Geographic Information Systems: Indispensable Ingredient for Good Governance in Ghana

Peter KUNTU-MENSAH, USA

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SUMMARY

The United Nations Development Program (UNDP) has defined Governance as the exercise of political, economic, and administrative authority in the management of a country's affairs. Good governance is the implementation of government policies and practices thereof in the most efficient and effective way to the benefit of the public. Good governance is the bedrock of sustainable development of a society based on sound domestic policies; it is characterized by sustainable economy, efficient government, effective civil society, successful private sector, democratic and participatory involvement of the citizenry, effectual mobilization of resources, balancing equity, and adherence to the rule of law. Underlying these characteristics are elements of transparency, and accountability spurred by free flow of information enabled by appropriate information technologies. Because the main business of government - to make decisions in the public interest - involves geographically related issues, Geographic Information Systems (GIS) provide incomparable power that can play critical roles in all dimensions of good governance. This paper discusses how GIS can be employed to enhance and improve governance in Ghana.

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1. INTRODUCTION

In recent times developing countries have been admonished by the United Nations, The World Bank, Commonwealth Secretariat, United States Agency for International Development (USAID), and other donor/development agencies of the developed world to introduce, commit to, and practice Good Governance as a means to alleviating poverty, and sustaining development. A UNDP Mission Statement states:

> *"UNDP, at the request of governments and in support of its areas of focus, assists in building capacity for good governance, popular participation, public and private sector development and growth with equity, stressing that national plans and priorities constitute the only viable frame of reference for the national programming of operational activities for development within the United Nations system"*

The 1991 Harare Commonwealth Declaration also committed member governments to *democratic process and institutions* which reflect national circumstances (W'O Okoto-Uma, 2001). The World Bank introduced the concept of Good Governance as the interaction of private and public sectors to facilitate the processes of society to benefit the general population. The same sentiments have been re-echoed by USAID, and other organizations of the industrialized world as the bedrock of sustainable development for the developing countries. Thus Ghana, like many developing countries, trying to build a more open and equitable society, has also embraced this concept of Good Governance. Governance, as defined by UNDP, is the exercise of political, economic and administrative authority in the management of a country's affairs. Good governance involves the constructive interaction of state, market and civil society in cohesion way, characterized by effectiveness and efficiency, accountability, the rule of law, public participation, consensus orientation, responsiveness, equity, and strategic vision. Good Governance should comprise organizations, mechanisms, and procedures which will afford citizens the ability to exercise their legal rights, access to state resources, opportunities, and information that will enable public participation in the decision-making policy process. The one single mechanism that can serve as a vehicle for integrating all the components of good governance in Ghana is Geographic Information Systems (GIS) which, by its nature, synthesizes the same geographically related information that government requires to guide public decision making.

2. GIS AND GOVERNANCE

What is the main business of Government, whether national, regional, city, or local? In the simplest of terms, Government at all levels exists to make decisions in the interest of the

public it serves (O'Looney, 1997). These decisions made at policy, strategic/planning, management /tactical or inventory levels should be based on available accurate information. And increasingly, citizens are requiring government decisions to result in greater efficiency, equity, community visibility, or environmental health. In the exercise of good governance, accountability and transparency are critical; and appropriate information technologies and their corresponding organizational structures and procedures (De Meijere and De Lopez, 2004) are also being demanded.

Today, local government organizations are very conscious of the need to improve the quality of their products, processes, and services through ever-increasing efficiency of resource usage. At least 70-80 percent of all local government work involves land or geographically related issues or tasks (O'Looney, 1997, Longley et. al., 2005). The majority of the processes required to run the local government relate to services provided to individual land parcels lying within local jurisdiction (Jeffress, 2005). Hence local governments have come to depend on Geographic Information Systems to provide a very efficient tool for organizing and managing spatial data, as well as disseminating infrastructure information and services to the general public in transparent fashion using the power of the internet.

As GIS has become less expensive, it is being used in government decision making at all levels from national to the neighborhood. In fact, government users were the first to discover the value of GIS. The first recognized GIS, the Canadian Geographic Information System (CGIS), was developed for the Canadian Government for natural resource inventory and management. Today, GIS is used for more than inventorying natural resources as its capabilities have become more widespread and efficient, enabling more complex spatial analyses and modeling. It is used for infrastructure inventory, plan transportation routing, improve public service delivery, manage land development and generate revenue by increasing economic activity.

Local governments also use Geographic Information in unique ways. Since government is ultimately responsible for the long-term health, safety, and welfare of their citizens, wider issues necessary to achieve good governance have to be considered. These include incorporating public values in decision making, delivering services in a fair and equitable manner, and representing the views of citizens by working with elected officials (Longley, 2005). GIS is thus typically utilized in monitoring public health risk, managing housing, and tracking crime; other applications involve strategic, tactical and operational decision making in areas of law enforcement, healthcare planning, census, and education planning. Indeed the application of GIS is too pervasive to enumerate; see Table A for exhaustive list of GIS applications in local government.

3. WHAT IS SPECIAL ABOUT GIS?

The term "Geographic Information System" is loosely applied to a large number of interrelated technologies and, as such, defies strict definition. But it is generally considered a computer-based system that links spatial data (the locations of man-made and natural features on the surface of the earth) and other attribute data to generate reports and maps. It involves

the capture, assembling, storage, retrieval, analysis and display of the geographically referenced data. Practitioners also regard the total GIS as including operating personnel and the data that go into the system. The data - features, activities, and events - is used for solving complex planning and management problems.

The main components include the user's hardware, the software, the database of spatial data, management system, trained personnel, and the network (intranet, LAN, internet). The hardware is the device used to carry out the GIS operations and displays processed information. This mainly consists of the computer and its variants. The software is the computer program that runs to enable GIS; this could be a GIS software package from a vendor or web browser that interfaces with a remote GIS server. The database is the repository of spatial information that is needed for any GIS. It consists of a digital representation of selected aspect of some specific area on or near the earth's surface (Longley, et. al., 2005). Data is a myriad of information including high resolution satellite imagery, aerial photography, topographic and planimetric maps, cadastral maps, street network, census data, GPS data, and much more. The capture, creation, maintenance, and dissemination of GIS data have generated very brisk economic activity. It forms such a large portion of GIS implementation that only government organizations produce the bulk of it. GIS must also have a management system that establishes procedures for GIS activities. GIS must have the people that actually make the system run. These important people include the designers, programmers and maintenance personnel, and a host of spatially aware people. In recent times the network has become an integral component of GIS. It enables digital data to be exchanged/shared rapidly within an organization (intranet), and among organizations (internet). It has forever changed the way government organizations do business and serve information and products to the public. Indirectly or in directly, Geographic Information Systems, in special ways, have become a part of our everyday lives. Almost all human activities, decisions, and natural phenomena involve a geographic component, and they can be studied using GIS. Also working with spatial data involves very complex and difficult choices, which are uniquely handled with GIS procedures.

4. GHANA OFFICE of GIS (GhOGIS)

Concepts such as Electronic Democracy (eDemocracy), Electronic Government (eGovernment), Electronic Business (eBusiness), Electronic (eCommerce), etc, are now part of the digital lexicon. In the same vein ICT/GIT/GIS is being used by most governments of the industrialized world. Information technology is enabling people to access more information that is valuable in their decision making process. Information and communication technology is opening new doors for developing countries, giving them greater capacity to cope and interact with the global community. Ghana is not oblivious to information technology. Though it is one of main ever-increasing information technology hubs in Africa, Ghana has not taken advantage of the capabilities of GIS.

At a time when Ghana is practicing (or seeking to practice) "good governance", a backdrop of our historical, cultural and political circumstances should guide us. While the scope of governance should result in efficiency of government service delivery, it is typically defined

through constructs of accountability, legitimacy, and respect for basic rights, competence and equity. Spatial information is relevant to all these dimensions, and developing, maintaining, and using GIS will enhance governance relationships. At a time when Ghana is implementing Land Administration Program (LAP), the dialogue must include the development of comprehensive information technology "as fundamental for providing solutions to national challenges and for our ability to ensure the sustainable growth of the nation. It is vital that government agencies apply contemporary technologies to day-to-day operations. GIS in particular is special case of information technology that is essential for all aspects of national administration." (Khunkitti , UN speech, Longley, 2005)

Presently the Government of Ghana is pursuing many policy initiatives, strategies and programs – good governance, sustainable development, LAP, Poverty Reduction, etc – all with the ultimate results of eradicating poverty and improving the well being of present and future generations. What all these programs need in common to support decision-making is a system of organized data across disciplines, across organizations. This can be achieved through a Ghana Geographic Information System. An Office of GIS, Ghana Office of Geographic Information Systems (GhOGIS), should be set up to cater to all things geospatial for the whole country - build a Ghana GIS.

A Ghana Office of Geographic Information Systems (GhOGIS) will serve the people of Ghana and the government to build a multi-user, multipurpose GIS database for the Country. Made available through the internet to local and global GIS communities, a Ghana GIS database will be a valuable asset to the state's planning needs for both policy development and implementation. Datasets on many themes could be included: political and regional boundaries, natural features, infrastructure, emergency management, census data, public lands, water resources, conservation, geology, demographics (population), biophysical regions, fishery and fish habitat, high-resolution aerial photography, satellite imagery, and data used for planning and management of coastal ecosystems, environmental monitoring, etc.

The impact of a Ghana GIS cannot be overstated. Cadastral and Land Information system may be the first place to start, but areas of tourism, investment, trade, development planning, government administration, decision-making, policy implementation and finally good governance will be greatly promoted. Ghana indeed is ripe for a Ghana GIS. There is the need for it, and there is no lack of expertise or personnel in area; the time is now.

5. CONCLUSIONS

The concept of good governance as encouraged by UN, World Bank, USAID and other organizations is a high-quality idea for the Government of Ghana to pursue. The ultimate aim - to bring a better life to the Ghanaian population, by poverty eradication, and improving the well being of present and future generations through effective and efficient administration and management of the country's resources. What is needed to support government decision-making is accurate spatial data organized across disciplines and across organizations. Geographic Information Systems answers the need. It is computer-based system whose capabilities have been well proven. As it has become less expensive to implement, government organizations are relying more and more on GIS for decision making and

management at all levels from national to the neighborhood. Ghana needs to explore the possibility of using the power that GIS offers to enhance governance. AGIS committee should be set up to look into the possibility. An Office of GIS – Ghana Office of Geographic Information Systems (GhOGIS) should be set up to cater to all things geospatial for the whole country – building a Ghana GIS.

Table A: GIS applications in local Government (Curled from Longley et. al., 2005)

	Inventory Applications (locating property information such as ownership and tax assessments by clicking on a map)	**Policy Analysis Applications** (e.g., number of features per area, proximity to a feature or land use, correlation of demographic features with geological features)	**Management/Policy-Making Applications** (e.g., more efficient routing, modeling alternatives, forecasting future needs, work scheduling)
Economic Development	Location of major businesses and their primary resource demands	Analysis of resource demand by potential local supplier	Informing business of availability of local suppliers
Transportation and Services Routing	Identification of sanitation truck routes, capacities and staffing by area; identification of landfill and recycling sites	Analysis of potential capacity strain given development of certain areas; analysis of accident patterns by type of site	Identification of ideal high-density development areas based on criteria such as established transportation capacity
Housing	Inventory of housing stock age, condition, status (Public, private rental, etc.), durability and the demographics	Analysis of public support for housing by geographic area, drive time from low-income areas to needed service facilities, etc.	Analysis of funding for housing rehabilitation, location of related public facilities; planning for capital investment in housing based on population growth projections
Infrastructure	Inventory of roads, sidewalks, bridges, utilities (locations, names, conditions, foundations, and most recent maintenance)	Analysis of infrastructure conditions by demographic variables such as income and population change	Analysis to schedule maintenance and expansion
Health	Locations of persons with particular health problems	Spatial, time-series analysis of the spread of disease; effects of environmental conditions on disease	Analysis to pinpoint possible sources of disease

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Tax Maps	Identification of ownership data by land plot	Analysis of tax revenues by land use within various distances from the city center	Projecting tax revenue change due to land-use changes
Human Services	Inventory of neighborhoods with multiple social risk indicators; location of existing facilities and services designated to address these risks	Analysis of match between service facilities and human services needs and capacities of nearby residents	Facility siting, public transportation routing, program planning, and place-based social intervention
Law Enforcement	Inventory of location of police stations, crimes, arrests, convicted perpetrators, and victims; plotting police beats and patrol car routing; alarm and security system locations	Analysis of police visibility and presence; officers in relation to residential populations; police experience and beat duties	Reallocation of police resources and facilities to areas where they are likely to be the most efficient and effective; creation of random routing maps to decrease
Land-use Planning	Parcel inventory of zoning areas, floodplains, industrial parks, land uses, trees, green space, etc.	Analysis of percentage of land used in each category, density levels by neighborhoods, threats to residential amenities, proximity to locally unwanted land uses	Evaluation of land-use plan based on demographic characteristics of nearby population (e.g., will a smokestack industry be sited upwind of a respiratory disease hospital?)
Parks and Recreation	Inventory of park holdings/playscapes, trails by type, etc.	Analysis of neighborhood access to parks and recreation opportunities, age-related proximity to relevant playscapes	Modeling population growth projections and potential future recreational needs/playscape uses
Environmental Monitoring	Inventory of environmental hazards	Analysis of spread rates and cumulative	Modeling potential environmental harm to

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	in relation to vital resources such as groundwater; layering of nonpoint pollution sources	pollution levels; analysis of potential years of life lost in a particular area due to environmental hazards	specific local areas; analysis of place-specific multilayered pollution abatement plans
Emergency Management	Location of key emergency exit routes, their traffic flow capacity and critical danger points (e.g., bridges likely to be destroyed by an earthquake)	Analysis of potential effects of emergencies of various magnitudes on exit routes, traffic flow, etc.	Modeling effect of placing emergency facilities and response capacities in particular locations
Citizen Information/ Geodemographics	Location of persons with specific demographic characteristics such as voting patterns, service usage and preferences, commuting routes, occupations	Analysis of voting characteristics of particular areas	Modeling effect of placing information kiosks at particular locations

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BIOGRAPHICAL

Dr. **Mensah** is a professor at a Texas A&M University-Corpus Christi, TX where he teaches courses in Surveying/GPS, Photogrammetry, Remote Sensing, and GIS. He is a certified photogrammetrist (CP) and geospatial consultant. He is a member of American Society of Photogrammetry and Remote Sensing, American Congress for Surveying and Mapping, and Texas Society of Professional Surveyors.

CONTACTS

Texas A&M University-Corpus Christi
College of Science and Technology
Geographic Information Science Program
Conrad Blucher Institute, 105
6300 Ocean Drive, Unit 5868
USA
Tel. + 1 361 825 3419
Fax + 1 361 825 5848
Email: peter.kuntu-mensah@tamucc.edu
Web site : http://gisc.tamucc.edu