

## **Water Resources account of Egypt vs Ethiopia's Nile Sub-basins: The Utility of the Concept of Water Budget**

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### **Abstract**

Following the construction of Grand Ethiopia Renaissance Dam, the hydroelectric dam meant to generate electricity, Ethiopia and Egypt are having disputes over the Nile water resource. Egypt alleges that Nile water is the "only" freshwater source, and hence considers Ethiopia's dam as existential threat. Whereas for Ethiopia, the dam is the energy source that would electrify and light one of the darkest countries in Africa and the world. Therefore, this article applied the concept of hydrologic water budget to investigate annual net and reserve water of the Nile basins in the two countries so as to verify if indeed Ethiopia has plentiful alternative freshwater resources, Nile water is the Egypt's sole freshwater source and the dam is an existential threat. Accordingly, Ethiopia's Nile river sub-basin receives 456.6 billion cubic meter (BCM) of water as rainfall while losing 443.3 BCM of water as Nile river outflow and evapotranspiration. The resultant net water storage is, therefore, 14 BCM per year, which is only 4% of the rainfall it receives. On the other hand, Egypt receives 106 BCM of water as Nile river input, rainfall, groundwater extraction, and desalinization; and is losing only 51 BCM of water as evapotranspiration. The net annual water storage for Egypt is, therefore, 55 BCM, indicating a clear hydrologic advantage of Egypt over Ethiopia's. Secondly, owing to the reservoir of Aswan Dam, Egypt also has advantageous water reserves. There is 108 BCM more surface water reserve in Egypt's sub-basin compared to Ethiopia's 30 BCM. Thirdly, Egypt's 63,200 BCM groundwater reserve is approximately, 400% higher than Ethiopia's 12,730 BCM groundwater reserve. Lastly, Egypt has an infinite access to coastal water, which up on desalination can provide unlimited domestic water supply, the resource that Ethiopia has no access to, as a landlocked country. Consequently, it is verified that Egypt has an overwhelming water resource advantage, and that Nile water is not the only freshwater source, and so the dam is not remotely Egypt's existential threat.

**Keywords:** Water budget, Hydrologic input, Hydrologic output, Water balance, Grand Ethiopian Renaissance Dam (GERD), Egypt, Ethiopia

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