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A decision support system for water resources planning and management in the Nile basin

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The Nile River Basin covers about 10% of the African continent and is spread over ten countries (Burundi, Congo, Egypt, Eritrea, Ethiopia, Kenya, Sudan, Tanzania, Uganda, and Rwanda). Almost all Nile water is generated on an area covering 20 percent of the basin, while the remainder is in arid or semi-arid regions. Egypt and Sudan are almost totally dependent on the Nile for their water uses. And, most other Nile countries are close to water stress, if not already below the water scarcity threshold of 1000 m3 of water per inhabitant per year. Water stress is compounded by rapid population growth, occurring at twice the global average rate. Hence severe water scarcity conditions are looming over most Nile countries. Nile Basin economies are heavily depended on agriculture which accounts for more than half of the Gross Domestic Product and employs more than 80% of the workforce. However, the lack of water supply infrastructure, the variability of the climate, and the poor cultivation practices have seriously restrained, if not completely halted, economic growth.

These complex challenges are at the forefront of an unfolding initiative by the Nile Basin nations to set forth equitable and lasting water development and utilization agreements. The goal of this initiative is poverty alleviation and sustainable economic growth. Thus, water sharing is intended to facilitate the creation of efficient markets for food and energy and stimulate environmentally-sound industrial and economic growth. However, effective policy dialogue requires that the countries assess and weigh the benefits and impacts of various water development and management strategies accruing to themselves and to the other Nile partners. Pre-requisite elements in this process are the existence of an institutional cooperative framework, information and modelling systems, and the technical expertise to use them.

The Nile Decision Support System (Nile DSS) is the outgrowth of several projects

implemented in the course of the last 10 years. These were collaborative efforts of the Georgia Water Resources Institute at Georgia Tech, the Nile Governments and their agencies, and various international organizations including the Food and Agriculture Organization of the United Nations (FAO) and the World Bank. The Nile DSS includes planning and operational components developed for and used by individual countries as well as basin planners. Operational management systems have been developed and used in Egypt (High Aswan Dam) and Uganda (Lake Victoria), while a planning DSS was recently completed for all Nile countries. In this article, we highlight the Nile DST integrative design and present typical applications.