ASL1200S GROUP PROJECT

ADDRESSING THE TENSIONS SURROUNDING THE GRAND ETHIOPIAN RENAISSANCE DAM

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1 INTRODUCTION

Figure 1: The Grand Ethiopian Renaissance Dam

The Grand Ethiopian Renaissance Dam (GERD) embodies one of the most ambitious hydropower undertakings in Africa, promising Ethiopia with an essential source of renewable energy and a boost in its development (Olumide, 2019). It dams the Blue Nile just before it crosses the Northern Ethiopian border into Sudan, effectively leaving the water supply of all downstream countries at the will of Ethiopia (Tadesse, 2017). These downstream countries are heavily reliant on the Nile River for agriculture, drinking water and electricity generation, with Egypt relying on the Nile for 90% of its freshwater needs (Hassan, 2022). The dam has become a topic of friction amongst the three nations of Egypt, Sudan and Ethiopia.

Figure 2: Location of the GERD

Consequently, there have been long, unsuccessful attempts to reconciled Ethiopian energy needs with Egyptian and Sudanese water security, resulting in the potential for regional destabilization and subsequent political and economic instability. Our solution is through cooperation and scientifically backed intervention. The way we propose to do this is through the establishment of the Nile Hydropower and Water Security Commission, which would manage everything from the sustainable daily operation of the dam to mediating disputes between member nations and overseeing water sharing policies.

2 LITERATURE REVIEW

The conflict-of-interest stems from historical water agreements, regional insecurity and the broader impacts of globalization. The following five sources provide key information in the context of our problem and provide examples of how other regions tackled similar issues, forming the basis of our solution.

2.1 TADESSE (2017), WATER, POWER AND POLITICS IN AFRICA

This source focuses on colonial-era Nile water treaties which often stressed on countries near the mouth of the river, like Egypt and Sudan, as opposed to countries closer to the source, like Ethiopia. These agreements are the basis of Egypt's argument, stating that it has "historical rights" over the Nile, something that Ethiopia rejects. According to Tadesse, equitable water distribution is the key to regional stability.

2.2 MITCHELL (2021), GLOBALIZATION AND WATER RESOURCE CONFLICTS

Globalization has exacerbated tensions of natural resources, particularly shared water bodies such as the Nile. Mitchell shows how economic interdependence and external investments in projects of a similar nature to the GERD can make disputes harder to resolve.

This is because global powers tend to polarize behind different nation's claims, complicating regional diplomacy.

2.3 OLUMIDE (2019), HYDROPOWER IN AFRICA: CHALLENGES AND OPPORTUNITIES

A successful story for cross-border cooperation in relation to hydropower projects in Africa is the Lesotho Highlands Water Project: an example that this article centralizes on. Although its local impact is controversial, the LHWP is an example of international cooperation done right. Despite this, Olumide warns of the need for strong regulatory frameworks and community inclusion, a goal our proposal aims to achieve as well.

2.4 NGUYEN (2020) CLIMATE CHANGE AND WATER SECURITY IN THE NILE BASIN

The Nile is part of a broader ecological system, one that would be affected by changes in the Nile and one whose changes would affect the Nile. For instance, a change in rain patterns can affect the river in ways we may not know of, a claim that Nguyen makes in this article. He further states that adaptable and flexible solutions like the proposed NHWSC are essential to prevent crises related to extremes in water availability.

2.5 HASSAN (2022), STATE FRAGILITY IN EGYPT AND SUDAN: THE ROLE OF RESOURCE SCARCITY

Hassan explores the role of resources scarcity and political instability in seeding conditions ripe for conflict in Egypt and Sudan. Considering their climate, they are highly sensitive to changes in their water supply, demonstrating their need for external, neutral bodies like the proposed NHWSC to mediate and implement long-term solutions.

3 DETAILED DESCRIPTION OF THE PROPOSED INTERVENTION

To allow for the entire region to reap the benefits of the dam as opposed to having only one country do so, we will create a multilateral body that will mediate the management of the dam, and the energy is generates. Our solution is cooperation and data-driven and will be called the Nile Hydropower and Water Security Commission, working on a cooperative government framework with the goal of building trust and transparency between the 3 nations, a crucial objective to ensure sustainable use of the GERD and prolonged regional peace.

One of the key tasks of the commission is to manage water release schedules from the GERD such that the filling and operation of the dam would not handicap downstream nations. It will do this using hydrological data and predictive models to determine the best times that the dam would release or store water, considering various factors such as seasonal variations, rainfall and agricultural demand in Egypt and Sudan. In doing so, Ethiopia will be able to benefit from the dam without Egypt and Sudan having to pay the price for it (Olumide, 2019).

The GERD exists to solve a key problem in Ethiopia: its acute energy shortage. Being one of the largest hydroelectrical dams in the world, the NHWSC will also mediate the sale and export of excess energy that it generates to other nations in the region, which is mutually beneficial. This will foster economic interdependence, where all 3 countries fully benefit from the GERD, reducing the likelihood of conflict involving damage to it.

Regardless of political conflict of interest, the GERD is a huge project, and it is the responsibility of the NHWSC to ensure that its adverse ecological impact is kept to a

minimum. Independent experts and local scientists will be responsible for monitoring water quality, soil erosion, and health of aquatic life. This environmental focus is critical for maintaining the long-term sustainability of the Nile River Basin (Hassan, 2022).

4 MATERIALS AND IMPLEMENTATION

4.1 MATERIALS REQUIRED

A range of technical equipment, communication infrastructure and human resources will need to be installed to allow the data driven aspect of the NHWSC and GERD's operation to be smooth and effective. This includes:

1. **Hydrological Data Sensors**
   These are to be placed along the Nile to monitor water levels, rainfall and flow rates in real time. This data is the basis for the entire predictive hydrological model.

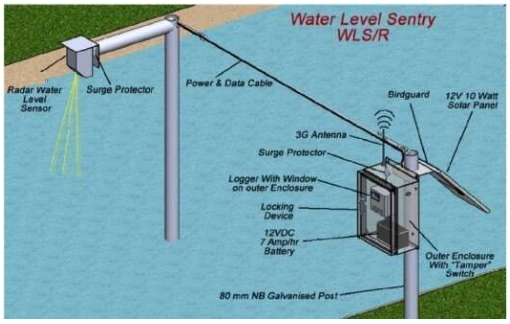

Figure 3: Hydrological Data Sensors

2. **Satellite Communication Systems**
   This is necessary to link all 3 offices of the NHWSC in the respective national capitals of Addis Ababa, Cairo and Khartoum together with all the monitoring stations and the GERD control centre, to allow each party the ability to contribute to decision-making in real time.
3. **Solar Backup Systems**
   These are essential to provide uninterrupted power to the NHWSC, since nature does not take a break just because of a power outage, and decisions may still need to be made during times of outage.
4. **Office Infrastructure**
   Offices will need to be built in each country that is a part of the NHWSC.

4.2 COST BREAKDOWN

The estimated total cost of the establishment of the NHWSC is broken down departmentally. At a price of USD 15 000 per unit, and a further USD 3 000 for installation, hydrological sensors are to be placed strategically along the Blue Nile. Including maintenance for a year, the subtotal for data measurement will be around USD 300 000.

To transmit data recorded on the sensors, the satellite transceivers will cost USD 10 000 each, for a total of 10 transceivers. Storing all the data will require data centres that need USD 20 000 per centre to be setup. A satellite service subscription will be needed by the NHWSC at a cost of USD 15 000 per year for a subtotal of USD 150 000.

To always ensure power to the system, backup power arrangements will be needed. Each solar panel, for a total of 20, will cost USD 7 000 each and will power the sensors and NHWSC offices. Batteries for these solar cells cost USD 3 000 per unit, and an additional USD 20 000 per unit to install and USD 2 000 per unit per year to keep running, bringing the total cost for energy to USD 200 000.

Office space in each national capital will cost around USD 20 000 per year to rent, inclusive of utilities, internet access and stationery. Each office requires a team of at least 15 members, consisting of hydrologists, engineers, environmental scientists, diplomats and

administrative personnel, whose roles will vary, and so will their salaries. Inclusive of travel and accommodation costs, the subtotal for this section will be USD 500 000. This is also the most expensive section of the operation of the NHWSC.

For environmental preservation, local environmental experts would periodically conduct impact assessments on the surrounding ecosystem, costing roughly USD 10 000 per year. They require advanced equipment and software which bills to USD 30 000. Furthermore, environmental reviews will be conducted twice a year at a cost of USD 20 000, costing the NHWSC USD 100 000.

Summing all costs up, in the first year of its operation, the NHWSC is expected to use up USD 1 250 000.

4.3 IMPLEMENTATION PROCESS

The implementation is expected to take up to a year, being characterized by 4 key milestones, each spaced 3 months apart.

PHASE 1 (MONTHS 1 TO 3)

This is the initial setup phase, where headquarters are established in each national capital, experts are hired and allocated office space, and the final operational framework of the organization is put in place.

PHASE 2 (MONTHS 4 TO 6)

This will encompass the installation of equipment and the calibration of infrastructure critical to the data driven models of the NHWSC. Remote communication networks will also be put in place to link all member countries. To boost trust in the new organization, public outreach campaigns can be launched. Labor for this will be primarily drawn from local populations.

PHASE 3 (MONTHS 7 TO 9)

Water management protocols, and water release schedules will be finalized and energy sharing agreements will be negotiated between member nations.

PHASE 4 (MONTHS 10 TO 12)

The NHWSC will reach full operational deployment in this phase, monitoring water levels and environmental conditions in the Nile Basin. Adjustments will be ongoing to achieve optimal hydropower production and the NHWSC will commence the distribution of electricity to other nations in the region.

5 CONCLUSION

The proposed Nile Hydropower and Water Security Commission represents a detailed potential solution to the ongoing GERD conflict. It is designed to incentivize cooperation through economic interdependence, hence anchoring regional stability so that everyone benefits from the GERD. It uses real-time data to adjust and always maintain the best possible solution. It builds on successful examples like the Lesotho Highlands Water Project, ironing out its imperfections, to offer a roadmap for what is one of Africa’s most critical water resources (Tadesse, 2017; Olumide, 2019).

6 REFERENCES

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