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Eastern Nile Water Resource Modeling: Strategic Perspective and Options Assessment of Upper Blue Nile (Abbay) River Basin Cascades Development

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The aim this study was to understand the future water development perspective in the eastern Nile region by considering the current water use situation and proposed reservoirs in the upper Blue Nile (Abbay) River basin in Ethiopia using simulation approach. Simulations was carried out on the basis of monthly time step and using historical ensemble time series data as representative of a possible near future scenarios during the implementation of all the reservoirs planned in upper Blue Nile. Series of existing and proposed cascaded water development projects in the upper Blue Nile were particularly considered in this study. Simulation result indicates the overall energy gain in Eastern Nile region increases by 258%. The upstream country Ethiopia can generate as much as 37268 GWh of Energy while the energy production in Sudan increases by 39%. Energy production may likely decrease by 10% in Egypt. The study concludes hydropower development in upper Blue Nile basin has insignificant impact on existing consumptive water uses downstream of the proposed development. The cascaded developments integrated with existing water resources systems have performance efficiency of above 92%. This study is an indicative analysis of the potential benefit of upstream Nile development without significantly affecting existing development in the Nile Basin. Further scientific analysis in this direction helps the Nile countries to reach in their pursuit to water use agreement.