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Politics of Environmental Protection: Investigating Socioeconomic Problems South Sudan has Experienced Arising from Ownership of Trans-boundary Natural Resources

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Abstract

The availability of trans-boundary natural resources has been a curse to South Sudanese. In South Sudan, these trans-boundary natural resources include air, water, wildlife, livestock, fisheries, pests, forest, lands, petroleum, and minerals among others. During their exploitations, they have led to socio-economic problems such as flooding, environmental pollution, diseases, conflicts, poverty and politicization of environmental legal regimes. Intervention from Government of South Sudan to resolve these socio-economic problems has been through high level meetings with countries sharing trans-boundary natural resources such as Uganda, Ethiopia, Sudan, Tanzania, Rwanda, DR Congo, Kenya, Central Africa Republic (CAR) and Eritrea. Other interventions include technical engagements, signed Memorandum of Understanding (MOUs) on cooperation agreements, signed protocols, signed treaties and depoliticization of environmental legal regimes. The study used multi case studies and comparative method in understanding trans-boundary natural resources. The study's finding reveals that trans-boundary natural resources are enormous in South Sudan and must be nurtured for the benefits of South Sudanese. Environmental protection must be prioritized to ensure that environmental degradation is avoided. There is an urgent need to enact Environment Act that should establish National Environmental Management Authority (NEMA) that should implement the Act in later and spirit. The study concludes that while trans-boundary natural resources need to be exploited, attention should be particularly paid to the environment to prevent degradation as well as conflicts arising from competition over these trans-boundary resources. Further research is hereby recommended to trans-boundary natural resources' scholars to investigate the positive impacts of the trans-boundary resources on the people of South Sudan.

Keywords: Environment, Intervention, Natural, Resources, Ownership, Politics, Problems, Protection, Socio-Economic, Trans-Boundary.

1. Introduction

Trans-boundary natural resources refer to natural capitals that are shared by more than one country. According to Robert Amanda (2011), trans-boundary natural resources are resources that have multiple ownerships, which cannot be claimed, by a single country (Amanda, 2011). Indeed, trans-boundary resources are natural resources and environmental assets that cross local jurisdiction such as districts, provinces or states (Okonkwo, 2017). While these natural resources are quite vital, their management is very challenging given that each country has its own different set of policies, procedures, laws and regulations and above all, different priorities. Although lack of policies harmonization affects the effective management of trans-boundary natural resources, the application of international laws continued to serve as a remedy in managing such resources.

Trans-boundary natural resources include air, water, wildlife, pests, forest, lands, petroleum, and minerals among others. These resources are characterized by the following:

- Share by more than one country
- Scarce to easily acquire
- Difficult to manage by many countries
- Can be a source of conflicts amongst the sharing states
- Get extinct or deplete easily

While their characteristics are drawn from above, these resources are argued to have been provided by God (Tisdell, 2010). Thus, some countries sharing these resources always wish to cooperate in harnessing them for prosperity of their people. However, this has not been the case, most of the countries sharing them have quite often been tormented by socio-economic and political problems arising from the ownership of these resources. Why is this the case? Why should countries and particularly, South Sudan face socio-economic problems arising from the ownership of trans-boundary natural resources? What is the intervention of the governments, especially the

Government of South Sudan? When should the governments, particularly, the Government of South Sudan should do this? This study should answer the above questions. This paper is outlined as follows: section one introduces the question. Section two discusses five socio-economic problems South Sudan has experienced arising from ownership of trans-boundary natural resources. Section three discusses the solutions to the socio-economic problems and section four gives conclusions and section five recommends further research.

2. Socio-Economic Problems Arising from Ownership of Trans-Boundary Natural Resources in South Sudan

As noted in the introduction, the presence of trans-boundary natural resources brings both prosperity and problems to the countries sharing them. In South Sudan, the ownership of resources such as water from river Nile, wildlife, petroleum (hydrocarbons), forest and lands has brought in socio-economic problems as discussed below:

2.1. Flooding

Known always as devastating, flooding is an overflowing of a large amount of water beyond its normal confines, especially over what is normally dry land (Odok, 2021). South Sudan has been flooded by cubic volumes of waters coming from Nile River in Entebbe, Uganda. The Nile River is the longest and the snakiest river in the world. Running through 6696 km, the Nile is a major trans-boundary water resource in the globe (Nebiyu, 2017). The Nile River Basin is a confluence of the Blue Nile stemming from Lake Tana in Ethiopia and the White Nile, stemming from Lake Victoria in Uganda (Odok, 2021).

River Nile is jointly owned by eleven countries: on upstream: Ethiopia, Eritrea, Kenya, Tanzania, Rwanda, Burundi, DR Congo and Uganda. On midstream is South Sudan and on downstream is Sudan and Egypt. The riparian states owning river Nile is a home to over 619 million people (Gwapedza, et al, 2025).

On July 2021, river Nile from Entebbe increased the cubic volumes of waters from 12.05mm to 13.5mm pumping unprecedented amount of water to the Nile river of South Sudan. While South Sudan relies on Uganda for any flood alert, Uganda didn't bother to inform South Sudan. Hence, the consequences of the flood became quite detrimental. Although this was the case in 2021, at the time of writing this paper, Uganda has agreed to alert South Sudan on any flooding occurrence.

The heavy rains confounded the situation in South Sudan, leading to inland flooding, mostly in the eastern, southern and central parts of the newest country. River Pibor, Sobat, Lol and other rivers were extremely overflowing and continued being overflowed at the time of writing this paper. The flooding has caused large-scale displacements of people, livestock's and severely destroyed crops and property. While flooding was experienced in the entire South Sudan and the region, the flooding in eight of ten states and one administrative area in South Sudan between July 2020 and January 2021 deeply affected an estimated 1,060,000 people (UNOCHA Report, 2021). Of the people affected, an estimated 501,000 were displaced from their homes (Ibid). Jonglei, Greater Pibor Administrative Area have been the worst affected (490,000 people), followed by Lakes (145,000 people), Unity (125,000 people), Upper Nile (100,000 people), Warrap (65,000 people), Western Equatoria (54,000 people), Central Equatoria (39,000 people) and Northern Bahr-el-Ghazal (14,000 people) (Ibid).

Although South Sudan is a member of Nile Basin Initiative (NBI) headquartered in Kampala, It is also a member of Cooperation Framework Agreement (CFA) of Nile waters signed in August 2024. Above all, South Sudan by extension is a party to 1959 Agreement apportioning the Nile waters to Sudan with 18 cubic millimeters and Egypt with 55 cubic millimeters. However, South Sudan did not benefit from this treaty due to the fact that the Government of South Sudan has not enacted Water Resources Management law to regulate it water resources. While South Sudan is an independent state, it can claim the ownership of the river Nile through the 1959 treaty on the basis that the agreement was inked when South Sudan was a part of Sudan. However, with all South Sudan memberships and affiliations to river Nile, the country couldn't get an alert from its neighbors of the sudden increased in river Nile waters. While South Sudan doesn't have any technological advancement to detect the rising of water levels, the neighbors, particularly, Uganda could have helped given that Uganda has a "dipping" technology. This would have abated the disastrous impact of flooding across South Sudan and the eastern African countries. There are river gauging stations along the White Nile which include five telemetry stations in Nimule and two in Malakal as well as one at the Sobat River. Moreover, the country has a gauging station in Juba, Mangala, Bor and Nasir which are used to monitor water levels and flood depths. Overall, these monitoring gauging stations need to be strictly managed to detect the rising water levels.

2.2. Pollution

Pollution has remained as one of the socio-economic problems arising from the ownership of trans-boundary natural resources. Known as an introduction of contaminants into the natural environment that causes adverse change in the ecosystems, pollution continued as the riskiest phenomenon to environmental management (Bergstrom, 2007). Pollution has a proto-type of air, water, soil and noise. Each of the four typologies has devastated consequences. For instance, air pollution is done through emission of chemicals to the earth atmosphere by motors, cars, and factories. The chemicals could be toxic gases and biological molecules, which are detrimental to human health. The causes of air pollution come from burning of fossil fuels, petroleum and mining operations, exhaust gases from factories and industries.

The effects of air pollution may vary based on the kind of pollutant. But generally, the impact of air pollution ranges from:

- Increased risk of respiratory illness and cardiovascular complications
- Increased risk of skin diseases
- Increased risk of cancer diseases
- Global warming
- Acid rains
- Ozone depletion

- Hazards to wildlife (Tisdell, 2010).

Moreover, air pollution is further theorized to have a planet wide implication. Natural scientists have even speculated an apocalypse-like scenario where air pollution if left unchecked, can bring about an extreme form of global warming called the runaway greenhouse effect (Harrod, 1948). Though this is purely speculative, it is a phenomenon that has already occurred on Venus (Daly, 1973).

Besides, water pollution has been committed through contamination of waters. For instance, the eleven countries that own Nile River have constantly contaminated it. Rubber, plastics, glasses; metals, animals, human fleshes and discharged wastes are mostly thrown into the river Nile. The resultant of these contamination of water has led to death of plants, animals and human beings. Because of the huge deposited of contamination, the river Nile has filled up, rising in topography and exceedingly turning into a dry land. Because of these, aquatic animals and plants are getting extinct. In South Sudan, the river Nile has remained a narrow river as most it has been turned into a dry land. In the middle of river Nile in Juba, a mountain has grown in the river and this has been turned into a hotel by a local investor and called it Highland Resort.

Soil contamination follows water pollution. For instance, due to random throwing of plastics, metals, glasses and undisposed materials, the soil has been polluted.

The causes of soil pollution include but not limited to:

- Improper industrial waste disposal
- Oil spills
- Acid rain which is caused by air pollution
- Mining activities
- Intensive farming and agrochemicals (fertilizers and pesticides)
- Industrial accidents (Max-Neef, 1992).

Effects of soil pollution include:

- Loss of soil nutrients, which renders the soil unfit for agriculture
- Impacts the natural flora and fauna residing in the soil
- Degrades vegetation due to the increase of salinity of the soil
- Toxic dust (such as silica dust) can cause respiratory problems or even lung cancer (Perman, 2013).

The resultant of this pollution has been poor yields when crops are grown and the mushrooming of diseases during rainy seasons. Moreover, soil erosion is another type of pollution. Refers to displacement of upper soil layer by the erosive agents, soil erosion is a devastating kind of pollution that affect agricultural production.

Noise pollution is another type of pollution. It refers to the excessive amount of noise in the surrounding that disrupts the natural balance (Harrison, 1994). Although it is usually a man-made affair, it includes certain natural calamities like volcanoes, which can contribute to noise pollution as well. In general, any sound, which is over 85 decibels, is considered to be detrimental (Dasmann, 1984). Also, the duration individuals are exposed during noise pollution plays an impact on their health. For perspective, a normal conversation is around 60 decibels, and a jet taking off is around 150 decibels (Ciriacy, 1968). Consequently, noise pollution is more observable than the other varieties of pollution in the cities.

Noise pollution has several contributors, which include:

- Industry-oriented noises such as heavy machines, mills, factories;
- Transportation noises from vehicles, aeroplanes;
- Construction noises;
- Noise from social events (loudspeakers, firecrackers, etc.); and
- Household noises (such as mixers, TV, washing machines) (North and Panther, 1976).

Noise pollution has now become very common due to increased in urbanization and industrialization of towns. Noise pollution can bring about adverse effects as follows:

- Hearing loss
- Tinnitus
- Sleeping disorders
- Hypertension
- Communication problems (Callan and Jall, 2000).

2.3. Diseases

Diseases arise from poorly managed ownership of trans-boundary natural resources. As discussed earlier, most pollution brings forth diseases. For example, air pollution brings about respiratory diseases such as Tuberculosis, pneumonia, enzyme, skin diseases, cancers. Water pollution comes from water born diseases such as diarrhea, dysentery and worms. Soil pollution comes with disease of crops, which lead to poor yields that hamper agricultural activities. On the other hand, noise pollution as discussed earlier brings forth diseases such as hypertension, sleeping disorders, hearing loss and other disorders. All these diseases affect plants, animals and human beings.

The trans boundary movements of wildlife have brought into South Sudan other diseases from Kenya and Uganda. The East Coast Fever (ECF) is one of these diseases that has been spread by these trans-boundary animals. These animals move freely amongst three countries without being tested and diagnosed. The Taposa of South Sudan, Karamojong of Uganda and Turkana of Kenya have been experiencing huge losses of their cattle because of the transmissions of ECF around the borders. The army worms and locusts from Uganda first landed in South Sudan in 2017. It has affected two regions in South Sudan significantly: Eastern and Central Equatoria causing plants diseases. The pests fed on more than 80 host plants but preferably maize and sorghum, which are the major staple crops in South Sudan (Lancaster, 2019).

2.4. Conflicts

Conflict is one of the conundrums that arise from the ownership of trans-boundary natural resources. Because these resources are scarce as well as being valued, conflicts arise from inter-states and intra-states. Many sociological thinkers such as Karl Marx and Auguste Comte have argued conflict as not being a problem but rather failure to resolve such conflict as a problem. According to Karl Marx, conflicts are inherent within human lives.

In the case of South Sudan, most conflicts that are external have been caused by the mismanaged of petroleum related resources as well as borders. For instance, the conflicts between Sudan and South Sudan over Heglig in April 2012 were triggered because of hydrocarbons resources found at Heglig. In this senseless war, 642 members of Sudan People's Liberation Army (SPLA) together with 338 members of Sudan Armed Forces (SAFs) were killed (De Waal, 2013). Although Heglig war was quite devastating leading to the withdrawal of SPLA, the management of Heglig petroleum resources is yet to be addressed. Apart from Heglig, Abyei has been in turmoil because of the presence of petroleum resources. According to analysis carried out by the International Crisis Group (ICG), in 2003, Abyei was producing more than 25% of Sudan's oil and in 2005, it continued to produce more than 25% of Sudan's oil and more than 72% of Southern Sudan's production (ICG Report, 2007). Because of these trans-boundary resources, Abyei has remained as a courting girl whose ownership is highly contestable. That is why the referendum of Abyei, enshrined in the Comprehensive Peace Agreement (CPA), of Sudan and Southern Sudan by then, that ended the 22 years' war between the Northern Sudan and Southern Sudan, has not been conducted until at the time of writing this paper. The fear has been that the Ngok Dinka people who are supposed to vote in the plebiscite could vote for Abyei secession to South Sudan. This has sent jittery feelings to the Northern Sudanese Government.

Still on the external conflicts, they have been tensions between South Sudan and Kenya over oil rich elemi triangle. This is a region, which is contested by South Sudan Government as well as Kenya Government. From 1920s through 1980s, the maps of Kenya excluded elemi triangle from Kenya and Sudan. However, from 1990, the map of Kenya included elemi triangle as part of Kenya. This is due to the potentiality of the region endowed with hydrocarbons resources because of the glossy sedimentary rocks. Both Kenya and South Sudan have their militaries around elemi triangle. The elemi triangle case resembled the migingo island case once contested by Kenya and Uganda. When the conflict over the ownership of this tiny island reached its apogee in May 2006, President Museveni sent his troops to the Island and hoisted the Uganda flag there. Kenya soldiers were already at island. The tension mounted. However, President Kibaki played its diplomacy by withdrawing Kenya soldiers five kilometers back from the Island. President Museveni made a controversial as well as an interesting comment that "the island belong to Kenya but the waters belong to Uganda". He proceeded by further noting that "you are in Kenya if you stay on shores of the island. However, once you touch the waters, you are in Uganda". Thus, he furthermore said, the island is useless unless it has waters. So, these kind of tensions are quite occurrences due to porous and un-demarcated borders of Africa.

On the intra-conflicts, trans-boundary natural resources have plunged many countries into civil wars including South Sudan. These wars are caused by struggle over the control of resources, particularly, petroleum resources. The civil wars of South Sudan of December 2013 and July 2016 were all triggered by the struggle over political power and natural resources. The 60 percent of annual revenues that South Sudan allocated to military spending in the 2020- 2021 budgets is a testament to this fact (Nield, 2021). When the history of decades of civil wars and political violence are considered, the risk of prolonged conflict increases. Studies have shown that countries in which trans-boundary resource exports constitute 33 percent or more GDP have a 22 percent risk of conflict, compared to 1 percent risk for countries with no such exports (Collier and Hoeffler, 2000).

The conflict and violence that begun as a political power struggle in the Sudan People Liberation Movement (SPLM) party has made everything worse as far as petroleum resources are concerned (Chol, 2016). Reports from the Ministry of Petroleum indicate that petroleum production fell by 50 percent of its pre-conflict levels in 2014, before increasing to 164,000 barrels per day, or 70 percent of pre-conflict levels, by the end of the year (MOP Report, 2014). At the same time, oil prices on international markets dropped 60 percent since June 2014 (Ibid). South Sudan has no stabilization mechanism to protect her oil from fluctuations in international markets, and the drop in oil prices has had a devastating impact on the economy (Deng, 2015). At the time of writing this paper, the main pipeline that ferries crude oil from Paloch to Port Sudan is being repaired to pump the crude oil as it was destroyed by the warring parties in Sudan (Riak, 2024).

2.5. Poverty

Poverty is one of the socio-economic problems arising from ownership of trans-boundary natural resources. Poverty refers to the state of being extremely poor and a person lives on less than one United States dollars a day. Because of the scarce of trans-boundary natural resources, poverty peeped in and this has affected the productive levels of these individuals. From 2006-2023, South Sudan received approximately 30 Billion USD revenues from the hydrocarbon resources but these billions cannot be showcased in the economy (Riak, 2024). There are no decent schools, hospitals, enough running clean water and social amenities. These billions have been usurped by political and military elites landing South Sudanese into object poverty.

Undeniably, South Sudanese have remained the poorest on the planet earth with terrifying statistics. The human development indicator, at 0.435 is among the lowest in the world while access to basic social services remains a key conundrum across the country (UNDP Report, 2021). The total population, which was 8.5 million in 2008, is very young with 51% men and 49% women because of preceding wars that exiled many women as refugees in the neighbouring countries and other parts of the world. Twenty-five percent of the adult population is literate (Chol, 2016). Moreover, eighty-seven percent of the population is rural based, with the majority depending on subsistence agriculture or animal husbandry as their primary source of livelihoods (Freeman, 2003). Sixty four percent of the population lives below the poverty line and eighty eight percent of the population earn less than one US dollar a day. Fifty six percent of the population living in female-headed households is poor compared to forty two percent in male-headed households (Household Census, 2016). Access to adequate health care remains a major challenge. Infant mortality is extremely high at 105 per 1,005 live births as is maternal mortality rate, which

remains one of the highest in the world at 2,075 per 100,000 live births (Dickie, 2006). South Sudan is at the bottom of ten countries for all 8 Millennium Development Goals (MDGs) and 7 of the 17 Sustainable Development Goals (SDG) indicators. From the available data, South Sudan has failed to achieve all the Millennium Development Goals and is unlikely to achieve Sustainable Development Goals 1 to 3 particularly in reference to this paper, eradicating extreme poverty; achieving universal primary education; promoting gender equality and empowering women, and combating HIV/AIDS by the first quarter of 2021 (Chol, 2016).

The contributions of deficiencies in each dimension to overall poverty show that, in the case of South Sudan, the lowest living standards and health are the extreme sources of poverty and diseases. Deficiency in health is easily the most serious source of overall deficiency, with two health-related indicators accounting for sixty percent of the multidimensional poverty index (Ibid). The indicators for employment and education are petrifying. The employment index is 0.550; mean-year of schooling index is 0.355 with expected years of schooling index as 0.444 as well as education index with 0.381 and income index is 0.476, which remains the lowest in the world (Keynes, 1936).

2.6. Politicization of Environmental Legal Regimes

Environmental laws in South Sudan have been politicized to the extend that there is no any law to protect the environment. The Ministry of Environment and Forestry has been faced with incompetence of providing regulations to protect the environment. The environmental law has remained a bill for decade with Ministry of Justice. Whenever, this bill almost reaches the parliament for enactment, politicians politicize and keep as a bill (Riak, 2024). The environmental law is very critical as it is intended to protect the natural world (environment) by establishing the National Environmental Management Authority (NEMA) which should directly manage the environment. The Ministry should remain the regulator and NEMA should be the direct supervisor of the environmental activities. Due to politicization and differences amongst the political elites, the environmental legal regimes are inadequate in South Sudan. Once, the environmental law is enacted, various regulations will be pieced out for different components of environmental protection.

3. Interventions from the Government of South Sudan in Ensuring that Trans-Boundary Environmental Problems are Resolved Amicably

3.1. High Level Meetings Held

Since its independence on the 9th July 2011, the Government of South Sudan has continued to engage the world and the region on the trans-boundary problems that have been brought into light by the sharing of trans-boundary natural resources. For instance, on the resolution of pollution on the river Nile, the Government of South Sudan through the Ministry of Foreign Affairs and International Cooperation and Ministry of Water and Irrigation held five meetings with the Government of Uganda and members of Nile Basin Initiative (NBI) in resolving the river Nile pollution since 2011.

The pollution of river Nile doesn't emanate from Uganda per see but from the other upper riparian states. Although South Sudan has signed the Cooperation Framework Agreement (CFA) on the management of river Nile waters on August 2024, it has a right in protecting its citizens from pollution of its waters by the neighboring states. Apart from ministerial meetings, there were three presidential meetings conducted in 2011, 2016 and 2021 by the President of South Sudan, Salva Kiir with his counterparts in Kenya and Uganda as articulated in the interview by the Hon. Deng Dau, Deputy Minister of Foreign Affairs and International Cooperation on 5th August 2021 (Dau, 2021). While Uganda, Kenya and Tanzania have inked agreements on the management of Lake Victoria, South Sudan is not a party to these agreements but of course has obligations to ensure that such agreements protect countries sharing river Nile including itself.

Apart from pollution of the river Nile, the high level meetings tackled the rising of river Nile waters in Entebbe from 12.05mm to 13.05mm which has devastated South Sudan with flooding in the seven states out of the ten states (Odok, 2021). Water born diseases, and their treatments were also discussed and agreed by these meetings to be prevented. While interviewing the minister of Water and Irrigation of South Sudan, Hon. Manawa Peter Gatkuoth on 6th August 2021, he noted that their meetings had recommended the used of Best Available Technologies (BAT), monitoring the water levels in river Nile, research and studies and environmental impacts assessments (Gatkuoth, 2021).

On petroleum resources pollution, high-level meetings were conducted between South Sudan and Sudan. Both ministries of Petroleum for South Sudan and Sudan discussed at length the transportation of South Sudan crude oil through Port Sudan for export. The required fees South Sudan has been paying were agreed in these meetings to be reviewed, as the fees were quite high. For instance, South Sudan paid $24.1 (transportation, processing, piping and barrels fees) to Sudan. Moreover, the environmental degradation, especially, on the constant rupturing of pipelines were discussed too. Diseases that have been associated with environmental pollution and the compensation packages topped those meetings. Hence, much of the works was later referred for technical engagements.

On petroleum resources potential conflicts in elemi triangle and Abyei areas, the Government of South Sudan had engaged Government of Kenya in three high level meetings to abandon any oil exploration in elemi triangle areas until the matter is resolved through negotiations or any other arbitration. On Abyei, the Government of South Sudan is engaging Sudanese government, particularly; the new regime is onward looking to resolve the Abyei debacle.

On wildlife, the ministry of Livestock and Fisheries had conducted three meetings on the management of trans-boundary animals such livestock's and fishes. Based on the interview, the researcher had with minister of Livestock and Fisheries, Hon. Onyoti Adigo Nyikwec on 9th August 2021; the ministry conducted its first meeting in march 2015, second meeting in August 2018 and third meeting in May 2020 with ministries of Livestock of Uganda and Kenya (Adigo, 2021). The resolutions of those meetings have been on control of random movements of livestock; carrying out joint vaccination of the livestock against ECF and alert on the outbreak of ECF and other livestock contagious diseases.

On pests, particularly, army-worms and locusts, the Government of South Sudan through its ministry of Agriculture and Food Security engaged the Uganda ministry of Agriculture. On an interview with Hon. Josephine Lagu, Minister of Agriculture, Government of South Sudan on 9th August 2021, she acknowledged that her ministry has conducted two high-level meetings in resolving the devastation of army worms and locusts (Lagu, 2021). The Uganda ministry of Agriculture had agreed to alert South Sudan ministry of Agriculture on the movement of pests cross its borders to South Sudan.

However, the achievements of all these high-level meetings have not been sufficient. At the time of writing this paper, the waters in the river Nile has risen to 11 mm and there is no any alert from Uganda. It is the Government of South Sudan through its close monitoring and supervision of the river Nile waters, which is now alerting and asking those along the Nile and those in lower areas to vacate and leave as the flooding is going to increase. The gap in this intervention is lack of follow up and above all lack of co-operation from the governments of countries mentioned herein.

3.2. Technical Engagements

The Government of South Sudan through its ministries carried out numerous technical engagements in addressing environmental problems arising from management of trans-boundary resources. For instance, the government through the cabinet set up technical committee on river Nile waters. This committee has met with technical committees from eleven countries sharing river Nile waters. Although their meetings are done annually, they have consented that pollution from partner states sharing river Nile is quite severe (Krupnick, 2020). This technical committee has continued to report its findings to ministerial and high level committees.

On technical committee on re-negotiation of tariff fees ($24.1) of South Sudan crude oil transportation through Sudan, the committee conducted three meetings since the establishments of Revitalized Government of National Unity (R-TGoNU) and these technical meetings recommended the determination of tariff fees on the sliding scales and to be based on a fixed percent of the crude price, for instance, 24.1%. If the prices of crude shoot at $100 per barrel then it should be multiplied by 20% and if the prices come to $50 per barrel, it should also be multiplied by the same 20%. This shall help both governments to benefit equally from the revenues of the petroleum resources. Moreover, the same technical committee recommended the regular cleaning up of the pipelines by the Sudanese Government to avoid rupturing and leaking. The technical committee recommended application of low and non-waste technologies and regular studies on the pipeline to avoid environmental degradation. The Environmental Audit Committee of the ministry of Petroleum has taken up the recommendations of the technical committee and forwarded these concerns to the Norwegian Consultant reviewing the feedback from comprehensive environmental audits of all the oil fields in South Sudan.

Besides, technical committee on elemi triangle conducted two meetings with its Kenya counterpart. Although this technical committee has not done much, it has commissioned a study, which will have its findings published in January 2026. Nonetheless, the technical committee acquired various maps that showcased status of Elemi triangle since Kenya's independence in 1963. The technical committee recommended the resolution of conflicts in the Elemi area through negotiation and mutual understanding.

Technical borders committee to negotiate all borders of South Sudan with Kenya, Sudan, Uganda, Ethiopia, DR Congo, Central Africa Republic was established via Cabinet Resolution Number 3/07/2019 to negotiate all borders of South Sudan with neighboring countries. This technical committee with its file at the ministry of Foreign Affairs and Presidency had conducted nine meetings. These meetings have mapped out the contested borders, orals histories, planned negotiation matrices and environmental concerns and have recommended its findings to high-level ministerial committee.

On technical working groups on livestock mobility and diseases control, the cabinet of South Sudan has resourced this committee to do its work efficiently. Livestock plays a great role in South Sudanese economy. There are about 21 million livestock in South Sudan; out of which 15 million are cattle and 6 million are goats and sheep (Pearce, 2015). With the ECF spread across the region and the deaths of millions of cattle across South Sudan in December 2019-2021, South Sudan Government prioritized the protection of these livelihoods. The technical committee recommended the vaccination of the cattle, establishing alerts through early warning and conservation of the environment to the ministerial committee.

Finally, technical committee on army-worms and locusts control and technical impact assessment committee on environment got formed via cabinet memo to advise the government on the army-worms and locusts control. So far, the committee has mapped out the seasons of attacks by army-worms and locusts, the scientific interventions required and the resources needed. The committee has conducted six meetings with its Uganda counterpart.

The above technical committees achievements have been on meetings with their counterparts and creating awareness of the problems arising from the sharing of trans-boundary natural resources such as pollution, diseases, conflicts, poverty and flooding. However, the gaps remained on the full implementations of their technical recommendations by the governments.

3.3. Signed Memorandum of Understandings (MOUs)-Cooperation Agreements

Government of South Sudan has signed numerous MOUs for Cooperation Agreements with various governments in the regions on the amicable management of trans-boundary environmental problems. One of such MOUs is the Cooperation Agreement with Government of the Republic of Uganda on Nile Waters Management and associated environmental factors. Although Hon. Deng Dau Deng, the former Deputy Minister of Foreign Affairs whined to me that Agreement was confidential due to possible reprisals from Egypt and Sudan, the 2024 Cooperative Framework Agreement has detailed roles of Government of South Sudan as well as that of Government of Uganda. Both governments have sovereignties and regional roles to protect and harness river Nile for the welfare of their citizens. Article 7 of the Agreement has provided punitive measures against the citizens of the two countries that abuse the river Nile and cause environmental pollution (The Cooperative Framework Agreement, 2024). However, this has not been the case, as the MOU has not been implemented in later and spirit. Citizens from both countries have continued to pollute the river Nile at their will.

Another MOU is on wildlife, livestock and fisheries management. The MOU signed on August 2012 details the responsibilities of both Governments of South Sudan and Uganda to co-operate on the cattle contagious diseases alert, free movement of wildlife across borders and free movement of fishes across these two friendly countries. Article 3 of this agreement stressed this trans-boundary cooperation in mutual trust and understanding (Cooperation Agreement, 2012). However, the implementation of this MOU is quite slow and is not helpful.

On petroleum resources, an MOU with Government of Sudan was signed on the 27th September 2012. Duped as Agreement on Oil and other Related Economic Matters (AOREM), the agreement bring out the responsibilities of both Government of South Sudan as well as that of the Sudan in the management of trans-boundary resources which in this case is petroleum. Article 1 articulates that necessity of both countries to protect and preserve the hydrocarbon resources together with facilities use for evacuation of the crude oil to the international market (Cooperation Agreement, 2012). The same agreement stresses the protection of the environment from pollution by any citizen or corporation in which severe penalties could apply. Nonetheless, the implementation of this MOU has taken difficult path, as both governments have failed to act on the environmental degradation's caused by the mishandling of the pipeline and other oil transportation facilities.

3.4. Signed Protocols

The Government of South Sudan and those of neighboring states have signed various protocols in the management of conundrums arising from ownership of trans-boundary natural resources. For instance, South Sudan Government signed a protocol of Borders Management in November 2011 with the Government of Sudan. In this protocol, both countries are required to protect and preserve colonial borders and its natural world. Thus, the two countries agreed to use the 1956 borders left by the Great Britain, the former colonial master. In this protocol, Heglig, Bambo, Kafia-Kingi, Mirem and other contested areas are left as part of Sudan. However, this is the not the case currently as the Government of South Sudan contested these borders leading to April 2012 Heglig in-carnage. Moreover, both Government of South Sudan and Sudan signed a protocol on Free Movement of Wildlife in February 2013. This protocol has helped both countries in harnessing their wildlife development and environmental conservation.

On the other hand, South Sudan signed a protocol on General Trading and Environmental Co-operation in July 2012 with Uganda. While this protocol speaks much about trade between two sisterly countries, its also touches the areas of environmental co-operation. On environmental co-operation, the protocol articulates the training of staff of Ministry of Environment of South Sudan by its Uganda counterpart. In addition, its also encourages the preservation of forests along the common border areas. Although these protocols are beautifully in papers, they are yet to be implemented and thus, nothing has been achieved so far. Even the basic training of South Sudanese environmental officers has not been done. The gaps have continued, as the lack of implementation from South Sudan and Uganda Governments in actualization of the protocols is worrisome.

Furthermore, both Government of South Sudan and Government of Kenya signed a protocol on the Trans-boundary Management of Livestock in June 2013. In this protocol, the Government of South Sudan has a responsibility to restrain its cattle herders from abusing the environment at the Kenya soil, particularly, the control of greener pastures and wetlands in areas of Turkana and Kapenguria. On the other hand, the Government of Kenya has a responsibility to ensure that the Turkana pastoralists don't cross the Taposa areas without permissions from Taposa local leaders. Moreover, the abuse of the environment and pollutions associated with cattle herding has been clearly articulated in the protocol in that both Governments should preserve the environment, protect it and avoid conflicts that emanate from the control of water points and pastures. The protocol also emphasizes about the vaccination of the cattle against the ECF before crossing to any of the two countries. The evidence of the vaccination against ECF is seen through a yellow sign embedded on the left ear of a cow. While this protocol sounds great in the paper, its implementation is yet to be seen. This has remained a gap in the intervention against trans-boundary natural resources problems arising from their ownerships.

3.5. Signed Treaties

On 16th April 2016, the Heads of State and Government of the East African Community (EAC) admitted South Sudan into the East African Community (EAC) in Dar as Salaam-Tanzania. Then on 16th October 2016, President Salva kiir assented the East African Community Treaty making the Republic of South Sudan the 6th member of the Community. The Treaty provides responsibilities and rights of each partner state to itself and to the Community. The responsibilities include protection of trans-boundary natural resources from abuse, pollution, diseases and extinction. The treaty also provides framework for settling socio-economic problems arising from the ownership of trans-boundary natural resources.

Indeed, the EAC Treaty stipulates cooperation in environment and natural resources management and further stresses the importance of environmental issues and natural resources. Article 111, b and c provide an intervention in resolving the debacles associated with trans-boundary natural resources, in that the partner states:

a) Undertake to co-operate and adopt common policies for control of trans-boundary movement of toxic and hazardous waste including nuclear materials and any other undesirable materials;

b) Provide prior and timely notification and relevant information to each other on natural and human activities that may or are likely to have significant trans-boundary environmental impacts and shall consult with each other at an early stage (EAC Treaty, 1999).

Moreover, article 112 (c) on environment and management stipulates that the partner should take measures to control trans-boundary air, land and water pollution arising from developmental activities (EAC Treaty, 1999).

With all the above clear articles on the intervention, the Government of South Sudan through the Ministry of East African Community Affairs has been engaging East African Community Secretariat, particularly the Sectoral Council on the Environment and Trans-boundary Natural Resources Management. The only achievement basically, that has been realized, is the creation of awareness and sensitization amongst the partner states. However, nothing has been achieved on the actual implementation of those two articles 111 and 112 of the EAC Treaty. Like other many interventions mentioned earlier, the gap in this intervention is unwillingness of partner

states to implement those articles due to their commitments to the internal sovereignty issues. More still, the problem of slow integration process the region is going through has affected the implementation of those two articles.

3.6. Depoliticization of Environmental Legal Regimes

There is a need to depoliticize environmental legal regimes by ensuring that the environmental act is enacted immediately.This is critical for the greatest protection of the environment (natural world) of South Sudan. Hence, politics and personal interests should be avoided at all cost on the matters of environment and life.

4. Conclusions

The study is critical as it comes at a time when the debates of trans-boundary natural resources has reached it apogee. While trans-boundary resources are important to be exploited, the protection of environment is very key. The study through empirical literature has identified the socio-economic problems in South Sudan related to competition over trans-boundary resources to include flooding, pollution, diseases, conflicts, poverty and politicization of environmental legal regimes. These problems have devastated the environment of South Sudan. Interventions from the Government of South Sudan to solve these socio-economic problems include high level meetings held, technical engagements, signed MOUs for cooperation agreements, signed protocols, signed treaties and depoliticization of environmental legal regimes.While trans-boundary natural resources need to be exploited, attention should be particularly focused to respect the environment and prevent degradation as well as prevent conflicts arising from competition of these trans-boundary resources.

5. Recommendations for Further Research

While the study has revealed the socio-economic problems and solutions arising from the use of trans-boundary natural resources, further research is hereby recommended to investigate the positive impacts of these trans-boundary resources on the people of South Sudan.

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