ARCNEWS

ESRI • Summer 2010 | ESRI International User Conference Issue | Vol. 32 No. 2

Geospatial Responses to Disasters: The Role of Cyberspace

By Melinda Laituri, Warner College of Natural Resources

The geospatial community can meet the challenge of disaster management. The Haitian earthquake, the Indonesian tsunami, Hurricane Katrina, the World Trade Center, Chernobyl, California wildfires, Danube flooding, Three Mile Island—multiple, large-scale disastrous events continually occur, and the magnitude and frequency of disasters appear to be increasing. Disasters represent the intersection of human communities with natural events where the built environment may actually exacerbate the outcomes of these events as in the case of Hurricane Katrina. Other disasters are the result of human activities and conflict that impact local communities with long-term and far-reaching outcomes as in the case of Chernobyl and the World Trade Center tragedy. Extreme events impact both the industrialized and developing worlds. However, the results of disasters are felt disproportionately in

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GIS in a Changing World

By Jack Dangermond

The cloud. Crowdsourcing. Neogeography. Collaboration. The geospatial industry, the IT environment, and the world around us are all changing rapidly. We often talk about how GIS is changing the world. But today I want to spend some time talking about how the world is changing GIS.

GIS has a long history of successfully adapting to new technologies, applications, customer types, and business models. From mainframes to minicomputers, UNIX workstations to PCs, desktops to the enterprise, each round of technical innovation has led to improvements for GIS. Today, GIS continues to evolve in response to infrastructure changes. The distributed computing environment enabled by the Web introduces a whole new set of challenges and opportunities. Merging with and adapting to the latest advances are making GIS easier to use, more

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Nike Learns Who Its Customers Are

Thinking Strategically with GIS

Located in the city of Beaverton, near Portland, Oregon, Nike is the world's most recognized brand for athletic footwear and apparel. The company has long used GIS to visualize its operations from various perspectives. Using maps makes sharing information about important business decisions more efficient and effective. Because location plays such an important role in business decisions, such as manufacturing, planning, distribution, and site selection, GIS is an ideal system for visualizing and analyzing this location-based information for Nike. *(Read the article on page 21.)*

Nike uses GIS for the entire retail process, from planning and building to buying and shipping products (courtesy: NIKE).

European Union Satellite Centre Moves to Enterprise GIS

The European Union Satellite Centre (EUSC) recently signed a multiyear enterprise license agreement (ELA) with ESRI España, ESRI's distributor in Spain—headquartered in Madrid—giving the agency greater access to the latest GIS technology, training, and consulting services.

EUSC operates under the auspices of the European Union (EU) Common Security and Defence Policy (CSDP). The center provides imagery analysis and geospatial intelligence products and services to the EU.

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Online Content, Applications, and Sharing Are a Seamless Part of the User Experience

ArcGIS Is Now Online

Quick and easy access to geographic content, including maps, apps, and developer tools, is critical to any GIS project and can save valuable time and money. ArcGIS online capabilities provide a framework for delivering cloud-based GIS that supports collaboration between different groups or communities, regardless of the client application that is being used.

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Users can add their own data on top of detailed, ready-to-use global basemaps.

Ensuring Future Access to Digital Geospatial Data

Library of Congress Takes Leadership

GIS gives us the dramatic ability to create maps that resonate in our imaginations and enable us to tell compelling stories of change over time. The increase in use of GIS has brought digital geospatial data into the lives of millions of people while exponentially increasing the quantity of data under management.

While digital geospatial data is increasingly accessible, it is also fragile and at risk of loss unless efforts are made to preserve it and keep it accessible over the long term. How will we ensure that the digital records of our contemporary landscape will remain accessible in the future? The United States Library of Congress is addressing this issue.

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Improving User Feedback, Leveraging Community Knowledge

ESRI Launches "Ideas Portal"

ESRI launched the ArcGIS Ideas Web site as a forum for users to suggest new products and improvements, vote for their favorites, and discuss ideas submitted by others. Users can submit ideas by product, service, or specific industry, including everything from small tweaks to existing ArcGIS features to groundbreaking new ideas.

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At the ArcGIS Ideas Web site, users can post, comment, and vote on product improvements recommended by other users.

European Union Satellite Centre Moves to Enterprise GIS

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The ELA expands GIS software deployment at EUSC, giving the staff access to the newest generation of geospatial capabilities and allows them to design and implement new approaches for managing and accessing geospatial knowledge.

EUSC views the ELA as an effective vehicle for streamlining access to software, services, and training, thereby saving time and reducing and consolidating costs. This step is envisioned as an important institutional investment for EUSC to accomplish its core mission of conducting imagery analysis and publishing timely, relevant, and accurate geospatial intelligence products and services for the EU.

The center, headed by director Tomaz Lovrencic, has already deployed a considerable amount of ESRI technology. It also employs many expert GIS software users, including image analysts, geospatial specialists, and other supporting personnel from EU member states.

While EUSC has used GIS software products for several years, the enterprise license agreement will allow EUSC to easily expand the use of GIS as its needs continue to grow the rapidly expanding needs for remote-sensing data across Europe.

Alfonso Rubio, managing director of ESRI España, says that he looks forward to continuing the close working relationship with EUSC. He adds, "We are pleased that ESRI technology can help the center conduct cutting-edge image analysis and produce map products for the EU's military staff as it directs peacekeeping operations and natural disaster relief efforts around the world."

More Information

For more information, contact ESRI España (e-mail: info@esri.es). AN

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ArcNews (ISSN 1064-6108) is published quarterly by ESRI at 380 New York Street, Redlands, CA 92373-8100, USA. *ArcNews* is written for the ESRI user community as well as others interested in mapping and geographic information system (GIS) technology. It contains material of interest to planners, foresters, scientists, cartographers, geographers, engineers, business professionals, and others who use spatial information.

GIS Professionals Helping Others

URISA's GISCorps Is a Place for Service

"The best way to find yourself is to lose yourself in the service of others."—Ghandi

Shoreh Elhami

Some people are skillful, some people are givers, and some people are both. People who are trained GIS professionals have many opportunities to serve the earth and help its environments and its inhabitants. Shoreh Elhami has made a way for GIS professionals to offer their skills to people in need, whether it be to support humanitarian relief, enhance environmental analysis, or provide support for disaster response. Cofounder of the volunteer GIS assistance program GISCorps (**www.giscorps.org**), Elhami is a GIS hero who helps GIS workers become heroes too.

URISA's GISCorps coordinates the deployment of GIS volunteers to communities in need around the world. These volunteers provide their GIS expertise remotely or on-site and have been involved in a variety of missions. The business of GISCorps is run by a core committee of six individuals who volunteer their time in the evenings and on weekends to keep the program running.

Elhami is the GIS director for Delaware County in Ohio and has been working for that county for 21 years. In her spare time, she can be found administering various aspects of GISCorps, such as finding recruits for a project in Southeast Asia. Why? "Helping others makes me happy," says Elhami. "If a person can help others, and do it in a timely manner in a way that meets other people's needs, it is the best success that can happen in a life."

In October 2001, while attending URISA's annual conference in Long Beach, California, Elhami shared an idea with several of her colleagues. The idea was born out of a simple question that she put to those colleagues: "Would GIS professionals be willing to volunteer their time and expertise—for a short time—to communities in need?" The reaction to the question was very encouraging. In October 2003, after two years of brainstorming and presenting the idea to various groups, the URISA Board of Directors adopted GISCorps as an initiative and later as a program of URISA. As of April 2010, GISCorps has launched 60 missions in 30 countries around the world. Its volunteers have contributed more than 7,400 hours to those missions.

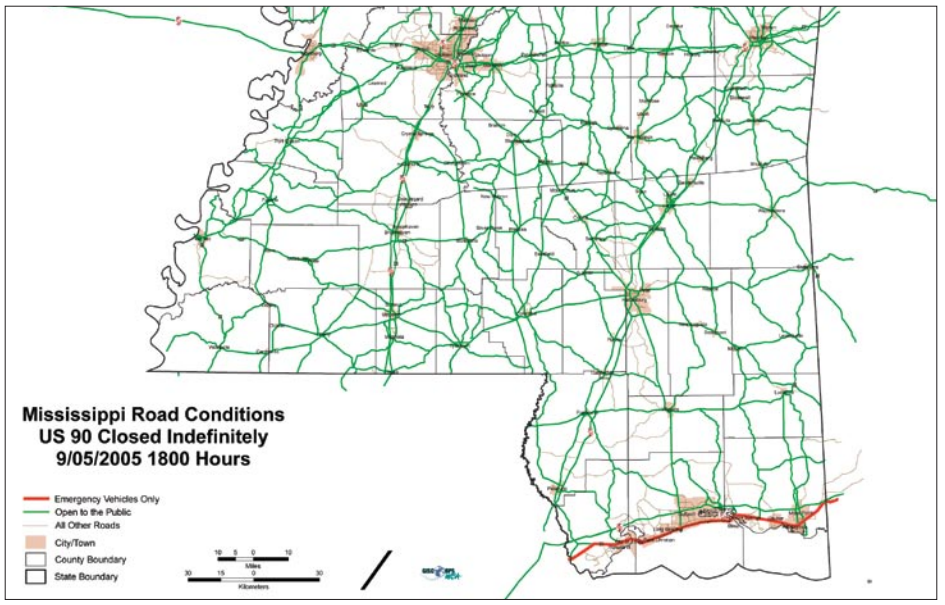
"GISCorps assists nonprofit organizations, which, without our help, would not be able to serve their target groups," explains Elhami. "The initial concept was to build the organizations' GIS capacity so they, in turn, could better serve their communities. We teach their people how to use the technology, and we provide support until they become self-sufficient."

For example, a 2010 project is to build digital maps for North Korea. The United Nations World Food Programme (WFP), via the Information Management and Mining Program (iMMAP), needs maps so it can deliver services, food, and other necessities. It also needs to know the obstacles to getting to those locations. WFP sent a request to GISCorps for expert volunteers to conduct heads-up digitizing. Mapmakers, during the Union of Soviet Socialist Republics era, had created 400 hard-copy maps. Elhami and her coworkers looked at the specifications from WFP's request and estimated how many volunteers and volunteer hours would be needed to finish the project in six months. They found that it would take 20 volunteers contributing 180 hours each to complete the project. Since WFP wants to use ArcGIS for the project, volunteers are required to be adept in ArcGIS 9.3. Elhami scanned the database of volunteers and sent an announcement to people whose skill sets met the criteria of the request. Within the first hour after sending the announcement, 14 people had responded. These volunteers will never set foot in North Korea to work on this mission because everything on the project will be done remotely from the volunteers' locations, probably from home. Each volunteer just needs to donate time and expertise.

GISCorps provided response support for the 2004 tsunami that hit the coasts of the Indian Ocean; 2005's Hurricane Katrina that devastated Louisiana and Mississippi; and, most recently, the earthquake that crumbled so many Haitian cities and villages. Some GIS volunteers do work on-site. In these cases, the requesting organizations are responsible to pay the volunteers' travel and accommodation expenses. However, in a disaster situation, volunteers may need to find a free spot for a sleeping bag in the corner of a crowded community building.

"People in the GIS community are very special," notes Elhami. "It has been an honor to be a facilitator at GISCorps that has become a conduit of help to so many. We have sent people all over the world to provide assistance that makes other people's lives better."

Raised in Tehran, Iran, Elhami and her husband became architects. They moved to the United States 25 years ago, and Elhami went to graduate school at Ohio State University. While working there as a research assistant, she discovered GIS technology. She fell in love with GIS and its concepts. She was then hired by Delaware County for her GIS expertise. She also taught GIS at the university for 10 years but finally stopped teaching because of her commitment to GISCorps.



The status of Mississippi road conditions on September 5, 2005, a few days following Hurricane Katrina's landfall.

Shoreh Elhami speaking to Afghanistan Information Management Services personnel.

The first on-site mission that Elhami worked on was in Kabul, Afghanistan. She wanted to learn what it was like to work at a location and know firsthand how hard it would be. The project was in partnership with the United Nations Development Programme (UNDP) and Afghanistan Information Management Services (AIMS). AIMS had set up shop in Pakistan because the Taliban forces were ruling Afghanistan. Once the Taliban forces were removed from power, AIMS relocated to Afghanistan and requested support. Specifically, AIMS wanted to grow its GIS capacity by moving from ArcView to ArcGIS. At that time, Elhami was an authorized ArcGIS instructor, so she taught Afghans how to use ArcGIS. GISCorps has since sent three more volunteers to provide advanced ArcGIS and ArcGIS Server training.

"Kabul was interesting," says Elhami. "I learned a lot. I thought that if a country as turbulent as Afghanistan can welcome a volunteer, any country can. I have since kept in touch with those people, and two of my AIMS Afghan students actually came to last year's ESRI User Conference."

Of GISCorps' 60 missions, 38 have been handled remotely. When Elhami initially conceived the program, she had not imagined that people could provide support from home. The Internet technology at that time was unable to support the work that needed to be done. But now, this is possible, and, what's more, affordable. People—such as mothers with young families—who would not have previously been able to work can now volunteer their help.

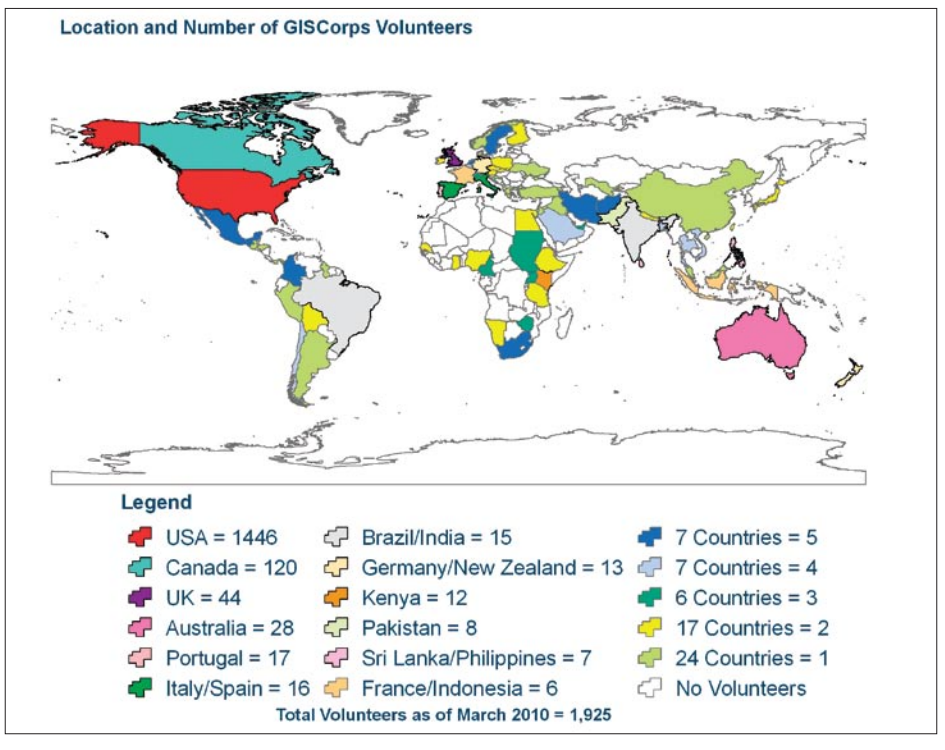
Mission assignments vary. Some may be extensive, while others can be as short as two hours. Short projects may include judging a map contest or teaching a class. Some projects are complex, requiring very specialized skills. For instance, two volunteers who are ArcGIS Server specialists are working with the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER). The goal of this UN initiative is to ensure that countries and international organizations have access to and develop the capacity to use all types of space-based information for disaster management. These GIS volunteers are doing high-level work, such as determining the GIS needs of UN-SPIDER by performing a needs assessment. They are developing a plan of action for the GIS configuration of software and hardware so that the organization will be able to react more rapidly when disasters occur.

As of March 2010, GISCorps has attracted 1,925 volunteers. These volunteers come from 76 countries around the world.

People interested in volunteering can register via the GISCorps Web site. Organizations can also use the Web site to request GISCorps' assistance. These requests are reviewed and screened by GISCorps' core committee. "We have no paperwork and no bureaucracy, and work gets done quickly," says Elhami. "E-mails fly, and we give fast answers and get quick responses. This method has proved very successful. Everybody cares, everybody knows why we are here, and we try to do our best to make things happen."

More Information

To see how you can become involved, visit the GISCorps Web site at **www.giscorps.org**.



GIS in a Changing World

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collaborative, more powerful, and ultimately more useful for the work you do every day.

The Cloud

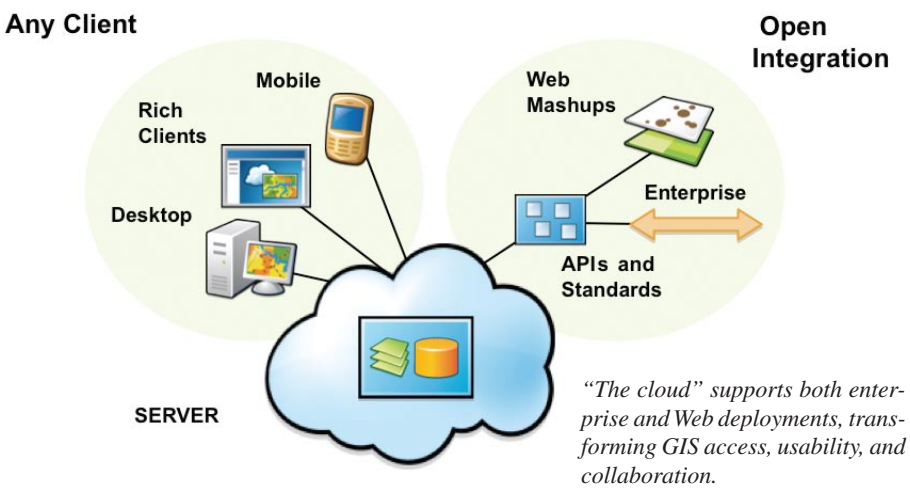
Cloud computing delivers technological capabilities on demand as a service via the Internet. Rather than the classic computing model of operating system plus software applications with files and database storage, "the cloud" model consists of services, clients, hosted content, and virtual machines. In other words, you do not load and run software and store data on your computer; you log in and use the system in the cloud. In addition to cloud computing on the public Internet, the same pattern can be implemented within a smaller, more secure community (private cloud) using the same concepts.

Cloud computing is emerging as an important technology trend in almost every industry, including the GIS community, and rapidly moving into the mainstream. We announced recently that ArcGIS 10 is cloud ready, which means that people will be able to rent and deploy GIS servers in the cloud, quickly and easily scaling their system up to solve large problems. For many users, this will provide a more efficient solution for maintaining infrastructure. Also, for many government agencies, it provides a solution for them to serve their data without the cost of administering hardware.

Crowdsourcing

Sometimes referred to as volunteered geographic information or user-generated content, crowdsourced data is contributed by nonauthoritative sources (e.g., everyday citizens). The challenge for GIS practitioners is to ensure the usability of this data in a GIS workflow or to turn this crowdsourced data into useful geographic knowledge. This can mean checking the data to make sure that it is authoritative; it can also mean getting involved in data collection, structuring the process to ensure that the collected data has meaning and is appropriate as well as authoritative.

Long the keepers of purely authoritative data, GIS practitioners are beginning to take crowdsourced data seriously. Crowdsourcing gives ordinary citizens the opportunity to provide feedback directly to the government. It can significantly augment authoritative datasets. It provides extraordinary opportunities for citizen science. And it can put a virtual "army" of volunteers on a large project in short order.



"The cloud" supports both enterprise and Web deployments, transforming GIS access, usability, and collaboration.

GIS tools supporting crowdsourcing will change the way organizations collect and manage spatial data. New features in ArcGIS 10 give users the ability to modify geographic content within any Web mapping application and provide a venue for online communities to become active contributors to geodatabases. Web editing makes it easy to capture ideas and observations for distributed problem solving and extend GIS editing capabilities to more people within the organization. These capabilities allow everyone—from authoritative data editors to citizens on the street—to contribute content to the geodatabase. This will enrich GIS, giving GIS practitioners new types of data to use, manage, interpret, and incorporate into their work.

Neogeography

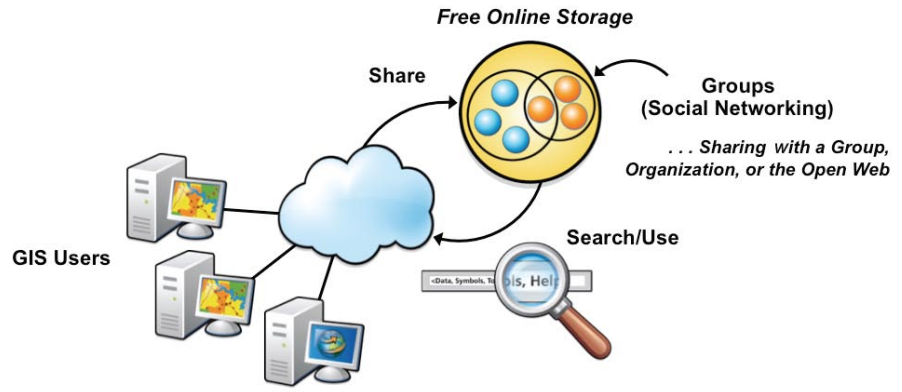
The neogeography movement—emphasizing ease of use, visualization, mashups, etc.—has been successful at changing the way society uses and interacts with geographic knowledge. Purveyors such as Google and Microsoft have made great advances in basic mapping, visualization, and mashups and, in the process, have shown us new user interface patterns. ESRI is learning from these new patterns, incorporating such ideas into our next generation of software. As a result, the distinction between the world of neogeography and the GIS world is gradually disappearing.

One of our primary goals is to make our technology much more straightforward. We believe ArcGIS 10 is an order of magnitude easier to use than previous versions. This simplification comes from a new focus on how people will use the information and capabilities of GIS, resulting in a simple yet powerful system for working with maps and geographic knowledge. These changes will greatly increase usability by GIS practitioners as well as society in general.

Collaboration

New collaborative technologies are redefining how we work together and share information at every scale. This collaboration crosses traditional lines, such as organizational boundaries, professional domains, and geographic borders. Sharing gives people access to vast stores of knowledge that were previously difficult or impossible to obtain and leads to more informed decision making.

ArcGIS is now online. This means that users can share and discover maps and apps and create mashups through virtually any client—ArcGIS Desktop, smartphones such as iPhone, and browsers. Developers can also leverage ArcGIS Online to build and deploy applications. Having ArcGIS Online gives users the power to quickly find, share, and use geographic content from ESRI as well as the user community. Through ArcGIS Online, GIS professionals will create knowledge, maps, and models and easily publish them for anyone to use. They will share their work through groups that they can create to collaborate on specific projects and by building communities with common interests.



With ArcGIS Online, users share maps, data, and applications with specific groups or the world.

No one organization can create the GeoWeb or own the entire global spatial data infrastructure. This will be done by thousands of individuals and organizations all over the world creating geoservices and building applications on top of this infrastructure, using new collaborative tools.

GIS Is Changing

GIS has proved to be a flexible, adaptive technology, evolving as the ecosystem around it changes. At each step in this evolution, GIS has not just adapted to these changes but embraced them, becoming more powerful and more valuable. Recent technological advances are helping us reenvision what a GIS is in a new context. As a Web-hosted or cloud-based system with ready-to-use maps and apps, GIS is rapidly moving toward the vision where it can be used anywhere, anytime, by anyone.

How we use GIS, the way we interact with it, and the way it interacts with the world are all changing. While some of this change has been and will be driven by new tools and technology from ESRI and others, the biggest driver of change is you, the GIS user. We're not redefining GIS; you are. You're telling us what technologies we need to embrace; what new functionality we need to add; and perhaps most significant, you are showing us through application of these new technologies how GIS can be used in ways we never dreamed possible. AN

Crowdsourcing engages citizens in spatial data collection and civic participation, empowering everyone to participate.

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low-income countries where population growth, inadequate infrastructure, environmental degradation, and poverty create conditions of vulnerability. Disasters become "teaching moments" to better understand the human relationship to the natural world (through events such as earthquakes, tsunamis, and volcanic eruptions) and how the constructed environment of cities, rerouted rivers, and overgrown forests aggravate extreme events.

Disasters reveal the need for integrated solutions that include on-the-ground emergency response informed by geospatial technologies and digital databases. Visualization and spatial applications are critical in pre-, during, and in post-disaster management and response. Increasingly, cyberspace plays a role in geospatial responses to disaster in the following ways: (1) revealing the role of virtual communities in disseminating information via new and innovative means (e.g., mobile phones, mashups, crowdsourcing); (2) illuminating the need for interdisciplinary approaches to address disasters where geospatial approaches and technologies are at the forefront; (3) identifying efforts to improve communication through spatial data; and (4) developing long-term strategies for recovery efforts, risk reduction, restoration, and monitoring programs.

Steven Johnson's book entitled *The Ghost Map: The Story of London's Most Terrifying Epidemic and How It Changed Science, Cities, and the Modern World* (published by Riverhead Books in 2006) recounts the story of John Snow's map of cholera deaths in 1854. Johnson emphasizes the role of local knowledge and multidisciplinary approaches in creating a bird's-eye view of the spread of the disease from a central water pump in industrializing London. Once scientific opinion accepted the waterborne theory of cholera, Snow's map became an important demonstration of the integration of science and local knowledge, linking an artifact of the built environment to a pattern of disease and disaster. In 1883, Krakatoa, a Pacific island, vanished in a volcanic eruption. Simon Winchester recounts the disastrous aftermath of this event in *Krakatoa: The Day the World Exploded: August 27, 1883* (published by Perennial in 2003). This was one of the first events to have nearly instantaneous global coverage due to the technology of the time: telegraphy, underwater cables, and news agencies. This sharing of knowledge of place and disaster is one of the main characteristics of the *global village*. Marshall McLuhan coined this phrase in 1960, referring to the contraction of the world due to electronic media.

Disasters bring us closer via the Internet (the underwater cables of the Krakatoa era) and the World Wide Web (telegraphy and news agencies). Online disaster communities, made up of the victims and their families, governments, news outlets, nongovernmental organizations, humanitarian aid groups, and an interested public, form in response to cataclysmic events. The online disaster community is global in that it transcends national boundaries in virtual space; solicits aid and intervention; and provides multiple lines of communication and information dissemination via chat rooms, blogs, and help lines. Virtual scales are not measured in terms of distance but by one's relationship to the event: friend, family, disaster responder, aid provider, or government official. However, the disaster occurs in an explicit geographic location with measurable results that are photographed, recorded, and placed online—where the physical environment intersects with virtual space.

Effective disaster management and response demand rapid utilization of information and data from many sources. The ability to seamlessly integrate and distribute digital data into spatially explicit forms for rapid assessment and analysis during and after a disaster remains a challenging undertaking. Specialized data, data networks, and information processing methods and technologies are needed in a highly dynamic situation fraught with uncertainty and unpredictability. However, during and post-disaster activities reveal high levels of access to and pooling and sharing of digital resources, skills, and capabilities through the creation of novel and innovative sociotechnological networks.

Researchers have done considerable work in addressing the role of geospatial technologies in disaster response and management. This research includes GIS and public safety; GIScience; and applications for emergency response, disaster recovery networks, vulnerability mapping, and local responses to disaster using GIS. The integration of the Internet with GIS applications has been applied to such areas as 3D real-time emergency response, serving maps on the Internet for emergency escape routes, and mobile GIS and digital video for urban disaster management. Geospatial modeling has been used for such things as determining evacuation routes, tracking hurricanes, and ascertaining refugee populations. The conceptual basis for disaster prediction and planning is undergoing a shift as evidenced by Susan Cutter et al. in a 2008 paper entitled "A Place-Based Model for Understanding Community Resilience to Natural Disasters." Cutter et al. highlight the need to focus on resilience and adaptability rather than risk and vulnerability. The January 2010 *Cartography and Geographic Information Science* is a special issue that focuses on temporal and spatial scales of hazards and disasters, monitoring of long-term recovery, and methods to improve communicating knowledge of these events using spatial data. A suite of research has considered the role of

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local communities in integrating local knowledge into disaster management activities. The notion of "people as sensors"—people collecting information, often spatial information, to aid in the recovery process and posting this information on the Internet for broad dissemination outside the established traditional channels of emergency response—is yet another aspect of the intersection of disaster, place, and technology.

In 2007, the National Research Council (NRC) published *Successful Response Starts with a Map: Improving Geospatial Support for Disaster Management,* written by the Mapping Science Committee. This report describes the state of the art of geospatial data and tools for emergency management and emphasizes the need for improvement on how this data and the tools are used. Mechanisms to increase data sharing, use of satellite images, and Internet services for data provision are among the critical needs to enhance the use of geospatial technologies. The Indonesian tsunami and Hurricane Katrina reveal important advances that occurred via the use of the Internet and GIS. For example, the disaster of the Indonesian tsunami demonstrated the ability to quickly provide remotely sensed images both before and after the event that showed the extent of damage. This occurred through partnerships between software vendors, Internet service providers, and remote-sensing companies. The failure of governmental agencies in the aftermath of Hurricane Katrina resulted in numerous individuals responding via creating maps of donation and emergency aid sites. Creating data-sharing mechanisms in times of emergency response is needed; however, the report cites security as one of the main reasons for the lack of data sharing and for failure in providing data for emergency response. The recommendation by the Mapping Science Committee is to strengthen the National Spatial Data Infrastructure (NSDI) of standard development and clearinghouse construction and to provide the framework for emergency management data needs and coordination.

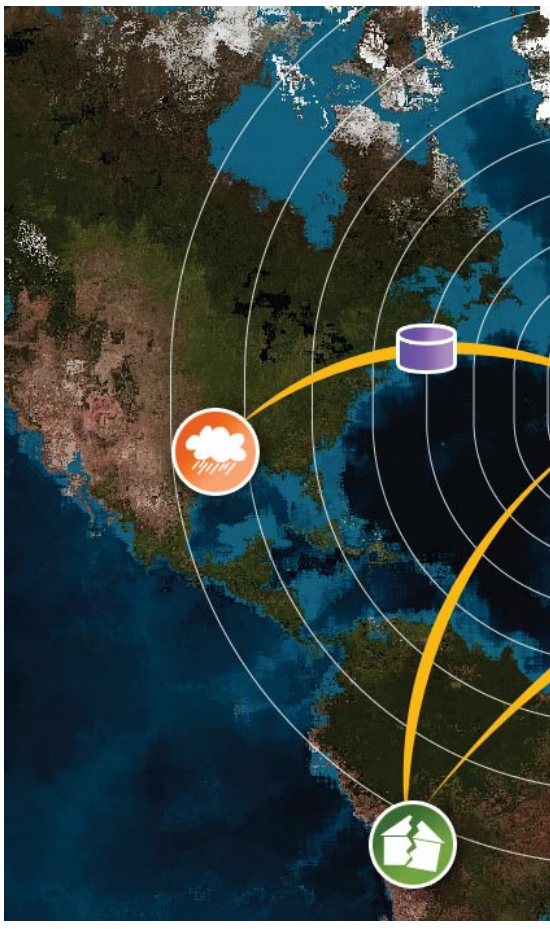
In 2009, the United Nations Foundation and Vodafone published a report, *New Technologies in Emergencies and Conflicts: The Role of Information and Social Networks,* that describes the new technologies and innovative uses of existing technologies to address crises. The mobile phone; the growth of broadband; and emerging telecommunications, computing, and multimedia are having a profound impact on how, when, and where people communicate. One of the observations reported is the shift to "many to many" forms of communication, such as social networking, from the traditional "one to many" type of communication in the form of radio and television. These communication changes will impact dissemination and delivery of information, as well as develop people-centered approaches focusing on local needs and emergency planning efforts. Geospatial trends are viewed as either top down, where high-resolution satellite images are used to assess infrastructure damage after disasters, or bottom up, where crowdsourcing techniques integrate cell phone broadcasting, social networking, and online maps to pinpoint local crisis conditions.

When disasters have occurred, there has been an informal development of technology and communication that has self-organized during the event to provide coherent, relevant information outside the traditional information providers. The spontaneous response to disaster was particularly acute after Hurricane Katrina in the United States, coupled with Internet and mobile applications outside the traditional structure of information dissemination and emergency management. These events reinforce emergency management as a community activity that is local yet linked to national-level priorities. However, the issues of appropriate data protocols and validity and authentication of information are not insignificant. Collaboration and coordination between government agencies, humanitarian organizations, and private companies remain problematic due to conflicting missions, data security issues, and inadequate funding of emergency response technologies. There is an international need for a regulatory framework for geospatial tools and communication techniques similar to the call by the NRC for the NSDI.

The integration of mapping, Global Positioning Systems, satellite imagery, and interactive geographic information systems provides important opportunities for developing and sharing information and techniques. "Technological gift giving" during disaster events has resulted in special licensing arrangements, innovative data sharing, and new applications. Mashups—the mixing of hybrid Web applications from multiple sources—combine satellite imagery with maps and geospatial data to provide local data. This activity capitalizes on researchers' observations about the need for data collection at finer spatial scales, such as neighborhoods and subneighborhoods, to create better disaster management plans. Disasters create space for the establishment of new networks, opportunities for collaboration, and information exchange.

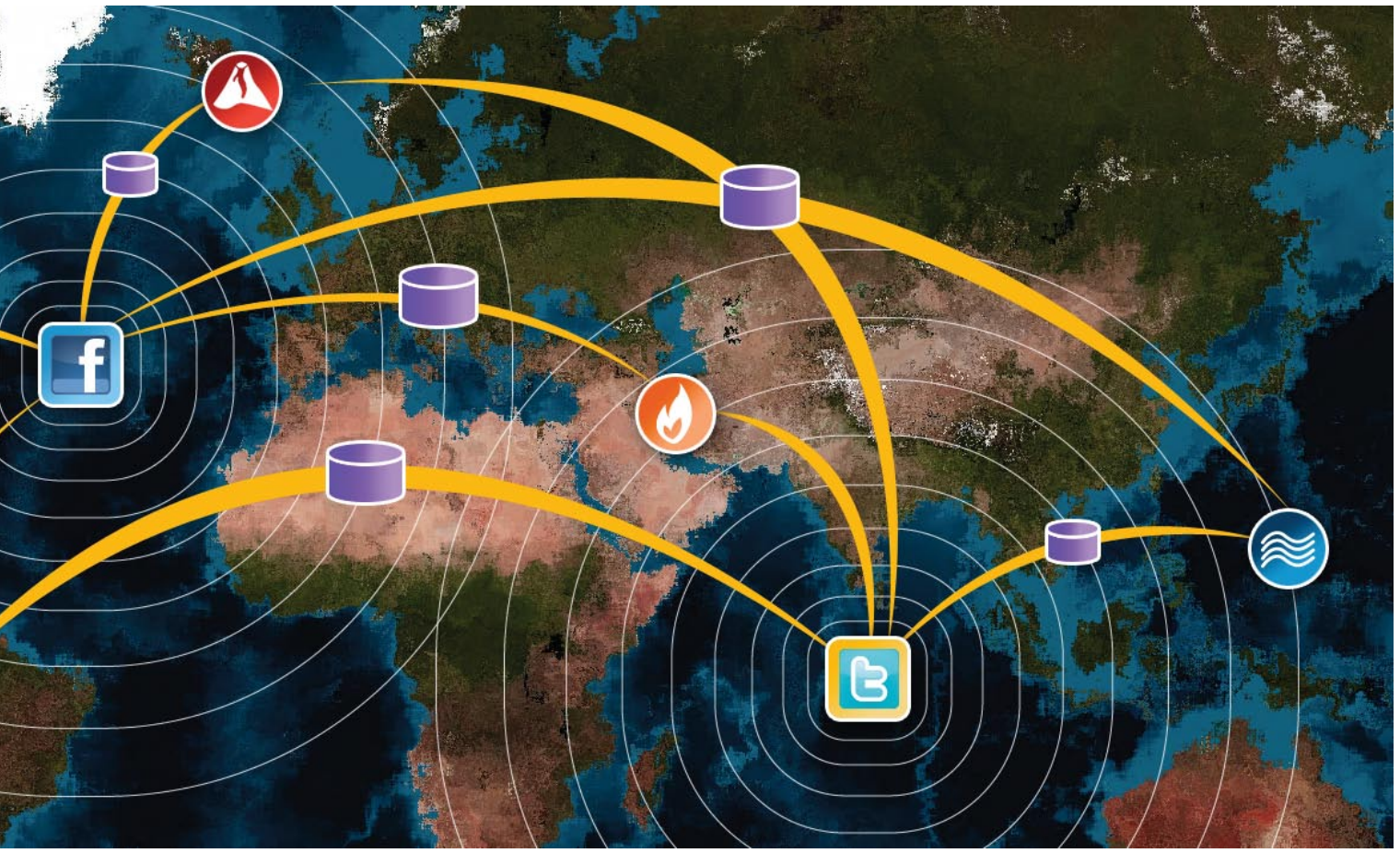
Maps and, increasingly, satellite images are ubiquitous throughout the online disaster landscape. Global and regional consortiums provide technical advice about disaster response, training opportunities for GIS disaster applications, direct access to satellite imagery, technical help in processing digital data, and links to other information portals. Often, the latest satellite images and maps of a recent disaster can be found on these sites. For example, United Nations Institute for Training and Research (UNITAR) Operational Satellite Applications Programme (UNOSAT) provides the international community with geographic information and aims to universalize access to satellite imagery. The Radio and Internet for the Communication of Hydro-meteorological Information for Rural Development (RANET) project uses Internet technology to disseminate early warning information, satellite imagery, weather, and climate data to rural areas. The application of appropriate or best-fit technologies is a critical aspect of GIS and Internet applications due to factors such as bandwidth, literacy levels, and data availability. Cell phone and wireless technology are key factors in countries with inadequate wired infrastructure where interactive maps can be accessed on cell phone screens.

In 2005, Paul Currion wrote about the "first responders of the wired world" in reference to the innovative uses of blogs, message boards, pinpoint maps, mashups, and Web portals by technically savvy Internet users to share local information about disasters. While emergencies vary widely in scale, severity, and duration, they are inherently local. Oftentimes, information required from a GIS for immediate emergency response is seemingly simple, not requiring complex analytic procedures but reliable and adequate data. These activities attempt to distribute appropriate, accurate information in a timely fashion and, in some instances, in real time. Multiple disasters have facilitated the formation of volunteer organizations that provide hands-on expertise to develop location-specific GIS applications. These organizations respond to disaster events by developing a list of volunteers and soliciting assistance in response to disasters. For example, GISCorps coordinates short-term, volunteer GIS services to underprivileged communities worldwide. Immediately after the Haitian earthquake, MapAction had a team on the ground to assist in relief coordination through developing maps of relief deliveries.



We have learned several important lessons in novel uses of satellite imagery, GIS, and Internet technology in translating disaster information to other audiences:

- The Internet enhances the ability for interactive communication of relevant information quickly and efficiently, provided people have the means to access the technology.
- Different forms of media interact to fuel news stories and information dissemination. The Internet, online media, and blogs work in concert, remixing and amplifying information.
- Synergistic effects from multiple new technologies (mobile phones) are enhancing access to information, as well as how information is disseminated.
- Web sites, wikis, interactive maps, and blogs offer immediate assistance to a community, such as relief efforts, locations of impacted areas, potential dangers, shelter locations, donations, and ways to assist.
- Different types of information can be made rapidly available that depict the geographic extent of the event, and satellite images provide a bird's-eye view of the location.
- People living around the world have the opportunity to learn about the human tragedy that results from a disaster, and this fosters a sense of global community.



These lessons suggest a promising future based on a strong technological imperative. However, several challenges exist:

- Accessibility to a reliable computer network and Internet connections is dependent on an overall well-developed infrastructure.
- Issues related to data availability and access to copyrighted and classified data are evident in both developing and developed countries.
- The power of information and communication technologies is at times not evidenced by their actual performance during a catastrophe. For example, during the Kashmir earthquake of 2005, basic GIS data layers were not available, and processed satellite images revealed little in the way of damage assessments.
- Maps and information needed for the local scale are often not available. This data is location specific, sensitive to scale, and rarely has adequate coverage of the social landscape.
- Information assessment for disaster management must be closely examined to determine if such databases and GIS products are really meeting the needs of the impacted populations.
- Information must be authentic and valid to be trusted by the users and affected populations.

There are several actions that the geospatial community can take to address issues associated with disasters. These include

- Develop standards and protocols for data for emergency management, building on the framework of the NSDI.
- Increase the skills in information systems for emergency managers and humanitarian aid workers to better understand the role of data collection and information for emergency management.
- Develop training for community-based emergency data collection for localities. Develop drills for emergency response that include GIS applications, rapid response assessments, and analysis.
- Develop new methods for geovisualization.
- Develop emergency management GIS applications and curricula to train the next generation of emergency responders. Develop geospatial educational tools for multirisk assessment.
- Build participatory partnerships and approaches in mapping disaster events.
- Research and develop appropriate temporal and spatial scales for disaster management databases.
- Establish long-term monitoring data collection programs to understand recovery and restoration in an interdisciplinary environment.
- Integrate the lessons learned to create feedback mechanisms for improving response to disasters.

Solutions have been implemented that include technological innovation and creative public-private partnerships. However, solutions must go beyond technology and tools and address long-term, foundational change through interdisciplinary approaches and long-term strategies building on the innate creativity of individuals. In 1997, Susan Hanson edited *10 Geographic Ideas that Changed the World* (published by Rutgers University Press), which discusses three ideas that directly relate to the issues of disaster management. The “idea of the map” is arguably the most powerful of geographic ideas in its ability to convey information authoritatively. Coupled with digital technology, the map takes on new forms through the use of "geospatial technologies," broadening our perspective by creating the possibility of analyzing ever larger amounts of geographic data. Situating the interactive map within the context of "human adjustment and adaptation" heralded the emergence of analyzing coupled human and natural systems. We now find ourselves at the crossroads of the virtual and physical worlds where solutions to disaster management provide an important role for geography and geospatial tools.

About the Author

Dr. Melinda Laituri is an associate professor in the Forest, Rangeland, and Watershed Stewardship Department, Warner College of Natural Resources, Colorado State University (CSU), Fort Collins, Colorado. She is the director of the Geospatial Centroid @ CSU Web site that provides information and communication about GIS across campus and community. Laituri teaches graduate courses in GIS. Her research focuses on the intersection of science and culture using geospatial science. She has research projects in Mongolia, New Zealand, Ethiopia, Canada, Alaska, and China. Other research work focuses on the role of the Internet and geospatial technologies in disaster management and cross-cultural environmental histories of river basin management.

More Information

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Library of Congress Takes Leadership

continued from cover

Highlights

- Geospatial data is fragile and at risk of loss unless efforts are made to preserve it.
- The Library of Congress is exploring ways to preserve digital geospatial information.
- Collaborative projects are exploring how to access historic and superseded data.

The mission of the Library of Congress is to make its resources available and useful to the United States Congress and the American people and to sustain and preserve a universal collection of knowledge and creativity for future generations. In 2000, the library established the National Digital Information Infrastructure and Preservation Program (NDIIPP) with the mission to develop a national strategy to collect, preserve, and make available significant digital content, including geospatial data, for current and future generations.

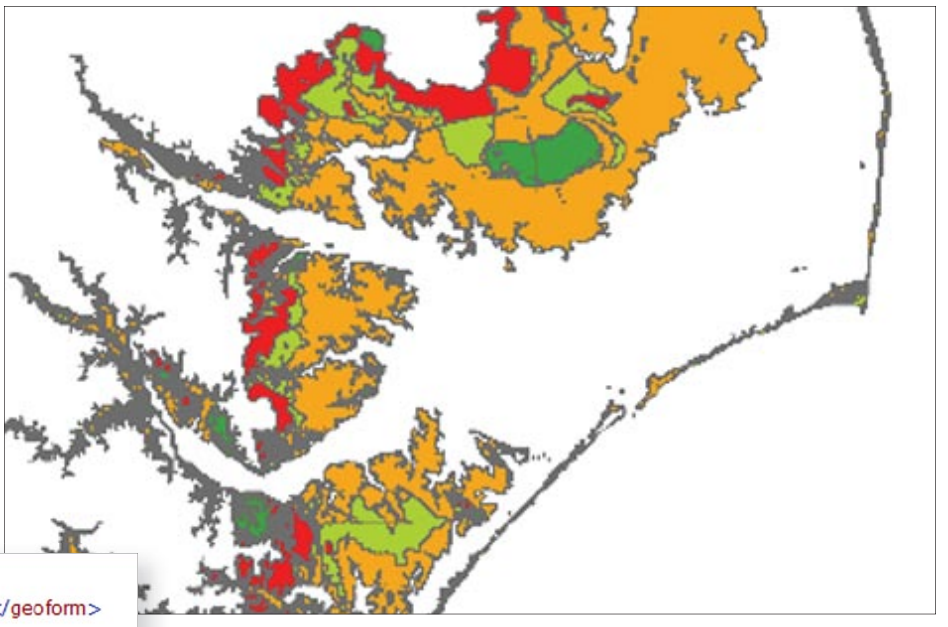
NDIIPP has established collaborative projects that build on and leverage existing activities and workflows for digital preservation purposes while modeling useful recommendations and approaches. These partnerships between academia; government; and GIS industry players, such as ESRI, have served to share research discoveries and help guide the development of GIS for preservation awareness.

In 2004, NDIIPP funded the North Carolina Geospatial Data Archiving Project (NCGDAP), a collaboration between the North Carolina State University Libraries and the North Carolina Center for Geographic Information and Analysis, to gain a richer understanding of the technical challenges associated with preserving geospatial data.

To help cultivate an understanding of temporal data management as a customer problem, NCGDAP met with selected ESRI development teams, including the geodatabase team, in April 2005 to discuss preservation challenges and concerns. NCGDAP later evolved into the Geospatial Multistate Archive and Preservation Project (GeoMAPP), adding the states of Kentucky and Utah and continuing to explore geospatial data preservation issues across state lines.

GeoMAPP has continued the contact with ESRI and other industry representatives through the National Geospatial Advisory Committee (NGAC), an organization established under the auspices of the United States Federal Geographic Data Committee (FGDC) to provide advice and recommendations related to the management of federal and national geospatial programs and the development of the National Spatial Data Infrastructure.

GeoMAPP has continued to engage the geospatial industry on the preservation issue through presentations at the 2010 ESRI Federal and International User Conferences.



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    Hurricane Storm Surge Inundation Areas (1993), to
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Image (above) includes rich metadata (left) that can assist with analysis.

The engagement with ESRI has helped GeoMAPP direct industry attention toward identifying user needs related to preservation activities and initiating a discussion that encourages ESRI and other private-sector entities to identify opportunities to enable geospatial content preservation, retention, discovery, and long-term access in their tools and services.

This engagement with industry has helped inform the broader NDIIPP approach to preserving digital geospatial information and has informed a proposal to develop a centralized online environment to share comprehensive information on the challenges and benefits of preserving digital geospatial data.

The Geospatial Data Preservation Web portal will promote awareness of the fragility of digital geospatial materials to creators, legislators, funders, users, and the general public while also providing an authoritative resource on preservation strategies and tools for creators, users, and professionals charged with the management of critical geospatial information.

Bill Lefurgy, the Library of Congress manager responsible for the geospatial preservation portal, notes, "Digital geospatial resources have significant value to Congress and to people everywhere. But keeping the data available over time is a challenge. Data stewards have told us that they need a Web-based clearinghouse that will provide the most current information about geospatial preservation tools, services, and practices."

NDIIPP will develop the portal in partnership with the Center for International Earth Science Information Network (CIESIN) at Columbia University in New York.

According to Robert R. Downs, the senior digital archivist and senior staff associate officer of research at CIESIN, geospatial data faces the same pressing set of preservation problems affecting many other kinds of digital data and information (degrading media, rapid software and hardware obsolescence, incomplete standards), but geospatial data has unique preservation issues that will be addressed by the portal.

The direct impetus for the information portal came out of observations garnered during NDIIPP's Framing a National Preservation and Access Strategy for Geospatial Data summit held in November 2009. This stakeholders' convening session was designed to understand the broad sweep of stewardship organizations involved with geospatial information creation, preservation, and access; get input about the types of digital geospatial information that are priorities for preservation; learn about current stewardship roles and responsibilities; and identify gaps in the geospatial information life cycle in terms of preservation and access. The summit identified stewardship organizations—such as FGDC, the National Archives, the National Climatic Data Center, the National States Geographic Information Council (NSGIC), and the U.S. Census Bureau—as the initial audience for the discussion, but there are plans to engage the wider geospatial community in the near future.

The clear need emerged from the summit for an outreach program to broadly inform the public, geospatial users, and funders about the value of geospatial data and why it should be preserved. This led to the planning for the portal, which will be developed and rolled out over the course of 2010.

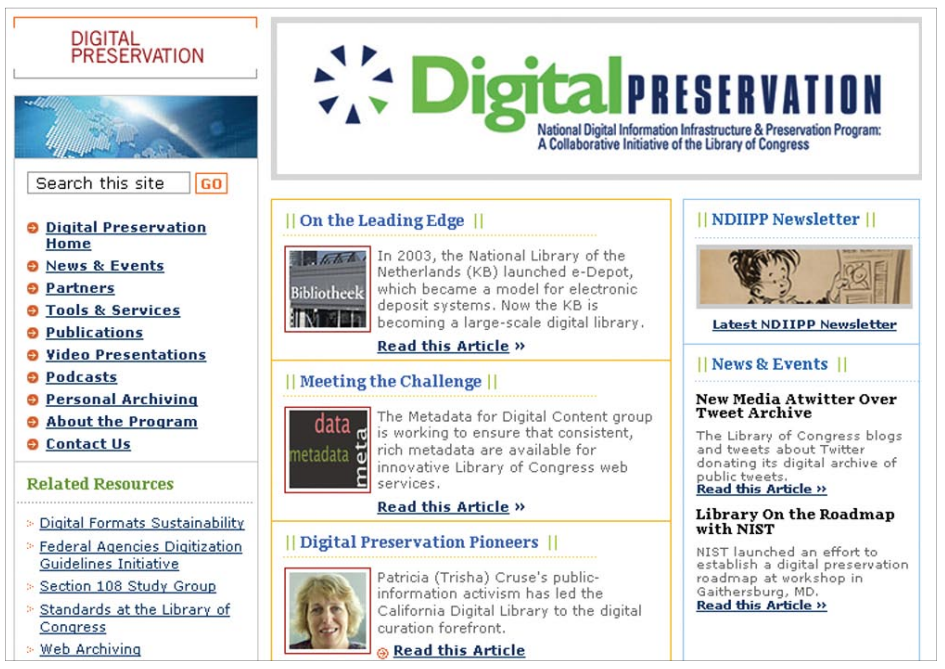
Portal topics will include geospatial data policy, provenance, intellectual property rights, confidentiality, appraisal and selection, geospatial data deposit, data preparation, documentation, preservation metadata, software dependence, persistent identifiers, and storage media.

The initial planning phase will include the solicitation of inputs from key stakeholders and potential users, development of an informal advisory committee drawn from experts in various disciplines related to geospatial data and its preservation and selected user community representatives, and conduction of an initial requirements analysis.

This planning phase will determine the final contents of the portal, which will likely include introductory documents promoting an understanding of geospatial data preservation; links to current geospatial preservation projects and resources from government agencies, organizations, and associations; information on relevant standards, tools, policies, and examples of successful (and unsuccessful) geospatial data preservation projects and approaches; educational and training opportunities and resources; and a calendar of relevant meetings, conferences, workshops, and seminars on geospatial preservation.

More Information

For more information on the Library of Congress digital preservation initiatives, visit **www.digitalpreservation.gov** or contact Butch Lazorchak, digital archivist, U.S. Library of Congress (e-mail: wlaz@loc.gov). Information on the GeoMAPP project can be found at **www.geomapp.net**. Information on the Center for International Earth Science Information Network at Columbia University in New York can be found at **www.ciesin.org**. For more information on the Framing a National Preservation and Access Strategy for Geospatial Data summit, visit **www.digitalpreservation.gov/news/events/other_meetings/geosummit09/index.html**. AN



The digitalpreservation.gov home page.

ESRI Provides Software, Services, and Around-the-Clock Support

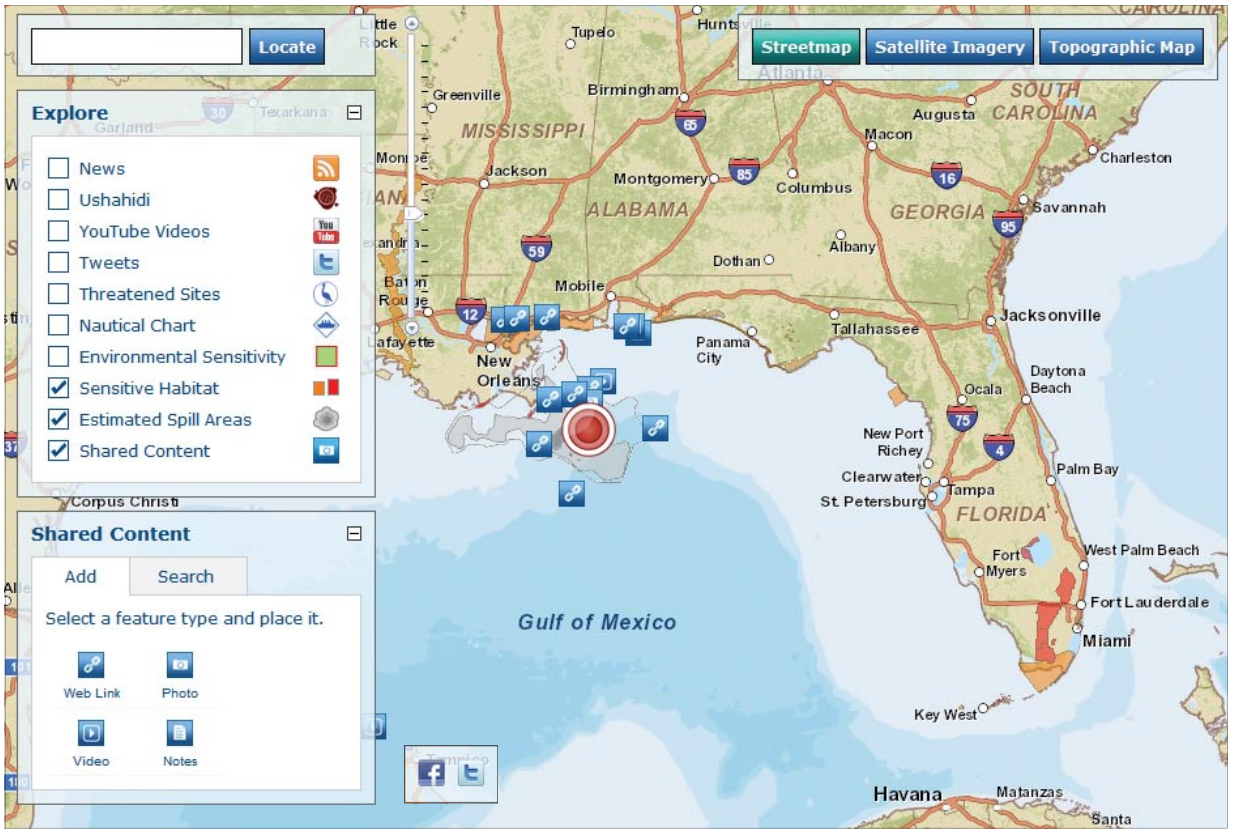
Users Respond to Oil Spill Disaster

First responders, government officials, environmental experts, and commercial companies are using GIS to monitor the BP-operated Deepwater Horizon MC252 oil spill in the Gulf of Mexico and identify potential impacts to natural resources. GIS analysis and data help response agencies collaborate by increasing their situational awareness to support command and control. As the event unfolds, agencies will be able to make better decisions to manage the spill's repercussions. GIS technology supports incident management efforts through delivery of current and accurate information to response agencies using a powerful common operating picture (COP).

In the Gulf of Mexico, ESRI is working closely with dozens of agencies and the GIS community. ESRI's disaster response team is providing assistance to users in local, state, and federal government agencies, as well as in the private sector. The team is supplying software, technical support, GIS data, and personnel.

Dozens of agencies have responded with GIS support.

Members of the Spill of National Significance (SONS) used GIS to compile and consolidate information in a spatial context, providing incident command with a COP. "Since the spill is accruing over a large geographic area, various analysis techniques are being employed to verify placement of boom assets used to mitigate the effects of oil upon the shoreline," says David Gisclair, technical assistance program director, Louisiana Oil Spill Coordinator's Office. "By using GIS technology, field information can be processed into products useful in the incident command decision-making process."



The ESRI oil spill map application enables people to add geospatially referenced tweets, photos, and YouTube videos. This allows information captured from the Gulf Coast to be shared around the world via the Web.

Devon Humphrey, geospatial intelligence officer and instructor, Texas A&M University, Corpus Christi, discussed how he and his staff came to help. "We see ourselves as kind of 'GIS smoke jumpers,'" says Humphrey. "We have come in to fight the spill and will get things set up so that others can rotate through over the next several years. The plan is for these GIS professionals to train replacement GIS staff as they rotate through the Houma command post and provide them with certification from the National Spill Control School at Texas A&M University. The training will be conducted here in the GIS Lab and will include a combination of GIS for oil spill and National Incident Management System (NIMS) training required to work on this spill."

The GIS section at the incident command post, located in Houma, Louisiana, coordinated by Humphrey and his team, was able to collate all collection data (imagery or otherwise) from state and federal agencies on oil boom and oil slick information. All this information was visually posted in such a manner (maps/imagery) to allow for rapid assessment of the situation in the field by senior leadership.

"GIS folks were able to rapidly change layers of information to match user needs," says Lt. Col. Roy Worrall, Incident Awareness and Assessment (IAA), supporting civil authorities, U.S. Army National Guard, "for example, building a product for the state leadership that reflected information on engineering projects, such as breakwaters, tiger dams, and sandbagging operations. All of this was done on a daily basis, and products were updated continuously as information became available."

The engineering, construction, and technical services firm URS Corporation has been working successfully using GIS to provide data management and decision support to the myriad of businesses and government entities responding to the oil spill.

"The coordination of spatial data for so many agencies, companies, and entities is daunting at best," says Eric Songer, GISP, URS Corporation. "Every federal agency dealing with natural resources is present, as well as the state agencies of four different states, and all the contractors brought in to help with the response. There are dozens of entities, all with varying degrees of spatial awareness."

Lynn Ford, GIS manager for the Alabama Department of Environmental Management, says, "Alabama is using ArcGIS Mobile 10 to collect the locations and condition of deployed boom. The application allows the marine police and marine resources officers to stream GPS coordinates to a laptop, attribute the line, and edit the attributes. The data is sent to a server in near real time to provide the data to the planners."

ESRI Disaster Response Web Site

ESRI is also providing support and services for the Gulf oil spill (**www.esri.com/services/disaster-response/gulf-oil-spill-2010**) through its disaster response Web site. Resources available include continuously updated maps, data, and applications, as well as links to incident-related Web sites. These resources provide the response community with tools to anticipate any adverse effects and respond proactively.

As part of its Web site, ESRI launched an interactive map application that allows users to add volunteered geographic information (VGI) in the form of links to online photos, Web sites, and YouTube videos. By doing so, volunteers can add current information to the map and increase everyone's awareness of activities related to this tragic event.

ArcGIS Online was used to rapidly set up portals for site awareness related to the oil spill. The content is being used for response and mitigation requirements. The site currently features the following types of content:

- *Applications:* Web mapping applications that combine basemaps with other types of information
- *Services:* Links to relevant map services
- *Data and maps:* Links to downloadable data, maps, and layer packages

Services include an oil spill plume trajectory model, an environmental sensitivity index map, and electronic navigation charts.

More Information

For more information, contact Geoff Wade, ESRI (e-mail: gwade@esri.com), or Russ Johnson, ESRI (e-mail: russ_johnson@esri.com), or visit the ESRI disaster response Web site at **www.esri.com/services/disaster-response**.

ArcGIS 10 Simplifies GIS Workflows

GIS professionals can now take advantage of a host of tools and other enhancements that simplify their work. Improvements to ArcGIS that range from making it easy to add basemaps to ArcGIS Desktop projects to automating map production and performing spatial analysis more efficiently, as well as tools for collaborating with others, are just a few of the features of this release.

Improvements to Productivity

New productivity tools to support the workflows of GIS professionals enhance the whole ArcGIS user experience. This release makes map creation and production much easier and provides best practices templates to help users get started quickly. Users can search by keywords or data types to find data and maps. They can also use the search function to quickly and easily find symbols to use in their maps and tools for analysis.

Editing in ArcGIS 10 is streamlined; this release introduces sketch-based desktop and Web editing, which means that users can choose from a customizable on-screen palette of features in desktop and Web clients. In addition to making users more efficient, this new editing experience allows the expansion of volunteered geographic information or user-generated content on the Web.

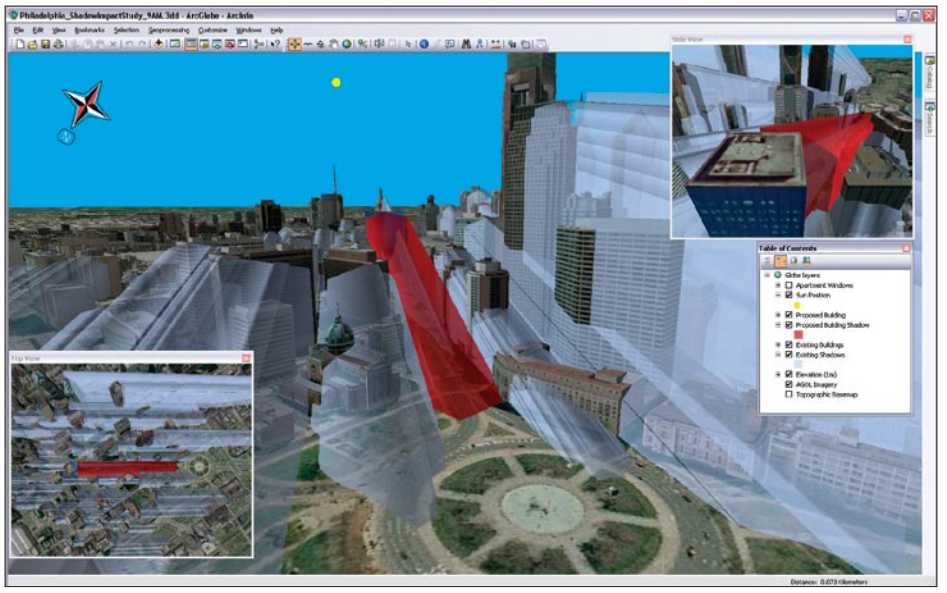
Users will notice faster performance, which is the result of averaging local graphics cards on desktops and improved cache generation and management, as well as optimized Web graphics. These caching and Web graphic improvements translate into more responsive drawing performance, including smooth, continuous panning of data.

Online Content

An exciting aspect of ArcGIS 10 is that users can leverage online maps and tools that are a built-in part of their ArcGIS experience—this includes ArcGIS Desktop; mobile devices, such as smartphones; browsers; and applications developed using ArcGIS Web Mapping. For example, with the click of a button, ArcGIS Desktop users can add a visually pleasing basemap to their projects. Also, users can find, share, organize, and use maps, apps, and other resources via the new ArcGIS.com site—a Web-based gateway into the ArcGIS system. Furthermore, users can discover, share, and present geographic information using ArcGIS Explorer Online, a new browser-based version of ArcGIS Explorer.

Cloud Deployment

ArcGIS Server can now be used from the Amazon cloud. Running ArcGIS Server on Amazon allows organizations to take advantage of multiple cloud services and features. These include the ability to deploy ArcGIS Server across more than one data center and access to Amazon's elastic computing infrastructure, which makes it possible for organizations to quickly adjust the capacity of ArcGIS Server services and applications to user demand.



ArcGIS 10 allows template-based editing in 3D, such as building a shadow analysis.

Powerful Spatial Analysis

The notion of time is now built into the data management visualization and analysis aspects of the software. Users can create, manage, and visualize time-aware data. They can also display and animate temporal datasets, as well as publish and query temporal map services. The ability to see data over time opens opportunities for more in-depth analysis.

It is now much easier and faster to perform 3D visualization on the local machine. In fact, at this release, ArcGIS becomes a full 3D GIS, offering 3D data models, editing, analysis, and visualization on the local machine. As a result, users can do virtually everything they do in a 2D environment in a 3D environment.

Also with this release, ESRI continues to advance geographic science with new tools. ArcGIS 10 includes Python scripting for automating common tasks and analyses. Using Python, the capabilities of ArcGIS can be combined with other scientific programming to create powerful solutions. Among the new analysis capabilities offered in ArcGIS 10 is location-allocation, which helps users understand how their facilities' placements in a given network impact their ability to serve their customers.

New Ways to Share

Tight integration with ArcGIS online searching and sharing capabilities makes it easy to create and distribute projects that may include data, layers, maps, tools, scenes, globes, diagrams, and add-ins. It is also easy to discover and organize geographic data throughout the enterprise via the new Search service in ArcGIS Server. ArcGIS 10 also enables feature-level editing via Web applications.

Improved Access to Imagery

The use and management of imagery are now more efficient on the desktop and the server. Users can experience faster performance with accelerated image display, and they can save time by using the image analysis window for image interpretation and processing. It is also easy to manage massive image collections with dynamic mosaicking and on-the-fly processing. Users can efficiently serve dynamic image mosaics to many applications.

More Flexible Deployment

ArcGIS Desktop licenses are now much easier to install and manage. Users can borrow ArcGIS Desktop licenses for temporary use away from the office (e.g., field units, work from home, business travel). Also, as mentioned above, users can extend ArcGIS use to the Amazon cloud. This is done through flexible Amazon Machine Image (AMI) hosting capabilities.

Expanded GIS in the Field

The new Mobile Project Center simplifies ArcGIS Mobile deployments. Also, users can now leverage streaming GPS, photo attachments, and location tracking. ArcGIS Mobile has a customizable, ready-to-deploy application that allows users to extend mobile projects to in-vehicle and tablet-based PCs. Also, soon customers will be able to download the new ArcGIS for iPhone mapping application directly from the Apple iTunes App Store. In addition, ESRI is providing an ArcGIS for iPhone Software Development Kit (SDK) so organizations can build their own focused iPhone applications.

Better for Developers

Developers can also take advantage of the simplified experience that ArcGIS now offers. They can use add-ins, which are easy to share and deploy, or Python to extend their desktop applications. They can also easily build applications with additional Web APIs and streamlined software developer kits. There is now a single ArcObjects .NET SDK as well as a single ArcObjects—Java SDK for ArcGIS Desktop, ArcGIS Engine, and ArcGIS Server.

More Information

To find out more about ArcGIS 10, visit **www.esri.com/whatsnew**.

For Additional Information About ESRI Products

Inside the United States, please call ESRI at 1-800-447-9778.

Contact your local office:
www.esri.com/locations

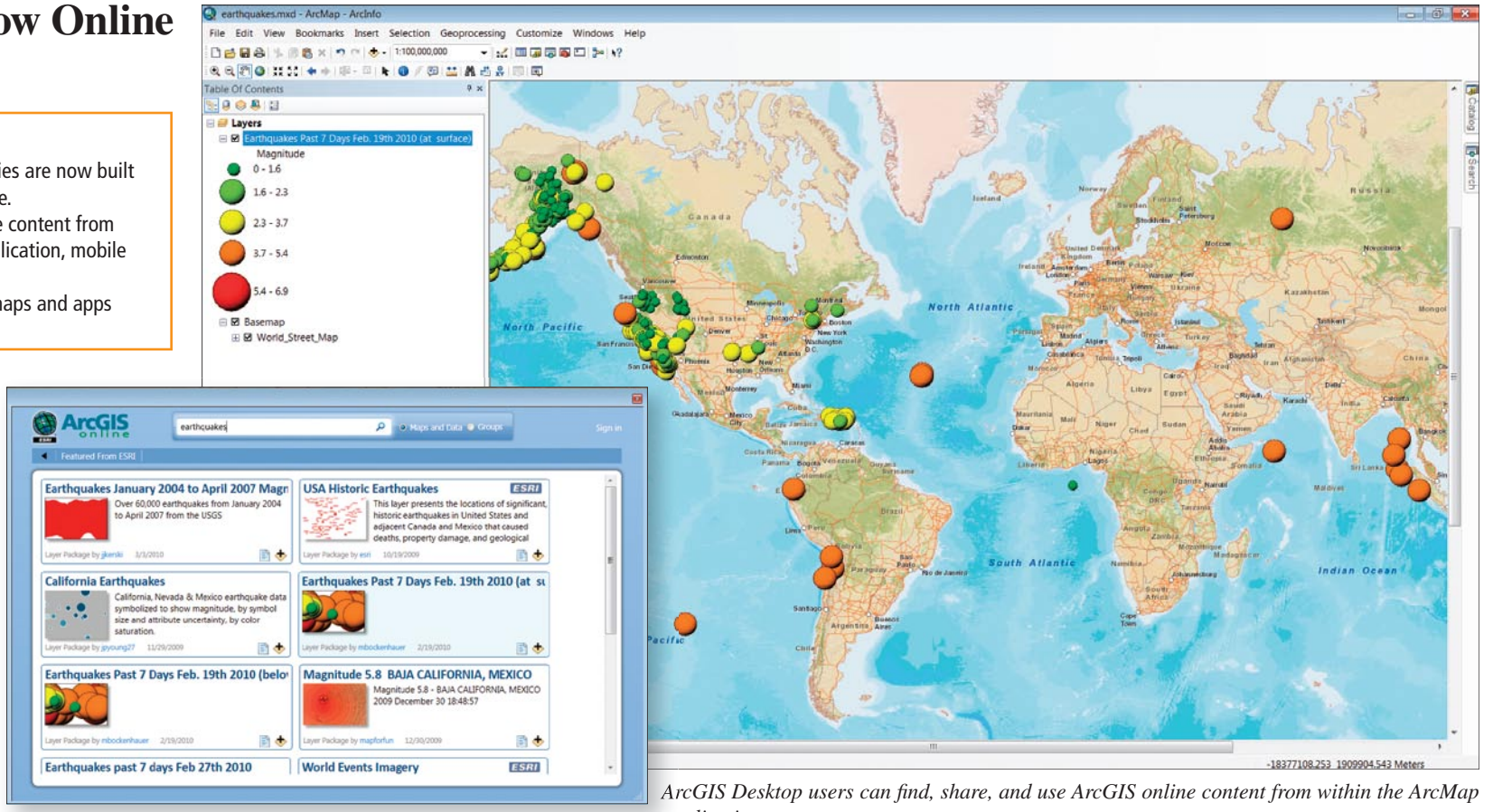
Contact your local ESRI reseller:
www.esri.com/partners

ArcGIS Is Now Online

continued from cover

Highlights

- ArcGIS online capabilities are now built into the user experience.
- Users can access online content from a browser, desktop application, mobile device, or custom app.
- Users can share their maps and apps across different clients.



ArcGIS Desktop users can find, share, and use ArcGIS online content from within the ArcMap application.

Access from a Browser

ESRI recently released ArcGIS.com, a central Web gateway into the ArcGIS system and ArcGIS online content. Users can find, share, organize, and use maps, apps, and other resources published by ESRI and the user community. Users can also build communities around common interests by creating specific groups and organize and share their content through these groups to facilitate collaboration. Users can post comments and rate their favorite maps and apps so that others can search by most viewed, highest rated, and favorite content.

In addition, ArcGIS Explorer now has an online version that can be accessed from a Web browser. ArcGIS Explorer Online is the same application that has been available on the desktop, but it is now available as a browser-based application that doesn't require a download. ArcGIS online content can be accessed directly from within ArcGIS Explorer Online to create maps that can then be shared and consumed by the broad community.

The JavaScript Web mapping application is another new browser-based application. It provides a quick and easy way to create maps online. It uses ESRI's basemaps as a starting point, and users can then search ArcGIS online content or other GIS servers and the Web to find additional layers and create mashups. These mashups can also be shared and consumed by others, including users of the ArcGIS for iPhone mapping application.

Access from ArcGIS Desktop

With the release of ArcGIS 10, ArcGIS Desktop is tightly coupled with ArcGIS online content and capabilities. Users can browse, use, and share content directly from the ArcGIS Desktop ArcMap application. This includes content that is publicly available (e.g., basemaps published by ESRI) and user content that has been published through groups. Once an ArcGIS Desktop user has authored a map that includes ArcGIS online content, the map can be uploaded by creating a layer package. By uploading that layer package, other users can then find and use the authored map.

Access for Mobile Users

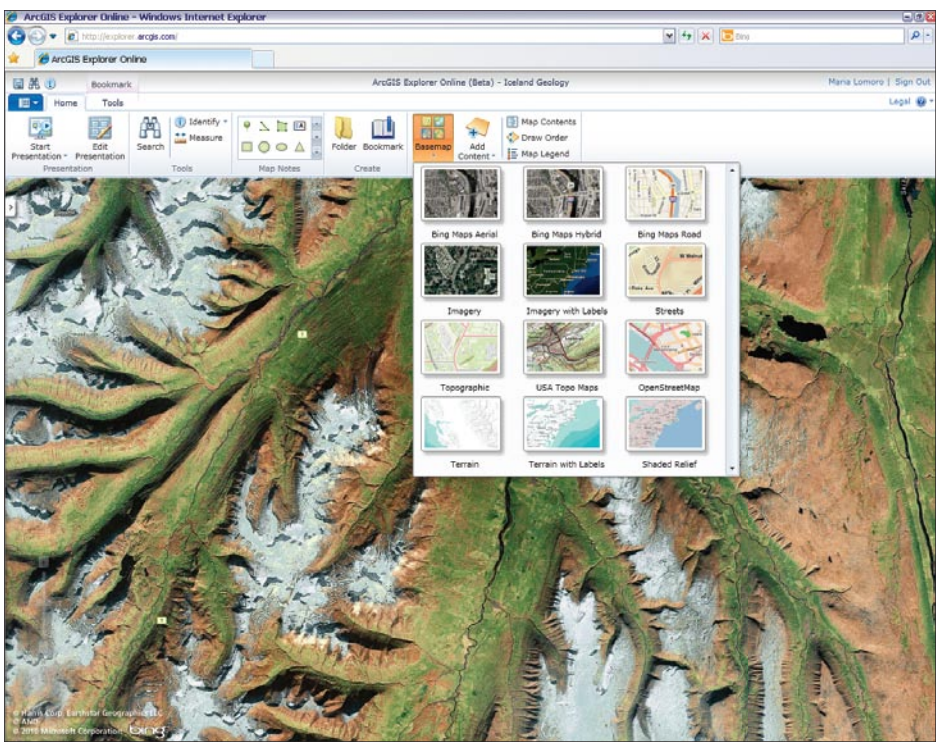
Mobile users will also be able to browse and consume ArcGIS online content. They can do this through the ArcGIS for iPhone application built with the ArcGIS API for iPhone. The application provides instant access to ArcGIS online maps and allows users to search content, select maps, and add them to their favorites. Using native iPhone gestures, users can browse ArcGIS online maps, perform queries, search, identify, and perform GIS analyses based on the information that was authored as part of the map. Field-workers can also use the iPhone application to collect and update features, then post their updates to an on-premises server. An application and API for Android are planned for a later release *(see related article about iPhone on page 13)*.

Access for Developers

In addition to the mobile software development kits (SDK), developers can use ArcGIS Web Mapping APIs for JavaScript, Flex, and Silverlight/WFP to leverage ArcGIS online content for quickly building Web mapping applications.

More Information

To learn more, visit www.esri.com/onlinegis. AN



ArcGIS Online basemaps can be accessed and added directly from within ArcGIS Explorer Online (Copyright © Harris Corp., Earthstar Geographics LLC, Copyright © AND, Copyright © 2010 Microsoft Corporation/Bing).

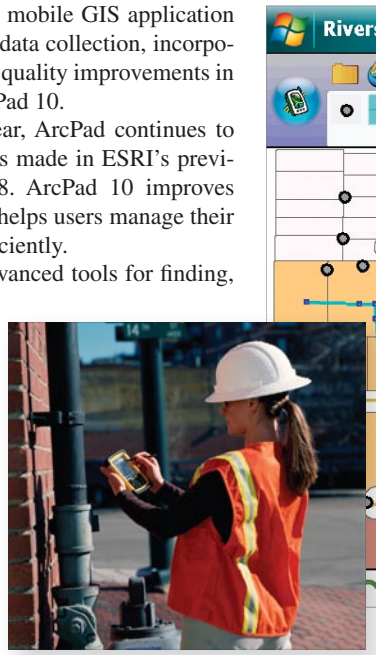
New Dynamic Toolbar and Support for ArcGIS Online Map Services

ArcPad 10—Easier Data Collection

ArcPad, a feature-rich mobile GIS application for field mapping and data collection, incorporates new features and quality improvements in the latest version, ArcPad 10.

Now in its tenth year, ArcPad continues to build on enhancements made in ESRI's previous release, ArcPad 8. ArcPad 10 improves field productivity and helps users manage their GIS projects more efficiently.

ArcPad includes advanced tools for finding, creating, and updating GIS information. ArcGIS Desktop provides checkout and check-in management of ArcPad data and maps, while the ArcGIS Server ArcPad extension can be used to synchronize edits back to the enterprise geodatabase directly from the field.



The new, dynamic QuickCapture toolbar in ArcPad 10 lets users quickly capture new features with a single tool selection.

ArcPad Studio, which was included in core ArcPad software at version 8, is the development framework to create projects tailored to an organization's specific workflows by using customized tools and add-ins.

New features include

• *Support for ArcGIS Online Map Services*—Access ArcGIS online basemaps, such as World Street Map, World Topographic Map, and World Imagery, as well as Bing Maps, that can be used in ArcPad projects.

• *Improved Performance*—Drawing speed has increased from the previous release. Improvements have also been made to ESRI StreetMap Premium to ensure the maximum amount of memory is available to both ArcPad and StreetMap Premium, ensuring better performance for users.

• *Dynamic QuickCapture Toolbar*—Quickly capture new features with a simple tap-on screen. The QuickCapture toolbar contains tools representing features in the user's current map that the user can choose to create new features. This toolbar requires no customization and can be used across all the user's ArcPad projects.

• *Enhanced ArcPad Data Manager for ArcGIS*—More opportunity exists to customize an ArcPad project with no coding or scripting needed. Data entry forms are generated for related tables, and users have greater control over using photos in ArcPad projects. Hyperlinked photos are now integrated in the checkout and check-in processes.

• *Better Camera and Photo Experience*—A new camera module that works for a greater number and range of hardware devices will benefit ArcPad 10 users. Across a variety of devices, the camera's user experience is the same. Along with improved photo management (within the ArcPad Data Manager), users will be able to incorporate photos into their ArcPad projects much easier and faster.

More Information

For more information on what's new in ArcPad or to evaluate ArcPad at no cost, visit **www.esri.com/arcpad**.

ESRI Launches "Ideas Portal"

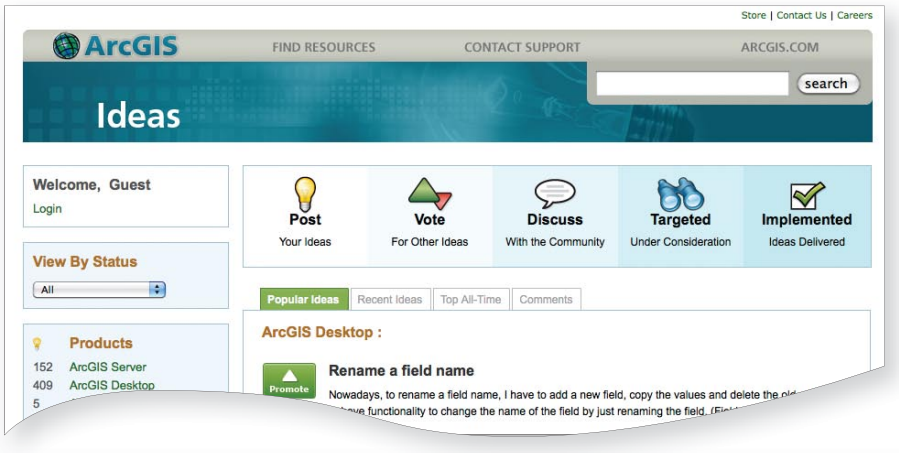
continued from cover

The Ideas Web site is designed to provide ESRI developers with direct customer input. Through voting and discussion among users, suggested product improvements can be refined and prioritized. The site also creates a stream of constant input and opportunity for ongoing dialog between users and ESRI.

The Ideas Web site provides constant feedback to users on submitted ideas. On the home page, users can see activity levels for the day and a running total of ideas and votes submitted. They can sort and scan recent ideas and the "Top All-Time" ideas submitted. Through discussion, they gain feedback from peers, as well as ESRI experts who are identified with the ESRI globe logo. Users can also see recent user ideas that are under consideration or have already been implemented.

The site is already proving itself to be an important and viable venue for users to learn from each other and for ESRI to learn from users. Since the April 2010 launch, enhancements have already been made to the site, such as Twitter feeds, to keep contributors connected. More improvements, perhaps based on user recommendations, are sure to follow.

Go to **www.ideas.arcgis.com** to submit ideas or participate in real-time discussion and voting. AN



Virtual City Template Enables 3D City Modeling

Highlights

- 3D city enables realistic what-if scenarios.
- Temporal analysis in 3D drives new insights.
- 3D city models combine basemaps, imagery, elevation, and object data.

With the release of ArcGIS 10 and significant capabilities added to the ArcGIS 3D Analyst extension, the system becomes a truly 3D GIS. Working with a 3D GIS gives developers and city planners the ability to

- Analyze data and impacts not possible in 2D.
- Create models that drive critical decisions.
- Present and share realistic 3D scenarios with stakeholders, decision makers, and the public.

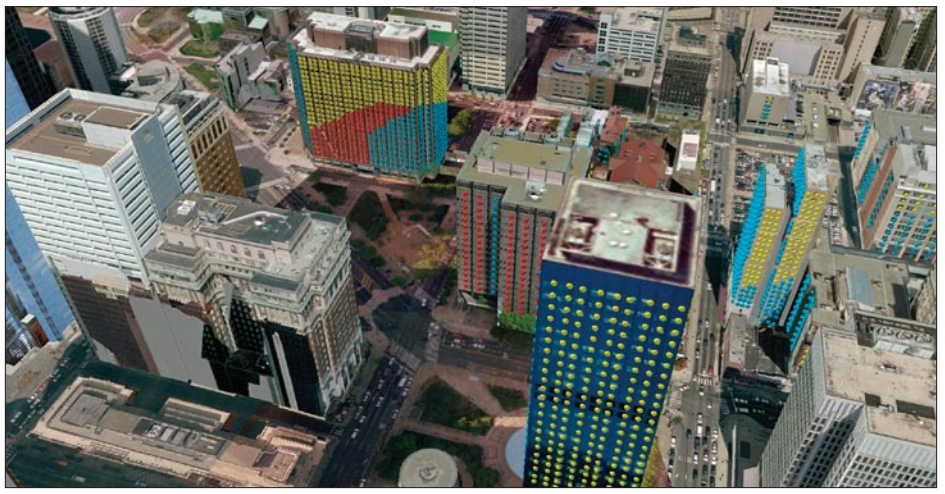
To speed the transition to planning cities and communities in 3D, the ArcGIS 3D Analyst extension now includes a Virtual City template.

A realistic 3D city model combines basemaps; imagery; elevation information; and objects, such as buildings and bridges. The virtual city model can also go belowground to include subsurface structures, such as basements, parking structures, subway systems, and utility infrastructure. Included template features of street furniture, vegetation, cars, and people seem to bring virtual cities to life.

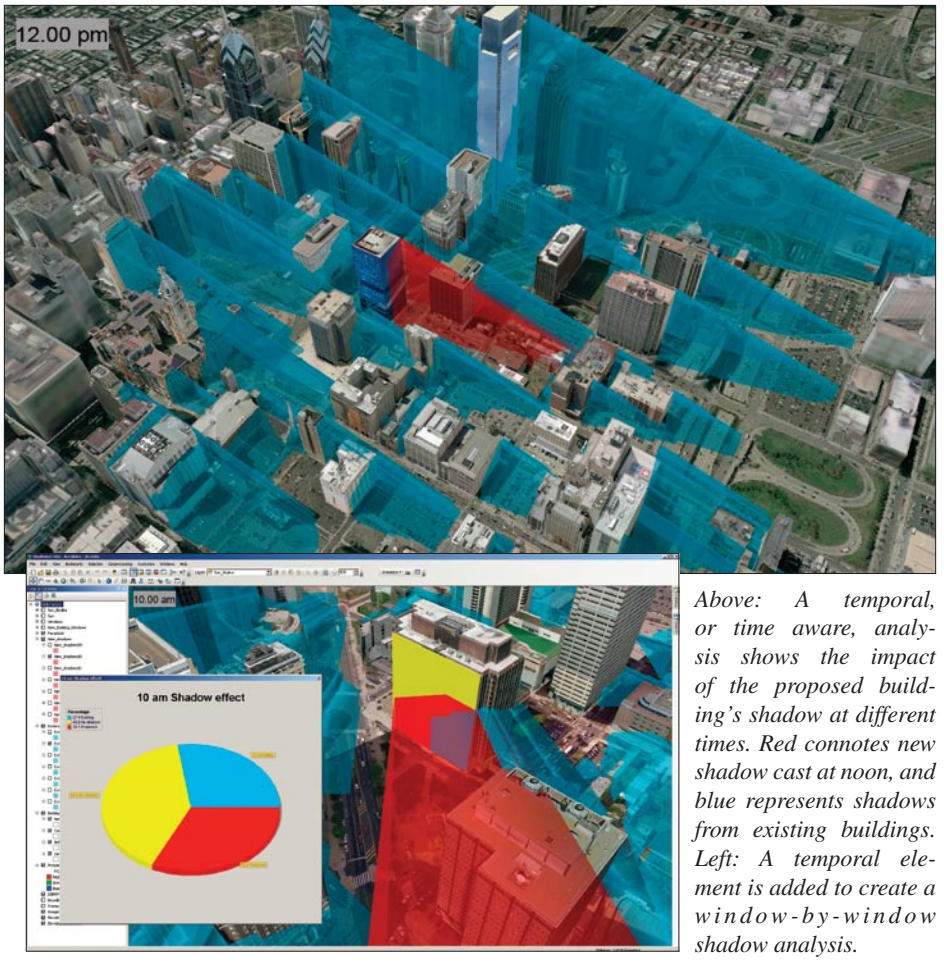
The Virtual City template uses Philadelphia, Pennsylvania, as a best practices model, walking users through step-by-step instructions on how to add elements to create a virtual city. There's also a tutorial on performing different types of 3D analysis.

Visualizing What-Ifs

The real power of ArcGIS 3D virtual cities comes in evaluating what-if scenarios. Concepts can be quickly visualized, evaluated, refined, or tossed aside depending on how a scenario plays out.



Planners can analyze where the proposed building is casting new shadows, window by window, by time of day. Here windows colored red denote new shadow, yellow represents no shadow at all, and blue shows overlapping or existing shadow cast by nearby structures.



Above: A temporal, or time aware, analysis shows the impact of the proposed building's shadow at different times. Red connotes new shadow cast at noon, and blue represents shadows from existing buildings. Left: A temporal element is added to create a window-by-window shadow analysis.

Tools built into the ArcGIS 3D Analyst extension help users assess the visual sensitivity of a proposed project or building, including changes to a skyline, effects of shadow on existing structures, and impacts on viewsheds and lines of sight for surrounding buildings.

Take, for example, the impact of a proposed building in Philadelphia. In this scenario, planners can visualize and analyze the volumetric shadow the new structure will create. In 2D, planners could only determine that a shadow would be cast and where it would fall. With 3D volumetric analysis, they can perform more complex analyses that take into account time of day and existing shadows.

Other analyses can show the number of hours a day that any given window on a neighboring building will be in shade because of the proposed new building.

Although 3D virtual city models create visually compelling images to help communicate a vision or development concept, the real value is the depth of analysis that simply isn't possible in 2D.

More Information

For more information on the ArcGIS 3D Analyst extension and Virtual City template, including video demonstrations, visit **www.esri.com/3D**.

Navigate Maps, Capture and Report Data, and Perform GIS Analysis

ArcGIS for iPhone

ESRI has expanded its mobile GIS platform to support the iPhone. ArcGIS for iPhone will include both a free downloadable application from Apple's App Store and an API for iPhone developers to build focused mapping solutions.

ArcGIS for iPhone leverages capabilities from ArcGIS Online to provide a seamless and easy user experience. Users can navigate maps and discover assets from Web services, as well as capture new data from the field and send information back to the server. This allows ArcGIS Server customers to leverage their GIS investment in the iPhone by using the device to access their own corporate data. ArcGIS for iPhone also promotes collaboration and information sharing between multiple users in the field. For example, field users can create and share status updates with others to communicate and work more efficiently.

ArcGIS Application for iPhone

ArcGIS for iPhone is a native iPhone application that serves as a mobile gateway into the ArcGIS system. This system will include access to services available through ArcGIS Online or on-site ArcGIS Server deployments hosting your corporate authoritative data. The ArcGIS for iPhone application consumes maps authored and hosted through ArcGIS Server. These maps contain not only data but also functionality (query, find, geoprocessing tasks, etc.).

The ArcGIS for iPhone application includes the following capabilities:

- Map navigation using native iPhone gestures
- Search, Identify, and Measure tools
- Collection/Update features and attributes (these will be available after initial release)
- GIS analysis through access to geoprocessing tasks (this will be available after initial release)
- GIS information sharing with other iPhone users

ArcGIS API for iPhone

The ArcGIS API for iPhone is built on Objective-C/Cocoa, the development framework for iPhone. It provides developers and ESRI partners with the opportunity to create their own custom, spatially enabled iPhone applications to address their end-user and business requirements. It also lets organizations extend their solution products to iPhone's large user base and brand their iPhone applications with a custom logo, look and feel, etc.

The API is designed to work with and use Web services available from ArcGIS Server and ArcGIS Online, and its architecture is similar to ESRI's ArcGIS Web Mapping APIs for JavaScript, Flex, and Silverlight. It will also follow the same ArcGIS API release and deployment pattern: easy online access/download with periodic updates.

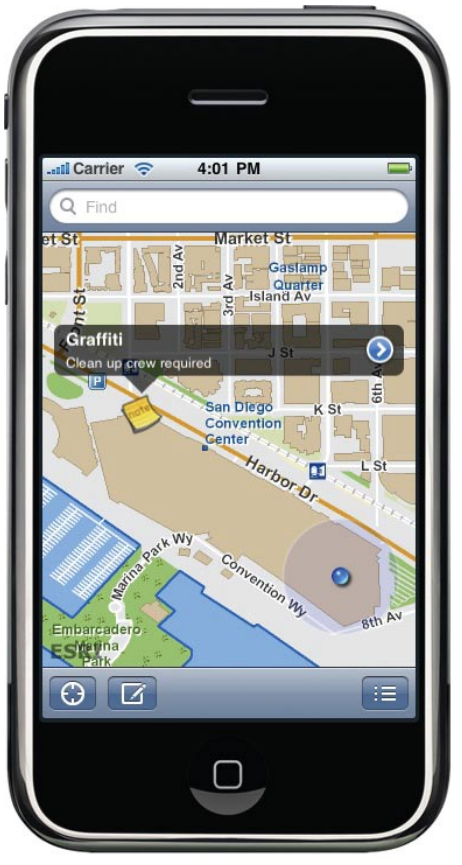
Developers and ESRI partners will use the API to create their own applications for both external and internal use. They can also easily build iPhone applications that work with their own published Web services.

The beta version of the API is available from the iPhone Resource Center and includes

- Conceptual and reference help guide
- Integrated templates and documentation
- Community resources, including code galleries, sample applications, forums, and blogs

More Information

To learn more, visit **www.esri.com/arcgisforiphone**.



Find and use ArcGIS services to access content directly from the iPhone.

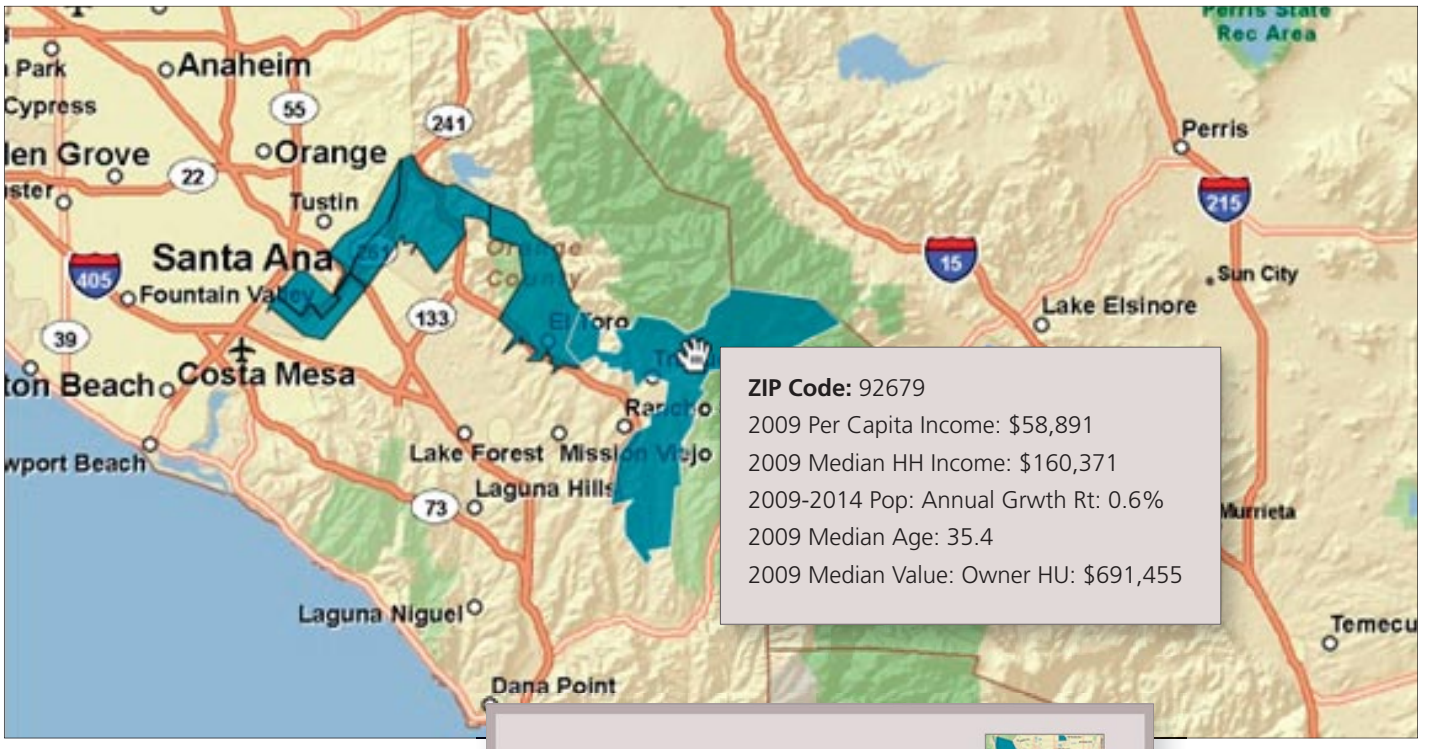
Smart Map Search—Decision Making Made Easy

Latest Release of ESRI Business Analyst Online

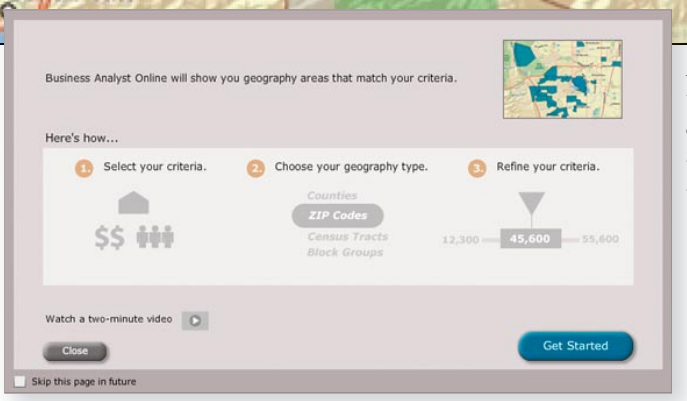
Highlights

- Pinpoint the best locations in an instant with Smart Map Search.
- New data provides insight into consumers' spending habits.
- Custom PDF maps allow users to easily share their findings.

All organizations struggle with decisions regarding location: Where do we open the next site? Where should we target the next campaign? Where are the vulnerable populations? As a decision-making application, ESRI Business Analyst Online (BAO) guides users to the best conclusions. Decisions can only be as good as the information that goes into them, and with the new Smart Map Search tool, a variety of new data, and custom PDF maps, BAO helps users be even more efficient and effective in their decision making.



Above: Smart Map Search displays the locations that meet all the selected criteria on one map.



Left: The three-step workflow guides users to quickly and easily identify the areas that meet all their top criteria.

Smart Map Search

Smart Map Search guides users through a three-step workflow to find the best areas based on their particular needs. Users simply select up to five of their most critical demographic, consumer, or business criteria, such as per capita income and median age. They then select the type of geography they would like Smart Map Search to highlight on the map (e.g., states, counties, ZIP Codes, or census tracts). Finally, users set the range of values they have in mind for each selected criterion (e.g., per capita income greater than $40,000 and median age greater than 35). Smart Map Search then displays all the areas on the map that meet all selected criteria. A table of the results, which can be exported to Excel, is also generated to show how each geographic area identified ranks for the individual criterion selected.

Smart Map Search makes the decision-making process much more efficient. No longer do users have to perform analysis for each criterion separately, then view the results one at a time on individual maps. With Smart Map Search, all the top criteria can be incorporated into one analysis, which can be displayed on one map, allowing users to quickly and easily identify their best locations. Using the new tool, franchisers can easily find the perfect site for their next locations, city governments can now efficiently identify their vulnerable populations, and marketing professionals can determine whom to target and how to target them for their campaigns.

New Data

The wealth of current and relevant U.S. data in BAO is vital for guiding users to the best conclusions. In addition to the 2010 and 2015 data updates, the data in BAO has been expanded to include thousands of new variables for the Market Potential, Consumer Spending, and Retail MarketPlace data categories.

The new Market Potential data measures the probable demand for a product or service. For each variable, users can map the expected number of consumers, the percentage of consumers, or an index that compares consumer behavior in an area to the national average. For instance, someone looking to open a baby boutique can find areas with a higher-than-average demand for baby furniture.

Consumer Spending averages and indexes are now included for several spending categories, making it possible to visually compare and rank geographic areas against one another. For example, a marketing firm trying to determine where to target a campaign for a baseball team might look at populations with higher-than-average spending on sporting events.

Measures of supply and demand and the supply/demand gap can now be mapped using the new Retail MarketPlace data. This information illustrates where consumers' needs are being met or where there might be new market opportunities. As an example, a city government may look at the leakage/surplus factor for restaurants in the area before deciding whether to allow a restaurant chain to open a restaurant in its community.

Custom PDF Maps

To make it even easier to share analysis results, BAO users can now create their own custom PDF maps. In addition to the standard site maps available, users can select any map they create in BAO, including color-coded maps for any of the thousands of data variables, Smart Map Search results, and Bing business search results, and simply click a button to create a custom PDF. The custom PDFs have the same look and feel as BAO reports, allowing them to be easily integrated with other BAO analyses.

BAO is available in the United States at different subscription levels, from one-time-only reports to premium subscription packages and specialized development services. Nonsubscribers can purchase a day pass for 24 hours to take advantage of more than 50 preformatted reports and maps.

More Information

For more information, visit **www.esri.com/bao**.

Easily Add Demographic Reports and Data to ArcGIS

With the ESRI Business Analyst Online Reports Add-In, ArcGIS Desktop users can now easily and quickly add demographic reports and data to their GIS projects. The downloadable add-in acts as a bridge, connecting ESRI's desktop products to demographic reports and data from ESRI Business Analyst Online (BAO).

GIS professionals are able to obtain and consume ESRI Updated Demographics from BAO to create presentation-quality reports in PDF and Excel formats for trade areas and sites they have defined in their desktop products. They are attaching this data as attributes of map layers for use in their everyday ArcGIS mapping workflows. In addition, BAO Reports Add-In users have access to the BAO Web application (**bao.esri.com**) where they can search for businesses, thematically map areas, create trade areas, compare sites, and create customized reports.

ArcGIS users can now seamlessly generate demographic reports for trade areas and sites they have defined in their desktop applications.

Business Analyst Desktop users are taking advantage of the add-in to expand the data available in their desktop environment for their areas of interest. They can also create reports for any trade area, ring, or drive time that they have created in Business Analyst Desktop, as well as access the BAO Web application.

Each year, professional demographers, statisticians, and economists at ESRI create updated current-year and five-year projections of demographic data. This updated data is released in BAO as soon as it's available. Therefore, add-in users will also have immediate access to these updates. This is a benefit for Business Analyst Desktop users, as they will no longer have to wait until the data is released in the desktop environment to start incorporating it into their analyses.

BAO Reports Add-In is downloadable from the Resource Center. ArcGIS Desktop users can get a free seven-day trial, after which they will need to purchase a subscription to continue accessing the reports and data. The add-in is free for Business Analyst Desktop and Business Analyst Server users.

More Information

For more information and to download the BAO Reports Add-In, visit **www.esri.com/baoaddin**.

Community Basemap Program

Users Collaborate to Build Free, High-Quality Basemap

Please see "Community Maps Program" poster on pages 24–25.

Highlights

- Users can contribute their high-quality data to online community maps.
- Free hosted map services can be accessed by anyone.
- Program includes tools and templates to help author and cache maps.
- Benefits include reduced costs and broad availability of maps.

A new and popular program is helping provide users worldwide with uniform and authoritative source basemaps that contain the level of detail and coverage needed for most GIS Web mapping projects. Most organizational GIS departments compile and maintain mapping data for their own jurisdiction, but adding this data to global basemaps that can be used by anyone creates many challenges that cannot be easily overcome by individual organizations. Through ESRI's Community Maps Program, ArcGIS user organizations and other geographic data providers worldwide now have a way to contribute their authoritative, up-to-date geographic data to a community map that is broadly available.

Hundreds of organizations around the world are providing their authoritative and up-to-date content for integration into online community maps, such as World Topographic Map, World Street Map, and World Imagery. These popular maps are hosted and maintained by ESRI and can be used with ESRI software (desktop, Web, mobile), as well as standard Internet browsers using ESRI's free and open Web mapping APIs. The intent of these community maps is to provide the best available data from multiple governmental and commercial data providers to the GIS user community and to continue to enhance these maps.

What type of data is needed? Detailed basemap data for cities or regions at 1:5,000 scale, for example, vegetation layers, building footprints, or parcel data; basemap data for counties or regions at 1:50,000 scale; detailed street map data at 1:50,000 scale or larger; and high-resolution imagery, for example, 1 meter or better—collected in the past three years. Any data that is provided through the program is checked to ensure that it improves on the existing data in the community map. And while ESRI will request permission to publish the data as part of the community map online, it does not take ownership of the data. Content that has been contributed and accepted is integrated into one of the existing community basemaps and published during the update cycle, typically twice a year.

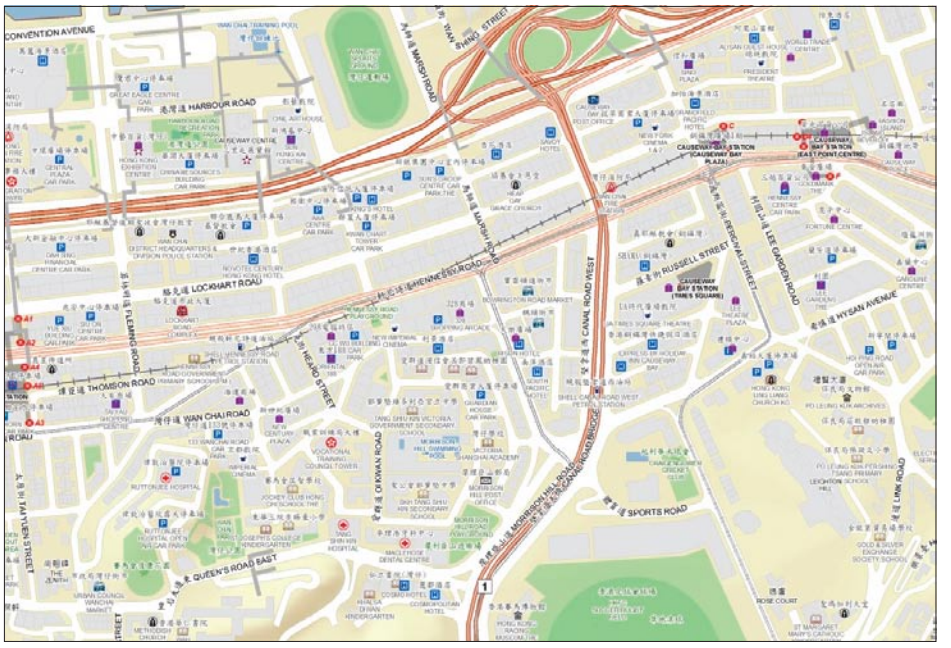
Organizations that are interested in receiving help to prepare their data for online publishing can perform two important steps: author the map, then cache the map. To help with authoring the map, ESRI has created a number of downloadable map templates that ensure uniform, high-quality cartography. These templates also include map documents, sample data, and symbol style files. Once the map has been authored, a map cache is generated using the Bing Maps/Google Maps tiling scheme, or ArcGIS Server can be used to create a map cache using the built-in tiling scheme. Alternatively, ESRI can create the map cache based on the authored map provided by the organization. The map cache is then blended into the community map and published.

Participation is simple. User organizations that are interested in contributing their data to the Community Maps Program just need to fill out a participation form and provide some information about their data, such as coverage area, resolution or scale, and a brief description. Once ESRI has received the data, it will review the data to confirm the suitability and notify the user organization.

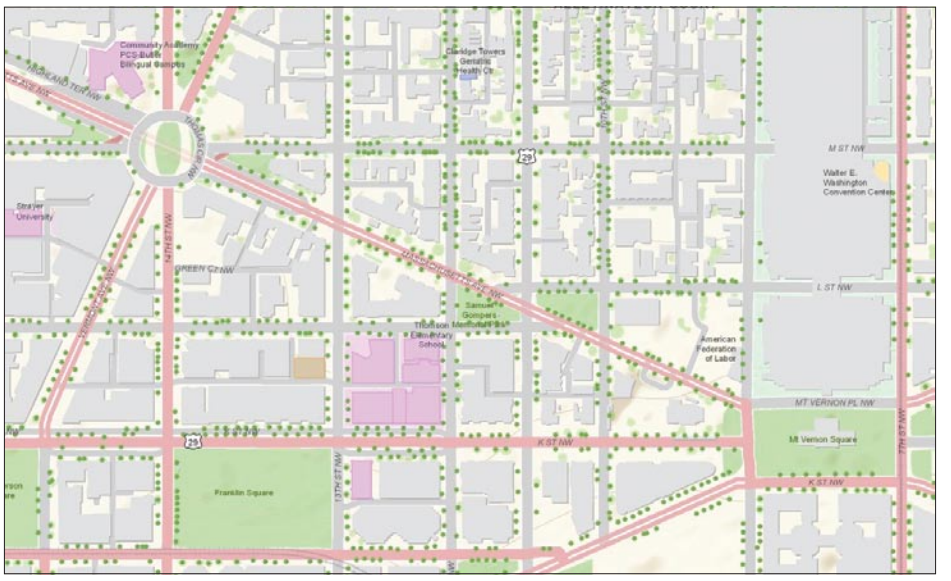
Contributing geographic data through the Community Maps Program benefits user organizations by eliminating costs associated with distributing data and making it widely available. It also decreases the costs associated with setting up and maintaining data. More importantly, it provides a mechanism for user organizations to make their high-quality, authoritative content available globally in an easy-to-access manner.

More Information

To get more detail about the program, fill out the participation form, and download map templates, visit **www.esri.com/communitymaps**.



Detailed street data for Hong Kong.



District of Columbia. Data provided by District of Columbia Geographic Information System (DCGIS).

GIS Applied in E-engagement

A Hong Kong Experience of Citizen Engagement in Public Affairs

Highlights

- Web 2.0 with GIS encourages public sharing of opinions through an online platform.
- A virtual district council office is powered by ArcGIS Server 9.2 for the Java Platform and SQL Server.
- The Web site dynamically generates maps with different layers and symbology at different scales.

Web 2.0 has caused a paradigm shift in the way we communicate and share information on the Internet with the proliferation of Web applications, such as social networking sites, blogs, chat rooms, and video-sharing sites. Governments and many public service organizations have captured the essence of Web 2.0 and integrated it into their current infrastructures, which are enhanced to offer more effective and timely services to their citizens. The Washington State Department of Transportation (United States) has pioneered the use of Twitter to deliver traffic information and updates. Its use of social networking technologies has facilitated timely dissemination of useful information across different communities. Similarly, Chinese Premier Wen Jiabao also tapped the intelligence of Web 2.0 technology to exchange dialogs with Internet users via two national news portals, **www.gov.cn** of the central government and **www.xinhuanet.com** of the Xinhua News Agency, in February of this year.

GIS Combined with Web 2.0 Engages Hong Kong Citizens in Community Affairs

Engaging community involvement is at the heart of the Web 2.0 concept. Combined with GIS, Web 2.0 technologies present users with added convenience in the global village. Dr. Winnie Tang, CEO of ESRI China (Hong Kong) Limited, as well as a district councillor of the Hong Kong Special Administrative Region government, made the first attempt in Hong Kong to use "crowdsourcing" via her personal Web site **www.winnietang.hk**. The built-in functions of the site help raise public awareness of information and communication technology (ICT)-related community affairs and encourage public sharing of opinions through the online platform.

Hong Kong, also known as the "Pearl of the Orient," is located at the southern tip of China.

With a land mass of only 1,104 square kilometers (426 square miles) and a population of seven million people, it is one of the most densely populated areas in the world. The city is geographically divided into 18 districts served by individual district councils responsible for coordinating administrative affairs and acting as bridges of communication between the local population and the government. In her role as district councillor for Kwai Tsing District, Tang would very much like to engage the general public to contribute their views and suggestions on district affairs and cultivate a strong sense of a close-knit community. Having a population of more than half a million in her district, Tang recognized the need for improving efficiency and transparency in the process of governance.

"With over 4.8 million Internet users in Hong Kong," Tang says, "the 70 percent penetration rate ranks us second in household broadband penetration in Asia. Sitting on the Digital 21 Strategy Advisory Committee, I have advised on and advocated Gov 2.0 to our government when Web 2.0 clearly has set the trend and expectation of people in this digital era. I believe Gov 2.0 would set some successful examples."

Hong Kong, with a land area of only 1,104 square kilometers, has a population of seven million people.

Kwai Tsing District Map

In an effort to better serve the growing community with her experience in GIS technology, Tang developed a virtual district council office on the Internet, coined Kwai Tsing District Map (**www.districtmap.hk/kwaitsing**). Powered by ArcGIS Server 9.2 for the Java Platform and SQL Server, Kwai Tsing District Map not only allows the public to access geographic information of the district but also provides an open platform for posting comments, suggestions, or complaints. ArcGIS Server 9.2 enables the Web site to dynamically generate maps with different layers and symbology at different scales, allowing Internet users to easily indicate the exact location tied to an issue or concern. The reported issues' spatial information is stored in SQL Server, using ArcSDE technology, for further analysis.

ArcGIS allows different layers of information, such as buildings, transportation means, and recreational facilities, to be presented on the map. An Internet user may flag the exact locations and areas of the corresponding issues being reported, which are then verified and validated by the Web site administrator to determine follow-up actions. Issues addressed range from public facilities to community safety, transportation services, environmental issues, and recreational facilities. If the concerns prove to be valid, they will be forwarded to the relevant government departments. Blue flags on the map indicate locations of newly reported issues, whereas red flags indicate investigations in progress.

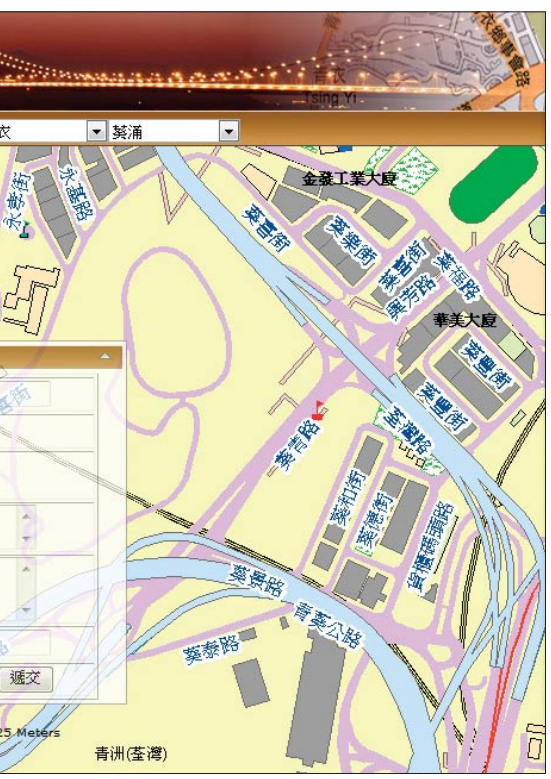
This new way of information sharing has greatly sped up follow-up work by the office of the district councillor with timely and accurate information. Progress of investigation is also posted for public reference on a regular basis. Through the interactive map, the public can check on the status and updates of reported incidents around their community. "I am certainly pleased with this current setup and with favorable feedback from the community," says Tang. "I've been asked to share this experience with other district councillors on this new alternative communication channel."

Compared to the traditional district council offices, which operate during specified office hours, the Web-based, GIS-enabled Kwai Tsing District Map escalates e-engagement, or public participation in community affairs, and collaboration within the district. Kwai Tsing District Map provides an effective and efficient system by which local residents can voice their needs, opinions, and concerns whenever Internet access is available.

The current trend of Web 2.0 has greatly reshaped our expectations as most of us enjoy the social value to individuals and the business value for the private sector. Gov 2.0 is beginning to set a new trend for public figures and politicians to stay connected with the citizens and their supporters. With security, scalability, and interoperability being addressed, crowdsourcing—capitalized to engage the public in community affairs—can bring about broader value and benefits to both governments and their citizens.

More Information

For more information, contact Virginia Wan, corporate development manager, Global Business Department, ESRI China (Hong Kong) Limited (tel.: 852-2730-6883, e-mail: vwan@esrichina-hk.com).



Users of the Kwai Tsing District Map can point to the relevant locations on the map and provide views and suggestions on community affairs.

Namibia Launches GIS-Based Land Evaluation Project

Highlights

- ArcObjects libraries facilitated the development of an application in Visual Basic .NET.
- The application was easily customized to local contexts.
- Complete training on GIS was provided by the local ESRI distributor.

The Republic of Namibia, located in southern Africa on the Atlantic Ocean, gained its independence from South Africa in 1990 and has since benefited from a stable multiparty democracy. The country is home to the Directorate of Valuation and Estate Management (DVEM), which, under the supervision of the Namibian Ministry of Lands and Resettlement (MLR), was faced with a critical problem in the consistency of the determination of its land values due to the use of a semiautomated approach applied to the assessment process.

This approach resulted in a slow, cumbersome, tedious, and resource-consumptive process, prone to mistakes and irregularities and therefore undermining the ability to defend the results obtained in a valuation court. The principal desire of DVEM was thus to convert to an automatic mode of value assessment and achieve accuracy and consistency in the determination of agricultural land values for land tax purposes. At the heart of the discussion was the need for an application that would provide the ability to value agricultural land for land tax purposes and generate valuation rolls in accordance with the local legal framework. The solution had to be adaptable to the particular local context.

The search for an appropriate software application was not the only preoccupation of DVEM; it also needed equipment updates that would support the new solution, as well as training on how to actually make it work. The local teams needed to be reinforced. MLR required a hands-on approach from an experienced consultancy firm—one that could not only provide it with the adequate solution but also give MLR all the tools it needed to make the solution work and be independent in the management of the agricultural land taxation process and national land heritage.

An international tender was launched to find the business partner that had access to the right solution, allowing the calculation and visualization of land values through a GIS. The application had to be, above all, transparent, homogeneous, rational, and simple. The system needed to permit data exchanges between the land valuation system, the computerized deeds registration system, and the cadastral system.

After careful deliberation, MLR chose IGN France International, because it believed the company had the answer to its problem in the IGN-developed computer-assisted mass appraisal (CAMA) solution, which corresponded to MLR's needs. ArcGIS Desktop software-based CAMA is designed to bring transparency to land taxation calculations and is easily customizable to local contexts. ArcGIS was chosen because it stood out as the software that IGN was completely confident would fit its client's specific needs and was perfectly suited to the project's goals.

ESRI also helped IGN respond to the client's needs by providing ArcObjects libraries that facilitated the development of an application in Visual Basic .NET. This application was used during the automation process and focused on the transparency of land valuation calculations.

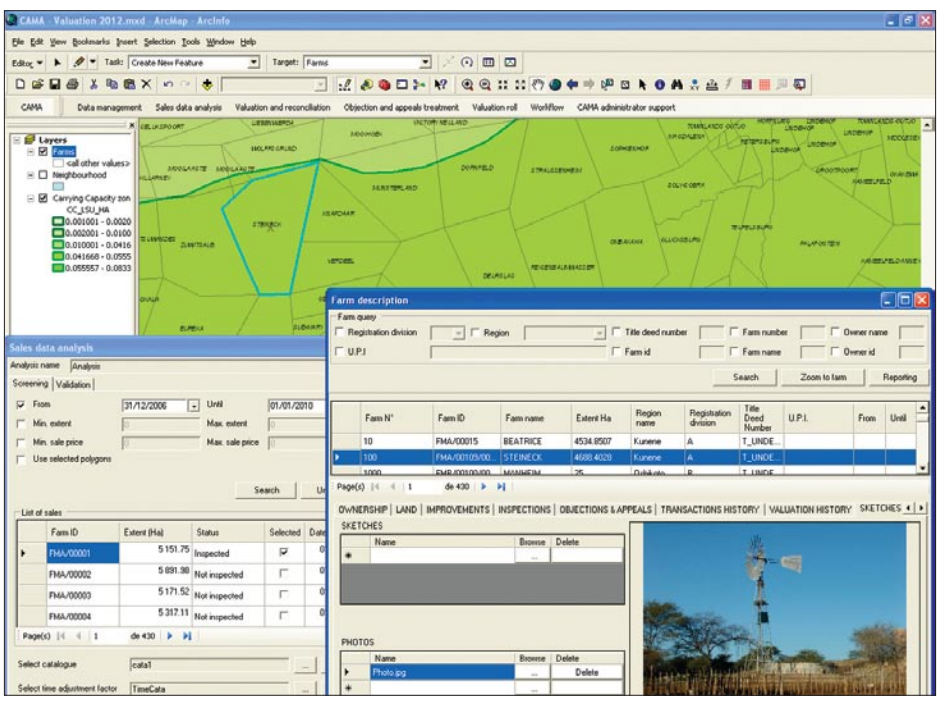
The IGN-developed solution is divided into seven distinct GIS modules (Data management, Sales data analysis, Valuation and reconciliation, Objection and appeals treatment, Valuation roll, Workflow, and CAMA administrator support). These modules are concentrated on one toolbar, while a second toolbar is used to manage the connection to the application and to the Oracle database that contains the land values.

To ensure success, the Namibian project was begun near the end of 2008 with full and complete training on the GIS software provided by the local company, Geocarta. Once this general training was completed, IGN held three days of further on-site GIS training specifically designed to boost the local teams' capacities in the field of land management. Once the training was finished and the CAMA system installed, technical assistance was also provided to help smooth any bumps in the road that MLR might encounter. Other training sessions that were held focused primarily on land assessment in theory and, more specifically, on problem-solving tools developed specially for ArcGIS.

The Namibian project was ultimately a success because of the level of cooperation present throughout its duration.

More Information

For more information, contact Kelsy Meyer, marketing and communication assistant, IGN France International (e-mail: kmeyer@ignfi.fr, tel.: 01-42-34-56-49, Web: **www.ignfi.fr**).



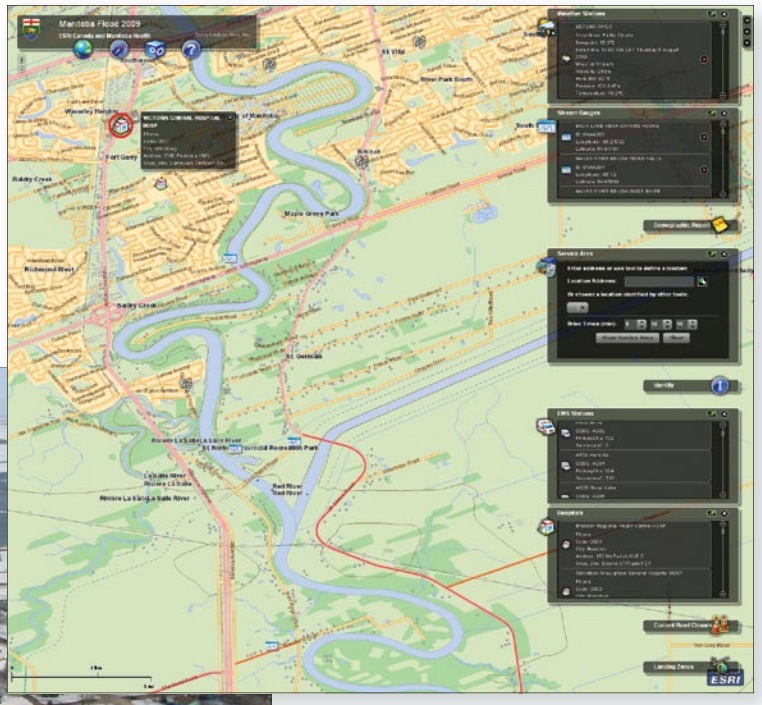
The CAMA solution is divided into seven GIS modules (Data Management, Sales data analysis, Valuation and reconciliation, Objection and appeals treatment, Valuation roll, Workflow, and CAMA administrator support).

Manitoba Responds to Red River Flood with Common Operating Picture

ArcGIS Online Services Combine Basemaps, Imagery, Real-Time Data

Highlights

- The COP, based on ArcGIS online services, helped achieve an accurate visual of the unfolding natural disaster.
- The application was intuitive, aligning all organizational goals into a single platform.
- The COP was used to quickly identify residents to prioritize for evacuation.



Above: The Red River shown with several tools, including a service area locator, stream gauge updater, and links to live weather stations. Left: Aerial view of southern Manitoba.

With crests rising to more than 20 feet, the spring 2009 Red River flood surpassed the floods of 1950 and 1979 to become Manitoba, Canada's second highest since record keeping began in the 1800s. The situation was exacerbated by seasonal snowmelt, powerful ice jams, flash flooding across the province, and heavy rainfall. In response, Manitoba Health's Office of Disaster Management (ODM) funded the development of a common operating picture (COP)—an effective visualization tool that enabled the province to achieve real-time situational awareness, act quickly, and communicate its response plan to key stakeholders.

During the flood, ODM was tasked with ensuring the continuity of health services for community residents and that emergency operations remained uninterrupted. To meet these challenges, ODM needed a tool that would allow it to analyze the current situation, predict future outcomes, and make critical decisions—such as deciding which roads to open and close, which residences and buildings to prioritize for evacuation, and which routes were most effective for emergency vehicles to travel. It also needed to communicate these decisions quickly and effectively to senior decision makers to enable them to take action and mitigate risk to residents. With few resources available to implement a complex system, the situational awareness tool would have to be simple, intuitive, and able to guide users through the four stages of emergency management—mitigation, preparedness, response, and recovery.

ODM sought a partner to help develop the tool and selected the expertise of ESRI Canada Limited, ESRI's distributor in Canada. Together, they built the common operating picture with ArcGIS online services to combine basemaps, imagery, and real-time data into a map window, so that ODM could achieve an accurate visual of this unfolding natural disaster. The data sources included satellite imagery, data from CanVec (a cartographic product by Natural Resources Canada), and geospatial data from the Manitoba Land Initiative. Environment Canada's Web site was monitored on a regular basis for the latest weather conditions and forecasts to continuously gauge stream flows. Real-time weather data and topographic information were also combined to predict future outcomes and trigger evacuation events.

The team then developed and displayed a multitude of ArcGIS online services layers of the COP to represent personal care homes, emergency medical services (EMS) facilities, helicopter landing zones, hospitals, ring dikes, ice jams, broken bridges, and ambulances. Using intuitive symbology, these layers were easily interpreted and allowed users to zero in on problem areas for effective analysis. The team also extracted road segment data from the Medical Transportation Coordination Centre and incorporated it into the COP to communicate road closures. Intuitive symbology and real-time data empowered ODM to provide effective support to operations on the ground and quickly solve challenges, such as ice jams and road closures.

"Our group had limited knowledge of GIS, and there was no time to secure additional resources," says Gerry Delorme, director, ODM. "However, the common operating picture was so intuitive and easy to use that it allowed us to align all our goals into a single platform and be fully operational quicker than I ever imagined possible."

In around-the-clock operations, ODM referred to the COP to conduct thorough data analysis, make 20 to 30 critical decisions each day, and address the four stages of emergency management. During the mitigation phase, the tool provided an answer to the question, Where has there been a flood like this before? Using the Live Maps layer, ODM was able to sift through data from similar floods in 1950, 1979, and 1997 to uncover recurring patterns.

During the preparedness phase, there was concern that the Red River Floodway would not divert enough water and that ice jams would block the floodway. If this had happened, ODM would have needed to quickly identify residents to prioritize for evacuation. To take a proactive approach, it leveraged the COP's ArcGIS online services to generate demographic reports that revealed information such as the percentage of senior citizens in a specific area.

The COP addressed the response phase of emergency management by enabling ODM to monitor environmental factors affecting the flood, such as heavy rainfall. Links to weather stations throughout the province provided a constant update on the latest weather conditions and forecasts. The COP also enabled ODM to investigate stream gauges in individual communities to determine how specific areas would be impacted by the flood during peak times and coordinate response activities. Finally, during the recovery phase, ODM was able to look back at a historical record of flood activity and analyze RadarSAT data from earth observation satellites to view polygons that marked the flooded areas.

In addition to serving as a powerful decision-making and problem-solving tool, the COP was used during ministerial briefs with the deputy minister to explain and justify emergency management planning. The ability to communicate effectively meant that operational response times were greatly reduced, and ODM could focus on taking action to ensure the safety of Manitoba residents. This fusion of critical information allowed collaborative planning during one of the most severe natural disasters in Manitoba's history.

"The COP was the first thing we looked at every morning," explains Delorme. "The ability to assess what had happened since we last looked at the application and what was currently happening helped us form quick and confident predictions about where things were headed."

Looking forward, ODM will continue to integrate more data sources into the COP, including a recently purchased public alert communication system. ODM also plans to use the tool to monitor ambulances and hospital bed counts in cases of emergency.

More Information

For more information, contact Gerry Delorme, director, ODM (e-mail: gerry.delorme@gov.mb.ca).

Rapid GIS Deployment

New Mexico Gas Company Starts from Scratch

Highlights

- GIS-based maps enable utility staff to see the entire state at once.
- With geographically enabled data, the utility can quickly create work orders.
- With GIS, operations staff can see how its data relates to the company's transmission lines.

When New Mexico public utility company PNM sold its gas assets this year to Continental Energy Systems, the newly formed New Mexico Gas Company faced a significant hurdle: maintain existing service levels for its 500,000 customers while building an operations and engineering platform from scratch.

The utility needed its distribution data—information related to pipes, valves, meters, work orders, and customers—in one place where it could be stored, managed, and accessed by everyone on staff. A legacy GIS and various computer-aided drafting (CAD) and paper mapping systems had to be converted to one GIS. In addition, the company needed a core technology solution to facilitate engineering work and field access to data.

New Mexico Gas Company selected GIS technology from ESRI so that utility data could be used, shared, and edited for operations, maintenance, and engineering functions. Within three months, the utility had consolidated disparate data into one place and deployed GIS tools throughout the company. The GIS launch was speedy, budget constraints were met, and employees were trained in time to use the new technology.

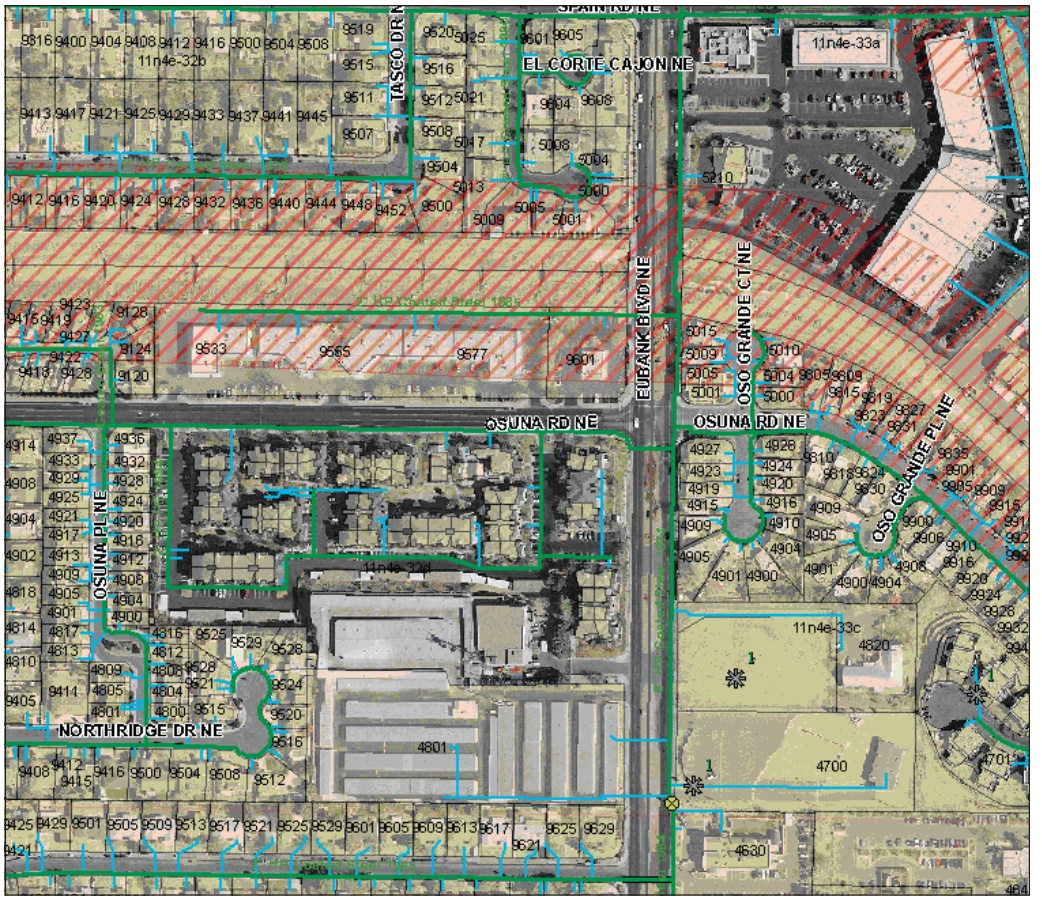
"With GIS-based maps, we can see our entire state at once," says Curtis Winner, New Mexico Gas Company manager of land services. "I turn on the aerial imagery, and all of a sudden, I'm in Carlsbad, a five-hour drive. It really helps staff evaluate projects and saves on travel. Using GIS tools, such as bookmarks, we can jump all over the state without leaving the office."

The first step was to migrate existing applications to the GIS. The second step was to focus on the data stored in its homegrown record-keeping database for gas distribution, AMIGO. Information such as construction orders, asset data, leak reports, and repairs was pulled into the GIS by linking each piece to relevant points, lines, and polygons.

"We looked at what we had, and we knew we could tie in the AMIGO data with attributes in GIS to improve data accuracy in the database," Winner says.

To enhance the geodatabase, New Mexico Gas Company brought in aerial photography, county street data, parcel data, and available environmental data. The utility built specific task assistant procedures for both mapping and design of distribution pipelines and other assets.

With GIS-based utility maps, the operations staff is able to view county assessor and parcel data, along with topography, aerial images, and customer information, and see how that data relates to the company's transmission lines.



Task assistant tools allow New Mexico Gas Company staff to map designs for new construction and maintenance.

Field crews use GPS data to track facilities and update asset information. Because all the data is geospatially enabled, the utility can quickly create work orders for new construction and maintenance. Using GIS-based spatial analysis, the company performs least-cost analysis to site potential pipeline corridors. These routes can also be imported into the utility's hydraulic modeling software, ensuring accurate and timely model runs.

"Potential routes can be identified quickly, and we know the exact length for generating accurate cost estimates," Winner says. "We have taken a lot of the what-ifs out of the equation and can quantify our recommendations."

New Mexico Gas Company also uses GIS for environmental planning and permitting. The staff can view assets in relation to groundwater discharge zones and other environmentally sensitive areas, such as cultural sites and threatened and endangered species habitats. "The GIS system is running smoothly and being used company-wide," says Deborah McDonald, GIS administrator, New Mexico Gas Company.

More Information

For more information, contact Curtis Winner, manager, Land Services (tel.: 505-697-3639, e-mail: curtis.winner@nmgco.com).

Colombian Coffee Growers Use GIS to Brew Better Crops

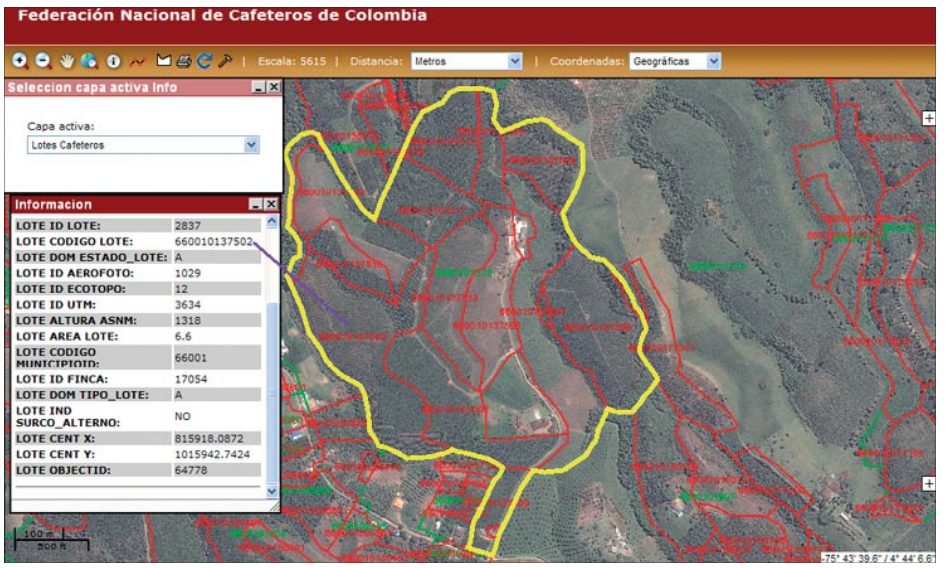
Highlights

- Crop forecasting is carried out using ArcGIS analytic tools.
- Field service teams can upload data using the ArcGIS Mobile application.
- ArcGIS Server Image extension manages and publishes large volumes of geospatial imagery.

The coffee harvest is a historic component of the Colombian economy that can be traced back more than 300 years to the arrival of Jesuit priests from Venezuela, who began its cultivation. Today, the harvest represents about 10 percent of Colombia's total exports, and the industry employs more than 500,000 people in its coffee production operations. Most farms are small producers, with less than five hectares of coffee trees under cultivation.

In 1927, the Federación Nacional de Cafeteros de Colombia (FNC) was formed to represent the interests of the small coffee growers in the country. However, because of the large number of coffee growers, FNC faced a problem in centralizing the data collected from these farms. This impacted the federation's ability to negotiate better coffee prices based on coffee yield predictions across the entire country.

To improve its forecasting capabilities, FNC conducted an extensive survey of coffee production in Colombia nearly 20 years ago. The resultant Encuesta Nacional Cafetera (ENC) is the standard on which the regularly updated Sistema de Información Cafetera (SICA) is still referenced today. SICA is a system that provides the fundamental data infrastructure and strategic information used in the design, formulation, and tracking of Colombian coffee farming. The current version of SICA has been based on ArcGIS Server software since 2008 and is used for online information analysis, planning, sustainability policies, decision making, competitive analyses, environmental monitoring, crop forecasting, farm registration, and quality assurance. FNC had been using ArcGIS Desktop software for many years and naturally selected ArcGIS Server to upgrade SICA.



An individual parcel is selected within FNC's coffee crop sample area. Displayed data includes its latitude-longitude location and various identification codes.

The model ENC survey included a collection of aerial photographs that were orthorectified using ESRI's GIS software for inclusion in the original SICA geographic database. Today, the ArcGIS Server Image extension is used to manage and publish the large volumes of geospatial imagery that it collects from remote-sensing sources, such as orthophoto mosaics, satellite imagery, and aerial photography, for inclusion in SICA. The technical staff at FNC uses ENVI image processing software for multitemporal analysis and research on the collected imagery.

Crop forecasting is carried out using ArcGIS analytic tools on SICA data, which includes georeferenced samples collected by FNC field service teams within specified cultivated areas. To conduct the biannual sampling process, more than 1,000 field technicians harvest both ripe and unripe beans from coffee trees in each specified area. The beans are counted and weighed, then statistical processes are applied to extrapolate crop estimates for the succeeding six-month period. After completing their samplings, the FNC field service teams upload the crop yield data into the SICA geodatabase through either an Internet-based server application or a custom-built ArcGIS Mobile application. Because the FNC GIS is Web based, near real-time updating of the SICA database can now be performed.

The collected data is also analyzed by Cenicafé, FNC's research center, and the federation provides reports to its members regarding its critical findings. Current research topics include erosion management; soil remediation; and the multiple ways in which the coffee harvest is affected by changing environmental factors, such as variations in rainfall and temperatures.

FNC also monitors the socioeconomic issues that affect the coffee farmer. SICA maintains information regarding the educational opportunities for FNC members, the condition of the infrastructure in their towns and villages, and the health care facilities available to them.

GIS has proved to be an invaluable resource for the Federación Nacional de Cafeteros de Colombia and its constituent farmers. The technology not only provides a wide range of services related to coffee crop forecasting and associated research but also allows the federation to track the quality of life of its members. This provides a compelling example of the power of GIS and how it can help improve the socioeconomic conditions of people throughout the world.

More Information

For more information, contact Juan Pablo Becerra, program coordinator, Federación Nacional de Cafeteros de Colombia (e-mail: juan.becerra@cafedecolombia.com), or Carlos Cardona, Procálculo Prosis S.A. (e-mail: ccardona@prosis.com).

Nike Learns Who Its Customers Are

Thinking Strategically with GIS

Highlights

- Nike uses ESRI Business Analyst to help solve complex business problems.
- Nike's GIS solution includes a secure Internet application, allowing information and tools to be accessible throughout the company and its affiliates.
- GIS helps the company distribute product in relation to where customers are located.

Located in Beaverton, Oregon, a Portland suburb, Nike has redefined the shoe market. The company's success and worldwide reach are due in part to its innovative people and their use of forward-thinking technology to apply resources wisely across the organization.

One of those technologies is GIS. Information like customer and store locations can be placed on a street map, along with marketing information, including profiles of areas down to a census block group or customer address. This makes GIS useful in obvious applications like site selection and property management but also an important technology for the entire retail process, from planning and building to buying and shipping products.

Seeing Is Everything

Nike first licensed GIS from ESRI in 1993 for use in the company's Sales department to help staff management understand where Nike product was being distributed. Being able to visualize this on a map gave new insights into where to distribute product based on demographic information; sales history; and other factors, such as where schools with competitive sports teams are located. Seeing all this information combined visually on a map made the decision-making process more fact based and easier to communicate throughout the company and to partners.

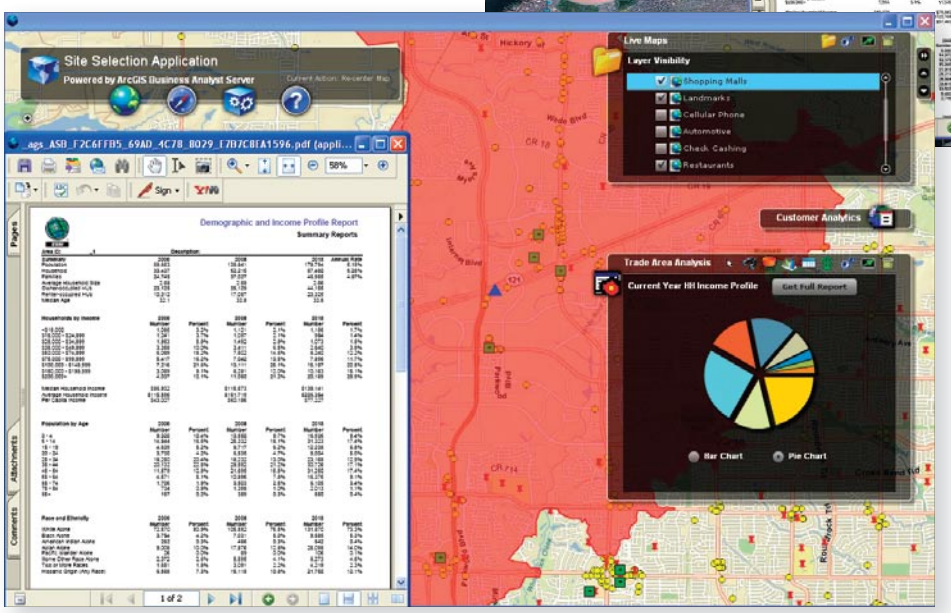
Beginning in 2003, the Sustainable Business & Innovation department also began using GIS technology to map shoe collection locations for Nike's Reuse-a-Shoe program. The technology allowed the company to locate shoe repositories for donations and find communities in need of resurfaced sports courts. Since the beginning of the Reuse-a-Shoe program, the company has recycled more than 20 million pairs of athletic shoes and contributed to more than 250 sports surfaces. Nike has continued to expand the use of the technology to retail and operational, or commerce, areas of the organization.

Maps make the decision-making process more fact based and easier to communicate.

Understanding the Marketplace, One Customer at a Time

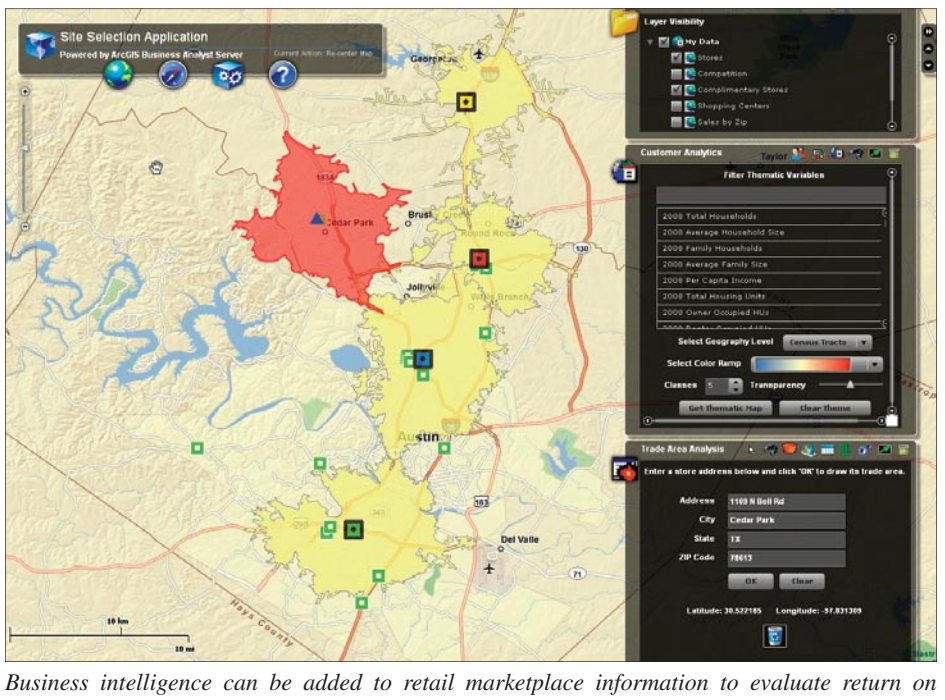
Today, Nike uses ESRI Business Analyst software as both a desktop and server-based GIS that can be used over the Internet as a secure application. GIS is used to help solve complex business problems across its organization.

Seeing the existing suite of markets and activities in stores improves analysis, such as site selection and market optimization.



Viewing information on a map gives sales staff new insights into where to distribute products.

Business Analyst provides access to data including geographic, demographic, and marketplace information that Nike combines with its own point-of-sale and "door," or retail store, location data. Using Business Analyst, Nike's regional teams map, analyze, and share key planning information with other departments. GIS provides added business intelligence to retail marketplace strategy and the evaluation of marketplace return on investment.



Business intelligence can be added to retail marketplace information to evaluate return on investment.

Repeatable Workflows

The process Nike uses to apply GIS is replicable for any location, since the data and tools used are standardized. Using Business Analyst, trade area rings of appropriate size around doors are created and analyzed using demographic and other data provided through Business Analyst, along with data points created from internal information, like customer data. Various reports, such as demographic, income, and retail expenditure for each area of interest, can be easily created and consolidated into one comprehensive report.

The GIS solution includes a secure Internet application, information, and tools that are accessible throughout the company and by Nike affiliates, such as Cole Haan, Converse, Hurley, and Umbro. Business Analyst users create custom reports via pull-down menus that provide information, such as retail expenditure, market research information for sports participation, and much more. While affiliates cannot change the base data, they can incorporate their business information, such as their own store locations, and benefit from using the Nike information for their own marketing analyses.

Significant Returns with GIS

GIS reduces the time and effort spent on researching information and creating reports. Analyzing the data provides new insights and improves the quality and scope of business data. Moving to server-based GIS ensures that data is shared by the company and the same data is used by everyone. Having the information Nike needs in a central place means reports can be run quickly. By seeing the existing suite of markets and activities in stores, analyses, such as site selection and market optimization, are improved.

Unlimited access to the data and maps allows global employees to see the same information simultaneously, and it can be shared more broadly across multiple groups.

The Road Ahead

GIS data and software have provided an effective solution for Nike. Communication has been enhanced, and the ease of use has made sharing information effective. With GIS, Nike has the technology to keep its finger on the pulse of everyday business operations.

More Information

For more information on how businesses use GIS, visit www.esri.com/business.

Digital Flood Insurance Rate Maps Are GIS Ready

State of Hawaii Deploys Web-Based Flood Hazard Assessment Tool

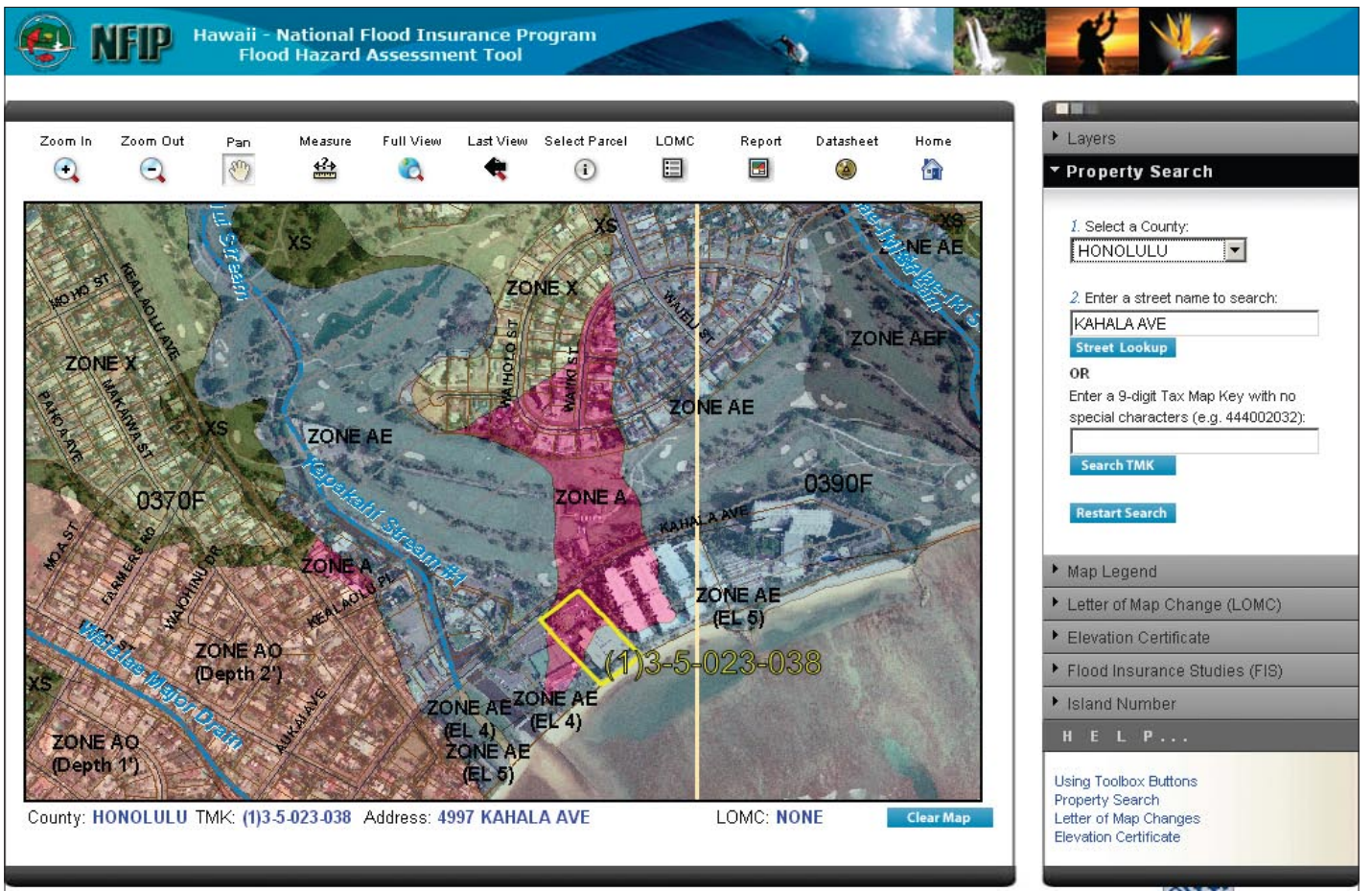
Highlights

- The team created the application with ArcGIS Server for the .NET Framework.
- An ArcGIS Desktop map document file was developed.
- Adding more layers has allowed more detailed assessment.

When most people think of Hawaii, they imagine a paradise of beautiful beaches, big waves, and glorious sunsets. They may also think of the lush vegetation and diverse wildlife. What most people don't know is that Hawaii is also among the wettest places on earth with an average annual rainfall total of more than 60 inches. While the majority of this rainfall runs off harmlessly into the ocean, flooding in developed areas is an everyday risk. In fact, flooding is the number one natural disaster in the United States. To proactively assess and address flooding risks to the public, the U.S. Federal Emergency Management Agency (FEMA) has developed the National Flood Insurance Program (NFIP). This program was created by Congress in 1968 to help provide a means for property owners holding federally backed mortgages to financially protect themselves in the event of a flood. Flood insurance is mandatory if you live in a high-risk area and have a mortgage from a federally regulated or insured lender. The NFIP offers and regulates coverage and costs to those affected property owners in communities that participate in the program. In return, the participating community agrees to adopt and enforce ordinances that meet or exceed FEMA requirements to reduce the risk of flooding. In Hawaii, all four defined communities, which align with the four counties in the state, participate in the program.

To identify a community's flood risk, FEMA conducts a Flood Insurance Study. The study includes statistical data for river flow, storm tides, hydrologic/hydraulic analyses, and rainfall and topographic surveys. FEMA uses this data to create the flood hazard maps that outline the community's flood risk areas. These flood hazard maps delineate the flood zone classifications ranging from low to high risk.

In 2004, FEMA began a nationwide map modernization process to digitize these flood hazard maps into GIS-ready Digital Flood Insurance Rate Maps (DFIRMs). The objective of this process was to provide a more powerful tool for flood risk management, insurance activities, and disaster operations. End users can now integrate accurate and timely local data with FEMA flood hazard data to support their work in the NFIP and take advantage of technology to streamline processes.



Once the parcel is located, flood risk can be assessed.

For Carol Tyau-Beam, the State of Hawaii NFIP coordinator, this was the opportunity to utilize this data in a much more effective and efficient manner. "With the development of the DFIRMs," she says, "we knew we could get much more out of the maps than previously. We are a small state composed of just four communities, but with hundreds of miles of shoreline and so much development in these areas, accurate flood maps are critical for the decision-making process."

Tyau-Beam worked closely with the FEMA-operated Map Service Center to download the DFIRM databases by community as they became available. While the data was available in multiple formats, FEMA selected the ESRI shapefile format due to its compatibility with the existing data available throughout the state. This provided the required baseline data, however, only at the desktop and only for two of the four communities statewide. Given the magnitude of the map modernization process, not all communities in Hawaii had come online with DFIRM data at the same time. Initially, only two of the four communities in Hawaii had the DFIRM data designated as effective. Tyau-Beam had become familiar with a local ESRI partner, the Onyx Group, through the local ESRI user group community. She had seen a presentation at a user group meeting where a solution was presented that was very similar to her situation. She says, "They presented the opportunities to develop a Web-based application that would be easy for the public to use while providing the sophistication to provide accurate and effective maps."

Development of the initial application, dubbed the Flood Hazard Assessment Tool (FHAT), began in 2007. DFIRM data was collected where applicable, as was aerial imagery and parcel and road network layers from the Hawaii statewide GIS program. With the abundance of data available in shapefile format, the decision was straightforward to develop the application using ArcGIS Server for the .NET Framework. Functional requirements were developed through an iterative process. The team knew the tool needed to be as simple to use as possible, since it was intended for public use. That meant removing some of the typical GIS functionality and minimizing the buttons and tools on the screen. An ArcGIS Desktop map document file (.mxd) was developed that combined the required feature, raster, and data layers and set the appropriate symbology. The team then created an ArcGIS Server map service from the .mxd file and integrated it into the Web application. The resultant tool was a completely customized solution designed specifically for a wide range of public users. ArcGIS Server handles the mapping requests and responses, while traditional .NET Framework controls handle the remainder of the tasks.

The initial FHAT application was rolled out on January 1, 2008 (**gis.hawaiinfip.org/FHAT**). It included the ability for users to locate their property by one of three ways: location, street address, or tax map key. DFIRM data was included for Kauai and Honolulu counties, with georeferenced raster .tif files deployed for Maui and Hawaii counties. The tool was promoted statewide as a valuable resource for obtaining current flood hazard data. Tyau-Beam scheduled a series of presentations to local stakeholders, including the planning and design community, as well as insurance professionals and real estate organizations.

As soon as the initial tool was rolled out, the development team immediately saw the potential of additional functionality and data. Tyau-Beam notes, "We saw that we could use the tool not only to disseminate effective flood maps, but we could also use it for public review of preliminary maps." Over the next two years, other layer additions included incorporation of Letters of Map Change, NGS benchmarks, and stream cross sections. These layers added information to the tool and allowed even more detailed assessment. A reporting capability was included to generate a hazard assessment report on a property. The team also added preliminary DFIRM maps for Maui and Hawaii counties to allow the public to review these maps online and provide comment. Specifically, second generation preliminary DFIRM maps for Honolulu and Kauai counties were added to the FHAT to allow users to overlay these on the effective DFIRMs for quick and easy comparison of the two. A link was added to allow comments on these preliminary layers to be submitted directly from the map. Because the framework of the FHAT had been developed in a modular fashion, these additions proved to be simple and straightforward to implement.

Today the system continues to evolve, most recently with the incorporation of an Elevation Certificate (EC) tool. An EC form is required for the permitting process on a property in a special flood hazard area. This tool allows applicants or surveyors to initiate an EC for a property directly from the FHAT. The EC tool uses GIS attribute data extracted from the search query to generate a partially completed PDF form. The user can then download the partially completed form to finish filling it out and save and submit it electronically.

More Information

For more information on the State of Hawaii FHAT, contact Carol Tyau-Beam, state NFIP coordinator (e-mail: Carol.L.Tyau@hawaii.gov); for technical information, contact Steve Lettau, the Onyx Group project manager (e-mail: slettau@onyxgroup.com).

Mexico City's Earthquake Drill Shares Responsibility with Citizens

Emerging Technology—GIS on a Table—Improves Government Response

By Chris Phillips and Anthony Starr

Highlights

- Mexico City implemented advanced visualization technology to improve GIS information sharing between decision makers.
- GIS facilitated separate groups to see, interact with, and share the exact same data from different locations.
- With ArcGIS, the exercise enabled the many participants to reach a joint understanding of the situation.

On September 19, 1985, Mexico City, Mexico, experienced one of the most devastating earthquakes in history. The magnitude 8.1 quake shook the city in two separate tremors, burying more than 10,000 people amid the city's rubble. Mexico City officials and citizens commemorate that event by conducting an annual citywide evacuation and simulation, in large part designed to better prepare the city for similar catastrophes in the future. The responsibility for protecting citizens and conducting the annual simulation exercise falls on Mexico City's Civil Protection Department.

According to the head of Mexico City's government, mayor Marcelo Ebrard, this annual exercise allows the city to "measure our response capacity," which is critical in understanding the current state of the city's preparedness.

The Scenario

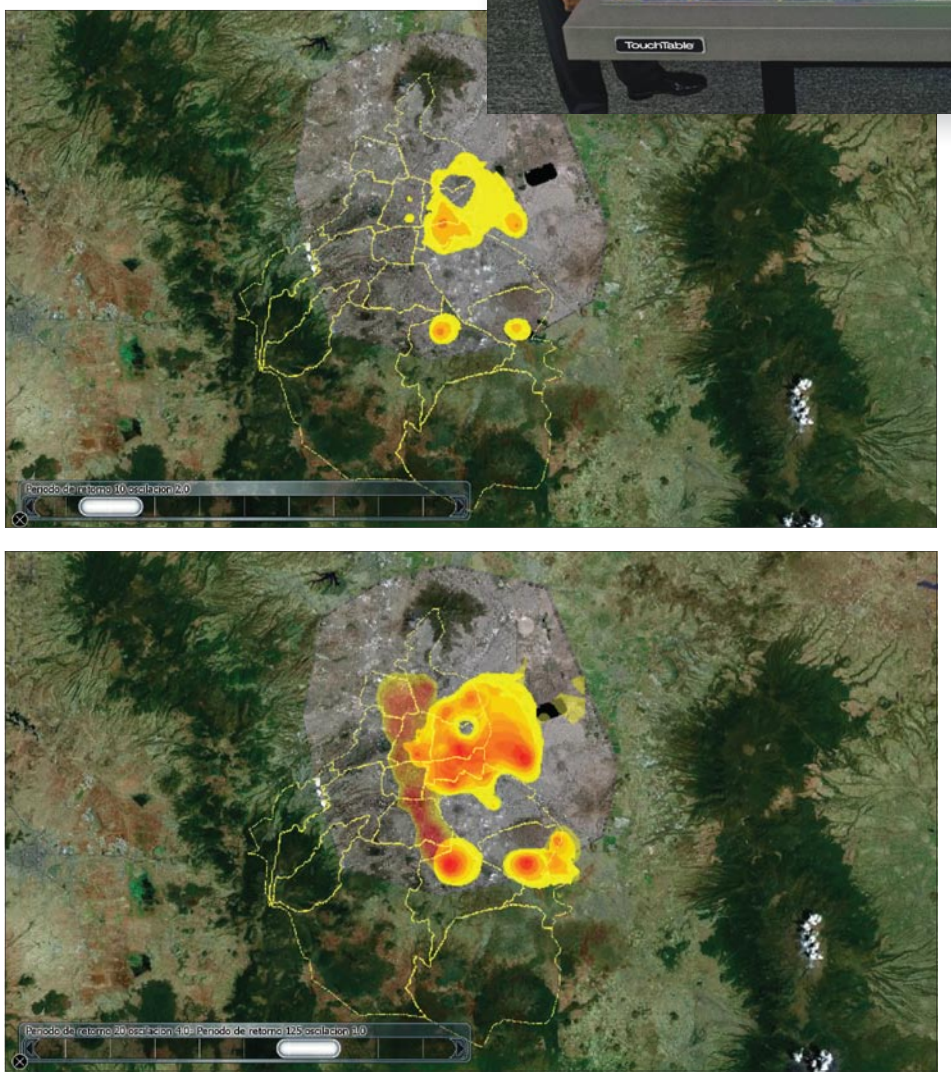
In 2009, the evacuation drill simulated a 6.9 magnitude earthquake with its epicenter in Atoyac de Alvarez, Guerrero, and included the assumption of a total collapse of the National Lottery building located on Paseo de la Reforma. The 2009 exercise proved to be an extraordinary demonstration of government and citizen collaboration. According to Mexico City's federal district government, the level of civilian participation reached a staggering 5.4 million citizens. More than 12,000 law enforcement personnel were involved in the evacuation, coordinating activities from more than 2,100 buildings within the city, a logistical challenge and dangerous proposition without the appropriate tools and resources in place. Compare that to 2001, when just 47,000 citizens participated in the drill, evacuating a total of 227 buildings. As citizen participation continues to rise, improved utilization of tools to enhance a shared understanding between city officials and citizens on evacuation routes, response plans, and contingency plans becomes imperative.

A comprehensive GIS-based dataset, called the Hazards and Risk Atlas, helps the Civil Protection team assess high-risk locations throughout the city by standardizing a platform to manage the convergence of these datasets. The overall objective of the team is to improve its responsiveness based on the information contained in Mexico City's Hazards and Risk Atlas. Recently, ArcGIS Desktop, with the ArcGIS 3D Analyst extension and TouchTable technology, was added to the technology portfolio, helping Civil Protection officials broadly share the Hazards and Risk Atlas data, significantly improving the city's responsiveness.

Innovative Solutions

Implementing a standard format for archiving GIS data and finding a better way of disseminating that data between city officials and citizens are critical to improving the city's response capacity. During the 2009 evacuation simulation, data in Mexico City's Hazards and Risk Atlas was published using ArcGIS Desktop and the ArcGIS 3D Analyst extension. The next step was to access the project through the TouchTable interface to improve the way data is manipulated and shared. The Civil Protection team used multitouch gestures and visualization tools to communicate objectives and give real-time updates on the state of affairs to authorities. The combination of tools used in this exercise enabled a broad set of participants in locations throughout the city to share a common picture and reach a joint understanding of the situation.

Decision makers in one of Mexico City's Emergency Operations Centers use the ArcGIS 3D Analyst extension in conjunction with a TouchTable TT84 to reach a joint understanding of Mexico City's critical assets and areas of concern during a drill.



Mexico City officials can sequence through a group of static files to predict areas of impact and severity of impact based on oscillation and magnitude of the earthquake event.

Experts discuss the potential hazards based on oscillation and magnitude of the simulated quake while using a TouchTable.

To accomplish this, documents used in this exercise were authored using the ArcGIS 3D Analyst extension's ArcGlobe application to include 61-centimeter satellite imagery for all the federal districts and a combination of shapefiles offering a geographically accurate and meaningful representation of available assets. The team marked and tagged geospatially referenced assets with relevant photos or metadata to supplement the group's understanding of asset allocation, emergency vehicle location, and building details. Multiple instances of the TouchShare and ArcGIS software running on desktops, laptops, and other devices used by the Civil Protection team allowed details to be shared enterprise-wide regardless of the users' geographic locations.

In addition, network visualization and sharing over multiple TouchTables and conventional computing devices facilitated separate groups of users being able to see, interact with, and share the exact same data from disparate locations throughout the city.

The Outcome

Data gathered from this annual simulation allows incremental improvements in response time through the study of historical data. This information is added as layers in the ArcGlobe project file and allows response teams to prepare for future events based on geographically relevant data from past events. As new data is acquired during the annual exercise, the data is added to the city's data archives, improving understanding and preparedness for future events.

Using Mexico City's historical data, officials are able to more accurately predict likely danger zones that may affect future real estate and development considerations and lead to improved seismic building codes and improved geographic locations for new structures. In addition, in the event of a crisis, the city's Civil Protection team is able to better target populated venues and buildings based on location or temporal data, such as time of day or year. This improved understanding allows the creation of a well-devised emergency response plan and greater efficiency during critical events.

Ebrard summarized the benefits to the evacuation drill as "great for training people, and the drill permits us to evaluate and improve the government's reaction, as well as [improve the reaction time] of all emergency units."

The annual evacuation event not only is designed to establish better preparedness for the Civil Protection Department but also establishes shared responsibilities between governmental authorities and the citizens of Mexico City.

About the Authors

Chris Phillips is the product manager for TouchTable, Inc. Phillips' experience includes more than 12 years of managing new technologies in the biotech, nanotechnology, surface computing, and GIS markets. His work has been documented in a variety of print publications, ranging from scientific journals to textbooks. Anthony Starr is the senior technical writer at TouchTable, Inc. Starr has written technical documentation and created illustrations and marketing graphics for the power, pharmaceutical, military, networking, surface computing, and GIS industries.

More Information

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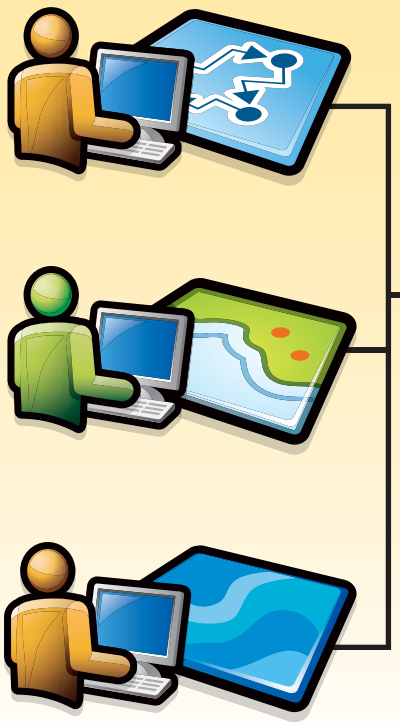
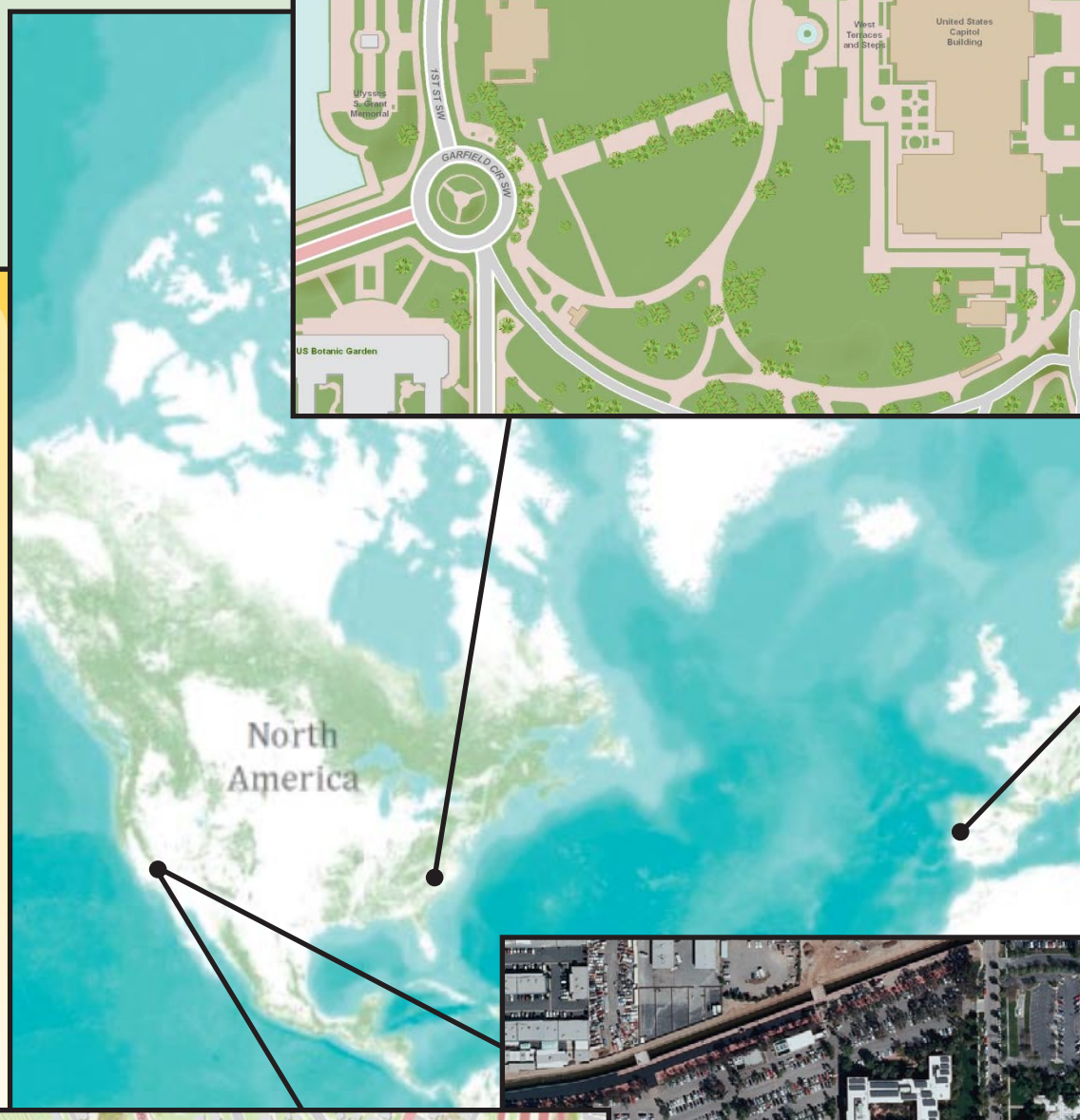
Community Maps Program—World-class ba

GIS users and organizations around the world are contributing their geographic data to create a community basemap published and hosted on the Web. This resource can be freely used by GIS users and provides the entire GIS community with cartographically rich and detailed, ready-to-use, high-quality basemaps for GIS projects.

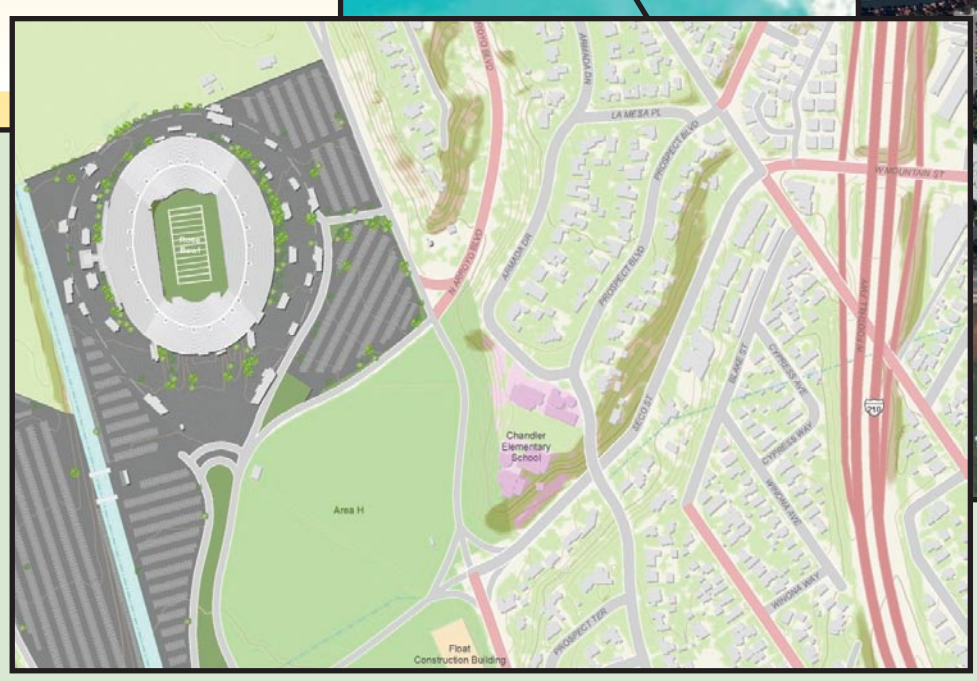
User organizations contribute their data.



Map Templates



Data provided by San Bernardino County, California.



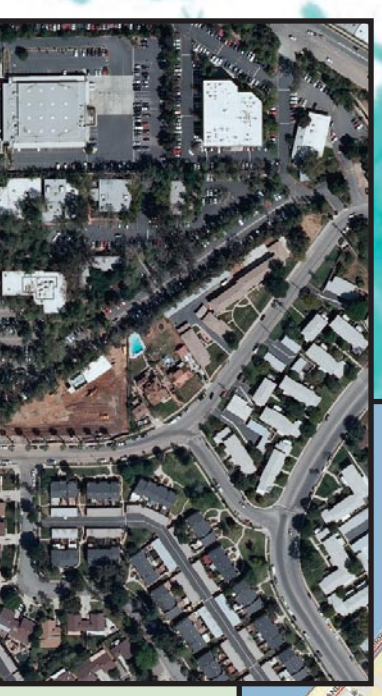
Data provided by City of Pasadena, California.

www.esri.com/communitymaps

asemaps built by the GIS user community

Data provided by District of Columbia Geographic Information System (DCGIS).

Data provided by Instituto Geográfico Português (IGP).



Data provided by ESRI China (Hong Kong) Limited.

Community maps built with user data can be consumed with different client applications.

Desktop

Browser

JavaScript Viewer

ArcGIS® Explorer Online

Mobile

iPhone
Android
Windows Mobile

esri

Economic Growth Strategy Transformed Through a Spatial Data Infrastructure

Croatia Simplifies Landownership Process with a National Geoportal

Highlights

- The ArcGIS Server Geoportal extension is improving land reform.
- With ArcGIS Server, ministries quickly access geospatial resources of all types.
- Croatian GIS users now have access to vast quantities of geospatial data.

The Republic of Croatia, roughly the size of West Virginia, is home to more than 4.4 million people. Ranked as the 18th most popular tourist destination in the world, sightseers visit its beautiful national parks, the high peaks of the Dinaric Alps, and more than 1,000 islands in the temperate Adriatic Sea.

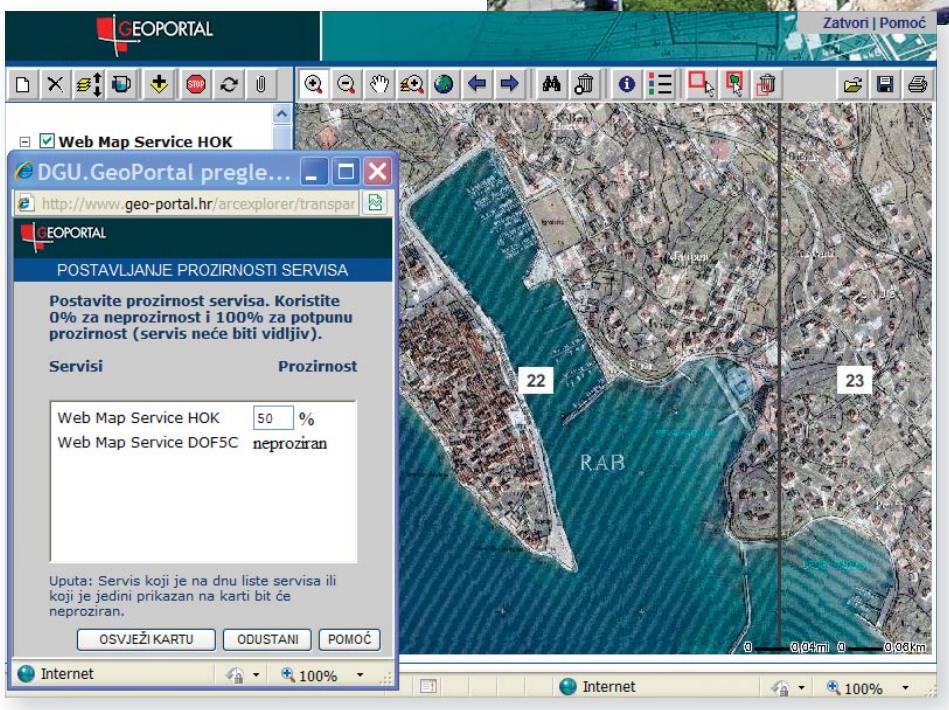
A successor state of the former Yugoslavia, the country declared its independence in 1991, which the European Union (EU) and the United Nations recognized in 1992. Building itself up from virtually nothing, the country is now governed by a forward-thinking parliamentary republic, which is adopting new laws to promote economic growth and help its candidacy for EU membership.

Making countrywide geographic data available throughout the nation with a spatial data infrastructure (SDI) is one way the country continues to grow. An online geoportal created with GIS technology makes this possible. The geoportal makes it easier for citizens, government, and private-sector users to find and access vast quantities of geographic information and related services. The geoportal is the first phase of a Croatian national SDI and has already shown its value by reducing the time it takes to register land within the country by 90 percent.

Enabling Property Rights in Croatia

Ten years ago, a simple land title transaction took an average of 400 days to carry out. Most information was stored and managed in paper-based files, making it difficult to share. Agencies, such as the State Geodetic Administration (SGA) in charge of the country's official maps and cadastre, and the Ministry of Justice, responsible for land registers issued at municipal courts, could not easily exchange data.

A view over the old city walls of Dubrovnik, Croatia, and its old harbor.



As the first step toward an SDI, the cadastral data managed by SGA is now available for browsing, searching, and purchasing via an online data catalog found at www.geo-portal.hr/Portal.

In 2000, the Croatian Parliament adopted a State Survey and Real Property Cadastre Program to transform the existing registers into digital format. This involved topographic surveys as well as resurveying 5 percent of the existing cadastre focusing on areas of special interest, such as towns, coastlines, islands, nonregulated state agricultural land, and infrastructure corridors.

The datasets were cofinanced by federal institutions and interested local governing bodies. For example, orthophoto production was completed through 30 different agreements between local and state governments. Over a 10-year period, 21 counties produced topographic data and resurveyed each cadastre. By the end of 2010, 56,000 cadastral maps will be digitized and verified.

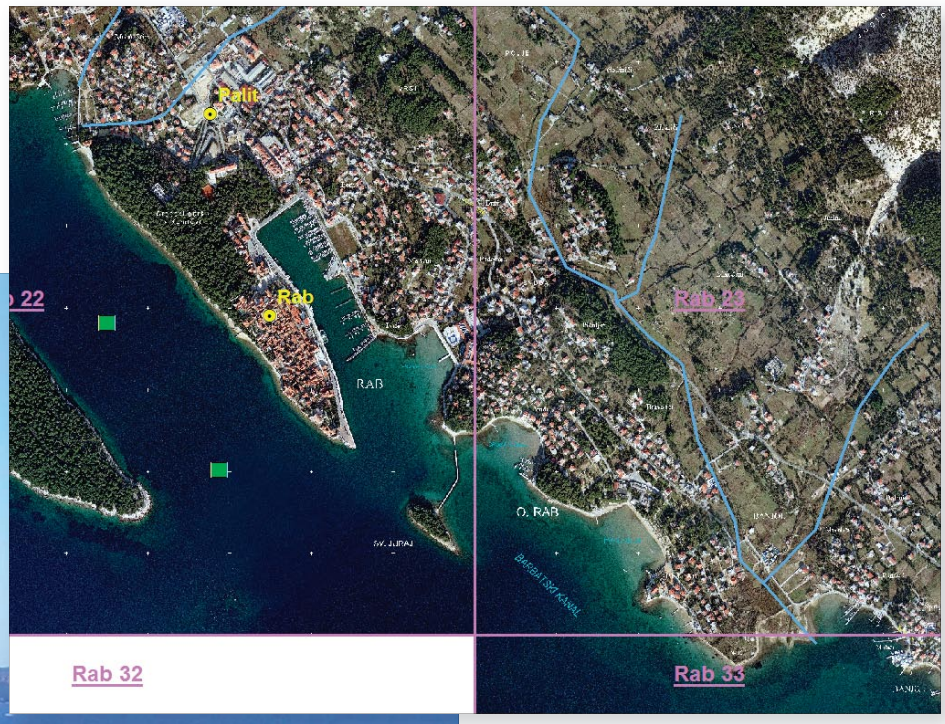
Once created, the data is gathered and housed in the Real Property Registration and Cadastre Joint Information System (JIS). The JIS unites the cadastral data managed by SGA and legal information from the Ministry of Justice. Having consistent and shareable data across the country via the ArcGIS Server Geoportal extension is improving the processes of implementing land reform because documents can be issued from both cadastre and land registers. The average time for processing changes to land titles has dropped from a 400-day average to less than 37 days.

Online Data Access Through Geoportal

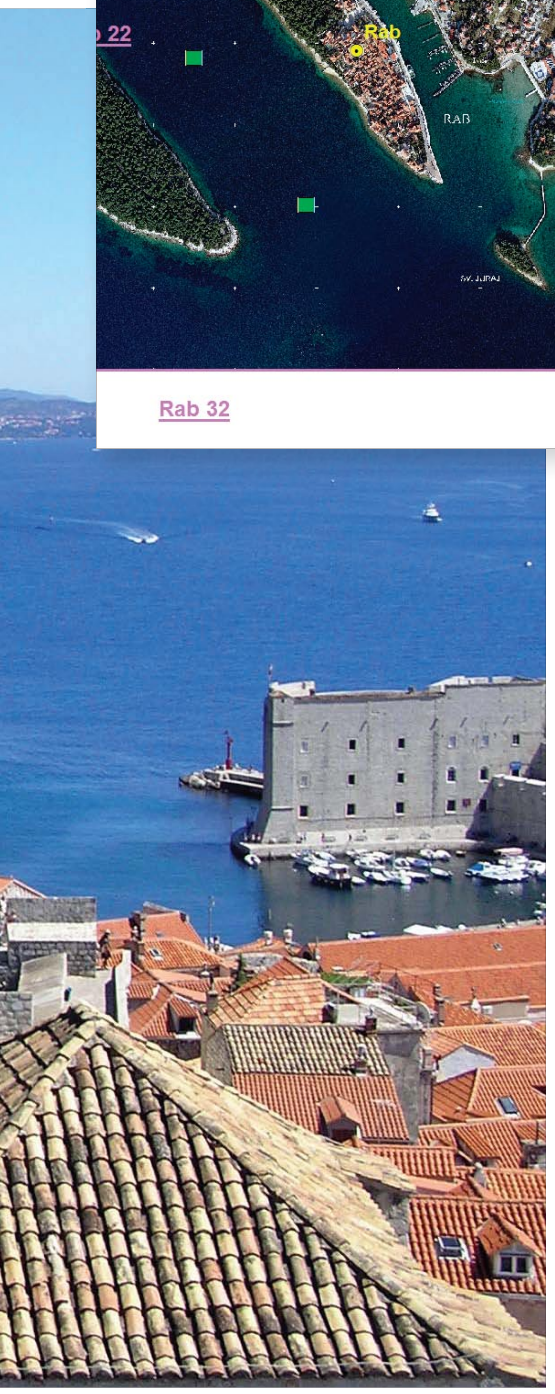
As the first step toward an SDI, the cadastral data managed by SGA is now available for browsing, searching, and purchasing via an online data catalog found at www.geo-portal.hr/Portal. To develop the geoportal, the state selected ESRI's distributor in Croatia, GISDATA d.o.o., and con terra GmbH, the professional services arm of ESRI Deutschland GmbH, ESRI's distributor in Germany and Switzerland. The companies established an action plan to develop a national SDI. They chose ArcGIS Server and the ArcGIS Server Geoportal extension to provide the platform for the state's ministries to quickly access geospatial resources regardless of location or type.

Based on the EU's Infrastructure for Spatial Information in Europe (INSPIRE) directives for sharing geographic information across Europe, Croatia's national SDI will provide a more open, transparent, and efficient use of spatial information, as seen through the improved land registration.

SGA registers data with the geoportal by using metadata, which follows the ISO standards



SGA provides the platform for organizations to quickly access geospatial resources regardless of location or type.



required by INSPIRE. Only the metadata is uploaded to the geoportal, while SGA's sensitive data remains securely housed within its own servers. Through the ArcGIS Server Geoportal extension, registered data includes digital orthophotos, 1:5,000-scale basemap information, raster cadastral maps, administrative units through the Central Registry of Spatial Units, and land survey information from the Registry of Geodetic Points.

The First Step to a National SDI

By the end of the year, more agencies within Croatia will register their data with the geoportal, using the SGA data as a guide for resolution and standards. The Ministry of Defense; the Ministry of Culture; and the Ministry of Agriculture, Fisheries, and Rural Development will all provide spatial data.

By creating a comprehensive SDI, Croatia expects to continue to see improvements in the reduction of time when producing and accessing data. Geospatial data and service producers in the government will be easily connected to the consumers who need the data. Data integrity will be maintained, and the users can more easily share the authoritative version of data.

Dr. Zeljko Bacic, director general of SGA, says, "Simple access to geospatial data is the key prerequisite for an efficient and economically prosperous society. A geoportal in operation means that other governmental organizations can use SGA data but also make their data accessible. This is the first step to the establishment of a Croatian national geoportal as part of a national SDI. I am convinced we shall do this soon, as we have a clear direction from the Croatian government and sufficient knowledge and capacity to do this."

The SGA geoportal has revealed opportunities in local and regional government for GIS users in nature protection, urban planning, agriculture, public safety, and more. "The SGA geoportal is the first of its kind in southeastern Europe," says Andrej Loncaric, director of GISDATA in Croatia and the southeastern region. "Croatian GIS users now have access to vast quantities of geospatial data that will make their everyday work much easier."

More Information

For more information, contact Zeljko Bacic, director general, State Geodetic Administration, Republic of Croatia (e-mail: zeljko.bacic@dgu.hr).

What Is an SDI?

SDI stands for *spatial data infrastructure.* What does that mean? Think of the roads and dams and underground pipes necessary for the well-being of a community or nation. These fundamental engineering projects are, of course, *infrastructure.* An SDI is similar except that it consists of essential data rather than concrete or steel. A broader view recognizes that it is a framework of technologies, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve the use of geospatial data across multiple public and private organizations.

Collaboration Through GIS and a Regional SDI

GeoSUR Opens Geographic Information for Use Throughout South America

Highlights

- The GeoSUR Regional Map Service was developed with the support of the EROS Center using ArcGIS Server.
- The ArcGIS Server Geoportal extension provides quick access to geospatial resources throughout the region.
- GeoSUR offers a cutting-edge, on-the-fly topographic processing service.

Sustainable development means meeting the needs of the present while preserving the environment for future generations. Creating an economy in a country that is in tune with basic ecological support systems doesn't stop at country borders. Rivers traverse borders, roads must connect various cities, and forests transcend country boundaries.

South America, with its bountiful natural resources, will benefit from a collaborative effort to manage its many precious resources and maintain healthy living conditions for its people. "There is a need in South America to make important development decisions—decisions that impact the lives of thousands, sometimes millions of people—using sound and accurate scientific information," says Eric van Praag, regional coordinator of the GeoSUR Program. "Much of this information can be expressed geographically and can be put into formats and represented in ways that decision makers understand and can readily use."

Ensuring that geographic information is readily available is the mission of the GeoSUR Program, a regional initiative to integrate and disseminate spatial data in South America. GeoSUR was originally developed under the aegis of the Initiative for the Integration of Regional Infrastructure in South America (IIRSA), which promotes the development of transportation, energy, and telecommunications infrastructure from a regional viewpoint. Since the program's inception in 2007, GeoSUR has grown to serve a large audience interested in development objectives, both regionally and within individual countries.

GeoSUR has three main components: a geoportal, a network of map services, and a regional topographic processing service.

GeoSUR portal home page.

GeoSUR serves an audience interested in regional development objectives on the continent of South America.

GeoSUR Portal Makes Updating and Finding Spatial Data Easier

GeoSUR has developed, with support from the U.S. Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center, the first regional portal providing access to geographic data and services from all South American countries (www.geosur.info). Launched in October 2009, it provides a point of entry to the map services and metadata catalogs operated by GeoSUR's partner agencies. GeoSUR chose the ArcGIS Server Geoportal extension software to build the portal because it provides an efficient platform to integrate the diverse and changing geospatial resources located throughout the region.

GeoSUR provides training and technical assistance to all partner agencies.

The regional portal provides access to the metadata holdings of all the participating agencies. It keeps a central metadata database that is periodically updated by an automatic harvesting mechanism that fetches metadata from the participating agency's catalogs. The portal also contains a map viewer that allows the user to retrieve, open, and view layers available in partner map services. The network architecture is decentralized to keep the data updated and close to its producers. Currently, there are more than 20 map services linked to the portal and more than 3,000 metadata records available on its database.

Network of Regional and National Map Services

A great variety of national and regional spatial data is available through GeoSUR, including political-administrative divisions, soils, topography, ecosystems, hydrography, biodiversity, water bodies, geology, cities and towns, elevation models, land cover, aerial photos, ecological regions, satellite imagery, and infrastructure.

This information is available through a decentralized network of map services currently being created by the GeoSUR participating agencies, with each agency committing to the development of a Web Map Service (WMS) and a metadata catalog. Once a map service is developed, the map service administrator creates an ISO 19119 metadata record for it and registers it on the GeoSUR portal for public viewing.

GeoSUR emphasizes the use of recognized Open Geospatial Consortium, Inc. (OGC), and International Organization for Standardization (ISO) standards and protocols to reach interoperability of its various geoservices. Participating agencies have the liberty of choosing the hardware and software platforms for sharing data with the network, provided they use regionally recognized standards.

Most map services in the network contain geographic data at the national level, but there are two regional services available today: the GeoSUR Regional Map Service and the Condor Service.

The GeoSUR Regional Map Service is geared toward infrastructure developers, offering access to spatial data on existing IIRSA and Andean Development Bank (CAF) infrastructure projects and on themes that impact infrastructure development, such as roads, ports, airports, railroads, oil pipes, rivers, protected areas, land use and land cover, and topographic relief. The service was developed with the support of the EROS Center using ArcGIS Server. All regional data in the service is available for download at no cost.

The Condor Service allows visitors to view environmental data of the Andean countries useful for planning infrastructure projects. The service includes an early assessment tool focused on identifying environmental risks and opportunities for projects in the planning phase. The Condor map viewer is available at esriurl.com/c3.

On-the-Fly Topographic Processing Service

GeoSUR offers a Topographic Processing Service (TPS), the first of its kind in the developing world that provides access to digital elevation model (DEM)-derivative products that can be generated on the fly for any location in South America. Users can run the service models using an assorted set of DEMs at different resolutions, including 1 kilometer, 90 meters, and 30 meters. The available TPS models include elevation profile, slope classification, dynamic watershed delineation, hillshade, elevation classification, aspect, and raindrop trace. The service is part of the GeoSUR Regional Map Service, available at the GeoSUR portal (www.geosur.info). All TPS-derived data can be downloaded free of cost.

Before launching the service, the USGS EROS Center filled the voids in the Shuttle Radar Topography Mission (SRTM) 30-meter dataset for South America with Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) GDEM and GTOPO30 data and created a set of seamless derived datasets that include hillshade, shaded relief, slope, and aspect for the region.

Advanced users can directly access these models from ArcGIS Desktop by accessing the TPS GIS geoprocessing service (tps.geosur.info/arcgis/services). From within ArcMap, local data can be used with this service to more precisely extract the derivative products and simply integrate them into the application. To further streamline the TPS service, users can integrate them in local ModelBuilder applications and Python scripts.

"Important development decisions are often taken without the proper use of geographic information and modeling techniques that are now becoming widely available," says Santiago Borrero, secretary general of the Panamerican Institute of Geography and History (PAIGH).

GeoSUR: An Eye on Spatial Data for South America

GeoSUR is coordinated by CAF and PAIGH, with technical assistance from the USGS EROS Center and the national mapping agencies of Colombia, Chile, and Ecuador. Participating agencies include, but are not limited to, national geographic institutes and national environmental agencies from the region. In total, more than 22 national agencies have agreed to participate in the GeoSUR Program, with more expected to join.

GeoSUR provides training and technical assistance to all partner agencies as they develop the map services and metadata catalogs to be linked to the GeoSUR Geoportal and the Regional Map Service. GeoSUR specialists are on call to offer technical assistance that agencies may need, both remotely and on-site. GeoSUR also sponsors peer-to-peer communications among participating specialists.

More Information

For more information, contact Eric van Praag, regional coordinator, GeoSUR Program (tel.: 58-212-209-6554, e-mail: evanpraag@caf.com), or visit www.geosur.info.

Abu Dhabi SDI Supports Wide-Ranging E-government Programs Using GIS

Highlights

- The operations team uses GIS for data processing, data review and assessment, and publication of map services.
- ArcGIS Server and ArcGIS Mobile solutions aid in developing the AD-SDI clearinghouse and associated metadata catalog.
- The AD-SDI geoportal provides access to the data clearinghouse from which more than 300 map layers are being made available to the community.

Abu Dhabi, the capital of the United Arab Emirates (UAE), lies on a T-shaped island jutting into the Arabian Gulf. Today, Abu Dhabi houses key sustainable energy, economic, and environmental initiatives leveraging leading technology. As such, the timely collection, preservation, and distribution of relevant geospatial data are critical to maintain its spatial data infrastructure and ensure the smooth running of the emirate's many governmental and commercial activities.

The Abu Dhabi Spatial Data Infrastructure (AD-SDI) is an initiative administered within the Abu Dhabi Systems and Information Centre (ADSIC) to facilitate the sharing of geospatial data among government agencies and other stakeholders. As part of Abu Dhabi's ambitious e-government program, AD-SDI is empowering government and society with convenient, open access to high-quality and up-to-date geographic information and spatially enabled e-government services.

In Abu Dhabi, government entities have invested heavily in GIS technology and geospatial data to meet their own organizational needs. The emirate is now in an excellent position to leverage that investment by establishing the necessary institutional capabilities that are needed to support more effective sharing and utilization of geospatial information. AD-SDI was conceived to provide that framework.

Establishing the AD-SDI Initiative

In June 2007, ADSIC launched the AD-SDI initiative to provide a framework of standards, policies, data, procedures, technology, and capable staff to facilitate and support the effective use and sharing of geospatial information in Abu Dhabi. Incorporated into AD-SDI are a data clearinghouse, geospatial portal, and Web site, as well as an extensive program for community engagement, organization, coordination, and establishment of formal agreements for data provision and sharing.

The operations team at the Spatial Data Center (SDC) is utilizing the ArcGIS suite of software for data processing, data review and assessment, publication of map services, and GIS analysis and cartography for special projects. ESRI technology has also been used in developing the AD-SDI clearinghouse and associated metadata catalog and the supporting services based on ArcGIS Server technology and the REST and SOAP interfaces, in addition to mobile GIS applications based on the ArcGIS Mobile solution. Other map viewers were built using Flex and Java APIs.

A dedicated AD-SDI staff is in place to facilitate, promote, coordinate, and support the AD-SDI initiative with the various member entities. Venues for such cooperation and collaboration with entities include facilitating the AD-SDI Technical Committee meetings and discussions; developing and implementing agreed-upon standards for geospatial data maintenance and update; and mobilizing working groups and special interest groups in key areas of common interest, such as environment, utilities, and public safety and security.

Now in the third stage of a three-stage process, the initiative has almost 40 government and quasi-government entities involved, with more expected to join this year. As part of the community development, ADSIC is in the process of developing service-level agreements and licensing arrangements with each entity that spell out what data will be provided, the timing of periodic updates, and access and use restrictions for the data each is providing. In addition, a geolegal policy has been mobilized to work on strengthening aspects of the legal framework to address issues that have special relevance to geospatial matters, such as security, privacy, and intellectual property rights.

Standardization Essential in AD-SDI Development

Standards including the appropriate data, technology, and procedures are essential to ensure interoperability across the AD-SDI community.

Integrating existing GIS data and procedures across the AD-SDI community is a matter of proactive stakeholder engagement and consultation to avoid redundant and often inconsistent spatial datasets. Today, the emirate's fundamental geospatial datasets (FGDS), such as cadastral data, orthoimagery, elevation data, transportation, land use, soils, and utility networks, are maintained by the relevant government organizations. The entities are streamlining their workflow to update the spatial data they are responsible for by recording changes on the ground as they occur as part of their business processes. This approach of transaction-based data maintenance ensures that spatial data is updated and delivered to the AD-SDI community in a timely manner.

A geospatial metadata catalog is another significant factor in maintaining standardization in AD-SDI, as it provides a master inventory of the fundamental data and geospatial services available. All the layers in the data clearinghouse have some level of metadata that is accessible through the geoportal. The metadata catalog was originally compiled by the ADSIC team, but responsibility for maintenance of this information is being transferred to the custodian agencies as a condition within the service-level agreements. Organizations using ESRI products can maintain their data through ArcGIS Desktop. Others can update their information through the geoportal, once authorized to do so, or through any ISO standards-based metadata maintenance tool.

Geoportal Key to AD-SDI Success

The ultimate goal of the AD-SDI initiative is to create a seamless network of interoperable nodes—geospatial portals—that will provide easy access to all geospatial information in the emirate. Currently, both secure government and publicly accessible geoportals have been set up, and the information available is being expanded and updated on an ongoing basis.

The AD-SDI geoportal provides access to the data clearinghouse from which more than 300 map layers are being made available to the community. Data is now being kept current, as the custodian entities periodically submit updates to the ADSIC team, which runs the data through procedures to ensure that the new information is consistent with the agreed-upon standards. The geoportal is being used as a common reference for viewing existing data, and a few users are now employing thick-client access to map services.

Many organizations in the AD-SDI community have implemented or are planning to implement their own geoportal nodes. The Environment Agency-Abu Dhabi has been operating its node for over two years, and other entities, such as the Abu Dhabi Water and Electricity Authority, Department of Municipal Affairs, and Urban Planning Council, have instituted or are planning to institute their own Web-based mapping services for internal and public use.

AD-SDI Garners Wide Support and Boosts Potential Savings

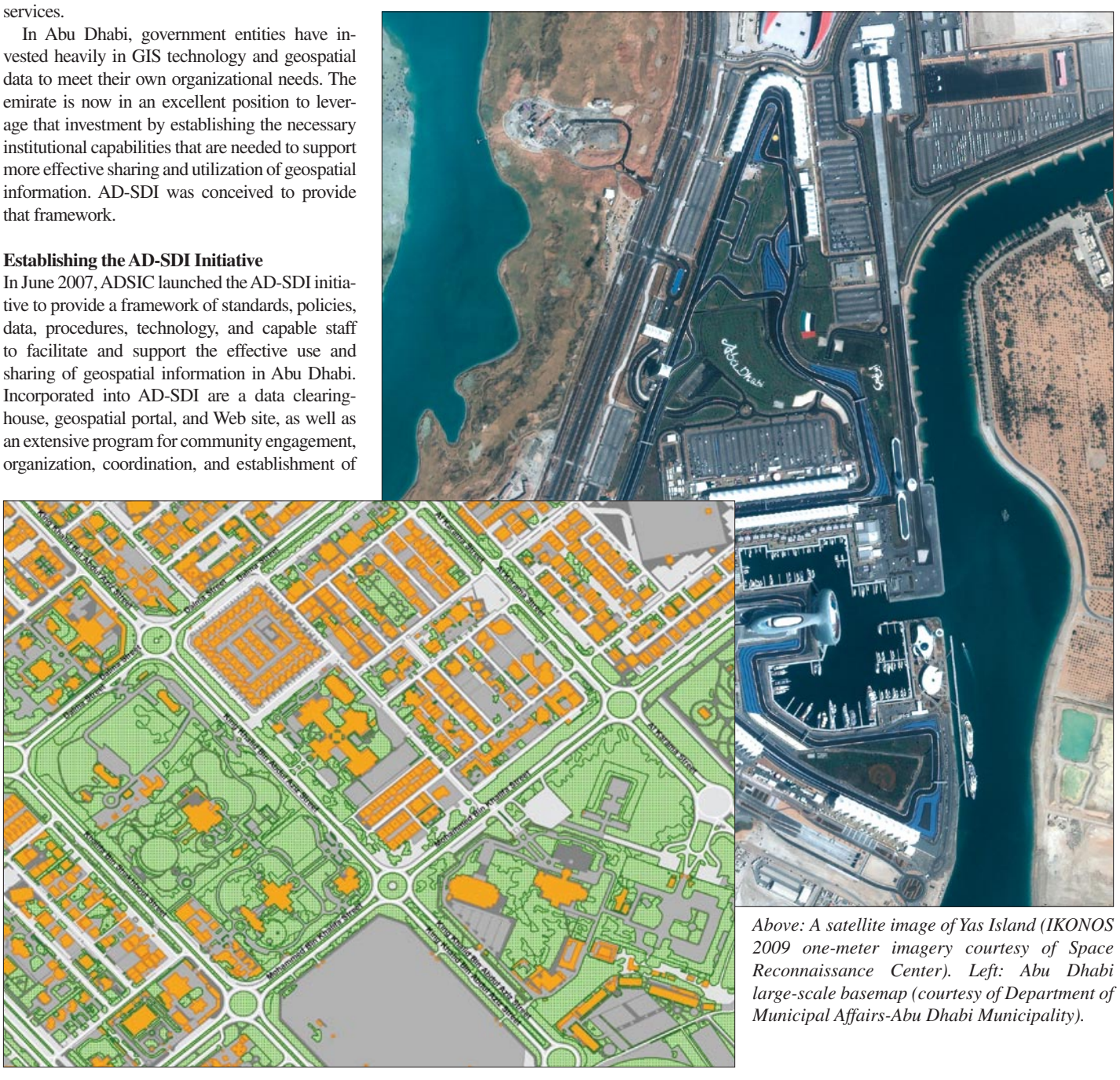
The essential value of AD-SDI is widely recognized across the community, and huge cost savings are already being realized in several ways:

- All spatial data maintained by organizations for their own business purposes is now standardized according to the broader needs of the community, leading to improved and newer usages of the data, thereby leveraging the value of the data investment many times over.
- Previously, spatial data projects could be launched by individual government entities. Now, the AD-SDI Technical Committee is included in the procedure, which leads to better alignment of the projects for the common needs of the community and avoids costly and redundant data acquisition.
- The top leadership is now being provided with access to accurate and up-to-date information in a reliable and timely manner, empowering it to make informed decisions.

The implementation of these portals will lead to a greater sharing and utilization of spatial data in Abu Dhabi. The participating organizations are now routinely adding new users as more people become aware of what is available and how it can be used in their work.

More Information

For more information, contact the Abu Dhabi Spatial Data Infrastructure initiative (e-mail: info.sdi@adsic.abudhabi.ae) or visit **www.sdi.abudhabi.ae**.



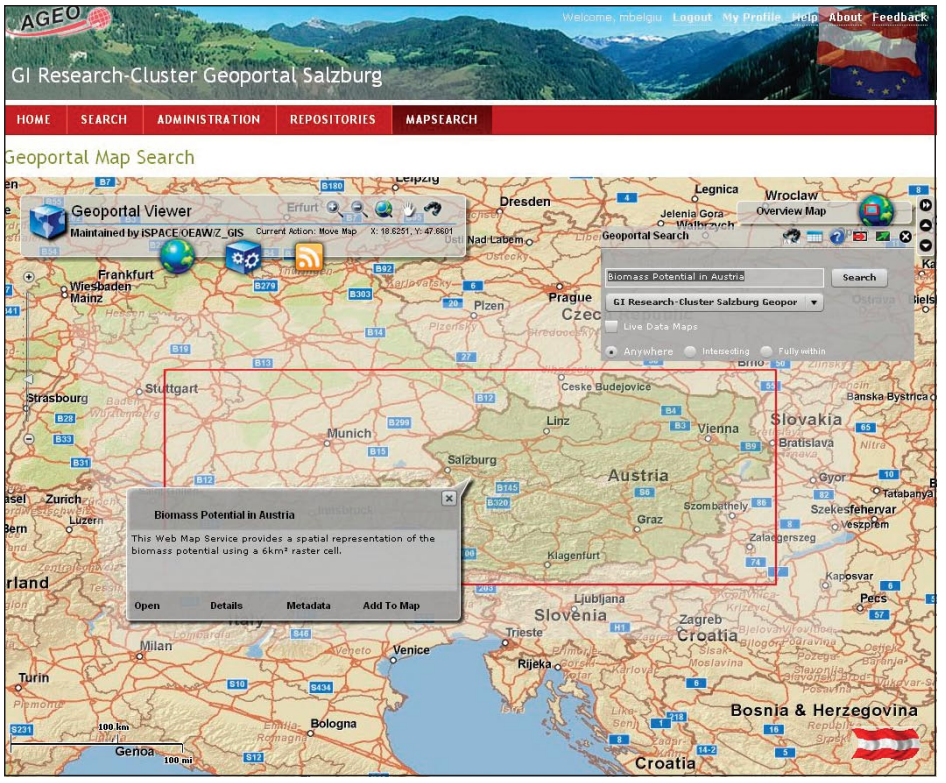
Above: A satellite image of Yas Island (IKONOS 2009 one-meter imagery courtesy of Space Reconnaissance Center). Left: Abu Dhabi large-scale basemap (courtesy of Department of Municipal Affairs-Abu Dhabi Municipality).

Austria's Geographic Data Conforms to INSPIRE

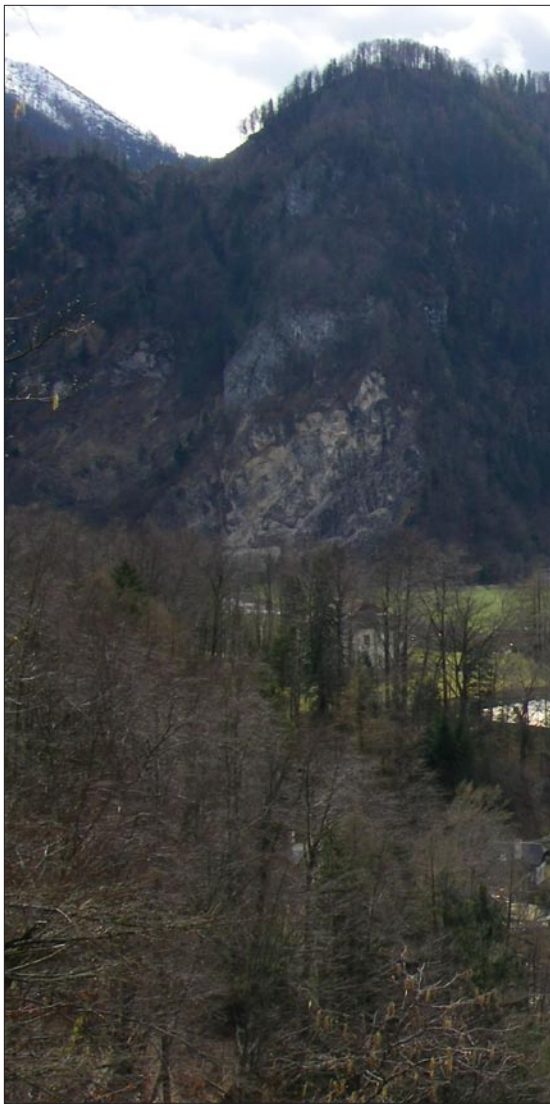
By Mariana Belgiu, Research Assistant, Austrian Academy of Sciences, Institute for Geographic Information Science

Highlights

- ArcGIS Server Geoportal extension supports customized metadata profiles.
- Geographic information custodians can publish metadata that conforms to the Austrian Metadata Profile.
- Information sharing helps private- and public-sector agencies reap the benefits of working together.



Visualizing biomass potential in Austria with Web map services.



Austria encompasses much of the mountainous territory of the eastern Alps, which contains many snowfields, glaciers, and snowcapped peaks. Nestled in valleys near idyllic farms and hidden among the forests and woodlands that cover almost half the land lie glistening palaces and gabled houses.

To protect the beauty and splendor of its natural resources, Austria has used GIS for the past 25 years. The Federal Office of Calibration and Measurement coordinates geographic information, ensuring the data is standardized and always available. However, Austria consists of nine independent federal states, each with its own provincial government, which has led to the creation and management of geographic resources being scattered across many organizations. Having disparate data sources makes it difficult to use the information to make more informed decisions on social and environmental issues. To solve this problem, the Austrian government found it necessary to develop a coordinated spatial information system capable of data sharing and reuse on national, regional, and cross-sector scales.

The system is a geoportal based on ArcGIS Server and the Geoportal extension. The geoportal gives the states and regions a collaborative approach to developing a coordinated, comprehensive, and sustained information system. The Austrian umbrella organization for geographic information, AGEO, maintains the geoportal.

Coordination Across Austria

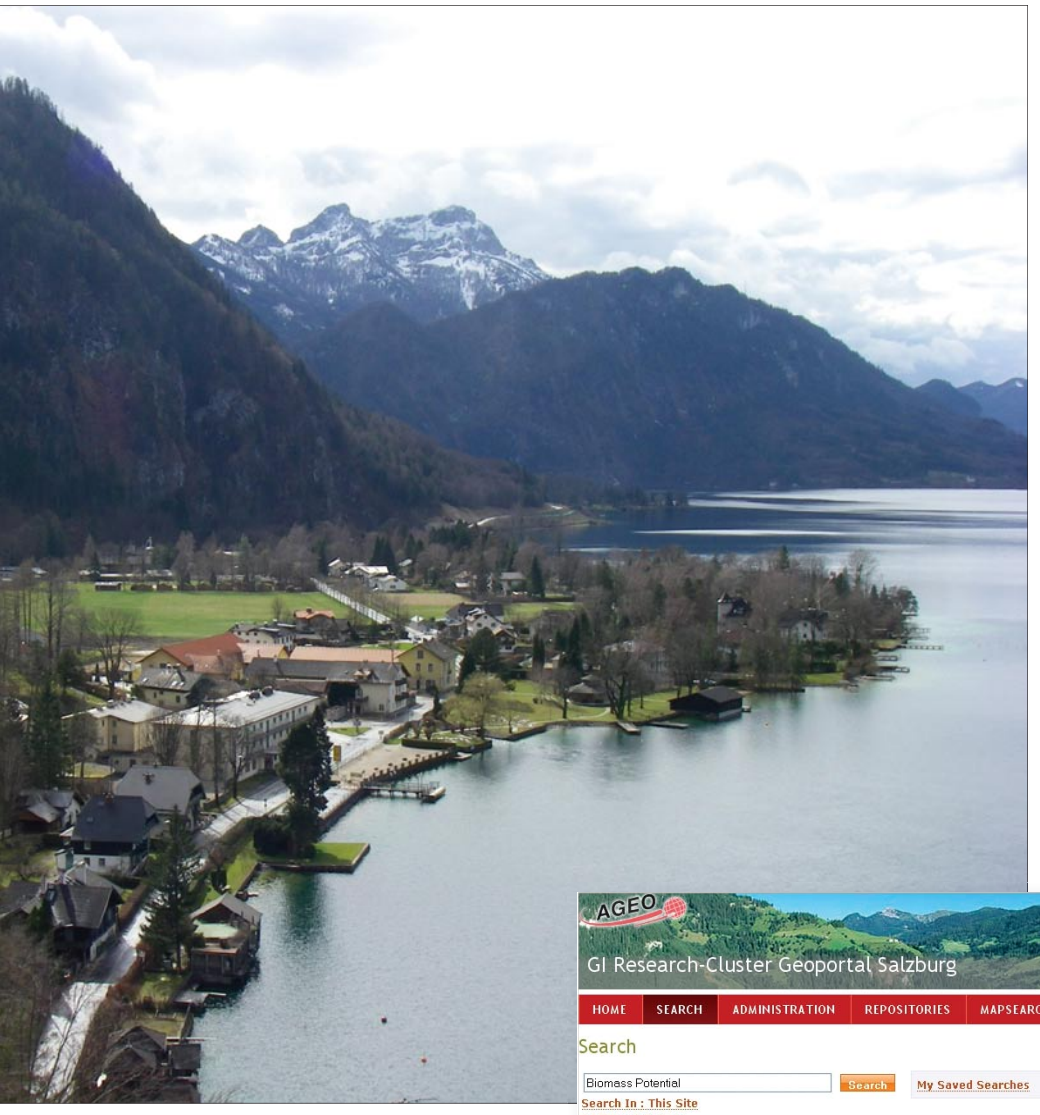
AGEO was formed in 1998 to make it easier to access geographic data throughout the country. The organization brings together national and municipal administrations, universities, and many different professional associations, representing the interests of the Austrian geographic information community at both the national and international levels.

In the last few years, this umbrella organization has focused its activities on supporting and promoting the development of a national spatial data infrastructure within the framework of a European geographic information-sharing community. "The AGEO organization is concentrating its activity not only on public administration of geographic data but also on business; academic; and, of course, general public interests," says Prof. Dr. Josef Strobl, the current chair of AGEO.

At the European level, the Council of the European Union and the European Parliament set up the legal framework for developing the Infrastructure for Spatial Information in Europe, the INSPIRE Directive. This directive (Directive 2007/2/EC) came into force in March 2007 and aims to integrate islands of geographic information of varying standards and quality throughout Europe. Austria incorporated the INSPIRE Directive into its national legislation, taking a first step toward implementing the requirements of the directive in the country. The next step involves the creation of communication mechanisms between producers and users of the geographic information.

Metadata Makes Sharing Geographic Information Easier

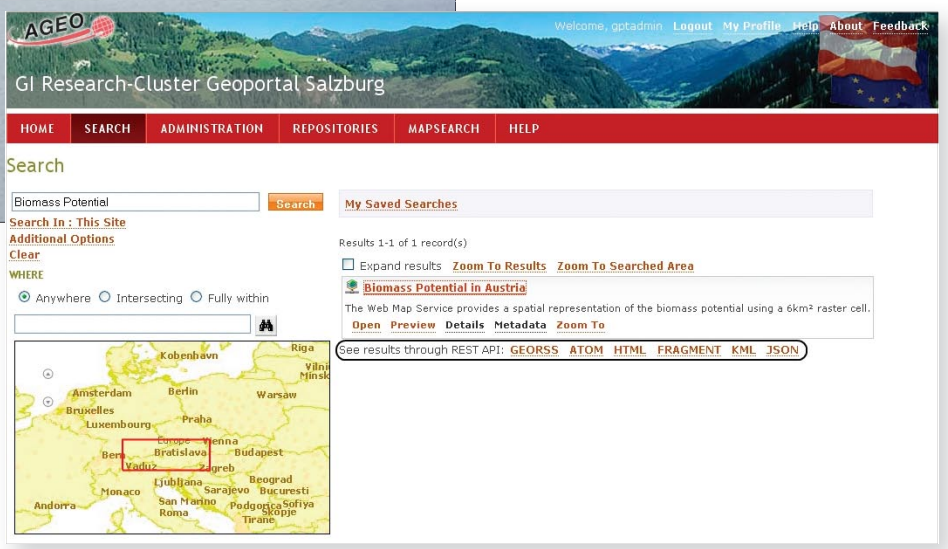
One of the main difficulties with sharing data in Austria is that the available spatial datasets and



services lack comprehensible documentation. This can be solved by accompanying the spatial data with metadata, which is structured information that describes the datasets. Unfortunately, many data producers do not understand the benefits of creating metadata and treat the task as boring, time consuming, and therefore unnecessary.

To address this problem, Austria prepared a national metadata profile combining specifications of international standards, INSPIRE's Metadata Implementing Rule, and existing regulations in the country. This profile, the Austrian Metadata Profile, ensures a consistent approach to geographic information throughout the country. It specifies the metadata elements needed to increase the lifetime and value of spatial data and services. These elements include identification information; use restrictions; spatial and temporal extent; geographic resource maintenance information; spatial representation and reference; quality; and the distribution of geographic resources, such as access policies.

The Geoportal extension provides data publishers with an online metadata editor that makes it easy for them to publish metadata about geographic resources in conformance with the Austrian Metadata Profile. The Geoportal extension was chosen because it provides the technological keys for sharing and reusing resources across applications, enterprises, and community boundaries and facilitates development of a metadata editor that conforms to a specific metadata profile. The Geoportal extension also includes a metadata editor tool, discovery tools, a data visualization application, and metadata harvesting tool that enable automated acquisition of metadata from other repositories.



Geoportal search for biomass potential.

Bridging Data Producers and Users

The geoportal represents the bridge between data producers and users. The producers create data and services for their own business needs and publish corresponding metadata to the geoportal. Users formulate queries and evaluate the returned metadata records to decide whether the discovered data accomplishes their requirements.

The geoportal's metadata editor makes geographic resources discoverable in a straightforward manner. The publisher logs in to the geoportal and chooses either the spatial datasets or spatial services schema that conforms to the specifications of the Austrian Metadata Profile. Then, using the metadata editor, the user fills in information about the data or services to create its metadata. If the user needs assistance, hints provide more information about what values should be input in each field. The generated metadata is then added to a metadata repository that is comparable to a library catalog. Users can search and find information about the availability of a particular dataset or service, which includes information about content, author, year of publication, and more.

The available geoportal and the online customized metadata editor represent an important step toward shaping a national spatial data infrastructure and a milestone toward achieving the goals of the INSPIRE Directive.

About the Author

Mariana Belgiu is research assistant at the Austrian Academy of Sciences, Institute for Geographic Information Science, Salzburg, Austria. She received her M.Sc. degree in GIS at the University of Salzburg, Austria (2009), and she is now in the initial stages of her Ph.D. work with a focus on ontologies within the spatial data infrastructure framework.

More Information

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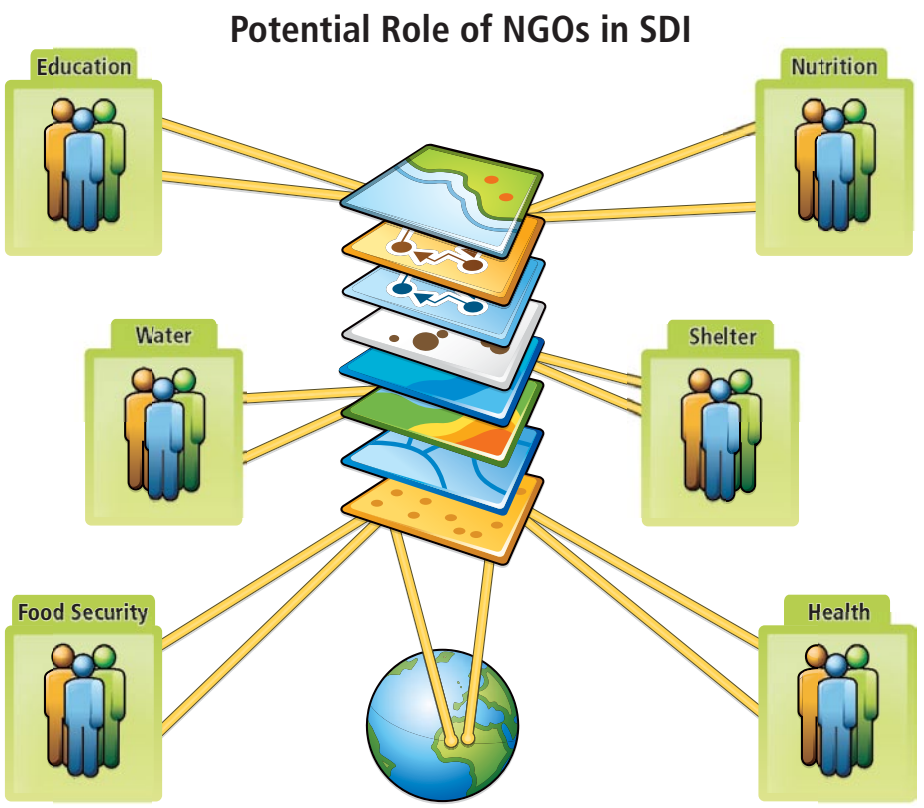
NGOs Contributing Geographic Information as a Public Good

By Jonathan Palmer, Director, Global Information Communication Technology, Wildlife Conservation Society

While for many, the term *BINGO* conjures the imagery of cozy, and perhaps outdated, social gaming halls, it also refers to big international nongovernmental organizations (BINGOs), a collective term for the world's largest nonprofit organizations, typically working across multiple continents and with annual budgets in the hundreds of millions of dollars. Their function in implementing major science- and evidence-based programs, independent of direct commercial and government interests, gives them a unique role as consumers and generators of geographic information across a range of scales from the local to the global. This unique role is accentuated by much of their effort being focused in the information-poor environments of the South, a loose geographic term based on the global North-South Divide (with countries such as Australia and New Zealand being in the North). Many BINGOs are household names like CARE, The Nature Conservancy, Oxfam International, Save the Children, Wildlife Conservation Society (WCS), and World Vision.

One key question facing BINGOs is this: To what extent should they publish the knowledge and information they generate as a free, public good (as in the sense of a free service or product)? From the point of view of economics, two conditions are required to be considered a public good: use of the good by one individual does not reduce the opportunity for others to make use of the good (nonrivalry), and everyone has access to the good (nonexcludability). While there is a range of physically free goods (e.g., clean air in most locations), the Internet and the supporting information technology revolution have seen the explosion of electronically free goods—ranging from free software to open access to data. While BINGOs have benefited from this explosion, many are what economists would refer to as free riders, with limited capacity to contribute back to the pool of the public good. Looking to the future, there are a number of reasons to be optimistic that BINGOs will increasingly contribute to the information capital of free goods available to the societies in which we work—not only based on the commitment of BINGOs and their supporters but also based on the support (and demands) of our donors and on the innovations by our technology partners, which are making contributions to information as a public good both easier and, increasingly, a competitive necessity.



BINGOs work across a broad range of industry verticals, including conservation and the environment, emergency response, and development. In turn, development covers almost any sector you care to imagine—including areas as diverse as agriculture, water, microfinance, health, and education. Within these verticals, BINGOs play a range of roles including policy formulation and advocacy; the facilitation of change through capacity building and innovation in partnership with governments, civil society, and others; and direct service delivery together with the promotion of transparency and access to services. Across all vertical sectors and for all the different roles BINGOs adopt, geography mediates almost every aspect of our work; most of the major issues we face have an explicitly geographic element. There are many great examples of how geography underpins the work of the global nongovernmental organization (NGO) sector: land-use planning and creation of management plans for protected areas, rapidly assessing needs and gaps in services following a natural disaster, and balancing efficiency and equity in the delivery of health or education support services.

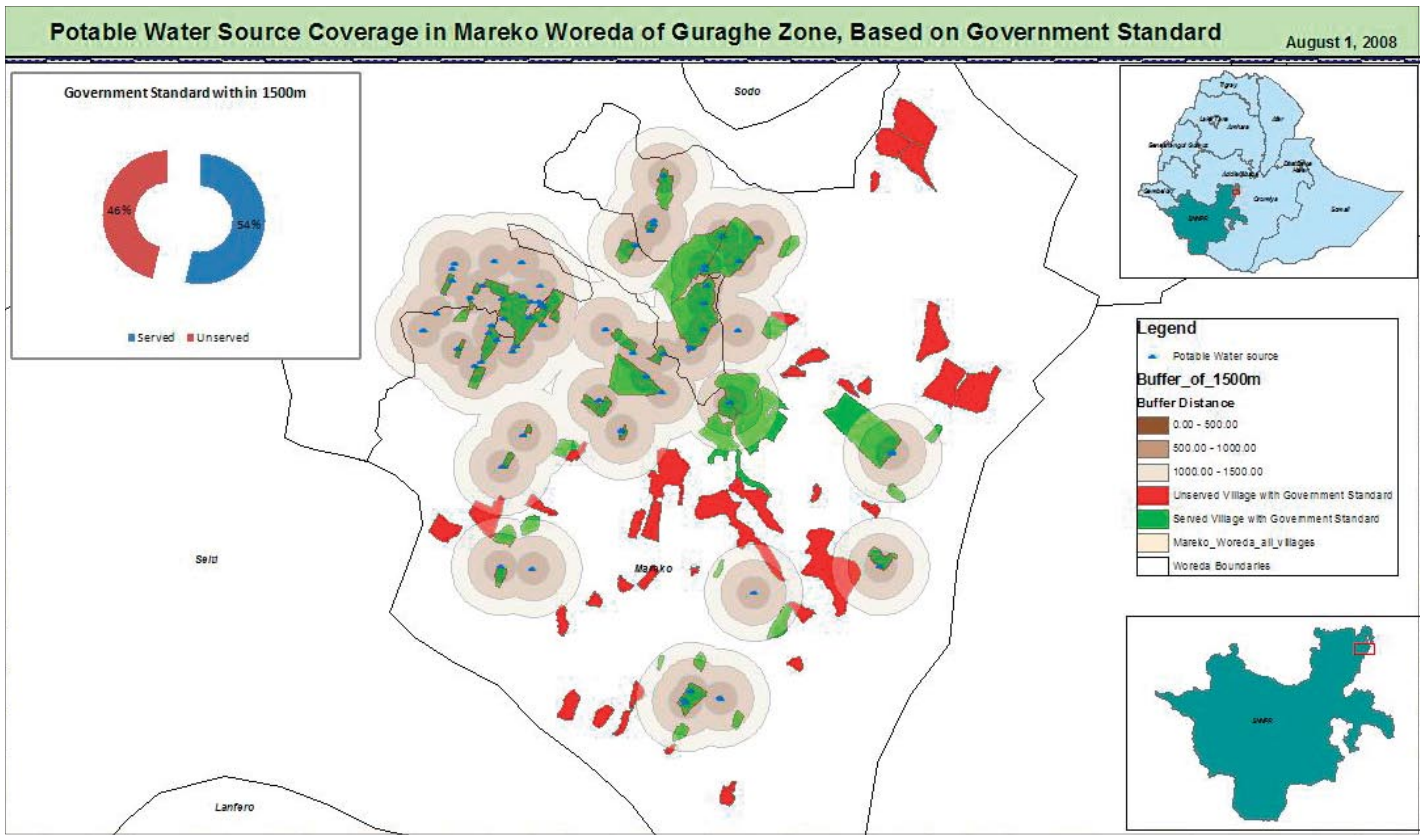
Geographic information has a key role to play not only because of the geographic nature of the issues we all are trying to address but also because geography provides a rapid and meaningful way to aggregate information and place it into a meaningful context. GIS is increasingly underpinning the decision making that takes place in the mashup society in which we now live. Such projects are not restricted to the North: grassroots, crowdsourcing initiatives, like Ushahidi (the international open source data visualizing project), while only leveraging basic points-on-a-map technology, demonstrate the power of simple GIS technology for promoting transparency. What will the future hold where more complex geographic tools are made easily available and usable for the people of the South to tell the compelling stories of the challenges they face in addressing poverty and securing their man-made and natural environments? How will BINGOs assist in telling these stories?

While historically BINGOs have been criticized for working in isolation, a range of factors has transformed and continues to transform the collaborative landscape, especially with regard to information sharing and information as a public good. First, the majority of agencies are now focusing on partnership and supporting local governments as civil society and other organizations address their needs, commitments, and priorities. Second, the interdependency of issues within and across both the natural and man-made world is increasingly making collaboration a prerequisite for success. Third, a range of initiatives is changing the competitive landscape in which we work. Beyond initiatives in the North, like Data.gov, a range of institutional and collaborative frameworks is emerging in the South that not only facilitates collaboration and data sharing but is also beginning to throw down the challenge that others collaborate and share information. For example, in East and Southern Africa, the Regional Centre for Mapping of Resources for Development (RCMRD) is increasingly taking on the challenge of responding to its mission of facilitating access to geographic information and products for use by its member states and beyond. Through engaging in the NASA- and U.S. Agency for International Development (USAID)-initiated Regional Visualization and Monitoring Station (SERVIR) project, RCMRD is ensuring the increasing capacity of its member states to respond to environmental threats such as wildfires, floods, landslides, and harmful algal blooms. The Water Center for the Humid Tropics of Latin America and the Caribbean (CATHALAC), based in Panama, provides a similar role to RCMRD but focuses on Mesoamerica. It will become increasingly challenging for BINGOs to claim the mantle of facilitating transparency if their own efforts are not visible at some level in initiatives like RCMRD. Finally, multisector initiatives, such as Conservation Commons as well as member-driven collaborations within the BINGO sector such as NetHope, are providing the institutional framework for collaboration linked with the single point of engagement for partners to support our collective efforts. For example, with leadership from The Nature Conservancy, WaterAid, and the Wildlife Conservation Society, NetHope is in a dialog with ESRI about how, through collaboration, ESRI technology can benefit the missions of 30 of the world's leading NGOs.

While geography underpins our work and collaboration is increasingly accepted as both a valuable and competitive necessity, we still have a long way to go to achieve the vision that many of us aspire to. Investing in capital projects is a challenge for any organization in the current economic environment. By their very nature, NGOs are extremely resource limited, and the issues we address are, almost without exception, massive in scale: global environmental degradation and biodiversity loss, the needs of billions of people at the bottom of the pyramid surviving on less than $2/day, and disease outbreaks and natural disasters that threaten the livelihoods of millions of people around the globe. In addition, only a percentage of the funds going to BINGOs are unrestricted, that is, funds that the organization is free to decide how they can be used. Even where a capital investment in technology might deliver significant value to an NGO's mission, it may also push up the administrative overhead—one of the most common yardsticks used to compare NGOs' performance. Beyond resources, we must also acknowledge the slow pace of organizational change—and this is not just driven by resources but also by each of our own organizational histories. The fact that data sharing has been, for all intents and purposes, prohibitively expensive has in the past allowed a range of genuine needs to protect data—such as individual health data and locations of endangered species—to expand into a persuasive myth in some organizations that data sharing is not desirable, not a priority, and not possible.

It would shock many readers to discover how few of the major international NGOs have developed a spatial data infrastructure (SDI) for optimizing geographic information investments and sharing information even within their own organizations. For others, this is perhaps less shocking; implementing an SDI remains a challenge in many private-sector organizations, and with a choice between frontline needs and back-office investment, where do you think most people would choose to invest? Many in the NGO sector see the emergence of cloud services, like those available via ArcGIS.com, as an opportunity to leapfrog our peers in the commercial sector and build spatial data infrastructures without incurring the massive hardware and software costs traditionally associated with such work. Of course, this involves more than just logging in and uploading our data—our success will depend on leadership from the private sector, leveraging not just the technology provided but also the wealth of expertise. Perhaps more than anything, the evolving technological landscape and support of our technological partners contribute to the belief of many that we are truly in a position to move the needle in terms of BINGOs' capacity to contribute to geographic information as a public good.

As we do not generate a dollar bottom line, we are all heavily dependent on the wishes and demands of our donors. While donors are increasingly requiring data collected with their funds to be, at some stage, made public, few are



Map of villages in Mareko Woreda (district), Ethiopia, showing villages in two colors (red: communities traveling more than 1,500 meters to fetch drinking water; green: communities within the government water-fetching distance standard, 1,500 meters). Maps such as this are used by the NGO International Rescue Committee to identify gaps in safe drinking water coverage. This map shows that roughly half of the communities in Mareko District need additional water points (courtesy: International Rescue Committee).

fully committing the funds and enforcing the concomitant requirement that data be made public in a secure, timely way that drives outcomes across our missions. Notable exceptions include USAID's PREDICT project, for example. Here, through engaging University of California, Davis, and leading experts in wildlife surveillance, including the Global Viral Forecasting Initiative, the Smithsonian Institution, Wildlife Conservation Society, and Wildlife Trust, USAID is funding a program to monitor, and provide the foundation for a response to, the emergence of new infectious diseases in geographic hot spots. Collaboration and the public sharing of geographic information within the PREDICT project are a central component of its information management strategy. Beyond support from the technology industry, for BINGOs to successfully transform some of their collected data into a public good, donors will need to facilitate a change that will see information sharing being transformed from a poorly specified contractual clause to an outcome-driven, fully funded activity within a project.

So what is the future role of big international nongovernmental organizations in contributing to the world's wealth of geographic information as a public good? There are many reasons to be hopeful and many challenges ahead. Geographic information has a critical role to play not only because of the intrinsic nature of the challenges facing both the man-made and natural worlds but also because it far more easily aggregates, or meshes, into a meaningful story. The signs are strong that we are rising to the challenge of finally consigning to the historical dustbin any suggestion that contributing knowledge and information for the broader public good is beyond our collective capacity. With the continued support of our donors and technology partners, we, as BINGOs, can increasingly move from primarily being consumers of free information goods to taking the lead on contributing to the public information capital that is essential to the success of all our missions.

About the Author

Jonathan Palmer is the Wildlife Conservation Society's director of global information communication technology (ICT). Palmer has a strong professional interest in strategically aligning technology with business objectives. His outstanding technical and analytic skills have enabled him to deliver a range of solutions—from online collaboration and mapping tools for the WCS Global Avian Influenza Network for Surveillance project to the NetHope ICT Database, engaging 30 international NGOs in sharing strategic ICT information. Palmer lives with his wife in northern Tanzania.

More Information

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NGOs and GIS

A nongovernmental organization (NGO) is a legally constituted organization that does not include any participation or representation by a government. NGOs have successfully used GIS technology for many years to help the environment and society. GIS technology enables organizations of all sizes in both the public and private sectors to take advantage of their geographic data—including NGOs that provide services and analysis at the local level as part of the civil society.

Conservation: GIS enhances NGOs' effectiveness with data collection, science-focused modeling, conservation planning, and the creation of maps and visualizations that support various efforts to conserve nature and manage natural resources.

Sustainable development: GIS supports many sustainable development efforts throughout the world, providing policy makers and planning agencies with visualization tools to manage growth and change.

Disaster response: NGOs actively use GIS to support their response to earthquakes, floods, hurricanes/cyclones, wildfires, and other disasters.

Social programs: For humanitarian, health, peacekeeping, and other social programs, GIS technology helps NGOs leverage limited resources and multiply the positive impact of benefits to individuals, families, and society.

GIS-Based Web Site Unites Conservation Science and Practice

By James R. Strittholt, Executive Director, Conservation Biology Institute

Highlights

- GIS is Data Basin's common language-bridging tool through ArcGIS Online.
- Maps are built on a series of ESRI basemaps with Data Basin datasets customized by users.
- Data Basin is vast and provides users with different doorways into the system through ArcGIS Online.

Conservation is becoming increasingly challenging as the world's population approaches seven billion and natural ecosystems are increasingly strained under human demand for food, water, energy, and other natural resources. Global climate change adds a heightened sense of urgency to find solutions to a growing list of complex conservation problems. To attain true ecological sustainability, we must find effective solutions to the myriad of conservation problems we face, and we must act quickly through a variety of means—new policy creation, altered management strategies, and changes to individual behaviors.

Conservation is all about place; therefore, mapping plays an integral part in successfully addressing many of today's conservation challenges. Whether it is planning for wildlife connections across a human-dominated landscape, designing strategies to minimize or offset new human infrastructure like roads and pipelines, or developing forest management plans that significantly lower the impact on native species and protect water resources, mapping is fundamental to finding solutions to these issues.

While it is impossible to know everything, many believe we know far more than is currently being applied. In many instances, the barriers to finding and implementing solutions are more constrained by political and social reasons than by the lack of scientific or technical knowledge. For example, conservation scientists and conservation practitioners too often operate in separate spheres or communities, and all would benefit greatly if they could find a common space to share and interact. Likewise, everyday citizens are keenly interested in many conservation issues and welcome the opportunity to participate to make a meaningful contribution.

Is it possible to bridge conservation science and conservation practice using GIS as the common language? Could a GIS approach be fashioned that would meet a high scientific standard while, at the same time, appeal to nonscientists? Could the political and social challenges we face be addressed simultaneously with the technical ones? And finally, could a solution be constructed that would have immediate benefits but be flexible enough to meet new social and technical challenges in the future? These were the questions the Conservation Biology Institute (CBI) was asked to address by the Wilburforce Foundation, which has spearheaded this effort.

After more than two years of design, programming, and user prototype testing, the Conservation Biology Institute has launched a new Web site called Data Basin. Built on the ArcGIS Online technological foundation and with direct support from ESRI's Professional Services staff, Data Basin is an innovative Web tool that is free and available to all users.

Data Basin is based on six major building blocks—datasets, maps, galleries, people, groups, and tools. Users can easily search for any or all of these items within the system.

• Datasets are spatially explicit files, currently shapefiles and ArcGrid files, with other formats (e.g., image files and geodatabases) being incorporated soon. These can be biological, physical, or socioeconomic datasets that can be uploaded by users, downloaded, or visualized inside Data Basin. More than 1,000 datasets are currently in the Data Basin warehouse, with more being added every day. In addition, Data Basin is linked with other Web map services allowing greater content to users. While data sharing is the primary theme of Data Basin, sometimes privacy is required to advance conservation. Therefore, users can elect to make datasets they upload totally private, available to specific groups, or available to everyone. Some types of datasets are the following:

• Maps are visualized datasets created with easy-to-use tools within Data Basin. Maps are built on a series of ESRI basemaps with Data Basin datasets customized by users. Maps can be kept private, shared with groups, or made public. Users can critique maps with provided drawing and commenting tools.

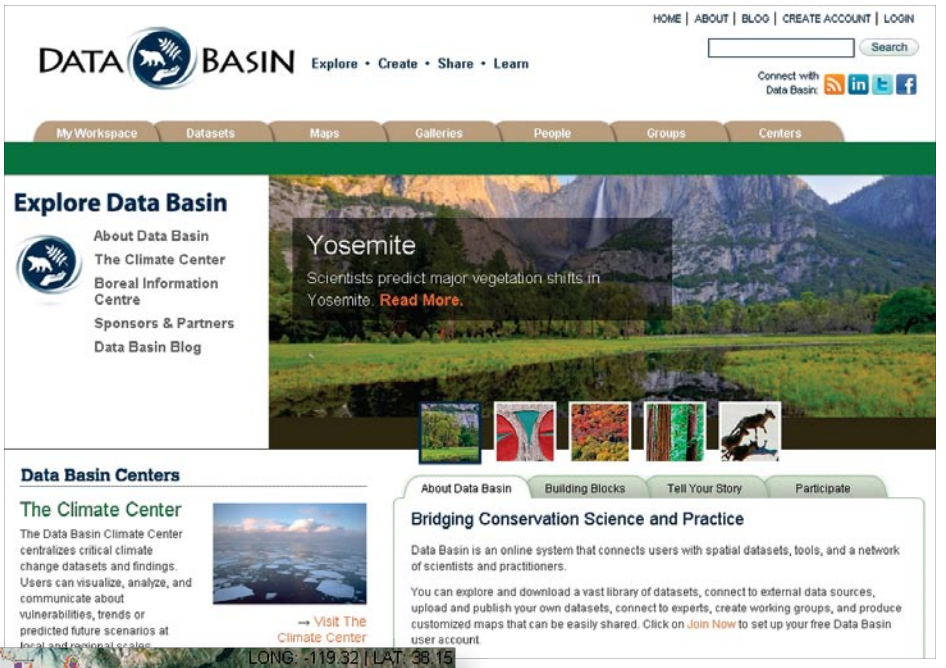
• Galleries are meaningful collections of datasets and/or maps created by Data Basin users. Users and organizations can publish galleries (including studies, atlases, and books) that others can easily find and use. Examples of galleries in Data Basin include the Commission for Environmental Cooperation (CEC) *North American Environmental Atlas* and the *Atlas of Alberta: The Last Great Intact Forests of Canada,* by Global Forest Watch Canada.

• People are members of the Data Basin community. Users can search profiles to find data providers, potential collaborators, or interested audiences.

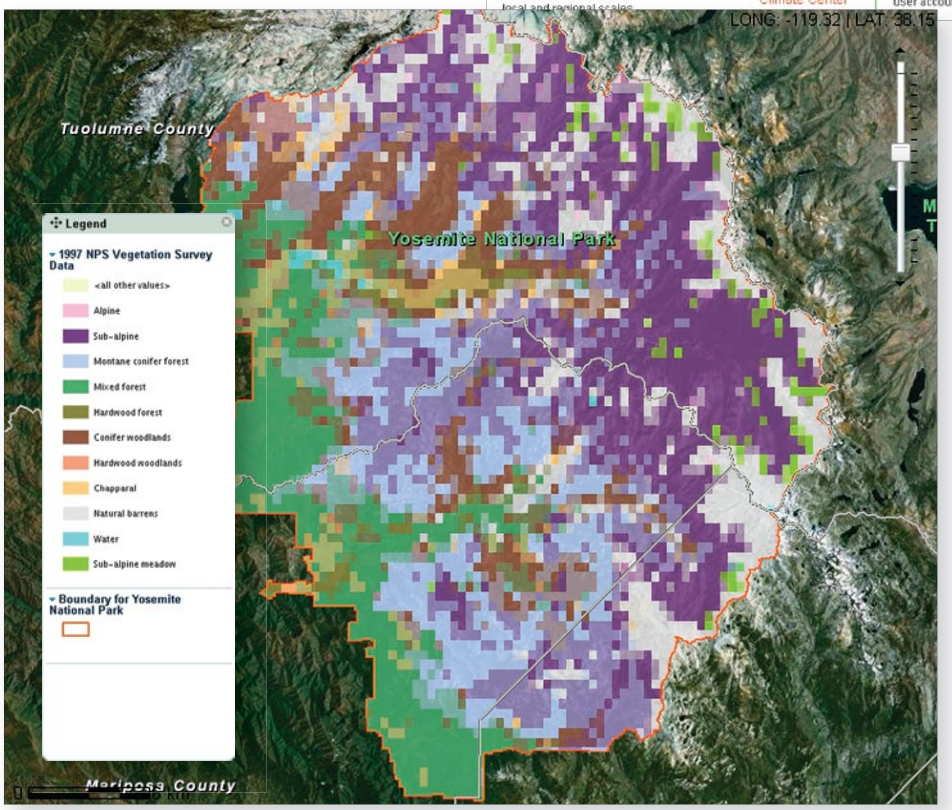
• Groups are user-defined subsets of Data Basin users collaborating on a specific topic or issue. Group members can share, analyze, and discuss datasets and maps. Data Basin allows private (closed) and public (by request) groups. Groups can be used to conduct peer review, negotiate a conservation solution between disagreeing parties, generate products from a working group on a specific topic, and more.

• Tools are map-based, analytic functions provided to users to help them answer basic conservation questions using the available datasets. Tools are being developed by CBI or outside partners, such as The Nature Conservancy and the University of Alberta, for inclusion in Data Basin. Those currently in development include an environmental risk avoidance tool, protected areas planning tool, and watershed assessment tool.

Anyone with an ESRI Global Account can join Data Basin. Once registered, users are asked to complete a simple, editable profile page so others can get to know them. Users are then provided with their own private workspace where they can easily organize content that they contributed or find in the system; create and edit personal profiles; manage their account; track creation of datasets, maps, and galleries; and manage their group activity.



Data Basin home page. Note featured content and direct links to social media outlets.



Public map created by a Data Basin user showing vegetation of Yosemite National Park in 1997.

Data Basin is closely integrated with various social media platforms—Twitter, Facebook, and LinkedIn—and has incorporated RSS feeds throughout the site for easy topic or item monitoring by users. Now users can interact easily with conservation data and maps, as well as each other, in the same system.

The depth and breadth of Data Basin is so vast that breaking up some of the content for users was important—to essentially provide users with different doorways into the same basic system. This was attained by introducing the concept of *centers*. Centers are topics or geographies of special interest to Data Basin users. Users can find specific datasets, maps, galleries, people, groups, and analytic tools under each center. Three centers currently exist within Data Basin. Thanks to generous support from the Kresge Foundation, the Data Basin Climate Center and Aquatic Conservation Center have been initiated. The Boreal Information Centre is the third center and focuses on conservation of the North American boreal forest region. This center is currently funded by the Ivey Foundation, Limited Brands, TNC, and Toronto Dominion Bank. Other centers are being designed and include a Connectivity Center, a Conservation Education Center, and an Aboriginal Peoples Center.

In addition to the datasets and maps, Data Basin provides users with information about conservation based on the ever-growing content of the site. Various components are routinely featured, giving emphasis to noteworthy contributions. Data Basin supports its own active blog with content frequently updated by CBI staff and guest bloggers.

About the Author

Jim Strittholt is executive director of the Conservation Biology Institute, Corvallis, Oregon, and has over 10 years' experience in applying computer mapping technologies (including GIS and remote sensing) to address various ecological assessments and conservation planning projects in the United States and internationally. He holds a master's degree from Miami University (Oxford, Ohio) and a Ph.D. from Ohio State University.

More Information

For more information, visit **www.databasin.org** or contact Jim Strittholt (e-mail: stritt@consbio.org, tel.: 541-757-0687); Tosha Comendant, Data Basin project coordinator, Conservation Biology Institute (e-mail: tosha@consbio.org, tel.: 707-266-4270); or Erin Ross, ESRI (e-mail: eross@esri.com).

Reforming Economic Development and Fighting Sprawl with Effective Maps

Highlights

- With GIS, Good Jobs First has produced many sophisticated studies.
- Nonprofit uses GIS to strengthen its argument that states should rewrite their economic development program rules.
- ArcGIS was used to create a regional impact study of workers dislocated in a plant closing.

Jobs are a red-hot topic these days; public officials are under terrific pressure to create and retain them. As a result, tax breaks and other economic development incentives to stimulate the economy are getting a lot of attention. Unfortunately, such programs are poorly understood and often given loaded labels such as "corporate welfare." Companies threatening to leave are committing "job blackmail," and those that stage multistate competitions are exploiting "the economic war among the states."

A more descriptive term is job subsidies. But whatever their name, reforming incentives is no small task: the average U.S. state has three dozen programs on the books, costing states and cities an estimated $60 billion a year. They range from straightforward training grants to arcane programs like tax increment financing, enterprise zones, and film production tax credits.

Enter Good Jobs First, an activist nonprofit based in Washington, D.C., that helps grassroots groups and public officials cut through the jargon. Founded in 1998 by Greg LeRoy, it provides research, Web tools, training, and consulting with a staff of eight (including two in New York City, New York). LeRoy had worked on the issue since the late 1970s at two other nonprofits in Chicago, Illinois.

As the executive director of a group for the first time, LeRoy was challenged: how to make the issue crisp and compelling. A fan of Edward Tufte—professor emeritus of political science, statistics, and computer science at Yale University—and a student of how research is presented graphically, LeRoy's first hire was a GIS-trained planning school graduate. Their first study was about wages: Minnesota had passed a landmark reform requiring companies to disclose the pay levels of workers hired in incentive deals.

They stumbled on Anoka, a far-north suburb of Minneapolis, Minnesota, which had filled up an industrial park with 29 companies pirated from Minneapolis and older inner-ring suburbs. LeRoy realized he had struck a data gold mine: subsidized job relocations that could be mapped for a sprawl analysis. Good Jobs First received a copy of ArcView (courtesy of Ralph Nader in 1999) and a study grant from the Joyce Foundation and issued *Another Way Sprawl Happens* in early 2000.

The findings were disturbing and received prominent media coverage: the net effect of the relocations was to move jobs away from poverty, people of color, and transit access. It was the first time company-specific incentive deals had been mapped and analyzed for their land-use impact.

Good Jobs First has since produced a string of increasingly sophisticated studies, using ESRI products in-house or with partners. The largest is *The Geography of Incentives: Economic Development and Land Use in Michigan.* Funded by the Charles Stewart Mott Foundation, it maps 4,000 deals in seven metro areas and sorts the deals through the lens of Myron Orfield's community typology and other criteria. In a state hard hit by the decline of manufacturing, the most damaging images involve job loss as well as creation: it is the first time incentives have been geographically juxtaposed against plant closings and mass layoffs (as officially notified under the federal WARN Act). For the state's most generous subsidy, the maps of the largest metro areas like Detroit, Michigan, show very few deals going to the central city or the densest inner-ring suburbs, even though those areas have suffered the vast majority of shutdowns. For some, the images conjure up redlining, the practice of geographic discrimination that banks and insurance companies have been accused of.

Good Jobs First has produced several more such studies, all funded by the Ford Foundation. "Reverse Robin Hood" was the banner business-section headline of the *Chicago Tribune* reporting on 15 years of State of Illinois investments in the six-county Chicago metro area. The Good Jobs First maps revealed that one in six company-specific subsidies went to a small slice—the Northwest (O'Hare) Corridor—an enormously attractive place with the nation's second-busiest airport and several feeder freeways, the engine of the region's wealthiest quadrant. By contrast, large swaths of Chicago's South Side and its low-income and predominantly African-American southern and western suburbs got few deals or none. At a Chicago Urban League forum, the state's commerce secretary was publicly chastised.

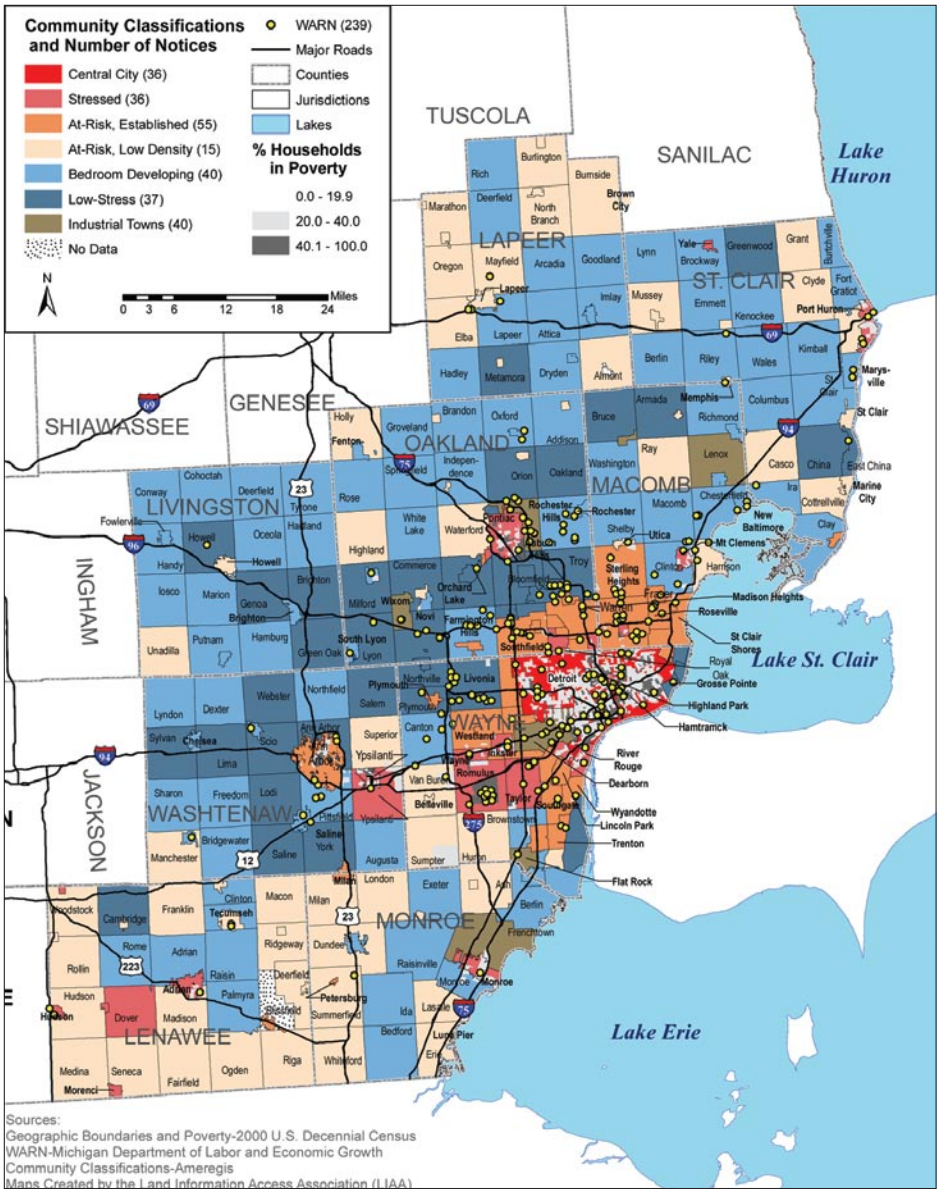
Another study revisited the Twin Cities (*The Thin Cities*) where state legislators had responded to the Anoka study by adding a disclosure-form question: Did this deal involve a move, and if so, from where? Eighty-six times, the study revealed, companies had received subsidies simply to move around within the metro area, and the moves were overwhelmingly outbound: 22 were more than 10 miles outbound. The relocations were analyzed by race, poverty, welfare, and tax base wealth—and for their impact on workers who cannot afford a car: 60 of the 86 moves made jobs inaccessible via public transit (including 26 that had been accessible). The bottom line: longer commutes and more air pollution; a depleted tax base for places already poorest; and more low-income and workers of color spatially trapped, unable to compete for new jobs.

Two of the most recent studies were done in-house with ArcGIS. *Sprawling by the Lake* found similar inequities in the Buffalo-Niagara metro area of New York. And another study of relocations—covering Cleveland and Cincinnati, Ohio—shows companies moving away from older areas to get lucrative enterprise zone tax breaks.

The policy punch line of the sprawl studies is simple: states (which legally enable and regulate incentives) have two "policy silos" that are utterly disconnected and often at war: economic development versus planning for transportation and land use. Therefore, Good Jobs First argues, states should rewrite their economic development program rules to make them subordinate to planning goals. Incentives are tools and nothing more, and they can be reformed to reduce sprawl and promote regional equity, but only if a state is intentional about it.

Good Jobs First has also created startling unpublished maps for labor leaders. In Chicago and Philadelphia, Pennsylvania, it mapped the geography of unionization and found that across the board, as jobs thin out, they deunionize. As a Chicago Federation of Labor officer reacted, "Now, sprawl looks like a giant antiunion conspiracy." After Good Jobs First publicized the findings within labor, the national AFL-CIO passed a convention resolution condemning sprawl and urging its affiliates to weigh in for smart growth.

The smart growth movement has historically paid too little attention to jobs, Good Jobs First argues. Indeed, the original 10 principles of smart growth do not contain the word job or workplace. By using maps to dramatize how incentives fuel sprawl and how sprawl hurts union members, Good Jobs First has brought a new public policy hook and a new constituency to the cause.



Detroit metro area plant closings and major layoffs, 2001–2004.

Good Jobs New York, Good Jobs First's New York City project, has produced Subsidy Snapshots, or brochures with community maps showing company names and incentive deal details. In both Manhattan and Queens, New York, the snapshots were co-released with the borough president; they are being used by job training providers who seek to place trainees at companies that are committed to job creation. Good Jobs First most recently used ArcGIS in a regional impact study of workers dislocated in an Indiana plant closing.

These pioneering mapping studies have enabled Good Jobs First to reach large, new audiences; firmly connect incentives to sprawl and all its attendant injustices; and inspire some public officials to start rewriting the rules. No bar chart or correlation graph could have carried the messages so powerfully as maps.

More Information

For more information, contact Greg LeRoy, Good Jobs First (e-mail: goodjobs@goodjobsfirst.org; tel.: 202-232-1616, ext. 211; Web: **www.goodjobsfirst.org**).

GIS for NGOs—Free E-book

ESRI is pleased to make available *Non-Governmental Organizations,* an easy-to-access, no-cost booklet featuring articles from ESRI publications showing how professionals within nongovernmental organizations (NGOs) are using GIS to help them make the best use of their resources.

Begun three years ago, ESRI's Best Practices series now contains more than 30 e-books that cover a wide range of topics in GIS, such as science, retail business, law enforcement, and air quality. These e-books are instantly available online at no cost. Published as PDFs with color illustrations, they can be read online at the ESRI Web site or downloaded and printed. Additional titles become available frequently.

See Complete List

For a complete list of GIS Best Practices e-books currently available, visit **www.esri.com/bestpractices**.

Using GIS to Bring Accountability and Transparency to International Relief Efforts

Highlights

- INTOSAI improves the accountability and audit of the flow of international aid by using GIS.
- GIS and imagery are used to prevent waste, duplication, fraud, and competition between aid organizations.
- INTOSAI uses GIS to audit contract management risks.

More than 100 international agencies, including nongovernmental agencies, came to the aid of Aceh Province in Indonesia after the 2004 tsunami. That year, a magnitude 9.1 earthquake in the Indian Ocean set off a devastating tsunami with waves up to 30 meters high striking Southeast Asia. Almost 230,000 people in 14 countries lost their lives. The greatest damage occurred in Aceh Province on the northern tip of Sumatra. The coastal region was leveled. Water rushed inland as far as four kilometers, in one instance carrying with it a 2,600-ton barge and depositing it to languish as a reminder of what had happened. The tsunami severely impacted services and infrastructure throughout Aceh Province. Water, sewer, and electrical systems were destroyed and had to be reestablished. Even transporting supplies and the labor force to the affected areas was hampered, because the road along the west coast had been severely damaged or completely washed away in large sections.

Seeing the region today, little evidence remains of the devastation, as Aceh Province continues to not only recover but also, as the government's motto says, "build back better."

Understanding Geography to Provide More Effective Aid

From the beginning, GIS played an important role in mapping the impact of the disaster, guiding emergency responders to the devastated areas, and coordinating the relief effort. International agencies' host nations contributed US$4.5 billion to the rebuilding effort.

It was important to ensure that contributions went to the people who needed the help so that the next time a disaster occurred, such as the magnitude 7 earthquake in Haiti and the magnitude 8.8 earthquake in Chile, countries would once again be willing to provide relief. Trying to meet the challenge of following the global audit trail with the help of GIS is the International Organization of Supreme Audit Institutions (INTOSAI).

INTOSAI, based in Vienna, Austria, serves as an umbrella organization for the international government audit community. The organization is autonomous and nonpolitical, working with the United Nations Economic and Social Council (ECOSOC). ECOSOC sets forth policy recommendations for promoting higher standards of living; identifying solutions to international economic, social, and health problems; and encouraging universal respect for human rights. For more than 50 years, INTOSAI has provided a framework to improve government auditing worldwide.

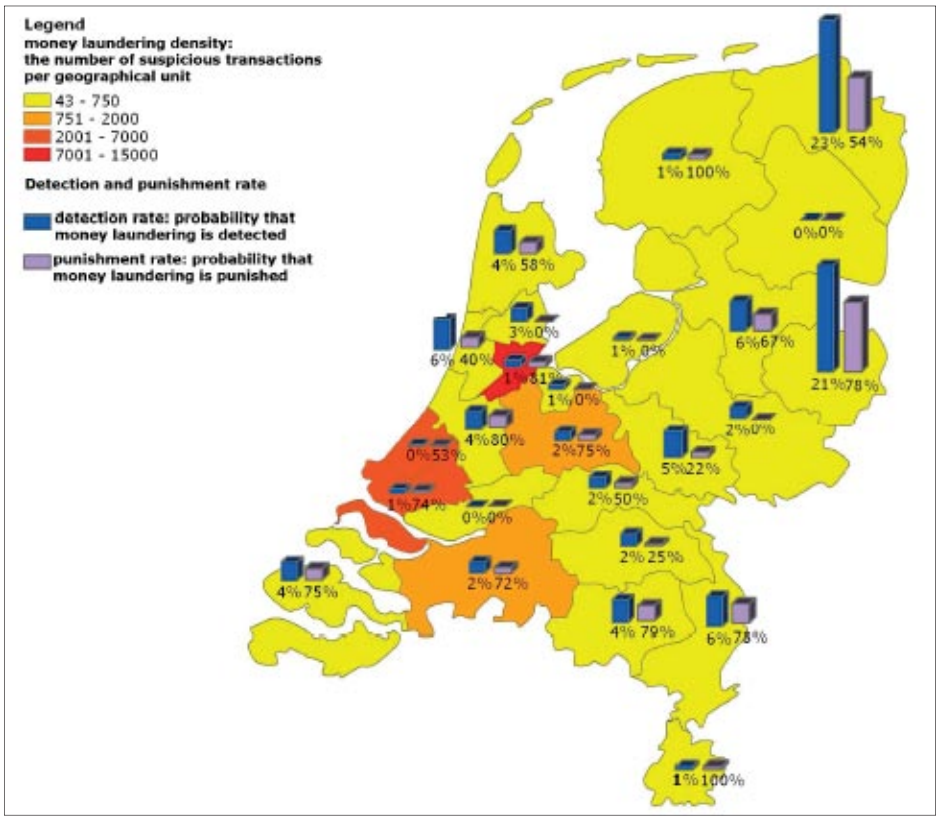
Over the last few years, INTOSAI has learned how to improve the transparency, accountability, and audit of the flow of international aid by using GIS.

Wanting to take a lesson from one of the countries affected by the tsunami, representatives of INTOSAI's Tsunami Task Force attended a weeklong training course in the spring of 2006 at Aceh's Syiah Kuala University. It was hosted by the GIS and Remote Sensing Laboratory at the university. The Tsunami Task Force members learned how to use geospatial information to help plan, coordinate, monitor, and audit disaster-related aid. The session was taught by staff from Badan Rehabilitasi dan Rekonstruksi NAD-Nias, the temporary building and reconstruction arm of the Indonesian government in Aceh Province. Auditors from the Indonesian Supreme Audit Institute (Badan Pemeriksa Keuangan) followed an intensive course focused on GIS and the use and integration of imagery data in their work. Training was provided by the International Institute for Geo-Information Science and Earth Observation, now part of the University of Twente in the Netherlands. ESRI provided ArcGIS licenses for a hands-on tutorial.

Pilot Leads to Auditing Worldwide

As a result of the training, the Netherlands Court of Audit—the chair of the Tsunami Task Force and a member of INTOSAI—set up a knowledge center in 2007 that explores how GIS and geospatial data can be used in auditing. The center was supported by ESRI Nederland B.V., ESRI's distributor in the Netherlands. A year later, the Netherlands Court of Audit obtained ArcGIS licenses and trained its first group of auditors. Today, it uses GIS to map the results of combating money laundering in the Netherlands. The technology is also used to help social programs target services for homeless children and for the distribution of Dutch funds for development assistance worldwide. By providing a visual representation, the Court of Audit can account for where money has gone and measure the success of policy measures. INTOSAI is now urging nations and agencies to use GIS and geospatial information for transparency and accountability as aid flows to Haiti and Chile for the earthquake recovery effort. In the Netherlands alone, about 100 million euros were collected for Haiti, with about 43 million euros coming from the Netherlands government.

The Netherlands Court of Audit intends to use its GIS knowledge and expertise to advise the Dutch Ministry of Foreign Affairs and a group of major nongovernmental organizations on how to enhance transparency and accountability for tracking aid monies for Haiti.



GIS analysis helps visualize data and combat money laundering.

GIS Is Required for Effective International Aid Auditing

INTOSAI promotes the use of GIS and imagery data to plan, coordinate, and monitor disaster-related aid in order to prevent waste, duplication, fraud, and competition between aid organizations. The organization believes using GIS leads to facilitating more efficient and effective audits of disaster-related aid since it is geographic in context: aid is intended for a specific location, whether it be to reconstruct and rehabilitate infrastructure, buildings, and farmlands or assist the people who live there. Besides the Netherlands Court of Audit, examples of effective use in aid abound, including the United Nations World Food Programme, which uses satellite images and GIS to locate refugees and plan the distribution of food. The International Criminal Court uses satellite images to locate refugee camps and gather evidence on human rights violations, such as the destruction of villages. The European Commission's Directorate-General for Agriculture has used GIS successfully over several decades in its Monitoring Agriculture through Remote Sensing project. The program helps European member states make decisions on where aid should be provided based on remotely sensed data and statistical input to allocate agricultural and environmental subsidies.

GIS benefits all stages of an audit from assessing relevant risks and designing, conducting, and analyzing the audit to communicating the results:

- *Assessing relevant risks*—GIS can analyze the geographic spread of projects that are behind schedule, the use of certain contractors in a region, and the geographic spread of funds allocated. Remotely sensed data can be used to quickly verify information in databases with information from the field, for example, whether houses registered as finished actually appear to be on current imagery.
- *Designing the audit*—GIS can be used to focus on projects behind schedule in order to audit contract management risks or focus on projects on schedule to audit performance, such as the quality of the houses and occupation rates. Field visits by the auditors can be planned more effectively through establishing the locations to which teams need to be sent as opposed to the locations for which the auditors can rely on remotely sensed data.
- *Conducting the audit*—By combining geographic data from GPS and satellite-based maps with audit field data, the data can be analyzed immediately. The data can then be used throughout the project.
- *Analyzing the audit*—Analyzing large quantities of data is possible and understandable with GIS. For example, when looking at settlements in Aceh Province that were affected by the tsunami, data on the loss of school buildings and surviving children and location-specific information, such as elevation and the location of the destroyed buildings, helped auditors better measure whether schools had been built in areas where they were needed.
- *Communicating the results*—GIS provides a visual means of communicating that is immediately understood by the audience.

INTOSAI has published its findings in a report, *Lessons on Accountability, Transparency, and Audit of Tsunami-Related Aid*. INTOSAI also produced and distributed a flyer to help the auditing community understand why GIS and geospatial information are so important to the relief effort.

More Information

For more information, contact Egbert Jongsma, Netherlands Court of Audit (e-mail: e.jongsma@rekenkamer.nl), or visit www.intosai.org to read more about INTOSAI's final report on the accountability for and audit of disaster-related aid.

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User Conferences to Take Place This Fall in Mexico City and Rome

Regional User Conferences Highlight New Technologies and Innovative Applications

Professionals who are part of the international ESRI user community are encouraged to attend their region's GIS user conference. "These events are an exceptional supplement to other ESRI education opportunities, such as training classes, the online resource centers, and the ESRI International User Conference (ESRI UC), in the states every summer," says ESRI president Jack Dangermond. "I hope many users will join us in the coming months and realize the benefits of these events."

2010 ESRI Asia Pacific User Conference

The 2010 ESRI Asia Pacific User Conference (APUC), combined with the ESRI Australia Pty. Ltd. 2010 client conference (OZRI), took place March 3–5 on Queensland's Gold Coast, in Australia. More than 500 delegates from eight countries in the Asia Pacific region attended. The new APUC and OZRI combination provided a large forum for users to build their GIS knowledge base and network with other users, as well as ESRI staff and business partners.

With the conference theme, "GIS: Extending the Reach," the APUC focused on how GIS has evolved from being seen as a tool to only connect information to a location to being recognized as a valuable system that delivers tangible benefits, such as improved analysis and productive workflows. The agenda revolved around how successful, modern GIS solutions are being implemented at all levels from governments and companies to communities and individuals.

"It was exciting to see how an increasing number of organizations are taking GIS beyond traditional boundaries to deliver real benefits and significant outcomes," says Brett Bundock, CEO of ESRI Australia. "Organizational, technical, and geographic accomplishments were shared via this excellent regional forum for our users."

Dangermond gave the Keynote Address and discussed how the geodesign concept helps extend the reach of GIS to address important societal issues. Geodesign, which pairs geospatial technology with design, is not simply observing geography, as Dangermond says, but it is actively designing the future and the world, integrating information and science with creativity, engineering, planning, and more.

Also during the Plenary Session, there was a presentation about the Koala Diaries Web site that won ESRI Australia the GIS in Community Award. The site was created to undertake a koala sighting census. Though it came together quickly, the project was a first in terms of integrating geographic technology with community engagement to record the occurrence of a single species in Queensland. The information is available to government agencies and other stakeholders, showing how many koalas are left in the area, where they live, and in what condition; this helps with policy making and scientific research. The site can be viewed at **www.koaladiaries.com**.

Technical experts presented papers during the plenary as well and held technology sessions throughout the conference. Visitors learned key GIS information, including the new tools and capabilities of ArcGIS 10. In addition, user presentations gave attendees the chance to see how organizations around the world have leveraged GIS to overcome issues and succeed.

To find out more about the conference, see pictures, or order the proceedings DVD, visit **www.esriaustralia.com.au/ozri**. The next APUC will be held in Manila in the Philippines; the date is to be determined.

2010 ESRI Latin America User Conference

The 17th annual ESRI Latin America User Conference (LAUC) is being hosted by SIGSA, the ESRI distributor in Mexico, and will take place September 22–24, 2010, in Mexico City at the Sheraton Maria Isabel Hotel & Towers. The conference venue is located on the Paseo de la Reforma and overlooks the famous Angel of Independence monument. One thousand professionals are expected to attend this year's LAUC, which is the premier event for users throughout Latin America.

"The LAUC prides itself on being usercentric and focused on new GIS trends such as ecosystem GIS mapping," says Carlos Salman, CEO of SIGSA. "It's the best regional GIS event to be part of in Latin America. So, if you're interested in GIS technologies, case studies, and a way to develop your GIS knowledge, skills, and network, this is the right place to be."

The gathering is also a way to hear about real-world GIS applications and projects during informative and inspiring paper presentations. User abstracts are being accepted for possible presentation at the conference. The deadline for submissions is August 30, 2010.

This year, the LAUC will host the Conference for Education on September 21 as an opportunity for academics and researchers to share their GIS ideas. To learn more about the conferences, visit **www.sigsa.info/lauc2010**.

2010 ESRI Europe, Middle East, and Africa User Conference

The 2010 ESRI Europe, Middle East, and Africa User Conference (EMEA) will be held October 26–28 in Rome, Italy, at the Ergife Palace Hotel. The EMEA is being hosted by ESRI Italia, the ESRI distributor in Italy. This reunion of the European User Conference (EUC) and Middle East and North Africa User Conference (MEAUC) will give users in these regions the chance to meet with an even larger ESRI community—approximately 1,000 attendees are expected.

"We're very excited about combining the conferences again," says Dangermond. "We anticipate a comprehensive event that will serve our users well and lead to some fantastic discussions and ideas."

There will be preconference workshops; paper sessions divided into nine different tracks, including one for the United Nations; technical workshops; an exhibition; and training sessions. These offerings will explore how to apply geography and technology to solve problems, increase profitability, and help build better businesses and communities.

Abstracts are being accepted for possible inclusion in the paper session schedule. Users are encouraged to talk about their GIS experiences with this diverse audience of their peers. The deadline for submissions is September 8, 2010.

More information about the conference is available at **www.esri.com/emea**.

More Information

For a complete listing of ESRI events worldwide, visit **www.esri.com/events**.

Partner Conference Focuses on ArcGIS 10

Conference Proves Partners Are Helping to Advance GIS

"I've never been so excited and energized; there are so many opportunities to spread geography everywhere and extend the reach of GIS," said ESRI founder and president Jack Dangermond during the Plenary Session at the 2010 ESRI Worldwide Business Partner Conference (BPC). The BPC took place March 21–23 at the Palm Springs Convention Center in California.

Jack Dangermond at 2010 ESRI Worldwide Business Partner Conference.

ESRI partners represent a global network of organizations that integrate and expand a variety of technologies and solutions for a broad range of industries. They collaborate with ESRI to take GIS into new markets, assist customers with ESRI technology, and strengthen the GIS user community. In return, partners are able to develop their businesses, grow their presence in the GIS market, and cultivate their relationship with ESRI. The BPC is an excellent resource for partners as it serves as a forum to help them stay current on GIS and connected to ESRI. "It's partners helping partners," says Dangermond.

"We came away from this conference with new partner-to-partner relationships and new opportunities in the pipeline," says Kevin Daugherty, vice president of sales and marketing for the Sidwell Company based in Illinois.

"The BPC is an incredible venue to catch up with all the ESRI distributors from around the world as well as all of the ESRI partner staff that we work with throughout the year; the event is just the right size to have engaging conversations with these key people," says Brian Boulmay, director of business partners at OpenSpirit Corp., which took home the ESRI Partner of the Year Award for the energy industry this year.

With an agenda focused on extending the reach of GIS, the conference's sessions, user presentations, demonstrations, and discussions centered on how ESRI and partners can work together to widen the scope of GIS capabilities and the organizations leveraging the technology.

Talking Shop About ArcGIS 10

During the plenary, Dangermond reflected on last year's partner successes and discussed what the future holds for GIS including the ArcGIS 10 release, the biggest in ESRI's history. "There's been new technology, new business models, and new competition," said Dangermond. "Now we have a new platform for what we all do in both the business and government spaces." He shared how ArcGIS 10 better supports the cloud, Web services, new media, and data sharing and makes the entire system richer yet easier.

ESRI staff also presented during the opening session, demonstrating some of the biggest ArcGIS 10 advancements, from freeware and imagery to mobility and fewer clicks of the mouse. Damian Spangrud, the ArcGIS product manager, highlighted how some of the changes to ArcGIS Desktop are "going to transform how people use GIS. It's simpler, more productive, resulting in better maps and better workflows." ESRI's John Calkins used a Yosemite National Park safety demonstration to show how the data searching, map panning, and geoprocessing of ArcGIS 10 result in fewer mouse movements and clicks that save as much time as a week a year. Bern Szukalski, the ArcGIS Explorer product manager, talked about accessing new maps and data online via ArcGIS Online, ESRI's new online GIS. Szukalski also demonstrated the new browser-based version of ArcGIS Explorer, which further simplifies and improves the way GIS information is accessed and shared online.

Building Knowledge and Relationships

User presentations; industry trend sessions; demonstration theater presentations; and networking activities, such as the GIS Solutions EXPO—which featured more than 30 exhibitors—and the Jim Christoffersen Golf Classic, kept partners busy. The summit offered technical sessions and a keynote presentation given by technology expert David Chappell of Chappell & Associates.

Josh Lewis, ESRI's new partner program director, hosted two sessions about the recently launched ESRI Partner Network. The new approach to partnering rests on simplicity, from programs and contracts to success sharing. "It's one program, two pathways (solutions or services), and three valuable tiers (silver, gold, or platinum)," Lewis says.

Attendees also met with ESRI's industry solutions experts to discuss projects and possibilities in their market. They met the development teams as well and explored specific technical topics, such as what is required to move solutions to version 10.

Celebrating Achievement and Commitment

Awards were given out at the BPC to recognize partners for their outstanding achievement over the past year in the areas of solution development, services or sales, and fostering ESRI technology into key markets. "I'm very proud that our relationships continue to work year after year," Dangermond says. The 12 organizations that have been partners for more than 20 years were also honored during a special breakfast at the conference. "It takes collaboration to execute and deliver quality products and services to clients," says Jeremy Peck, ESRI (UK) Ltd. sales director. "No company these days is an island."

More Information

More information about the BPC, including videos, conference proceedings, and the 2010 ESRI Business Partner Awards, is available at **www.esri.com/bpc**. To learn more about the ESRI Partner Network, visit **www.esri.com/partners**.

ESRI Partner Offerings

ESRI maintains relationships with more than 2,000 partners that provide focused assistance to our customers. These partners have extensive experience providing GIS solutions and services across several industries. Our partners offer solutions and services that range from custom ArcGIS applications to complete system implementations. In this issue, we would like to recognize a handful of our partners that helped us launch the ESRI Partner Network. For a complete list and description of our partners and their offerings, visit the ESRI Partners Web site at **www.esri.com/partners**.

Enterprise GIS
3-GIS
www.3-GIS.com
3-GIS Express Solution
The 3-GIS Express Solution product suite combines several applications from 3-GIS into an enterprise system that delivers advanced mapping technology to desktop, field, and administrative users. Components of Express Solution, including Field Express Chameleon, Network Express, Conductor, and Buzz, leverage ArcGIS Server technology to provide enterprise capabilities and services at a reduced cost. As an integrated suite of applications, 3-GIS Express Solution gives users GIS-enabled asset management on a user-friendly platform.

Systems Migration
Latitude Geographics
www.geocortex.com
Geocortex Essentials
Geocortex Essentials simplifies the process of migrating from ArcIMS to ArcGIS Server. Built for ESRI's next-generation development platforms, Geocortex Essentials helps users immediately leverage a wide variety of tools and core components available off the shelf. These tools, which are customizable and extensible, are designed to keep users' organizations closely aligned with the long-term evolution of ESRI's Web-based GIS platform.

Aeronautical Charting
CGx AERO in Sys
www.aeroinsys.com
AIP-GIS Charting
AIP-GIS Charting is a platform for editing and updating all International Civil Aviation Organization (ICAO)-compliant Aeronautical Information Publication (AIP) charts in a georeferenced environment. Built on top of Production Line Tool Set (PLTS) for ArcGIS—Aeronautical Solution, AIP-GIS Charting extends and automates the necessary processes for creating, producing, and maintaining aeronautical charts. AIP-GIS Charting also includes ICAO-compliant templates that help organizations reduce production time while leveraging industry standards.

GIS Services
PenBay Solutions
www.penbaysolutions.com
In-Vision OnePass
In-Vision OnePass is a facilities data capturing service that provides spatially referenced interior datasets by collecting room geometry, assets, and attributes and conditions in a single pass. By integrating with a GIS, PenBay's OnePass service allows users to quickly visualize and leverage this data in their workflows to help create an effective facility information infrastructure inside the building footprint. OnePass helps real property and public safety organizations alike make better decisions regarding the true state of building interiors.

Application Design
GEOCOM Informatik AG
www.gdn.geocom.ch
GDN Studio
GEOCOM's GEONIS product family is a generic GIS application framework based on ArcGIS Desktop and ArcGIS Server. GDN Studio is a new offering from GEOCOM that allows users to design and customize GEONIS applications. With GDN Studio, users can generate tools, such as forms, reports, data lists, and menus, that can be run on ArcGIS Desktop and ArcGIS Server. Users can visit the GEOCOM Developer Network for more information about GDN Studio and to communicate with other GEONIS developers, as well as access a knowledge base of comprehensive documentation.

New ESRI Press Books Guide GIS Professionals and Students

Get Help with Common GIS Tasks

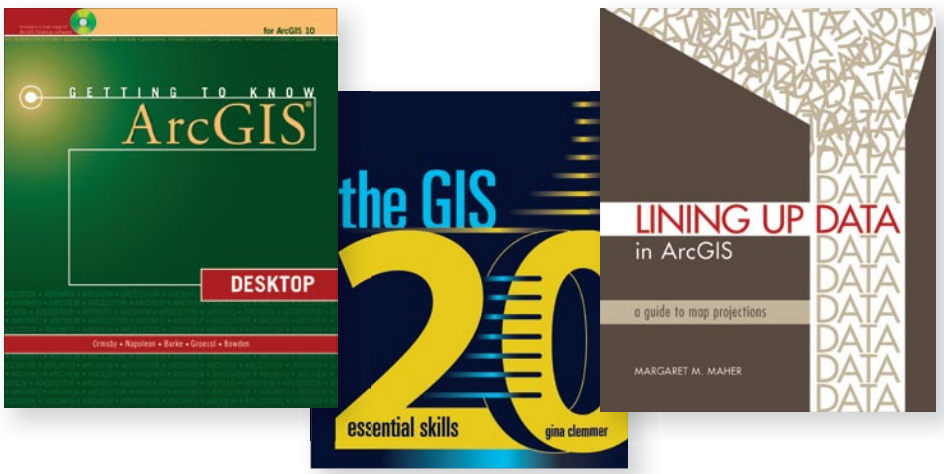
Whether a foundation in GIS is needed, or just a refresher, there are several options from ESRI Press that will help in building skills using the technology. Three books available this summer will help with the new functionality in ArcGIS 10, teach how to work with map projections, and help software users brush up on some of the essential skills of GIS.

Getting to Know ArcGIS Desktop, Second Edition (for ArcGIS 10)—Fully updated for compatibility with ArcGIS 10, this book provides an overview of the principles of GIS while teaching the mechanics of ArcGIS Desktop software. Ideal for self-study or use in the classroom, the step-by-step exercises provide a framework for users to easily practice skills in map symbology, data overlay, map projection, and data conversion. ISBN: 9781589482609, 604 pp., $79.95

***The GIS 20: Essential Skills*—**Written for those who don't have a lot of time, this quick-reference workbook offers a handy list of 20 basic functions applicable to most GIS users. Also included are executive-level summaries of how the functions are commonly applied in different types of analysis. Five hundred GIS practitioners helped define the 20 essential skills, which include creating good layouts, creating buffers, and publishing maps. ISBN: 9781589482562, 128 pp., $39.95

***Lining Up Data in ArcGIS: A Guide to Map Projections*—**A common concern for GIS users is properly projecting their map data to the appropriate coordinate system. *Lining Up Data* presents all the techniques needed to identify the correct projection for one's data as well as how to create custom projections to align data. Quickly troubleshoot and resolve common errors concerning data alignment with this easy-to-use reference guide. ISBN: 9781589482494, 200 pp., $24.95

More Information
For more information about these and other books from ESRI Press, visit **www.esri.com/esripress**.



Online-Only Articles

More *ArcNews*

The Summer 2010 issue of *ArcNews* online (**www.esri.com/arcnews**) presents the following special online-only articles:

GIS Joins Search for a Missing Hiker on California's Mount Whitney
At 14,505 feet, Mount Whitney is the highest mountain in the lower 48 states. By early afternoon Monday, October 26, 2009, a hiker was unaccounted for and the National Park Service and the Inyo County Sheriff's Department began to prepare a SAR mission that used GIS.

Rebuilding After a Disaster
Five years ago last December, on the day after Christmas, a magnitude 9.1 earthquake in the Indian Ocean set off a devastating tsunami. From the beginning, GIS played an important role in mapping the impact of the disaster.

BroadbandStat Goes Live Online
ESRI teamed with Connected Nation to develop BroadbandStat, a Web GIS application for creating maps to show where broadband coverage currently exists in each state, which will help pinpoint where the expansion of new broadband services will help support local economic development.

Also, look for the expanded ESRI T-shirt section online, as well as new supplemental podcasts.

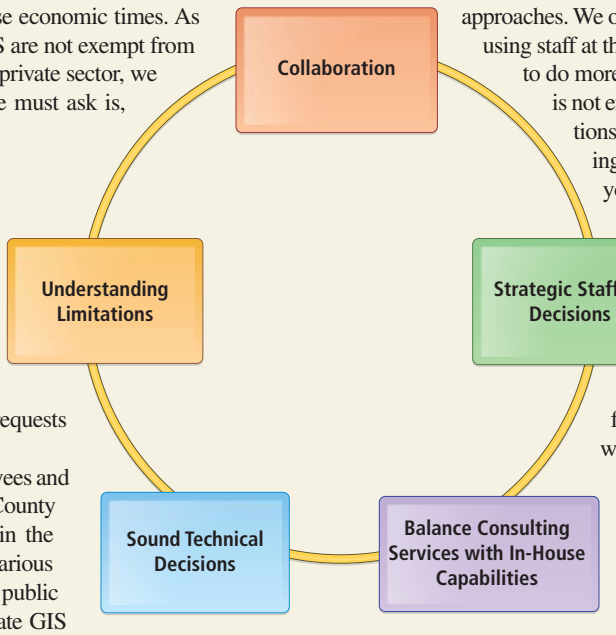
"Managing GIS"

A column from Members of the
Urban and Regional Information Systems Association

Finding Success During Hard Times

By Nicole Gattuso, GIS Director, McHenry County, Illinois

Almost everyone is facing the challenge of how to get by in these economic times. As powerful and necessary as GIS has become, those working in GIS are not exempt from needing to do more with less. Whether working for the public or private sector, we all are examining the resources we have. The question everyone must ask is, How can I better manage my system for continued success?



Background

McHenry County, Illinois, is located in the Chicago region. It is the sixth-largest county in the state of Illinois. McHenry County consists of approximately 150,000 parcels and has a population of around 320,000 people. McHenry County's GIS began roughly 15 years ago in the Assessment Department. It was then moved to the Information Technology Department in 2007 and became its own department in 2009. Just as it became its own department, revenues were 18 percent lower than expected and requests for applications tripled.

The McHenry County GIS Department has six full-time employees and is funded 100 percent through a document recording fee in the County Recorder's Office. The mission of the department is to maintain the parcel basemap and points of interest data, develop and deploy various interactive maps to assist departments, provide greater access to public information, assist departments with GIS solutions, and coordinate GIS efforts regionally.

With requests for applications on the rise, the question McHenry County faced was how to better manage limited resources to maximize application development and support. The county found success by using five key strategies:

- Collaborate.
- Make strategic staffing decisions.
- Balance consulting services with in-house capabilities.
- Make sound technical decisions.
- Understand limitations.

Collaborate

Collaboration is important for success. If you are a public agency thinking about creating new revenue streams by selling data, consider what you might be losing. When you share your knowledge freely and collaborate with others, you will be able to accomplish much more. When others have greater access to information, the value of your information increases. People become dependent on the information and appreciate the value. Additionally, if nobody knows what you have, you are going to miss many opportunities to work with others.

In the Chicago region, McHenry County works closely with neighboring counties. Collectively, we have formed a group we refer to as the Northeastern Illinois, or NEIL, group. We meet regularly to discuss projects we are doing and share advice. We are developing data sharing standards to increase the efficiency of sharing data, which helps not only each county but also the municipalities or agencies that use data from multiple counties. Most recently, we have been collaborating to do aerial flights together. This reduced costs and increased our chances to obtain additional federal funding from both the United States Geological Survey and Chicago Metropolitan Agency for Planning.

Make Strategic Staffing Decisions

In these difficult economic times, it is critical to be choosy about whom you hire. It is important to have a balance of knowledge within your team. You will maximize what you are able to do if you spread out your knowledge and expertise. If you do have the opportunity to fill a position, be sure to take your time and make sure it is the right choice. Understand the important factors needed to fill the position and don't settle. Last year, McHenry County had to fill a position for a developer. It was a difficult task finding people who had expertise in .NET programming and GIS. We narrowed down the skills we thought were critical. We had to interview 50 candidates and administer a technical examination for each candidate. The investment in time paid off with finding the right candidate. It is also imperative to invest in the right training. When looking for areas to cut funding, sometimes this is the first area people look at. However, given how the GIS environment is rapidly changing, staff knowledge can quickly become obsolete if it is not updated.

Balance Consulting Services with In-House Capabilities

From a management perspective, hiring a consultant instead of using staff to undertake a project will not reduce the amount of oversight required by the manager. McHenry County has tried both approaches. We once hired consultants to do all our development, and we have tried only using staff at the county. The key to success, we believe, is balance. We have managed to do more than we can ever afford by having a developer on staff. However, this is not enough. You need outside knowledge to really grow and support applications. When hiring consultants, you need to be just as selective as when hiring your own staff. It is good to look for a consulting firm that understands your business needs and is willing to share knowledge openly.

Make Sound Technical Decisions

When planning any project, you need to look ahead at what is needed in terms of hardware, software, and resources to support the system. Often, agencies jump right in with the expectations of what they want and do not put the time into mapping out how to get there. This often leads to redundancies and shortfalls. The McHenry County GIS Department has been fortunate to work with an IT Department that strives to implement best practices. This has allowed easier integration of our GIS with other systems, such as our tax database and document management system, which ultimately has reduced resources needed.

Understand Limitations

At McHenry County, we have a list of data and applications that we desire to create. However, with limited resources, it is impossible to do it all. We believe the best thing to do is determine what your mission critical needs are first. At McHenry County, we have determined that applications related to public safety and providing the public with easier access to information as our priorities. Although every need is important, it is critical to set priorities. With limited funding and resources, it is inevitable that some of your projects will need to be put on hold. It is also inevitable that you may not be able to do everything you did in the past. It is important to communicate realistic expectations with your customers and set realistic goals.

Conclusion

In these tough economic times, don't be afraid of change. We believe the best thing to do is embrace it! Every challenge gives you the opportunity to improve. Although it is a challenge in these economic times, I like to think of this time as an opportunity to evaluate how to improve things with greater efficiency and develop new paths to success.

About the Author

Nicole Gattuso, GISP, is the GIS director for McHenry County, Illinois. Gattuso has more than 12 years of experience in the GIS field. Prior to McHenry County, she worked for Wilbur Smith Associates providing GIS analysis of toll highway systems across the nation and for the Northern Illinois GIS laboratory. Gattuso is an active member of the Illinois GIS Association and a firm believer in the need for GIS professionals to share data and collaborate on projects. She graduated from Northern Illinois University with a bachelor's of science degree in geography and special coursework in computer science and mathematics.

More Information

For more information, contact Nicole Gattuso, GIS director, McHenry County, Illinois (tel.: 815-334-4280, e-mail: nlgattuso@co.mchenry.il.us).

McHenry County GIS Department, left to right: Brian Anderson, Feng Lin, Edward Amoo, Amanda Foley, and Nicole Gattuso.

NATIONAL GEOGRAPHIC™

"Geo Learning"

A column by Daniel C. Edelson,
Vice President for Education, National Geographic Society

GeoMentors Make a Difference

At the 2009 ESRI International User Conference, Jack Dangermond, president of ESRI, announced the GeoMentor Program during the plenary. This exciting collaboration between ESRI and the National Geographic Society is designed to get more GIS professionals involved in education. The program helps GIS professionals find schools and other settings where they can serve as GeoMentors to the students.

There are lots of ways that GeoMentors can help educators, and the GeoMentor Web site provides a matchmaking service to help educators find GeoMentors that are well-suited to their needs and setting. The Web site allows GeoMentors and educators to seek out an appropriate partner and provides a safe channel through which to initiate contact. The site offers many ideas for projects that teachers and GeoMentors can work on together and tips for how to collaborate successfully.

In the past year, many lives have been changed by GeoMentors, so I asked Charlie Fitzpatrick, ESRI K–12 education manager and leader of the GeoMentor initiative for ESRI, to share some stories from these volunteers and the educators they've worked with. At a time when so much of the media coverage about education focuses on the challenges and failures, these stories show us what is possible and offer us hope.

Charlie reports that some educators have needed on-site assistance with getting software installed, convincing the guardians of computer labs that GIS activities are a legitimate use of computers, or simply showing how to work through basic activities.

One elementary school teacher told Charlie, "It's just priceless having [the mentor] here. She was really persistent in helping us overcome the technical hurdles from our system, just installing through the permissions we have. Then, once it was installed, the kids are so fast with computers, they go beyond me quickly and I can't always help them. She came in and wrote down some procedures to help us do our work. The kids know how to do things, but when they get stuck, they go back to the sheets and figure out how to move forward. I couldn't have done this project without her."

While some educators keep a mentor all to themselves, others encourage them to work directly with students. One longtime mentor who worked with an individual student wrote, "I don't do stuff like that for the publicity but for the individuals involved. I'm happy to report that the student I e-mentored made it to college, where he's pursuing his dream of becoming an architect! That's satisfaction enough for me."

The most surprising thing Charlie told me is how much impact a mentor can have with a relatively small commitment of time. One mentor told Charlie, "I go visit the school once a month, and now when I arrive, the teacher has a couple questions and the kids have some specific questions—they write these down on a page ahead of time—and we spend the whole time just running through their questions. Sometimes it's 'Where do I find data about my subject?' Other times, they ask something where all I say is, 'Look in the help file about the word X,' and they're off and running, just because they couldn't figure out the specific word to search under, like 'mosaic.' Sometimes, they can't wait and will ask me that by e-mail, and I just need to send back a single sentence to get them on track."

These stories have us convinced that we're on the right track with the GeoMentor Program. We were delighted with the outpouring of interest we received at last year's ESRI User Conference, and we've continued to build up the numbers of registered mentors and educators throughout the year. We are still learning lessons about how to help educators and mentors find the right match and what resources we can offer to help them get their collaborations under way. We expect to continue to expand and improve the GeoMentor Web site for some time to come.

In the face of all the challenges of creating a new program, though, we continue to be driven by the clear need for programs like this one. As one club leader recently told Charlie, "Yes, there are lots of clubs, and they are doing some cool things, but if we had more adult volunteers, we could easily engage three times as many kids. That's the same everywhere. What we need most is helpers."

The goal of the GeoMentor Program is to recruit more of these helpers and connect them to educators who can use their help. If this appeals to you, then please visit the GeoMentor Web site for ideas and inspiration and to seek out an educator who would like your assistance. It's easy to make a difference, and the rewards are unparalleled.

More Information

The GeoMentor Program is a joint initiative of ESRI and the National Geographic Society, being implemented under the direction of Charlie Fitzpatrick from ESRI and Anne Haywood from National Geographic. For more information or to sign up, visit **www.geomentor.org** or contact Charlie Fitzpatrick, ESRI (e-mail: cfitzpatrick@esri.com).

"Crossing Borders"

A column by Doug Richardson,
Executive Director,
Association of American Geographers

Needed: A National Blueprint for GIS and Geography Education in Our Schools

The Obama Administration recently released its blueprint for revising the Elementary and Secondary Education Act (ESEA), commonly known as No Child Left Behind. Last reenacted in 2002, the law funds K–12 education in the United States and has been long overdue for congressional reauthorization, but political clashes have prevented action until now. With the debate over health care reform—which had been sucking all the oxygen out of political Washington—finally over, the administration has started to turn its focus to other policy issues, and the ESEA is near the top of the list.

The AAG has been actively engaged with key officials on Capitol Hill regarding No Child Left Behind in recent years. Our biggest concern is that geography is the only core academic subject identified within the law that does not receive a specific funding allocation for implementing programs to further the teaching of geography at the K–12 level. The AAG and many others throughout the GIS community have been working with individual members of Congress, as well as the leadership of the Senate Committee on Health, Education, Labor, and Pensions (HELP) and the House Committee on Education and Labor, for several years now to respond to their requests for information, and we have gained some traction.

The Senate HELP Committee, which is chaired by Tom Harkin (D-IA), has already begun hearings on the ESEA reauthorization and recently hosted Education Secretary Arne Duncan for a discussion of the topic. Duncan noted that the current eight-year gap between reauthorizations is the longest in the 45-year history since the law was first enacted and that it is crucial that Congress act now to fix flaws in the law. Senator Michael Enzi (R-WY), the ranking Republican on the HELP Committee, applauded the administration's initiative in releasing the blueprint and especially commended the focus on the special needs of rural school districts. He specifically cited the lack of attention to rural needs in the program, asserting, "No Child Left Behind has been criticized as a one-size-fits-all law, a claim that has rung especially true in rural areas." This line of argument should work well for geography and GIScience education in that we can argue that geography and GIS, of all subjects, are especially suited to adapting to the places where they are taught.

The general Obama ESEA blueprint for education reform does not mention geography or provide any dedicated funding for the teaching of geography or GIS at the K–12 level. The blueprint, however, is generic in nature and offers only a big-picture look at the major changes the administration is seeking. These changes include a request to the states to adopt college- and career-ready standards and reward schools for producing dramatic gains in student achievement. The focus on careers is especially valuable for geotechnologies, which have been recognized by the Department of Labor as one of three critical growth fields. On a promising note for geography, the document does challenge the nation to embrace educational standards that would put America on a path to global leadership.

In addition to reaching out to members of the administration in the coming weeks and months, the AAG will continue to work with Congress to respond to congressional requests for information on the importance of teaching geography and the funding of geographic education. At the recent AAG Annual Meeting, we hosted several special sessions focused on geography education and federal education policy. Speakers included Congressmen Chris Van Hollen (D-MD), who holds an influential House leadership position, and Tim Walz (D-MN), a former high school geography teacher. Van Hollen and Walz applauded the efforts of geographers and GIS users to promote geography education at the K–12 level and urged our community to continue to reach out to members of Congress.

As an integral part of our long-term effort to address K–12 geography education and the ESEA reauthorization, we have released a draft AAG Blueprint for Geography Education to complement President Obama's initiative and lay out a more comprehensive strategy for enhancing geography education in the United States. We view this blueprint as an evolving document, and we invite the ESRI user community to review it and make comments or suggestions for improvements at **www.aag.org/blueprint**.

Separately, the AAG will also continue to engage with other decision makers, including the National Governors Association (NGA), the Chief State School Officers, and other leading state officials, to advance and support key geography education programs. The NGA serves as the leading voice of the states in Washington and is attuned to the critical issues being debated on Capitol Hill, including the reauthorization of the ESEA. Perhaps of greater importance, the NGA runs a center on best practices that can be a key starting point for promoting ideas. We will work through the NGA and other avenues to bring attention to the importance of geographic education at the K–12 level and the value of this education to GIS and related careers involving geotechnologies.

Ultimately, we at the AAG will be looking to the GIS community for assistance and leadership during this process. We suggest that you consider contacting your members of Congress to provide your own perspectives on the need for teaching geography and GIS in U.S. schools and the importance of dedicated federal funding for this purpose. The effort to bring attention to geography at the federal level has been an important cause to the AAG in recent years. As we engage in the reauthorization debate this year, we will redouble our efforts and ask you to join us in this crucial undertaking. To learn more about how you can help support the teaching of geography and GIS in our schools, visit **www.aag.org/NCLB**.

Doug Richardson and John Wertman
drichardson@aag.org

Help Others Discover the World Through GIS

GIS Day 2010 Event Registration Now Open

GIS users across the globe can now register their 2010 GIS Day event online (**www.gisday.com**). GIS Day is an excellent opportunity to share how a government, organization, institution, or individual is using GIS technology to better understand our world. The 12th annual GIS Day celebration will be held Wednesday, November 17, 2010.

This grassroots event is held every year on the third Wednesday of November, during Geography Awareness Week, a geographic literacy initiative sponsored by the National Geographic Society. Events that celebrate GIS Day have been held in more than 80 countries, involving public officials, professionals, educators, and students. Thousands of GIS users around the world invite guests to attend GIS workshops, tour map galleries, receive hands-on GIS technology training, learn about educational and career opportunities, and much more. The event continues to gain momentum each year, thanks to the GIS user community.

For several years, the Center of Advanced Spatial Technologies located at the University of Arkansas has participated in GIS Day by inviting speakers from nearby organizations to show examples of their work and provide demonstrations using the latest GIS technology. Every year, the center also bakes a GIS Day cake for the students and speakers to enjoy. This cake was made by Nani Verzon, Carrie Davis, and Maci Edwards for GIS Day 2009.

Goodhue County, Red Wing, Minnesota, USA
Each year, the Goodhue County GIS Department holds a map/poster display during National Geography Week and GIS Day. Staff and citizens like to view the various maps, and many stop by the GIS office to ask staff questions about them. Some staff have even mentioned that GIS Day is their favorite event during the year. The GIS Department feels the best way to explain GIS is through visuals such as finished maps from a GIS project.

Timor-Leste Geographic Information Group, Dili, East Timor
Timor-Leste is the newest country in Asia with 1 million people. It held its first GIS Day event in November 2009. Thirteen organizations participated with an estimated 500 visitors. Six seminars were held, and approximately 20 people attended each seminar. Organizers held a map exhibition and gave out brochures. Because this event was the first GIS and map exhibition in Timor-Leste, the purpose was to raise awareness about GIS and the mapping industry.

Resources Available
There are many more event examples and success stories available at **www.gisday.com/success**, including hands-on GIS workshops, training seminars, special presentations and talks, map galleries, treasure hunts, and field trips. Once an idea is in the works, users are encouraged to access the free resources and support ESRI provides online, including sample agendas, proposal letters, white papers, how to do a GIS Day proclamation in your area, and even how to create your own GIS Day cake.

Users can also host more than one event, such as an open house at a business as well as a demo at a local school. Remember, registering all your events ensures that each occasion can be found in the event finder—this is useful to the general public and members of the press.

More Information
For more information, visit GIS Day events online at **www.gisday.com**.

URISA Connects GIS Professionals

The Urban and Regional Information Systems Association (URISA) is the association for GIS professionals. It is an international association that offers educational programs, publications, and other resources. In addition to producing the *URISA Journal; The GIS Professional* newsletter; and all the association's conference offerings, including GIS-Pro 2010, URISA strives to be the go-to organization for GIS professionals around the world.

But URISA is also organized to connect professionals locally. URISA has more than two dozen state, provincial, and regional chapters. Chapter meetings, workshops, conferences, and social events occur regularly throughout the United States and Canada and also in the Caribbean. Chapters connect GIS professionals locally, and the networking and education are invaluable. Workshops, "happy hours," and multiple-day conferences are all provided by URISA chapters.

More Information
To find information about your local URISA chapter, visit **www.urisa.org/urisa_chapters**.

ArcGIS Server Disseminates Geospatial Services

ESRI's ArcGIS Server adds geographic data and analysis to Web applications, such as the following, that serve organizations and communities in a variety of ways. To submit your ArcGIS Server site address and view other Web sites powered by ArcGIS Server, visit www.esri.com/serversites.

City of Golden
maps.cityofgolden.net
ezMaps is a Web-based mapping tool that not only shows different views of the City of Golden, Colorado, but also presents information associated with specific properties, including address, school district, zoning, and city council ward information. At this site, users can also access information on parks, trails, and snow routes.

District of North Vancouver—Hazards
www.geoweb.dnv.org/applications/hazardsapp
The District of North Vancouver, Canada, is exposed to many natural hazards. Its Hazards application depicts such threats as landslides, floods, debris flows, chemical hazards, and wildfires. Users can also search for detailed geotechnical reports and studies. This site is one of a series of four that the district created to expand public and civic awareness in North Vancouver.

Sutherland Shire Council, Australia
mapping.ssc.nsw.gov.au/Sutherland
This site helps people find council facilities like halls, libraries, and playgrounds in Sutherland Shire Council, Australia. It includes aerial photography, contours, storm water, waste pickup, zoning, and environmental and planning details. The site also has a drawing toolbar to add, move, and change graphics.

Grant County eGIS
grantin.egis.39dn.com/#
Grant County, Indiana's enterprise GIS (eGIS) was built with Web-based ArcGIS Server technology using the ArcGIS API for Flex. The application allows county departments to share information across the enterprise and disseminate geographic, tax, and assessment information to the public.

Free ESRI Publications

ESRI provides numerous periodicals, which can be subscribed to free of charge by simply going to www.esri.com/subscribe on the Web. Here are some examples.

HealthyGIS
HealthyGIS is a newsletter printed quarterly for the health and human services GIS user. The publication features articles describing the function of GIS in public health, workforce development, and health education. Those interested will find techniques for implementing ESRI software into their health care work environment.

ArcWatch
ArcWatch is an e-newsletter published monthly for anyone interested in what's new with ESRI, its software, and GIS mapping solutions.

Government Matters
Government Matters is a quarterly printed newsletter for those interested in state and local government and its relationship with GIS. It addresses possibilities for more efficient community management using GIS.

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New Training Offerings from ESRI

ArcGIS 10 Courses Available

ESRI is offering a full range of training courses to help customers quickly adopt and utilize new productivity tools available in ArcGIS 10. Instructor-led courses are available at ESRI learning centers nationwide and online through the Virtual Classroom.

According to Nick Frunzi, ESRI Educational Services director, "The ArcGIS 10 release enables powerful spatial analysis and can vastly improve productivity. We want to help customers integrate this new technology into their workflow as quickly as possible."

Newest and most popular courses available to support the transition to ArcGIS 10 include the following:

Desktop
ArcGIS Desktop I: Getting Started with GIS
ArcGIS Desktop II: Tools and Functionality
ArcGIS Desktop III: GIS Workflows and Analysis

Special Functions
Data Production and Editing Techniques
Introduction to Geoprocessing Scripts Using Python
Managing Imagery Using ArcGIS—**new course**
Working with 3D GIS Using ArcGIS—**new course**

Geodatabase
Building Geodatabases
Data Management in the Multiuser Geodatabase

Server
Introduction to ArcGIS Server
ArcGIS Server: Web Administration Using the Microsoft .NET Framework
Building Web Applications Using the ArcGIS API for Flex—**new course**
Building Web Applications Using the ArcGIS API for Microsoft Silverlight/WPF—**new course**

Visit www.esri.com/training to view the complete course list. For a period of time, ESRI will offer some courses in both ArcGIS 10 and 9.3 to ensure that all customers have access to essential training.

Free Seminars
ESRI is also offering free live training seminars so users can learn about new productivity tools and features in ArcGIS 10. Go to www.esri.com/lts to view the schedule and request reminders to participate.

New Instructor-Led Training Format Enhances Learning
Students who've previously taken ESRI instructor-led courses will notice something different when they take a course based on ArcGIS 10. A new, more immersive, experiential approach to learning will debut in over 20 courses beginning in August 2010 with the remainder of instructor-led courses to be upgraded in early 2011.

Previously, courses followed a format of lecture, demonstration, then exercises. Now, with a focus on interaction, instructors will also lead group exercises, guide discussions that facilitate peer-to-peer learning, and introduce scenarios in which students engage with each other in exploring ways to solve tangible workplace problems.

ESRI instructors are going through rigorous training themselves to gain CompTIA CTT+ certification. Whether registered for a course in a traditional classroom or Virtual Classroom, students' increased interactivity in the learning process results in greater transfer of new skills and knowledge.

More Information
Contact an ESRI training consultant to develop a complimentary staff development plan (tel.: 1-800-447-9778, extension 5757; e-mail: gistraining@esri.com).

For More Information

ESRI Training Web Site:	www.esri.com/training
ESRI Training Matters Blog:	www.esri.com/trainingblog
Instructional Series Podcasts:	www.esri.com/podinstruct
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Revisiting "UN Uses GIS to Promote Peace and Provide Aid"

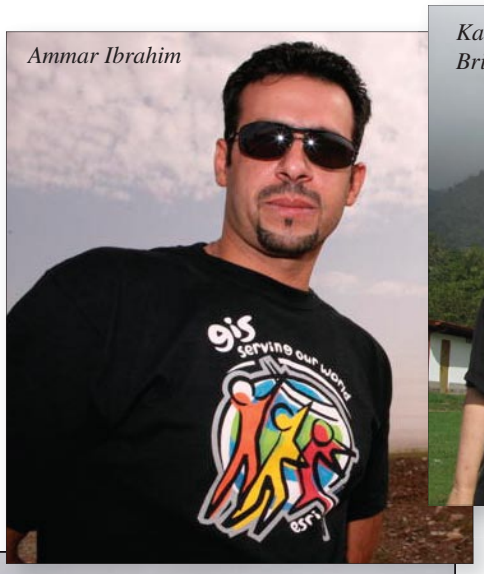
Correction—The caption that accompanies the Port-au-Prince, Haiti, damage assessment map on page 18 of the Spring 2010 issue of *ArcNews* dated the principal earthquake incorrectly. The caption should have read, ". . . within days of the January 2010 earthquake." This was corrected online as soon as it was called to our attention. ESRI sincerely regrets any confusion or inconvenience this error may have caused.

Iraq, Costa Rica, and Canada— Girding the Earth with ESRI T-Shirts!

Ammar Ibrahim, a server-based mapping system administrator for Iraq's Central Organization for Statistics and Information Technology and its Population 2009 Project, is wearing his ESRI T-shirt while taking field results in Sulaimaniyah.

Kathy Scott, GIS coordinator for Washington State Parks, and Brian Hall, GIS analyst at Washington Department of Fish and Wildlife, spent two weeks in the mountains of Costa Rica. They were volunteers in an Earthwatch expedition to study the ecological benefits of shade-grown coffee. It's nice that their ESRI T-shirts weren't in the shade!

Tat Ma, a GIS specialist for the Department of Indian and Northern Affairs Canada in Iqaluit, Nunavut, Canada, is showing Geoffrey Moore, trainee, how to use a GPS unit and integrate the data into GIS. They are posing next to an inuksuit, which is a common man-made landmark used for navigation or as a reference location. The photo also shows two very cool ESRI T-shirts!



Ammar Ibrahim

Kathy Scott and Brian Hall


Tat Ma (right) and Geoffrey Moore

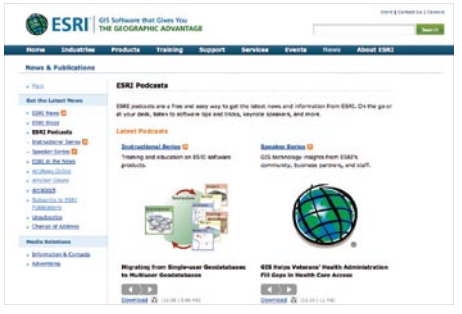
Wear an ESRI T-shirt in a unique location and send a photograph to *ArcNews*. Photos will be considered for use in *ArcNews*, the expanded T-shirt section at *ArcNews* online, or both. While digital photos sent via e-mail (tmiller@esri.com) are preferred, prints or slides can be sent to Thomas K. Miller, *ArcNews* Editor, *ArcNews* T-Shirt Feature, ESRI, 380 New York Street, Redlands, California 92373-8100 USA. See *ArcNews* online at **www.esri.com/arcnews**.

Listen to ESRI Podcasts

ESRI podcasts are a free and easy way to listen to users share their experiences, get the latest news and information from ESRI, and learn software tips. ESRI Speaker Series podcasts feature GIS technology insights from users, business partners, and ESRI staff. ESRI Instructional Series podcasts focus on new and updated software features. Podcasts can be downloaded and listened to on a computer or portable MP3 player.

More Information

To check the availability of new podcasts and subscribe to the podcast feeds, visit **www.esri.com/podcasts**.



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Collaborate with our customers to support innovative database and applications development, service-oriented architecture, and enterprise software solutions. The variety of project work enables you to use your software development, database engineering, and GIS expertise and project management skills in a number of growing markets.

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Use your technical experience, consulting skills, and results-driven focus to sell solutions, not just features and functions. Support our customers' ongoing needs for spatial technology in high-growth areas, including commercial business, utilities, petroleum, state and local government, defense, and the federal government.

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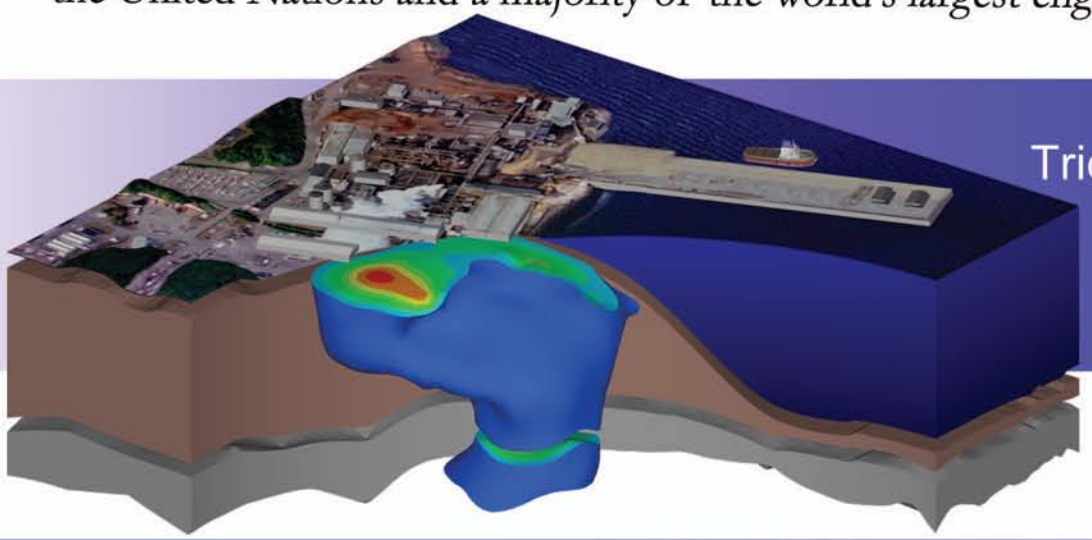
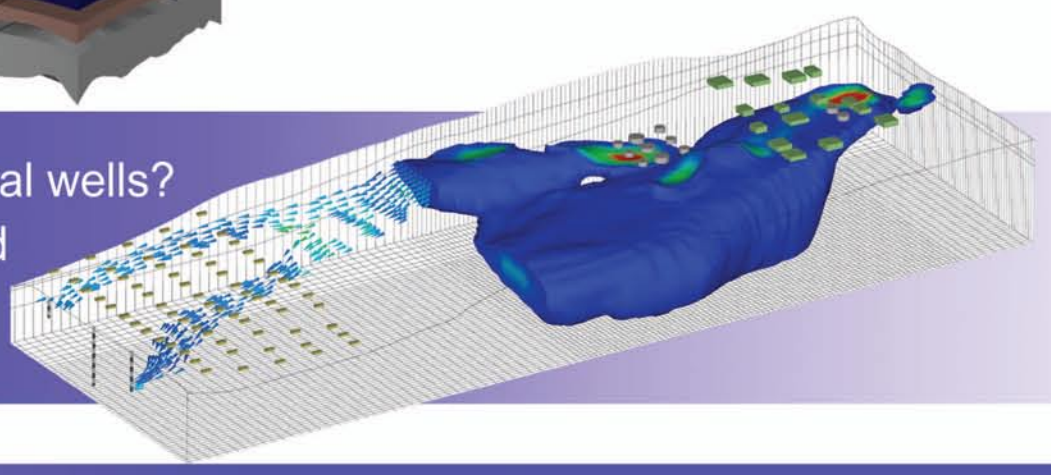
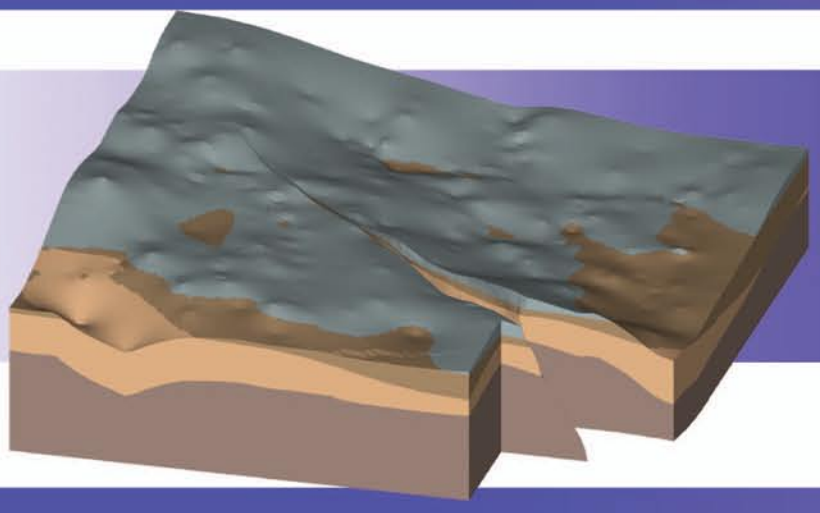


Trichloroethylene contaminant plume at an industrial facility on the coast.

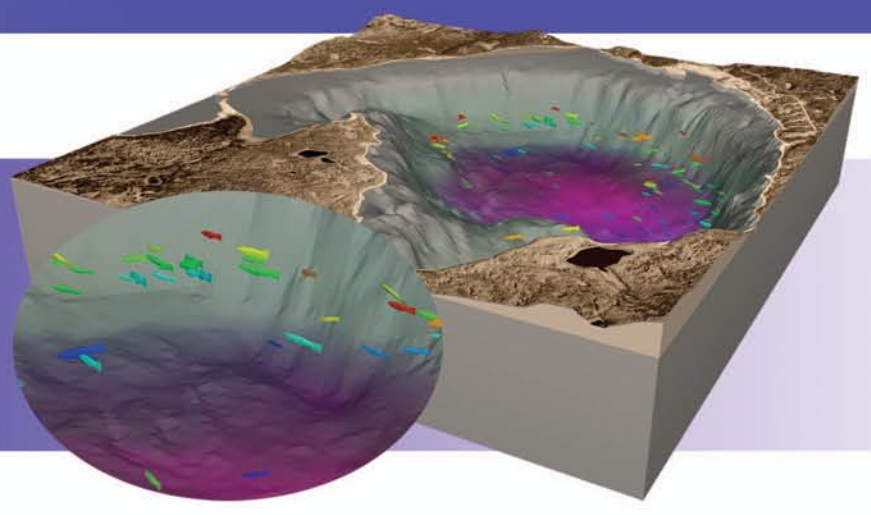


Will the contamination reach the municipal wells?
Do your clients really understand your MODFLOW results?



Do your 2D cross-sections adequately describe your complex geology?

Will the trout in Northern Canada's lakes survive Global Warming?



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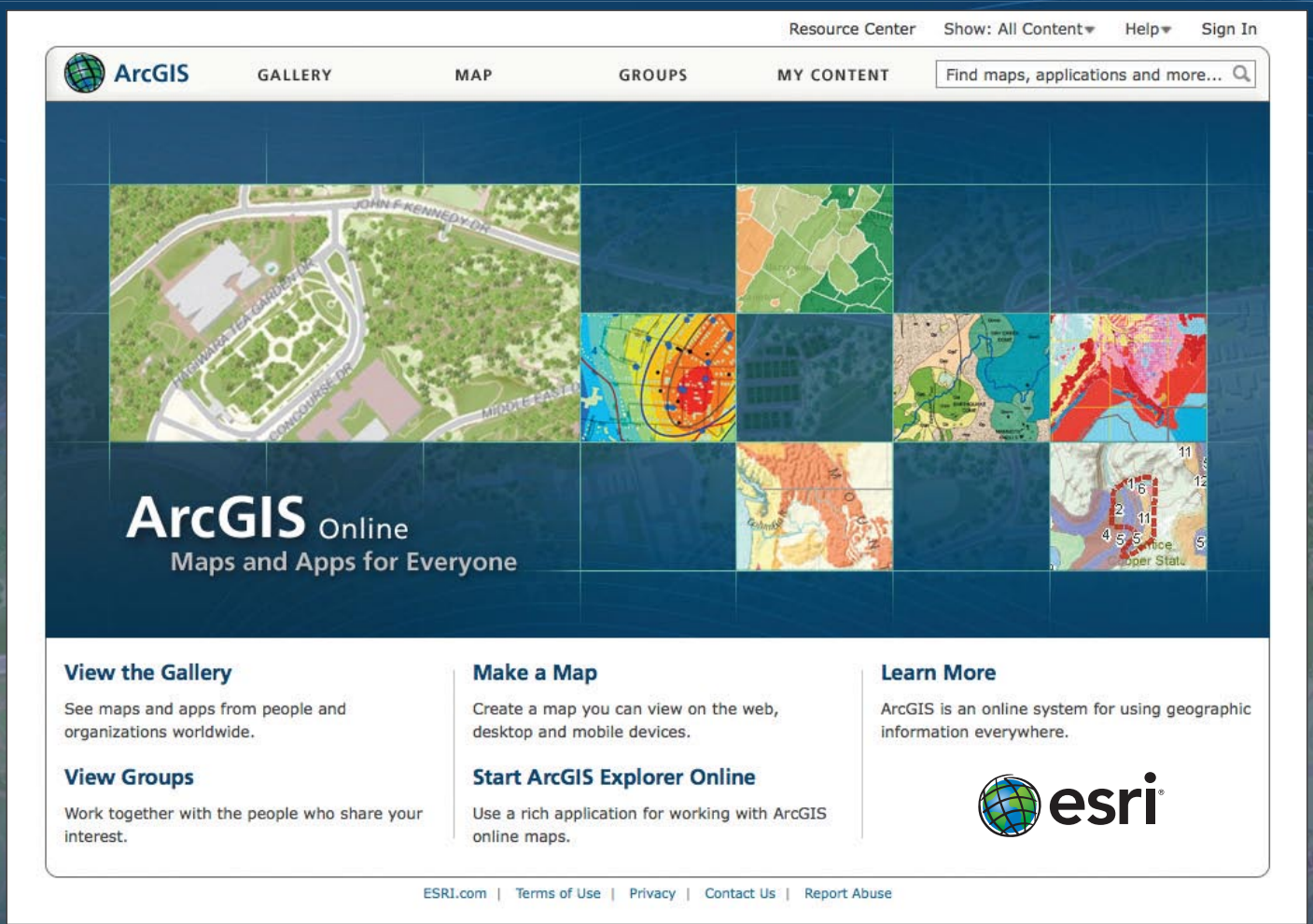

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