

PLANNING ON SOLID GROUND

The Nile Basin Decision Support System

December 2014



Nile Basin Initiative

Background

Shared by 11 countries with a combined population of over 400 million, the River Nile exemplifies both the opportunities and challenges of managing a resource that sustains the livelihoods of more than 230 million people who live within its basin.

But with the aid of the Nile Basin Decision Support System (NB DSS), Member States have a set of analytical and scenario evaluation tools to ensure efficient management and optimal use of the basin's shared water resources.

As the Nile Basin Initiative's flagship innovation in the field of water resources planning, the NB DSS is playing an instrumental role in monitoring and assessing the water and related natural resources of the basin.

Planning for the development and management of water resources, as well as the attendant problems, is a complex undertaking. The NB DSS comes in handy to meet such complex planning needs; and the NBI has provided technical support and training to national project teams to facilitate its utilisation.

The NB DSS is playing an instrumental role in monitoring and assessing the water and related natural resources of the basin



A training session in Uganda on mainstreaming climate change in Awoja catchment planning using the Nile Basin Decision Support System (Photo: Sowed Sewagudde)

For one thing, it offers a variety of analytical tools that support a range of planning activities, from data processing to scenario management and decision making. For another, it is designed to be highly flexible and open, so it can be expanded to meet different planning requirements. Also, it has many features that make it possible to adopt standard procedures for analytical work in support of water resources planning.

What is the Nile Basin Decision Support System?

The NB DSS comprises a set of modelling, information management and decision making tools. It is a comprehensive analytical framework that NBI Member States have developed jointly to help them understand the river system better. With better understanding of the river system, they are able to make informed water resources planning decisions to address common challenges.

The NB DSS comes in the context of NBI's approach to regional cooperation that harmonises and employs standard analytical tools for water resources planning and management.

Harmonisation of analytical tools is crucial given that the management of water resources entails a wide range of decisions related to, for example:

- Water allocation - apportioning water between countries or for a particular use or sector, determining downstream releases, and assigning water rights;
- Water infrastructure - the location and size of facilities like dams and what crops to plant on which area and when;
- Policies and treaties - regulations about minimum flows and whether a particular country should sign agreements on shared water resources.

Quick Facts

Beneficiary countries



Period: Developed from 2007 to 2012 and still evolving

Licenses distributed by end of 2014: 99

New licenses expected to be distributed in 2015: 300

Thematic area: Water resource development

Supporting sound decision making

Decisions come with consequences, some of which may be undesirable for any number of reasons. Adverse outcomes may arise due to imperfect understanding of the context of a problem, uncertainty about the future, lack of scientific information, or inherent bias towards some preferred solution.

Sound decisions therefore are those that maximise positive results, minimise negative repercussions, and lead to sustainable outcomes by making the best use of the available scientific information. However, decision making about

water resources planning and management in trans-boundary river basins is singularly complex because of the multiple jurisdictions involved.

This implies that any decision making process has to navigate and contend with numerous authorities, policies, value systems, and data standards, among other differences. Without a common framework to guide decision makers, the potential for misunderstanding looms ever larger in circumstances such these.

Value of standardisation

The standardisation of procedures and practices has fostered mutual understanding among NBI Member States. It has been valuable in:

- Data collection, processing, sharing, and exchange;
- Setting common approaches for environmental flows;
- Environmental and social impacts assessments of water resources development and management interventions;
- Building consensus on the value system for evaluation of development or management scenarios and options;
- Responses to emergencies like droughts and floods.

Common analytical tools provide a platform and avenues for standardised ways of handling different decision making problems. In particular, they can be used to promote harmonised procedures in analytical work in water resources planning and management.

Standardisation of tools is especially crucial to analytical work in operations such as:

- Data quality control and processing;
- Modeling different river basin processes;
- Scenario management;
- Quantification of impacts of planned water resources development and management interventions;
- Multi-criteria decision analyses.

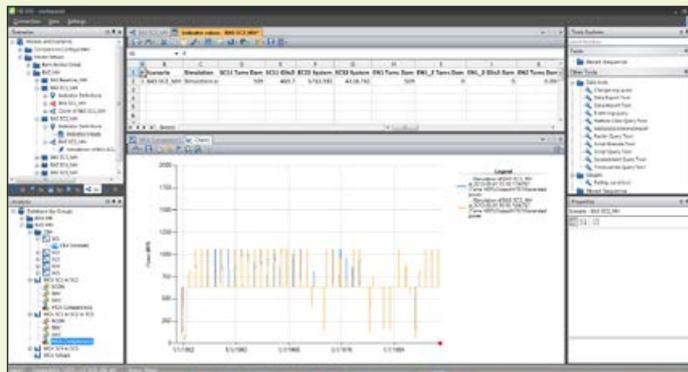
Attributes of the Nile Basin Decision Support System

The NB DSS has certain vital attributes that make it an effective platform for standardisation of analytical tools and procedures:

- It is based on generic work flow that is in line with recognised good practices;
- It guides the user to adopt this generic workflow, thereby contributing towards the adoption of common work flows;
- While the system can be applied over the entire range of water resources planning work flows, the user can apply its tools to any segment of the work flow such as data processing and modelling.

Other attributes are that it provides the necessary tools for:

- Data quality control and assurance;
- Documenting all user interactions with the system, which makes all transactions auditable, an important factor in trans-boundary and multi-country user settings;
- Transparent ways of incorporating stakeholders' preferences in water resources decision problems;



Application of the Nile Basin Decision Support System

- Transparent ways for quantifying the criteria for evaluating water resources management and development scenarios.

Designed to meet the requirements of complex water resources planning, the NB DSS provides a diverse range of tools for data processing, modelling, scenario management, optimisation, and multi-criteria decision making. It offers tools for integrating environmental, social, and economic objectives, thus facilitating water resources planning across different sectors.

Benefits

Some of the notable issues being explored using the NB DSS are:

- Understanding how the water resources system of the Nile Basin operates;
- Understanding the impacts of climate change;
- Analysing likely future scenarios;
- Understanding downstream impacts of upstream developments;
- Quantifying the benefits of coordinated management of storage dams;
- Understanding the trade-offs if hydropower dams are developed in the Blue Nile Basin in Ethiopia.

As a comprehensive analytical framework, the NB DSS offers a variety of instrumental features including:

- The software framework for storage, processing, interpretation, and visualisation of data;
- A suite of models for simulating river, lake, and reservoir systems;
- A toolset for analysing water resources problems and evaluating alternative scenarios;
- A suite of tools for generating information needed for decision making;
- A toolset for collaborative decision making in water resources planning and management.

Examples of successful application

The NB DSS is currently the analytical tool with the widest circulation among the NBI Member States. More than 100 licenses have been distributed in nine Member States with 300 more expected to be issued in 2015. With this level of uptake, the NB DSS is on track to become the standard tool for the Nile Basin, having been tested and applied within the Member States.

At the regional level, models created with the aid of the NB DSS have been used by NELSAP-CU to develop the Multi-Sector Investment Opportunity Analysis and by ENTRO to develop the Joint Multi-Purpose Programme.

The models were concurrently applied and expanded during the development process. This allowed the developers and users of these models to learn by doing and to fine-tune them along the way. At the same time, users too have been taught how to develop their own tools and models to address local needs.

In Uganda, the NB DSS has been used to develop the catchment management plan for the Awoja catchment of the Lake Kyoga sub-basin. The lessons of the Awoja experience are now being used in other catchments in Uganda.

Uganda's National Water Resources Strategy has also been formulated using the NB DSS, an experience that has given those involved unprecedented insights into the potential of the country's water resources and the impact they could have on its neighbours.

The application of the NB DSS has given the integrated water resources management philosophy practical meaning. In planning for the Awoja catchment, for instance, all stakeholders using and impacted by the Lake Kyoga sub-basin were involved in decision making and setting priorities. With the catchment management plan now in place, the focus has since shifted to the investment phase. Projects that have

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been mooted include mini hydropower dams, irrigation schemes, as well as domestic water supply and multi-purpose reservoirs for supplementary irrigation.

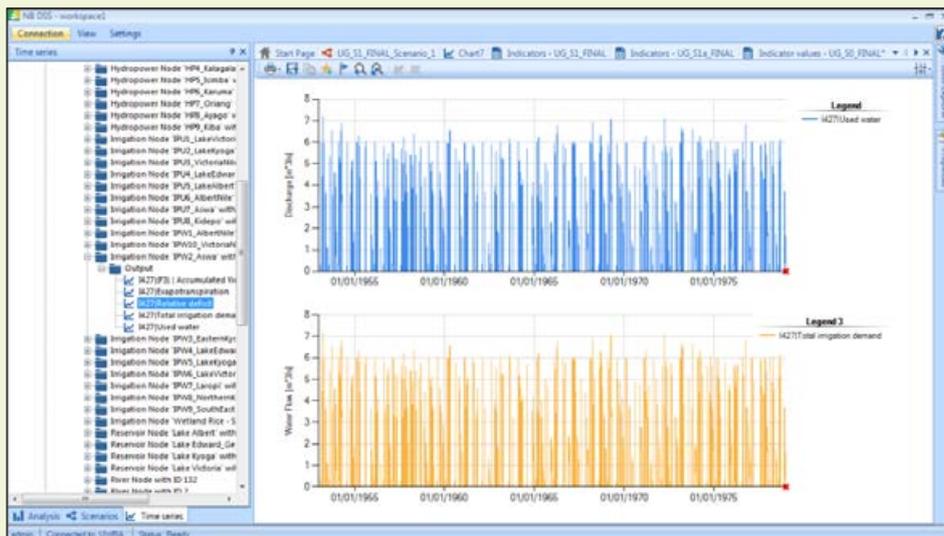
Stakeholders across a range of institutions in

Uganda are now applying the NB DSS to their own work. In addition to the line Ministry of Water and Environment, others are the Ministry of Agriculture, Animal Industry and Fisheries, the National Agricultural Research Organisation, and Makerere University.

"The NB DSS has given us good insights into what Uganda's water resources can do and the impact they can have on our neighbours," says Mr. Sowed Sewagudde, Ag. Assistant Commissioner in the Department of International and Transboundary Water Affairs, Ministry of Water and Environment. "With this tool, you can speak with your neighbours using a common language and you can secure your interests from an informed perspective."

The NB DSS has been applied to a pilot case on irrigation and hydropower development opportunities in the Lake Tana and Beles River basins in Ethiopia. Licenses have been allocated for use in the development of management plans for all catchments in Tanzania, and the tool has become the data handling software of choice for many users in the country.

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➔ Irrigation water use vs water demand.

Sustainability

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Proactively promoting the whole range of capabilities that the NB DSS offers is essential to ensuring the sustained adoption of its tools. Beyond modelling, the NB DSS has other functions such as data processing as well as applications that are relevant to the broader work of water resources planners.

As a case in point, users are encouraged to build on the NB DSS to develop their own tools and models that are tailored to the specific water resources planning challenges or issues they are dealing with.

Lessons learnt

Expanding and consolidating the user networks that have emerged in different NBI Member States is essential for institutionalising the knowledge that has been acquired.

As new users pick up the NB DSS and as advanced features are added, so does the need for continuous technical support. Accordingly, there is in place the NB DSS Help Desk that provides user community services to the growing number of licensees.

When its value is appreciated holistically, the NB DSS becomes integral to water resources planning processes. This mitigates the risk of it being treated as an additional burden or responsibility.

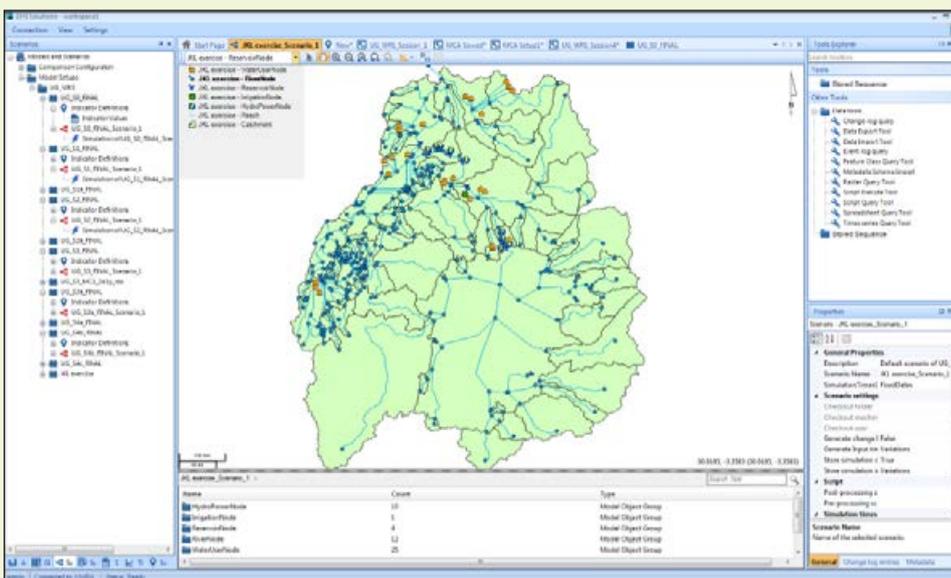
Expanding and consolidating the user networks that have emerged in different NBI Member States is essential for institutionalising the knowledge that has been acquired. It is the surest way to prevent the

erosion of knowledge and to guarantee that it is transferred to successive generations of users. But for this to happen, there has to be continuity and this would be helped if there were no constant changes among government counterparts.

Although the DSS offers a comprehensive suite of tools, they are not always fully exploited. The software tends to be associated primarily with modelling; yet it can also be utilised as effectively for data processing and other applications. Bringing these tools out to the larger 'market' of potential institutional users will encourage wider use by exposing the numerous analytical possibilities they present. For instance, most of the new licenses that will be distributed in 2015 will go to universities.

As a set of dynamic tools and applications, the NB DSS is continuously upgraded to improve its utility and regularly retooled for different purposes and changing needs. The downside to this constant upgrading is the challenge it poses when introducing new and advanced features to groups that include users with no experience of, or limited prior exposure to, the software. This challenge could in future be addressed through modularised training. This approach employs progressive learning packages for users at different levels of proficiency and exposure to the software.

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Uganda Water Resources Assessment Study.

Find out more...



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