Development of GIS Environmental Information Systems in Nigerian Forestry and Water Resources

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Introduction

Two Nigerian projects are described, illustrating the use of ArcView/GIS, analysis for the management of environmental databases in Nigeria. The first involved development of a forest information system (FIS). This study was undertaken by Geomatics Nigeria Limited with GeoSpatial International Inc of Canada and Geomatics International GmbH of Germany. It was funded by the African Development Bank and under the supervision of the Nigerian Federal Department of Forestry. The second is development of a HydroMapping Information System (HMIS) for water resources. It is being undertaken by Geomatics and GeoSpatial and is funded and supervised by the Nigerian Federal Ministry of Water Resources.

Although both studies involved similar map layers, data tables, and outputs, a period of three years elapsed between them, resulting in substantial improvements and simplification of the GIS and database programming.

Forest Information System (FIS)

The FIS is a national repository for forestry information. It allows input of spacial and tabular data for all of the country's forest reserves as well as supplemental maps and information such as vegetation types, land uses, demography, geology, ecozones, etc. The FIS is run on a networked PC with Windows NT, ArcView 3.1, Oracle and Powerbuilder software. The themes and tools panels allow selection of maps and tables for data entry, editing and analysis or output. Users can browse the data, analyze and produce reports. Outputs from the system include a variety of maps, tables and reports, plans for field work and forest management, and models of productivity under differing treatments. Maps and tables can be produced at a variety of resolutions up to the 1:150,000 satellite images and 1:250,000 land use and vegetation maps, which were originally used for image analysis and data input.

HydroMapping Information System (HMIS)

The HMIS is a repository for surface and ground water resource information, as well as data on engineered systems, boreholes, and supplemental information and maps. Being 3 years later, it benefits from updates in hardware and software technology. It runs on a PC with Windows 2000, ArcGIS 8.1 and MS Access 2000 software. This has proven easier to learn and operate than the earlier FIS, as well as having better spatial-tabular integration. Data input is via a series of Access templates, requiring only minimal computer knowledge for use. Inputs include hydrological and hydrogeological physical and chemical data, meteorology, demography, geological, and supplemental information. Modelling includes water recharge, reservoir depletion, contamination and geological features. Outputs include maps, tables and reports of borehole locations and water data, surface waters, contamination, saline intrusion, water table isobars, likely

areas for good water production or depletion, population-water resource needs or supplies and a variety of supplemental maps and tables.

Conclusions

GIS has proven an easy to use and comprehensive tool for the storage of data, analysis, production of maps and reports, data modeling and information querying related to forest and water resource data on a country-wide basis for Nigeria.