



Best Practices in Environmental Information Management in Africa

The Uganda Case Study

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Foreword

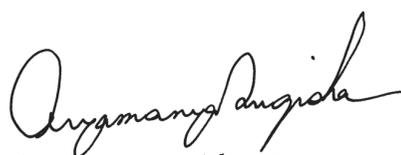
The availability of consistent, up-to-date and relevant environmental information is a pre-requisite for rational and cost-effective decision making processes. Among the efforts undertaken by the Uganda National Environment Management Authority (NEMA) over the past 10 years has been the effective management of environmental information. As early as 1994 it was realized that most institutions in the country needed to collect, update and transform their data into formats that can be used in environmental analysis. The National Environmental Information Center (NEIC) established during the same year played a leading role in laying the foundation for capacity building in the use of tools such as Remote Sensing and Geographical Information Systems (GIS) among government institutions. These tools have greatly enhanced the production of the National State of Environment reports and Environmental Atlases in Uganda.

In the current national legislation, the National Environment Act, Cap 153, 1995 requires that NEMA produces a National State of Environment Report (NSOER) biennially. NEMA has continued to meet this obligation and to date seven reports have been published and disseminated. The same legislation requires that each District produces a District State of Environment Report (DSOER) annually and NEMA has provided guidelines to support this process. The National State of Environment reporting process in Uganda has a wide participation, with most government institutions making significant and valuable contributions.

Recently, NEMA has undertaken to provide support to the Uganda Bureau of Statistics through the Poverty and Environment Project to establish an operational environmental statistical unit. Having as many of the core national datasets managed in a coordinated manner that enables ease of access and compatibility carries the promise of providing the country with opportunities to conduct the required analytical tasks much more efficiently.

It has taken a lot of effort and dedication on the part of all national institutions that collect and use environment related data to reach where we are in promoting informed decision making in environmental management and we hope that other countries can learn from our experience to move forward some of the similar initiatives they have embarked upon. NEMA highly appreciates the technical and financial support from UNEP, World Bank, GRID-Arendal and other stakeholders that have been instrumental in improving the management of environmental information in Uganda.

I hope this publication provides you a snapshot of both the successes achieved and challenges faced in managing environmental data and information in Uganda.



Aryamanya-Mugisha, Henry
Executive Director, NEMA

Introduction

Environmental management in Uganda was first accorded the attention it deserves with the creation of the Ministry of Environment Protection in 1986. Following this, Uganda realized the need to put in place systems and structures to ensure the management of environmental information. The underlying assumption was that good information would lead to better decisions and management practices which would eventually be positively reflected by an enhanced environment and improved quality of life of the people.

The management of environment information involves a number of processes and outputs. These include the collection, organisation, analysis and communication of data, statistics and other qualitative material. The production of environmental information entails the collection and analysis of raw data and their interpretation into forms that can be used for decision making (NEMA 1996). Some of the outputs include assessments and studies and the production of state of the environment reports, environmental outlook reports, statistical compendia, data books, environmental atlases and policy statements by both public and private sector organizations.

Decision makers use this information to assess the condition and trends in the environment, to determine and adjust policy directions and to invest resources for the management of the environment. Environmental information management is therefore essential for decision makers to analyse cause and effect, develop strategies for action, manage natural resources, prevent and control pollution, and evaluate progress towards national, regional and local environmental goals and targets (NEMA 1996).

The critical link between environmental information management and good decision making was recognized

and formalized internationally in 1992 under Principle 10 of the Rio Declaration on Environment and Development which in part states:

“Environmental issues are best handled with the participation of all concerned citizens [...]. At the national level, each individual shall have appropriate access to information concerning the environment [...] and the opportunity to participate in decision making processes [...] Effective access to judicial and administrative proceedings [...] shall be provided.” (UNEP 1992).

A number of countries have followed up on this commitment and signed and ratified the Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters for the European Countries in Aarhus, Denmark on 25 June 1998 (UNECE 1998).

At the national level, article 41 of Uganda’s national Constitution (1995) grants every citizen the right to access information in the possession of the state or its agencies. This is further enshrined in the Access to Information Act (2005) which in article 3 reiterates that public access to information is a matter of good governance. The National Environment Act Cap 153 in articles 85–87 provides for access, management and regular dissemination of environmental information. These principles and commitments confirm that access to environmental information, effective participation in environmental decision making and access to justice provide critical opportunities to the public to influence both their living conditions and the broader environment. Access to environmental information is therefore not only a theoretical achievement or philosophical entitlement, but a practical vehicle for realizing sustainable development (Kiss and Ewing, undated).

Genesis of Environment Information Management in Uganda

The formative stages

The Government of Uganda recognised and institutionalised the concept of access to environmental information well ahead of the Rio Summit of 1992. Government developed a project to establish an Environment Information Centre with support from the United Nations Environment Programme (UNEP) as early as 1987. The idea arose from the need for an up-to-date database that could provide environmental information on demand so as to improve natural resources management and conservation. In 1989, a Users' Needs Assessment was undertaken to specify information and capacity building needs to that end. During the same year, the government with the assistance of UNEP and the World Bank Technical Division, Africa Region (AFTEN), established an information centre – the National Environment Information Centre (NEIC) – within the Ministry of Environment Protection. This was later formalized through a cabinet decision in August 1990 (NEMA 2007).

The mandate of the centre was to provide environmental information to support decision making for development by collaborating with sector institutions. It would do so through the establishment of environment information systems (EIS) described in Box 1.

The NEIC initially focused on the establishment of a dedicated Geographical Information System (GIS) or computerised mapping unit to work with secondary information to produce tailored products to answer contemporary environmental management questions. The centre tried to collect and store all available data in-house. This effort was partly abandoned due to the huge

Box 1. What is an EIS?

An EIS can be conceptualized as an integrated information system within an organizational entity which employs a variety of information technologies and analogue strategies to capture, integrate and provide environment information resources to users. It can be viewed as an intermediary between the national or district level served and the various other information systems or people responsible for delivering and using this information (Kling 2000). The components of an EIS – the information resources, the hardware and software, the natural resources and the people interact with the environment by responding to various information demands and providing support through various outputs. Information from an EIS could be analyzed and presented in a multi-media environment. This adaptability is what makes it suitable for use at all levels of government.

amounts of data involved, but also in recognition of the fact that storing of data belonging to other institutions sowed seeds of 'discord'.

The potential conflict associated with being a repository of data that belongs to other institutions was not the only challenge that faced the infant NEIC. A number of institutions including the then Department of Statistics and the Department of Surveys and Mapping contested NEIC's mandate to generate statistics and maps respectively. Both institutions claimed the sole mandate to generate the two outputs under contest. The above challenges were however, amicably resolved by the admission of both institutions to actively and jointly participate in an Environment Information Network (EIN) with NEIC.

Moving from vagueness to clarity

In view of the initial challenges, and over time, NEIC evolved into an organisation that focussed more on the production, use and dissemination of re-packaged information. The production of four pilot District Environment Profiles between 1991 and 1993 marked the beginning of this process. These were for the districts of Kampala, Iganga, Mbale and Rakai. The NEIC later played a key role in providing information support to the National Environment Action Plan (NEAP) process in 1992. The 1994 National State of the Environment (SOE) report was a major information output of the NEAP process. This report, together with the National Environment Management Policy published in the same year, was instrumental in the passing of the framework law on the environment in 1995 (National Environment Act Cap 153). Indeed the 1994 SOE was constantly referred to by Ugandan legislators as the law was being debated. It has also had other impacts within the wider public (see Box 2).

The NEIC remained a small and technically constrained unit throughout the tenure of the NEAP process. This may have been due to several reasons which were identified by the NEAP (MEP 1994). These included: inadequate institutional mechanisms for the dissemination of information between the data source and potential users; limitations with regard to availability, quality, coherence, standardization and accessibility of data; and lack of a legal framework on access to information, particularly with regard to confidential or proprietary information. The NEAP process thus made a number of recommendations to improve and build on the capacity already developed within NEIC. This included, among others, the sugges-

tion to incorporate NEIC into the information unit of the proposed environmental authority. Prior to that, a review to redefine the role of the NEIC was undertaken in April 1995. NEIC was eventually incorporated into NEMA in July 1995 and the final structure of NEMA was completed by December 1995.

The 1995 review identified a number of elements that were considered crucial for the successful development of a program to integrate EIS into the development process in Uganda. The key elements of this program included the development of:

- an Environment Information Network (EIN) at national and district levels;
- a strategy for integrating environment information into the development planning process; and
- a training program in support of the Environment Information Network at the national and district levels.

The review also assessed the environment information management capacity within 21 different institutions. To differing extents, all the institutions surveyed were found to manage environment information in fulfilment of their mandates. Some of them had functional documentation centres while others even had IT capability. The procedures for data collection were mostly well defined, but those for analysis, processing and archiving differed. Some institutions were not aware of the data holdings in other establishments and this in some cases led to duplication of efforts or poor compatibility between datasets.

As a solution, it was proposed that a national metadata-base be developed. A metadata-base is a database with information on other existing databases. It guides users on what data exists, acquisition dates, formats, geographical coverage, where they are hosted and the access requirements. In late 1995, a metadata tool developed by the UNEP Global Resource Information Database (GRID) was installed and used for this purpose (Martin 1996).

The results of the review were presented to the first National Workshop on Environment Information Networking held in March 1996. Representatives from the 21 institutions surveyed were in attendance. The meeting endorsed the establishment of an Environmental Information Network (EIN) with a clear institutional framework and characteristics (see Box 3). It also endorsed NEMA's role as the network convener.

The workshop further recommended the use of working groups to tackle issues that were considered key to get-

ting the EIN concept up and running. An Expert Working Group (EWG) was established to review the issues identified during the NEAP process as areas of major concern and come up with priority datasets that would support an action plan to address those issues. One of the findings was that although some datasets were critical for particu-

Box 2. Impact of the SOE 1994

With the production of the first SOE in 1994, the document quickly became one of the most anticipated products from NEMA. It has gained a reputation as a report with accurate and scientifically-based information. An evaluation of its impact carried out in 1995 highlighted the following:

- It had raised awareness of citizens to the state of their environment,
- It quickly became a standard reference document for media and private sector work, public awareness and formal educational purposes,
- It provided the factual basis for various development plans, programmes and policy, as well as the retrospective assessment of existing or past government policy,
- It enhanced the profile of NEIC in Africa with some countries like Lesotho and Gambia seeking technical assistance in preparing their own reports,
- It became a 'must-have' document, as indicated by the willingness to pay an equivalent of US\$ 10 for a copy.

Source: NEMA 1995

Box 3. Characteristics of the EIN

- The EIN operates as a network of members with open lines of communication between all and with each member an equal partner.
- Membership is open to all, although the initial emphasis was to ensure involvement of large data producing government agencies and more recently, major data users.
- The network provides a forum for communication on a range of technical, institutional and policy issues relating to the availability, dissemination and use of environmental information.
- NEMA is the secretariat whose key functions include coordinating the activities of the network and budgeting.
- The secretariat is not envisaged as a repository of data i.e. network members which are data producers remain in total control of their own data. Metadata activities enhance access to the data.
- The network builds awareness of information management needs and issues, capacity development, promotion of standards, and elaboration of data release policies by the data producing institutions.

lar work, others constituted core baseline information required for almost all environmental analyses. It was realised that for optimal functionality, there was need to strengthen the core dataset producing institutions. An investment programme funded by the World Bank through the Environment Management Capacity Building Project (1996–2000) was consequently drawn up. It focussed on training, equipment and data capture.

Incorporating decentralisation

The proposed structure for the EIN also had to take note of the governance reforms that were taking place in the country at the time. Through the Decentralisation Statute (of 1993) and later the Local Government Act Cap 243 (of 1997), control of environment management was

localized to promote greater participation in decision making at the lower levels. The NEAP (MEP 1994), in line with these reforms, proposed the decentralization of environment information systems to district level to provide an information mechanism for implementing the action plan. Districts and Local Councils were to effectively become components in a network of local environmental bodies.

The integration of environment management functions within the local authorities allowed NEMA, as the national organisation for environmental policy and regulation, to step back and play a more strategic role in coordinating and monitoring all environmental issues country-wide.

Current institutional arrangements

In light of the above developments, the network architecture was designed to follow a two-tier arrangement, comprised of the horizontal (national) level and the vertical (district) level.

The horizontal Environment Information Network

The horizontal network was made up of the seven departments regarded as being the most common sources of the core datasets as identified in the 1995 review. These are indicated in Table 1. An eighth institution – the Department of Physical Planning – has since been added. The institutions in the horizontal network worked closely with NEMA to build their capacity in environmental planning, data and information presentation and standards development.

The vertical Environment Information Network

The vertical network mirrors the horizontal EIN but is based at the district level. It is made up of the District Environment Officer and a team of district technical officers. There are also downward and upward linkages between NEMA and the lower levels, specifically the sub-county, which is the lowest administrative level or local government. This is in line with the decentralisation policy where districts as basic planning units need to meet their own data requirements, while also contributing to the national-level datasets.

The vertical networking concept was based on the premise that by having an EIN with a supporting information system that links all districts, NEMA would have a cadre of trained personnel capable of adequately supporting the environmental information needs for development, right from the lower planning levels. The District Environment Officer would become a so-called hybrid-manager with a mix of environmental and technical information management skills (Gowa 2001). The opportunity created by this role is that such a person would have a solid understanding of information systems as well as in-depth knowledge of environmental management. These dual roles would bring about greater success in exploiting EIS to the benefit of the environment.

As with the horizontal EIN, the initial phase of the programme took the form of a pilot activity. Seven focus districts were involved; namely Arua, Busia, Kabale, Kasese, Mbale, Mbarara and Tororo. A number of capacity building activities took place including training in GIS and database management, and the provision of equipment. The staff trained included the District Environment Officers and District Planners for each of the pilot districts. The EIN activities were eventually extended to 20 other districts and 2 municipal councils, with these benefiting from the same capacity building activities as the initial seven.

Table 1. Institutions of the horizontal EIN and their data responsibilities

Institution	Data/information provided
Department of Surveys and Mapping	Topographic data and rehabilitation and expansion of the geodetic network
Department of Statistics	Socio-economic data
Ministry of Agriculture, Animal Industry and Fisheries	Farming systems
National Agricultural Research Organisation	Soil data
Department of Meteorology	Climate data and rehabilitation of weather stations
Makerere University Institute of Environment and Natural Resources	Biodiversity data
Department of Forestry (currently National Forest Authority)	Vegetation
Department of Physical Planning	Land use data

Linking the horizontal and vertical EIN

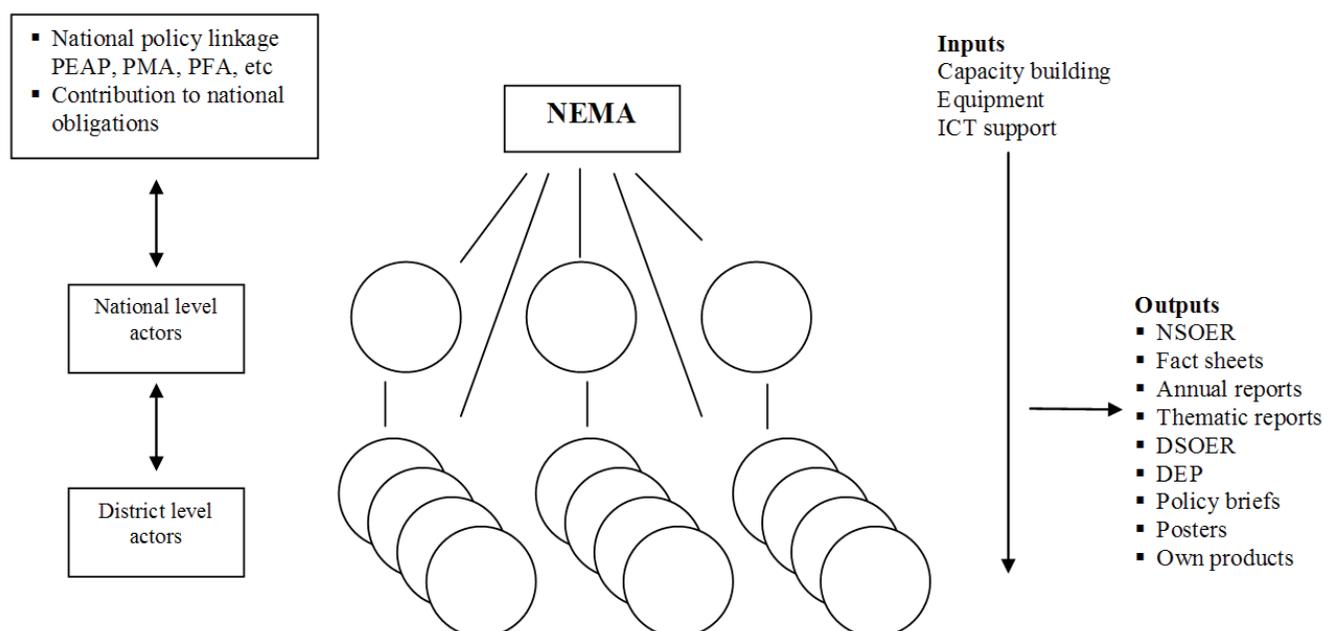
All the EIN activities are carried out within the framework of Uganda's obligations to national development goals and targets. Each node continues providing information support to national priorities such as the Poverty Eradication Action Plan (PEAP), which is Uganda's poverty reduction strategy paper, the National State of the Environment Report (NSOER) and District State of the Environment Report (DSOER) processes. Figure 1 highlights the linkages at the different levels. It also shows the links between the government policies and other environmental information management instruments.

In order to kick start the activities of the network at national level, it was agreed that the 1:250,000 map sheet of Mbale should be revised as a collective pilot activity. Uganda is covered by about 17 map sheets at this scale. The Mbale map sheet, at that time, covered about 12 districts in total – some in their entirety while others only partially. Each participating institution had to digitize the information for the data they hold. After computerisation, district or other lower-level specific information could then be extracted or combined with data from other collaborating institutions for analysis as required. Over time, this was expanded to include the map sheets of Jinja (covering about 10 districts) and Kampala (approximately 4 districts) at the same scale. The number of districts in each map sheet has now changed due to the formation of new districts. To build on the information within those map sheets, the network later worked on updating information of Kumi, Jinja and Luwero



Figure 1. Linkages between the horizontal and vertical environment information network

Adapted from: UNEP/NEMA 2004



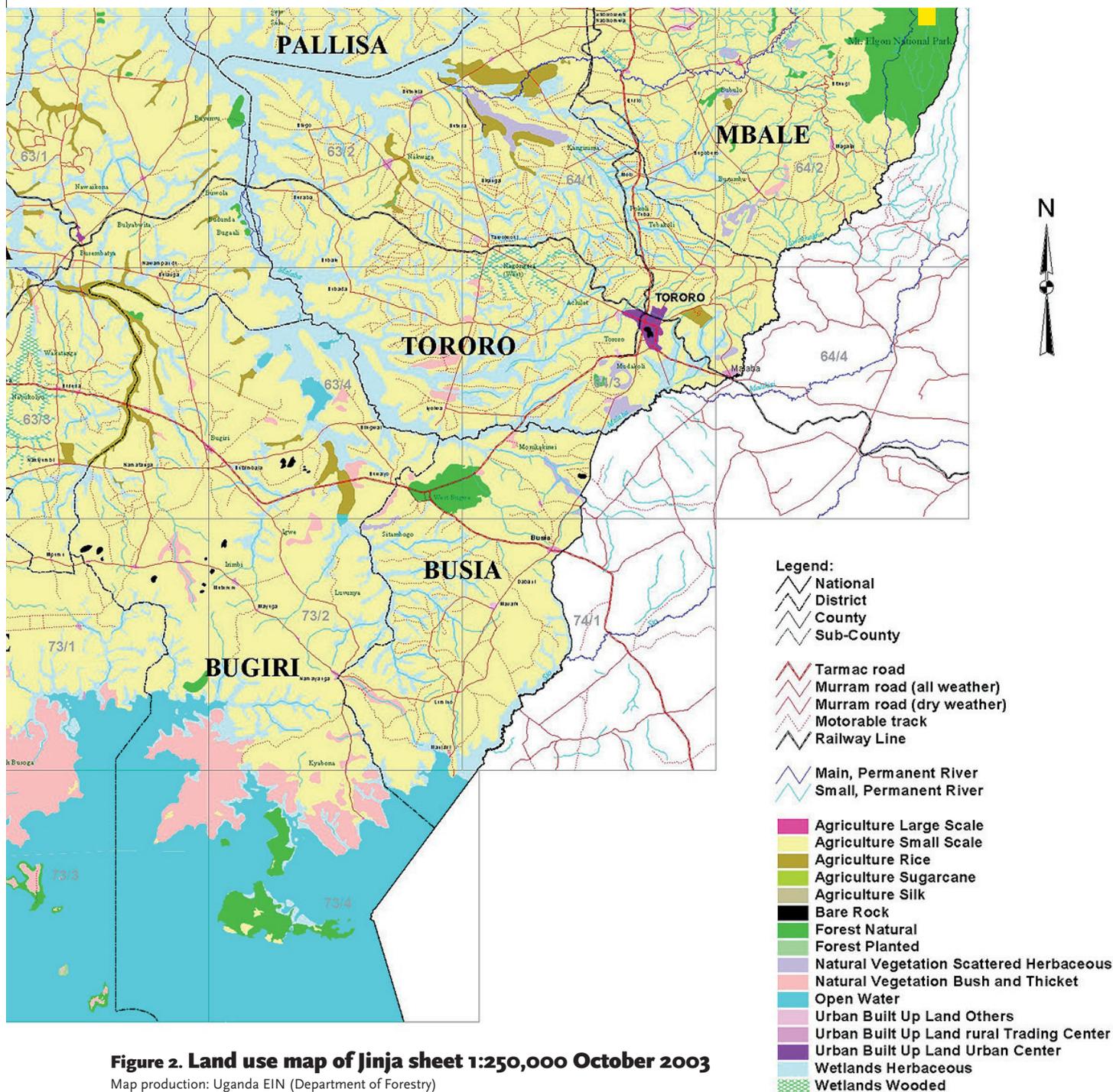


Figure 2. Land use map of Jinja sheet 1:250,000 October 2003
Map production: Uganda EIN (Department of Forestry)

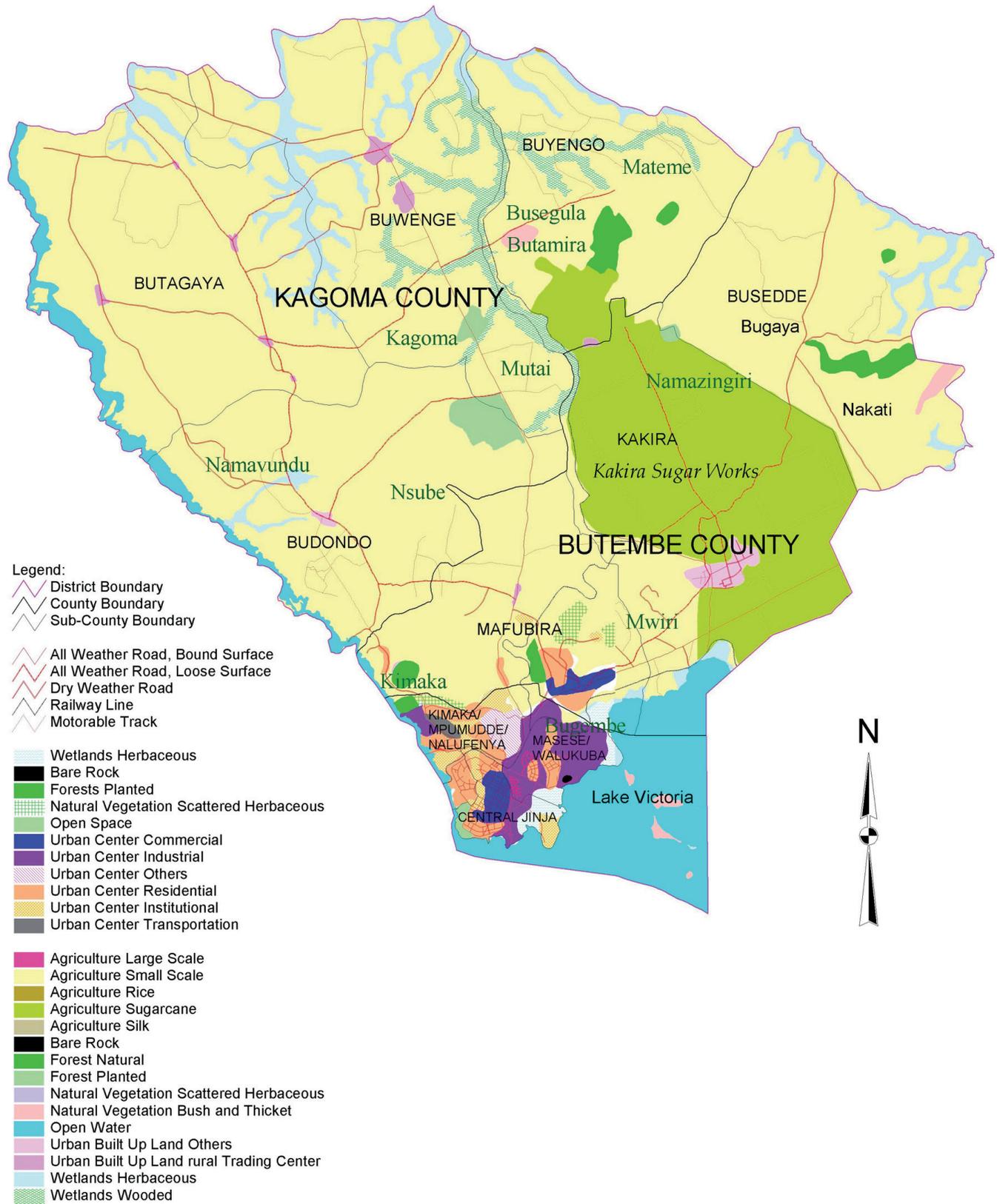
districts at the 1:50,000 scale. Figures 2 and 3 show the land use information for the Jinja map sheet and Jinja district respectively. Agreeing on standards for geo-coding, referencing, file formats, EIS equipment, and data collection methodologies made it easier to exchange data between institutions for analysis at different levels. Other activities undertaken included rehabilitation of weather stations, reconstruction and expansion of the geodetic network and strengthening the use of the Internet.

The horizontal EIN has been relatively successful in addressing technical network issues such as standardisation and sharing of data, but a lot still remains to be done in ensuring networking from an organisational or policy level. In most cases the points of contact for key data sets in certain institutions are individuals, other than organisational units. This creates a problem of continuity. The support of the policy makers is critical in ensuring long-term sustainability of the network. To this end, the EIN,

as a whole, still has a lot to do in bringing this category of people together to enlist their support.

The successes of the horizontal EIN need to be documented, technical guidelines published for reference and products showcased to advertise the network. Additionally, the number of participating institutions needs to be expanded so as to benefit from the different institutional data types. While a scientific evaluation of the impact of the EIN has never been carried out, anecdotal evidence points to a general improvement in the overall management and availability of key environmental datasets and their use in environment management. This is further borne out by the fact that UNEP modelled its Africa-wide EIN along the lines of the Uganda EIN, and by countries like Ethiopia that have adapted the concept to their local situation (UNEP/NEMA/EPA 2005). However, this success is not so evident at the vertical level and this needs attention.

Figure 3. Land use map for Jinja district at 1:50,000 scale January 2004
 Map production: Uganda EIN (Department of Forestry)



Impacts on environmental planning and development

Over the last 18 years, the programme to improve the management of environmental information in Uganda has brought a number of dividends to various planning and development initiatives. This has been through environmental assessment and reporting at different levels, support to the national development processes, the use of remote-sensing technology for decision making, increased access to information including for education and research, better public awareness, and local government planning, among others.

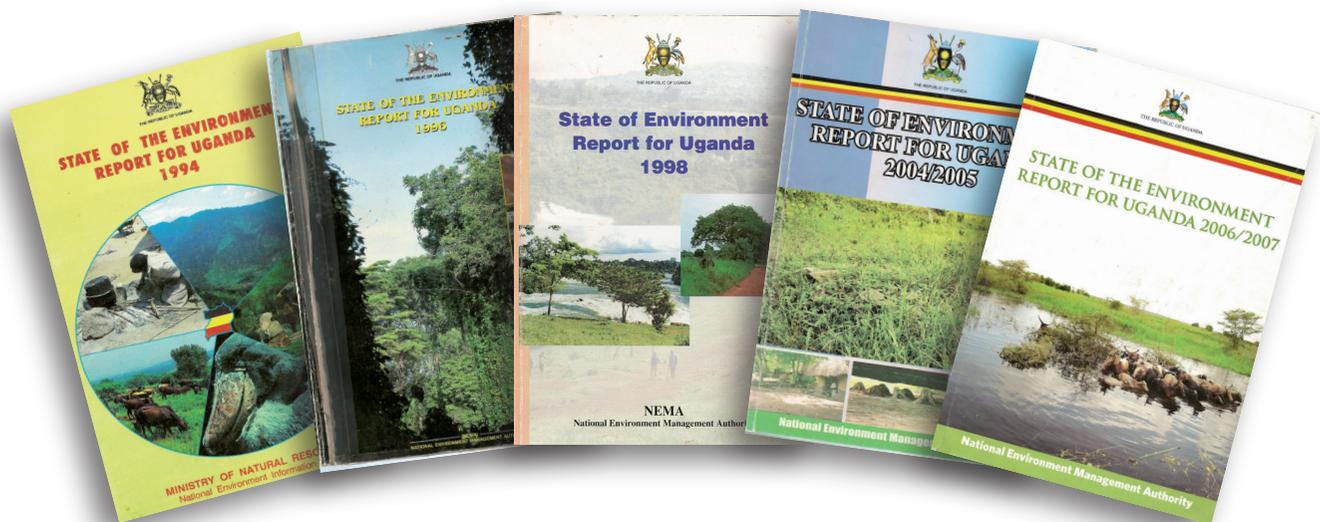
Regular reporting on the environment

Uganda has been using environmental assessment and reporting as a tool to provide information to support development planning, and monitoring of progress towards set targets since 1994. These assessments or State of the Environment (SOE) reports provide an overview of the state of the environment and natural resource base. They explain what is happening, analyse why it is happening and indicate the responses at policy and action levels. The scope varies from the national to lower levels.

The National Environment Act Cap 153 in Section 86 requires that NEMA produce a State of the Environment Report once every 2 years. NEMA has been doing this since 1994 and is able to share this experience with other countries that are publishing SOERs. Indeed the Ugandan experience in producing SOERs has been sought by and provided to the Governments of Eritrea, Lesotho and

Malawi (Turyatunga 1998). NEMA has also been able to provide technical backstopping at a regional level. In 2000, NEMA was appointed one of six African UNEP Collaborating Centres to coordinate processes for environmental reporting. NEMA is in charge of the Eastern Africa sub-region that includes Uganda, Kenya, Ethiopia, Eritrea, Burundi, Rwanda, Djibouti and Somalia. Its role includes coordinating the sub-region's participation in the Global Environment Outlook and Africa Environment Outlook processes. NEMA also coordinated the production of the IGAD Environment Outlook which was published in 2007.

The Environment Act also requires the lead agencies to report annually to NEMA on environmental aspects of their portfolio. NEMA has developed and shared guidelines on sectoral environment reporting with the Lead Agencies. A lead agency is defined as any ministry, department, parastatal, agency, local government system or public officer in which or in whom any law vests functions of control or management of any segment of the environment (GOU 1995). With the exception of the Department of Geological Surveys and Mines, the sectors have so far failed to fulfil this legal requirement. This may be as a result of weak follow-up and enforcement of the legal requirement or attributed to insufficient incentives to compel lead agencies to report. Such incentives could include, among others, reporting formats, indicators, feedback mechanisms, and resources to prepare reports (NEMA 2005).



The failure to report on an annual basis has in a sense had an impact on the credibility and ownership of the SOERs by sectoral agencies. In many instances the lead agencies lack ownership of the chapter or section of the SOER that addresses their mandate; claiming that they were not involved in the production process. To address this issue, NEMA is currently working with the lead agencies to produce the required sector reports. These reports will then be used as an input to the 2008 SOER which is currently under preparation. It is thought that working together with the lead agencies to produce these sector reports will establish clearer linkages between the sector reports and the national SOER, and thus act as a stimulus for future annual reporting. Furthermore, it is hoped that this will also lead to the full integration of the EIS into the functioning of the lead agencies.

Districts are also required to produce district SOE reports (DSOERs). Between 1997 and 1998, thirty nine districts produced DSOERs with support from NEMA. Again in 2004, 56 districts were trained and assisted to produce DSOERs. To further streamline the process, guidelines for the production of these reports were developed and distributed to the districts to enable better budgeting and continuity of the process. Maps, satellite imagery and other data produced by the institutions in the horizontal EIN serve as a big source of information in the production of the DSOERs.

The Environment Act stipulates that DSOER production should be an annual event. But maintaining this frequency is a challenge, especially in terms of the human and financial resources required for its production. Indeed without external support it is unlikely that this legal requirement will be complied with. Mbale will soon be the only district with three editions of the DSOER. The third edition (2008) is currently being compiled with support from the Mt Elgon Regional Ecosystem Conservation Programme, a trans-boundary project being implemented under the East African Community (Nakayenze 2008).

Contributing to national development processes

Information from the SOE reporting processes in Uganda is linked to achievement of key national development goals such as the PEAP, which is Uganda's poverty reduction strategy paper.

Following elaborate poverty assessment studies in the late 1990s and early 2000, Uganda now has a much wider operational definition of poverty that includes the lack of access to information, the voiceless, as well as social exclusion (MFPED 2002). Information to the public is therefore considered a critical empowering factor in efforts to eradicate poverty and improve management and governance of the environment. The different dimensions of poverty are described in detail in Box 4.

Box 4. Dimensions of poverty

The Uganda Participatory Poverty Assessment Process (UP-PAP) studies show that poverty exhibits multi-dimensional and integrated characteristics – it is not just about the lack of income. It is the inability to satisfy a range of basic human needs, and stems from powerlessness, social exclusion, ignorance and lack of knowledge, as well as shortage of material resources.

- Powerlessness is seen in terms of lack of participation, voicelessness, unmet aspirations, gender discrimination and poor governance.
- Ignorance and lack of knowledge is described as the state of being illiterate and ignorant about oneself and surroundings.
- Social exclusion is about being excluded from accessing certain services or benefits or not being heard in community meetings.

These different dimensions of poverty reinforce each other. That is why it is essential for the country to ensure an integrated approach to development activities. The UPPAP studies emphasize that information is particularly important so that socially-excluded people can grasp the opportunities that exist.

Source: MFPED 2002

Against that background, the Ministry of Water and Environment has just launched a 10-year investment plan for the environment and natural resource sector. This sector investment plan is to be integrated into the National Development Planning (NDP) process that was launched in November 2007. Most elements of the current EIN programme including the development of environment information systems have been included in the sector investment plan and will thus be mainstreamed into most sectoral activities. As far as the environment sector is concerned, this will contribute to addressing some of the dimensions of poverty.

Further, the Ministry of Finance, Planning and Economic Development has indicated that mainstreaming and budgeting for environment activities will be a pre-condition for sector funding at national and local levels. Guidelines for the mainstreaming process are being developed and management of environment information and use will be one of those key activities. If efforts for poverty eradication are to be effective, addressing components of poverty such as information access are of particular importance because as the analysis shows (figure 4) by 2002, about 42.7 per cent of the rural and 14.4 per cent of the urban population in Uganda could be categorised as poor (UBOS and ILRI 2007).

The information content of the SOEs has been critical in making the document a prerequisite for sustainable development. The principle of sustainability requires that explicit recognition must be given to existing interrela-

Box 5. The District Environment Action Plan

The District Environment Action Plan (DEAP) is a synthesis of community perceptions of environmental issues. It highlights major problems faced by the people, their causes and any actions required to tackle them. The plan looks at the issues from both a sectoral and cross-sectoral basis. When complete, the DEAP is integrated into the District Development Plan to ensure that district resources are effectively allocated to address the priority environmental problems identified through the consultative process.

Contributing to development processes at the local government level

At lower levels, the DSOER is designed to play a big role as a planning tool. It identifies, explains and measures all significant environmental problems in the district identified through a survey of environmental problems conducted at the grassroots. This survey is synthesized into a District Environment Action Plan and finally integrated into the District Development Plan (see Box 5).

As a monitoring tool, the DSOER is used to evaluate the effectiveness of the DEAP in addressing the identified environmental problems. It feeds directly into the national environmental monitoring system, in that the information generated at district level is aggregated and synthesised into a national SOER.

The success of the DSOERs would appear to lie in the uptake or ownership of the process by the districts. The reality is that although the DSOER is prepared by the District Environment Officer in consultation with district sectoral staff, the entire process is heavily facilitated (financially and otherwise) by NEMA. As a result, in many districts it tends to be viewed as a 'NEMA' process. Indeed if NEMA were to withdraw its support to the districts it is questionable whether DSOERs would continue to be produced. This also extends to the EIS database which appears to be an isolated product. It is not integrated in a district database covering all possible sectors; and when questioned, it is clear that the custodian for this database is the DEO, and not the district. This is a clear weakness as it does not encourage district-wide ownership of the EIS.

There are also technical challenges that undermine the quality of the DSOER. During this study, the DEO of Masindi indicated that district officials need simple equipment like cameras, mobile laboratory kits, global positioning systems, noise meters and air quality monitors to be able to improve the data and information quality of the DSOERs.

Supporting regional development initiatives

The SOE reports have provided vital information that demonstrates how natural resources degradation undermines

development at national and even regional level. For instance, there has been speculation regarding the underlying cause of the lowering of the water level in Lake Victoria. Some reports indicate release of excess water at the Owen Falls Dam as the cause. A recent report by the Regional Centre for Mapping of Resources for Development (RCMRD) in Kenya however, indicated that the lowering of the water level is the result of increased evapo-transpiration from the lake due to heavy silt and the resultant high heat capacity of the lake water (Khumala 2008). This result will be further verified by the assessment input to the proposed 'Atlas of Uganda's Changing Environment' currently under preparation (UNEP-GRID Arendal/NEMA forthcoming). The significance of this information is that it can help decision makers to properly target actions aimed at addressing the problem of transboundary issues such as lowered water levels in Lake Victoria.

Using technology to support planning and policy decisions

It is well documented that development of Information and Communications Technology (ICT) is vital for rural transformation and a strong engine for national development. This is part of the rationale behind the promotion of technology such as Geographical Information Systems (GIS) and Internet connectivity at the national and lower levels. NEMA has for some time been using the Internet to communicate with a local and global audience, through its website: <http://www.nemaug.org>. GIS is increasingly being used in advocacy, awareness, research, education and decision-making in Uganda. It is a computerised mapping system that employs technology such as remotely sensed satellite images and Global Positioning Systems (GPSs) for analysis.

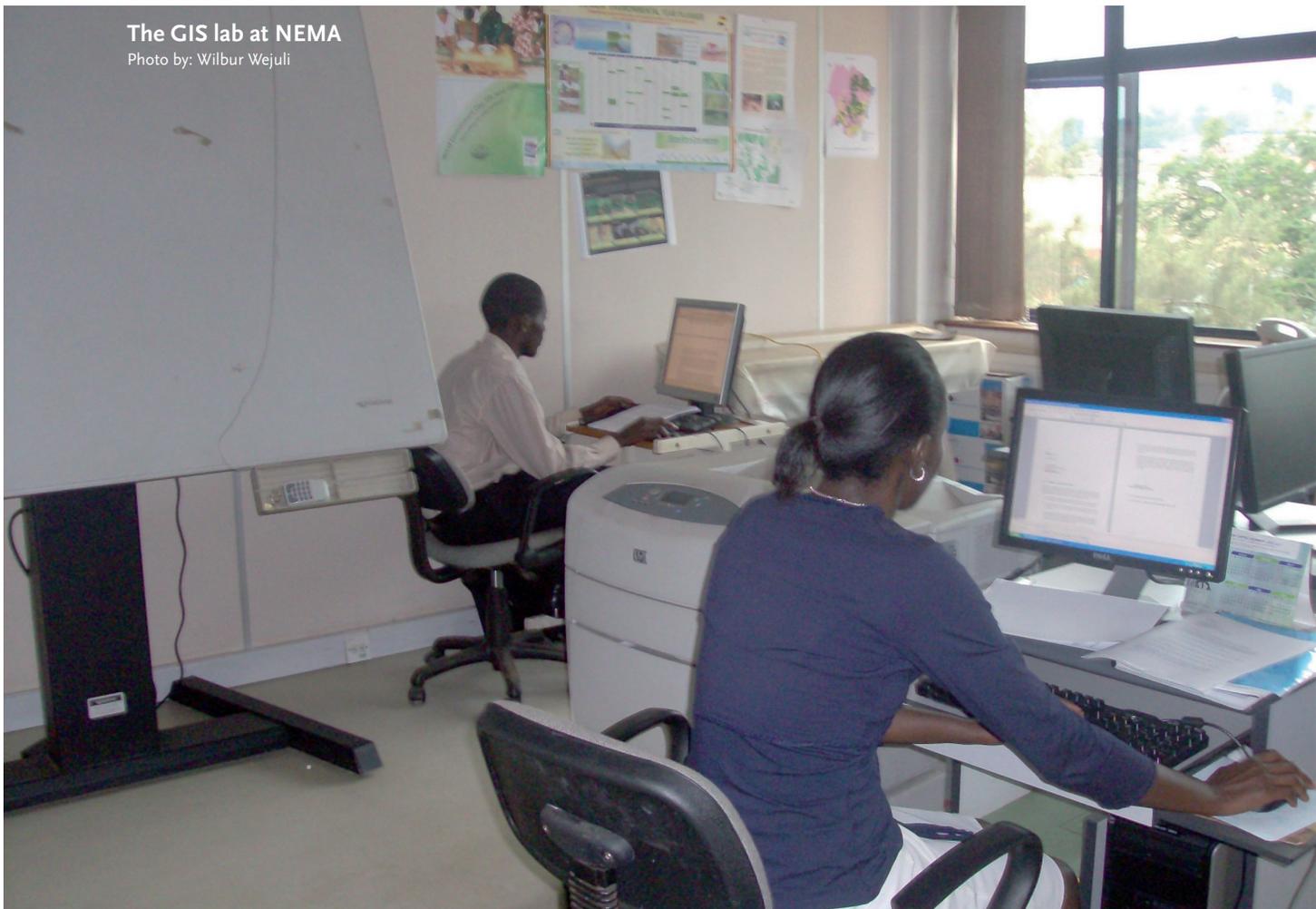
NEMA is in possession of satellite imagery covering the whole of Uganda for the years 1990 and 2000 that was provided by UNEP under the Africa Environment Information Network programme. Additional data has recently been received from the Regional Centre for Mapping of Resources for Development in Nairobi Kenya for the years 1972 to date. This latter data is being used in the production of the "Atlas of Uganda's Changing Environment".

The data provided by UNEP has been shared with a number of EIN institutions and is already being used at national level as a monitoring tool to support policy development. An example is the use of GIS to support the inventory work of Uganda's wetlands. This research has resulted in the protection of wetlands that provide key ecological functions, such as the Nabajuzzi wetlands in Masaka municipality for its water supply functions, as well as its important role as a habitat to wildlife, in particular the Sitatunga; and Nakivubo and Kirinya swamps in Kampala for their effluent water purification roles (NEMA 2004).

While EIS technology has added value to planning processes at national level, this is not the case at the lower

The GIS lab at NEMA

Photo by: Wilbur Wejuli



levels. A number of drawbacks have held its progress in balance. These include:

- lack of appreciation at the district level that environmental information generation at that level is for the benefit of the planning processes there, rather than just an input to NEMA's work.
- inability of the environment officers to mobilise the required local revenues to support the district EIS's. This may not be unique to the environment information sector. Studies show that although Local Governments enjoy autonomy in the collection and allocation of their own revenues, none of the local governments in Uganda has been able to fully finance its development initiatives without the assistance of donors (Bazaara 2003).
- lack of output devices like plotters and relevant printers. Thus there is a limitation in the process of producing captivating GIS and other graphical outputs that could stimulate interest in the technologies and outputs produced through EIS implementation.
- staff turnover, lack of software, non-functional or lack of appropriate equipment. For instance, in Mbale and Jinja the DEOs who were trained in GIS have since left, while in Masindi, some of the hardware is no longer functional due to a poor repair and maintenance culture (Nakayenze 2008, Nabihamba 2008).

The above challenges are related to the fact that the entire life-cycle for establishing, operating, and maintaining an evolving and growing environment information system was not properly thought through at the initiation of the process. Two examples illustrate this point. Any GIS requires huge amounts of disk space to support the analysis and to store the information generated, but the capacity of the computers that were provided was so low that the heavy duty programmes needed for image analysis or other GIS work could not be installed or those that were, run very slowly. Secondly, staff turnover that is a normal part of working life seems to have been ignored. Both local governments and NEMA have failed to factor that into the project life-cycle by having regular training and refresher programmes for the environment officers. So when a trained DEO leaves, the skills gap left is never plugged.

Some suggestions for improvement include appropriate equipment, a dedicated manager to implement the GIS and the development and implementation of an action plan for the EIS after installation and training (Nabihamba 2008). Financial sustainability should also be part of the action plan and systematically pursued during implementation. The establishment of an effective monitoring

and evaluation system would also provide meaningful assessment of performance and allow for activities to be re-directed so as to address some of the identified issues early enough.

Enhancing access to environment information

One of the cornerstones of the information programme was to improve access and use of environment information by the public, especially in the areas of education and research. Supporting education and research is a means for cultural, social and economic development. It therefore follows that strategies that support these causes will do much to improve the wellbeing of the people and the environment. Informed individuals are better equipped to participate in finding solutions to everyday personal and community problems. They are more likely to play a meaningful role in environmental

decision making and to take advantage of opportunities for environmental justice.

In support of this, NEMA established a Resource Centre at the NEMA offices in Kampala. The aim was for the Centre to be a source of easily accessible, appealing and authoritative information which would bring home to the public the concept of individual responsibility for the protection of the environment. This was also part of the Government's response to section 85 of the Environment Act on public access to environmental information.

The Resource Centre is designed as a walk-in centre located on the ground floor of NEMA house. It is a free public service to anyone seeking information on any aspect of the environment – school children, students, teachers, decision makers, researchers, consultants and members

The resource centre at NEMA

Photo by: Wilbur Wejuli



of the private sector, among others. It is open Monday to Friday 0830–1600 hours, apart from public holidays. The services provided have expanded beyond those associated with a traditional library to include a bibliographic system; a directory of experts in the field of environment; and a metadatabase of national institutions involved in the management of the environment.

NEMA has also supported the establishment of Environmental Resource Centres in 26 districts. These were equipped with shelves, tables, chairs, books, a photocopier and Internet connectivity. A television set was also provided to enable viewing of environmental videos. Unfortunately, video cassette recorders (VCRs) were not provided and so the television sets are not being used as anticipated. The focus is now on strengthening these Resource Centres. Support, in the form of data, journals, publications and other information materials have been provided by various organisations including the collaborating EIN institutions. Others have been donated by UNEP, UNDP, and the World Resources Institute.

Demand for the use of the Resources Centre at NEMA is growing. The current space of 56 m² is hardly enough to accommodate the 50–100 users who register daily to use the centre's facilities. But this is set to change. In August 2008, NEMA management approved plans to expand this to 113m² and these improvements should be completed in the first half of 2009 (Wamala 2008).

At the districts, the Resource Centres are ineffective and only opened on demand. Although space has been allocated for them, the reality is that this space is inadequate or at times inappropriate. In Mbale, for instance, the Resource Centre doubles as the office for a member of the support staff, implying that when out of office, it will be locked. But also, space that would otherwise have been used to house information materials is instead used to store filing cabinets and other office paraphernalia.

The reasons for this lack of effectiveness are simple. As one moves from the centre to the local level, there is more emphasis placed on the provision of social services as opposed to environment management programmes (Turyatunga 1998). The reality is that competition with major district priorities impedes implementation of environmental programs, with initiatives such as resource centres being relegated to the bottom of the activity list. Given the role of information in development, this needs to be addressed urgently, possibly through the appointment of dedicated managers, ideally with IT/internet capability, to manage such resource centres (Nsimire 2008). It may also be advisable to combine efforts with other sectors at the district level in order to jointly manage these centres and increase the nature of services they can provide. This may also assist in resource mobilisation from the district financial envelope.

Improving public awareness and education

A common shortcoming of people in the environmental and other scientific fields is assuming that the public understands the usefulness, relevance and applications of their work. It is possible to have a network, with good products that nobody uses, because they have no knowledge of them or worse, because they do not understand them. It is therefore necessary to develop and implement an outreach strategy that would enhance awareness, knowledge and effective use of the EIN.

Currently two types of products have been developed to enhance public awareness: intermediate products and packaged technical information. The intermediate products have included thematic maps targeted to specific problems, with answers to particular questions. The packaged technical information has included fact sheets, policy briefs, videos on topical environmental issues, and television discussion and documentary programmes. Public awareness through television and radio has proved important in improving the knowledge base of Ugandans, based on local content, issues and examples. With a literacy rate of 69 per cent (UBOS 2006) many Ugandans cannot access environment information because of language or geographical barriers such as physical distance or location. Geographical barriers relate to the practicalities of expecting a community member to travel all the way to sub-county headquarters to access information. A study carried out in Masindi and Mbale districts discerned that many users feel that the information contained in the Resource Centres is for those of higher literacy levels (Gowa 2001). Yet public awareness can be improved through better access to information through the use of innovative and available technologies like FM radios broadcasting in the local languages. There are many FM radios that can be used for this purpose. By March 2008, the Uganda Communications Commission reported that 173 FM radio stations were operational (UCC 2008).

An empowered community at a sub-county, parish or village will be better able to pass on development messages or to participate in monitoring and management of the environment. Currently, the public education department of NEMA has programmes on 5 FM radio stations and one country-wide television station. At the districts, financial resources are usually the impediment as programmes have to be paid for, and air time is expensive. In Mbale the example was given that it is easier to access funds to fuel a car belonging to the environment department, than to run a radio programme (Nakayenze 2008).

The SOEs have also proved to be invaluable in support of learning in the formal education sector. During the production of the SOER 1994, it was observed that students from the Makerere University Institute of Environment and Natural Resources used the drafts extensively before

final production (NEMA 1995). The documents are still extensively used by university-level students. In addition, the documents have for some time now been recommended text for the A-level geography course (Paper 3 on Regional Geography of Uganda).

Supporting environment monitoring and compliance

Processing facilities engage in a range of activities that may have significant impacts on the environment, long-term sustainability and the health and well-being of people. These negative impacts relate to poor disposal of waste and pollution of the environment. Whereas Uganda's industrial base is still small, there are already signs of pollution and widespread degradation of the environment. Yet the country's economic growth strategy is private sector and industry led (NEMA 2004).

The Environment Act requires that all facilities undertake Environmental Impact Assessments (EIAs) of their activities before they are commissioned. The Act further requires that any person or persons who *carry out any activity, which has, or is likely to have significant impact on the environment, and any person carrying out any other activity prescribed by the Act shall keep records relating to the amount of waste and by-products generated by the activity; the extent of his activities indicating the economic value of the activity on the area covered expressed in monetary value of the product per year; the observable effects of the activity on the environment; and how far in the opinion of that person, the provisions of the Act have been complied with*. The Act also requires that the records kept under Section 78 be transmitted to the authority or its designated representative annually and received not later than a month after the end of each calendar year.

The above mentioned information is important in supporting NEMA's audit and inspection functions. These data are also important in acting as powerful incentives for self monitoring by processing facilities. They allow informal monitoring and self or voluntary audits by the so called regulated community.

NEMA clearly appreciates the importance of tracking facility emissions and pollution in achieving the authority's monitoring and compliance strategy. The authority therefore developed an inspections and audits database to verify the information generated by the processing facilities. The two databases are populated with data from EIAs, environmental audits and compliance agreements. To date information from 1,822 EIAs, 159 audits, and 42 compliance agreements have been entered into the database (Kutesakwe 2008). A code of conduct for Environmental Inspectors that includes specifications for reporting and guidelines for facility-level reporting has also been produced for use by the industries.

The development of the monitoring and compliance database is a step in the right direction as it provides the opportunity to develop standardized data elements, to integrate (its) data systems. It should also encourage collaborative work with other regulatory institutions as co-owners of the data systems, and promote new approaches to better collection, use and dissemination of data. There are also planned improvements to the datasets, including adding geo-coordinates information, ability for trend analysis, and automatic updates.

Whereas the effort expended in the above area is commendable, the full benefits of the data infrastructure are yet to be demonstrated. There is little public disclosure of the information in the databases, and internal use of the datasets even within NEMA is still limited. The promise to make the databases fully interactive has yet to be achieved. The downside of this is that no moral pressure has been exerted on processing facilities to do their own disclosures. Many of the facilities only continue to generate the data because it is a legal requirement but have no pro-active policy or incentive to disseminate their facility information to the public. It has also been indicated, that although the law requires that facilities provide information on their operations on request, many industries including Uganda Breweries Limited and Kasese Cobalt Company Limited have in the past declined to release information on their operations to the public (ACODE unpublished).

Challenges to the Environmental Information Regime in Uganda

Data issues

Despite the efforts to organise and systematise the environmental data collection process there still exist data gaps and challenges. Lack of and inconsistent collection of data on key natural resources and their processes leads to information gaps, thus rendering it difficult to make accurate predictions. For instance, despite its likely importance to the economy and livelihood security, there is still limited information on the impact of climate change in Uganda. Up-to-date data on soils is also lacking and yet this is the country's major natural asset.

Standardization and harmonization of data are issues that lead to unreliability, incompatibility, inconsistency, non-uniformity and conflicting data sets. Although a number of public institutions are now providing data at a cost, there are still limited incentives to do so as the resources collected have to be remitted to the national treasury from where they are difficult to claim by the data generating sector/institution. Despite the importance of data dissemination, there has been and still is very little in the way of documented policies or procedures. In order to stimulate a cohesive approach among institutions, in January 1997 NEMA produced draft guidelines addressing issues of data dissemination including confidentiality, pricing and responsibilities of both data producers and users. These guidelines need to be published so as to be of practical use to the individual institutions.

Other reasons that have contributed to these problems are the high costs of data collection, storage and dissemination; difficulty of quantifying some of the environmental variables; and lack of appropriate indicators to measure these variables. Encouraging private sector involvement would be one way of reducing the high costs associated with data collection. However there is limited incentive for them to do so.

NEMA has made some progress in (addressing the issue of environmental indicators and in) developing a set of environmental monitoring indicators. These are intended to measure environmental quality and trends and how they relate to sustainable development (NEMA 2005). The indicators are intended to streamline the data collection process by allowing institutions to:

- collect information that accurately reports on the state of the environment;
- harmonize measurements so that monitoring results can be shared and compared;
- improve communication between sub-sectors and the lead environmental agency (NEMA);

- minimize uncertainties regarding unconfirmed or contradictory assessments; and
- measure sustainable development by linking environmental parameters to socio-economic aspects of development.

Capacity, expertise and equipment

Another challenge being faced is the technical expertise and specialized equipment required to manipulate some of the data. As indicated earlier, there are manpower constraints at the national and lower levels due to normal staff turnover. Trained staff often leave, and if the skills gap is not promptly plugged it leads to a shortage of appropriate technical competence. This therefore requires regular training, re-training and also strategic planning to anticipate these staff movements. Training is also critical in determining the sophistication of the analysis and outputs that can be generated. This issue is important especially when it comes to translating the EIS outputs into planning guidelines or policy statements.

Even where equipment is available, in some cases it is not effectively nor efficiently utilised and maintained. Maintenance accounts for a substantial proportion of the entire information systems life-cycle and should be a major concern for organisations. Research shows that systems maintenance costs range between 70–80 per cent of the budget (Powell 2007). Another opportunity to be explored is for equipment to be leased and not bought, as is the case in countries such as South Africa or in Europe.

Other challenges experienced include inadequate network infrastructure (high Internet connection fees, low bandwidth, and weak links), general infrastructure problems (unreliable power), inadequate financial support especially after the end of donor support, poor information retrieval skills among users and inadequate linkages with partner organizations. In Mbale only the management of the district (the Chief Administrative Officer, Planning, and Finance units) have access to the internet on their computers (Nakayenze 2008). DEOs in Jinja, Nakason-gola and Masindi have no internet access and this applies to many other districts around the country (Nabihamba 2008, Kunobere 2008, Nsimire 2008).

Networking issues

The data collection and information management infrastructure in the country is still very weak. Networking and coordination mechanisms between data producers and users could be better systematised at all levels. The principle of networking revolves around collaboration

and partnership. It involves building partnerships with policy makers, politicians and the technical experts from participating institutions. Technical issues can never be completely divorced from politics. It is extremely important to have the commitment of high-level decision makers in partner institutions and the politicians. Cultivating this commitment cannot and should not be a one time affair. This commitment translates into marketing of the EIN and increased public support for its activities, as well as mobilisation of financial resources, among others. Low public awareness about the network translates into low demand for its products. Increased demand for products means greater innovation and ensures relevance and sustainability for the network.

Networking should also actively include working with other programmes in the same arena, so as to reduce duplication, and enhance effectiveness through synergies. One such initiative is the Uganda Spatial Data Infrastructure (SDI) initiative, under the Ministry of Finance, Planning and Economic Development.

Market research and strategy

As indicated, one of the challenges facing the EIN is the lack of visibility. Therefore a key focus of the EIN should be to develop and implement an outreach strategy that would have a two pronged effect: first and foremost improve network visibility and knowledge of its products and services; and secondly enhance awareness on environmental issues and show how the network products can aid decision making, education or other purposes. This would stimulate interest among civil society, the scientific, business and political community and increase demand for services. At the same time it would compel the lead agencies and districts to report and improve their environment information management procedures.

Some of the issues that could be looked at include market research, preparation of a business plan outlining key elements of the activities to be undertaken, branding of the network, fund raising and products such as brochures and website, among others.

Conclusions and Recommendations for the future

Uganda has come a long way in trying to improve the management of environmental information. There was a time when looking for data was as challenging as looking for the proverbial needle in a haystack. This has now changed. This section of the report provides some recommendations for improvement and issues for the future.

1. It is time to think of scaling up the EIN activities. Uganda has been addressing EIN issues for over 10 years now. It was probably important to keep the numbers small and manageable during the infancy stages. A lot of interest has been generated amongst other institutions that are not EIN members and this is the opportune time to learn from the past experience and to include these institutions in the network.

2. It might be necessary to develop an appropriate set of rules or subsidiary legislation that specifically governs environment information. This would further strengthen the provisions under the Environment Act and the Access to Information Act while also addressing some of the issues such as practices and technologies that have been identified in this document

3. There should be a more innovative approach to the production and dissemination of public information. Demand for products will only grow when the public is aware of the potential of the existing technology and/or what products are available. For instance, a lot of effort is put into the production of the SOER, but dissemination tends to stop at launching and distribution. This, as indicated in the assessment for SOER 1994 is not adequate (NEMA 1995). After all, access to information is a constitutional right and information is a public good. It must be packaged to reach as many people of Uganda as possible. There are a number of relatively cheap approaches that can be used to ensure that the public is informed of what is available. Continuous updating of databases, production and dissemination of targeted information in multiple formats could be a good starting point. This must be done on a regular basis and according to an agreed outreach strategy.

4. It is necessary to strengthen the entire information management life-cycle. Issues regarding policy, standardization, and access are very important as they subsequently impact on collection, analysis, marketing and dissemination of the information. For example, when it comes to data collection, applying international metadata standards would be useful in developing and maintaining a high quality and standard database. Issues of management of information especially related to the collection-archival phase are also important. Regular

monitoring and evaluation activities help keep activities on track or to re-direct them for optimal effectiveness.

When working on such life-cycle activities it always helps if a network product is defined. Such a product would give a general picture of how the different resources or institutions would come together to deliver the 'information management capability' (Martin 1996). It would also allow each level or sector to see how what they bring fits into the entire scheme of things and make the issues more relevant while working towards a common goal. SOE reports at national, sectoral or lower levels are examples of such products. These could be designed to become the key asset of the network, acting as a stimulus for product diversification within the collaborating institutions themselves. As discussed earlier, the lack of a network product around which to coalesce could be one of the reasons why the vertical EIN is not as vibrant as the horizontal EIN.

5. It would be beneficial for professionals from the different districts and sector institutions to meet regularly to share ideas and best practices and generally keep up the momentum that characterized the inception of the EIN. The distributed nature of the EIN means that the information management personnel (technical officers, and others) involved in this endeavour are located in different parts of the country. Although it is theoretically possible to communicate using email, for a great part of the time, personnel work independently. Facilitation of continuous dialogue among network members is central to its sustainability and growth. Best practices from over the years on issues such as data standardisation or dissemination mechanisms should also be documented and published in the form of guidelines for use by the network.

6. There needs to be a deliberate strategy to continuously address technical competence in environmental information management. The information management skills of personnel at the different levels vary. These differences can greatly affect the level of participation and the quality of information provided. Basic training is therefore required, but this needs to be complemented by regular upgrading of skills and exposure to new approaches and ideas. NEMA has, on occasion, carried out training of national and district staff in various aspects of information management and handling. The trainees are then expected to transfer their acquired skills to colleagues in their departments. Most of the districts have high turnover of staff and once staff have left there is once again a gap in the skills set of new employees. Since NEMA does not carry out regular train-

ing of the districts, this is a big challenge. But there is also need for the districts themselves to be able to support their own training programmes.

7. EIN activities should be integrated into the normal work of the DEOs. Working on activities such as EIN requires time that may at times conflict with the task and responsibility allocation of personnel in the various institutions. This is especially the case at the lower levels of governance such as in the districts and sub-counties. Many districts have only one Environment Officer who is in charge of the entire district. The ideal situation would be to integrate EIN activities into the normal working hours of the institutions. However this is not always possible as the institutions have mandates and work programmes that do not integrate these activities. Where there is external support, for example from UNEP in the case of the Africa Environment Information Network project, additional facilitation in form of top up allowances has been given to staff to ease the situation a little. Other innovative approaches such as the use of interns can provide the support along with the expertise required for specific tasks without excessive budgetary implications.

8. Strategies to address the issue of sustainability are critical to the success of any program. The EIN needs to be concerned about the sustainability of its structures and needs to lay strategies to address this issue. Confidence building across the network is an integral part of this process, and can be approached through capacity building. The environmental reporting processes must always be linked to achievement of key national development goals such as the PEAP, Prosperity for All, and the MDGs, among others. By incorporating the EIN into government activities, it then becomes an integral part of the

budget, an in so doing ensuring sustainability. Many such initiatives fail because they are difficult to sustain after the cycle of project support has ended, in situations where they use a project approach. Personnel mobility and lack of institutional support are some of the challenges that have resulted in high costs and in some cases leading to the collapse of EIN activities after donor support ends.

9. There should be a clear strategy to strengthen the vertical EIN. This could be by integrating other sectors into the EIS at district level so that it becomes more of a district entity, other than just 'belonging' to the DEO or NEMA. There should also be efforts to integrate or link the EIS with other information systems like the Local Government Information System (LOGICS).

10. The network should develop a strategy for the future. Support from UNEP's Africa EIN project has allowed the Uganda EIN to carry out an inventory to discern the current status of EIS in the country, design an appropriate implementation structure, agree on operational procedures, and articulate an implementation strategy for the next five years. Apart from guiding future work, this implementation strategy can also be used as a project proposal to source funding. While the inventory and implementation strategy articulate issues from the producers side, the EIN also needs to consider issues from the users' side. Market research can add this dimension to this strategy. It can provide information on potential clients, their current information or data requirements and the nature of their future needs. It can also be used to fine tune existing products and services by providing an indication of what users' feel about the products that are already in the market. The guiding question should always be whether the users' needs are being met by current products.

References

- ACODE (unpublished). *The need to address environmental, economic, political and social challenges*. Draft Report. Action Coalition on Development and Environment (ACODE).
- Bazaara, N. (2003). *Decentralization, Politics And Environment in Uganda*. Working Paper Series: Environmental Governance in Africa. WP No. 7. World Resources Institute, Washington D.C.
- GOU (1995). *The National Environment Act Cap 153*. Government of Uganda (GOU). Uganda Printing and Publishing Corporation, Kampala.
- Gowa, E. (2001). *The Impact Of Environment Information Systems On Local Communities In Uganda. A Case Study Of Mbale And Masindi Districts*. M.Sc thesis. Makerere University, Kampala.
- Khumala, E. (2008). Remote Sensing Officer. Regional Centre for Mapping of Resources for Development (RCMRD), Nairobi. *Personal Communication*. July 2.
- Kiss C and Ewing M, (undated). *Environmental Democracy. An Assessment of Access to Information, Participation in Decision making and Access to Justice in Environmental Matters in Selected European Countries*. The Access Initiative. European Regional Report.
- Kling, Rob (2000) *Learning about information technologies and social change: The contribution of social informatics*. For the Information Society 16(3) Center for Social Informatics, Indiana University, Bloomington, USA. <http://www.slis.indiana.edu/kling>
- Kunobere, J.(2008). District Environment Officer. Nakason-gola District, Uganda. *Personal Communication*. July 24
- Kutesakwe, J (2008). EIA/Audits Data Entry Clerk. National Environment Management Authority (NEMA), Uganda. *Personal Communication*, July 31.
- Martin, G. (1996). *Mission Report to National Environment Information Centre*. The Orbis Institute, Ottawa.
- MEP (1994). *National Environment Action Plan for Uganda*. Ministry of Environment Protection (MEP), Kampala.
- MFPED 2002. *Deepening the Understanding of Poverty. National Report*. Uganda Participatory Poverty Assessment Process. Second Participatory Poverty Assessment Report. Ministry of Finance, Planning and Economic Development (MFPED), Kampala. Also available on: <http://www.finance.go.ug/uppap/docs/NationalRpt.pdf>
- MFPED (2008). *The Plan To Achieve Prosperity For All Ugandans. Understanding Bonna Baggaggawale*. Ministry of Finance, Planning and Economic Development (MFPED), Kampala. Also available on http://www.finance.go.ug/docs/BONNA_BAGGAGGAWALE.pdf
- Nabihamba, E (2008). Municipal Environment Officer, Jinja Municipal Council, Jinja. *Personal Communication*, July 25.
- Nakayenze, A (2008). District Environment Officer, Mbale district. *Personal Communication*, July 22.
- NEMA (1995). *The State of Environment Report for Uganda; 1994: An Evaluation Report*. National Environment Management Authority (NEMA), Kampala.
- NEMA (1996). *National State of the Environment Report for Uganda 1996*. National Environment Management Authority (NEMA), Kampala.
- NEMA (2004). *National State of the Environment Report for Uganda 2004*. National Environment Management Authority (NEMA), Kampala.
- NEMA (2005). *Indicators for environmental assessment in Uganda*. National Environment Management Authority (NEMA), Kampala.
- NEMA (2007). *Implementing the Africa Environment Information Network in Uganda: Issues, Trends and Lessons*. National Environment Management Authority (NEMA), Kampala. Available on: <http://www.nemaug.org/attachments/AEIN%20ofactsheet%20to%20NEMA.pdf>
- Nsimire, W. (2008). District Environment Officer, Masindi District. *Personal Communication*, August 3.
- Powell A (2007). *Maintaining Information Systems*. Southern Illinois University Edwardsville, Available on: http://www.siue.edu/~apowell/CMIS270/Class27_Maintenance.ppt
- Turyatunga, F.R. (1998). *Uganda Case Study: The National Environmental Management Authority*. World Resources Institute, Washington D.C. Also available on http://pdf.wri.org/ncsd_uganda.pdf
- UBOS 2006. *Uganda National Household Survey 2005/2006*. Report on the socio-economic module. Uganda Bureau of Statistics (UBOS), Kampala.

UBOS and ILRI (2007). *Nature, Distribution and Evolution of Poverty and Inequality in Uganda 1992–2002*. Uganda Bureau of Statistics and the International Livestock Research Institute (ILRI), Kampala.

UCC (2008). *Status of the Communications Market – March 2008*. Uganda Communications Commission (UCC), Kampala. Also available on: <http://www.ucc.go.ug>

UNECE (1998). *Convention on Access to Information, Public Participation in Decision making and Access to Justice in Environmental Matters*, Aarhus, Denmark.

UNEP 1992. *Rio Declaration on Environment and Development*. United Nations Environment Programme (UNEP). <http://www.unep.org/Documents.multilingual/Default.asp?DocumentID=78&ArticleID=1163>

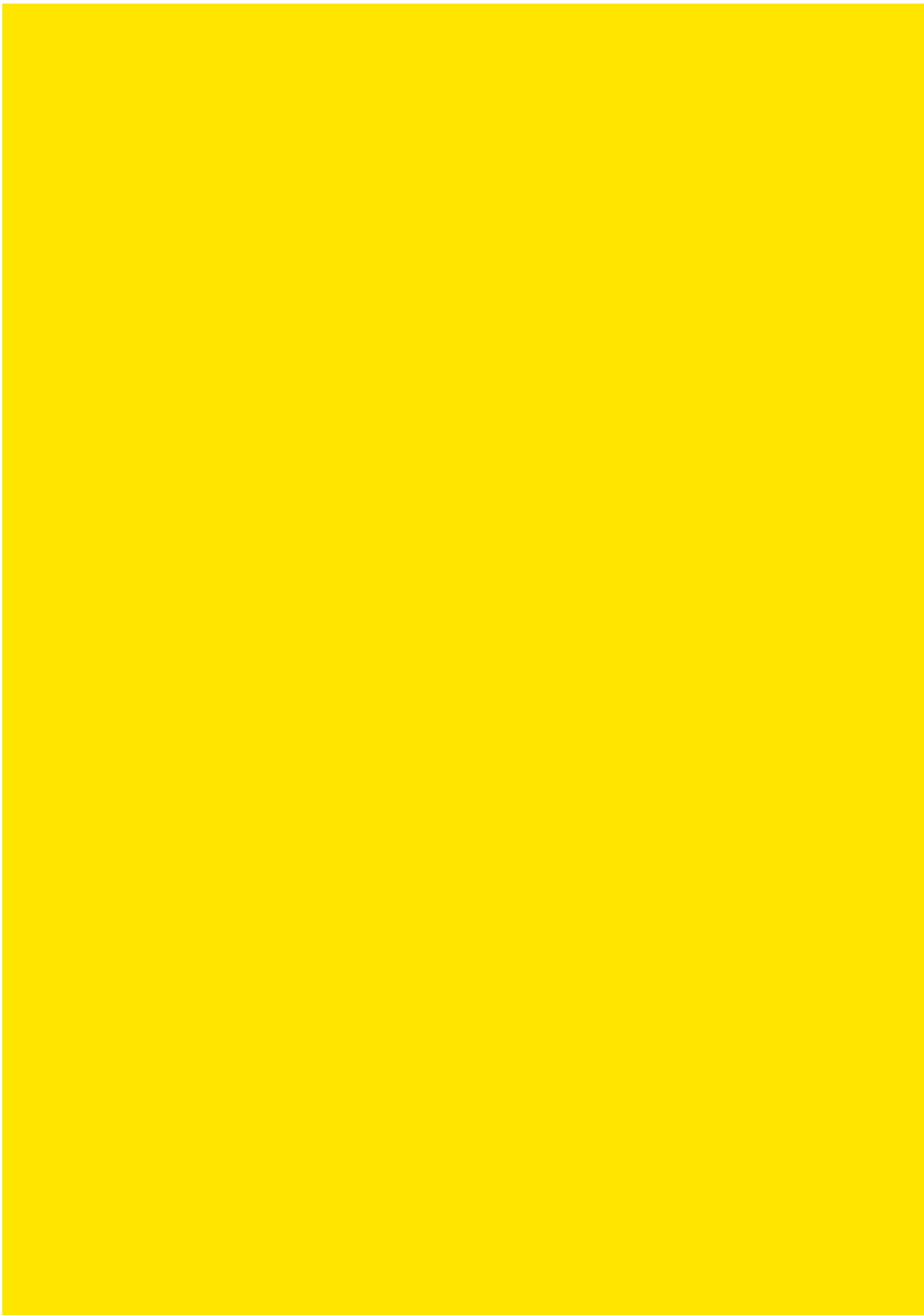
UNEP/NEMA (2004). *Inception Meeting For Africa Environment Information Network in the Eastern Africa Sub-Region Workshop Report*. National Environment Management Authority (NEMA). Kampala, Uganda.

UNEP/NEMA/EPA (2005). *The Africa Environment Information Network Strategy and Plan for the East African Sub-region*. United Nations Environment Programme (UNEP)/ National Environment Management Authority (NEMA), Environment Protection Agency (EPA), Nairobi.

UNEP/NEMA (forthcoming). *Atlas of Uganda's Changing Environment*. United Nations Environment Programme (UNEP) GRID-Arendal and National Environment Management Authority (NEMA).

Wamala, E (2008). Librarian, National Environment Management Authority, Uganda. *Personal Communication*, July 31.

Annexes



Annex 1: Key milestones in the environment information management process

1986

Ministry of Environment Protection was formed

1987

Idea to establish an environment information centre began

1989

Users needs assessment to discern information and capacity needs required for the establishment of a national environment information centre

1989

Establishment of the National Environment Information Centre (NEIC)

August 1990

Cabinet decision formalising the formation of the NEIC

1991–1993

Production of 4 pilot District Environment Profiles

1992

Start of the National Environment Action Plan (NEAP) process

1993

Passing of the Decentralisation statute

1994

The Environment Management Policy was published

1994

Production of the first State of the Environment Report for Uganda

1995

Passing of the Environment Act Cap 153 which gave the right of access to environment information

1995

Promulgation of a new constitution which recognised access to information as a basic right

April 1995

Review to redefine the role of the NEIC

July 1995

Incorporation of the NEIC into NEMA's Division of Information and Monitoring

December 1995

Installation and use of the UNEP metadata tool at NEMA and EIN institutions

December 1995

Establishment of NEMA completed

March 1996

First national workshop on environment information networking in Uganda

1996

Publication of the second edition of the National State of the Environment Report

1996–2000

7 districts chosen to pilot the vertical environment information network

1997

Local Governments Act giving mandate for environment management including environment information to districts

1997–1998

NEMA supports 39 districts to produce DSOERs

1998

Publication of the third edition of the National State of the Environment Report

2000

NEMA appointed a UNEP GEO Collaborating Centre

2000

Publication of the fourth edition of the National State of the Environment Report

2001

Vertical environment information network expanded to 27 districts (including the original 7)

2002

Publication of the fifth edition of the National State of the Environment Report

2004

56 districts trained and supported to produce DSOERs

2004

Publication of the sixth edition of the National State of the Environment Report

2005

Passing of the Access to Information Act

2006

Publication of the seventh edition of the National State of the Environment Report

2007

NEMA coordinates the production of the IGAD Environment Outlook

July 2008

Process to produce the eighth National State of the Environment Report began

August 2008

NEMA management agreed to expand the Resource Centre

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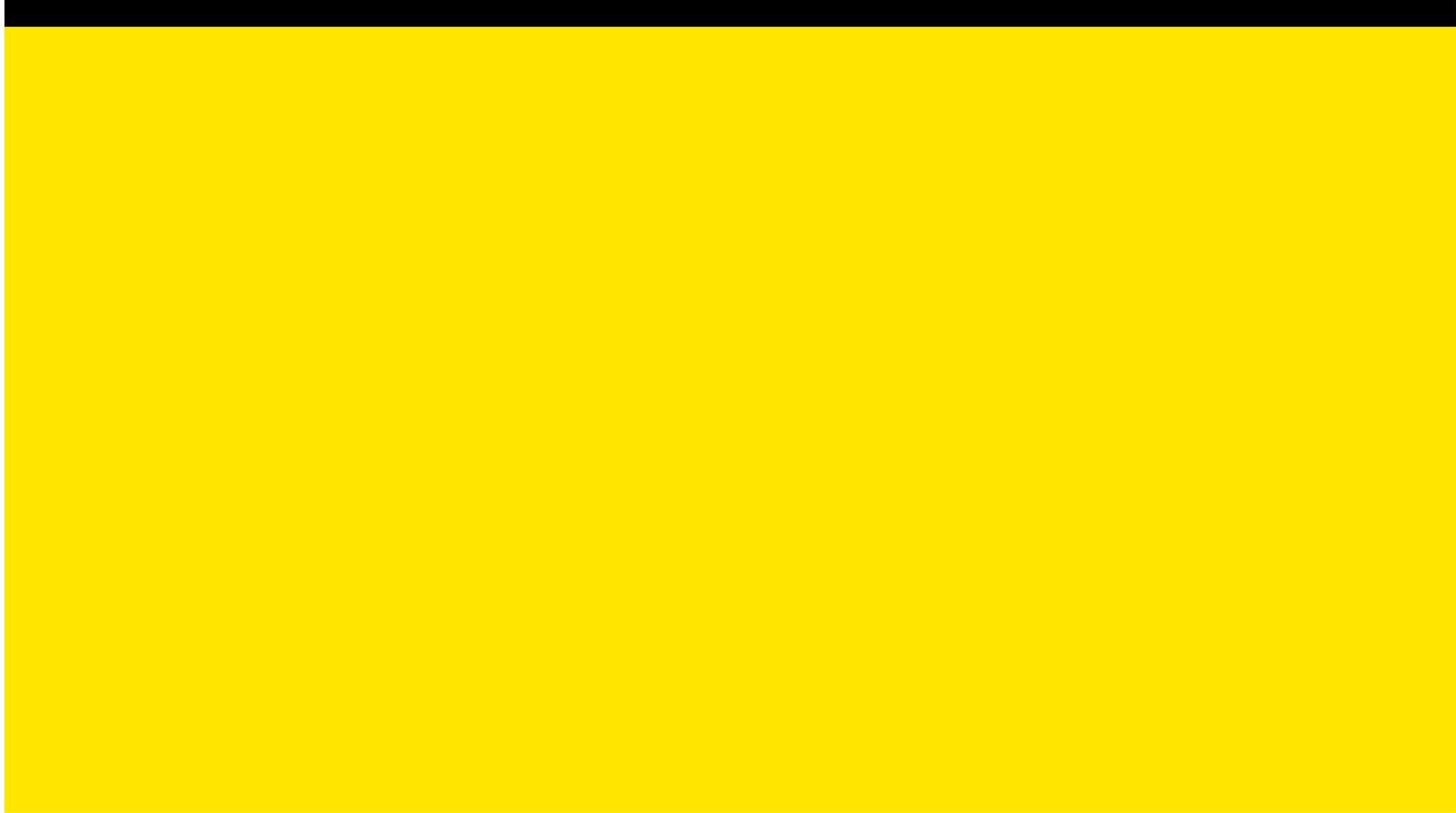
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