Entrenchment of GIS Technology for Enterprise Solutions in Maryland's State and Local Government

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Abstract

Beginning in 1974, the State of Maryland created spatial databases under the MAGI (Maryland's Automated Geographic Information) system. Since that early GIS, other state and local agencies have begun GISs covering a range of applications from critical lands inventories to cadastral mapping. In 1992, state agencies, local agencies, universities, and businesses began a series of GIS coordination activities, resulting in the formation of the Maryland Local Geographic Information Committee and the Maryland State Government Geographic Information Coordinating Committee. GIS activities and system installations can be found in 22 counties plus Baltimore City, and most state agencies. Maryland's decision makers rely on a variety of GIS reports and products to conduct business and to communicate complex issues more effectively. This paper presents the status of Maryland's GIS applications for local and state decision making.

Introduction

Maryland first established a geographic information system (GIS) more than 25 years ago. However, many institutional and organizational impediments have prevented the state from developing fully integrated enterprise architecture. For the state and local government organizations, the range of applications and pace of implementation for geospatial technology vary significantly in both vertical and horizontal components. The result is a heterogeneous mix of data, applications, and organizational arrangements for the state. This paper provides a review of Maryland's GIS evolution, the diffusion of the technology into state and local agencies, an assessment of the current level of development and decision-making capacity existing within the state, and an analysis of the major issues confronting Maryland's government and GIS community working toward reaching a comprehensive and democratic approach to delivering and utilizing geospatial information.

History of Maryland's GIS Organizations

In 1974, the Department of State Planning initiated the first Maryland statewide geospatial database effort. Maryland's Automated Geographic Information (MAGI) System was completed under the direction of Secretary Vladimir A. Wahbe and Edwin Thomas, Director of Comprehensive State Planning, using Comprehensive Planning Assistance Program (Section 701) grant funds (Warnecke, 1998). The original MAGI team included MAGI planner John Antenucci, founder of PlanGraphics (Frankfort, Kentucky), and MAGI contractor Jack Dangermond, founder of Environmental Systems Research Institute (Redlands, California) (State of Maryland, 1990).

In 1975, the U.S. Department of Interior rated MAGI the most comprehensive system for statewide manipulation of spatial data in existence. At that time, the MAGI System consisted of a central statewide database, maintained at the University of Maryland, College Park, on a UNIVAC 1108 computer. The statewide database contained nearly 88,000 grid cells of 91.8 acres each and a package of linked software subroutines. The database included not only digital spatial data, but also maps, technical manuals, library lists, and tabulations (State of Maryland, 1990). Extension of MAGI beyond a single agency, however, did not evolve. Vestiges of MAGI became components of the present-day GIS operated by Maryland's Office of Planning (MOP) (Warnecke, 1998).

In 1992, at the Towson State University GIS (TSU/GIS) conference, the Maryland Geographic Information Systems Committee (MDGIS) was formed. Conference participants agreed to pursue statewide coordination efforts to establish separate subcommittees to represent federal, state, and local government agencies, the private sector, and the University of Maryland System (Figure 1). By late 1992, under the leadership of the Department of Natural Resources (DNR), the state agencies formally organized the Maryland State Government Geographic Information Coordinating Committee (MSGIC). Local governments, led by Harford County's GIS manager, initiated the Maryland Local Government GIS Committee (MLOGIC) and began meeting semi-annually. The remaining subcommittees under the MDGIS retained *ad hoc* coordination status among the federal agencies, universities, and business community, but were dissolved by 1995 as MSGIC and MLOGIC became more active in addressing the need for GIS coordination in Maryland (MSGIC, 1999).

MSGIC continues to be an active coordinating body whose representatives, in accordance with the governor's executive order, appointed by their respective agency heads, serve as committee members. Eighteen agencies, from an original set of 27, have remained active members of the committee. Annual elections from among the appointed members fill the positions

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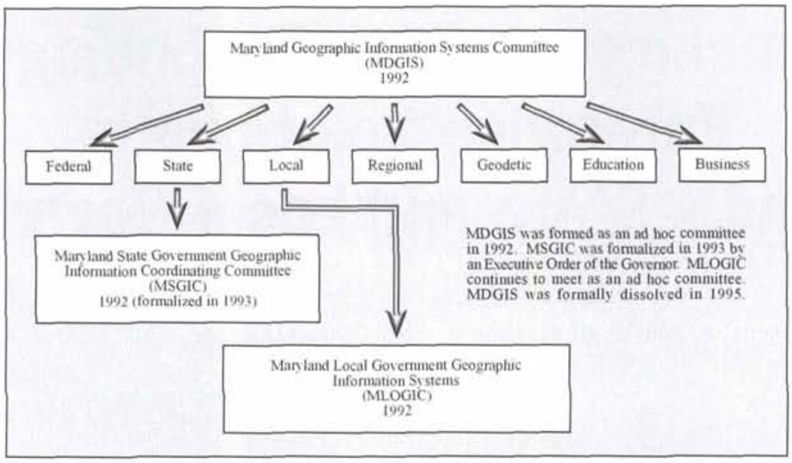


Figure 1. Evolution of Maryland Government GIS Organizations (Source: MLOGIC).

of chair, chair-elect, and secretary. A similar organizational structure operates for MLOGIC with representatives from the 23 Maryland counties, Baltimore City, and other incorporated cities. MLOGIC is a voluntary organization dedicated to fostering communication between Maryland's counties and cities and providing input to the Maryland State Geographic Information Committee (MSGIC) on issues affecting state and local governments.

In 1995, the University of Maryland, Baltimore County (UMBC) initiated an experiment called the Baltimore-Washington Regional Collaboratory. This regional prototype, renamed the Baltimore-Washington Collaboratory (BWC) in 1999, began constructing a geospatial framework and maintaining a Web site (**http://baltimore.umbc.edu/bwc**) to foster the use of data, information, and applications in an extended community of citizens, NGOs, academics, government, and business organizations that were not represented by MSGIC and MLOGIC. Formal linkage between the Maryland GIS communities and the Federal GIS communities grew out of the BWC with the installation of a National Spatial Data Infrastructure (NSDI) clearinghouse node (**http://baltimore.umbc.edu/mdnsdi**) in 1999 (MDNSDI, 1999). The Maryland NSDI node supports local and state databases, as well as remote sensing and other data resources, developed through federal grants and cooperation (i.e., the National Aeronautics and Space Administration, the National Science Foundation, the U.S. Geological Survey, the U. S. Forest Service, Bureau of the Census, and the U.S. Environmental Protection Agency).

Maryland is poised to increase the depth and breadth of GIS applications and databases as a result of 25 years of progressive development. The potential for an integrated, or enterprise, approach to state and local activities is dependent upon many factors. The capacity of information technology, via the NSDI architecture, may be a key factor to alleviate organizational barriers for a statewide network. But the degree to which enterprise architecture can be created within a segmented and stratified state and local GIS organizational structure will depend ultimately on the state's data sharing and access policies.

National County-Level Geospatial Data Applications

A national survey of counties conducted in 1998 provides a background for assessing the status of Maryland's use of GIS in local government. The survey was conducted by the Social Science Research Center, Mississippi State University, under a contract from the NASA Stennis Space Center (Wittig *et al.*, 1998). Data were collected from a sample of 4,462 county agencies. Figure 2 shows the level of use of geospatial technologies (remote sensing, GIS, and GPS) for three types of counties: Non-metro counties (of less than 100,000 population), medium-metro counties (100,000 to 500,000), and metro counties (500,000 plus). The use and awareness of geospatial technologies is correlated with the size of the county, as demonstrated by lower levels of GIS use for non-metro counties, mid-level usage by medium-metro counties, and highest use for metro counties. Respondents identified ten high priority interests in geospatial technology applications (Wittig *et al.*, 1998):

- Develop a countywide GIS to improve operations and services (77.6 percent).
- Determine exact locations of "stationary" features such as property lines, road intersections, etc. (76.7 percent).
- Convert paper maps to digital maps to save physical space (73.8 percent).
- Address geocoding for determining exact location from an address (73.7 percent).
- Assign Land Information System to manage land parcel, survey, appraisal, and tax information (71.9 percent).
- Provide access to your department-wide GIS via the Internet (71 percent).
- Map the public land survey, that is, legal description of the land (70.5 percent).
- Map tax parcel information and associated data (69.8 percent).
- Convert hard copy tax maps, databases, and spreadsheets to a GIS-ready format (69.1 percent).

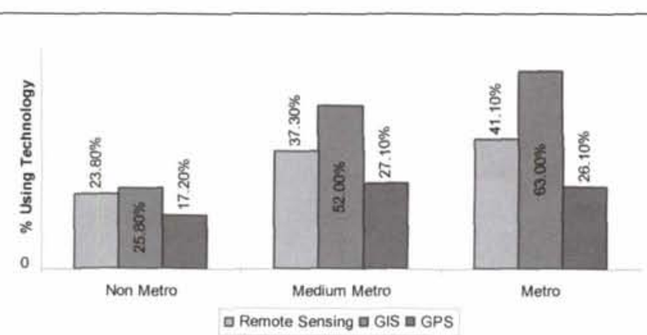


Figure 2. Curent use of geospatial technologies in U.S. counties (Source: Wittig *et al.*, 1998).

• Produce maps from satellite imagery (67.7 percent).

It was determined that the term GIS was recognized by more than 90 percent of the respondents from planning/housing, parks and recreation, public works, finance, administration, and health departments (Figure 3). This awareness, combined with the level of GIS use by counties, suggests a significant diffusion of the technology into the local government community (Warnecke, 1998) and parallels the experiences of Maryland's counties.

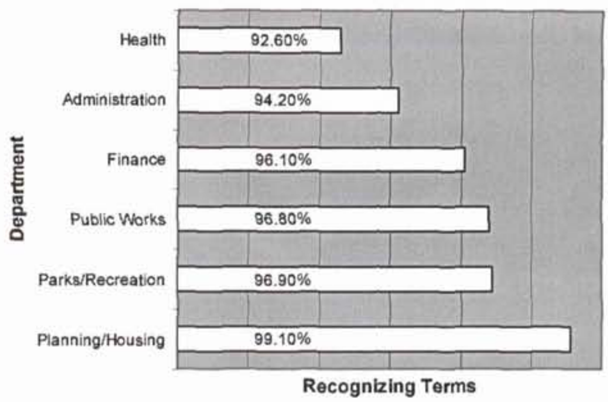


Figure 3. Government departments with highest awareness of GIS (Source: Wittig *et al.*, 1998).

Maryland's County-Level Survey

The State of Maryland has the primary responsibility for assessing and mapping real property, or legal parcels, in the state. Currently, the State of Maryland Office of Planning (MOP), in cooperation with the Department of Assessments and Taxation, produces a statewide parcel map database in a raster format. This database is marketed by MOP as a product called MdPropertyView. Because of the cadastral layer's importance, many of the counties have elected to create and maintain their own cadastral databases in both raster and vector formats. This separate, but equal, GIS construction has raised many issues regarding data rights, duplication of efforts, and disparity between jurisdictions.

In 1999, MLOGIC conducted a Cadastral Mapping Survey (MLOGIC, 1999). The purpose of the survey was to determine the status of cadastral mapping within county and city governments in Maryland. The survey was sent to all 23 counties, Baltimore City, and three larger incorporated cities (Annapolis, Frederick, and Hagerstown) situated within the counties. The survey yielded 26 responses to 27 inquiries. The survey was organized to query information from each organization on system/database background, maintenance, public access, and vertical integration. The questions included choices, rather than narratives, and yielded the following results:

- Twenty-five of the 26 organizations operate a GIS with a cadastral layer (Figure 4a);
- Nine counties use MdPropertyView exclusively;
- Fifteen counties/city and two incorporated cities have or are compiling cadastral layers in vector format;
- Importance of cadastral information by organization: Fifteen high (mission critical, used daily), eight medium (used frequently), and two low (use periodically) (Figure 4b);
- Data conversion has been performed using contractors, universities, and in-house resources;
- Data conversion methodologies included table or heads-up digitizing and raster-to-vector conversion;
- Thirteen municipalities either currently maintain or plan to set up the parcel database (Figure 4c); and
- Maintenance is performed using coordinate geometry (COGO), digitizing, and raster-to-vector conversion.

As of 27 April 1999, the State of Maryland has 2,035,111 parcels (MLOGIC, 1999). The survey highlighted the significance of local government compilation and maintenance activities as follows:

- Parcels in vector format or currently in compilation 1,715,736 (84.3 percent)
- Parcels in maintenance or planned maintenance 1,654,804 (81.3 percent)

Counties' responses provide a clear indication of duplicative data management activities and inefficient state architecture. MLOGIC survey questions on vertical integration investigated the potential, or willingness, of the municipalities to provide parcel-level data to the state. Upward migration of county parcel data would effectively eliminate duplication of effort. Under current legislation the state has the responsibility for parcel mapping. However, the counties continue to demonstrate daily their stewardship requirement to apply parcel-mapping information in automated GIS environments. Current legislation, a remnant of the pre-GIS era, will require reexamination if the state is to approach the efficiencies of enterprise GIS organizations (NAPA, 1998). Two legislative bills were introduced and defeated in 1999 that were crafted to remedy the pricing policies of the 1992 legislation. These efforts demonstrate the current intra-state political dynamics regarding philosophies for data democratization versus state operated GIS revenue centers (Annotated Code of Maryland, 1992; **http://mlis.stte.md.us/1999rs/billfile/hb0790.htm**; **http://mlis.stte.md.us/1999rs/billfile/hb1098.htm**).

The cadastral data layer for the counties can be used as an indicator for the status of GIS development. Other indicators, such as number of software licenses, number of departments building or accessing spatial data sets, and number of applications in development, also provide a perspective on the level of a county's GIS implementation. A classification of the relative levels of county GIS implementation was obtained from assessment of the survey instrument and knowledge of the counties' GIS practices. Three levels of implementation are presented in Figure 5. High represents counties with multiple systems installed that have significant activities in developing countywide databases and applications; Medium indicates more than one system installed within a department or multiple departments; and Low defines those counties with a single GIS installed, or contracted services for providing their GIS. As with the national survey, Maryland counties display a tendency for more advanced GIS implementation in counties with significant metropolitan population centers.

Baltimore County Applications

Few counties in Maryland are as advanced in GIS as Baltimore County (**http://www.co.ba.md.us**), which has invested more than $5,000,000 in the past decade to develop the baseline geospatial foundation layers and create applications for the county's operations. Baltimore County initiated a large-scale enterprise GIS implementation in 1994. All data conversion, hardware, software, support, and application development were funded as a capital project managed by a GIS Services Unit in the Office of Information Technology. The county was divided into three geographical areas for data conversion, with the first phase in the southeastern portion where the most difficult conversion issues were encountered, such as the highest population and infrastructure density and extensive shoreline features.

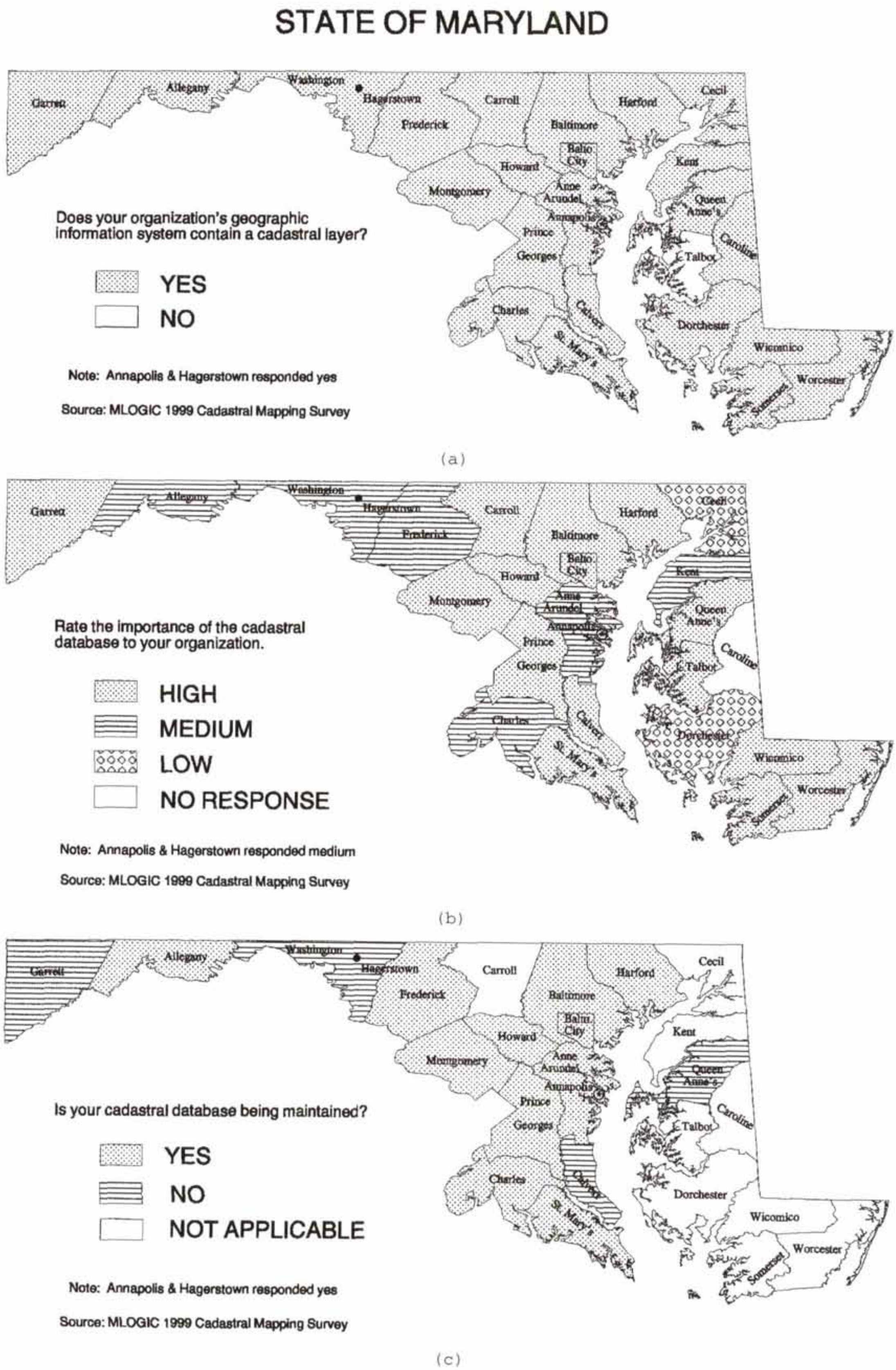
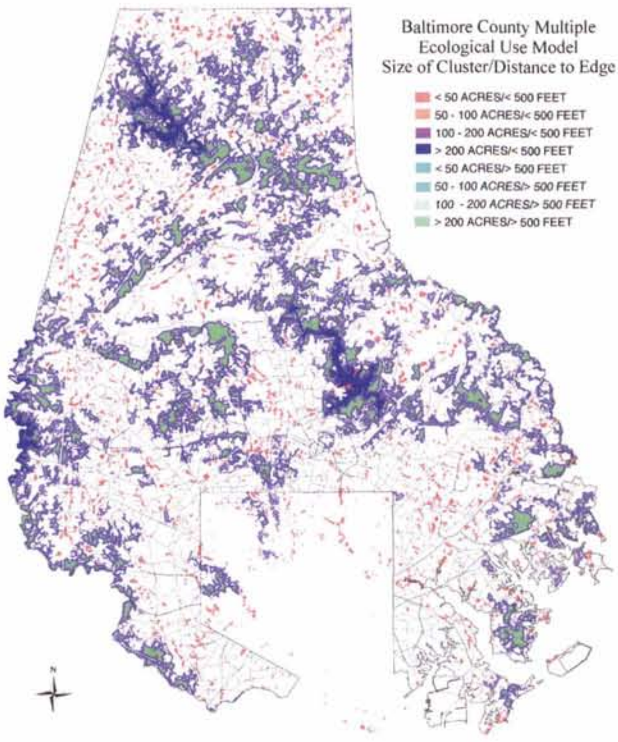


Figure 4. (a) Maryland jurisdictions with a cadastral layer in their GIS, (b) Importance of cadastral information in Maryland local government GIS, (c) Cadastral database maintenance in Maryland local government organizations (Source: MLOGIC).



Source: Baltimore County Department of Environmental Protection and Resource Management (DEPRM)

Plate 1. GIS-based assessment of the Baltimore forest resources (Source: DEPRM).

Plate 2. Shoreline changes on Tilghman Island, Maryland (Source: Maryland Geological Survey).

An example of the county's more sophisticated GIS-base applications is the methodology for establishing a greenway corridor system along the county's fragmented forest landscape (Plate 1). The project demonstrates the application of GIS technology as both an assessment and a decision support system for targeting special conservation forest resources and identifying options for selecting greenways. This GIS application was performed by the Baltimore County Department of Environmental Protection and Resource Management (DEPRM) in conjunction with the Maryland Department of Natural Resources' Chesapeake and Coastal Watershed Service. A local contractor, Biohabitats, Inc., assisted the project under a subcontract. This effort entailed the use of four primary data sets for forest cover, subwatershed boundaries, stream locations (including first-order reaches), and land use. Landsat and SPOT satellite data were classified to obtain forest cover using the IDRISI software package (Clark University). Other GIS-formatted data sets were obtained from the U.S. Geological Survey, the Maryland DNR, and MOP. A methodology was developed to differentiate existing and potential riparian and upland management areas by ranking interior forest, forest buffers and gaps, impervious surfaces, slopes, and important species (DEPRM, 1996).

Currently, 15 departments access the central GIS database with a number of extensive application developments in progress. A related example is the development of the Regional Crime Analysis Geographic Information System (RCAGIS) in coordination with police departments along the Baltimore-Washington corridor. The RCAGIS system represents a regional application that requires cross-jurisdictional GIS coordination.

Other counties with sophisticated GIS installations include Anne Arundel, Harford, Howard, Prince George's, and Montgomery, and Baltimore City (Figure 5). Many examples exist for GIS applications in each of these counties, such as National Pollution Discharge Elimination Systems (NPDES), zoning, public access, flood plain mapping, etc. However, no county has instituted a comprehensive, enterprise architecture to date with backing of the county executive office. Therefore, these county systems require constant revalidation of their expenses in budgetary competition with other county programs.

MSGIC Products and Services

MSGIC has focused on a variety of key areas to help coordinate statewide activities. Under direction of an executive committee, with elective officers, the following subcommittees address policy, technical, and logistical coordination activities:

- Database and Resource Development
- Technical Assistance, Uses, and Applications
- Marketing and Education
- Standards
- Global Positioning Systems

It is through this mechanism of interrelated GIS coordination committees that Maryland has begun to offer statewide products and services, such as the Maryland Technology Toolbox, the Maryland GIS Resource Guide (Appendix), and the

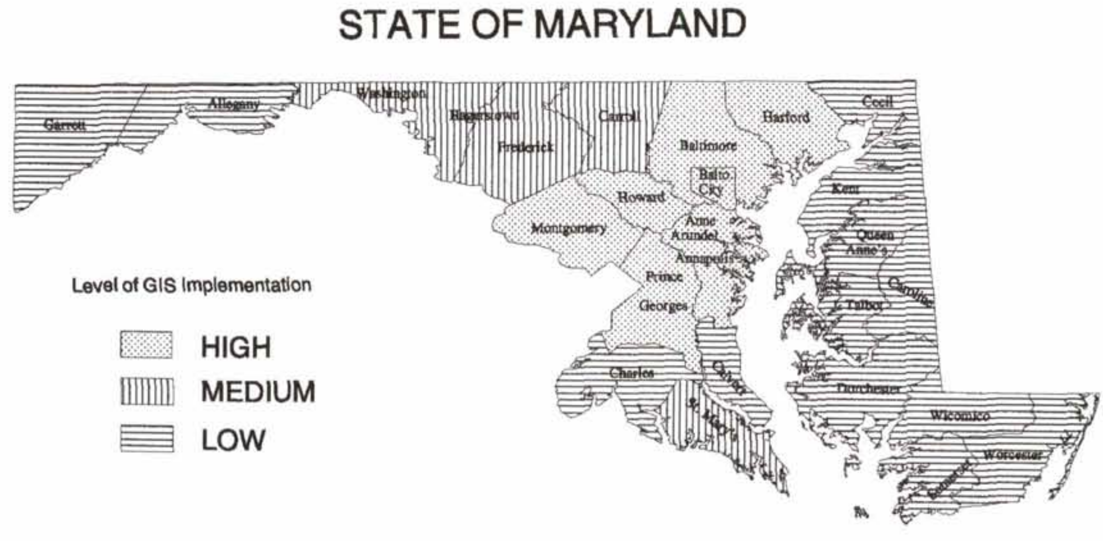


Figure 5. Levels of GIS implementation in Maryland local government (Source: MLOGIC).

MSGIC Web site (**http://www.dnr.state.md.us/MSGIC/**). Access to the State of Maryland's government data, however, is not free and is generally not provided to counties or citizens for cost of fulfilling user request (COFUR). Instead, Maryland agencies have added "reasonable cost" to recover staffing and database development expenses under special legislation passed in 1992 (Annotated Code of Maryland, 1992). A listing of services is also included for state agencies to perform various analyses and assessments. This costing structure is generating continued debate among the GIS and the government community as awareness grows for citizen data and information rights. Special licensing agreements are currently required to obtain most of the data listed in the Appendix. While this arrangement was initially intended to develop a revenue stream for MOP, DNR, and other agencies to continue funding GIS activities, the results have been counterproductive. First, the pricing structure has yielded a limited market and hence limited revenues; second, the information exchange relationships between counties and the state agencies has been negatively impacted, yielding increased duplication of effort and general lack of cooperation for both data exchange and application development; and third, the creation of a healthy GIS data user community in business, education, and government has not been realized. In essence, the benefits of data democratization as a key fuel promoting statewide GIS enterprise have not been achieved.

Maryland Department of Environment

Development of GIS-compatible data layers has been aggressively pursued by the Maryland Department of Environment (MDE) over the past five years, as the department has been coordinating hazardous materials lists and toxic release inventories with the U.S. Environmental Protection Agency. Geographic locators have been recorded for all regulated or permitted facilities, mapped into the GIS, and linked to associated database files. The department's activities have focused on meeting internal requirements for managing the demanding workload of environmental regulation cases. In 1998, an industrial explosion in the Wagner's Point area of Baltimore Harbor raised citizen outcry due to the close proximity of residences to regulated industries. A public relations challenge was facing MDE, as concerned citizens demanded remediation and protection for their homes. The issue was addressed by MDE using GIS-generated maps to effectively communicate the exact locations of homes at risk. A resolution for area residents was arranged through government purchase of the homes at risk. The area is now strictly zoned for heavy industrial land use.

Maryland Geological Survey

The Coastal and Estuarine Geology program at the Maryland Geological Survey (MGS) uses a GIS (MicroImages, Inc., Lincoln, Nebraska) for mapping shoreline changes along the Chesapeake Bay and Atlantic coast. MGS uses digital 1988–98 orthophotoquads as the base map for overlaying historical hydrographic charts and maps spanning back 150 years (Plate 2). Quantitative analysis of shorelines' mass movement is calculated for specific study areas along the coast. The ability to link raster orthophotoquads with historical shoreline vector data for engineering calculations has made GIS an invaluable tool for coastal geomorphologic studies. Plate 2 is a detail taken from an MGS study (Hennessee, 1997) where the image was significantly reduced from the original to relate the boundaries from the present to the past.

Maryland Department of Natural Resources

The Tidewater and Ecosystem Assessment Division has instituted an Internet mapping program for distributing water quality information linked to all sampling stations in the state. Programmers designed the Internet mapping program to incorporate water quality data provided by DNR and geospatial data represented in ArcView shape files. The Web-based GIS product, developed by UMBC Spatial Analysis Laboratory in conjunction with Cybergroup, Inc. (Baltimore, Maryland), used Cold Fusion programming to process more than 500,000 database records from the DNR database to access, query, download, and generate statistics (Plate 3). DNR's primary objective was to design an intuitive, Internet-based graphical user interface (GUI) for an environmental structured query language (SQL) database that would assist state agencies, universities, researchers, and the general public in finding and using considerable amounts of water quality, living resources, and toxics data. Basic GIS function for point and query, zoom, pan, and identify enable the DNR managers, as well as citizens, to work with the previously unwieldy water quality records and to generate maps and reports directly from the Web page (**http://baltimore.umbc.edu/dnr**).

The Geographic Information Services Division is responsible for providing state-of-the-practice GIS applications in support of DNR. An example of one application is Maryland's Environmental Resources and Land Information Network (MERLIN) system, maintained over the past couple of years for DNR employees. MERLIN is an electronic atlas that runs across the local area network at DNR containing most of the digital maps employed by DNR staff in their daily operations. The MERLIN database includes MdProperty View (parcel maps), archeological, historical, floodplain, wetland, sensitive species project areas, watershed boundaries, submerged aquatic vegetation, protected lands, and other data. MERLIN also contains a raster graphics database of images from 7.5-minute USGS quadrangle maps, SPOT and Landsat Thematic Mapper satellite imagery, and color-infrared orthophotography. A public access module for MERLIN (Plate 4) is available over the Internet (**http://www.mdmerlin.net**).

Comparisons of GIS Entrenchment into State and Local Government

Examining Maryland's counties for their relative positions regarding implementation of GIS yielded the three-level assessment displayed in Figure 5. As shown in the national survey (Figure 2), the level of involvement with GIS technology is correlated to the size of the county. Reasons for this trend have been related to financial and personnel resources required for investing in geospatial technologies. While the cost of hardware and software has been reduced dramatically over the past decade, the cost of county-level data remains a significant factor. Counties with large population bases, such as Anne Arundel, Harford, Howard, Baltimore, Montgomery, and Prince George's, and Baltimore City, have invested millions of dollars into their systems and database development. A large portion of Maryland counties remain in the medium-level range as a result of more recent acquisitions of system components and staffing buildup. These counties, such as Garrett, Cecil, and Worcester, have focused on creating fundamental base layers, including cadastral and survey, while relying on DNR database resources for digital orthophotoquads, wetland inventories, and forest resource data layers. Counties at the lowest level of GIS implementation are benefiting from the diffusion of knowledge and experiences of their sister counties and are beginning to ask fundamental questions regarding the cost and benefits of enterprise GIS approaches in government. As more and more counties consider GIS a requisite for governance and less as a technology luxury, more innovative approaches to creating and maintaining the geospatial systems are evolving. For example, St. Mary's, Calvert, and Charles counties recently entered into a cooperative agreement to develop regional databases for emergency response management applications in the southern Maryland area. Groups such as MLOGIC facilitate the exchange of county GIS corporate knowledge.

On a statewide basis, the GIS community of users continues to be dominated by planning, natural resources, and environmental issues. However, both the Departments of Assessments and Taxation, and Highway Administration have entered into cooperative arrangements for developing statewide data layers for property and roads. Maryland's Department of Business and Economic Development (DBED) recently submitted a budget for developing GIS capability. MSGIC and the advent of products, as listed in the Maryland GIS Resource Guide (MSGIS, 1999), and the digital database contained in the Maryland Technology Toolbox, are fostering increased GIS activities among the participating agencies. The existence of these proliferating applications and tools appear to be providing a pseudo-enterprise-like environment based on *ad hoc* cooperation in absence of a comprehensive policy. This diffusion process is successful, but perhaps slower and less efficient than a process founded on policy that would allow for GIS budget submissions as part of the capital improvement and management information systems budgetary process. At present, Maryland department executives must balance GIS investments as add-ons to their base budget priorities. Maryland's Governor Glendening experienced first hand the benefits of GIS for decision making and visualization when he spearheaded a national trend for Smart Growth. He used a GIS-based time-series visualization of urban sprawl on the Baltimore-Washington area to help communicate the impact of rapid uncontrolled growth (Plate 5). The Maryland Smart Growth and Neighborhood Conservation Act is an urban growth policy designed to preserve neighborhoods, conserve natural resources, and protect Maryland's rural legacy. As decision makers become more accustomed to relying on the decision-making value of geospatial technologies, they are more likely to support policies directed at ensuring enterprise-wide applications throughout government.

Operational database linkages and exchange between the local and state governments represent a critical step in creating enterprise architectures for a state. Maryland has the beginnings of such structure, but significant barriers remain on issues of data policies, data rights, land parcels or cadastral database stewardship, and information technology infrastructure. Currently, GIS in counties is managed separately from GIS in the state agencies, as demonstrated by the distinct MSGIC and MLOGIC organizations with separate voting rights and policy development arrangements. Many issues of interoperability are being addressed by both the counties and the state agencies following the guidance of the Federal Geographic Data Committee (FGDC) activities for metadata standards and framework protocols (MDNSDI, 1999). As the Maryland NSDI framework increases in detail and in statewide coverage under an NSDI cost-of-reproduction policy, a shift toward reliance on shared and database exchange arrangements can be expected. The increase in statewide geospatial data resources will likely foster formalized arrangements between state and local agencies to maintain these shared database resources. What remains to be addressed is the creation of comprehensive data policies to keep the balance between data democratization of taxpayer-funded data and information development priorities for state and local agencies.

Conclusion

In 1990, Habern W. Freeman, County Executive of Harford County, observed, "Despite my many years in county government, I have never become accustomed to the lack of information available to those who make decisions. I have concluded that most poor decisions are due to lack of information or the inability to integrate many sources of information. . . . How does a county executive . . . know everything required about any given matter? The answer is GIS." (PTI, 1991). Since the time of Mr. Freeman's tenure, Maryland's state and local agencies have developed significant capacities for operating GIS within their organizations. In Maryland, the stage is set for the next step in GIS evolution, that is, statewide organizational enterprise and entrenchment of GIS resources into state and local governance.

Acknowledgment

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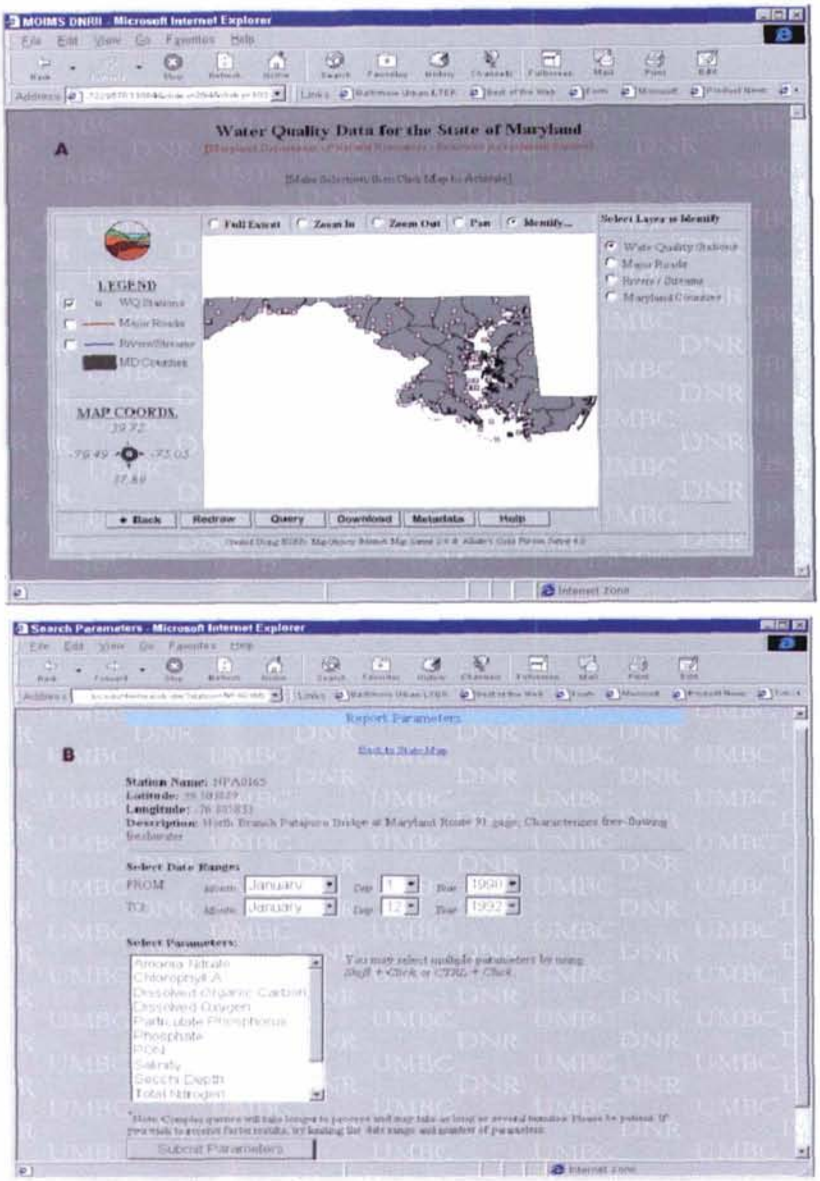

Plate 3. Web-based map-serving product developed for Maryland Department of Natural Resources (Source: UMBC).

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Appendix

Maryland GIS Resource Guide (Source: MSGIC)

Maryland Digital Data Products

Forest Insect Defoliation and Spray Block Maps

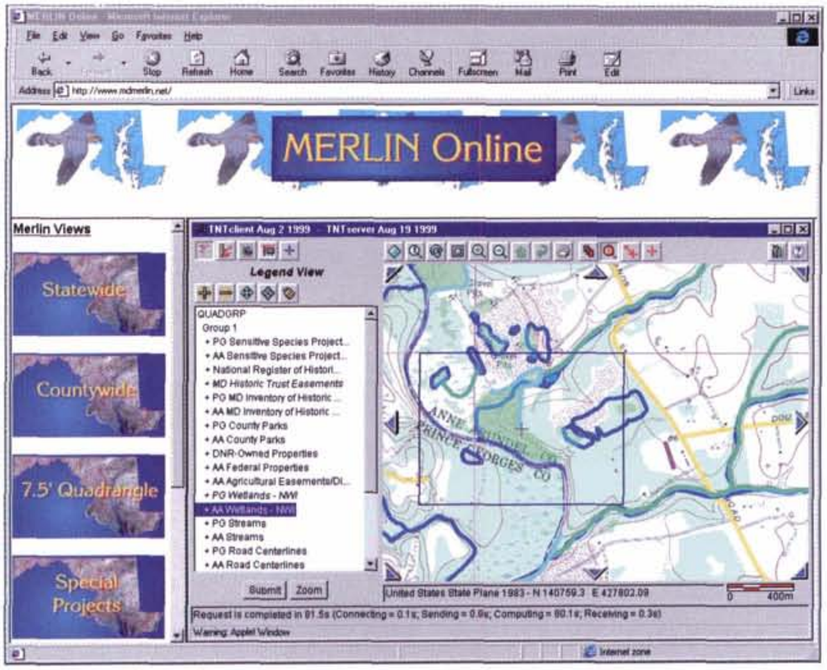

Plate 4. MERLIN public access module interface (Source: MSGIC, graphic by UMBC EarthLab).

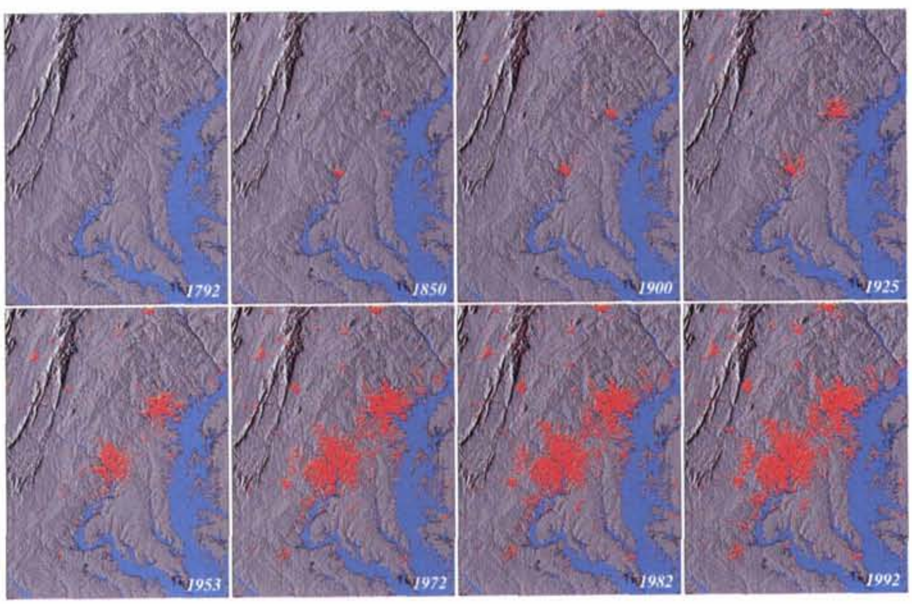

Plate 5. Two-hundred years of urban growth in the Baltimore-Washington region (Source: UMBC).

Leased Facilities
Leased Facilities - Maps
Maryland Historical Trust (MHT) Preservation Easements
Maryland Inventory of Archeological Sites
Maryland Inventory of Historic Properties
National Register of Historic Properties
Presence/Absence Grid of Archaeological Sites
USBS Topographic Quadrangle Maps
Digital Orthophoto Quarter Quad (DOQQ) Maps
National Wetlands Data
Shed96 - Third Order Watersheds for the State of Maryland & Washington, D.C.
Protected Lands
Chesapeake Bay Critical Area Boundary Line
Critical Area Proposed Project Information
100 and 300 Foot Stream and Shoreline Buffers

Maryland Forest Resource Inventory Forest Vectors
Unenhanced Thematic Mapper TM Data
DNR Lands Unit Boundary
Digital Orthophotoquads
GIS Screening Model for Power Plant Siting
Maryland Chesapeake Bay Mainstream and Tributary Water Quality Sampling Data
Transit Routes, Lines & Facilities
Statewide Grid Maps
Geodetic Control Information
Geodetic Control Maps
Three Dimensional Topographic Mapping
1990 Census Computer Mapping boundary Files & Data
Computerized Property Maps and Spatially Reference Parcel Data (MD Property View)
County Political and Land/Water Boundaries
SHA Grid Map Digital Products (circa May 1994)
Intelligent Digital Street Map for Maryland (Maryland Land Base)
Land Use/Land Cover
LANDSAT Color Composite County Images and LANDSAR TM (1994)
Redistricting Digital Maps
Living Resources Monitoring Database (1)
Living Resources Monitoring Database (2)
Water Quality Monitoring database
Point Sources Discharge database and related GIS coverage
Submerged Aquatic Vegetation (SAV)
Bathymetric Soundings (NOAA Historic)
Toxics Release Inventory
Land Cover (EMAP)
Shorelines (NOAA 1:80,000 and 1:250,000)
Watersheds (USGS 8-digit HUC)
Hydrography (USGC 1:100,000 and 1:2,000,000
Digital Elevation Model (USGS 3 Arc Second DEM)
Census Bureau Data
Political boundaries
Planimetric Maps and Digital Orthophotography - Baltimore County
10' Contours - Carroll County
Digital Orthophotography - Carroll County
Wetland Designation Overlays-Carroll County
Planimetric and Parcel Maps, and Digital Orthophotography - Prince George's County
Tax Maps with Zoning Classifications - St. Mary's County
Water and Sewer Service Area - St. Mary's County
100-year floodplains - St. Mary's County
Census Geography - Washington County
Floodplains - Washington County
Urban Growth Boundary - Washington county
Zip Codes - Washington County
Fire Districts - Washington County
Ambulance Districts - Washington County
School Districts - Washington County