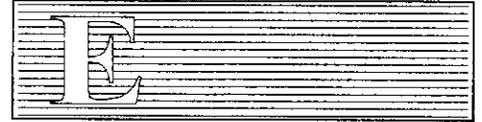




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**DEVELOPING A NATIONAL FRAMEWORK FOR  
GEO-SPATIAL INFORMATION IN GHANA**

Developing a National Framework for Geo-Spatial Information in Ghana

First Meeting of the Committee on Development Information  
United Nations Regional Cartographic conference for Africa  
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## **Developing A National Framework for Geo-Spatial Information in Ghana**

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# Developing a National Framework for Geo-Spatial Information in Ghana

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## **Introduction**

In Ghana, over the years considerable amount of valuable environmental information (geo-spatial information included) have been collected in various forms and in different depths by government ministries, departments and agencies. A distributing feature of the availability of this information, is the lack of general awareness of the existence of this valuable resource in repository agencies. Where they are known to exist, they are poorly stored or scattered in various places and mostly out of date. This is due to the fact that there is no systematic collation and arrangement of the information on a continuous basis in a well classified and structured form to make it accessible, easy and convenient to use. The information is, therefore, not readily available and a lot of time is spent in the collection of already existing data. Also due to the general economic decline experienced in the recent past, most data gathering institutions lack the basis facilities for efficient operation.

This weakness of the state of natural resource information was recognised in a report by a Land Use Planning Committee set up by the Ministry of Lands and Natural Resources in October 1978 (MLNR, May 1979). The report called for the classification and storage in a readily accessible form in a central depository or in a number of clearly identified centres.

The report also called for the setting of databases and identification of focal points to be linked together with a national information network. Since the publication of this report, efforts have been made to coordinate activities relating to different types of natural resource information.

This dream is now in the process of being realised. The development of a national framework for geo-spatial framework can be traced over a twenty year period, which can

categorised into three phases of development: pre-development, development and post development phases.

## **Pre-development Phase**

The pre-development phase can be traced to the early 1980s. It covers the decade 1980-1990 which was characterised by awareness creation of the potential of environmental information system (EIS) technologies.

In 1980 a National Remote Sensing Committee was established as part of the African Remote Sensing Council (ARSC) which Ghana ratified and signed in March 1980 to become the 18<sup>th</sup> member. The committee was made of twelve members. Its main objective was to create awareness on the potential use of remote sensing in development by drawing of government attention to the need for the use of remote sensing products in natural resource and environmental management. Many of the core agencies involved in EIS activities were involved today were represented on the committee. These early efforts did not achieve much due to the general economic decline which affected institutions that gather and process data.

In 1986 the University of Ghana initiated efforts to established a remote sensing unit. In 1988, the Environmental Protection Council (EPC) now the Environmental Protection Agency (EPA) initiated an attempt to establish a directory of environmental organisations whose statutory functions or activities relate to aspects of environmental management. This initiative was to enable the EPC exercise its role as the national focal point of the United Nation Environment Program's (UNEP) environmental information referral system INFOTERRA. The exercise enabled EPC to identify the sources and types of environmental information available in different institutions.

In the same year EPC purchased and installed the first geographic information system (GIS) equipment. The system could not survive on its own, due to the absence of any structure to support it in terms of data servicing and supplies.

In 1988, as part of the preparation of the National Environmental Action Plan (NEAP) for Ghana, the need for information on short and long term effects on the environment was

realised. This was followed by the revival of the National Remote Sensing Committee and holding of two workshops on the status of remote sensing and geographic information systems in 1989. The aims of the workshop was:

- ◆ to promote remote sensing applications in Ghana
- ◆ to provide an evaluative basis for government and donor funding of remote sensing activities.
- ◆ To demonstrate the possibilities for the management of geographic information to be acquired through remote sensing and other surveys.

Also in 1989, as a result of difficulties experienced with access to geo-spatial information in updating the structural plan of the Accra metropolitan area, attempts were made to establish a joint-user spatial database unit as part of an Accra Planning and Development Programme with assistance from the United Nations Development Programme (UNDP) and United Nations Centre for Human Settlements (HABITAT)

The NEAP preparation provided an opportunity for a more coherent framework on environmental and resource management information. The NEAP identified land degradation as the critical environmental problem, therefore land information availability was deemed a priority. In 1991 when the NEAP was finalised for Ghana, a National Environmental Information System (NEIS) was proposed to rectify the deficiencies on the state of environmental information.

The function of the NEIS is:

- ◆ to provide an information referral service on a wider range of environmental subjects;
- ◆ to service as a readily accessible archive of homogenous datasets on environmental quality;
- ◆ to provide organised data and information on the state of the environment and to serve as information support for development planning;
- ◆ to provide a means for early warning and evaluating the impact of activities and environmental initiatives;
- ◆ to provide inputs for environmental education programmes;

## Development Phase

Since land information was to play an important part in the solution of Ghana's environmental problems, there was the need to determine information on environment,

### Requirements in tackling the problem

A workshop on Land Information Requirements for Land Use Planning was organised in 1991, with the aim of:

- ◆ Determining the exact purpose for which information will be collected, how and by whom it will be effectively be used;
- ◆ Establishing clear guidelines for the information products (content, nomenclature, scale, presentation and accessibility of land use information);
- ◆ Defining the parts to be played by the various partners, including economic, institutional and management aspects;
- ◆ Suggesting a mechanism for the co-ordination of partners.

All potential producers and users of environment related information were invited. A total of 30 organisations were represented. The workshop noted that the demand for land use information far exceeded the supply of information and recommended among others that:

- ◆ a technical committee of users and suppliers be set up to prepare specification of maps;
- ◆ the capabilities of the institutions to be strengthened;
- ◆ certain particular institutions play leading roles;

The workshop recommendations led to the design of the environmental information system development (EISD), a subcomponent of the Environmental Resource Management System (ERMS) component of the Ghana Environmental Resource Management Project (GERMP) a five year project to implement the NEAP which started in 1993.

The focus of the EISD was on strengthening institutions involved in the collection, processing and analysis of environmental information. The EISD was aimed at the creation of core data sets for environmental planning. These involve:

- ◆ Development of topographic base which involves the improvement of existing capacity for map production and establishment of digital mapping capabilities. A digital topographic base to provide the basic spatial framework for other project activities and geo-referencing of satellite imagery and provide information on slope, and elevation as well as information on human settlements;
- ◆ Production of digital and paper copy maps of current land use for the whole country at 1:250,000 from satellite imagery.
- ◆ Production of digital and paper copy maps of soil and land suitability at 1:250,000 from existing soil maps and development of a data base of agronomic suitability indices for selected crops at various levels of management and inputs. Suitability maps were to be produced at a scale equivalent to 1:1,000,000 for major land utilisation types.
- ◆ Production of a computerised data base of climatological records for 100 year period since 1898 and data analysis for land suitability mapping;
- ◆ Production of indicative land ownership maps for the whole country according to broad categories at a scale equivalent to 1:250,000 in digital and paper formats.

### **Approach to EIS Development**

A network or distributed model of EIS development was adopted, dictated by the need to strengthen information management capabilities of the institutions involved. The network approach of task sharing among suppliers and users has been found to be successful in a number of ways. It is built on the collective strength of partner agencies to overcome individual limitations. The approach also ensured a large volume of compatible national level data was available to network partners and other users in a short time. The network operates through a forum, the Land Information Project Operations Committee (LIPOC) of six members.

A number of workshops, three in number has been held to help fashion out the main features of the framework. The first was held in March 1995 on database specifications. The aim of the workshop was to provide a forum for discussion on technical issues to build consensus for guidelines and modalities for EIS database specification and implementation in Ghana. 50 participants from 23 organisations attended. Scope of issues covered included:

- ◆ Data gathering and processing procedures in data gathering agencies,
- ◆ User information needs, gaps and possible overlaps,
- ◆ Database development objectives and formulation of conceptual model;
- ◆ Adoption of common geographic framework of reference
- ◆ Adoption of common database architecture for graphic and non-graphic data;
- ◆ Adoption of standard data exchange formats
- ◆ Development of institutional network and coordination mechanism.

Some of the important outcomes of the workshop was agreement to develop the core datasets in an agreed pilot area and the need to expand the LIPOC forum to non-members. This was followed by a second workshop in 1996 under the theme “Harmonised Environmental Data for National Development”.

The objectives were:

- ◆ Review progress of EIS development activities under GERMP
- ◆ Discussion of a harmonised framework for the use of environmental datasets
- ◆ Exposure of policy-makers and technical personnel to potential use of available environmental data.

During the workshop, a draft general framework agreement for data copyright, data access and release was presented. This involved discussion of legal issues of digital data covering ownership, copyright and a pricing. A proposal on institutional framework for geo-spatial information was presented.

## **Experiences and Lessons**

During the 1996 workshop, it was obvious that significant progress had been made since project start-up and many important lessons have been learnt. The focus of EIS development was to address the problem of availability of spatial data and to establish the necessary institutional framework to facilitate the flow of data. Ghana recognised very early that EIS development would be successful if institutions work together. The early experience showed that the optimal approach has to recognise lead institutions in the production and management of relevant geo-spatial information. It aimed at strengthening institutions involved in the collection, processing and analysis to produce information in their areas of competence. The development of requisite databases build on recognised institutional mandates and harmonisation of datasets, validated by the mandated institution as internally consistent.

During the second phase of geo-spatial information framework development, early issues discussed by the network, centred on technical matters like database specification. Progress was slow from the beginning as it was characterised by lack of understanding of technical issues, administrative bottlenecks and slow decision-making process at senior management level.

As work progressed, about late 1996, there was a shift in issues discussed with more emphasis on integration and harmonisation of datasets. This was due to the choice of a pilot area by the network members as a case study. This helped to determine problems that would be encountered in the integration of the different datasets. With the success of the pilot effort, there were discussions also on applications and promotion of the potential uses of the datasets to create demand for the products. The focus shifted to institutional issues and the situation after end of project.

The effort was not without problems. An important problem has been institutional arrangement. Institutional issues include lack of clear understanding, commitment, lack of proper perception of the capabilities of information technologies. Relations between different sectoral institutions in terms of distrust and suspicion of taking over another institution's mandate have been real.

Other issues include the expansion of the network to include non-members, data access and sharing conditions and procedures, copyright, cost-recovery and coordination mechanisms. The absence of in-county technical service support from the private sector was also a problem in the initial stages of the second phase.

The problems were solved through continuous dialogue offered by the presence of a forum – LIPOC. The availability of a driving force – EPA as an coordinator and honest broker was helpful. Coordination has been an important vehicle in this wise.

### **Post Development Phase**

To ensure that the successes achieved are sustained, the identified problems especially the institutional issue has to be addressed. This is being done through the development of a National Framework for Geo-spatial Information Management (NAFGIM) which will formalize cooperation and collaboration among information suppliers and users. It will promote the use of a digital spatial framework for data collection and use in the country. A workshop was organised in November, 1997 to serve as platform for participants to understand and appreciate the full import of the NAFGIM. The formalisation of the framework to be known as National Framework for Geo-spatial Information Management (NAFGIM) was agreed upon, with the following objectives:

- ◆ To provide the framework for the development of geographically referenced databases in Ghana;
- ◆ To establish and promote standardised geographic data protocols and database formats to support national development;
- ◆ To provide a framework for geo-referencing non-spatial data;
- ◆ To facilitate access to data on cost recovery and sustainable basis; and
- ◆ To provide a consistent and harmonised framework for the exchange of geo-referenced data.

In the longer term, NAFGIM is expected to evolve into an independent body with a permanent secretariat.

## **Structure of NAFGIM**

To ensure that EIS development is anchored in a national consensus, and has the support and approval of the highest levels of decision makers, NAFGIM has been structured to comprise five divisions as follows:

### **(i) National Geo-spatial Advisory Committee**

The principal role of the Advisory Committee is to advise Government on issues related to the development of geo-spatial information required for national development. The Committee is expected to function at the highest level possible in order to be able to provide political leadership and authority for NAFGIM. The Committee will also serve as the interface between geo-spatial information practitioners and the government.

### **(ii) Geo-spatial Information Forum**

The Forum will constitute a loose configuration of data users and producers which will coordinate the development of geo-spatial information and the establishment of mechanisms for the harmonised exchange of inter-sectoral information. The operation of the Forum is expected to promote the use of information in decision-making, planning and management in Ghana.

### **(iii) Geo-spatial Workgroups**

The various data themes of NAFGIM are grouped into four categories:

**Base Cartographic**

**Thematic**

**Socio-economic**

**Applications**

The workgroups will co-ordinate the themes and also have the responsibility of determining the technical details, such as the standards and compatibility of data processing and reporting systems.

#### (iv) Geo-spatial Data Centres

The institutions that have the mandates for the collection, processing and maintenance of data and information related to the environment constitute a network of geo-spatial centres. These centres will ensure the maintenance of a record of the location of the official data. They will initiate the development of appropriate data release policies and the publication of technical and management reports in their areas of competence.

#### (v) National Geo-spatial Information Secretariat

The Secretariat which is designed to be independent will serve as the primary contact point for geo-spatial information community members. It will seek to enhance the availability and open exchange of geo-spatial data and to facilitate accessibility to compatible and coherent national datasets. The secretariat will also service the Advisory committee and the Forum, and facilitate the development of policies, guidelines and procedures to ensure the harmonisation of geo-spatial data sets.

### Conclusion

This structure is about to be put in place with assistance from a project Natural Resource Management Project (NRMP). When the structure is firmly in place it would ensure geo-spatial information and can be readily available for the development of Ghana.

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