The Nile Basin Decision Support System

Analytic tool for water resources planning jointly developed by Nile Riparians

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The Nile Basin

Basic data:
- Shared by 11 countries
- Area: 3.2 million km²
- Average annual discharge: ≈ 85 (+/-) BCM
- Population of basin countries ≈ 400 + Mill
- Population in the basin ≈ 230+ Mill

Flow contribution by regions
- 86 % from Ethiopian highlands; highly seasonal flows; > 70 % of flow in 3 months
- 14 % from Equatorial Lakes

- All flow generated most upstream; yet upstream parts least developed → growing population and economies upstream → pressure for development
- Downstream parts nearly totally dependent on flow from upstream; → concerns of possible impacts by upstream
- Balancing development in mutually beneficial manner for the riparians primary target of NBI
Cooperative management of shared waters

Need for Jointly developed tools…..

- Sustainable management of shared waters need cooperation among riparians at all stages— from planning to implementation to management and monitoring
- Joint planning and management of water resources measures (dams, canal, etc) should also be seen as confidence building activities
- Joint planning needs tools that are owned and trusted by all riparians
- Therefore, such tools need to be developed in a transparent and participatory manner
- Use of jointly developed tools can:
  - Help build confidence in planning outcomes
  - Foster technical collaboration (learning by doing)
  - Expand level of understanding of common issues,
- The Nile Basin Decision Support System (NB DSS) is analytic tool developed by the Nile riparians
The Nile Basin Decision Support System is a comprehensive analytical framework that offers:

- The software framework for storage, processing, interpretation and visualization of data
- Suite of models for simulating river-lake/reservoir systems
- Toolset for analyses of water resources problems, evaluate alternative scenarios
- Suite of tools for generating information needed for decision making
- Toolsets for collaborative decision making in water resources
Nile Basin DSS: Key Components

**Data/information management system**
- Time Series analysis toolkit
- Basic GIS functionality
- Integrated database
- Ensemble generator (for probabilistic analysis)

**Modeling System**
- Water balance and allocation model
- Rainfall-runoff modeling tools
- Hydrodynamic modeling
- Soil erosion process model
- Crop water requirement
- Model linking/nesting tool

**Decision making/Analysis tools**
- Scenario management (including indicator calculation)
- Multi-objective optimization
- Economic analysis tools
- Multi-criteria analysis tool
Nile Basin Decision Support System (DSS):

**Integrating environmental objectives in decision making**

A *response function*.. predicting fish = f(impoundment area,)

**DSS Script** implementing response function

**Environmental indicators** for each scenario
NB Decision Support System

Types of information it generates

Basin hydrology and Changes

Environmental, Social Economics Indicators

Environmental indicators

- **Footprint Areas**
  - Ecologically Sensitive Areas
  - Carbon emissions
  - Fisheries Production

- **Downstream Areas**
  - Floodplain/Wetland Area Inundated
  - Biological Production
  - Abundance of Pest Black flies
  - Bank Stability
  - Recovery Distance
  - Seasonal Shift

- **Water Quality**
  - Phytoplankton Growth Potential
  - Aquatic Macrophytes Growth Potential
  - Water pollution g/s

Food security and Livelihoods:

- Impact on Recession agriculture;
- Fish Productivity;

Displacement
What Nile Basin DSS it provides …

- **Multiple functionality** needed for water resources planning ranging from data processing to modeling, scenario analyses to multi-criteria decision making

- An **integrated framework**

- **Generic system that** can be applied at different scales

- **Data security**: multi-level user access control; data protection, metadata and change log to record history of data processing,

- **Expandable software architecture**

- **Multiple deployment options**: on institutional networks (LAN) or as single – standalone installation

- **A continuously evolving software system ...**
Catchment Planning using NB DSS

Case Study: Awoja Catchment, Uganda

**Objective:** to prepare a catchment management plan for the Awoja Catchment, Lake Kyoga sub-basin, covering

- Agreed investments in infrastructure and other interventions; and
- Water management interventions and actions

NBI Secretariat provides:
- Technical support to national project team and consultants
- Training to national project team