NB DSS Application, Ethiopian Case Study (by Belayneh Temesgen)

Description and challenges in the study area

The case study area is the upper part of Awash River Basin, sharing a boundary with Abay (Blue Nile) basin on South-Western side. The Awash River Basin is highly populated and complex river system involving many competing stakeholders; it joins the stream flows from the capital, the four regional states, and the City of Dire Dawa (self administrative city). The development of an operational DSS tool in the sub basin will greatly benefit the Awash River Basin Authority, the water resources administrator, in order to manage the basin water resources bit by bit through development of database and output of analytical tools by evaluating the temporal and spatial variability of water resources at the point of interest to determine the optimal and efficient allocation of water for the various developments. The selection of this particular area has a target of attracting the attention of the stakeholders and decision makers, who have also a large stake in the Abay (Nile) River Basin flows, on the NB DSS tool potential capacities to address the key water resources management issues of any basin.

Methodology and data set used

The study area is divided into 21 sub catchments for modeling purpose, the flow of un-gauged areas estimated by area proportion after infilling some of the gaps of the gauged catchments for a duration of 30 years (1982-2011).

The model calibration has been done before running the simulations of the other scenarios; the flows of the built model have been compared with the measured flows at hydrology gauging stations which are located downstream of irrigation demand abstractions.

The increased demand of Adam city is assumed to be double the demand in the base scenario; the flow time series below Koka dam is assumed as its operating rule and available flow for meeting the demands in the immediate downstream.

The demand nodes for irrigation, used in the models are 15 for base and 18 for the other scenarios; in addition to the cities' water supply demand nodes. The water resources utilization in the study-area has a serious problem of meeting the demands for irrigation; supply priorities are given to the cities.

Model output and NB DSS results representation

A bulk of time series data of flow, demands, priority, dams' properties, and others are stored in the models using the Mike Hydro modeling tool. The models are run and registered in NB DSS; *the impact of interventions on the flow of Awash River at Awash station is analyzed using the following Indicators.* The Indicators are evaluated using the scripts provided by NBI.

Flow Variability: Calculates median annual flow amplitude and compares with baseline.
Dry Low Flow: Calculates dry season median flow for three driest months and compares with baseline.
Wet Low Flow: Calculates wet season median flow for fringe months around wettest months and compares with baseline.

The results of the scenarios and the analyses in NB DSS showed that it is possible to improve the interventions that the crisis in the Awash sub-basin due to shortage, loss of electric power, and inefficient use, can be avoided. The management scenario formulated in NB DSS for the case study indicated how the deficit and the downstream flow decreases, the decrease in hydropower generated, and the social dissatisfactions can be improved, even without any additional water resources development. The Multi-criteria Analysis (MCA) in NB DSS have clearly explains the modified management can transform existing semi-traditional system handling by using a decision support tool; the same is true for other basins like Abay (Nile). Therefore we need to use NB DSS in Abay basin for better management of the water resources.