting data. Also included in the book are explorations of the newest ESRI data format, the geodatabase, which stores spatial and attribute information in a relational database.

Included with *Getting to Know ArcGIS Desktop* is a fully functioning 180-day trial version of ArcView 8 software on CD–ROM as well as a CD of data for working through the book's exercises. Note that the ArcGIS Demo software on the CD–ROM in this edition requires the Microsoft Windows 2000, XP, or NT (Service Pack 6a) operating system.

Authors: Tim Ormsby, Eileen Napoleon, Robert Burke, Carolyn Groess, and Laura Feaster
ISBN 1-879102-89-7; 2001
552 pages; $59.95
Order online directly from the ESRI Store at www.esri.com/shop or call 1-800-447-9778.

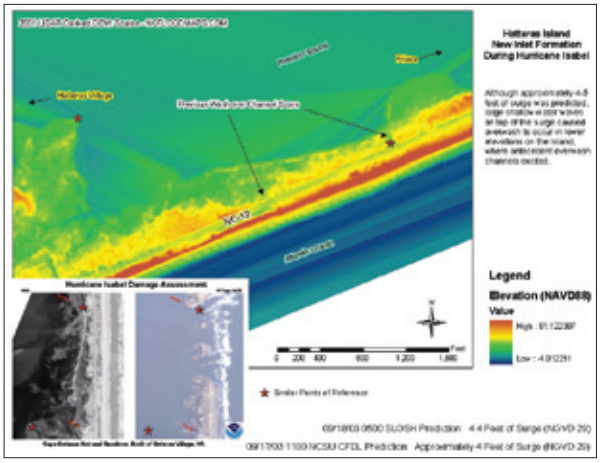
Coastal Services Center Monitors Storm Surge

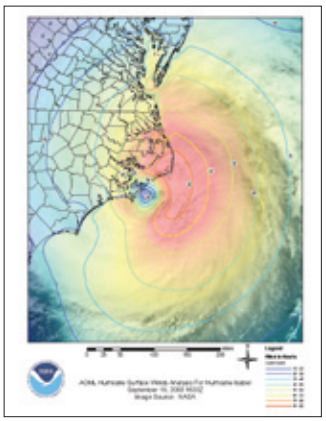
GIS products put to work in emergency management assist in situation reporting and analyses; damage prediction, estimation, and assessment; resource management; and general information exchange. Federal Emergency Management Agency (FEMA) Region IV (RIV) GIS provides support to the Regional Operations Center (ROC), open Disaster Field Offices (DFO), and various partners upon request through a trained cadre of GIS reservists.

By way of a prior agreement between officials at the National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center in Charleston, South Carolina, and those at FEMA, staff from the center recently provided on-site technical support to FEMA RIV GIS in Atlanta, Georgia, as well as at the DFO in Raleigh, North Carolina, before, during, and after Hurricane Isabel. This storm made landfall near Drum Inlet on North Carolina's outer banks on Thursday, September 18, 2003. Serving in dual roles, the center's two spatial analysts provided myriad support to the agency.

Specifically, center staff assisted by locating, gathering, and analyzing various event-related spatial data and using that data to generate current and forecast impact maps. Spatial data was obtained from a variety of sources and ingested into ArcView and/or ArcMap, overlaid with other relevant data, and distributed as hard-copy maps for use by federal and state emergency managers in operational decision making. Some of the more useful meteorological and oceanographic data used before, during, and after the event included H*Wind Project-observed windswaths (obtained from the NOAA Atlantic Oceanographic and Meteorological Laboratory's Hurricane Research Division); Sea, Lake, and Overland Surges from Hurricanes (SLOSH) storm surge inundation data (obtained from the NOAA National Weather Service [NWS] Tropical Prediction Center/National Hurricane Center); georeferenced high-resolution satellite imagery (obtained from the National Aeronautics and Space Administration MODIS Rapid Response System); forecast flood inundation data (obtained from the NOAA NWS Southeast River Forecast Center); light detection and ranging (LIDAR) high-resolution topographic and near-shore bathymetric data (obtained from the U.S. Geological Survey); and forecast wind swaths and storm track data (obtained from FEMA and the U.S. Army Corps of Engineers HURREVAC model).

Thanks to Ethan Gibney, NOAA Coastal Services Center, e-mail: Ethan.Gibney@noaa.gov.





SLOSH maps

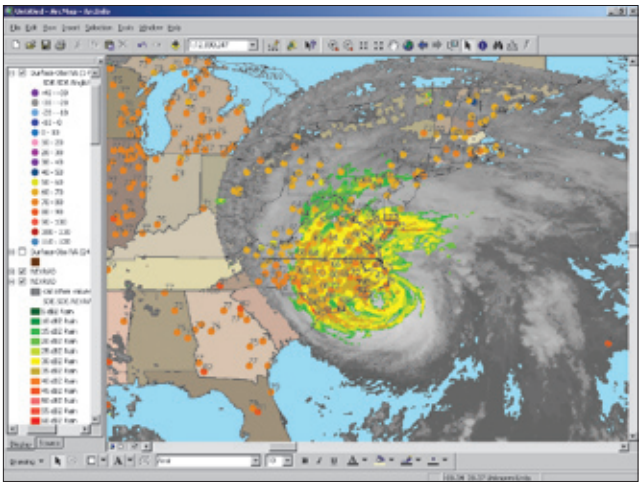
Forecasting Hurricane Isabel's Impact With GIS

As with many hurricanes, one of the biggest hazards associated with Hurricane Isabel was the combination of storm surge and heavy rain, which caused massive flooding conditions. The soil across much of the mid-Atlantic and northeast states was already saturated from a slow moving storm system that had preceded Isabel. The core of the strong winds to the east and northeast of the landfall were tracked through east–central Virginia toward northern Maryland, and these 60–80 mph gusts easily uprooted trees and downed power lines due to the saturated ground (more than 300 trees were uprooted in Washington, D.C.). The maximum winds of 105 mph at Orcacoke decreased rapidly to 50–70 mph within 30 miles of landfall. However, these winds continued to rapidly spread northward with the fast moving storm, and even the Washington/Baltimore area reported maximum wind gusts near 60 mph.

The main storm surge, also primarily to the east of the landfall position, spread up through the Chesapeake Bay toward Baltimore, causing significant urban flooding. Widespread four to six inches of rainfall were reported from the coastal locations of North Carolina all the way through the Washington, D.C., area from the storm. At landfall, a storm surge six to 10 feet above normal was reported along with waves 15–20 feet above the storm surge across the outer banks of North Carolina; an eight-foot storm surge was reported as far north as Fort McHenry in Baltimore.

Twelve hours before landfall a GIS time series of the forecast hurricane track, wind fields, and rainfall was created. Forecast weather data from Meteorlogix's Core GIS Weather site was downloaded and brought into ArcGIS and ArcGIS Tracking Analyst software for analysis. Because the forecast weather was in shapefile format, the intensity and duration of Isabel's impact on individual communities could be objectively identified using spatial queries. The forecast was quite accurate in predicting the location of severe weather events that were actually experienced.

Thanks to Dr. Clive Reece, Meteorlogix, e-mail: Clive.Reece@meteorlogix.com.



Hurricane hits the East Coast.

ESRI's Federal GSA Schedule

Contract Number GS-35F-5086H
Contract Period: March 11, 2003, to March 10, 2008

GIS software from ESRI is used throughout the federal government for automating, mapping, and managing a wide range of spatial information. Most digital map data available today and the spatial data standards practiced in most government agencies are based on ESRI GIS technology. ESRI offers the federal government a scalable family of commercial off-the-shelf (COTS) GIS software, training, services, and technical support through its Federal GSA Schedule.

Why should I purchase through the ESRI Federal GSA Schedule?

Federal government clients realize many benefits from ordering ESRI GIS software and services through the ESRI Federal GSA Schedule. The administrative costs of placing a GIS schedule order are lower than open market contracting and purchasing. ESRI and GSA have already determined the prices to be fair and reasonable, which takes the burden of price comparisons off individual agencies. For those agencies that require a contracting vehicle to be in place to purchase software and services, the GSA Schedule offers federal government clients a quick and easy way to get ESRI GIS software and services. Additional benefits include

- Minimum documentation is required.
- All FAR requirements including competition requirements are satisfied.
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- Government credit cards are accepted.
- It provides the best value for the customer.
- End user does not have to sign a separate software license agreement.

This schedule is available to federal government clients only.

Find out more about ESRI's Federal GSA Schedule online at www.esri.com/industries/federal/buy/gsasched.html. To order, simply call the ESRI Desktop Sales Center at 1-800-447-9778 or e-mail federal@esri.com.

GSA Federal Supply Schedule

GIS Day Is a World Event

GIS Day offers a venue for GIS software users around the world to show off real-world applications to schools, businesses, and the public. It is a reflection of the enthusiasm and commitment of individual GIS users everywhere and helps make people all over the globe aware of the important contributions GIS is making in almost every field and industry.

Staff from the InterAmerican Development Bank in Washington, D.C., celebrated GIS Day by setting up 18 displays and interactive demonstrations. Staff provided several videos and posters on GIS concepts and applications. The Indigenous Populations and Community Development (SDS/IND) Unit demonstrated the latest developments and conceptual data model for its cultural land use analysis methodology, and the Environmental and Natural Resource Division (SDS/ENV) exhibit showed tools for tracking hurricanes and responding to environmental disasters. An analysis of environmental risks for housing programs developed by Region 2 was also presented.

GIS Day is principally sponsored by the National Geographic Society, Association of American Geographers, University Consortium for Geographic Information Science, United States Geological Survey, Library of Congress, Sun Microsystems, Hewlett–Packard, and ESRI.

Consider sponsoring a GIS Day for your organization or community. The next GIS Day is Wednesday, November 17, 2004. To learn more about GIS Day and how your organization can participate, visit www.gisday.com.

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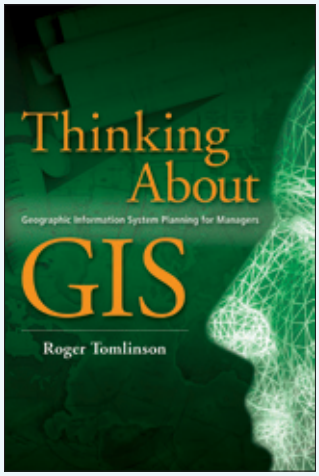

Thinking About GIS: Geographic Information System Planning for Managers

The fundamental principles behind planning for a successful GIS are explained in *Thinking About GIS: Geographic Information System Planning for Managers.* Renowned author Roger Tomlinson, commonly referred to as the "father of GIS," walks readers through a process that will result in a working GIS planning document that can pass muster in the most demanding bureaucratic environment.

Tomlinson's methodology and presentation, honed through the development of his successful GIS planning seminars offered worldwide, is targeted at people who have been charged with launching or implementing a geographic information system for their organization. Intended for managers and other senior executives of organizations considering GIS, Tomlinson details his practical method for planning systems that have proven successful over many years of use in public and private sector organizations.

Whether you are working with an existing system or creating a GIS from scratch, taking Tomlinson's tried-and-true lessons to heart will help you develop a system that meets the expectations of your organization.

Author: Roger Tomlinson
ISBN 1-58948-070-8; 2003
240 pages; $39.95
Order online directly from the ESRI Store at www.esri.com/shop or call 1-800-447-9778.

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