

April 2014

Crossing Borders



Encouraging Dialog between Geographers in
Academia and the Public and Private Sector

By Doug Richardson, Executive Director, Association of American Geographers



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Racism, Social Justice, and GIS

Geographic information systems have long played a significant role in efforts to understand and address racial discrimination and related social justice issues, ranging from urban housing redlining to historical GIS research of reconstruction following the US Civil War. This year marks the anniversary of the Martin Luther King Jr. March on Washington for Jobs and Freedom. Fifty years have passed since that landmark event, and many commemorative addresses acknowledge the considerable progress that has been made with respect to civil rights over the past half century. Nevertheless, recent history shows us clearly that the road is still long and there is still much to do.



Thus, one core theme of the Association of American Geographers (AAG) Annual Meeting this coming April in Tampa, Florida, will be "Racism and Violence in America: Fifty Years since the March on Washington for Jobs and Freedom." This featured theme for the AAG Annual Meeting provides an opportunity for us to explore past, current, and potential future contributions of geographic research and GIS tools and analysis to understanding

and addressing current needs in these and related areas. It will also enable all of us to reflect on our personal actions and commitment to reducing racism and violence. Dozens of plenary sessions and public events are planned around this featured theme, and we welcome your input, suggestions, and participation in these sessions.

GIS now plays a key role in helping to understand the interactions of race, ethnicity, and place in our society, and there are many ways in which the GIS community can constructively engage these issues, from community and participatory GIS projects to research programs that examine the role of race and ethnicity in geographic patterns of difference and opportunity around the world. I encourage the Esri community to share and discuss your GIS analyses and project work on these topics at the AAG Tampa meeting, which will be held April 8–12, 2014.

Julian Bond to Speak at AAG Meeting in Tampa

As part of this focus on racism at the AAG Annual Meeting and to commemorate the Civil Rights movement in the United States, the Association of American Geographers is also pleased to



Civil rights pioneer Julian Bond.

announce that Professor Julian Bond, a renowned civil rights pioneer and political leader, has been named the third recipient of the AAG Atlas Award. Bond will receive the award at the AAG meeting on Friday evening, April 11, 2014, where he will deliver a presentation, "Race Around the World," focusing on how civil rights figures and organizations have shaped and changed American foreign policy. More than 8,000 geographers, GIScientists, GIS specialists, and others from around the globe, including the media, are expected to attend the AAG meeting.

Bond has played and continues to occupy a central role in the US civil rights movement as a leading figure in the Student Nonviolent Coordinating Committee and as cofounder and first president of the Southern Poverty Law Center. Bond was repeatedly elected to the Georgia General Assembly for 20 years, including six terms as a state senator. More recently, he has served as chairman of the National Association for the Advancement of Colored People (NAACP) for 12 years, from 1998 to 2010.

Bond is the son of former college and university president Horace Mann Bond, and he has built his own record as a celebrated educator, having held appointments at several leading institutions, including American, Harvard, and the University of Virginia. He has been awarded more than 20 honorary degrees throughout his career.

Bond embodies the ideals and goals of the AAG Atlas Award, which is designed to recognize and celebrate outstanding accomplishments that advance world understanding in exceptional ways. The image of Atlas bearing the weight of the world on his shoulders is a powerful metaphor for this award program, as the AAG's awardees are those who have taken the weight of the world on their shoulders and moved it forward, whether in science, politics, scholarship, the arts, or war and peace. In addition to a substantial cash prize, an Atlas statuette will be presented to Bond as a compelling keepsake and an inspiring symbol for the award program itself. Author and scientist Jane Goodall and human rights leader Mary Robinson are the previous recipients of the AAG Atlas Award.

We invite you to join Bond and the AAG in Tampa to celebrate his extraordinary accomplishments and to discuss with him and others from around the world the future of civil rights and social justice. For more information or to attend the meeting, visit www.aag.org/annualmeeting.

Doug Richardson

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GIS and Public Policy

The potential for GIS and GIScience to contribute to the formation of public policy has long been a reality, but it is now becoming more broadly understood and central to governmental policy making at all levels, as well as in society at large. A core theme of the upcoming Association of American Geographers (AAG) Annual Meeting will be "GIScience, GIS, and Public Policy," which will explore the expanding role of GIScience and GIS in the public policy arena on crucial national issues, such as climate change, immigration, health, civil rights and racism, transportation, energy, electoral redistricting, natural resources, social justice, the environment, and many others.

The AAG annual meeting is one of the largest venues in the world for sharing and communicating the broad range of contributions by geographers, GIScientists, and GIS specialists to basic and applied knowledge and to problem solving. The 2014 AAG Annual Meeting, with more than 6,000 presentations on the latest scientific, technical, and policy research in geography and GIS, will be held April 8–12, 2014, in Tampa, Florida.

The theme of "GIScience, GIS, and Public Policy" also encompasses another dimension, that of federal and state policy making regarding GIS itself. At the AAG Tampa Bay meeting,

several special sessions will focus on the work of two key national organizations that make policy for GIS: the Federal Geographic Data Committee (FGDC) and the National Geospatial Advisory Committee (NGAC). Both of these organizations are leading the development of a new Strategic Plan for the US National Spatial Data Infrastructure (NSDI). The US Census Bureau and other federal agencies, as well as private-sector organizations, will also discuss their latest policy and technical developments related to the generation and use of geographic information systems and data and how these interact with the NSDI. Parallel international policies and activities of the Global Spatial Data Infrastructure (GSDI) will also be discussed.

Key issues in planning for the future of the NSDI include the explosive generation and availability of real-time interactive GPS/GIS spatiotemporal data, GIS cyberinfrastructure, web-enabled GIS, geography education and work force development policies, GIS certification, standards development, interoperability, and many others. Current challenges in GIScience, such as locational privacy implications of the widespread availability of real-time geographic data, will be an area of special focus. Other sessions will address issues such as public access to governmental GIS data, federal procurement procedures for GIS and mapping

services, and evolving legal frameworks of a spatially enabled society. We would also like to solicit your own ideas and suggestions for GIS and policy issues or topics you would like to see addressed at the meeting (please contact me at the e-mail below with your thoughts).

In addition to the 2014 theme of "GIScience, GIS, and Public Policy," other cross-cutting themes for the Tampa conference include "Geographies of Climate Change," "Racism and Violence in America: Fifty Years since the March on Washington," and "Scale and Sustainability." These featured themes are designed to provide structure to a large, exciting, and well-attended meeting. As always, the AAG Annual Meeting is an open venue, and we look forward to your attendance and contributions, either as a paper or poster presenter on topics that particularly engage you or as an attendee who can add to the discussions. More information for registering or submitting special sessions or panels is available at www.aag.org/annualmeeting.

Ten Years . . .

In closing, I would like to note that I have been writing this column, "[Crossing Borders](#)," in ArcNews now for 10 consecutive years (without missing a column). It has been a great pleasure to engage in dialog with you and the global Esri community, and I would like to thank all of you for the opportunity to be part of and to help build the dynamic GIS industry we all value, with its extraordinary innovation and creativity and general good will. In

future installments of "Crossing Borders," I plan to open up the column and invite other leading geographers and GIScientists within the AAG to author or coauthor some of the columns. I hope you will like the new format, as well. Finally, I would like to personally thank Jack and Laura Dangermond and Esri staff, including ArcNews editor Tom Miller, for sustaining an open and sharing GIS community that is a remarkable force in our world and for indulging my column for the past decade.

I look forward to seeing you in Tampa in April, where we can continue our discussion of key issues around the theme of "GIScience, GIS, and Public Policy" and much more.

Doug Richardson

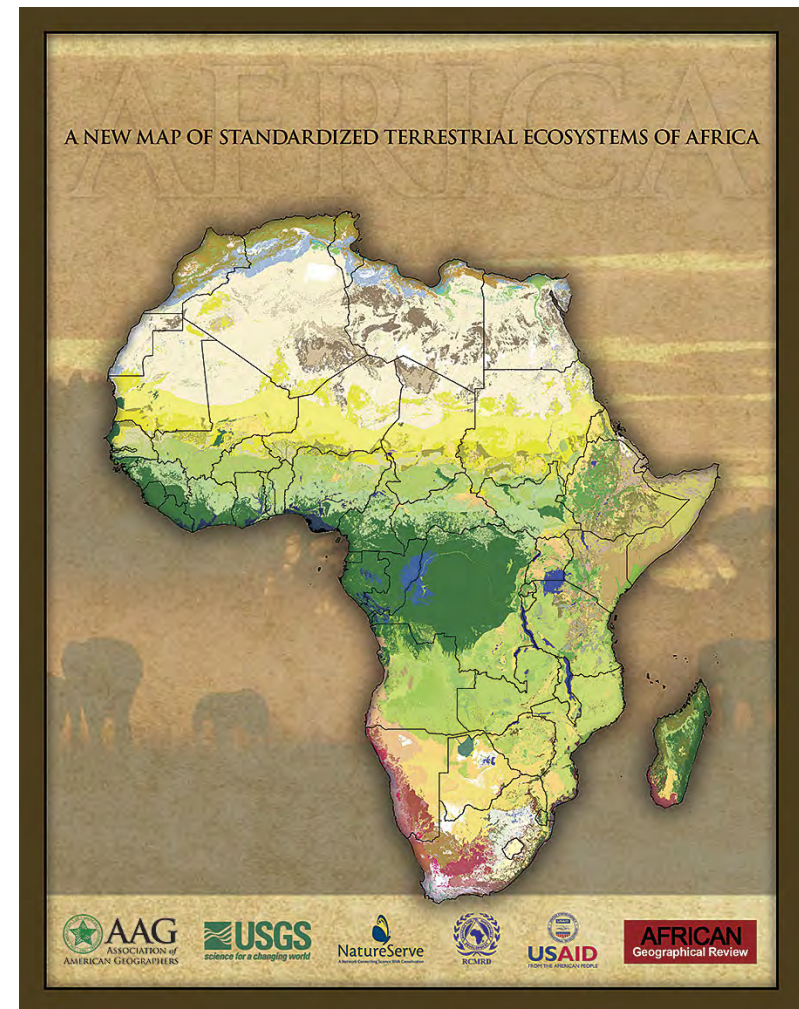
(This article originally appeared in the Fall 2013 issue of ArcNews.)

Stunning New African Ecosystem Maps

Terrestrial Ecosystems of Africa as a special supplement to the African Geographical Review, an AAG journal edited and managed by the AAG's African Specialty Group in close collaboration with African scientists and one of the leading continent-wide geographic journals for African scholars.

This stunning series of new and detailed maps of African ecosystems that comprises this special supplement was created by the US Geological Survey (USGS) in partnership with the conservation nongovernmental organization (NGO) NatureServe and with an international team of scientists from most African countries, as well as from North America and Europe. Significantly, these beautiful new maps also represent the finest spatial resolution (90 m base resolution) data of its kind ever produced for the entire continent.

The new maps show the potential distribution of 126 ecosystem types modeled using a cartographic statistical regression approach based on knowledge of vegetation types and environmental features at more than 32,000 locations. It is the first continental map to show modeled vegetation types in their physical environments, derived from rigorous assessments of data.



USGS and its partners developed several new continent-wide data layers and maps (landforms, lithology, soils, bioclimate regions, etc.) as inputs to the modeling process. African scientists developed a new ecosystem classification and provided sample points representing known locations of the newly described ecosystems. The Regional Centre for Mapping of Resources for Development, in Nairobi, was an in-region partner and host of key workshops for the project. NatureServe led the modeling efforts for the new ecosystem map, and 37 experts from 18 countries collaborated on this project, which was funded by US Agency for International Development (USAID).

Esri mapping tools and software were central to the development of the new terrestrial ecosystem maps of Africa. The mapmaking was largely accomplished with ArcGIS, the raster processing was mostly conducted with ArcGIS (GRID), and the continent-wide maps were developed using standard Esri data on county/administrative boundaries for every country in Africa.

These new ecosystem maps are a significant improvement over previously existing maps in several ways. For example, the final ecosystems map is a product of a sophisticated, predictive analytics modeling process that uses multiple input data layers for the entire continent and was created specifically for this effort. These input layers include a first-ever continental landforms layer developed from a 90-meter digital elevation model, a new bioclimate regions layer developed from long-term records of temperature and precipitation observations, and a new lithology

(rock/substrate type) layer produced as a compilation of existing regional geology datasets. These ecosystem maps are thoroughly integrated with the physical settings in which the vegetation exists.

The AAG has been involved for many years in working with universities, NGOs, and others in Africa, especially around themes of geographic science and sustainable development. These programs have included the AAG's My Community, Our Earth as a core program and have involved long-term partners, such as EIS-Africa, Harvard University, UN-HABITAT, the United Nations Environment Programme, the late Wangari Maathai's Green Belt Movement, Esri, and other organizations, and funding from Global Dialogues on Emerging Science and Technology programs, the Jane Goodall Institute, the National Aeronautics and Space Administration, the National Science Foundation, USAID, the US Department of Housing and Urban Development, the US Department of State's Bureau of Oceans and International Environmental Scientific Affairs, and private foundations. These collaborative efforts respond to needs as defined by Africans around issues of sustainable development, environment, education, and economic development.

This new ecosystems map and its underlying data will provide a valuable and synergistic resource for all these efforts and organizations throughout Africa. The new maps also will be crucial for a broad range of conservation applications and, in particular, gap analyses to identify unrepresented or

underrepresented ecosystems in protected areas. The maps also can support biodiversity, agricultural, and resource management strategies that incorporate an ecosystem approach. The maps will also contribute a new knowledge foundation for research on impacts of climate change, fire, and invasive species on ecosystem productivity in Africa and for better understanding the interactions of economic and social policies on the goods and services (e.g., food, fuel, fiber, water) that African ecosystems currently provide.

I would like to thank Dr. Roger Sayre, an ecosystems geographer and senior scientist for ecosystems in the Land Change Science Program at USGS and the lead author of the special supplement to the *African Geographical Review*, for his input to this column and for his vision and sustained leadership of this complex and enormously valuable mapping project.

The complete article, "A New Map of Standardized Terrestrial Ecosystems of Africa," including the new map series in full color and links to the underlying data for these maps, is available free of charge on the [AAG's website](#).

Doug Richardson

(This article originally appeared in the Summer 2013 issue of *ArcNews*.)

Getting a Job in Geography and GIS

Employees with geographic and geospatial skills are in high demand to help solve real-world problems and enhance organizations' efficiency and effectiveness. The latest estimates from the US Bureau of Labor Statistics classify GIS and remote sensing (RS) as "new and emerging" fields, in part because of their importance to the "green" jobs sectors. Job openings for GIS and RS scientists, technicians, and technologists are projected to grow between three and nine percent between 2010 and 2020, while median salaries for these positions continue to rise. The job category of "geographer" is poised for even more dramatic growth, with job openings projected to increase nearly 30 percent by 2020.

A recent report by the Georgetown Center on Education and the Workforce revealed that geographers are highly dispersed across sectors and industries within the US work force. Therefore, a comprehensive search for geography-related jobs should span resources across the business, government, nonprofit, and educational sectors. The [AAG's Jobs in Geography and GIS Center](#) is an excellent starting point. This online jobs listing allows you to search for current job openings by sector (e.g., private, public, academic, nongovernmental organizations [NGOs], etc.), by state or international location, and by topical specialties.

Other leading industry resources for careers in geospatial technology and GIS include [Esri](#), [Directions](#), [GISLounge.com](#), [GISjobs.com](#), and the [GIS Jobs Clearinghouse](#). Because the public sector continues to be a major employer of geographers, USAJobs.gov is a helpful place to go for federal government employment. Idealist.org is a central repository for volunteer and employment opportunities in the nonprofit and NGO sectors. Links to all these career resources can be found on the AAG careers website.

Research conducted for the AAG's National Science Foundation-funded EDGE program, which is geared to better preparing graduate students for nonacademic jobs in geography and GIS, indicates that employers today are particularly seeking employees who can apply broad, interdisciplinary perspectives and diverse expertise to the specific needs of their unique organizations and industries. More companies and industries are now using location-based data and spatial analysis to support business operations as wide-ranging as health care delivery, retail sales, environmental management, transportation planning, economic development, and more.

While the employment outlook for geography and GIS careers is relatively strong, competition for openings is high. In a tight job market, many students and professionals are considering strategies to boost their credentials and enhance their portfolio of skills. In addition to opening up new career paths, further education can also lead to increased earning potential. A directory of state-by-state listings of online courses, certificates, and degrees offered in geography and GIS is posted at www.aag.org/education. An important credential for GIS careers is professional certification. Information on becoming a certified GIS Professional (GISP) is available from the [GIS Certification Institute](http://www.giscertification.org), the leading GIS certification organization in the United States.

Volunteering and internships with potential employers also provide excellent work-based learning and professional development opportunities. Many employers recruit from their intern and volunteer pools, so these short-term experiences can often lead to longer-term or permanent employment. AAG has developed guidelines on how to get the most out of your internship and also lists internship and mentoring opportunities at its Jobs Center.

The Association of American Geographers offers a broad selection of resources to help current and aspiring geography and GIS professionals make the most of the many available employment opportunities. The Jobs & Careers area of the AAG website features a range of educational and informational

materials to support career exploration, including profiles of geographers working in a variety of fields, salary data and employment trends for more than 90 geography and GIS-related subfields, tip sheets and resumé advice, and much more. Also available is the new book, *Practicing Geography*, which provides a wealth of information on geography and GIS careers in business, government, and non-profit organizations. To access this regularly updated information, visit www.aag.org/careers.

The AAG's Annual Meetings (April 9–13 in Los Angeles this year) also feature a robust offering of current job listings, careers panel discussions, drop-in career mentoring services, and professional guidance and networking opportunities for prospective employees at all career stages. Good luck with your next job search!

Doug Richardson
(with contributions by Joy Adams and Jean McKendry)

(This article originally appeared in the Spring 2013 issue of *ArcNews*.)

New Online Geography and GIS Resources

The Association of American Geographers (AAG) has decided to make many new and existing publications and important reference resources freely available on the [AAG website](#). A small sampling of these online geography and GIS resources is summarized below.

Jobs in Geography and GIS

An extensive collection of career resources is now online for students interested in pursuing a career in geography or GIScience, or for seasoned educators or GIS professionals seeking to further develop their careers or find a new position anywhere in the world. The AAG Careers site includes information about the types of jobs available to those who study geography and GIS; information about typical employers; the most current salary data; career preparation tips; and links to working geographers who can offer advice, and much more.

Another valuable employment resource, AAG's Jobs in Geography (JIG), is now available as a feature-rich, searchable online jobs listing system. This new system, which will be publicly available on the AAG website, will make it easier for employers

to reach qualified candidates and for job seekers to connect with employers in all sectors.

The AAG Guide to Programs in Geography

The *Guide to Geography Programs in the Americas and AAG Handbook and Directory of Geographers* has long been a useful tool for students, faculty, and geographers throughout the world. This year we are pleased to announce that it will be more widely available to students and others, as it will be offered as a free online publication.

The new *Guide* describes in detail nearly all academic institutions throughout the Americas, including faculty specialties, financial assistance, and degree requirements. It also provides information on government agencies and private firms that employ geographers.

AAG Newsletter

The AAG has also transitioned its *AAG Newsletter* content to a set of interactive online communication channels. Geography and GIS news, op-eds, job listings, grant information, and event calendars are now updated and available on a more timely and

in-depth basis than before. An index on the AAG home page will make it easy to quickly find the information you want.

Additionally, AAG news and information are conveyed regularly online via the *AAG SmartBrief*, *AAG Geograms*, our website home page news section, AAG's online Jobs in Geography listings, AAG Specialty Group Knowledge Communities websites, and other similar outreach means.

The GIS&T Body of Knowledge

With support from Esri and UCGIS, the AAG is making a key reference work, *Geographic Information Science and Technology Body of Knowledge*, available online as a free, downloadable PDF and, for a small shipping fee, as a print edition. Organized thematically by GIS *knowledge areas*, the book presents a comprehensive survey of Geographic Information Science and Technology (GIS&T) topics, ranging from analytical methods and data modeling to GIS&T in society. It is an important reference work for GIS&T professionals and classroom teachers and students.

AAG Journals

There are no plans to discontinue the hard-copy versions of the AAG's flagship journals, *Annals of the AAG* and *The Professional Geographer*. Currently, all AAG members automatically receive both a hard copy of and online access to these leading AAG

journals. However, members who wish to receive their AAG journal subscriptions online only may do so on an individual basis. Many AAG members have now chosen this option, either for personal convenience or due to concerns about the environmental impact of printing and mailing the hard-copy issues.

The AAG Review of Books

The new online *AAG Review of Books* publishes scholarly book reviews as formerly published in the *Annals of the AAG* and *The Professional Geographer*, along with reviews of significant current popular books related more broadly to geography, public policy, and international affairs. As an online publication, it will be able to include many more worthy geography books for review and to publish these reviews in a more timely manner. In addition, it is also hoped that the new *AAG Review of Books* will reach a much broader interdisciplinary readership, as well as make important geographic contributions to policy and international affairs.

GIS Master's Degree Programs Online

The AAG has created a unique clearinghouse for GIS and GIScience training and educational programs. A special focus of the clearinghouse is a compilation of all GIScience and GIS professional master's degree programs, including both traditional and online programs.

AAG Annual Meeting Programs

The AAG will begin offering online electronic versions of our *Annual Meeting Program* book, for use on handheld devices and laptops, beginning at our upcoming April 9–13, 2013, conference in Los Angeles, California. The program will also still be available in printed program books for those attendees who wish to have the hard-copy version in Los Angeles or to access it as an archival reference source following the meeting.

I look forward to your feedback as we continue to transition AAG publications and resources online for your quick and easy access, and hope you will benefit from and enjoy these newly available resources [online](#).

Doug Richardson

(This article originally appeared in the Winter 2012/2013 issue of *ArcNews*.)

Help Develop Themes for the AAG Los Angeles Meeting

Each year, the [AAG](#) identifies a few featured themes for its Annual Meeting, and I'd like to invite you to help us this year as we plan the program for the Los Angeles (LA) meeting. In past years, themes have included topics such as space-time integration in geography and GIScience, climate change, geography and human rights, historical GIS, and geography and sustainable development.

We invite you and the Esri user community to help us develop ideas for themes by suggesting new ideas for Los Angeles, and for coming years, as well. Themes are often suggested by the meeting's location itself or by political and intellectual trends within the discipline or in society at large. Los Angeles, for example, readily prompts many possibilities. International cities and urban geographies would be a natural theme for the LA meeting. Water is always a dominant consideration for Los Angeles. Others come immediately to mind: the Pacific Rim and Asia. Borders. Migration and immigration. Hollywood, film, and global cultures. Transportation. And so many more.

Please send me an e-mail (drichardson@aag.org) with your ideas for special themes that you would like to see covered during the AAG's Los Angeles meeting or any comments you may have on

important new trends we should be thinking about for AAG's meetings. To stimulate our thinking, below are a few examples of possible themes that are beginning to emerge for the AAG Los Angeles meeting, which is scheduled for April 9–13, 2013. You are also invited to present a paper or poster during the meeting on any topics you think are important, sharing your work and discussing your ideas with an expected 8,000 geographers, GIScientists, and GIS specialists from around the world.

Emerging Asias

Acknowledging Los Angeles's and California's location on the Pacific Rim and their increasing interconnections with Asia, AAG president Eric Sheppard's 2013 presidential plenary session will take up the question of "Emerging Asias." This title references three aspects of Asia today: its rapid (re)emergence as a center of the global economy; its enormous diversity as a region; and, within the heterogeneous subregions of Asia, the expanding differences in the livelihood possibilities of those who have come to live prosperously and those who live precariously.

In the 21st century, the center of gravity of urbanization has relocated decidedly into the Global South, and Asia

in particular is experiencing unprecedented rates of urban change. The urbanization of poverty has been a central aspect of these changes, as circular rural-urban migration, low-wage manufacturing and informal economies and settlements, and urban politics accompany the emergence of a consumption-oriented urban middle class. How can we better understand these changes? What are the implications for northern cities? These and related questions are becoming widely debated; LA will be an excellent forum to engage further with them.

GIScience, Geography, and Health: Spatial Frontiers of Health Research and Practice

Building on several recent AAG initiatives, together with the National Institutes of Health (NIH) in this research area, this theme will explore new research frontiers in health and social environments and also address progress generated by the AAG Initiative for an NIH-wide Geospatial Infrastructure for Health Research. These AAG initiatives have generated a greatly increased awareness by health researchers, as well as geographers, of the core role that geography and GIScience can play in addressing global health needs, both in research and in practice.

Sessions will include leading medical and health researchers, and we encourage GIS specialists and geographers active in health to present their work. Topics addressed in these sessions will include spatial analysis and modeling of disease; health

disparities and inequalities; mobilities and health; exposure monitoring utilizing real-time GPS/GIS methods; genomes and geography; environmental health (including interactions among environment, pathogens, humans, and institutions); spatial patterns of drug abuse and treatment; gene-environment interactions; and mHealth and global health service delivery initiatives, among many others.

Climate Change, Variability, Adaptation, and Justice

This track of sessions would examine the latest research on global climate change and variability, including geographies of projected climate change impacts, mitigation and/or local adaptation strategies, and societal and human rights implications. The Obama administration's recent Strategic Plan for US Global Change Research for the next decade will also be the focus of discussion in terms of its potential opportunities for geographic and GIScience research related to global and climate change. This US Global Change Research Plan directly addresses central roles for geographic and GIScience research, urging researchers to conceptualize global change "at the spatial and temporal scales on which planning, management, and policy decisions are made." The plan also places increased emphasis on integrated human/natural dimensions of global change. Sessions addressing activities and outcomes of the United Nations Conference on Sustainable Development (Rio+20) will also be encouraged as part of this theme.

Borders

Southern California is an excellent venue for advancing research on political borders and their implications for the places they separate and the connectivities between them: migration, language and culture, water, sovereignty, economies, etc. The United States-Mexico border provides a compelling regional focus for this theme, and research and theoretical work related to borders elsewhere is also welcome. Field trips to border areas will also enrich these sessions.

These multifaceted themes are not intended to be the exclusive focus of an AAG meeting but, rather, serve as a lens to help focus discussion and provide a fresh and engaging skeletal structure to each of our large and richly complex meetings. The dynamism, innovation, and range of cutting-edge research presented at AAG Annual Meetings are always remarkable, and we encourage the broadest range of geographic scholarship and research at our meetings. The AAG Specialty Groups also develop their own featured sessions each year, and we encourage prospective attendees to contact the AAG Specialty Group in their areas of research interest to help build strong session tracks around the many diverse and interactive topics and regions that they represent.

For more information, visit www.aag.org/annualmeeting.

I look forward to receiving your good ideas for additional themes and to seeing you at the AAG Annual Meeting next April in Los Angeles, a most creative and fascinating "transnational" city!

Doug Richardson (with input from Eric Sheppard)

(This article originally appeared in the Fall 2012 issue of *ArcNews*.)

China and International Geography at the AAG

One of the greatest pleasures of a sometimes grueling travel schedule is the opportunity to meet with my counterparts and colleagues at other geographic societies around the world. I always try to find time to meet with them; to share information and news regarding geography and GIScience; to discuss possible collaborations; and, when possible, to participate in their annual meetings.

This past year at the AAG meeting in New York City, New York, everyone in attendance had the opportunity to welcome the leaders of geographic societies from around the globe. A set of special sessions featured dozens of reports of the status of geography and GIScience in other countries from the top officials of their national geographic associations. This kaleidoscope of international geography and GIS also provided a venue for leaders of international associations to interact with one another, as well as for AAG meeting attendees to get to know personally some of the leading geographers from other countries. These special sessions, entitled Snapshots: Geography in the World Today, will also be a featured event during the AAG's next Annual Meeting, to be held in Los Angeles, California, April 9–13, 2013. Please join me and our international guests in Los Angeles for

what promises to be a fascinating exchange on the status of geography and GIS worldwide.

During my sabbatical this past year, I also was able to meet with many and varied geographic societies throughout Europe and Asia in their own countries. Many of these international associations are now working together with the AAG on ongoing projects, such as The [International Encyclopedia of Geography](#) and on preparations for a geography and GIS presence at the decadal United Nations (UN) Sustainable Development Conference (also known as Rio+20), that was held in June 2012 in Rio de Janeiro, Brazil. I would like to thank Esri for its long and crucial participation in the AAG's My Community, Our Earth: Geographic Learning for Sustainable Development (MyCOE) partnership.

New Collaborations with China

As part of a two-month visiting professorship at the Chinese Academy of Sciences (CAS) this past year, I was fortunate to be able to attend the annual meeting of the Geographical Society of China (GSC), held in Urumqi (Wulumuqi) in Xinjiang Province in the far west of China, as well as to work with many others

throughout China to establish and solidify collaborative initiatives between the AAG and key Chinese geographic institutions, including the CAS, the GSC, and many university geography departments.

Esri's pioneering GIS systems are in widespread use in China and throughout Asia, both in universities and in government and industry. Many of China's booming cities rely on ArcGIS to plan, design, and manage their infrastructure, as well as to understand the complex interactions between their changing urban environments and human activities.

To better understand these urban spatial processes, the AAG has joined with the Hong Kong Geographical Society and the Geographical Society of China to help organize and support the [Conference on Spatial and Social Transformations of Urban China](#) scheduled for December 13–14, 2012. Building on the theme of this Hong Kong conference, AAG's incoming president Eric Sheppard also will be developing a track of sessions at the AAG Los Angeles conference in 2013 on international cities and urban systems, with a special emphasis on the urban explosion in Asia.

The joint projects and programs under way between the AAG and multiple Chinese geography institutions now encompass geographic research, international online education, publications, specialty scientific meetings, larger international conferences, and academic exchanges at all levels. An AAG-GSC Liaison and Coordination Committee has been established to help

manage, sustain, and expand these cooperative efforts. Its initial members include eight leading geographers from China and the United States: Michael Solem (AAG), Zhou Chenghu (CAS), Liu Weidong (CAS), Zhang Guoyou (CSG), Yu Lizhong (president of East Normal China University), Mei-Po Kwan (UC Berkeley), Alexander Murphy (University of Oregon), and myself. The projects undertaken to date are topically cross-cutting and designed to produce progress in geography in both countries and foster broader personal and professional interaction among individual geographers and GIScientists from the United States and China.

The Geographical Society of China and the Association of American Geographers solidified their growing collaborative relationship and activity during a formal signing ceremony of a memorandum of understanding during the AAG's recent Annual Meeting in New York City.

Asian geographers and GIScientists are attending the AAG Annual Meeting in rapidly growing numbers each year. I encourage you to join us in welcoming our international attendees from Asia—as well as from all countries—at the next AAG meeting in Los Angeles in 2013 and to explore with them ways in which we might mutually benefit from our exchanges and strengthen geography and GIScience through our collective efforts. Thanks, and I hope you enjoy the upcoming Los Angeles conference, meeting old and new friends, enriching our discipline

and ourselves intellectually and socially, and perhaps along the way also addressing the many needs of our interconnected world.

Doug Richardson

For more information about the AAG and the Los Angeles meeting, see www.aag.org.

(This article originally appeared in the Summer 2012 issue of *ArcNews*.)

Developing *The International Encyclopedia of Geography*

I am pleased to announce that the [Association of American Geographers](#) (AAG) will undertake one of the most ambitious and potentially far-reaching publication projects in the recent history of the fields of geography and GIScience. This will be a 15-volume work, to be published both in hard copy and online, tentatively entitled *The International Encyclopedia of Geography: People, the Earth, Environment, and Technology*.

This four-year project will engage geographers, GIScientists, and geographic societies around the globe, and its editors and contributors will reflect the international and interdisciplinary nature of our activities. The sheer scale of this undertaking, in terms of its length, depth, and international scope, has not, to my knowledge, been attempted before.

In-depth entries of up to 10,000 words will allow key topics and concepts in geography and GIScience to be analyzed and presented in ways that recognize their inherent complexity. Annual interactive online updates and extensions to supplemental material and resources will enhance the value of the encyclopedia to the researcher and the user alike. The scope and range of the publication will enable a much fuller discussion of the multiple subdisciplines and perspectives of modern

geography than is typically the case in such endeavors and will permit the engagement of interrelated ideas and topics from other closely aligned fields.

Scope and Vision of the Project

The goal of the project is to create the most comprehensive and authoritative in-print and online resource covering a field broadly defined to include

- Human geography
- Physical geography
- Geographic information science and systems
- Study of the earth
- Study of the environment

Our vision is that this resource will become the first and foremost location for all those needing scholarly, authoritative information about these fields for decades to come. Initial publication will be simultaneously in print and online.

It will be available to a worldwide audience, which will have a comprehensive, accurate and regularly updated account of the field at its fingertips. The level of information will appeal to everyone from the advanced undergraduate to top scholars in the field. The encyclopedia will provide accessible introductions to basic concepts, as well as sophisticated debates in contentious areas.

Where appropriate, it will bring perspectives from across the spectrum of science, social science, and the humanities to bear on the topics it explains and explores. We also plan to encourage coauthorship by collaborative teams of GIScientists and human and physical geographers to provide comprehensive coverage of cross-cutting topics.

What distinguishes this project from other encyclopedias is that it will be truly international, and it has the institutional support of the AAG and other major geographic associations from around the world. This institutional support will enable the encyclopedia to be updated on an ongoing basis, and as such, it has the potential to become the authoritative reference work in the fields of geography and GIScience for decades to come.

In sum, we intend to provide a serious, comprehensive, scholarly, in-depth, peer-reviewed overview and analysis of these fields for an interdisciplinary audience of scholars, graduate students, advanced undergraduates, professionals, and other interested researchers, as well as the general public. Our goal is to establish,

regularly update, and maintain *The International Encyclopedia of Geography* as the world's leading reference resource for the field—one that genuinely engages the needs of international academic and professional research communities.

Structure and Process of the Project

The International Encyclopedia of Geography will contain approximately 5,000,000 words, or 9,000–10,000 printed and bound pages, in 15 volumes, including an index. More than 1,000 illustrations and color photographs will also be included. The AAG, through its editor in chief and an international editorial team, will be responsible for ensuring that the entries are relevant, accurate, and consistent and, in so doing, ensure that each of the entries and the encyclopedia as a whole are high quality. At least two peer reviewers will assess each entry to ensure that it conforms to well-established standards of scholarly publication and fairly and adequately presents the state of the field for the subject matter.

In consultation with others, the AAG leadership has selected an experienced and distinguished editorial team, which will direct the overall project and guide the way in developing a taxonomy that knits together the research in these fields and provides balanced and comprehensive coverage. The core editorial team consists of an editor in chief and five distinguished general editors, each of whom will work with eight subject-matter section editors who represent relevant subfields and will guide

approximately 40 entries each. The core general editors, all of whom have broad networks of contacts in their areas of expertise, as well as strong editorial experience with leading publications, are Michael Goodchild (GIScience and technology), Dick Marston (physical geography), Audrey Kobayashi (human geography), Noel Castree (human-nature interactions), and Weidong Liu (economic geography and regional development); I will serve as the editor in chief.

After considerable care has been taken to finalize the taxonomy of the entries and the choice of contributors, the first drafts will be commissioned. When reviewed and finalized, they should provide a state-of-the-art analysis and discussion written in an accessible style in keeping with the aims of a definitive reference work. In addition to the entries themselves, we anticipate including an editorial introduction, time scale of key developments in the field, lexicon by subject, index, and several appendixes.

We have already appointed a project manager to provide a single point of contact for the editor in chief, general editors, section editors, and contributors and to oversee an online interactive manuscript submission and peer review process. The project manager resides within the AAG headquarters office and assists with project administrative matters.

The International Encyclopedia of Geography will be published in conjunction with Wiley-Blackwell, with which the AAG has

recently concluded extensive negotiations and a publishing agreement regarding the project. Distribution of the encyclopedia will explicitly reflect the international scope of the project.

Call for Participation

Significantly, as AAG president Ken Foote recently pointed out, *The International Encyclopedia of Geography* "will be an influential work for years to come, as well as an important community-building project within the discipline both nationally and internationally." As such, please give careful thought to those leading members of the geography and GIScience communities around the world we might encourage to apply for section editorships to help lead this project. We also will seek to engage younger editors and contributors who are working at the cutting edges of new directions in geography and GIScience, including those who can address the evolving nature and diversity of our discipline and our rapidly changing GIS and related geographic technologies.

There will be ample opportunity for very broad participation by the geography and GIScience community in this landmark project. As we move forward over the next few months with the initial organizational steps, I encourage you to offer your suggestions for candidates for leading editorial roles and authors for the project or to indicate your own interest in being considered as a contributing author or editor. Please submit your ideas or

comments to Joy Adams (jadams@aag.org), AAG's managing editor for the encyclopedia, who will document and pass these on as appropriate. Special information and discussion sessions also are scheduled for the AAG Annual Meeting in Los Angeles, California, next year for those who wish to learn more about *The International Encyclopedia of Geography*. Thanks for your ideas and suggestions, and I look forward to working together with you on this most engaging project in the years ahead.

Doug Richardson

(This article originally appeared in the Spring 2012 issue of *ArcNews*.)

Governors, Secretaries of State Support AAG Resolution

Geography Education in the United States

Former US secretaries of state George P. Shultz, James A. Baker III, and Madeleine K. Albright have endorsed an [Association of American Geographers \(AAG\) resolution](#) calling on Congress to "include authorizations and appropriations for geography education consistent with other core academic subjects for K–12, as part of a reauthorized Elementary and Secondary Education Act (ESEA)." The resolution issued by the AAG also supports geography programs such as the Teaching Geography is Fundamental Act and urges the Obama administration to include geography education as part of its proposals for improving science, technology, engineering, and mathematics (STEM) education.

A bipartisan group of 12 current governors, other key individuals, and major national organizations and corporations have also signed on to the resolution. The supporting governors are Haley Barbour (R-Mississippi), Martin O'Malley (D-Maryland), Rick Scott (R-Florida), Pat Quinn (D-Illinois), Sam Brownback (R-Kansas), Mark Dayton (D-Minnesota), Mary Fallin (R-Oklahoma), Peter Shumlin (D-Vermont), Gary Herbert (R-Utah), Earl Ray Tomblin (D-West Virginia), Paul LePage (R-Maine), and Lincoln Chafee (I-Rhode Island).

In endorsing the document, Secretary Baker stated, "During my time as secretary of state, I witnessed firsthand how important it was that Americans understood geography and the world around them. Since then, as countries have become even more interconnected, that need has grown. As a result, I support the efforts by the AAG to promote geography education in our schools, and I encourage the White House and Congress to do the same."



Secretary Albright asserted, "Geography played a leading role in nearly every policy decision I was involved in as secretary of state. Young Americans with an understanding of peoples, places, and cultures have a clear advantage in today's rapidly changing global economy, and I am encouraged that the AAG is working with Congress and the administration to build support for geography education at the K–12 level."

We at the AAG are delighted to have the support of so many influential national leaders and organizations as we champion greater federal funding for and attention to geography education. Geography is the only one of the 10 core academic subjects identified in the ESEA that does not have a specific funding authorization in the national program designed to support its teaching. As Congress works on reauthorizing the ESEA, this oversight must be addressed.

Other endorsers of the AAG resolution on geography education include the National Association of State Boards of Education; the American Geological Institute; former United Nations ambassador and governor Bill Richardson; the National Council for Science and the Environment; the US Green Building Council; and numerous geography-related organizations, including NCGE, Esri, NGS, the Coalition of Geospatial Organizations, URISA, GITA, AGS, and GISCI.

We urge the Esri user community members to express their own views regarding the need for geography education to their

congressional representatives, both at home in their districts and in Washington, D.C. The ESEA is currently being considered by key congressional committees (*see the URL below for more information*). If you wish to contact your local media regarding the need for geography education, a press release regarding the recent major endorsements of the AAG resolution is available for downloading from the AAG website. The AAG Resolution Supporting K–12 Geography Education, with a full list of endorsing organizations and individuals, is available at www.aag.org/AAGEducationResolution.

Doug Richardson and John Wertman

(This article originally appeared in the Winter 2011/2012 issue of *ArcNews*.)

Building GIS&T Cyberinfrastructure for Innovation in Latin America

The AAG has been involved for several years in discussions with the Inter-American Development Bank; the Knowledge Partnership Korea Fund; and the National Science, Technology, and Innovation Secretariat of Panama (SENACYT), on the feasibility and potential benefits of creating a distributed cyberinfrastructure of linked Geographic Information Science and Technology (GIS&T) Innovation Centers in Latin America for economic development, environmental protection, and other needs. These three organizations have provided support to the AAG to help explore this idea and develop a feasibility study and proposed plan for addressing this concept.

Recognizing the potential roles of science, technology, and innovation for improving the social and economic development of the Latin American and Caribbean regions, the AAG recently gathered leading representatives of universities, government agencies, research centers, international geography organizations, mapping agencies, and others, for strategic planning meetings in Panama focused on how best to enhance GIS&T research and educational capacity in Latin America.

This process brought together the leadership of many international geography-related organizations, including

Santiago Borrero of the Pan American Institute of Geography and History, Ronald Ablor of the International Geographical Union, Graciela Metternicht of the United Nations Environment Programme, Dr. Rubén Berrocal of SENACYT, Michael Goodchild of the US National Center for Geographic Information and Analysis (NCGIA), and dozens of other senior GIScience researchers and government officials from stakeholder institutions throughout the Americas.

Priority Needs

These meetings addressed the current status of GIScience and technology infrastructure and expertise at national, regional, and international organizations throughout Latin America and examined several GIS&T research and educational programs that could serve as useful models for the region. Participants identified gaps and needs in both the education and research areas for GIScience in Panama and Latin America and discussed the creation of employment opportunities for young researchers and scientists in the region.

Berrocal, the director of SENACYT, shared his strong support of national and Latin American efforts for the development of a

network of interactive and mutually supportive GIS&T research and educational centers to support social and economic development needs ranging from public health and agriculture to transportation and tourism. Berrocal, a medical doctor and researcher, also discussed Panama's new national strategic plan for science, technology, and innovation, which provides a national science policy framework and context for the development of GIS&T.

The assessment and analysis by the meeting participants identified the following challenges and priority needs, as well as others, for developing GIS&T cyberinfrastructure and capacity in Latin America:

- Achieve continuity in university programs regarding capacity and knowledge in GIS&T, and enhance individual as well as institutional capacity in public and academic sectors. This implies finding ways to sustain developed capacity and ensure that it is not lost when administrations change or new personnel replace existing skilled staff.
- Engage policy makers in understanding the key roles of geography and GIS infrastructure in addressing environmental protection, urban development, sustainable tourism, public health, social justice, transportation and logistics, and other national and regional development goals.
- Encourage sharing of geographic data and information, as well as geographic expertise and knowledge, more broadly

across disciplines and sectors. This implies public access to geospatial data and mechanisms to engage local populations in the design and development of national mapping programs.

- Encourage central repositories of fundamental geospatial datasets at national levels, including maintenance and updates. Linkages to regional-level geospatial portals will facilitate sharing across national borders to foster trade and cooperation on environmental protection and economic development programs throughout Latin America.
- Coordinate data collection procedures, comply with metadata standards, ensure interoperability, and follow online data dissemination protocols to permit multiple applications by a multitude of organizations, researchers, educators, and individual citizens. Data standards coordination is already under way, and many countries of the region are participating, but further progress is needed.
- Create curricula for geography, GIScience, and GIS in the education system and emphasize fundamental principles of GIScience and technology rather than only applications. The University Consortium for Geographic Information Science GIS&T Body of Knowledge (AAG, 2006) offers one starting point for these efforts.

Establishing a Network of Centers

Participants discussed several ideas, potential organizational models, and locations for research centers that might address regional GIS&T cyberinfrastructure needs as defined by the region itself. There was consensus about the importance of engaging all sectors, including public, private, academic, and nongovernmental, in the creation and support of the pilot centers. Adapting the "multiuniversity center" concept employed by NCGIA emerged as one potentially relevant model for successfully structuring the involvement of a diverse suite of universities and public research institutions in Panama and throughout Latin America.

After extensive discussion, the group unanimously requested that the AAG work together with SENACYT and the other organizations involved in the strategic planning process to develop an implementation plan and funding for a prototype center designed to enhance Latin American GIS&T infrastructure and capacity for innovation and economic development, with Panama being an initial host for the prototype center. The Panama GIS&T Center would work to expand networked linkages to universities throughout the region, as well as to research centers, government agencies, and other institutions, such as national mapping agencies, the Panama Canal Administration, and existing private-sector GIS&T institutions.

The initial funding for the prototype would be supplemented by long-term sustainable support in the form of research and educational services, additional grants, matching funds, and in-kind resources (human and infrastructure), as well as private-sector support through grants of funds, GIS&T equipment, or GIS software. The implementation plan also addresses mechanisms for achieving long-term sustainability and development of the networked GIS&T cyberinfrastructure centers and for their interactions with governments, nongovernmental organizations, universities, and other centers throughout the Americas. For more information, see www.aag.org/cs/laccenter.

Doug Richardson (with input from Patricia Solís and Candida Mannozi)

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A National GIS Infrastructure for Health Research

The AAG has been working closely with the US National Institutes of Health (NIH) on the integration of geography and GIS in medical and health research for nearly a decade. Two years ago, we began building on the foundation of these research collaborations and multiple NIH relationships with a far-reaching new initiative for GIScience, health, and geography, called the AAG Initiative for an NIH-Wide GIS Infrastructure. This ongoing initiative, including a recent AAG-NIH joint workshop to explore and further develop such a complex and large-scale undertaking, is described in more detail below.



The AAG Initiative

The rationale for this AAG initiative is the unmet need for spatial and spatiotemporal data and analyses, as well as for geographic context, across nearly all NIH's 30 individual institutes. This need is pressing for research undertaken at NIH ranging from gene-

environment interaction in biomedical research to the tracking of disease outbreaks and the assessment of health service delivery.

While some progress has been made in recent years in developing geographic information systems, geocoding services, mapping, and associated standards, problems nevertheless abound in the lack of interoperability among proprietary systems, longitudinal variation in data collection, difficulties of sharing inadequately documented data, issues of confidentiality of location-specific data, and lack of understanding of the basic concepts of geographic/environmental context and of spatial and spatiotemporal data and analysis. Although these problems and their solutions vary somewhat by institute across NIH, they also share a great deal in common, and therefore very substantial scale economies can be achieved by addressing them collectively.

Some individual NIH institutes have made independent and fragmented investments in spatial data and tools. The inefficiencies of this approach suggest that a common GIS infrastructure offers significant advantages. The AAG Initiative for an NIH-Wide GIS Infrastructure has been exploring the potential for such a collective solution, in consultation with many individual institutes and the NIH leadership. We are addressing

opportunities and obstacles to establishing such an ambitious infrastructure, strategies for optimizing the long-term research value of an NIH-wide GIS infrastructure, common standards and protocols, a catalog of available data resources, training programs and examples of best practices, collective negotiation of software and data licenses, and tools specifically adapted to the needs of health research. The overall vision of the initiative is to enhance the ability of NIH researchers to make use of this rapidly growing and increasingly important area of research infrastructure while taking advantage of economies of scale.

The AAG initiative is led by a steering committee appointed by the AAG Council, consisting of five leaders in the health-research applications of spatial and spatiotemporal technologies: Michael Goodchild, Doug Richardson, Mei-Po Kwan, Jonathan Mayer, and Sara McLafferty. It receives input from a larger advisory group that includes geographers and health researchers from across the disciplines represented at NIH. The first phase of the initiative has focused on creating a broad road map for the development of a GIS infrastructure for health research, assessing and documenting the demand for such an infrastructure throughout the institutes and among NIH leadership, and developing a sustainable funding model.

The AAG-NIH Workshop

After discussions with NIH officials in multiple institutes, the AAG recently received funding support from NIH to hold a high-level

workshop in February 2011 to further develop the conceptual framework and GIScience research needed for implementation of an NIH-wide GIS infrastructure, together with senior scientists and administrative leaders from all across NIH. This workshop, cosponsored by the AAG and NIH's National Cancer Institute and National Institute on Drug Abuse, was highly successful and represents what many attendees have characterized as a seminal event.

Presentations included an overview of current GIS activities at NIH institutes, perspectives from the GIScience research community, extramural researchers' views on GIS needs at NIH, and discussions of system architecture options for an NIH-wide geospatial infrastructure. Bill Davenhall of Esri also participated in the workshop and provided excellent background on a number of health-related GIS activities. Breakout groups in the workshop focused on identifying common needs, key challenges, and implementation alternatives. Recommendations, priorities, and next steps in this process were discussed and are the subject of a recent report prepared by the AAG and NIH (www.aag.org/health_geographies).

There was consensus among the participants in the workshop that developing a broader and deeper GIS infrastructure throughout NIH for medical research is needed. The discussion highlighted numerous benefits of geography and GIScience to NIH's health research programs. Examples of the benefits of a large-scale GIS infrastructure to health and biomedical researchers

include generation of research hypotheses through discovering geographic patterns and by analyzing data in ways that would not otherwise be possible, increased ability to understand gene-environment interactions and their role in disease occurrence, ability to advance mobile health systems by incorporating real-time GPS/GIS technologies, and the potential to integrate and link other major health databases with such an infrastructure.

Workshop participants also discussed the substantial challenges to the implementation of such an ambitious project. These challenges include dealing with locational privacy and confidentiality issues; developing and disseminating GIS and analytic modeling tools specific to the needs of health and biomedical researchers; and incorporating training and education in GIS, geospatial tools, and spatial thinking for health and biomedical researchers. Participants also recognized the importance of having a forward-looking strategy in developing an NIH-wide GIS infrastructure, being mindful of new and emerging technologies, including, for example, the geospatial web, social media, new information from electronic medical records, real-time health monitoring, and developments in sensor and location-aware technologies.

The next steps for pursuing the concept of a large-scale, NIH-wide geospatial infrastructure to support health research will include wide dissemination of the AAG-NIH Workshop Report to both the geography and health and biomedical research communities, preparing a more detailed inventory of the portfolio

of intramural and extramural GIS projects supported by NIH, and developing NIH requests for proposals and focused workshop proposals that address specific research needs related to such a complex infrastructure. Potential research would need, for example, to address spatiotemporal analysis in health research, where issues of scale, privacy, large datasets, and computational capacity are just some of the areas that need to be investigated; defining a distributed computing architecture (including cloud computing) for an NIH-wide GIS; developing a common language, or ontology, shared by biomedical researchers and geographers to foster collaboration; and addressing other needs and challenges described above. The workshop concluded with an executive briefing for senior leadership from many institutes in the NIH.

If successful, I believe this AAG initiative will open new doors for geographic research and discovery at NIH in collaboration with biomedical scientists at most institutes within NIH and in related public health fields, as well. For geographers, GIScientists, and medical researchers alike, it also holds real promise for making a meaningful difference in the health and lives of people around the world.

Doug Richardson

(This article originally appeared in the Summer 2011 issue of *ArcNews*.)

GIS and Geography: Interactions with the Humanities

The AAG will be continuing a decade-long arc of sustained activity around the theme of "Geography and the Humanities" with a special set of sessions on these interactions during its upcoming Annual Meeting in Seattle, Washington. We invite all interested GIS specialists, geographers, artists, writers, and humanities scholars to attend and participate in these sessions, to be held April 12–16, 2011.

As noted previously in this column ("[Geography, GIS, and the Humanities](#)," *ArcNews*, Summer 2006, Vol. 28, No. 2, p. 39), there has been a remarkable resurgence of intellectual interplay between geography, GIS, and the humanities in both academic and public circles. Metaphors and concepts of geography and GIS now permeate literature, philosophy, the arts, and other humanities. Terminology and concepts, such as space, place, landscape, mapping, and geography, are increasingly pervasive as conceptual frameworks and core metaphors in recent publications in the humanities.

The diffusion of ideas between geography and the humanities is significant for the insights and connections it has spawned. Scholars and writers outside the field of geography have developed new understandings from interrogating a sense of

place or by examining the changing landscapes of globalization and complex new international realities in traditionally geographic terms. The core traditions of geography, combined with recent geographic technologies, such as GIS, have opened new lines of intellectual inquiry in the humanities and changed research methodologies in numerous fields. And, of course, the mutually beneficial interactions between the discipline of geography and such humanities fields as the philosophy of science, cultural and ethnic studies, and various literatures in postmodernist thought have also had far-reaching implications for GIScience and geographic research and education.

For many years, the AAG has focused on developing ideas, methods, and partnerships through which we might further explore, showcase, and foster the emerging interactions between geography, GIS, and the humanities. These efforts resulted in a seminal Symposium on Geography and the Humanities, sponsored jointly by the AAG, the American Council of Learned Societies, and the University of Virginia, in 2007. This symposium explored how geography informs the humanities and vice versa, took stock of the new and evolving connections between geography and the humanities, and identified promising new

research paths along which such interaction can proliferate and be strengthened in the future.

These geography and humanities interactions are now the subject of two new books, emanating in part from the AAG Symposium and supported by grants from the National Endowment for the Humanities and the Virginia Foundation for the Humanities. The first of these complementary explorations, *Envisioning Landscapes, Making Worlds: Geography and the Humanities*, focuses a lens on the deep traditions of the humanities within the discipline of geography, with contributions from many of the most prominent authors in the humanities traditions of geography. The second book, *Geohumanities: Art, History, Text at the Edge of Place*, reaches outward to explore the new, rapidly evolving experimental and experiential engagements by humanities disciplines themselves as they seek to understand and incorporate geographic methods and concepts of space and place into their own work, which encompasses the rapidly expanding use of GIS throughout the humanities and the burgeoning field of historical GIS. Both of these new books, published by Routledge this spring, will be the subject of featured discussions during the AAG Annual Meeting's special Geography and the Humanities sessions in Seattle, together with the books' editors and authors.

Another highlight of the Geography and the Humanities track at the Seattle meeting for me will be a keynote presentation by the exquisite writer and longtime friend of geography, Barry

Lopez, who won the National Book Award for his book *Arctic Dreams* and recently authored *Home Ground: Language for an American Landscape*. I am delighted to note as well that he has been selected as the AAG's 2011 Honorary Geographer, a fitting award in light of this year's special focus on geography and the humanities. Lopez's keynote talk will be presented on Friday, April 15, 2011.

The AAG welcomes and encourages broad participation by the Esri GIS community in these Geography and the Humanities sessions. I look forward to seeing you in Seattle, a beautiful and most apt setting for these sessions on geography and the humanities.

Doug Richardson

(This article originally appeared in the Spring 2011 issue of *ArcNews*.)

Rebuilding Geography and GIS Capacity in Haiti

Five years ago, the Association of American Geographers (AAG) mobilized its membership and geographers around the world to respond to the devastation left behind by Hurricane Katrina in New Orleans. The online disaster coordination clearinghouse and a special fund that we organized with support from AAG members helped bring GIS, GPS mapping, and remote-sensing expertise to respond to the immediate needs of the disaster, then later helped rebuild geography programs and departments in the hardest-hit areas. We continue to hear from faculty and students in those departments about the difference these resources have made in their personal and professional recovery. For the AAG, this experience helped us appreciate, in a very direct way, the importance of coordinated disaster response and of understanding the long-term nature of recovery.

Since Katrina, we have continued to witness and respond to disaster—some at a distance, others closer to home. In 2010, some of the more visible examples include the devastating earthquake in Haiti; recent floods in Pakistan that inundated one-fifth of the country; and the explosion of the Deepwater Horizon well that spilled five million barrels of oil into the Gulf of Mexico, another disaster challenge for Louisianans and their neighbors. The number of disasters around the world each year has been steadily

increasing, and this trajectory is unlikely to waver given predicted changes in climate and corresponding impacts. All require resources for response and recovery. Geographic knowledge and information, geospatial technologies, and Web-based networking, not to mention the expertise to work in this context, are resources that have become increasingly essential in disaster planning, vulnerability assessment, response, and recovery.

In the five years since Katrina, the AAG and its members have become more engaged in collaborative efforts to build capacity for disaster response and recovery, with an emphasis on the contributions of geography and GIScience to these efforts. For example, the AAG has participated in a range of activities to support rebuilding in Haiti. Individual AAG members have also independently taken action to assist Haiti (and other disaster-impacted regions). At a broader level, we are working on international efforts to create a rapid response infrastructure and capability for global disaster reduction and recovery. These efforts are described in further detail below.

Haiti

On January 12, 2010, at 16:43:10 local time, a 7.0 magnitude earthquake struck Haiti, centered near its capital, Port-au-Prince. More than 300,000 people were killed. Another 300,000 were injured. About 1.5 million now live in tent encampments. Individuals important to the geography community in Haiti were among those who were tragically lost; key infrastructure was destroyed or severely damaged.



The headquarters of Haiti's National Center for Geospatial Information (CNIGS) was destroyed, and its gifted director, Gina Porcena Meneus, and five staff members were killed. Established

in 2005 with support from the United States and European Union, CNIGS's role was to develop geospatial information for sustainable development and natural hazard mitigation. Operating under the Haitian Ministry of Planning, CNIGS's geospatial data and imagery archive was one of the most comprehensive in the region prior to the earthquake. However, much of this spatial data infrastructure, now desperately needed for recovery planning and redevelopment, was lost. CNIGS was also the headquarters for Haiti's national chapter of the Pan-American Institute of Geography and History (PAIGH).

George Anglade, distinguished Haitian-Canadian geographer, writer, and political activist, also perished in the earthquake along with his wife of 43 years. He was one of the founders of the University of Quebec at Montreal (UQAM) and a professor of social geography there for more than 30 years before retiring in 2002. Professor Anglade actively participated in actions for a democratic Haiti.

Haiti's leading universities, eight of which are members of Agence Universitaire de la Francophonie (AUF), were devastated. The State University of Haiti (UEH), by far the largest, with approximately 15,000 students and 11 faculties in locations around Port-au-Prince (and 10,000 students in the provinces), saw most of its buildings (more than 90 percent) destroyed or severely damaged in the earthquake. UEH has a developing geography program with expertise in human, economic, rural, and population geography.

The AAG and its members have been involved in responding to the Haiti earthquake in many ways, from providing aid and information in the immediate aftermath of the disaster to capacity-building activities focused on long-term efforts to rebuild the country. The AAG headquarters office helped coordinate and respond to requests for geographic expertise in the days and weeks following the earthquake. Geographers from the United States and around the world volunteered their time and expertise through organizations such as the International Network of Crisis Mappers, OpenStreetMap, and GISCorps to acquire critical data and create maps guiding emergency responders in initial rescue and relief efforts.

The AAG has engaged with the U.S. State Department, private industry, and other organizations on how to rebuild CNIGS, including how to use the data collected during the earthquake response to reconstitute its lost assets, replace equipment and infrastructure, and build GIS expertise. We have also been working to help identify senior-level candidates for a proposed new position of chief geospatial information officer (CGIO). The CGIO will coordinate the use of geographic information and advise the Interim Haiti Reconstruction Commission and government of Haiti on planning and reconstruction activities. A geographic knowledge and information strategy is urgently needed for Haiti's recovery and development activities.

The recovery and development also require long-term engagement in capacity building. In support of this goal, the

AAG cosponsored and participated in a workshop organized by the American Association for the Advancement of Science (AAAS) and its Caribbean division. The workshop, entitled Advancing Capacity for Haitian Science and Science Education, was held July 10-18, 2010, in San Juan, Puerto Rico, and in Haiti. Haitian scientists and educators, along with colleagues from the United States, Puerto Rico, Canada, and Africa, participated in developing seven strategic goals and nearly 40 specific preliminary recommendations to advance science and science education in Haiti. A final report (coauthored by AAG staff) and recommendations will be released by AAAS in early 2011. Separately, AAG member Robert Maguire, associate professor of international studies at Trinity Washington University and chair of the Haiti Working Group at the U.S. Institute of Peace, shared his expertise and views about rebuilding Haiti in testimony presented before the U.S. Senate's Subcommittee on International Development and Foreign Assistance, Economic Affairs, and International Environmental Protection. Professor Maguire has worked in Haiti since 1974 and shared his vision for Haiti's future in an op-ed to AAG members.

Infrastructure for Global Disaster Reduction and Recovery

The AAG will continue its engagement with several long-term efforts to support Haiti's recovery and reconstruction. We also have created and encourage donations by geographers and

others to the AAG Haiti Recovery and Reconstruction Fund to help support the rebuilding of university geography and GIS educational and training programs in Haiti, including the reestablishment of CNIGS, with both their institutional and human capital needs. This fund will also be used to subsidize no-cost membership in the AAG for interested Haitian geographers and their students through the AAG's existing Developing Regions Membership Program. While membership is already substantially discounted, such support is essential given the dire situation affecting Haitian universities. When the AAAS report and recommendations on advancing science and science education capacity is finalized, we will continue to work closely with AAAS on its dissemination to key stakeholder groups (e.g., donor community) and identify specific areas in which the AAG and its members can contribute to and act in collaboration with the geography and GIS community in Haiti. We have also organized several high-profile sessions at the AAG 2011 Annual Meeting in Seattle, Washington, focused on geographers' activities and research-immediate and long term-relevant to response, recovery, and reconstruction in Haiti.

The response to the earthquake and other disasters of the early 21st century demonstrates the necessity of harnessing geographic knowledge, technologies, and data to coordinate relief and recovery. Yet, as Haiti illustrates, challenges to reducing disaster vulnerability, risk, and loss of life and infrastructure remain. At the same time, opportunities exist to strengthen and

leverage existing programs and networks for better coordination, positioning, and delivery of needed resources and to improve response time frames through a comprehensive, global network of rapidly accessible geographic information at multiple scales.

Beginning in early 2010, the AAG met several times with representatives of the Abu Dhabi Global Environmental Data Initiative (AGEDI), the Clinton Foundation, the United Nations Environment Programme (UNEP), Esri, and others, to discuss plans for the Eye on Earth (EoE) Summit to be held in 2011 and hosted by the government of Abu Dhabi. The purpose of the summit is to address the needs associated with creating international information networks that provide access to the best available environmental and social data for decision making from local to global scales. At the suggestion of the Clinton Foundation, this working group is developing the concept of a rapid response infrastructure focused on disaster relief and recovery in connection with EoE called the First Assist Locator and Coordinated Operations Network (FALCON) Initiative. This initiative is envisioned "as a public-private partnership (PPP) to address GIS and spatial data infrastructure capacity building for more effective disaster planning and response and climate change adaptation with special emphasis on those most vulnerable communities and countries in the world." FALCON is conceived as building on current capacity in disaster reduction and recovery available through, for example, the Global Facility for Disaster Risk and Reduction (GFDRR) of the World

Bank, United Nations International Strategy for Global Disaster Reduction (UNISDR), United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), and other governmental and nongovernmental organizations that are part of the disaster and humanitarian communities. The AAG will continue its work with AGEDI, the Clinton Foundation, and others, to develop and refine this initiative over the next year. We look forward to sharing updates about this and other activities in future issues of *ArcNews* and on the AAG Web site.

If you wish to support recovery efforts for Haitian GIS specialists and geographers or university geography and GIScience programs, please consider making a tax-deductible donation to the AAG Haiti Recovery and Reconstruction Fund. For more information or to make a donation, visit aag.org/Haiti. Thank you for your support of the AAG's efforts to help rebuild geography in Haiti.

Doug Richardson and Jean McKendry

(This article originally appeared in the Winter 2010/2011 issue of *ArcNews*.)

Space-Time Integration in GIS and GIScience

Every year, the Association of American Geographers (AAG) identifies a particularly timely or relevant set of themes to feature during its Annual Meetings. Last year, an overriding theme was climate change, for example, and previous years have included featured sessions on topics such as human rights, landscape and literature, sustainable development in Africa, geography of water, and many other topics.

A special symposium—focused on the research status, recent advances, and research needs of space-time integration, modeling, and analysis in geography and GIScience—will be organized within the AAG Annual Meeting in Seattle, Washington, April 12–16, 2011. This special set of invited papers will feature many leading GIScience researchers from Asia and Europe, as well as from other regions of the world, and will form a high-profile international symposium within the AAG Annual Meeting.

Space-time analysis is a rapidly growing research frontier in geography, GIS, and GIScience. Advances in integrated GPS/GIS technologies; the availability of large datasets (over time and space); and increased capacity to manage, integrate, model, and visualize complex data in (near) real time offer the GIS and geography communities extraordinary opportunities to begin to

integrate sophisticated space-time analysis and models in the study of complex environmental and social systems, from climate change to infectious disease transmission.

This special symposium will build on momentum generated from a space-time analysis workshop cosponsored by the AAG, the University of Redlands, the University of Southern California, and Esri in early 2010, as well as from several other initiatives during the past few years. GIScientists, geographers, modelers, computer programmers, GPS/GIS systems scientists, climate change scientists, epidemiologists, ecologists, planners, transportation experts, and others with active research expertise in integrating space-time in GIS and geography are encouraged to participate in this special symposium, which will open with plenary sessions led by prominent theorists and pioneers in space-time GIScience and technology research.

Doug Richardson

The symposium organizers are

Michael Goodchild—University of California, Santa Barbara

Doug Richardson—Association of American Geographers

Mei-Po Kwan—Ohio State University

Luc Anselin—Arizona State University

Kathleen Stewart—University of Iowa

Tomoki Nakaya—Ritsumeikan University, Japan

Dan Griffith—University of Texas, Dallas

Martin Dijst—Utrecht University, the Netherlands

Jeremy Mennis—Temple University, Philadelphia, Pennsylvania

Elizabeth Wentz—Arizona State University

Michael Gould—Esri

Donggen Wang—Hong Kong Baptist University, China

Jean McKendry—Association of American Geographers

May Yuan—University of Oklahoma

Seraphim Alvanides—Northumbria University, UK

The symposium organizers welcome paper or poster abstracts in the following areas:

Research advances and needs in space-time analysis and representation, such as

- Collaborations among GIScientists and modelers (systems, agent based, network, etc.)

- Real-time GPS/GIS interactive systems
- Technological challenges and R&D needs
- Visualization of space-time in GIS
- Sharing discoveries and results with decision makers
- Integrating analysis and results into Web 2.0
- Ontological frameworks
- Qualitative space-time analysis
- Temporal scale and event representation
- Historical time and HGIS
- Computational algorithms
- Analytic tools for time-constrained decision support systems
- Sensor integration
- 3D or 4D representations of time and space interactive data
- Real-time geographic management systems
- Uncertainty analysis
- Community or participatory GPS/GIS and related systems (including "vgi")

State-of-the-art applications of space-time modeling and analysis in areas such as

- Climate change response and adaptation
- Species migrations and habitat connectivity
- Marine environments (oil spill impacts, other persistent pollution, fisheries, ocean transport)
- Hydrology (flows and observations)
- Land use/Land cover change
- Location-based services (LBS)/Mobile GIS/Navigation
- Homelessness and poverty research
- Health (epidemics, disease transmission)
- Disaster response, crisis mapping
- Crime analysis and mapping
- Dynamics of urban renewal/decay
- Dynamics of the global financial system
- Wars, revolutions, and military activities
- Flows of labor and trade in a global economy
- Transportation (information, materials, people)
- Refugee populations

Education and the GIS workforce using space-time analysis, such as

- Needs of business, nonprofit, governmental, and academic organizations for expertise
- Opportunities and pathways to educate geographers and GIScientists (students to mature GIS professionals) in new research techniques, tools, and concepts

If you are interested in presenting a paper or poster in this Space-Time GIScience Research Symposium, please go to www.aag.org to register for the conference and submit your abstract by November 10, 2010. Indicate Temporal as one of your keywords.

Other Special Themes

In addition to this featured Space-Time GIScience Research Symposium, other special themes of the AAG Seattle meeting will include session tracks focused on Asian geographies and research collaborations, geography and public health, diversifying our discipline, and the changing role of universities in today's globalizing societies. These and hundreds of other cutting-edge research and education sessions and workshops will be held at the Seattle meeting. The AAG Annual Meeting, with more than 8,000 attendees from over 60 countries, represents one of the most dynamic, substantive, and innovative GIScience research and scholarship events in the world. I hope you will join us in 2011 in Seattle, one of my favorite cities.

More Information

For more information on the symposium, see www.aag.org/giscience/research.

(This article originally appeared in Fall 2010 issue of *ArcNews Online*.)

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 aag.org/cs/education/blueprint_for_geography_education.

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 aag.org.

Doug Richardson and John Wertman

(This article originally appeared in the Summer 2010 issue of *ArcNews Online*.)

The Library of Congress: Geography's Treasury

It's been 25 years since the AAG held its annual meeting in Washington, D.C., so attendees from around the world will have a lot to do this spring when it comes to catching up on the extraordinary cultural and geographic research institutions in this famously archival city. What better place to start than the Geography and Map Division of the Library of Congress?

Several major events at the AAG Annual Meeting will help geographers and GIS specialists experience the Library of Congress (LoC), with a special focus on the treasures and scholarly resources of its Geography and Map Division. But as it is the largest library in the world and holds extensive historical and current GIS, book, and periodical collections on every imaginable geographic topic, a brief history of the collection might both whet your appetite and prepare you for the sheer volume of its holdings.

The Library of Congress

Briefly, the Library of Congress was established by an act of Congress in 1800 upon the transfer of the capital from Philadelphia, Pennsylvania, to Washington, D.C. The legislation initially envisioned a reference library for Congress only,

containing "such books as may be necessary for the use of Congress—and for putting up a suitable apartment for containing them therein . . ."

The original library was housed in the Capitol itself until August 1814, when our colleagues from Britain visited and set fire to the Capitol Building, burning and pillaging the fledgling library in its cozy apartment, together with its comfortable leather chairs and globes, and its modest collection of books and maps. Fortunately, however, Americans are not ones to let minor slights fester, and within one month, retired U.S. President Thomas Jefferson offered his entire personal library as a replacement. Jefferson had spent 50 years accumulating books, "putting by everything which related to America, and indeed whatever was rare and valuable in every science," and his library was considered one of the finest in the country. The ecumenical nature of his collection, reflecting a voracious curiosity on all subjects, fundamentally altered the philosophy and rationale behind the collecting policies of the LoC, which then saw its mission as a repository for open scholarship on every conceivable intellectual pursuit.

In 1897, the Library of Congress was moved to one of my favorite Washington landmarks, the impressive Italian Renaissance

Jefferson Building, which is today the jewel among three Library of Congress buildings clustered near the U.S. Capitol. The central Reading Room of the Jefferson Building is one of the most beautiful odes to the love of knowledge in Washington. It is simply not to be missed.

The Geography and Map Division

But, of course, of most importance is its unparalleled collection of maps and related cartographic, GIS, and geographic reference materials. The Library's original Hall of Maps and Charts has now become the Geography and Map Division, occupying an area of 90,000 square feet in the Library's James Madison Memorial Building. Annual additions to the Geography and Map Division's collections average 60,000–80,000 maps and 2,000 atlases. The many rare and valuable maps and atlases in the collection include the recently acquired 1507 Waldseemuller map, original prints chronicling Napoleon's adventures in Egypt, and the 1482 printed edition of Claudius Ptolemy's *Geography*. The Geography and Map Division holds, preserves, and makes available to the public the largest and most comprehensive collection of maps and atlases in the world.

AAG and the Library of Congress

To help guide you through this magnificent collection, Dr. John Hébert, director of the Library of Congress, Geography and Map Division, will deliver a special plenary presentation at the

AAG Annual Meeting on the Library's geographic collections, its dynamic plans for the future, and how to access it for research and pleasure. Hébert's plenary talk on April 15, 2010, is cosponsored by the Washington Map Society.

An AAG field trip to a rare Library of Congress open house event—exclusively for AAG Annual Meeting attendees—will take place on Saturday, April 17. During the open house, the graceful Geography and Map Reading Room will host a unique exhibit of both modern and historic maps, atlases, globes, and terrain models, dating from the 14th century to 2010, followed by a "behind the scenes" guided tour of the Library's vault of priceless cartographic treasures.

Geography Reference and Online Services

The Geography and Map Division also employs very helpful reference librarians who will respond to requests "that cannot be answered by a library in the inquirer's locality." While this is a great service, they are quick to note that they cannot undertake extensive research projects or assist in preparing bibliographies, term papers, or other academic assignments (sorry, students).

As might be expected, numerous digital maps and GIS and other geographic resources are increasingly available online as well from the Library of Congress for both researchers and the public. A good place to start is www.loc.gov/topics/maps.php. But the

AAG Annual Meeting in Washington, D.C., from April 14–18, 2010, will offer a unique opportunity to experience firsthand the dazzling array of cartographic wonders at the Library of Congress. I look forward to seeing you there.

Doug Richardson

(This article originally appeared in the Spring 2010 issue of *ArcNews Online*.)

GIScience and Climate Change

Geographers and GIScientists have long played key roles in climate change research, and the tools and methods of geography—including GIS—will be crucial to understanding, limiting, and adapting to climate change in the decades ahead.

After years of delay and denial, responsible climate change research and responsive policy agendas are now assuming center stage in President Barack Obama's administration. Nearly all federal agencies now have legacy or newly mandated and funded research programs that actively seek to identify causes and impacts of global climate change and policies for mitigating or adapting to these impacts. Geography and GIScience, with long experience in the integration of the physical and social sciences, offer a well-placed bridge that can bring together the disparate natural and human system elements of climate change research and policy.

The U.S. Congress is now poised to undertake debate and potential definitive legislative action on several major climate change bills during the spring of 2010, precisely during the time frame of the AAG's upcoming Annual Meeting in Washington, D.C. For these reasons and more, "Geography and Climate Change" has been designated as the key overarching theme of

the AAG's Annual Meeting to be held April 14–18, 2010. Both the timing and the venue of this particular AAG Annual Meeting afford to geographers and GIS specialists around the world a uniquely significant opportunity to showcase the potential contributions of geography and GIS to climate change research and to engage and influence U.S. and international policy on climate change at a critical juncture in its formulation. This will be a most meaningful moment for the geography and GIS community to interact with federal agency researchers and U.S. national policy makers on perhaps the most consequential issue of our generation, both at the AAG meeting itself and throughout the city, including on Capitol Hill.

The AAG currently has invitations pending to several high-level Obama administration officials to attend and speak at our AAG gathering, expected to number 7,000 attendees. Based on the responses we have received to date, we anticipate that numerous senior climate change officials and scientists will be in attendance and that the dialog at this meeting will provide an important national and international forum for addressing and moving forward key science and policy dimensions of the climate change issue.

Many special sessions on climate change at the meeting will bring together top scientists and climate change policy leaders to explore coordination and synergy of climate change research and mitigation programs across multiple government agencies and enhance collaboration among governmental researchers and policy makers, university researchers, private-sector GIS firms, and educators.

For example, the Opening Keynote Session of the AAG Annual Meeting will focus on America's Climate Choices, a major ongoing National Academy of Sciences (NAS) study in which geographers and GIScience have played a central role. This study will be released just prior to the meeting, and this special opening session will be one of the first public presentations of the study's results. A primary goal of the NAS America's Climate Choices study is to address cross-cutting science and technology challenges involved in understanding our climate and to identify effective steps and promising strategies that can inform and guide the nation's responses to climate change.

Geography and GIScience are exceptionally well represented in the NAS study, with three of the study's four investigative panels led or co-led by geographers and many other geographers involved in key components of the research. Presenters at this AAG presidential session on America's Climate Choices will include Diana Liverman of the study's Informing Decisions panel, Marilyn Brown of the Limiting Emissions panel, Tom Wilbanks of the Adapting to Impacts panel, and Billie Lee Turner of the

Advancing Science panel. Other geographers and GIScientists involved in the NAS study include Ruth DeFries, Bob Kates, Susi Moser, Jim Buizer, and Linda Mearns.

Dozens of other sessions addressing geographic dimensions of climate change will be held at the AAG's Washington, D.C., meeting. These include, among many others, discussions of three new AAG programs focused on climate change education and teaching; perspectives on the use of GIS in climate change regulatory and enforcement strategies, including cap and trade scenarios; a 10-year retrospective analysis of the AAG's Global Changes, Local Places research program and publication, with implications for current policy and research in the climate change field; and several sessions sponsored by U.S. federal agencies on fostering interagency synergies and coordination of climate change programs. Numerous other sessions will cover the full gamut of current climate change research, ranging from carbon sequestration and climate change modeling to vulnerability analyses and social equities of climate change control and adaptation policies.

I encourage geographers and GIS specialists from around the globe to bring to the fore their research, GIS applications, and perspectives on climate change during the coming pivotal months of this debate. The AAG's Annual Meeting in Washington, D.C., may well represent the most important time and place for geography to engage and influence the far-reaching science and

public policy (and inherently geographic) decisions now coming before us on the issue of climate change.

Doug Richardson

(This article originally appeared in the Winter 2009/2010 issue of *ArcNews Online*.)

Geography, GIS, and Mental Health

For those of you who were hoping this column might offer a groundbreaking treatise on the state of mind of geographers and GIScientists, you can stop reading here. I'm saving that project for when I retire.

What I would like to discuss here are the opportunities and needs for geography and GIScience to participate in the rapidly expanding field of mental health research, a relatively unexplored area for geographers but one in which geography and GIS can, I'm convinced, be a significant and potentially paradigm-changing contributor. It is also a research area in which geographers and GIS specialists can engage with and help address enormous human and societal needs.

As many of you know, the AAG has been working for several years to try to build relationships with the National Institutes of Health (NIH) on behalf of geography and GIS and help medical researchers in the many different NIH centers better understand what geography and GIScientists have to offer to the field of medical research. This work has continued to develop new inroads for geography at several NIH institutes, as well as in the broader medical research communities outside NIH. For example, the AAG and the NIH's National Institute on Drug

Abuse (NIDA) have jointly sponsored special symposia at AAG's Annual Meetings during each of the past four years on the previously relatively unexplored research area of geography and drug addiction. That ongoing effort has now drawn attention throughout NIH and resulted in the publication of a book entitled *Geography and Drug Addiction*, which is being widely circulated in medical research circles and is available from the AAG.

The AAG's work on geography and drug addiction with NIDA has sparked further interest at other NIH institutes, including the National Institute of Mental Health (NIMH), regarding the potential for GIS and geography to also make contributions to the field of mental health research. We have been in lengthy and productive discussions with several NIMH researchers engaged in genomic studies that are attempting to identify genetic markers, the presence or absence of which, it is hypothesized, may correlate with various complex mental disorders, such as schizophrenia, depression, and so forth. The challenge here is that genetic factors are rarely determinant and are nearly always highly interactive with environmental risk factors.

This new genetic research has revived old debates about nature versus nurture, or genes versus environment, but at a whole new

scale and level of detail and sophistication. As mental health and other medical researchers are increasingly able to obtain highly detailed and sophisticated genetic information, there is now also developing a counter-demand for more highly detailed and sophisticated information about the environment in order to attempt to sort out complex gene-environment interactions. This is where geography, with its emphasis on place and related geographic methodologies for organizing and understanding environments, and GIS, with its ability to integrate and correlate vast amounts of different environmental data with observed conditions, such as mental health disorders or genetic risk factors, become central to this new research.

Consequently, geography and GIS are now on the threshold of enabling substantial new breakthroughs in medical research involving complex gene-environmental interactions. We still have a long way to go in understanding genetic and environmental interactions, and our GIS systems and geographic methods are both challenged by the complexity of these systems. However, I have found that medical researchers everywhere, from NIH to universities to private companies, are highly receptive to the promise that geographic methodologies and GIScience and GIS systems hold for a better understanding of the etiology, treatment, and prevention of disease, addiction, and mental health disorders.

These explorations with NIH have been both interesting and productive. An illustration of the unexpected pathways and

intriguing outcomes of these creative interactions between geography and the medical and mental health researchers at NIH is an invitation I received last fall to help organize a special session, together with others from NIH, on the topic of Geography, Addiction, and Mental Health for a meeting of the International Federation of Psychiatric Epidemiologists, which was held in Vienna, Austria. While generally not at a loss for words, I must admit that at first I was not sure what I should say (or not say) to a room full of psychiatrists. However, the meetings went very well, and there was genuine excitement on the part of the many psychiatrists, geneticists, psychologists, and medical researchers present in learning more about GIS and about geography's potential contributions to research on understanding the role of place and the environment in mental disorders and their treatment. Examples of the dozens of research themes with geographic dimensions we discussed included genetic and environmental interactions in schizophrenia, research on the consequences of refugee displacement, psychiatric morbidity of homelessness, psychopathology among Holocaust survivors and their children, urbanicity and psychoses, the global economic burden of mental disorders, public policy and the measurement of happiness, and searching for genes with environmental interactions in complex disorders. Plans are under way to follow up both organizationally and individually to help link these research programs with geography and GIS.

As one NIH scientist noted at our session, "To date, most mental health research has focused largely on biomedical pathways. Increasingly, however, researchers are considering how people's environments—the physical and cultural contexts in which they live—influence the prevalence and consequence of mental health disorders." The AAG will continue to engage these issues of geography's potential role in medical research at all institutes of NIH, and I encourage geographers, GIScientists, and GIS specialists to also consider how you might work together with researchers at NIH's National Institute of Mental Health to help address these complex but pressing mental health research and human needs.

For more information, contact www.aag.org or www.nimh.nih.gov.

Doug Richardson

This article originally appeared in the Summer 2009 issue of *ArcNews Online*.)

Supporting Our Colleagues Around the World

The AAG has established a new membership category for geographers, GIS specialists, and related professionals residing in developing regions. Those wishing to join the AAG from developing regions are now eligible to join the AAG for the deeply discounted membership rate of \$20 per year. Membership in the Developing Regions category includes all regular AAG membership benefits, except that the journals and newsletters are provided in digital online formats. Optional hard copies of the journals are also available for the cost of shipping only.

The AAG is a professional and scholarly association representing leading educators, researchers, GIScientists, and practitioners in geography. Founded in 1904 as a scientific and educational society, the AAG has more than 10,000 members who share interests in the theory, methods, and practice of geography, geographic science, and geographic education. The association hosts 7,000 attendees at its annual meetings, sponsors international workshops and specialty conferences, and conducts research programs on a wide range of geographic topics. The AAG publishes some of the world's most distinguished and influential scholarly journals, newsletters, books, and research reports. The AAG also supports and recognizes geographers and GIScientists around the globe through its many professional

development programs and prestigious grants and awards programs.

Developing Regions AAG members also gain access to members-only Web site resources, such as employment opportunities, job listings, inclusion in the AAG Guide to Geography Programs and Directory of Geographers, curricular materials, and research knowledge environments, and much more. Members are also able to participate in AAG's Specialty Groups, Listservs, chat rooms, and other interactions.

Support Our Colleagues and Our World

This new program serves as a mechanism to bring together talented colleagues from around the globe, from different countries and disciplines, to collectively help address the pressing needs of our society and world. It functions as a collaborative vehicle for research and problem solving on key needs ranging from health to agriculture and from energy to education. For example, one element of this program is a series of online clearinghouses for colleagues with a professional interest in the various regions (Africa, Asia, Latin America, and the Middle East).

Interested U.S. geographers and GIScience colleagues can help in several ways. They can donate to the AAG's tax-deductible Developing Regions Membership Fund, which was established to support the infrastructure and online resources needed for this new program. Contributions to this fund can also be earmarked to offer memberships to those Developing Regions professionals for whom even \$20 may not be affordable. A modest contribution to infrastructure or memberships can make a big difference for colleagues in developing countries.

AAG members and the Esri user community can also jointly extend the reach of this initiative by informing colleagues and friends in developing regions of the new program or by directly sponsoring memberships for colleagues, students, research collaborators, clients, and others who may be interested.

together to create closer ties among our GIS and geography colleagues from around the globe and cooperate in new and closer ways to help build a better world.

Doug Richardson

(This article originally appeared in the Spring 2009 issue of *ArcNews Online*.)



More Information

For more information on how to help with this new program or to join the AAG as a Developing Regions member, visit the AAG Web site at www.aag.org. With your involvement, we can work

Geography Education and GIS Professional Development

In economically turbulent times, many students and college graduates will likely be wondering what options they have at their disposal. Is it time to jump into the job market, or is graduate school a better option? Indeed, many geography departments are hearing from students who are curious about advancing their career options and the value of an advanced degree in geographic information science (GIScience) for future employment. Fortunately, even in difficult times, GIS and GIScience students still enjoy growing opportunities to pursue geospatial work in business, government, and nonprofit organizations where spatial, environmental, and interdisciplinary skills are needed. Having strong academic preparation in geography and GIScience will only expand the career opportunities available to students, allowing graduates to enter the job market at a higher level and advance more rapidly through the ranks after being hired.

Within the past few years, a number of studies in the United States and the United Kingdom have addressed the issue of employability, a term describing the readiness of an individual to obtain and then maintain employment (Mistry, White, and Berardi 2006; Donert 2007; Solem, Cheung, and Schlemper 2008—see www.aag.org for full citations). All of these studies point to some

important findings. First, hundreds of employer organizations across a broad swath of the business, government, and nonprofit (BGN) sectors seek individuals who are able to think spatially and use geographic technologies to collect, integrate, and analyze data on social and natural systems. And the good news for job seekers is that these same employers forecast an increasing demand for these abilities in the coming years.

A second important finding is that employers view geography education as an essential component of professional development in GIScience. This is because geography offers the conceptual frameworks, spatial science foundations, interdisciplinary perspectives, and spatial thinking skills underpinning effective use of GIS and related mapping technologies. In the experience of the employers surveyed and interviewed in this research, geographic learning through field studies, internships, and academic coursework enhances the work of geospatial professionals and helps ensure that the analytical power of geographic technologies is tapped productively.

Employers are also reporting broad and growing professional opportunities for GIScience graduates in areas as diverse as environmental management, transportation, public health, and

international trade. Here, too, there are opportunities for GIS professionals to enhance their employability by taking advantage of new models of graduate education, such as professional master's degree programs, which integrate management training and internships with GIScience education. Among the many such programs are the new Professional Master's Program in geography at Temple University and similar master's degree and certificate programs in geographic information science offered by universities ranging from Arizona State University to Pennsylvania State University and dozens of others. The Guide to Geography Programs in the Americas provides a detailed overview of these educational opportunities (available at www.aag.org).

Many employers still report difficulties finding qualified graduates possessing strong preparation in geography and spatial analysis. In recent years, the AAG has undertaken research projects aimed at improving geography education for careers in BGN organizations (as well as in K–12 and higher education). One of the larger challenges identified in this work is the need to better align curricula with students' career aspirations and the needs of employer organizations. This is especially true in doctoral programs where Ph.D. students who once aspired primarily to careers in academia are now often attracted to equally rewarding and socially engaged careers in government, nonprofit organizations, and businesses. Departments in which the M.A./M.S. is the highest degree offered demonstrate clearer understanding of student goals and curricula that address

BGN opportunities, but these programs still face challenges of implementation and helping students make transitions from traditional academic preparation.

The greater attention now given to BGN career preparation in geography graduate programs also holds promise for recruiting and retaining more women and minority students in the GIScience fields. This is because many of the students surveyed, including women and minority students, are especially interested in BGN careers, yet often feel that many purely technical graduate programs do not adequately provide them with the career advising and broader educational foundation they see as important to success in the GIS fields. But throughout the educational and career pipeline, students, parents, and teachers all need more information about the wide variety of GIScience career options available and the preparation required for success in these careers.

Given that context, the AAG has identified broad areas of critical data needs and actions for future work so that future graduates have a clearer sense of the opportunities available to them:

- Better data on the geographic and general skills that graduates employed in BGN positions use in their daily work
- Local, regional, and national estimates of employers' demand for geographic and geospatial skills in different types of BGN organizations

- Comparisons and assessments of undergraduate and graduate curricula in geography for preparation in BGN careers
- Continued development of disciplinary infrastructure to enhance graduate advising, career preparation, and transition support for early career geography and GIS professionals in BGN organizations, modeled after the success of recent National Science Foundation-funded programs, such as the Geography Faculty Development Alliance, and the AAG's Enhancing Departments and Graduate Education (EDGE) in Geography program

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Geography graduate and undergraduate programs have undertaken a leading role nationally in providing the broad-based GIScience and GIS educational and research programs needed by students and employers across BGN sectors. Thanks to the hard work and goodwill of countless individuals in the geography, GIS, and GIScience communities, including notably those of our friends and colleagues within the Esri education community, we are collectively developing the capacity for meeting the educational needs of our next generation of students and employers. For more information on educational programs available in geography, GIS, and GIScience, visit www.aag.org/education.

Doug Richardson and Michael Solem

GIScience for Human Rights

Nearly all geographers and GIS specialists are concerned about human rights and in their personal and professional lives seek meaningful ways to act on these concerns and values. For the past two years, the AAG has been working together with the American Association for the Advancement of Science (AAAS) to explore an array of issues, projects, and programs that engage GIScience, geography, and human rights.

This collaborative work has resulted in substantive developments in three areas of human rights activity that intersect geography and GIS:

1. The creation of a new Science and Human Rights Coalition, of which the AAG is a founding member and co-organizer
2. Cooperation around an AAAS project on Geospatial Technologies and Human Rights
3. The development of an AAG Geography and Human Rights Clearinghouse

I am pleased to report on progress to date on these new programs and invite the ideas, input, and participation of the Esri user community as we move forward.



The village of Bir Kedouas, on the Chad side of the Chad/Sudan border, in October 2004. This QuickBird satellite image pictures the village before it suffered attack by the Janjawid.

(Copyright 2008 DigitalGlobe. Produced by AAAS.)

Science and Human Rights Coalition

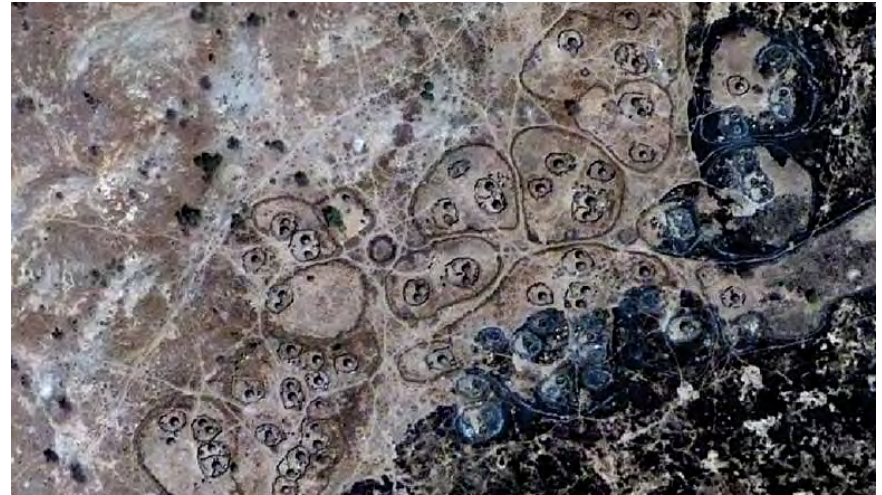
For the past two years, the AAG has worked closely with AAAS and a team of other scientific and professional associations to help develop the conceptual and organizational framework for a proposed new Science and Human Rights Coalition, to be hosted by AAAS. The coalition is a network of individuals and scientific organizations that recognize a role for science and

scientists in efforts to realize human rights. The working goals of the coalition are to promote human rights awareness and programs within scientific associations, professional societies, and science academies; facilitate collaborative partnerships between the scientific and human rights communities to address human rights challenges; create opportunities for scientific associations to explore and contribute their discipline-specific skills and knowledge to human rights; and expand the knowledge base of human rights organizations regarding scientific methods, tools, and technologies that can be applied in human rights work. Scientific associations that share the goals of the coalition are invited to participate as members. Individual scholars and scientists are encouraged to participate through their scientific organizations but may also be involved as affiliated members.

The formal launch of the new Science and Human Rights Coalition will occur January 14–16, 2009, in Washington, D.C. Speakers will include Mary Robinson, former United Nations High Commissioner for Human Rights and the former president of Ireland. The AAG is a founding member of the new coalition and is also playing an integral role in its launch. Further information about the new coalition and its formal launch is available at www.aag.org or shr.aas.org/scisocs.

Geospatial Technologies and Human Rights Project

The AAG also supports and provides input to the AAAS Geospatial Technologies and Human Rights project, which is



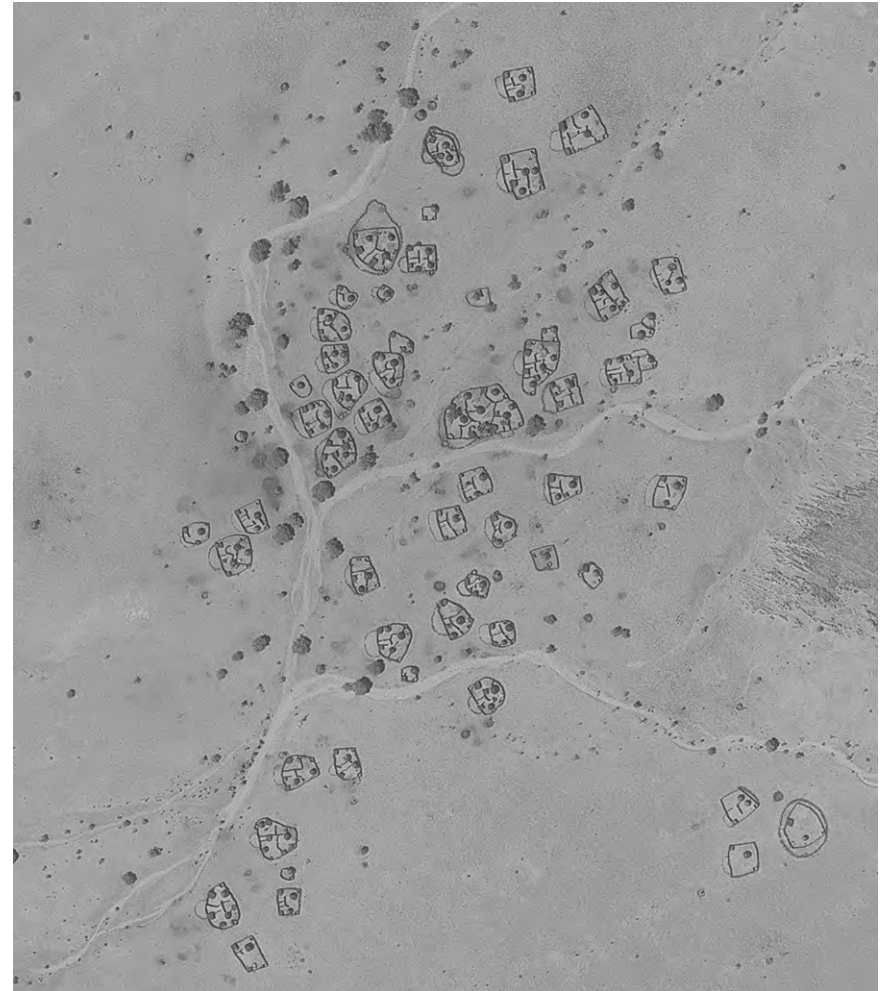
The village of Bir Kedouas following attacks by Janjawid fighters in January 2006. Analysis indicated that burning destroyed 89 homes, as well as crops and other structures.

(Copyright 2008 DigitalGlobe. Produced by AAAS.)

part of the AAAS Science and Human Rights Coalition. This project is funded by the MacArthur and Oak Foundations to develop applications, as well as human and information resources that improve the use of geospatial technologies and analysis by the nongovernmental organizational (NGO) human rights community. Working in partnership since 2006 with well-known groups, such as Amnesty International and Human Rights Watch, as well as numerous small, locally based organizations, the project has engaged in several efforts to bring high-resolution satellite imagery, GPS units, GIS, and geographic analysis and methods into wider use by human rights organizations. While

such tools and analyses were occasionally used in the past, the project seeks to explore the potential for an integrated approach to monitoring, documenting, and preventing human rights abuses. Such a system would draw together numerous satellite imagery programs with the extensive network of on-the-ground NGOs and other human rights observers to fully document, as objectively and as quickly as possible, ongoing atrocities around the world so that interventions might occur. This project has also benefited from imagery analysis support and expertise from the U.S. Department of State's Office of the Geographer, headed by Lee Schwartz.

Specific efforts to date include documentation and active monitoring of attacks on civilians in Darfur, presented on the Eyes on Darfur Web site (www.eyesondarfur.org), as well as documentation efforts in Burma and the Ogaden region of Ethiopia. In such remote regions, governments often are able to commit atrocities against their citizens with near impunity, and satellite observations can often be the only method of authoritatively corroborating witness reporting for international NGO and governmental human rights organizations. To a more limited extent, such imagery can occasionally be effective as a proactive protection and warning mechanism, allowing innocent people to escape from harm's way or deterring attacks on monitored villages or sites. In addition, the project is currently engaged in efforts to support indigenous land rights in Guatemala, document adverse impacts of aerial defoliation in



Malam al Hosh is currently featured as a "village at risk" on the Eyes on Darfur Web site, and is now one of the villages being publicly monitored by Amnesty International in an attempt to deter threatened attacks.

(Copyright 2008 ImageSat International. Produced by AAAS.)

Colombia, and explore applications and needs of local human rights organizations in other regions.

AAG Geography and Human Rights Clearinghouse

The AAG and the AAAS also recently entered into an agreement, supported by funding from the MacArthur Foundation, to develop an inventory of geographic research and scholarship relating to human rights. This inventory and resultant detailed bibliography will form the foundation of a new AAG Geography and Human Rights Clearinghouse, which will be housed on the AAG Web site. We invite all AAG members and Esri users, as well as others, to contribute to this clearinghouse. Among numerous applications and uses of this body of research, the AAG and AAAS particularly seek to identify research and project work that is substantive enough to be valuable as evidence or in support of expert testimony in international tribunals investigating human rights abuses. We would very much appreciate it if you could send citations of any geographic research or GIS project work that you believe would be useful for inclusion in this clearinghouse bibliography. Please e-mail research or project descriptions, bibliographic citations (preferably annotated with an abstract or brief summary of the work), and other relevant material to Megan Overbey or Matthew Hamilton at the AAG.

Geographer and AAAS Human Rights Project director Lars Bromley noted that "Geographers and GIScientists obviously have critical and long-standing roles to play in human rights

work. As such, AAAS is delighted to collaborate with the AAG in an effort to concisely identify relevant literature across a broad range of topics, which could inform future activities of interest to the human rights community." In addition to bibliographic, informational, and research resources, the AAG Clearinghouse will also provide links to other geography or GIS-related human rights programs, such as those of Amnesty International, the United Nations, and the U.S. Holocaust Memorial Museum's Genocide Prevention Mapping Initiative, among others.

Regular updates on these AAG and AAAS human rights programs will be available at www.aag.org and www.aaas.org. Special joint AAAS and AAG sessions on these human rights projects are also planned for the AAG's Annual Meeting in Las Vegas, Nevada, March 22–27, 2009. We hope to see you there and invite your input and assistance on these important collaborative projects.

Doug Richardson, AAG and Lars Bromley, AAAS

(This article originally appeared in the Fall 2008 issue of *ArcNews Online*.)

Global Dialogues: GIScience and Sustainable Development in Africa

The Association of American Geographers recently had the opportunity to participate with hundreds of African geographers, GIScientists, and environmental scientists in a new dialogue around the theme of Geospatial Science and Sustainable Development in Africa. These discussions, which were initiated in March 2008 and have already generated several promising new areas of research and educational collaboration, were sponsored by the U.S. Department of State's Global Dialogues on Emerging Science and Technology (GDEST) program. Follow-on activities and continuing interactions resulting from these dialogues have the potential to generate considerable ongoing and long-term cooperation among African and U.S. scientists in geographic research, geographic information science (GIScience) education and GIS applications, sustainability science, and many related fields.

Five other GDEST programs also have been undertaken, including dialogues in Japan (focusing on nanotechnologies), China (biotechnology), and Germany (quantum computing). However, the recent Africa GDEST program is the first to be initiated on a continental scale and the first to address geography-related research fields, such as geospatial science and sustainability.

The Global Dialogues on Emerging Science and Technology program focusing on Geospatial Science and Sustainable Development in Africa began in March 2008 with site visits to universities, governmental ministries, and nongovernmental organizations in nine African countries, followed by a conference on the same theme in Cape Town, South Africa.

The U.S. delegation was divided into two teams, East Africa and West Africa, and included members from the U.S. Department of State Humanitarian Information Unit and its Bureau of Oceans and International Environmental and Scientific Affairs, as well as representatives from other U.S. governmental agencies, several U.S. universities, the American Geographical Society, the Association of American Geographers, and the United States Agency for International Development (USAID) regional offices. The teams conducted more than 50 site visits and met with hundreds of African experts in the fields of environmental remote-sensing interpretation and modeling, GIS cartography and analysis, agriculture, education, health, surveying, mining, climate, hydrology, population, urban systems, and information and communication technology.

Care was taken to listen to and learn from our African colleagues, to identify needs rather than prescribe solutions, to build upon existing regional capacity in geospatial science and technology rather than duplicate or displace it, and to explore opportunities for collaboration between U.S. and African scientists and institutions, as well as among African organizations and networks, in ways identified as useful to scientists, educators, and governmental agencies from the region.

It was clear from both the country visits and the conference that significant progress has been achieved since the 2002 World Summit on Sustainable Development in terms of the diffusion and sophistication of geospatial technologies, applications, and coordination, both regionally and in individual countries, and their use in sustainable development planning and program implementation. Despite progress, however, optimal use of geographic information science and associated technologies is often constrained by a lack of resources, a lack of access to suitable data, and a lack of coordination among users and data producers.

Among other topics, GDEST participants particularly sought to promote future dialogues that would identify partners for collaboration on specific projects or programs; make better use of collaboration among U.S. and African scientists and practitioners to create a sustainable critical mass of African expertise; support regional and indigenous educational and institutional infrastructures; and develop educational and

research collaborative mechanisms, including faculty and student exchange programs, online interactions, and better access to research and curricular information.

The AAG currently is implementing some of the above resource sharing and online interactive coordinative mechanisms through its new subsidized Developing Regions Membership Program and through the existing AAG Center for Global Geography Education programs.

Also important to sustaining collaboration is supporting existing African networks of excellence and platforms for dialogue, information sharing, and communication. For example, African networks of excellence, such as the African Association of Remote Sensing of the Environment (AARSE), African Geo Information Research Network (AGIRN), African Reference Frame (AFREF), Environmental Information Systems Africa (EIS-AFRICA), Mapping Africa for Africa, and university networks (e.g., University Network for Disaster Risk Reduction in Africa [UNEDRA]), are vital infrastructures of communication and coordination for research, education, and applications collaboration. Descriptions of and linkages to these and many other existing African networks can be accessed directly through the AAG Web site at www.aag.org/developing.

The U.S. GDEST delegation representatives, both individually and in coordination with U.S. embassies in the countries visited, are currently following up on contacts and acquaintances made

during the site visits and will be continuing discussions on specific projects for which opportunities for partnerships and collaboration were identified. A report on the African GDEST program's progress and findings is under development and will be made available in the near future.

I would like to thank Lee Schwartz, director of the Office of the Geographer and Global Issues at the U.S. Department of State, together with Nina Fedoroff and Andrew Reynolds of the Office of the Science and Technology Adviser to the Secretary of State, for providing key leadership and logistical support essential to the success of the African GDEST program. Most importantly, on behalf of all of the participants, I would like to express our deep appreciation to our African colleagues for the opportunity to learn from them during these dialogues and for their insight and guidance on how to sustain ongoing interactions and useful collaborative activities in the years ahead.

More information on African geography and GIS research, education, and sustainable development activities, as well as collaborative needs and opportunities, is available and updated regularly on the AAG Web site (www.aag.org).

Doug Richardson (with input from Lee Schwartz)

(This article originally appeared in the Spring 2008 issue of *ArcNews Online*.)

Reaching Out to Developing Regions

While the AAG has long advocated providing greater support to and increasing scholarly and research exchange with geographers and the GIS communities from the developing regions of the world, the lack of financial resources has limited our ability, as an association, to implement such initiatives broadly. However, the AAG's financial foundation is now strong and growing, and as a result, I believe we can afford to share some of our membership benefits with those around the world who do not currently have the resources to access our publications, meetings, research programs, technology innovations, and other membership benefits.

We are therefore pleased to announce a new, subsidized AAG membership program for geographers and others interested in geography and GIS from developing regions of the world who wish to join the AAG. A summary of the new program, which is in effect now, follows below.

Summary of the Program

Geographers and others interested in joining the AAG who are from and living in developing regions and have an income of less than \$25,000 per year are now eligible for AAG membership at

the deeply subsidized rate of \$20 per year. The AAG developing regions membership includes all regular AAG member benefits, including online access to AAG's leading research journals, newsletters, and numerous other geography- and GIS-related publications. Optional hard copies of journals or newsletters are also available for a small incremental fee to cover cost of shipping only. Other benefits include eligibility to participate in AAG research grants and awards programs, as well as reduced registration fees at AAG annual meetings and other AAG-sponsored symposia, workshops, and seminars.

Developing regions AAG members also gain access to "members only" Web site resources, such as employment opportunities, job listings, inclusion in the AAG Guide to Geography Programs and Directory of Geographers, curricular materials, research knowledge environments, and much more. Members are also able to participate in AAG's specialty groups, LISTSERVs, chat rooms, and other interactions. A list of the many developing regions and countries from which AAG members may participate in this new membership program is available on the AAG Web site at www.aag.org.

Everyone Benefits

The AAG's Developing Regions Membership Program will benefit not only those geographers and GIS specialists from developing regions who wish to participate but also those of us in the "developed world." Greater international networking, information sharing, and interaction are becoming increasingly common—and necessary—in the work and lives of most geographers and GIScientists, both in so-called "developing regions" and in wealthier countries. As the AAG membership and the attendance at our annual meetings have grown in recent years, international geographers' participation in the activities of the AAG has grown at an even faster rate than that of domestic U.S.-based geographers. With more than 6,000 attendees already registered for the AAG Annual Meeting to be held in Boston this April (2008), nearly 27 percent are from countries other than the United States, up from approximately 20 percent a few years ago. Yet most of our current international membership and participation are still from the wealthier countries in Europe, Asia, and North America.

The AAG developing world membership category recognizes the obvious: that vastly different financial resources are available in different parts of the world. This new category of membership, while recognizing the more extreme financial needs of geographers in the very lowest-income countries, is not wholly inconsistent with the AAG's current general membership fee approach for the United States and other wealthier countries,

which also recognizes income level differences among individual members in establishing membership fees.

And, of course, enabling greater participation of geographers from the "developing regions" of the world in activities and networks of the AAG also enriches the experience, research, and scholarship of the AAG and its current members in myriad ways, providing both personal and professional benefits to us far exceeding the financial subsidies we might extend to our colleagues in some of the poorest regions of the world.

How You Can Help

The implementation of a new program of this scale is a large and complicated undertaking, involving the development of new AAG infrastructure for international outreach, materials creation and distribution, language translation, Web site development, and communications. The AAG has established a tax-deductible Developing Regions Membership Fund to help fund the infrastructure and staff needed to support the new program and also to provide financial grants for memberships for those developing regions' geographers for whom even \$20 may not be affordable. A contribution for infrastructure or memberships to this fund can have a far-reaching impact. A donation of only \$100, for example, would support five student members from Latin America for one year. A \$1,000 contribution could support AAG membership for ten geography faculty members from Africa for five years.

AAG and Esri user community members can also help by informing colleagues and friends in developing regions of the new program and perhaps by offering to sponsor memberships directly for colleagues, former students, research collaborators, and others who may be interested. The AAG already has developed brochures in four languages (Spanish, French, Portuguese, and English) describing the Developing Regions Membership Program, and plans more of these in many other languages, including Chinese and Arabic, as funds become available. A specialty group or GIS community may wish to support additional flyers in these or other languages and also might help with the translations. Copies of these flyers are available from the AAG in hard copy or as a digital .pdf file for anyone who wishes to distribute them to colleagues and friends in developing regions.

More Information

For more information on this new program or to join the AAG as a Developing Regions member, visit the AAG Web site at www.aag.org. I look forward to working with you to help build and sustain the AAG's new Developing Regions Membership Program in the years ahead.

Doug Richardson

(This article originally appeared in the Winter 2007/2008 issue of *ArcNews Online*.)

Sachs and Chomsky to Address AAG Boston Meeting

Two of the world's leading public intellectuals—Jeffrey Sachs and Noam Chomsky—are scheduled to participate in the Association of American Geographers Annual Meeting in Boston, Massachusetts, to be held April 15–19, 2008. "In terms of the power, range, novelty, and influence of his thought, Noam Chomsky is arguably the most important intellectual alive today," wrote Paul Robinson recently in the *New York Times* Book Review. Jeffrey Sachs has been cited in the *New York Times Magazine* as "probably the most important economist in the world." Sachs is the only academic to have been repeatedly ranked among the world's 100 most influential people by *Time* magazine.

Jeffrey Sachs, the director of the Earth Institute at Columbia University, will deliver the Opening Session keynote address at the AAG meeting on Tuesday, April 15. Sachs, who is also professor of sustainable development and professor of health policy and management at Columbia, is widely known for his work as an economic advisor to governments in Latin America, Eastern Europe, the former Yugoslavia, the former Soviet Union, Asia, and Africa. He is also special advisor to United Nations (UN) Secretary-General Ban Ki-moon. From 2002 to 2006, he served as special advisor to United Nations Secretary-General Kofi Annan and director of the UN Millennium Project. He has worked

extensively with international agencies and private foundations on problems of poverty, hunger, and disease control—especially HIV/AIDS—in the developing world.

Sachs' research interests include the links of health and development, economic geography, globalization, international financial markets, emerging markets, economic development and growth, global competitiveness, and macroeconomic policies in developing and developed countries. He is author or coauthor of more than 200 scholarly articles and has written or edited many books, including New York Times best seller *The End of Poverty* (Penguin, 2005).

Jeffrey Sachs' Opening Session keynote address will provide an apt beginning to a meeting during which the topics of geography and global sustainability will be pervasive, necessary, and inescapable themes.

I am also delighted to announce that **Noam Chomsky**, institute professor of linguistics at the Massachusetts Institute of Technology, has agreed to join us at the AAG meeting in Boston for a special session, which I have organized and will host, entitled A Conversation with Noam Chomsky, scheduled for Friday afternoon, April 18, 2008. This special session will be a

conversational interview, followed by an opportunity for audience participation through a question and answer period.

As most geographers know, Chomsky has written and lectured widely on linguistics, philosophy, intellectual history, contemporary issues, international affairs, and U.S. foreign policy. A small sampling of his numerous publications include *Syntactic Structures*; *American Power and the New Mandarins*; *For Reasons of State*; *Cartesian Linguistics*; *Language and Mind*; *The Political Economy of Human Rights (with E. S. Herman)*; *Knowledge of Language*; *On Power and Ideology*; *Language and Problems of Knowledge*; *World Orders, Old and New*; *The Common Good*; *Profit Over People*; *New Horizons in the Study of Language and Mind*; and *Understanding Power*.

Chomsky's work on the nature of human language and communication has profoundly transformed the field of linguistics and greatly influenced science and philosophy more broadly. *New York Times Magazine* writer Daniel Yergin characterizes Chomsky's "formulation of 'transformational grammar' as one of the major achievements of the century. His work has been compared to the unraveling of the genetic code of the DNA molecule." Yergin notes that Chomsky's linguistics theories have influenced "everything from the way children are taught foreign languages to what it means when we say that we are human." The "Chomskyan Revolution" has also generated intellectual reverberations across many disciplines, including geography, anthropology, education, psychology, computer science, and

genetics. Chomsky is one of the most frequently cited scholars of all time.

Chomsky is also an impassioned critic of American foreign policy and of corporate and governmental power. His now classic book on the role of intellectuals in American society, *American Power and the New Mandarins*, greatly influenced the debate on the Vietnam War and continues to prompt examination of the complicity of intellectuals in implementing policies of entrenched power to this day. Its arguments resonate strongly today in the context of a new war.

Chomsky studied linguistics, mathematics, and philosophy at the University of Pennsylvania (U-Penn) and Harvard and received his Ph.D. from U-Penn for his original and groundbreaking dissertation entitled "Transformational Analysis." He has received literally hundreds of prestigious scholarly awards, honors, prizes, fellowships, distinguished professorships, and honorary degrees. It is our great honor to have him join us at the AAG's Annual Meeting in Boston. I hope you will enjoy A Conversation with Noam Chomsky.

The AAG's Annual Meeting in Boston will also feature a major Jobs in Geography Career Fair, with hundreds of current openings for GIS and geography jobs of interest to Esri users in the private, public, and academic sectors. Students and midcareer job seekers will have an opportunity to meet directly with many of those doing the hiring. In addition, many sessions

and workshops will focus on careers and how to prepare for and get the GIS or geography-related job you want.

The meeting will also include more than 4,000 presentations covering the latest research in GIScience and geography; an International Reception; and a Gala Opening session with live music, dancing, good food, and drinks. You can also explore the rich cultural and physical geographies of Boston and New England through dozens of field trips and special GIS workshops. We hope you can join us to see old friends and make new ones, experience a new and expanding universe of geographic research and GIS applications, and perhaps find your place in this exciting new realm.

Doug Richardson

(This article originally appeared in the Fall 2007 issue of *ArcNews Online*.)

Educating Congress on GIS and Geographic Education

In 2001, as George W. Bush was settling into the White House, he made the Elementary and Secondary Education Act (ESEA) an early focus of his administration. The result was No Child Left Behind (NCLB), a reauthorization of the ESEA signed into law in early 2002. The No Child legislation focused on school performance and accountability in an effort to boost lagging schools and troubled school districts. While NCLB was passed on a bipartisan basis and supported by a wide range of traditional liberals as well as conservatives, the law has faced severe criticism in the intervening years from a mix of groups and for a variety of reasons.

The primary and most widespread attacks on NCLB have centered on the failure of the federal government to adequately fund the law and on misguided curriculum and testing requirements. In addition, there have been concerns that the near-exclusive emphasis on math and reading test scores has diverted teaching away from the social sciences and interdisciplinary education, including geography.

We in the geography community have also long been concerned with NCLB because geography is the only "core academic subject" identified within the law that does not receive a specific

funding allocation or implementing programs to further teaching of the subject on the K–12 level (for more information on this, see also "[Geography Education Needs Congressional Support](#)," *ArcNews*, Fall 2004). The AAG and our colleagues in the Geography Education National Implementation Project (GENIP) have been working to encourage Congress to change this over the last several years, but the reauthorization of No Child set for this year is our clearest and best opportunity to date.

Call to Action: How You Can Help

Earlier this year, the AAG helped coordinate the development of a letter from the GENIP organizations to key Congressional Education Committee chairmen Sen. Ted Kennedy (D-MA) and Rep. George Miller (D-CA) urging them "to give strong support to the teaching of geography in any proposal for the reauthorization of No Child Left Behind." As the committee continues its hearings on NCLB, it is continuing to craft reauthorization bills behind the scenes. While there is no guarantee that the process will conclude this year, we want to take advantage of this opportunity to make our case for the importance of geography in elementary and secondary school teaching and the need for associated funding.

To this end, we encourage you to begin now to educate your senators and congressional representatives about the importance of including geography funding in the proposals for NCLB reauthorization.

The following points may be helpful as you craft a message to your representatives:

- **Funding geography in NCLB is critical**—Geography is the only core-curriculum subject identified in the ESEA without associated funding. This must change if students are to make the necessary strides in geographic understanding and GIS literacy.
- **Implementing programs for geography are also needed**—Geography also lacks any specified implementing programs in NCLB. These programs should help implement more widespread teaching of geography in elementary and secondary schools.
- **Geography is essential to a well-rounded K–12 education**—Geographic understanding is important to every American; it is critical to the informed exercise of each citizen's civic responsibility. Geography helps us understand the connections between peoples and places—and with the natural environment. Geography education is key to achieving international understanding and economic development and also provides essential workforce skills needed to maintain U.S. competitiveness. The study of geography

enables students to access the explanatory power of maps and increasingly ubiquitous geospatial technologies, such as GIS, GPS, and Internet mapping. Geography helps us to understand and enhance our own communities as American citizens—and informs our understanding of the challenges facing the United States in an uncertain world.

You may wish to encourage your congressional representatives to keep these and related thoughts in mind as Congress deliberates on the challenges facing American students in the months and years to come. Without a geographic frame of reference, tomorrow's leaders will be lacking one of the central perspectives they need to formulate sound public policy in areas ranging from environmental conservation and transportation to national security and international trade. Your input to and education of Congress on this matter will be a valuable addition to the debate at this time, regardless of whether a reauthorization of NCLB occurs during this year or continues to a future year.

Doug Richardson

More Information

Additional information on NCLB and geography, including regular NCLB status updates, is available on the AAG Web site at www.aag.org.

Update: Judge Rejects MAPPS Lawsuit

My last column in *ArcNews* ([Spring 2007](#)) focused on the lawsuit recently filed by MAPPS et al., which sought to limit contracts for nearly all federal government mapping and GIS activities mainly to licensed architectural and engineering (A&E) firms. I am pleased to report that the judge in this case issued a decision on June 14, 2007, rejecting the MAPPS lawsuit.

Several geography and GIS organizations, including AAG, GISCI, GITA, UCGIS, and URISA, joined together to oppose the *MAPPS* litigation through educational outreach and the development of an Amicus Brief to the court on the case. The judge's dismissal of the *MAPPS* lawsuit will help ensure that all qualified professionals in the mapping and GIS communities will continue to be able to fairly compete for federal government contracts.

More Information

For more detailed information, including the full text of the court's ruling, the issues involved in the lawsuit, and the Amicus Brief, visit www.aag.org.

(This article originally appeared in the Summer 2007 issue of *ArcNews Online*.)

The *GIS&T* Body of Knowledge: A Valuable New Resource

A landmark new reference book, the *Geographic Information Science & Technology Body of Knowledge*, has established a systematic foundation for future educational and career development programs in the geographic information science and technology (GIS&T) fields for decades to come. Published by the Association of American Geographers (AAG) in collaboration with the University Consortium for Geographic Information Science (UCGIS), *GIS&T Body of Knowledge* is the first comprehensive approach to understanding the basic skills and knowledge relevant to the rapidly growing GIScience and technology fields.

Former National Science Foundation (NSF) director Rita Colwell pointed out in her article, "The New Landscape of Science: A Geographic Portal" (Colwell 2004—see [More Information](#) at end of article), that our revolutionary new geographic technologies are "well poised at this watershed juncture to help shape the new landscape of science." The *GIS&T Body of Knowledge* marks an important step in that process. Geographic information science and technology have today become critical components of the global cyberinfrastructure, both in the university and in society. The integrative capabilities of these and related technologies have extended research frontiers across many fields, in areas

ranging from ecology to epidemiology to transportation. Technologies such as GIS also have increasingly become the common ground for sharing data across disciplines, or the "glue" that connects large-scale interdisciplinary research, including much that is funded by NSF and other federal agencies.

Geographic Information Science & Technology Body of Knowledge will have application and impact far beyond geography. The technical expertise and theoretical insights that have been developed over the recent decades within the GIS&T infrastructure constitute a body of knowledge increasingly necessary to advancing research agendas across university campuses in programs ranging from statistics to biology, from engineering to law, and from sociology to computer science. As Harvard president Lawrence Summers noted on May 5, 2006, at the launch of Harvard's new Center for Geographic Analysis, "By embracing the new geography, I think Harvard is taking an important step today. This is an opportunity to explore vast intellectual territory . . . intellectual territory that can now be approached with new perspectives, new tools, and in newly important ways" (Richardson 2006).

The GIS&T cyberinfrastructure also plays a central role in the larger society. A transformational feature on the GIS&T landscape, and a significant opportunity for our society, for example, will be the widespread continued development and implementation over the next several decades of real-time interactive Geographic Management Systems (GMSs) as core daily operations management networks within most governmental and business organizations (Richardson 2001, Abler and Richardson 2003). Currently evolving examples of GMSs range from simple applications, such as real-time management of vehicle fleets or delivery companies, to the continuous interactive management across space and time of the extensive fixed and mobile assets and workforces of complex operations, such as those of electric utility companies, most modern military organizations, governmental emergency response agencies, national park agencies, automated transportation and logistics systems, and international disaster and humanitarian relief operations. GMSs' dynamic space- and time-interactive core capabilities create a powerful platform for integrating many other technologies and applications, including wireless communications, environmental sensors, work order processing, remote sensing and imagery, software agents, econometric modeling, and others.

This book will be an important reference and guide for those working with these existing and future GIS&T infrastructures in science, in society, and in education. Significant credit for the development of *GIS&T Body of Knowledge* goes to Duane

Marble, who both advocated for and pioneered the development of this body of knowledge throughout the 1990s. Without Duane Marble's early efforts in this arena, this book would not exist. More recently, the work begun by Marble has been continued by many, including the UCGIS education committee, which is ably chaired by David DiBiase. In addition to DiBiase, one of the *Body of Knowledge's* multiple editors includes Esri higher education solutions manager, Ann Johnson.

The needs to build the capacity of the GIS&T cyberinfrastructure within the academic and scientific workforce, and in the larger societal GIS&T workforce, are critical. In fact, the U.S. Department of Labor has designated geotechnology as "one of the three most important emerging and evolving fields, along with nanotechnology and biotechnology" (Gewin 2004). Employment opportunities and workforce development needs are growing worldwide as geographic technologies become pervasive in ever more areas of research and the economy.

This publication will also be a critical resource in the toolbox of GIS certification and accreditation bodies; job seekers; students; teachers; guidance counselors; curriculum planners; and GIS professionals in government, industry, and academia.

Finally, for those of us who have long been engaged in the research and development of the GIS&T infrastructure, it is gratifying to see this effort to codify the results of this exciting and dynamic field of inquiry into a systematized body

of knowledge that will support education and continued development of GIS&T in the future. I commend the editors for this important beginning and look forward to working together with the entire GIS&T community to evolve and update this body of knowledge in the years ahead.

Doug Richardson

More Information

For additional information on the book and also references cited above or to order copies of *GIS&T Body of Knowledge* (\$20 U.S. each, plus \$5 U.S. shipping per order), please visit www.aag.org/bok. Editors are Michael DeMers, David DiBiase, Ann Johnson, Karen Kemp, Ann Taylor Luck, Brandon Plewe, and Elizabeth Wentz.

(This article originally appeared in the Fall 2006 issue of *ArcNews Online*.)

Geography, GIS, and the Humanities

While the discipline of geography has traditionally embraced and contributed to the humanities, there has been a remarkable recent resurgence of intellectual interplay between geography and the humanities in both academic and public circles. The metaphors and concepts of geography and GIS now permeate literature, philosophy, history, the arts, and other humanities. Terminology and concepts such as space, place, landscape, mapping, and geography are becoming pervasive as conceptual frameworks and core metaphors in recent publications in the humanities. A brief scan of recent book titles, from publications such as the *New York Review of Books*, yields a fascinating array of examples of this phenomenon.

The growing diffusion of ideas between geography and the humanities is also significant for the insights and connections it has spawned. For instance, many scholars and writers outside the field of geography have developed new understandings from interrogating a sense of place or by examining the changing landscapes of globalization and complex new international realities in traditionally geographic terms. They have applied spatial approaches, using tools and concepts traditional to geography, GIS, and mapping to conduct research and gain insight in a wide range of disciplines, including history, fiction,

and linguistics. Old and new geographic techniques (especially GIS) and ideas applied to humanities studies have opened new lines of intellectual inquiry and have changed research methodologies in numerous fields. And, of course, the mutually beneficial interactions between the discipline of geography and such humanities fields as the philosophy of science, cultural and ethnic studies, and various literatures in postmodernist thought also have had far-reaching implications for geographic research and education.

The Monticello Symposium

During the past two years, I have been working on ideas, methods, and partnerships through which the AAG might further explore, showcase, and foster the current fruitful interaction between geography and the humanities. These efforts have resulted in a proposed Symposium on Geography and the Humanities, to be sponsored jointly by the AAG, the American Council of Learned Societies (ACLS), and the University of Virginia (UVA). The proposed symposium will explore how geography (including GIS) informs the humanities and vice versa. It will not only take stock of the emerging new connections between geography and the humanities but also identify promising

new research pathways along which such interaction can be strengthened and fostered in the future.

The symposium will be held at the University of Virginia in Charlottesville, from Friday to Sunday, June 22–24, 2007, with the Rotunda's Dome Room and the university's new special collections library as potential settings. The symposium will also include a special event at nearby Monticello, Thomas Jefferson's historic estate. I will be one of the co-organizers of the symposium, along with Dr. Steven Wheatley of ACLS and Dr. Edward Ayers, Dean of Arts & Sciences at the University of Virginia. John Hammer, the National Humanities Alliance's executive director emeritus, will serve as an advisor to the effort.

Call for Participation

The symposium will bring together 30 to 50 presenters and hundreds of other participants from many walks of life. Approximately one-third of these presenters will be geographers who routinely engage the humanities in their research, one-third will be humanities scholars who incorporate geography or GIS in their own work, and one-third will be well-known popular writers or artists who use geography to underpin key facets of their work or whose projects engage geographic ideas meaningfully in their conception or implementation.

An edited book drawn from the discussions, papers, and presentations of the two-day symposium will be published by

Blackwell. Symposium participants must be prepared to develop a full paper for publication if requested by the editors. The AAG, ACLS, and UVA will distribute the volume within the geography, GIS, and humanities communities, and it is our hope that it will spark additional work on the topics covered and related areas.

Applications for participation should be received no later than December 12, 2006. Earlier submission is encouraged. In order to defray the costs of participation, applicants in financial need who are accepted for participation in the symposium may apply for funding to support travel costs.

Additional calls for participation will be posted on several Web sites in the geography, GIS, and humanities communities, and symposium updates will appear regularly in the AAG newsletter and at www.aag.org/humanities. I look forward to working together with you to explore these fascinating intersections of geography, GIS, and the humanities in the months ahead.

Doug Richardson

(This article originally appeared in the Summer 2006 issue of *ArcNews Online*.)

GIS and Drug Addiction

Geography, including GIS, involves making connections-connections in our world among people and places, cultures, human activities, and natural processes. It involves understanding the relationships and "connections" between seemingly disparate or unrelated ideas, and between what is and what might be.

Geography also involves connecting with people. When I first encountered an extraordinarily vibrant, intelligent, and socially engaged scientist at a private dinner about a year ago, I was immediately captivated by the intensity of her intellectual passion to understand how and why people become addicted to drugs and what could be done to treat or prevent drug addiction. Fortunately, she was willing to think beyond the bounds of her own discipline in her search for answers. Our conversation that evening, which began with her research on fundamental biochemical processes of drug addiction in the human body, evolved inevitably to an exploration of the ways in which research on the geographical context of drug addiction might contribute to better understanding the etiology of addiction; its diffusion; its interaction with geographically variable environmental, social, and economic factors; and the strategies for its treatment and prevention.

This fascinating woman, I soon learned, was not only the director of the National Institute of Drug Addiction but also the great granddaughter of Leon Trotsky. Our chance encounter led to further wide-ranging discussions during several subsequent months on the interactions between geography and drug addiction, resulting ultimately in an agreement between the Association of American Geographers (AAG) and the National Institutes of Health (NIH) National Institute on Drug Abuse (NIDA) to jointly sponsor a special symposium on research topics related to geography and drug addiction.

I am pleased to announce that this special NIDA/AAG Symposium will take place on March 8, 2006, in conjunction with the 2006 Annual Meeting of the AAG in Chicago, Illinois. We invite interested geographers, neuroscientists, GIScientists, medical researchers, epidemiologists, geneticists, and others with expertise in geographical dimensions of drug addiction to apply to participate in the symposium. Themes to be addressed include:

- Spatial patterns of drug use and addiction
- Linking spatial models with neuroscience and genetics in drug abuse research

- Interaction of social and environmental factors with biochemical processes of addiction
- Geographic analysis linking demographic and genetic characteristics related to drug addiction and treatment
- Locational analyses of drug addiction treatment and service delivery facilities
- Neighborhood scale studies of geographic factors (including the built environment) and their interaction with drug addiction, treatment, or prevention
- Use of geographic information systems to better understand and respond to drug addiction
- Spatial diffusion modeling of addictive drug usage and its changing characteristics, including also predictive modeling
- Interaction of other spatially dependent variables with drug addiction or with prevention and treatment strategies
- Other geographic research relevant to better understanding the etiology of drug use and addiction

Attendance at the Geography and Drug Addiction Symposium will be open to all and will be free of charge to anyone registered for the AAG's annual meeting in Chicago. Those interested in participating in the symposium as a presenter should submit a one-page summary of their proposed topic, describing relevant research conducted, along with a brief resumé or CV to Yonette

Thomas, Ph.D., Chief, Epidemiology Research Branch, NIDA Division of Epidemiology, Services, and Prevention Research, at yt38e@nih.gov, and to me (Doug Richardson, AAG executive director) at drichardson@aag.org. Poster submissions are also welcome; poster applications need only be accompanied by an abstract. Applications for paper or poster participation in the symposium should be received no later than December 8, 2005. Earlier submission is encouraged. Participation in the symposium as a presenter will be limited to approximately 30 researchers.

Results of the symposium will help guide the development requests for proposals at NIH and future research agendas within geography and GIScience. A book or special journal issue publication of the symposium results, including selected research papers, is planned for early 2007. Symposium participants should be prepared to develop a full paper for publication if requested by the editors.

The "connections" forged between the topics of geography and drug addiction—and between the AAG and NIDA—will provide geographic context and analysis to support NIH's ongoing efforts to understand the complex processes of drug addiction. I believe it will also create an extraordinarily fertile new arena for geographic research, one which has significant potential for real-world benefit through better understanding and treatment of the scourge that is drug addiction.

For more information on attending or presenting at the NIDA/
AAG Geography and Drug Addiction Symposium, visit
www.aag.org/nida-aag/research. The director of the NIH's
National Institute of Drug Abuse, Dr. Nora Volkow, will deliver the
symposium's keynote address. I hope to see you in Chicago!

Doug Richardson

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Integrative Trends in Geographic Research and Societal Applications

Geographic research and GIS applications in society during the next century will occur in a context that is highly networked and which will continue, despite the artificial fences we erect, to transgress both disciplinary and sectoral boundaries. Partly in recognition of the complexity of a world changed through the forces of globalization, many institutions have begun to call for more integrative approaches to research and education for the next century. Certainly recent events have heightened the need for understanding our world and all of its marvelous diversity—an understanding that geography can richly provide.

The dynamics of globalization have strong spatial implications and geographic dimensions. As we embark in earnest on our journey through the 21st century, conflicts and terrorism are actively shaping the geopolitical relationships among people and places all over the world (Cutter, Richardson, and Wilbanks 2003). Environmental problems and natural disasters know no political boundaries. Ecosystem healing requires the participation of countries, nations, and communities from many political, economic, and social origins. With increased international migration, economic integration, and cultural interaction, pressures of globalization can fracture communities along ethnic, cultural, and religious divides.¹

In light of the realities of globalization, many prior understandings of the world have begun to change. Clearly, geographic research and education are essential to achieving better international and intercultural understanding, with all its implications for addressing economic, natural resource, and other social and political disparities.

At this time in history, the need is great for geographers and GIS specialists to apply their knowledge and innovation to these challenges. The opportunities are great as well. We now witness a rising tide of support for integrative and multidisciplinary approaches to research methods that have long been advocated and practiced by geographers, and for the integrative problem-solving capabilities of our new geographic technologies, led by GIS. Many federal, private, and nonprofit funding sources are basing research funding decisions increasingly on whether proposed solutions include strong multidisciplinary and partnership components. The National Science Foundation's recent publication on a "10-year Outlook for Environmental Research and Education" (Pfirman and AC-ERE 2003) establishes a thoroughly interdisciplinary vision and budgetary framework that encompasses all its activities. The National Academy of Sciences also has moved toward advancing multidisciplinary

research, incorporating within its geographic studies both the physical and human perspectives from its various divisions. For geography with its GIS technologies, thriving as it does at the intersection of the physical and social sciences—as an inherently interdisciplinary discipline—this trend within the broader research and applications communities generates many fruitful opportunities, provided we can effectively respond to them.

The increasing reliance of cross-disciplinary research programs and societal solutions on the highly integrative capabilities of the new geographic technologies also holds special promise for geography. To the extent that many multidisciplinary research and application projects now depend on the integrative and analytical power of our new geographic technologies, many other disciplines are finding it increasingly important or necessary to incorporate geographic ideas and perspectives into their curricula and research (NRC 1997). The technical expertise and theoretical insight of geographers is increasingly necessary to advancing research agendas across the university campus in programs ranging from MBA and public administration to engineering, law, and computer science. Geographers' know-how and "know-why" can be central to informing and advancing future multidisciplinary research programs during the AAG's second century. More undergraduate and graduate students, faculty, and researchers than ever before will need to tap into geography's traditions, technologies, and multidisciplinary experience. A critical task for the future of geography and

geographic information science as a discipline will be to engage these potential linkages and strike up effective interdisciplinary collaboration.

One fortuitous result for geography and the GIS community of these trends has been an explosion of employment opportunities for those with education and experience in geography and GIS. This past year, for example, the U.S. Department of Labor designated geotechnologies as one of the three most important and evolving new fields, together with biotechnology and nanotechnology. This trend shows every sign of continuing to expand well into future decades, as the demand for geographic understanding and GIS solutions grows worldwide. Meeting these needs will require an urgent and concerted effort by all sectors of our community—educational institutions, private-sector companies, and public-sector agencies. The challenges are great, but the stakes are high because more than ever what the world needs now is understanding.

Doug Richardson

¹ For further discussion of these topics and full information on the references, see Richardson and Solis 2004, "Confronted by Insurmountable Opportunities" (at www.aag.org/cb) from which portions of this column are adapted.

(This article originally appeared in the Summer 2005 issue of *ArcNews Online*.)

An "NIH of Geographic Research"?

I have long admired the National Institutes of Health (NIH) as an exemplar of how high-quality research can be conducted in a government setting, leading to major advances in science that ultimately enable us to better understand and meet real needs of people and society. What if there existed somewhere in the federal government something akin to an "NIH of geographic research"? Of course, the enormous scale of NIH's funding for basic biomedical research within the federal government would not be realistic for many years, if ever, for geography and GIScience. But the concept of a major federal institute of geographic research, staffed internally by thousands of first-rate scientists focused on fundamental research questions at the frontiers of geographic science, is one that is long overdue, and which could play an unprecedented role in enabling us to better understand and address critical needs of our world.

NIH has long been the leading generator of basic research in medical science internationally and has done so through massive programs of both intramural and extramural research funding. Thus, not only does NIH conduct basic research internally within its 20 major research institutes, but it also integrates and greatly extends this with substantial extramural research grant funding to university and private sector research institutes. Its emphasis on

generating real-world applications through basic research is one that deserves more attention in geography and GIScience.

The fundamental questions and large research programs of the type that might be undertaken by an "NIH of geographic research" would also help engender team and collaborative research capabilities much needed in GIScience if we are to address increasingly complex human/natural systems in meaningful ways. Another significant outcome of the intramural/extramural model of research at NIH has been the synergistic interaction and coordination of basic science research agendas among top researchers in federal, university and private research centers. In geography, these intersectoral linkages are poorly developed to the detriment of research progress across all sectors.

On a personal note, I have often been struck by contrast between the artificially fractured sectoral divisions in geography and the refreshing (and enjoyable) interaction of top scientists from multiple sectors in biomedical research. My wife and I frequently hosted social gatherings at our home in Washington, D.C., for my late father-in-law (an NIH biochemist who had received the Nobel Prize), and the guests invariably included leading

medical researchers from federal agencies, private research firms, universities, and international institutes. Nobody at those gatherings cared which sector a researcher worked in; what mattered was whether they knew what they were talking about. Perhaps geography could learn a bit from the biochemists in this regard as well.

A few federal agencies, such as NASA, NOAA, USGS, and DOE, do carry out some geographic research internally at a very high level, and Tom Wilbanks' long and substantive contributions at the Department of Energy are an excellent case in point. The National Science Foundation (NSF), of course, also plays a critical role in funding external geographic research and in helping to foster cross disciplinary programs, and we are fortunate to have strong leadership for geography and GIScience in place at NSF. Unlike the NIH, however, the NSF does not conduct large-scale research itself.

Perhaps the one existing federal agency with the greatest potential for developing a major integrated intramural/extramural geography and GIScience research capability would be the U.S. Geological Survey (USGS). Though a relatively small agency, geography has been assuming a more central role in the U.S. Geological Survey, and the prospects for its expansion are excellent were this to become a management priority, given geography's strong growth trajectory in society, government, and the university.

Geographic Research at the USGS

With this potential in mind, the AAG has been working closely with the USGS to help strengthen geography and GIScience research within the agency. The AAG has recently sponsored several special high-level meetings together with the USGS, including one in January 2005 dubbed the "USGS Geography Summit" at the Cosmos Club in Washington, D.C. USGS Director Chip Groat, Barb Ryan, and I opened the three-day meeting, which included 50 USGS geography division senior staff from across the country, during which we addressed the adoption and implementation of a new USGS 10-year science plan. It was a very productive meeting, with good progress made toward the realignment of geography at the USGS around a research focus and adoption of a proposed new geography science plan by those who will ultimately have to implement this vision. The AAG has also participated in helping to shape and revise the USGS 10-year science plan in several other venues, including recent National Research Council panel reviews of the science plan.

This past September the AAG also hosted jointly with USGS the AAG/USGS Geography Land Remote Sensing Workshop, a gathering of 35 leading geography remote-sensing experts from the university, government, and private sectors. This two-day meeting addressed the needs for continuity and advancement of Landsat and related geography/ecosystem monitoring remote sensing programs within the USGS and the government at large,

and an AAG publication with recommendations on this issue is forthcoming in May.

Although the vision of an "NIH of geographic research" is certainly far from a reality today, and it is not clear exactly where within the federal government a strong geographic research capability might ultimately develop, I am convinced that the need is sufficiently compelling that it will occur somewhere. With prescient leadership at the USGS, and support from the AAG, Esri, and others, might we see a greatly expanded federal basic research program for geography and GIScience in the future at the "U.S. *Geographical Survey*"?

Doug Richardson

(This article originally appeared in the Spring 2005 issue of *ArcNews Online*.)

Technology and Geography

The Association of American Geographers' (AAG) centennial anniversary this year has prompted the publication of many new books, including a volume just out entitled *Geography and Technology*, which raises many questions central to the Esri user community and the future of GIS and geography. In my foreword to the book,¹ from which the observations below are drawn, I noted that while new technologies have always been important in advancing geographic understanding, never have they been so thoroughly and rapidly transformative as at this stage in geography's evolution.

Just as new technologies have in the past profoundly expanded both research possibilities and the knowledge base of other disciplines, such as biology, physics, or medicine, so too are the revolutionary new geographic technologies developed during the past few decades extending frontiers in geographic research, education, and applications. They are also creating new and resurgent roles for geography both in society and universities.

This trend is still accelerating, as the integration of geographic technologies, such as the global positioning system and geographic information system (GPS/GIS), is creating an explosion of new real-time, real-world applications and research

capabilities. The resultant dynamic space/time interactive research and management environments created by interactive GPS/GIS, among other technologies, place geography squarely at the forefront of advanced multidisciplinary research and modeling programs and have created core organization management tools (geographic management systems) that will dramatically change the way governments and businesses work in the decades ahead.

While these and other important geographic technologies, including remote sensing, location-based services, and many others addressed in the book, are forging new opportunities for geography and society, they also pose challenges. Inherent within all advanced technology is the potential for its abuse as well as for creative and beneficial uses within science and society. As geographers and developers of new geographic technologies, we have an obligation to employ our expertise to help ensure that appropriate regulatory and legal frameworks are implemented to safeguard civil liberties and locational privacy as these new technologies become ever more widespread in research and applications. We must also work to ensure that these technologies are accessible to community-based groups

and that their benefits accrue to those historically dispossessed around the world.

Our new geographic technologies also are embedded in and magnified in their impacts by parallel developments in technology generally, including the broad advances in computers, the Internet, wireless communications, and many other areas. It is also the case that a great deal of cutting edge research and innovation related to new geographic technologies has originated in geography's burgeoning private sector, exemplified by dynamic and creative companies such as Esri or my former company, GeoResearch. This new reality highlights the need to foster better linkages and coordination among private, public, and university geographic researchers and research agendas—as is common in other disciplines blessed with strong private or public sector research components—if we are to sustain both the science and educational infrastructure necessary to achieve the full potential of GIS and other key geographic technologies in the years ahead.

Perhaps most important, there remains a need to better integrate geography's transformational new technologies with geography's traditional strengths and its characteristic diversity. Technology in geography does not pose a threat to our traditions; it offers a way to extend and revitalize these traditions. Just as the microscope and DNA sequencing have revolutionized research, education, and applications in biology, and in so doing made the work of Linnaeus and Darwin ever more important to modern

science and medical applications, so too will new geographic technologies—such as interactive GPS/GIS—extend research horizons in traditional areas across the full breadth of geography and make its applications more central to the needs of our society and our rapidly changing world.

Conversely, it is also clear that geographic technologies are integral to the intellectual core of our discipline and that an understanding of their evolution and impact is essential to understanding the history and philosophy of geography as a discipline. Our ways of thinking and doing as geographers always have been and will continue to be intertwined with advances in technologies that, while neither intrinsically good nor bad, in the best of hands help us to see beyond, integrate the disparate, visualize complexity, communicate the remarkable commonplace as well as the merely extraordinary, bridge continents and disciplines, and create geographic understanding.

I commend those who have pioneered these new technologies in geography whether GIS professionals, engineers, computer scientists, or geographers, for their contributions to geography. And I applaud the editors and the authors of *Geography and Technology* for their foresight and insight at this centennial moment in AAG's history by producing this important publication.

The topics and issues addressed in this centennial publication will be critical to the future of geography and GIS and to that of our world during AAG's second century.

Doug Richardson

Geography and Technology, edited by Stanley D. Brunn, Susan L. Cutter, and J.W. Harrington, Jr., 2004. Kluwer Academic Publishers (the Netherlands), pp. XI-XII. The book is available from the publisher or from AAG at www.aag.org.

(This article originally appeared in the Spring 2004 issue of *ArcNews Online*.)

Where Do We Go From Here?

The Geographical Dimensions of Terrorism

The Association of American Geographers (AAG), with funding from the National Science Foundation (NSF), recently concluded a research project entitled "The Geographical Dimensions of Terrorism." The project was undertaken as part of NSF's urgent call for research associated with the recent terrorist attacks on the United States.

The resulting research agenda and recommendations have been widely disseminated to national and international government agencies, the geographic research community, and related disciplines. Outcomes of this study also include the recent publication of a groundbreaking book on the topic.

This is an ongoing process, and we invite the participation of the international geographic research and GIS user communities as we collectively continue to evolve this work in the years ahead.

Key Research Areas

In our discussions with national policy officials and geographic researchers, three broad areas of critical national research priority have repeatedly emerged. These areas are geospatial data and technologies infrastructure, underlying causes of

terrorism, and vulnerability science and hazards. Examples of key recommendations in these areas are summarized below.

Geospatial Data and Technologies Infrastructure

The use of geospatial data and technologies was critical during the rescue, relief, and long-term recovery from the September 11, 2001, events. Their prominence now in planning for international efforts to address terrorism suggests many pressing research needs, both short term and long term, in the area of geographic information science and technology. Key action items include establishing a distributed national geospatial infrastructure as a foundation for homeland security. This infrastructure should be designed to serve other needs, as well, such as local government, planning, environmental protection, and economic development.

Research Needs

- What are our society's critical lifelines and infrastructure vulnerabilities, and how can we develop tools such as GIS to model and map their spatial linkages and interdependencies?
- What are the research challenges for continued integration of transformational geographic technologies (e.g., real-time GPS/GIS, remote sensing, and wireless mobile computing)

to enhance disaster response, national security, and infrastructure vulnerability assessment? What is the potential for using these integrated geographic management systems to address complex processes related to terrorism such as disaster response, reduction of world poverty, sustainable development, and a host of other needs?

- What were the variable geographic and economic impacts of the September 11 events, and how can we develop better spatial/economic models to predict variable short- and long-term geographic impacts of other potential terrorist threats or hazards?
- In an era of heightened security and precautions, how can individual human rights and privacy be protected when the powerful capabilities of advanced geographic technologies, as with so many other advances in technology, have inherent within them a risk for potential abuse? What social responsibilities will those employing spatial technologies in the future have for human rights, privacy, and related issues?

The Root Causes of Terrorism

One of geography's great strengths is its ability to synthesize information about places in order to understand the linkages between regions and the manifestation of global processes at very local levels. The rich set of contexts advanced by regional specialists can assist in understanding the root causes

of terrorism. These should be pursued in a systematic and analytically robust manner through a national interdisciplinary research program on the underlying causes of terrorism.

Research Needs

- How has the political control of space (or lack thereof) fostered terrorism? How do stateless zones and states shift their patterns through time, through changing environmental conditions and population migrations?
- What are the differential impacts of globalization and how are these manifested spatially? What is the geography of inclusion and exclusion, and how might these spheres be influential in reducing or heightening spaces of terrorism and/or conflict?
- What is the geographic variation, internationally, of the perception of the United States and its role in the world? How do these perceptions affect, positively or negatively, the vulnerability of the United States to terrorism?
- How might a greater emphasis on geography education foster better understanding of the world and its diversity and cooperation among peoples and societies?

Vulnerability Science and Hazards Research

The meaning of vulnerability has taken on new interpretations since September 11. We need to broaden our understanding of vulnerability beyond an exposure–response framework to a more

holistic view that includes exposure, susceptibility, resistance, resilience, and adaptation. We need a major effort to develop the basic data, models, and methods for conducting vulnerability assessments at all spatial scales.

Research Needs

- How can we spatially delineate the vulnerability of people and places and develop a comparative indicator to assess where vulnerabilities are greatest and why?
- How do we ensure the continuity of operations during an emergency and thus prepare for mutual support in terms of surprise? What types of data and information are required to ensure an adequate response?
- With regard to bioterrorism, what are the geographic conditions and factors that affect the diffusion of purposely introduced diseases among populations of humans, animals, or plants, and how are these different from naturally occurring diseases?
- How do we include intangibles such as values, symbols, and landscapes of fear in vulnerability assessments? How important is the perception of risk rather than a quantitative estimate of it in determining societal or individual response?

Working Together . . .

It is important to bring all of our geographic resources to bear on this important national and international priority. Collaborative efforts between organizations such as AAG, Esri, the International Geographical Union, the University Consortium for Geographic Information Science, and many others—as well as interdisciplinary linkages and partnerships with federal agencies, private firms, and international nongovernmental organizations—will be required as we all work toward refining and achieving this ambitious agenda.

The full results of the research undertaken to date by the AAG/NSF project are now available in the book entitled *The Geographical Dimensions of Terrorism*. Edited by Susan L. Cutter, Douglas Richardson, and Thomas J. Wilbanks, the book includes a foreword by Dr. Jack Marburger, the top White House science official, and an introduction by Dr. Philip Rubin of the National Science Foundation. An epilogue to the book by Jack Dangermond, president of Esri, provides an excellent perspective from the private sector and a poignant personal account of the events after September 11.

Published by Routledge, *The Geographical Dimensions of Terrorism* is written for policy makers and local governments, as well as researchers, and for use as a supplemental text for courses in geography and related disciplines. The book may be

ordered from AAG (at www.aag.org or by calling 202-234-1450) at a price of \$15.00 for AAG members or \$20 for nonmembers.

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