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A Blueprint for Adapting High Aswan Dam Operation to Challenges of Filling and Operation of the Grand Ethiopian Renaissance Dam

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Abstract

It is of utmost importance for Egypt, the most downstream country of the Nile River Basin (NRB), to re-assess the operation of High Aswan Dam (HAD), its faucet to the Nile flow, to planned transboundary dams, such as the Grand Ethiopian Renaissance Dam (GERD) on the Blue Nile. In this study, we present a modeling blueprint for adapting HAD operation under the impacts of filling/operation of the GERD based on water scarcity index called the Water Supply Stress Index (WaSSI). Our results indicate that the status quo conditions of the agricultural-based stress (WaSSIAG) downstream of the HAD are subjected to lower stressed system (average WaSSIAG=0.50) in the summer months (May through August) when HAD empties its storage to prepare for the Blue Nile rainy season. The analysis of different filling scenarios suggested that HAD will have to adapt its operation in summer months by elevating the downstream stress level (store more and release less), e.g., WaSSIAG=0.70, to moderate the effects of the GERD filling. Such adaptation will also help HAD to restore its normal operating level after GERD is completely filled (i.e., during GERD operation) in only 2 years compared to 7 years with no adaptation scenario. Our blueprint provides a tangible way forward for HAD to adapt its operation to a real-world transboundary challenge and maintain water security for Egypt.

Keywords: High Aswan Dam, GERD, Nile River, Water Supply Stress Index, Dam operation

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