GIS for Ghana

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Key words:

ABSTRACT

I would define sustainable development as the efficient allocation of resources for the improvement and preservation of life. Life in its varied manifestations has an intrinsic spatial attribute and an infinite number of others.

GIS is a system in which Geographic/Spatial data can be captured in a digital format onto which other attributes can be attached. The system incorporates features which allow for processing, manipulation and collation of data: selective presentation, storage and efficient dissemination of data. GIS can therefore mimic some aspects of life.

This paper is an attempt at exploring the possibilities and usefulness of the capabilities of the GIS system in solving the myriad of developmental challenges facing a developing country like Ghana. Ghana has a per capital income of 400 US Dollars, a population of about 18,400,000 people and an economy dominated by agricultural production.

Presently, the NDPC (National Development Planning Commission) the apex national body responsible for planning would issue a working document dubbed GPRS (Ghana Poverty Reduction Strategy), which would be the guiding principle for all other agencies and institutions responsible for planning in the country.

Studies and research leading up to the production of this major document has exposed the need for accurate and extensive spatial information for effective and workable management and planning decisions.

Major problems of rural and urban development include lack of access to electricity; insufficient supply of potable water; poor planning and land tenure system remaining major constrains on the promotion of efficient and environmentally friendly settlements, flooding, erosion and siltation of drains.

These developmental problems obviously cannot be solved without the input of the appropriate and accurate spatial information.

GIS, which integrates spatial and attribute data is certainly one of the effective systems to employ in analysing and solving these problems.

Already there are institution with first-rate facilities, and personnel developing fairly sophisticated GIS systems in Ghana. Also a number of mapping organisation have the

capability of producing/providing really quality spatial information in any required format for effective GIS system development.

The NDPC can create standard documentation for how a series of data types should be modelled in a geodatabase to facilitate interoperability of data sets between users.

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1. INTRODUCTION

I would define sustainable development as the efficient allocation of resources for the improvement and preservation of life. Life in its varied manifestations has an intrinsic spatial attribute and an infinite number of others

GIS is a system in which Geographic/Spatial data can be captured in a digital format onto which other attributes can be attached. The system incorporates features which allow for processing, manipulation and collation of data, selective presentation, storage and efficient dissemination of data. GIS can therefore mimic some aspects of life.

This paper is an attempt at exploring the need, the usefulness and the difficulty of establishing a GIS FOR GHANA. A brief overview of the development situation and process in Ghana will suffice here. Ghana has a per capital income of about 400 US Dollars, a population of about 18,400,000 people and the average contributions over the past 5 year of agriculture, industry and services to GDP are 36.5, 25.2 and 29.2 percentages respectively.

Administratively and politically, Ghana is divided into ten (10) regions which are subdivided into 110 districts. The apex national body responsible for planning (Economic, Social, Infrastructure etc) is the NDPC (National Development Planning Commission).

- The various MDAs (Ministries, Departments and Agencies) have their respective PPMED (Policy Planning Monitoring Evaluation Departments)
- The Regions – RPCU (Regional Planning Coordinating Units) and
- The Districts – DPCU (District Planning Coordinating Units).

The financial position of the country compelled her to access the HIPC II Initiative (Dept Reduction and Forgiveness) of the IMF in 2001. This has obligated her to come out with a poverty reduction strategy.

Therefore the thrust of the country's development plans would be shaped and directed by this strategy. In pursuance of this, the NDPC is coming out presently with a working document dubbed GPRS (Ghana Poverty Reduction Strategy). Poverty is now recognized as multi-dimensional with complex interactive and causal relationships between the dimensions. For purposes of the GPRS, Poverty is defined as unacceptable physiological and social deprivation. This may be caused or exacerbated by.

- The lack of capacity of the poor to influence social processes, public policy choices and market opportunities.

- Exposure to shocks due to limited use of technology to stem effects of droughts, floods, any warms, crop pests, crop diseases and environmental degradation among many other significant factors.

The GPRS aims to achieve significant poverty reduction and wealth creation by policy initiatives and interventions in the following five (5) key sectors

- The Macro Economy
- Production and Employment
- Human Resource Development
- Vulnerability and Exclusion
- Governance.

Once the GPRS becomes a working document, all planning units are obliged to be guided in formulating their individual programmes by it. The NDPC would then collate and coordinate the various programmes for effective implementation.

The problems facing Rural and Urban Development would be enumerated on to show the need for accurate and extensive spatial information as input into measures needed for their mitigation.

2. RURAL DEVELOPMENT

The long term goal for rural development has been to reduce disparities in income and standards of living between the rural and urban populations. This was to be achieved by creating opportunities in rural areas for enhanced sustainable livelihood and equity in investment. There has been an improvement in the provision of certain amenities over the period. The percentage of the rural population with access to electricity has risen from 8.7% in 1992 to 17.6% in 1999. The supply of potable water has improved. Indeed the general rural infrastructure has seen some improvement. What remains questionable is whether access to such facilities has necessarily improved. There are indications that the availability of electricity in rural communities does not necessarily translate into increased household use. Significantly the Ghana Living Standards Survey (GLSS) and other surveys have reported that consultation by the sick of qualified health personnel has declined despite quantitative and qualitative improvements in service provision. Some newly constructed markets are also left unused. Among the reasons given in some instances for this state of affairs is the poor sitting (Spatial) of such facilities.

3. URBAN DEVELOPMENT

A major problem facing Ghana's development has been the increasing pace of urbanisation unaccompanied by sound urban development and management practices. The planned development of settlements has further been inhibited by failure to produce a national urbanisation policy to guide settlement development.

Polices on environment have had little effect. Environmental sanitation and lack of capacity to deal with solid and liquid waste has shown little signs of improvement. Flooding erosion and siltation of drains remain a major problem. The rezoning of amenity open space and sites for public services for development as residential, commercial or industrial land continues unabated. The promotion of efficient and environmentally friendly settlements continues to be constrained by poor planning and by land tenure systems. The latter limit access to land and provision of contiguous development. Despite policies to the contrary, the physical environment of large and medium sized towns like Tamale, Kumasi, Cape Coast, and Accra continues to be chaotic, unhealthy and inefficient.

From the above, it is clear that a comprehensive rural and urban renewal is needed. One cannot solve problems of environment, planned development of settlements, land management etc without accurate spatial information. Indeed spatial information is sine qua non for any solutions to these problems.

4. GIS AS PART OF THE SOLUTION

One of the main purposes of a GIS is to find answers to questions using both geographic (spatial) and tabular (attribute) data. The questions asked of such a system range from the very simple to the complex. GIS excel in providing tools that can be used to solve problems that require sophisticated spatial analysis.

Since agriculture is the bedrock of the Ghanaian economy and hence very critical to her development, I would use that as a case study into how GIS could aid in efficient allocation of resources. For agriculture the most important goal is to create the highest possible yielding crop, with minimal distraction to surrounding systems.

Plant pathology, soil composition, herbicides, pesticides, climate, temperature and irrigation are just a few agronomic items involved in data collection and decision support. A GIS developed with such data would give planners and in extension, farmers a better method to map areas, integrate a wealth of agriculture data and analyse the results to see where, when and how pesticides, fertilizers and other variables can managed.

Instead of using one type of fertilizer or pesticide throughout a farm, the best fertilizer and pesticide can be applied to the right area of a farm at a varying rate and in precise amounts. The planner can also map and analyse soil content for better crop production.

For much of the farmland, soil composition may differ dramatically within short distances. Soil composition largely determines what type of tree to plant and what fertilizer and pesticides to use.

The ideal GIS proposal for Ghana should be diffused and bottom-up. Meaning the DPCUs ought to establish their systems, which must be, designed to have common interfaces with other systems.

The NDPC would naturally be the coordinator and should guide the DPCUs in data structuring, the media used for the transfer of files, among other factors. More important, Arc GIS Data models should be developed. The purpose of which is to create standard "templates" and documentation for how a series of generic geographic data types should be modelled in a geodatabase.

- This will facilitate interoperability of data sets between users
- Simplify GIS system implementation
- Simplify GIS data sharing.

5. PRESENT GIS DEVELOPMENT IN GHANA

These are some of the organisations presently engaged in some form of GIS system development

- EPA (Environmental protection Agency) basically utilizing GIS in tracking, Monitoring and analysing environment degradation and finding credible solutions to such problems.
- Forestry Commission/Forestry Research Institute-Using GIS to take stock of forest cover, exploitation of the resource and efforts at replenishing the tree stock.
- University of Ghana/Geography Dept, Remote Sensing Unit. This is a major Facility and it is engaged in a variety of applications. Provides services to other departments of state and the private sector.
- K.N.U.S.T/Engineering Dept-Another facility basically being used for training GIS practitioners.

6. MAPPING ORGANISATIONS

There are presently at least four (4) fully-fledged privately owned mapping organisations in the country. They are capable of producing orthophotomaps, line maps, thematic maps, topographic maps etc. some have their own aircraft and facilities for aerial photography. These companies, a host of smaller firms engaged in surveying services and the National Survey Organisation, the Survey Department of Ghana with offices across the length and breath of the country are certainly capable of providing the necessary spatial information required for any kind of GIS system development.

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