The Impact of the Sudd wetland on the Nile Hydroclimatology

Dr. Yasir. A. Mohamed [1]

Abstract

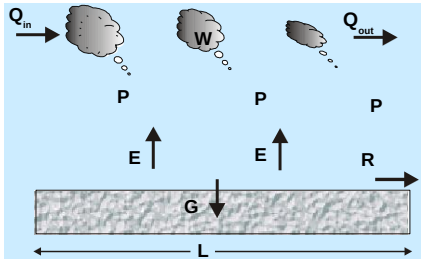
Climatology and hydrology are increasingly merged into one discipline – in particular at the river basin level – due to the coupled nature of the land surface-atmosphere interactions. Land surface processes – e.g., through evaporation – may affect atmospheric moisture transport, not only locally but also at continental scales. Similarly climate change influences river basin hydrology and water resources.

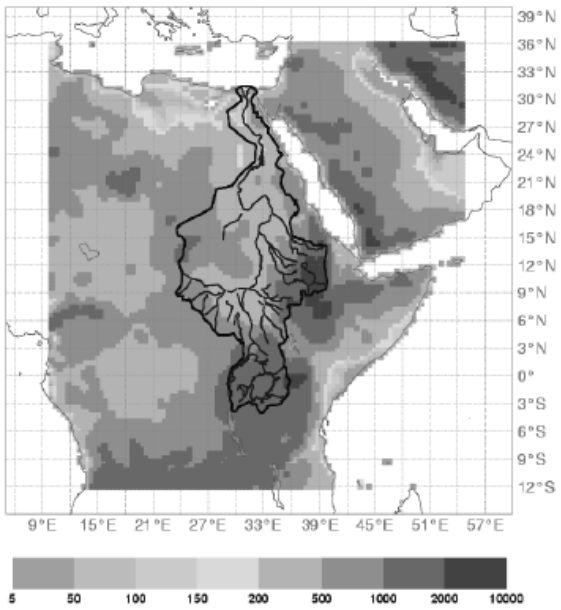
Large evaporation occurs over the Sudd wetland, huge swamps located on the Upper Nile. Historically, water resources planners have had the intention to reduce the Sudd evaporation by shortcut channels (e.g., Jonglei canal). The question is: what is the effect of draining the Sudd wetland on the regional water cycle, and on the Nile water flow?

Despite the importance of the Upper Nile wetland to the local environment, and as an expected supplier of additional Nile water, its hydrology and its interaction with the climate is not known precisely. How large is the wetland? How much does it evaporate? What is the impact on the regional hydroclimatology? These have been strongly debated issues over the last decades.

A Regional Atmospheric Climate MOdel (RACMO, KNMI The Netherlands) has been applied to the Nile Basin. Modest changes have been incorporated into the parameterization of the model for the orography, solar radiation, runoff and the soil moisture terms. Ground observations were used to evaluate model results including radiation, precipitation, runoff and evaporation data.

The validated model is used to study the impact of the Sudd wetland on the Nile hydroclimatology by comparing two model scenarios: the present climatology, and a drained Sudd scenario. The results indicate that draining the entire Sudd has negligible impact on the regional water cycle owing to the relatively small area covered by the wetland. The runoff gain would then be up to ~ 36 Gm^3/yr. However, the impact on local climate is large. The relative humidity will drop by 30 to 40% during the dry season, and temperature will rise by 4 to 6°C. The impact during the wet season is small.





[1]; y.mohamed@unesco-ihe.org; Hydraulic Research Station, MOIWR, P.O. Box 318, Wad Medani, Sudan