



THE SUDD INSTITUTE

RESEARCH FOR A PEACEFUL, JUST AND PROSPEROUS SOUTH SUDAN

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To dredge or not to dredge the White Nile's tributaries: is the cart before the horse?

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1. Introduction

Social media is teeming with mixed reactions to Egypt's plan to dredge the Bahr el Ghazal River to reduce the flood risks in South Sudan.¹ In addition to the mixed public reactions, South Sudanese officials continue to contradict one another in the media, signifying lack of consensus on the project within the government.² The Press Secretary in the Office of the President said the President was not aware of the project.³ The Minister of Environment and Forestry said the move to dredge the Bahr el Ghazal River was "illegal," adding her Ministry was not notified to conduct environmental and social impact assessments as required by national laws and best international practices.⁴ The Ministry of Water Resources and Irrigation, in a press release, stated the project is intended to reduce flood risks in Unity State which has been devastated by flooding in the last 3 years. Unity State Minister of Physical Infrastructure, Lands, Housing, and Public Utilities, Honorable Lam Tungwar Kueiwong, said the project is an initiative of the National Ministry of Water Resources and Irrigation and that it is intended to address the flooding. Taken as such, it is clear the public and the institutions are divided over this issue.

To resolve this controversy, we argue that the government should suspend the project and commission credible feasibility studies focusing on environmental and social impacts to generate evidence-based solutions to flood and other climate change induced shocks and stresses. In the subsequent pages, we explain why the dredging should be suspended for now

¹ See Eye Radio, (June 3, 2022). Government receives Egyptian dredging machines to clear Nile tributaries, <https://www.eyeradio.org/govt-receives-egyptian-dredging-machines-to-clear-nile-tributaries/>

² See Radio Tamazuj. 2022. Government officials contradict each other over river dredging equipment, project <https://www.radiotamazuj.org/en/news/article/government-officials-contradict-each-other-over-river-dredging-equipment>

³ See Eye Radio, (June 7, 2022). Kiir's office says gov't "didn't" approve clearing of Nile tributaries, <https://www.eyeradio.org/kiirs-office-says-govt-didnt-approve-clearing-of-nile-tributaries/>

⁴ See Eye Radio, (June 8, 2022). Ministry of Environment declares planned dredging illegal <https://www.eyeradio.org/ministry-of-environment-declares-planned-dredging-illegal/>

until credible studies are conducted, subsequently determining the next necessary policy actions in response to the nagging floods in the country, not just Unity alone.

2. Why should the dredging be suspended?

Benefits of dredging,⁵ according to the proponents, include reduction of flood risks, enabling people to return to original areas and resume normal livelihoods, enhancement of navigation, and subsequent enhancement of trade and movement of goods and services through the river, including transportation of oil products and other commodities from Unity State to the market. However, these benefits are not weighed against the potential negative impacts, therefore making suspending dredging the current best course of action.

There are several key reasons in support of suspension. First, the proposed project appears to have deeply divided the South Sudanese, with part of the public supporting it and part opposing it. It has moved from being a technical issue to being a political issue, making it hard to make informed decisions as the debate is currently being driven by emotions and politics. It has also divided public institutions. The Ministry of Environment and Forestry is opposed to the intervention, terming it “illegal,” owing mainly to lack of prior notice to conduct environmental and social impact assessments. The Presidency also does not seem to have a consensus. The Vice President for Infrastructure General Taban Deng Gai is allegedly for it. President Salva Kiir is said to have not been informed based on a statement by the Presidential Press Secretary, Ateny Wek Ateny. In essence, there is a serious division and therefore, suspending the exercise will allow time to conduct the necessary studies and build consensus on the best course of action.

Second, the scale of impacts is potentially higher based on similar projects elsewhere.⁶ It gets complicated when the goal is to address flood mitigation, as this would require excavation to widen the channel or deepen it, which has huge, negative implications. Dredging causes underwater noise, pollution from suspended sediment and contaminated sediment, and hydraulic entrainment, among others, with serious impacts on aquatic ecosystems.⁷ For example, suspended sediment, particularly at high concentration, has been found to lead to significant level of fish mortality. In addition, dredging is known for causing flood impacts downstream if the channel is opened in a way that makes the water move faster and at higher-than-normal amount. Studies in other contexts show dredging is not an effective flood risk reduction mechanism. In fact, it worsens flooding downstream and reduces water upstream. At the moment, no information is available on how deep and wide the Naam River (Bahr al Ghazal) was and how it is now. However, historical information shows the area has often witnessed flooding despite dredging that happened about 40 years ago. For example, the Anglo-Egyptian Administration used to dredge the Nile and its tributaries, and this was

⁵ Dredging is the removal of sediments from riverbeds and other water bodies through excavation to bring the depth and width back to normal state (see Wenger et al., 2017).

⁶ See Wenger et al., (2017). A critical analysis of the direct effects of dredging on fish, <https://onlinelibrary.wiley.com/doi/full/10.1111/faf.12218>

⁷ IBID

inherited by the Sudan which continued the tradition until the 1980s.⁸ This shows the dredging was less effective, or the floods of the 1961-4 would have not been so devastating.

Based on past scientific studies, Bentiu and other adjacent areas have usually experienced severe flooding following extreme flooding of Bahr El Jebel section, which overflows to the Bahr el Ghazal basin, causing it not into flow to Lake No, and subsequently spilling to adjacent areas.⁹ Last year, a spillover occurred in the western bank of Bahr el Jebel causing the Bahr el Ghazal not to flow and exacerbating the current severe flooding. A 2018's study on river barge system, looking at feasibility of dredging for navigation, conducted by UNOPS¹⁰ in collaboration with the Government of South Sudan and Japan, supports these historical facts about the nature of Bahr el Ghazal River. The report of the study describes the section between Lake No and Bentiu as "severely overgrown with vegetation over a distance of about 30km." Historically, there has been low discharges from Bahr el Ghazal into Lake No. This low discharge is reversed through backflow when the Bahr el Jebel has high discharge as it has happened recently. The UNOPS report concludes in part that the "complex situation of external influences on the water level makes it impossible to simulate water depths and flow velocities from Bentiu based on the currently available data." It adds that "results of estimating dredging volumes on the Bahr el-Ghazal between Bentiu and Lake No carry large uncertainties." Thus, new interventions need to consider these historical facts about the flood dynamics in the Bahr Ghazal basin, particularly around Unity. Undoubtedly, dredged materials can cause significant environmental damage and since the studies have not been conducted, there is no clear direction about how the dredged materials will be disposed of, an important concern.

Third, South Sudanese do not know much about the proposed dredging, and it is part of why it is becoming controversial. Essentially, the way the concerned institutions have approached this makes it appear as if there is something sinister that is being hidden. Oddly, the design information is not available. So, it is not clear how deep or wide the riverbed will be dredged. Nor does the public know the length of the slopes that will be dredged. All these dimensions determine the amount of and how fast the water can move.

Fourth, the project is being carried out in an ecologically sensitive area of the Sudd Wetlands,¹¹ which is protected by both national and international treaties and conventions, to which South

⁸ Around 2012, some dredging was done in some tributaries of the Bahr el Ghazal but it did not continue due to the 2013's war in South Sudan. This, according to sources privy to it, caused impacts in terms of wetlands and lagoons and streams drying up and this is because it was done without studies. This should be a lesson and no dredging should be allowed anymore without studies.

⁹ See J. V. Sutcliffe and Y. P. Parks. *The Hydrology of the Nile* (1999) and other publications.

¹⁰ See Report on River Barge System Feasibility Study Project, South Sudan. The study was conducted by Sebastian Bubmann and Dr. Georg Petersen for UNOPS based on the information available in the report. It is the most recent study related to the dredging of rivers in South Sudan, yet it concludes that there is high degree uncertainty about the dredging discharges and the possible impacts.

¹¹ The Sudd wetlands include the wetlands on Bahr el Jebel (the main wetlands), Bahr el Gazal Basin's wetlands (known as the Sudd trough) and the Machar Marshes, all of which are protected by both national and international laws. The Sudd Wetlands are proposed as UNESCO Heritage Site and conducting an activity that

Sudan is a party. The Sudd Wetlands are estimated to be worth about a billion US dollars a year in tourism, fishing, livestock, tourism and through a wide range of ecosystem services.¹² Recent assessment seen by the author, and which has not yet been published, puts the estimates at 3 billion US Dollars, which is a huge treasure to the nation and humanity. The project area is an habitat of rare species of wildlife which are protected by national laws such as the Wildlife Conservation and National Parks Act 2003 (provisional order, Laws of New Sudan), the Transitional Constitution 2011 of South Sudan as amended (particularly Article 41, sections 1, 2, 3 &4), and Land Act 2009, which requires Environmental and Social Impact Assessment as a pre-condition for any project on land, where the Act defines the land as including wetlands, forestlands, farmlands, residential lands, and pasturelands, among others. The Sudd Wetlands are a Ramsar site based on the Ramsar Convention on the Wetlands of International Significance to which South Sudan is a party since 2013. The Ramsar Convention encourages wise utilization and preservation and discourages major development projects that can adversely alter the wetlands and related ecosystems functions. Other relevant international treaties and conventions to which South Sudan has acceded and which protects the Wetlands include (1) Biodiversity Convention 1992 (Sudd is home to rich biological diversity), (2) Convention to Combat Desertification 1994 (dredging reduces water upstream and encourages desertification), and (3) United Nations Framework Convention on Climate Change (wetlands are an important carbon sequester). These laws and others guide the government not to undertake any project without first knowing its impacts on the Sudd, the complex riverine system, the people, and the environment.

Fifth, the involvement of Egypt makes the matter more sensitive and therefore, suspending it will give South Sudanese the time to study it and decide based on evidence, determining whether it is something they can consider without an external influence.

Lastly, while it may sound like a solution to dredge the river and drain excess water, climate change has made the environment so fragile. Due to climate change, we are constantly facing extreme situations of water scarcity and that of flooding. South Sudan is currently ranked as one of the top 10 most vulnerable countries to climate change in Africa and in the world.¹³ Most of the threats come from high temperatures, floods, and droughts. Temperatures have risen on average by more than 1 degree Celsius since the 1970s.¹⁴ These high temperatures have induced a decrease in rainfalls by between 10% and 20% since 1970s and an increase in the incident of droughts and floods. For example, between 1991 and 2021, there have been 27 incidents of floods of low to high magnitude compared to 18 incidents between 1961 and 1990

can undermine its protection can jeopardize the process for approval to be part of the UNESCO World Heritage Site.

¹² See Gowdy, J. and Lang, H. (2016). The Economic, Cultural and Ecosystem Values of the Sudd Wetland in South Sudan: An Evolutionary Approach to Environment and Development, https://evolution-institute.org/wp-content/uploads/2016/09/20160913_ei_south-sudan_low-res.pdf

¹³ See 2021 Global Climate Risk Index

¹⁴ See Funk, C., Eilerts, G., Verdin, J., Rowland, J., Marshall, M., 2011, A climate trend analysis of Sudan, U.S. Geological Survey Fact Sheet 2011-3072, 6 p, <https://pubs.usgs.gov/fs/2011/3072/>

and 11 incidents between 1931 and 1960¹⁵¹⁶. There are also 20 recorded droughts between 1991 and 2020 compared to 14 incidents of droughts between 1961 and 1990. It is an irony that South Sudan is experiencing extreme flooding amidst declines in rainfalls. What explains this is that high temperatures have increased both evaporation which leads to heavy rainfalls and subsequent flooding and drying up of moisture, which increases rain failures and drought. With this grim picture of climate change, choosing to dredge without proper studies is more dangerous than the risks associated with the attendant floods. Therefore, the project should be suspended to allow the conduct of credible studies which can inform the next course of action.

3. Studies on flood and drought risks and possible interventions

Flood risks reduction measures must be studied. The same applies to droughts. The studies must cover main patterns of floods and droughts, areas of risks and the possible interventions to minimize the risks. Possible interventions must be comprehensive and the ones that are not suitable must be determined based on the results of the studies. Some of the possible interventions that should be examined include:

1. Building dykes in the flood prone areas. With this, some auxiliary structures and facilities attached to dykes such as pump station, drainage canals, and drainage reservoirs must be explored.
2. Resettlement to fairly elevated areas: this requires assessment to identify suitability and other possible risks, including security risks.
3. Dredging: this will include identifying locations that might have silted and need dredging and possible impacts and mitigation measures.
4. Building dams upstream to control flood and generate electricity: suitable locations and environmental friendliness must be examined, as well as any other associated risks.

Studies on flood and drought risks and possible interventions mentioned above must be conducted by a committee composed of international and national experts. Their terms of reference must be as clear and inclusive as much as possible. Results from such a study must then inform the next course of action. If the next course of action is to dredge blocked or silted sections of rivers or build dams upstream or dykes or resettle populations in flood prone areas to high grounds or both or a select of those, feasibility studies and ESIA must then be conducted on each of the recommended interventions and a consulting firm of international reputation must be procured through transparent public bidding to conduct these feasibility studies.

4. What are the requirements for credible studies?

Flood interventions like dredging require credible studies. These studies enable the proposed interventions to be given greenlight based on evidence. In this section, we propose key principles that can guide in achieving credible studies. These include transparent and inclusive

¹⁵ See Douglas Johnson (1992) Reconstructing a History of Local Floods in the Upper Nile Region of the Sudan (now South Sudan), <https://www.jstor.org/stable/219027>

¹⁶ Also see Tuitmamer et al (2018) climate change and conflicts in South Sudan, <https://www.africaportal.org/publications/climate-change-and-conflicts-south-sudan/>

process, establishing a committee of technical team composed of South Sudanese and international experts, procuring a firm of international reputation to conduct feasibility studies and ESIA, making the process independent and the scope comprehensive, among others.

4.1. Transparent and inclusive process

Credible feasibility studies and ESIA need to be transparent, which means the public and stakeholders must be involved from point A to point Z and that the results are subjected to independent expert review and scrutiny before being approved by the authority responsible for environmental matters.

4.2. The studies must be conducted by credible entities

Who conducts the studies determines the credibility of the results. The results won't be credible if (1) those with interests to benefit from the project are part of the study team and (2) if those with questionable qualifications are the ones conducting it and if the process is not transparent, accountable, and inclusive. Obtaining a credible firm can be achieved through a transparent bidding process. This is important for two main reasons, namely, to avoid the conflict of interest and to generate robust, credible evidence. Since the issue is controversial, it requires a firm or a group of experts with unquestionable reputation, making the results acceptable to all the parties involved.

4.3. The scope must be as holistic as much as possible

The scope of the studies must be comprehensive and must be determined through a transparent and inclusive process. The flood risks studies must cover all the 4 river basins of White Nile, Bahr al Jebel, Bahr al Ghazal, and Sobat and must analyze different intervention scenarios. For each of the studies, the following should be considered:

1. Project options: This includes the assessment of alternatives, including alignments of dredging and of dykes, drainage canals and suitable sites of drainage reservoirs and flood control dams, among others.
2. The studies should focus on obtaining and analyzing various information, including:
 - a. Hydrographical information (e.g., rivers, streams, lakes, wetlands, and flood plains).
 - b. Relief (e.g., plains, valleys, slopes, and depressions).
 - c. Vegetation (e.g., forest, grasslands, shrubs).
 - d. Cultural Features (e.g., urban settlements, cattle camps, villages, croplands, power transmission lines, pipelines).
 - e. Transportation infrastructure (e.g., roads, airports, river ports) through topographical surveys and mapping to obtain up to date and clear topographical maps.
 - f. Geological and geotechnical information.
 - g. Economic and social analysis, including cost-benefit, livelihoods, conflict, and gender impacts analysis of several options.
3. Preliminary engineering design for various options.

The ESIA for each proposed interventions must be conducted in line with South Sudan's standards, as well as the World Bank's International Finance Corporation's Performance Standards on Environmental and Social Sustainability¹⁷. Screening and scoping processes must be transparent and inclusive. Most important, the process must include consulting the stakeholders, examining several alternative options, gathering comprehensive environmental and social baseline conditions, gathering adequate physical and biological data, determining possible impacts, and establishing mitigation measures, among others. The results must be reviewed by other experts and approved by the Ministry of Environment and Forestry.

5. Conclusion and recommendations

In this piece, we have argued why this controversial dredging project should be suspended. It has become controversial and is divisive, both of which are fueled by the absence of clear information on the project, its possible benefits, or harms. Without studies until the equipment arrived and with the level of controversy it has generated, what is being done is basically the proverbial putting of the cart before the horse.

Dredging the Bahr el Ghazal River (locally known in Bentiu as Naam) and any other river in South Sudan in the name of flood risks reduction without first conducting credible feasibility studies and environmental and social impact assessments is like performing a surgery on a sick person without diagnosing first what kind of disease the patient is suffering from. Any flood risks reduction interventions should be preceded by credible studies that diagnose the problems and prescribe the solutions. Judging through similar projects done without proper studies, dredging can be highly impactful on the environment, people, and their livelihoods.

Therefore, the best course of action now is to place it on hold through either a Presidential Order or Ministerial Order until proper studies are conducted. To rescue people from the deplorable situation of flooding, we recommend that the government work with partners to relocate communities to high grounds and provide relief, as well as dialogue and security so that there is no conflict between the displaced and host communities. The government should then commission comprehensive studies on flood and drought risks and potential risks reduction measures, including dykes, resettlement, dredging, dams, irrigation system, and some nature based solutions to flooding.

About the Sudd Institute

The Sudd Institute is an independent research organization that conducts and facilitates policy relevant research and training to inform public policy and practice, to create opportunities for discussion and debate, and to improve analytical capacity in South Sudan. The Sudd Institute's

¹⁷ See the 2012 International Finance Corporation's Performance Standards on Environmental and Social Sustainability.

intention is to significantly improve the quality, impact, and accountability of local, national, and international policy- and decision-making in South Sudan in order to promote a more peaceful, just and prosperous society.

About the Author

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