Ethiopian Natural Resources and Environmental Meta-Database (ENRAEMED)

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SUMMARY

Information processed for some other purpose exists some where in some form. But most of the time the where about, the type, quality, content and form of information are not known by users and information seekers. As a result it became evident that information most of the time becomes unavailable for planners and decision makers or even if available not at the right time. Moreover, there is a duplication of effort in view of trying to avail desired information. Generally finding and retrieving appropriate and up-to-date information is a major problem hampering decision-making.

The then Ministry of Natural Resources Development and Environmental Protection (MNRD&EP) expressed an urgent need to make existing information on the nations natural resources and the environment more accessible to potential users.

The nation-wide scope of the meta-database was emphasized right from the start by establishing a partnership of seven major federal institutions concerned with the collection, storage and dissemination of natural resources and environmental information, and by involving Regional States on a pilot basis as well.

A number of key steps were taken to address the concerns and facilitate smooth business operations. These are: Identifying and listing of stakeholders, Selection of key stakeholders, Developing and agreeing on Memorandum of Understanding (MoU), Forming the Organization Development Advisory Committee (ODAC), Forming the Technical Working Group (TWG), Forming the Internal Working Groups (IWG), Final agreement on data access and security policy.

In line with the above steps ENRAEMED is developed (in house developed software) based on review of internationally recognized metadata standards like the FGDC's, CSDGM and ANZELIC. The software has Metadata collector, administrator, explorer, and Meta-database website. Currently more than three thousand five hundred metadata on water, geology, GIS/RS digital files etc and related dataset have been described and hosted on website.

Presently the software ENRAEMED is adopted by UN-WATER Africa project/AWICH program. The ECA will promote the use of ENRAEMED in its member states. For the project and NEMC it is convenient to have the central server, located on the ECA premises in Addis Ababa, within reach. The project cooperated with the ECA technical staff to set up the website and get it up and running.

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1. BACKGROUND

In 1994, the Ministry of Natural Resources Development and Environmental Protection (MNRD&EP) of Ethiopia expressed the need for improving access to information on natural resources and the environment in the country. Information was considered to be a key factor for success in developing the nation's natural resources. It was felt that very little was known on what data were available and where they were stored, but there was general consensus that the amount of existing data would be large.

The option of building a natural resources and environmental database, covering the whole country, was considered but found unrealistic. This would be a huge long-term undertaking, which would not be able to satisfy information needs within the foreseeable future. Therefore, it was proposed to establish a ***meta***data base, which would not contain real data but ***references to the sources of data*** (reports, books, maps, satellite images, aerial photographs, etc.). This metadata base would cover the data collections of major institutions at federal and regional level concerned with the storage and dissemination of natural resources and environmental information. Through the metadata base, access to this kind of information would be facilitated nation-wide, leaving the data under the custody of the institutions where they are.

In 1997, the MNRD&EP was dissolved and split into the Ministry of Water Resources (MoWR) and the Environmental Protection Authority (EPA). These were established next to the already existing Ministry of Agriculture (MoA). Part of the staff of MNRD&EP and part of its data collections were transferred to the MoA. In the new situation, which had emerged, the organizational set-up of the ESP had to be redesigned. It was decided that the MoWR would be the contract party for DHV to carry out the whole ESP under the Grant Agreement between the Dutch and the Ethiopian government. Thus metadata base activity was conceived as Component one of the ESP for Strengthening of the Natural Resources and Environmental Information Management in Ethiopia.

2. OBJECTIVES

The objectives of the meta-database are to make natural resources and environmental information in Ethiopia more accessible to users. By making information more accessible, the overall objective is to improve planning and decision-making for the development of natural resources in the country. Furthermore, it helps generating the full benefits of investment in information and contributing to good governance by making information transparent to the public.

Its operation involves two aspects **Technical** and **Institutional**. The technical refers to the programming, testing and installation of the meta-database software and the institutional refers to the human resources and organization to use, promote and monitor the software

3. BENEFITS

It helps to advertise data, to render better services to the public, to bring investment into their data, to better manage and retrieval of own data, avoid duplication in data gathering and dissemination, to analyze information gap, improve information policy, preserve knowledge about data, protection of data and online exchange of data are some of the benefits of the metadata base.

4. APPROACH AND ACCOMPLISHMENTS

The processes and the operational results can be summarized as identifying and forming a partnership of metadata producing institutions, based on voluntary participation and commitment, creating an enabling environment for the development and implementation of the metadata base, and on the issues of ensuring the sustainability of the metadata activities beyond the lifetime of the project.

4.1 Forming a partnership

A practical reason to form a partnership is that no single institution covers all natural resources and environmental information. So, one has to form a group of institutions to cover the bulk of that information. The project, therefore, has sought and found the cooperation of seven major federal institutions involved in the generation, storage and dissemination of natural resources and environmental data. These were:

- The Ministry of Water Resources (the host) for water,
- The Ministry of Agriculture for land, forest, vegetation, crops and livestock
- The Geological Survey of Ethiopia for minerals and stones
- The National Meteorological Services Agency for climate
- The Environmental Protection Authority for environmental data
- The Ethiopian Mapping Authority for geo-spatial data (maps, satellite images, etc.)
- The Ethiopian Science and Technology Commission, which is a multi-sector institution covering all natural resources from a specific technology development point of view.

The above group of institutions covers a substantial part of the relevant information in Ethiopia and includes all resource types, i.e. both geo-spatial and bibliographic data. The project realized, however, there are other important institutions eligible to participate.

A firm ambition of the MoWR is also to make the metadata base a nation-wide undertaking by extending the partnership to relevant Bureaus in the Regional States. In the present political-administrative structure of Ethiopia, the Regions play a primary role in development planning and implementation. Access to information is therefore of vital interest to them and the nation.

Partnership was also extended to include two pilot regions: Gambela and SNNPR states. Later, other three more regions: Amhara, Tigray and Oromia were included.

4.2 Datasets of partner institutions

Preliminary data set collections assessment has been made in early 2000 in the partner institutions. These data collections include datasets of different kinds, i.e. bibliographic (books, reports, documents) geo-spatial (maps, satellite images, aerial photographs) and others like design drawings, audio-visuals, etc...

TABLE 1 PRELIMINARY DATA SET COLLECTIONS ASSESSMENT

INSTITUTION	**MOWR**	**MOA**	**ESTC**	**GSE**	**EPA**	**NMSA**	**EMA**
Estimates of Data Sets *	60,000	90,000	49,000	47,000	20,000	130,000	10,000
Priority Data Sets (assumed 10 %)	6,000	9,000	4,900	4,700	2,000	13,000	1,000
No. MD to be created per day per person	4	4	4	4	4	4	4
Estimate of annual working days	200	200	200	200	200	200	200
No. Of MD to be created per year/person	800	800	800	800	800	800	800
Years needed to create MD	7.5	11.3	6.1	5.9	2.5	16.3	1.3

4.3 Participation and commitment

Evidence suggests that an estimated 70% of IT development projects, all over the world, fail for various reasons. One of the main reasons is that the software does not fit the purposes of the users. In that case, automation will remain ineffective and can lead to great losses. The Ministry of Water Resources therefore has made it a point to follow a participatory approach seeking the interest, the commitment and the support of the potential users of the software in Ethiopia. Technically, the software could have been programmed anywhere in the world by a programming team. Instead, the ministry through the project has sought direct contact and involvement of the user community in Ethiopia. Establishing, at an early stage of the project, a Technical Working Group (TWG) and a Metadata base Advisory Committee (MAC) with representatives from the participating institutions.

4.4 Cooperation framework

The Cooperation Framework mentioned above could provide the basis for a Proclamation or Cabinet Order, which would legally formalize the metadata activities in Ethiopia in time to come.

4.4.1 Cooperation between host organization and partners

The metadata base set-up consists of internal metadata bases in each partner institution and a central metadata base, i.e. a clearinghouse for metadata, which will be managed by the metadata base center (WRIMDBC) in the MoWR. The leading principles for the handling of data and metadata have been laid down in the MoU of June 2002 concerning the metadata base Cooperation Framework. These are:

- Custodian institutions are the full owners of the data sets they keep and are free to disseminate them without prejudice to copyright regulations
- Metadata created by custodian institutions are their intellectual and legal property
- Custodian institutions have the exclusive right and duty to maintain their metadata
- Custodian institutions are obliged to transmit their metadata to the WRIMDBC and the latter has the duty to exchange metadata between all partners, so that the complete metadata base would be available to all of them at any time. Exchange will be done by posting metadata on the ENRAEMED website and by periodically distributing metadata on CD through normal mail (this is especially important for Regions where access to the internet may still be difficult)
- The WRIMDBC has the right and duty to evaluate metadata for quality before exchanging them
- Metadata are free of charge, i.e. they will not be sold commercially, and so is the metadata base software.

It is clear from the above regulations that the partner institutions, running an internal metadata base, and the WRIMDBC operating the central metadata base are strongly dependent on each other. Without the cooperation of the partner institutions, the central metadata base would not be populated and the WRIMDBC would be idling and defunct. On the other hand, if the WRIMDBC would not function properly and render the expected services, metadata would not be exchanged and the partners would not benefit from nation-wide access to metadata. They would also not benefit from the technical support of the WRIMDBC in terms of training and troubleshooting.

The MoWR has shown strong commitment to take responsibility for the operation of the central metadata base.

5. WHAT IS ENRAEMED?

ENRAEMED is in-house developed meta-database software based on review of internationally recognized metadata standards like the FGDC's CSDGM and ANZELIC, etc. The word ENRAMED is an Amharic expression "Let us walk together". And this stands for ***E***thiopian ***N***atural ***R***esources ***A***nd ***E***nvironmental ***Me***ta***d***ata base. The design of the program is tailored to local needs and handles both geo-spatial and bibliographic datasets. It has a metadata collector, administrator, explorer, website and library browser.

5.1 The architecture of ENRAEMED

ENRAEMED software is a freeware client/server or stand-alone metadata software collection tool. ENRAEMED will allow you to develop, archive and distribute your metadata according to metadata standards such as ISO, FGDC, Dublin Core and GILS. The backend database is Microsoft SQL Server.

Metadata elements are grouped into standard groupings called metadata schemas. Some of the most widely used metadata schemas include:

- Dublin Core
- CSDGM (Content Standard on Digital Geo-spatial Metadata)
- GILS (Government Information Locator Service)
- MARC21 (Machine Readable Catalogue)
- ISO/TC 211 standard

5.2 Components of ENRAEMED meta-database

- **Metadata Collector**: a form that serves the creation, maintenance, import and export of metadata;
- **Metadata Administrator**: a function that supports the central management of the software and database level operations;
- **Metadata Explorer**: a meta-database browser for CD or PC based users;
- **Meta-Database Website**: (ENRAEMED website that contains information about the software and metadata organization in Ethiopia.

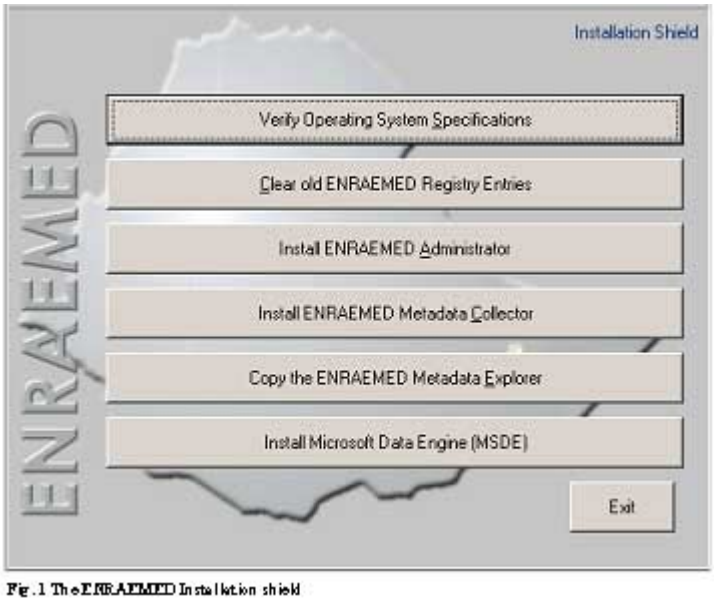
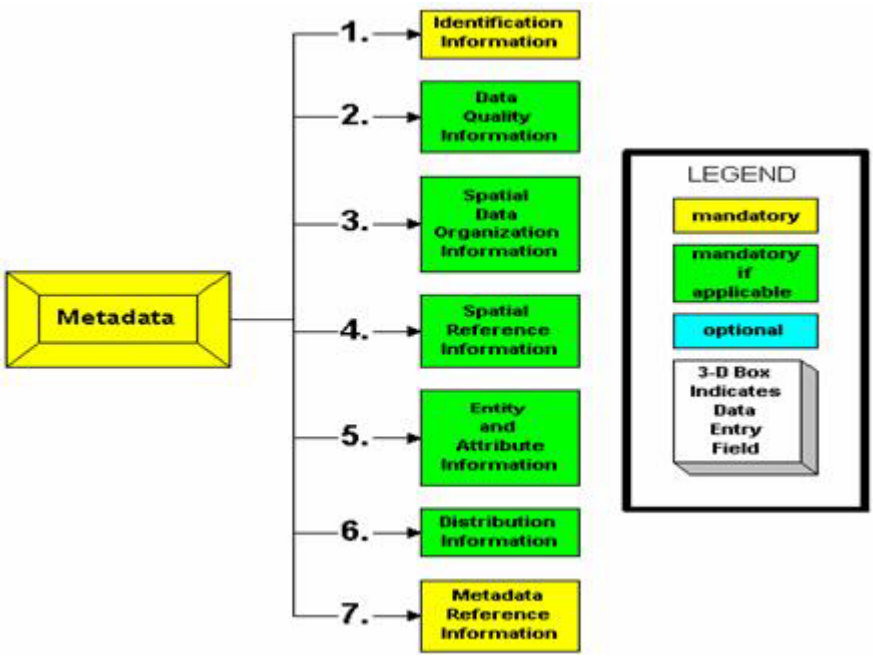


Fig. 1 The ENRAEMED Installation shield

Figure 1 Metadata Base Standard



6. SUPPORT TO METADATA BASE ACTVITITIES

While progressing on the development of the software, eventually it became clear that looking for other forms of cooperation becomes apparent. This refers to the arrangements made with UNECA and UNEP/FGDC.

6.1 Support from UNECA

Another IT-related problem was the design and operation of the searchable metadata website. Unlike a static website for information and advertisement only, this searchable website requires considerable server space and sophisticated software. The Ethiopian Internet Service could provide the required facilities and systems, but at considerable cost. The assistance obtained from ECA/DISD (Economic Commission for Africa / Development Information Services Division) for interim website hosting of metadata, free of charge is of great help for sustainability of the metadata activities. The ECA clearinghouse project offers to member states "country metadata spaces", which includes sufficient server space for metadata records, a website with unrestricted searching and browsing access to the metadata records, administration of the storage server and website and uploading services at no cost. This will greatly enhance the exchange of metadata among African countries. The ECA will promote the use of ENRAEMED in its member states.

The Center cooperated with the ECA technical staff to set up the website and get it up and running. The ECA also agreed to offer assistance in the form of training and workshops to build up website administration capacity in Ethiopia and other member states.

6.2 Support from UNEP/FGDC

The other major concern for the sustainability was the limited IT capacity available in government organizations for the future maintenance and, if necessary, upgrading of the ENRAEMED software. At the moment outsourcing of such kind of activities was needed. It was fortunate to find the UNEP (UN Environment Program) in Nairobi and the FGDC (Federal Geographic Data Committee) of the USA interested to adopt ENRAEMED and undertake its maintenance. An Agreement to that effect has been signed between the MoWR and UNEP. The source code of ENRAEMED has been handed over to the UNEP/FGDC, free of charge, for its perusal. While the FGDC will carry out the future maintenance and upgrading of the ENRAEMED software, the UNEP is involved in disseminating ENRAEMED metadata technology all over the world.

7. PRESENT STATUS

7.1 Nation wide

The potential use of the meta-database depends to a large extent by the quality and coverage of the information made available by partner organizations. Concerning the present status more than 3000 metadata are made available on the website mainly from two of the partner institutions i.e. The Ministry of Water Resources and Geological Survey of Ethiopia. This shows that not all the partners are up to their commitment for various reasons.

Metadata can be found on http:\\www.geoinfo.uneca.org Ethiopian Natural Resources and Environmental Metadata Base. It is also possible to download the software from the address WWW.Enraemed.net

7.2 UNECA

UNECA is currently is using ENRAEMED as a metadata entry tool to populate the clearinghouse nodes that it is at the moment maintaining, and also adopted by UN-WATER Africa project/AWICH program. The ECA will promote the use of ENRAEMED in its member states. For the project and NEMC it is convenient to have the central server, located on the ECA premises in Addis Ababa, within reach. The project cooperated with the ECA technical staff to set up the website and get it up and running.

AWICH is developed with the objective of bringing all African Water Information to one location where all stakeholders including policy makers, researchers, developers, regional as well as international organization to have an easy access on uploading and downloading.

8. PROBLEMS ENCOUNTERED AND PROPOSED SOLUTIONS

The sustainability of the works that have been done and that will be done depends on a number of factors and risks such as making computers available for creation of metadata, assigning permanent metadata processors, availability of incentives for the processors etc. These issues as observed, are to be seen critically as in many partner institutions; few or no computer was assigned, metadata processors are assigned temporarily in addition to their previous tasks.

Besides, custodian institutions have to make all possible efforts to ensure proper data storage and retrieval so that clients can actually and easily obtain datasets when they request them. This includes: Improved library management and digital data management, Ensuring access conditions mentioned in the metadata are regularly updated and enforced, efficient dissemination and distribution procedures of data etc., are maintained. Failing to do so will greatly affect the sustainability of the meta-database activities in the country.

Partnership is important in smoothing and maintaining good relationships and bridging professional gaps between institutions. However, maintaining it is not so easy. This is due to the fact that most institutions think it is a good will just saying yes. In reality the commitment it involves extends to human resources, financial contribution and more.

8.1 Financing of metadata activities

Up until April 2003, the work was financed from project-based arrangement. Since then it is being done under the government permanent budget. However, there is a shortage of finance to travel to the regions and do the required assistance, even making the software in-house to be used, maintenance works and arranging workshops as intended.

8.2 Proposed solutions

The top management of the partner institutions should remain committed to the importance of filling the meta-database. This could be enhanced through addressing the above-mentioned problems.

9. CONCLUSION

From experiences most IT projects are not always successful. It is estimated that about 75% of them fail in some or another way. This is due not only technical complexity but also to institutional and organizational problems, such as lack of commitment and collaboration. Therefore, it is very important to give it due attention.

REFERENCE

DHV Consultants BV in association with DHV Ethiopia plc, '2002' Environmental Support Project, Component1, Volume I-VIII, MoWR , Addis Ababa Ethiopia

BIOGRAPHICAL NOTES

To acquaint myself, I am 39 years old (born in Ethiopia, Arssi, Robe) married, have Postgraduate Diploma (professionals Master) in Rural and Land Ecology survey ITC the Netherlands and B.Sc. degree in Agriculture (Agronomy) from Alemaya University of agriculture

Have more than fifteen years of work experience in integrated development project studies, planning, implementation, monitoring, evaluation, and GIS (geographic Information System), Team Leader for GIS/RS and Metadata Management activities (MoWR), Country Coordinator – Ethiopia Agriculture Sector Support Project, Project Coordinator Lutheran World Federation (LWF) Northern Ethiopia as well, as a consultant in different disciplines.

Regarding Publications the following are some of them

- Survey of land use/land cover and degradation aspects in the Woundany-Mwatate-Msaw area,Taita Taveta District Kenya ITC the Netherlands.
- Co- Writer of different technical and integrated development master plan reports Ministry of Water Resources and associated national as well as international organizations projects.
- Different technical reports for the consultancy service provided

I am also member of different association such as LEM Ethiopia, Plant Sciences Association of Ethiopia, and Environment and Information society of Ethiopia

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