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Optimal Power Production of GERD with and without Upstream Irrigation

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Abstract

The Grand Ethiopian Renaissance Dam (GERD), which is expected to generate a total annual energy of 15,692 GWh and yield an average annual power 1791 MW is located at the Ethio-Sudan boarder. Ethiopia is expected to develop its potential irrigation area for enhancing the food security situation in the country. This may conflict with the performance of power production and total energy generation from GERD. This study assesses the potential impact of upstream irrigation development on the intended power production of GERD based on hypothetical abstraction scenarios of 5 to 12.5 BCM. The results indicate upstream irrigation abstraction between of 5 BCM to 12.5 BCM may reduce average annual power production from 1713 MW to 1140 MW and the total annual energy production from 15030 GWh to 9985 GWh. It means annual power production and total energy generation may reduce within the range of 12% to 33% regardless of the hydrological condition. The release from the reservoir may reduce from 10 to 25%. This study may help contribute in determination of dependable flow releases and set threshold flows on the ongoing negotiation in the long term operation of the dam.

Keywords: GERD, Abstraction, Power, Energy, Dependable flow

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