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## THE EFFECTS OF NILE WATERS AGREEMENTS ON DAMS' PROJECTS AND JONGLEI CANAL IN SOUTH SUDAN

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## 1.0 ABSTRACT

Construction of dams in South Sudan is connected to 1959 Nile Waters Agreement. The agreement gave Egypt and Sudan rights over other riparian's states and stipulated that they might be consulted on any project using Nile River waters outside the borders of these two countries. Furthermore, the agreement erroneously proposed the Jonglei Canal to channel "lose" water from the Sudd area in South Sudan to the Nile stream in favor of Egypt. The study found that the continuation of the Jonglei Canal and construction of any dams without water resources details and clear waters allotted to South Sudan is complicated. The paper focuses on the effects of Nile waters agreements on dams' projects, and the impacts of the Jonglei Canal in South Sudan, in addition to position of South Sudan on the 1959 Agreement, the CFA and diplomatic ties with Egypt and Sudan

Keywords: Nile River, White Nile, water resources, Nile Water Agreements, Jonglei Canal, Dams, Nile Basin

## 2.0 INTRODUCTION

Fighting over utilization of water resources is not a new phenomenon in the Nile basin region. Weather conditions, such as less rainfall and reduction in food production have deepened water demand. Other factors, like rapid population, economic growth, and urbanization, have increasingly doubled the need for water supply (Swain 2011).

Between 1891 and 1959, the colonial powers, Egypt and Sudan have produced agreements to fully utilize Nile waters (Mc Caffrey 1993). However, after the colonial era, the effects of these agreements remained, which triggered conflict over usage of the waters. The 1959 agreement remains the only valid document that governs the usage of the waters in the Nile basin countries (Adamsu 2020).

During the past two decades, the Nile Basin region has witnessed major developments. In 1999, the Nile Basin Initiative (NBI) was established as an attempt to bring all Nile basin countries towards more cooperation on the usage of water resources. In 2010, the Cooperative Framework Agreement (CFA) was partially signed by some Nile basin countries. Unfortunately, tensions among upstream and downstream countries remained unresolved, particularly on how to use the Nile waters (Swain 2011).

In 2011, two developments occurred, that include South Sudan emerged as a new riparian state in the region and the commencement of construction of the Grand Ethiopian Renaissance Dam, (GERD). Moreover, in 2015, the Declaration of Principles (DoP) was signed in Khartoum between Egypt, Sudan, and Ethiopia as an initial approval to construct GERD (DoP 2015).

Egypt has been raising concerns over the waters lost through evaporation in South Sudan. Thus, the continuation of the Jonglei Canal digging in the Sudd area has been recently resurfacing on Egyptian media. The digging of the Canal started in 1978 to channel the waters lost in the swampy Sudd area to Egypt, however, the work stopped in 1984 after the civil war broke out in Sudan (Allam, 2018).

It is also argued that some of the positive aspects of the Jonglei Canal project included addressing effects of poverty and underdevelopment among the inhabitants of the area. However, the negative impact of the Canal remains the loss of the largest conservation and ecological system in the world in addition to social implications to the inhabitants. The reopening of the Jonglei Canal settlement may not be discussed separately from a renegotiation of water sharing agreement in Nile basin countries (Lamberts, 2009)..

### 3.0 CONFLICT OVERUTILIZATION OF NILE WATER RESOURCES

Conflict over utilization of the Nile water started outside the Nile basin countries during the colonial era between Britain, Italy, and France. In fact, between 1891 and 1925, these three colonial powers struggled to control the Nile basin waters. And by 1925, Britain managed to exclude the other two countries in the eastern Africa and from Nile waters affairs. The reason behind the British influence in the region was the cotton discovered in Egypt and Sudan to supply textile mills in Britain (Swain 1997). The first Nile water agreement involved Egypt as the Nile basin country signed in 1929. In this agreement, the annual Nile water flow of (84) billion cubic meters was divided between Egypt (48) billion cubic meters and Sudan (4) billion cubic meters (Mohamed 1984).

The 1959 agreement re-divided Nile waters shares between Egypt and Sudan. For instance, (55.5) billion cubic meters for Egypt and (18.5) billion cubic meters for Sudan. The agreement allowed Egypt to build the High Aswan Dam and Sudan to build Roseires Dam (Mohamed 1984). The Aswan Dam construction started in 1960 and finished in 1971, while Roseires Dam began its construction in 1961 and was completed by 1966. The 1959 agreement however, complicated the usage of the Nile water in the riparian states and, therefore, these states decided not to adhere to the agreement after their independence (Mohamed 1984 & Swain 1997).

In 1999, the Nile Basin Initiative (NBI) was established to include nine (9) countries, Tanzania, Uganda, Rwanda, Burundi, the Democratic Republic of Congo, Kenya, Ethiopia, Sudan, and Egypt. In July 2011, South Sudan broke away from Sudan and was declared as an independent state which brought the number of the Nile basin countries to ten (10). The initiative's main objective was "to achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile Basin water resources" (Swain 2002).

Still there is no available document agreed upon by all Nile basin states despite the signing of the Cooperation Framework Agreement (CFA). The document was signed by the seven (7) states Ethiopia, Uganda, Tanzania, Rwanda, Democratic Republic of Congo (DRC), Burundi, and Kenya (CFA 2010). Egypt and Sudan did not sign because they have a reservation that the CFA does not protect their historical rights on the Nile waters (Swain 2011). Egypt and Sudan keep referring to the 1959 agreement as a document securing their historical rights and full utilization of Nile waters. They believe that upstream countries should always consult them in any projects that involve Nile waters (Peguita 2020).

## 4.0 WATER RESOURCES IN SOUTH SUDAN

Water resources in South Sudan are estimated to stand at (76) billion cubic meters which include surface and ground waters. The sources of surface water are White Nile River, Sobat River and their tributaries. Unfortunately, 50% of the 26 billion cubic meters of water flow through the White Nile River are lost in the Sudd area (FAO 2015 and Salman 2011). White Nile and its network of tributaries account to on 14% of River Nile water, while the Blue Nile accounts for 86% of Nile water. This makes any water infrastructure along the White Nile relatively less contentious.

It is worth mentioning that, water resources were not discussed under the protocol of wealth sharing in the Comprehensive Peace Agreement (CPA) signed in 2005 (CPA 2005). South Sudan may claim its waters share from the 1959 Nile Agreement that allotted (18.5) billion meters cubic of Nile waters to Sudan. Up to this stage, South Sudan, as the latest member of the Nile basin country, has not yet made an independent position regarding the 1959 Agreement and the CFA.

More studies need to be conducted as data on water resources are continuously fluctuating. Water resources information is important to determine the terms of the future waters agreements between South Sudan and Sudan and indeed with the rest of the Nile basin countries.

## 5.0 EXISTING DAMS IN THE NILE RIVER

Over a century and a half ago, many dams were built in the Nile Basin countries for irrigation, water flow regulation and flood control. However, after the 1959 Nile waters agreements, Egypt, Sudan, Ethiopia, and other Nile basin countries built hydroelectricity dams (Table 1). The 1959 agreement gave veto rights and full utilization of the Nile waters to Egypt and Sudan. In fact, the two countries agreed to negotiate as one team against any upstream state claiming for Nile waters in the future. Since the establishment of the NBI and the signing of the CFA, many Nile basin countries have proposed plans to construct dams for irrigation and electricity generation (NBI 2001). To mention some, Ethiopia, Sudan, and South Sudan. There are as well dams for electricity generation under construction such Grand Ethiopian Renaissance Dam (GERD), Karuma in Uganda and Ewsao Ngiro in Kenya..

**TABLE 1. EXISTING DAMS IN NILE RIVER**

S/N	DAM'S NAME	YEAR OF CONSTRUCTION	TYPE	CAPACITY (MW)	COUNTRY
4	Aswan Low Dam	1902	Irrigation	592	Egypt
6	Aswan High Dam	1970	Electricity	2100	Egypt
8	Sennar	1925	Irrigation	65	Sudan
9	Jebel Aulia	1937	Irrigation	17	Sudan
10	Kashm el Girba	1964	Irrigation	10	Sudan
11	Rossires	1966	Electricity	280	Sudan
12	Merowe	2009	Electricity	1250	Sudan
13	Owen Falls	1954	Electricity	380	Uganda
14	Tekeze	2009	Electricity	300	Ethiopia
15	Tana Beles Link	2010	Electricity	460	Ethiopia

Source: (Whittington, Waterbury, and Jeuland, 2014)

## 6.0 HYDROPOWER POTENTIAL IN BAHR EL – JEBEL (WHITE NILE)

Hydropower potential in Bahr el – Jebel, a combination of four schemes located between 38 km and 138 km downstream of the Nimule landing were identified as having significant potential. These schemes consisted of dam and associated power stations.

The Nile is among the longest rivers on earth and Bahr el – Jebel is a significant on this river. The White Nile River originates at Lake Albert in Uganda and flows some 225 km across the Ugandan plain to Nimule on the South Sudan-Uganda border. At Nimule the Nile River starts its descend into the South Sudan basin. It flows initially North West along a tectonic lineament for around 75 km before turning gradually to the North and then North East at Rejaf some 150 km downstream from Nimule. Below Rejaf, it reaches the alluvial plain where it widens and braids out and flows past Juba around 168 km downstream Nimule.

The climate in the region is seasonally hot and wet and is tropical as the area is close to the equator. The wet season is normally between June to October with annual rainfall ranging from up to 700 to 1000 mm. The dry season is typically between November and May. The humidity increases from January onwards before the rains come in June. The annual variation in the temperature range from 18 OC to 44 OC and the region is generally hot all year round.

## 7.0 PROPOSED DAMS IN BAHR EL – JEBEL (WHITE NILE)

Four sites were identified for hydropower generation: Fula Dam, Shukoli Dam, Lakki Dam and Bedden Dam. Fula Dam lies 36 km downstream of Uganda border, Shukoli Dam 52 km from Uganda border, Lakki Dam located at 77 km from Uganda border and, Bedden Dam location is at 136 km downstream of the Uganda border (Table 2).

**TABLE 2 PROPOSED DAMS ON BAHR EL – JEBEL SOUTH SUDAN**

S/N	DAM'S NAME	TYPE	CAPACITY (MW)	COUNTRY
1	Fula	Electricity	1080	South Sudan
2	Shukoli	Electricity	250	South Sudan
3	Lakki	Electricity	420	South Sudan
4	Bedden	Electricity	720	South Sudan

Source: (2010, Bakenaz, 2013, and Lemi, 2018)

The sequence of selection of dam development depends on marginally the lowest installed capacity out of the four proposed dams. It is expected that Bahr el – Jebel power projects would supply Juba Regional Grid, which cover connections to Juba and other nearby towns. However, power generation in any proposed dam in Bahr el – Jebel would be far in excess of the demand of the Juba Regional Grid. Therefore, Juba Regional Grid would be left with no option than to connect to neighboring countries.

The load forecast for South Sudan is doubtful, especially if the potential for development of industries, agriculture, and the domestic sector with higher wealth from benefits of oil found in South Sudan is considered. Also, the impact of minimal town planning in South Sudan on infrastructure reserve corridors makes it impractical to run out extensive distribution networks to allow significant load growth in the near future.

Hence, it is important to understand whether, in reality, there is a skewed demand growth and at what degree. Such a study would have far consequences on the planning of Bahr el – Jebel and also on development of the South Sudan transmission system. Market survey, specifically for Juba and the whole country, needs to be carried out to assess the current and future electricity demand.

## 8.0 THE JONGLEI CANAL PROJECT

Since 1959, Egypt has consistently endeavored to increase its share of Nile waters in Sudan after the Addis Ababa Agreement (AAA 1972). As a result, Egypt managed to convince Sudan's government to start Nile water projects in the current state of South Sudan. In 1976, the Jonglei Canal was initiated based on the 1959 Nile Waters Agreement to decrease the White Nile's loss while it passes through the Sudd swamps in the then southern region of Sudan. The construction of the Canal commenced in 1978 but stopped in 1984 after the eruption of civil war in 1983. The construction continued up to 240 km and only 120 km remains to finish the canal (Allam, 2018).

El-Moghraby and El-Sammani (1985) and Collins (2002) have listed benefits of the Jonglei Canal including, but not limited to, minimizing water losses through evaporation, control of floods, and improving living standards of the local population through agricultural and industrial development. However, some writers observed some implications of the projects on flora and fauna, increased fighting between different ethnic groups over the pastures, reduction of rainfall, and transformation of the area into a desert (de Mabior 1981, Howel et al. 1988, Ahmed 2008 and Collins 2002).

## 9.0 CONCLUSIONS

Dams for electrical generation are essential to meet the badly needed electric energy in South Sudan. Initial studies identified hydro sites such as Bedden, Shukoli, Lakki, and Fula for electricity generation (Lemi 2018). Based on the 1959 Nile Waters Agreement, Egypt and Sudan may use their veto rights on any project in the White Nile River (Adamsu 2020).

So far, no agreement about water share to South Sudan and it is not clear if it will renegotiate the division of Sudan's water share of (18.5) billion cubic meters.

Therefore, it is recommended that a feasibility study (including environmental and social impact assessment (ESIA)) should be conducted before resuming construction of Jonglei Canal or construction of any dam. The feasibility study will provide answers to any potential adverse environmental impact of the Canal on humans, plants, and animals. Another benefit of the study is that it will enhance public participation and consequently improve public perception leading to better diplomatic ties between South Sudan, Egypt and Sudan.

Interestingly, Allam et al 2018, and Allam, 2018, have concluded their studies that the Canal will increase the annual flow of the river Nile by 4% in Egypt. A detailed document on water resources in South Sudan needs to be produced. Thereafter, South Sudan's position about the 1959 agreement, the CFA, and the Jonglei Canal should be provided.



## REFERENCES

- Addis Ababa Agreement (1972). The Problem of South Sudan (1972). Retrieved from <https://peacemaker.un.org/sudan-addisababa-southsudan72>. Accessed April 2021.
- Admasu E (2020). Cooperation over the use of Nile water resources: The only option for peaceful Coexistence. Vol (7): No.2, pp. 3-9.
- Allam M, Elzawahry, Bekhit H, and Allam M. (2018). Jonglei Canal Project under Potential development in the Upper Nile States. *Journal of Water Management Modeling* 26: C448.
- Allam, M. N., Allam, G. I. (2007). Water Resources in Egypt: Future Challenges and Opportunities. *Water International*, Vol (32): No. 2), pp. 205-218.
- African Dams Briefing (2010). African Dams Briefing, International Rivers, June, [www.internationalrivers.org/files/AfrDamsBriefingJune2010.pdf](http://www.internationalrivers.org/files/AfrDamsBriefingJune2010.pdf), accessed April 2021.
- Cooperative Framework Agreement (2010). Retrieved from <https://nilebasin.org/nbi/cooperative-framework-agreement>. Accessed April 2021.
- Comprehensive Peace Agreement, (2005). Retrieved from <https://peacemaker.un.org/sites/peacemaker.un.org/>. Accessed May, 2021.
- Collins, R. O. (2002). *The Nile*. Yale University Press, New Haven, CT.
- De Mabior J (198). Identifying, selecting, and implementing rural development strategies for socio-economic development in the Jonglei Projects Area, Southern Region, Sudan. doctoral dissertation, Iowa State University the USA, page: 44-60.
- Declaration of Principles (2015). Retrieved from: <https://hornaffairs.com/2015/03/25/egypt-ethiopia-sudan-agreement-on-declaration-of-principles-full-text/>. May 2021.
- El Moghraby, A. I. and M. O. el Sammani. 1985."On the Environmental and Socio-economic Impact of the Jonglei Canal Project, Southern Sudan." *Journal of Environmental Conservation* 12 (1): 41-8.
- FAO (2015). AQUASTAT - FAO's Global Information System on Water and Agriculture. Country – Profile South Sudan. Retrieved from <http://www.fao.org/aquastat/en/countries-and-basins/country-profiles/country/SSD>. Accessed May 2021.
- Howell, P., M. Lock, and S. Cobb. 1988. *The Jonglei Canal: Impact and Opportunity*. Cambridge: Cambridge University Press.
- Lemi L (2018). Co-supplying the national grid: an assessment of private electricity generation and the potential of solar photovoltaic (PV) integration in Juba- South Sudan. Master Thesis, Budapest. Master Thesis submitted to the University of Twente, The Netherlands.
- Lamberts E (2009). The effects of Jonglei Canal operation scenarios on the Sudd swamps in Southern Sudan. Master Thesis submitted to the University of Twente, The Netherlands.
- Mohamed O (1984). Conflict and Cooperation, in Mohamed Ali Beshir (ed), *the Nile Valley Countries and Change*, volume 2, Khartoum: Institute of African and Asian Studies, University of Khartoum Press.
- McCaffrey, S.C (1993). Water, politics, and international law. In: P.H. Gleick, ed., *Water in crisis: A guide to the world's freshwater resources* New York: Oxford University Press, 94.
- Peguita E (2020). The Nile water dispute – International legal aspects, *advances in social sciences and humanities research*. Vol (498).
- Swain A (2002). The Nile Basin Initiative: too many cooks, too little broth. *SAIS Review*, 22 (2), 293–308.
- Swain A (2011). Challenges for water sharing in the Nile basin: changing geopolitics and changing climate, *hydrological sciences Journal*, Vol (56): No. 4.
- Salman A (2008). The new state of South Sudan and hydro politics of the Nile basin. *Water International*. Vol. (36): No. 2. 154-166.
- Swain A (1997). Ethiopia, Sudan, and Egypt: The Nile River Dispute, *Journal of Modern African Studies*, 34, 4, 675-694.



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