DEVELOPMENT OF A GEOSPATIAL METADATA STANDARD FOR HYDROLOGIC INFORMATION FOR NIGERIA

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ABSTRACT

The study identified relevant hydrologic spatial objects, adapted a conceptual data model for the identified objects, and designed a prototype metadata structure for hydrologic information. It also used the prototype hydrologic metadata structure to harvest metadata information using a metadata harvesting software. This was with a view to providing a metadata structure that can be used to store and manage information about hydrologic data in Nigeria, so that interoperability of information within the community can be enhanced.

Hydrologic spatial objects and their associated thematic information, together with hydrologic observation data types were identified using hydrological maps and yearbooks, and topographic maps. By adapting and modifying the structure and conventions of the Formal Data Structure (FDS), the spatial objects and data types were used to design a hydrologic data model, using a combination of vector representation and Entity-Relationship (ER) diagram. The objects were mapped into line, point and area objects based on their geometric characteristics. Each of the objects belongs to a thematic class depending on its attributes. The Draft International Standard Organisation ISO/DIS 19115 of the International Standard Organisation (ISO) was examined and elements suitable for Nigerian hydrologic community were adapted for the design of a prototype hydrologic metadata structure. Workability of the hydrologic metadata structure was assessed using the hydrologic data model to build a sample hydrologic database. ArcView GIS

and Microsoft Access were used to build the database, while ENRAEMED was used to implement the structure.

The study revealed typical hydrologic spatial objects (such as rivers, lakes and river gauging stations) together with their attribute information, as well as hydrologic observation data types adaptable as a hydrologic community's objects and data types. The study designed a hydrologic data model that was used to capture hydrologic datasets. It also designed a prototype metadata structure using the ISO 19115 Metadata Standard. The structure consists of total of 25 core elements – 11 mandatory elements, 14 conditional elements and 10 optional elements. The workability of the hydrologic data model and the hydrologic metadata structure were reflected in the ability of the system to answer "queries" posed to extract specific information from the database. The system responded to typical spatial and attributes "queries" such as interactive spatial selection, selection of spatial objects using topologic relationship and selection of thematic information by attribute conditions. Also, the tests carried out on the hydrologic metadata structure retrieved typical metadata information such as dataset identification, description, usage, status, quality and access. These metadata search "queries" were made to access and assess the data residing in the database.

The study concluded by providing a metadata structure that could be used to store and manage hydrologic information in Nigeria so that interoperability of information within the community can be enhanced. It also provided a hydrologic data model that could be used to capture hydrologic data into the geo-database.