

Climate Change in Senegal and Uganda: Historical Responsibility for Loss and Damage

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Abstract

This article looks at historical responsibility for climate change in reference to losses and damages from climate change related disasters in Uganda and Senegal. Senegal and Uganda are highly at risk to climate change caused disasters despite having historically contributed very little to global carbon emissions. Both countries will soon be further exploited for dangerous new fossil fuel projects that will export fossil fuels to European countries that have built their wealth from colonization and fossil fuel use. Senegal and Uganda must explore different solutions to their respective losses and their fossil-recolonization.

I. Introduction

At the 2023 United Nations Climate Change Conference in Dubai, United Arab Emirates, commonly known as COP28,¹ world leaders tersely negotiated the issue of loss and damage, or reparations for nations who did not contribute much to global carbon emissions but suffer some of the worst impacts from climate change caused mostly by greenhouse gas emissions of industrialized countries. The nations demanding reparations have for the most part not industrialized much. They were therefore not enriched by the fossil fuel economy like industrialized countries were and are unable to fund programs that attend to the consequences of these emissions. Beyond natural disasters, unindustrialized nations also struggle to fund adaptation to more complex consequences of the climate crisis, such as mass migration and agricultural collapse.

This article examines the carbon emissions of Uganda and Senegal, and their most salient climate crisis struggles. It also includes an analysis of current issues of fossil fuel resource sovereignty in the two nations, like the deep sea fossil gas extraction projects in Senegal by multinational corporations hoping to ship liquified natural gas to Europe, and the East Africa Oil Pipeline financed by several French companies, which is set to run through Uganda despite protest from Ugandans.

¹ COP28 refers to the 28th Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC).

Following this Introduction (Section I), the article begins with a brief Literature Review (Section II), and then delves into an analysis of three socioeconomic statistics (Section III). The fourth section examines Senegal's and Uganda's carbon dioxide (CO₂) emissions, in comparison to global CO₂ emissions. Section IV also analyzes the effects of climate change on agriculture, gender distribution in work, and migration in Uganda and Senegal. The fifth section provides an ethical analysis of the implications of climate change in Uganda and Senegal. This ethical analysis takes three angles: a.) introducing the ethical implications of current neocolonial and neoliberal fossil fuel explorations in Uganda and Senegal, b.) analyzing the work of some ethical thinkers in relation to climate change, and c.) an attempt to apply ethical approaches to climate change. The article ends with some conclusions (Section VI).

II. Brief Literature Review

Much of the research pertaining to climate change in Senegal and Uganda focuses on both country's heavy dependence on agriculture and their high vulnerability to climate change related disasters, leading to large internal migrations resulting in some cases in violent feedback loops. Twinomuhangi, Sseviiri and Kato (2023) and Abrahams (2020) focus on Uganda, while Grechi and Agustoni (2019) and Boccanfuso, Savard and Estache (2013) are about impacts in Senegal.

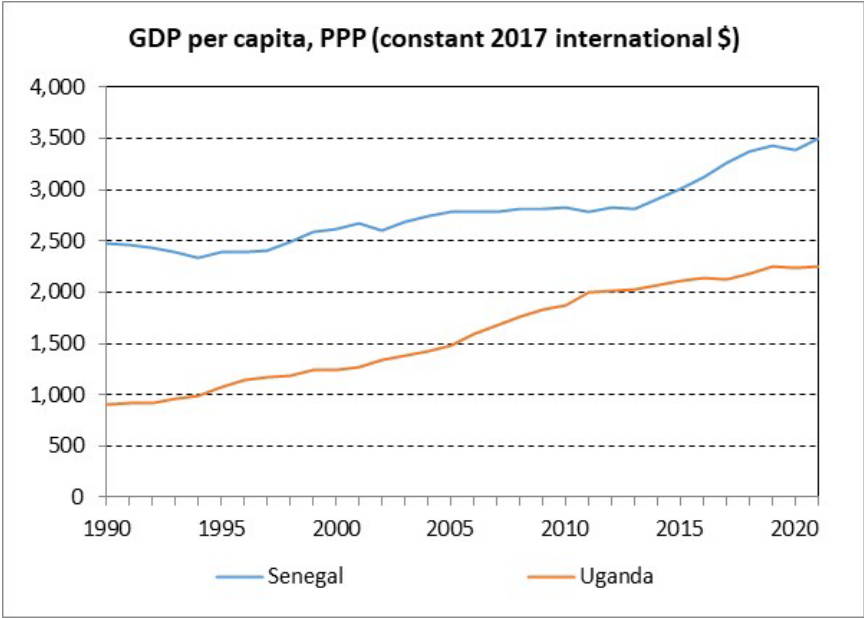
- Twinomuhangi, Sseviiri and Kato (2023) stresses Uganda's high vulnerability to the impacts of climate change leads to high levels of migration. This article seeks to address the literature gap in information about specific reasons for climate change related migration in Uganda. Climate change has caused an increase in heat waves, variability in rainfall, droughts that are more frequent and extreme, more concentrated rainfall resulting in increasingly frequent and severe floods and landslides. These events heavily impact Uganda's agricultural sector, particularly cattle farming, via a loss in biodiversity, soil erosion, and soil fertility degradation. This then leads to forced migration, which in turn leads to increased unsustainable urbanization. Additionally, past instances of soil degradation and migration caused by British colonial practices increase this problem as British colonizers forced over cultivation in regions besieged by drought, leading to forced resettlement for example of the Bakiga people.
- Abrahams (2020) explains how climate change exacerbates the effects of intense violence in Uganda in terms of localized conflict, violence over resource control, and violence within households. The article stresses that climate change creates a feedback loop as a driver of conflict in Uganda, particularly in the region of Karamoja. The authors stress that contemporary conflict patterns, historical conflict, physical geography, changing land use, biophysical impacts of climate change, socioeconomic impacts, resource access, and intrahousehold violence are all highly pressured by the effects of climate change. Authors highlight the importance of considering climate change as an overlapping or reinforcing factor in violence rather than worrying about causality in order to focus on solutions.
- Grechi and Agustoni (2019) is a case study on climate change and waves of migration that have affected the Matam region of Senegal for the past 50 years. The study focuses on the sociological effects emigration has on the region and aims to assist Green Cross Italy (a non-governmental organization (NGO)) in assisting with interventions in the Matam region. Climate change has caused recurrent droughts, highly degrading one third of Senegal's soil, an impact which is estimated to have affected half the nation's livelihoods.

- Boccanfuso, Savard and Estache (2013) outline potential solutions to reduce greenhouse gas emissions in Senegal and analyzes impacts of climate change in the country. The impacts of climate change in Senegal analyzed were diminishing agricultural potential and high vulnerabilities to global energy prices, both of which lead to increases in poverty. Analyzing World Bank data, the authors explored the varied impacts of climate change on poverty in Senegal. Solutions explored by Boccanfuso, Savard and Estache (2013) include electricity subsidies, increasing research on equilibrium effects on poverty, reduction of electricity sector rigidities, reduction of Senegalese dependency on oil imports, and the design of agricultural sector adaptation policies. The study found climate change’s disruption of agriculture to be the most concerning impact.

III. Socioeconomic Background

As shown in Figure 1, GDP per capita (adjusted for PPP and in constant 2017 international \$) of both Senegal and Uganda has risen almost steadily in the last three decades. Uganda’s GDP per capita was significantly lower than Senegal’s, with Uganda’s at \$902 in 1990 in comparison to Senegal’s \$2,470 in the same year. However, Uganda’s GDP per capita experienced faster growth rates than Senegal’s GDP per capita in the late 1990s and early 2000s, hence, reducing the difference between Senegal and Uganda to \$795 in 2011. Since 2013, Senegal’s GDP per capita then grew much faster than Uganda’s, and hence, the gap increased again more recently, with Uganda’s GDP per capita reaching was \$2,246 in 2021, while Senegal’s GDP per capita stood at \$3,495 in 2021 (a difference of \$1,249).

Figure 1: PPP adjusted GDP per capita in constant international \$), 1990–2021

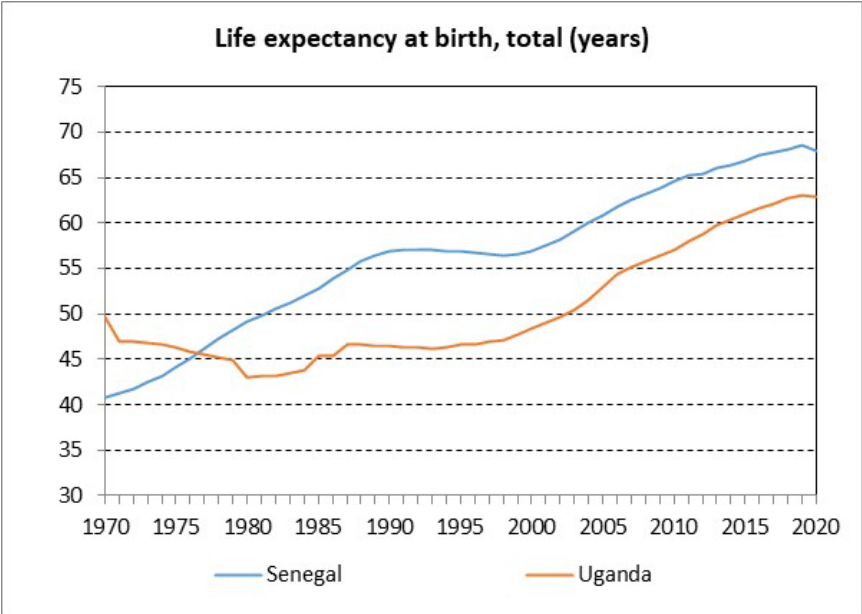


Source: Created by author based on World Bank (2023).

Life expectancy (shown in Figure 2) has risen significantly in the last five decades in both, Uganda and Senegal, though far more so in Senegal than in Uganda. Senegal’s life expectancy increased

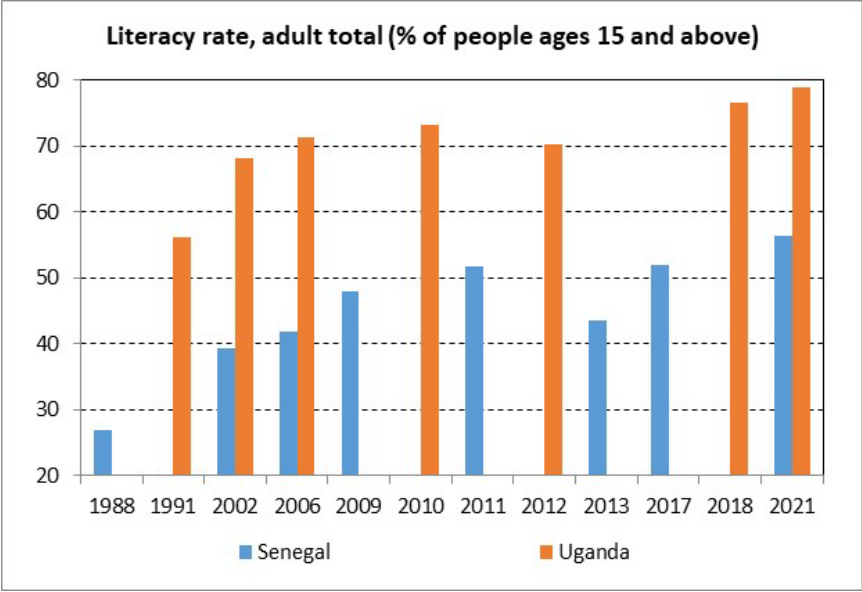
from 40.8 years in 1970 to 68.0 years in 2020, i.e., by 27.2 years. Uganda’s life expectancy increased from 49.6 years in 1970 to 62.8 years in 2020, i.e., by 13.2 years. Uganda had a higher life expectancy than Senegal in 1970, but Uganda’s life expectancy then declined until 1980, while that of Senegal increased sharply until 1991, hence overtaking Uganda in 1977. Both countries experienced sharp increases in their life expectancies during the last 20 years, except in 2020 (due to Covid-19).

Figure 2: Life Expectancy in Senegal and Uganda, 1970–2020



Source: Created by author based on World Bank (2023).

Figure 3: Adult Literacy Rates, all available years



Source: Created by author based on World Bank (2023).

Figure 3 shows the adult literacy rate for all available years for Senegal and Uganda. In 1988, Senegal's literacy rate was only 26.9 percent, compared to Uganda's 56.1 percent in 1991. While both countries literacy rates increased by about 12 percentage points until 2002, in relative terms, Senegal's increased much more than Uganda's. Furthermore, while Uganda's literacy rate seems to have stagnated during most of the 2000s, Senegal's literacy rate kept increasing until at least 2011, it then declined drastically in 2013, but then recovered in 2017. Both countries' literacy increased again during the last few years, with Senegal reaching 56.3 percent and Uganda reaching 79.0 percent. Hence, Senegal's life expectancy increased by 29.4 percentage points from 1988 to 201, while Uganda's life expectancy increased by 22.9 percentage points from 1991 to 2021.

Comparing the three figures with each other, we can see that Senegal had always a higher GDP per capita and with exception of the first six years of the 1970s always a higher life expectancy than Uganda. On the other hand, Uganda has done better than Senegal in terms of increasing GDP per capita, while Senegal has done better than Uganda in terms of improving life expectancy and literacy.

IV. Analysis of Facts

This section is divided into two subsections. The first subsection examines annual per capita CO₂ emissions and cumulative CO₂ emissions, while the second subsection examines the potential impact of climate change on the agricultural sector based on three agricultural indicators.

IV.1. Analysis of CO₂ Emissions

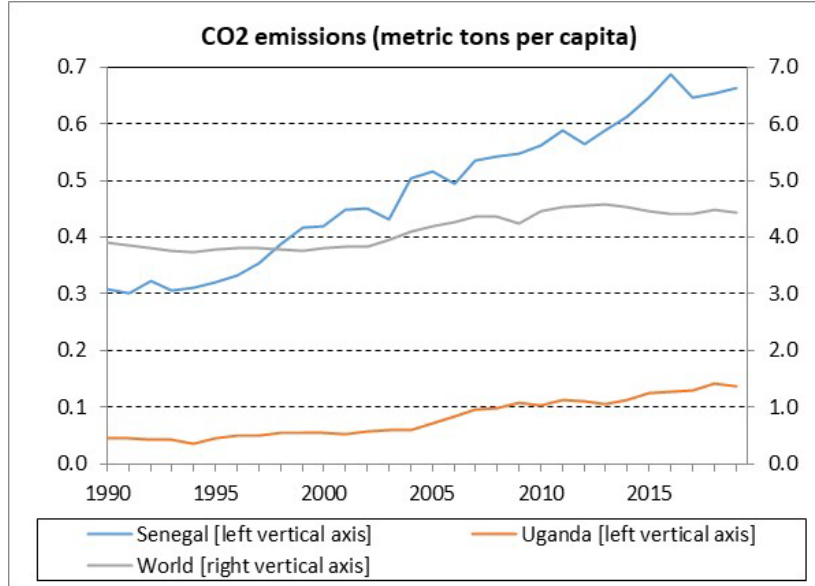
The left vertical axis of Figure 4 illustrates the yearly CO₂ emissions in metric tons per capita of Senegal and Uganda from 1990-2019. Senegal's rise in per capita CO₂ emissions roughly mirrors its rise in GDP per capita along the same time span, increasing from 0.31 metric tons per capita in 1990 to 0.66 metric tons per capita in 2019. Hence, Senegal's per capita emissions roughly doubled from 1990 to 2019. Though Uganda has significantly lower CO₂ emissions than Senegal during the whole period, reflecting Uganda's lower GDP per capita, Uganda's per capita emissions increased more in relative terms from 0.04 metric tons in 1990 to 0.14 metric tons in 2019, which is more than a threefold increase from 1990 to 2019.

In any case, both countries' per capita emissions are far below the world average, shown on the right vertical axis of Figure 4. The world average CO₂ emissions increased from 3.9 metric tons in 1990 to 4.4 metric tons in 2019. In 1990, Senegal's per capita emissions were 7.9 percent of the world average per capita emissions, while Uganda's per capita emissions were 1.2 percent of the world average per capita emissions in 1990. In 2019, Senegal's per capita emissions were 15.0 percent of the world average per capita emissions, while Uganda's per capita emissions in 2019 were 3.1 percent of the world average per capita emissions. Hence, over time, both countries are getting closer to the world average per capita emissions, but both countries are still far below the world average per capita emissions.

Figure 5 demonstrates industrial nations' historical accountability for the majority of carbon emissions. Although Figure 5 shows emissions by region rather than by nation, it is clear from this chart that Senegal's and Uganda's share in emissions from 1850 to 2019 is very small as the emissions from the whole African continent amounts to only 7 percent of total historical emissions. Meanwhile 43 percent of global historical CO₂ emissions derive from the high-income regions of North America, Europe, Japan, Australia, and New Zealand. While Uganda and Senegal's

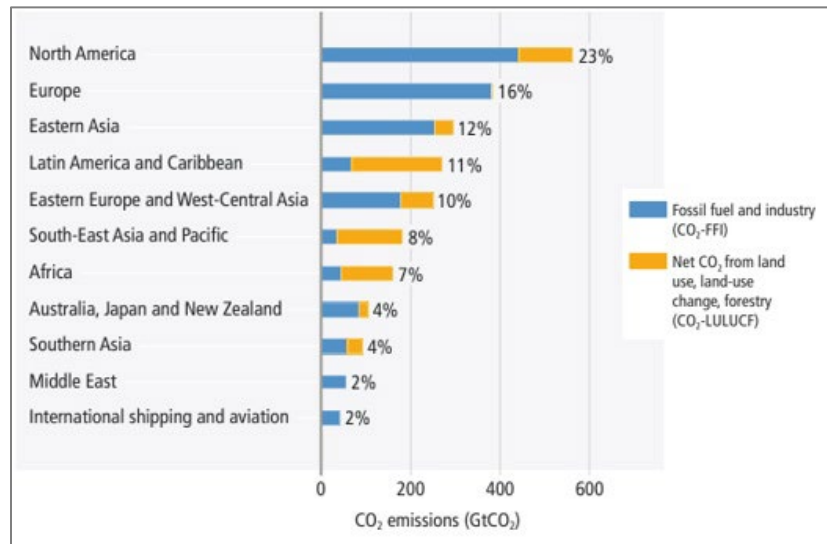
population, economy, and long-term ecological health suffer significant damage from the climate crisis, these nations’ actions are not to blame for the emissions that caused their loss and damage due to the climate crisis; wealthy industrialized countries are.

Figure 4: CO₂ Emissions (metric tons per capita) of Uganda, Senegal, and World Average



Source: Created by author based on World Bank (2023).

Figure 5: Cumulative Net Anthropogenic CO₂ Emissions per Region (1850–2019)



Source: Intergovernmental Panel on Climate Change (IPCC) (2022).

IV.2. Impacts on Agricultural Sector

Both Uganda and Senegal are highly agricultural-based economies, with much of the nations’ economic and food security dependent on their agricultural yields. In Senegal, 74 percent of rural households are considered “agricultural households,” of which 91 percent rely on subsistence

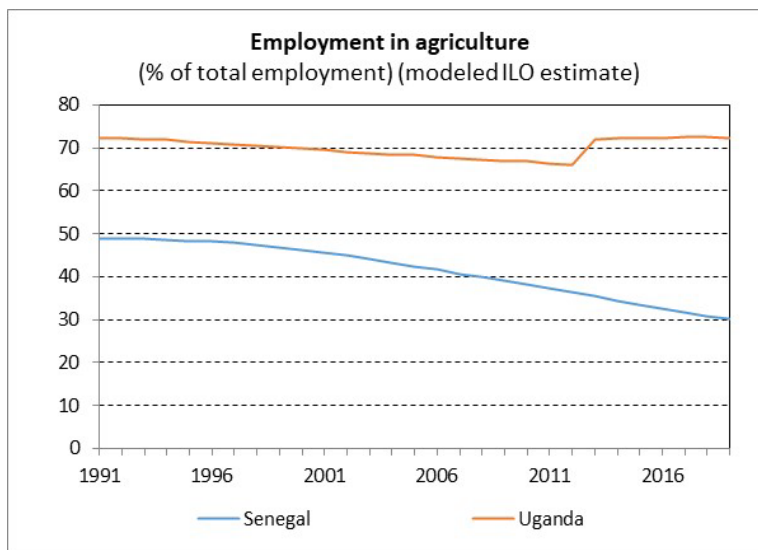
farming.² Ugandans are similarly highly dependent on agriculture, but their nation’s higher poverty level (in comparison to Senegal’s) makes the population of Uganda more vulnerable to agricultural shocks.³

Both country’s high dependence on agriculture and low GDP per capita increases the effects of climate change felt in their nations as drought, floods, landslides, and heat waves have become more frequent and extreme, majorly impacting agricultural yields. Uganda’s cattle farming has been particularly affected by the climate crisis. Climate change related disasters also negatively impact soil erosion, cause a loss of biodiversity, and a degradation of soil fertility. These reduce agricultural yields in both the short and long term.⁴ Given the limited data on the impact of climate change on soil erosion, loss of biodiversity, and soil fertility, the remaining paragraphs of this subsection examine a.) the share of agricultural employment, b.) the gendered differences in agricultural employment, and c.) climate related migration.

IV.2.a. Share of Agricultural Employment

Figure 6 visualizes the percentage of the employed population that works in the agricultural sector in Senegal and Uganda. Uganda has a much higher and steadier percentage employed in agriculture than Senegal. Senegal’s agricultural employment percentage has been experiencing a significant and steady downward trend in the past 30 years, which is mostly due to industrialization but partly also due to climate change. Much of Senegal’s most populated areas consist of low-lying coastal regions with high water tables and poor systems of drainage creating a high risk for erosion and flooding. Senegal’s agricultural sector has been highly impacted both by irregular rainfall and flooding, and by increased temperatures and decreased precipitation levels which have worsened Senegal’s already overexploited and degraded soils.⁵

Figure 6: Employment in Agriculture (percent of total employment), 1991–2019



Source: Created by author based on World Bank (2023).

² Grechi and Agustoni (2019).

³ Twinomuhangi, Sseviiri and Kato (2023).

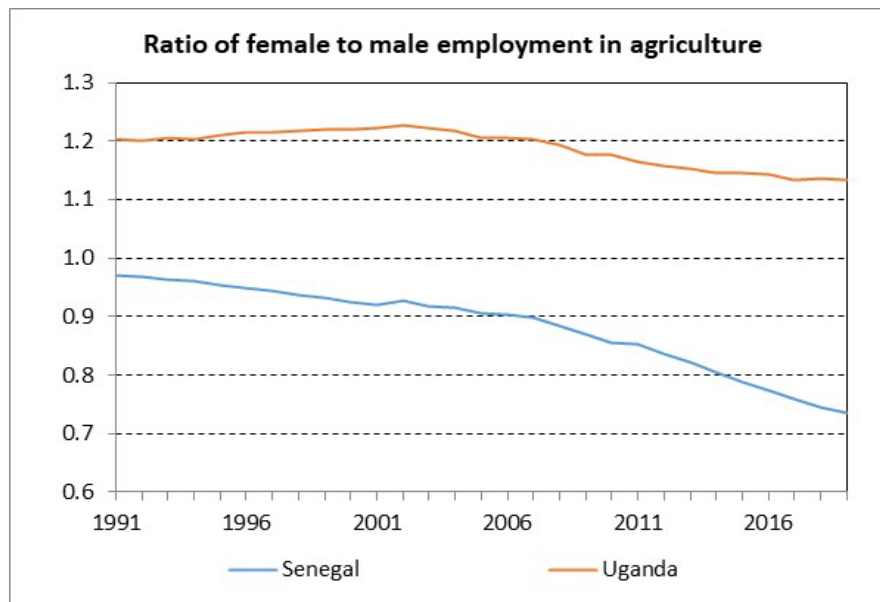
⁴ Twinomuhangi, Sseviiri and Kato (2023).

⁵ United States Agency for International Development (USAID) (2022).

IV.2.b. The Gendered Consequences of Climate Change

There are likely also gendered differences in the impact climate change has on agricultural employment as the effects of climate change on agriculture impact women and men differently. Figure 7 shows the ratio of female to male employment in agriculture from 1991 to 2019. While the percentage of women employed in agriculture is much higher in Uganda than in Senegal, common to both countries is that the ratio of female to male employment in agriculture has been decreasing over time (since 1991 in Senegal and since 2002 in Uganda). While there are other social changes that influence this ratio, climate change has likely also contributed to the declining ratio.

Figure 7: Ratio of Female to Male Employment in Agriculture, 1991–2019



Source: Created and calculated by author based on World Bank (2023) data for female and male labor participation rates in agriculture.

Senegal experiences a high level of gender inequality in general, according to their gender development index of 0.88. Women in Senegal have low levels of labor market participation. A high percentage of Senegalese women are self-employed or unemployed, or they are granted less desirable employment than men. For example, the female unemployment rate in Senegal is 23.5 percent in comparison to the male unemployment rate which is 11.4 percent.⁶ Additionally, the percentage of the female labor force that is employed by an outside employer (not self-employed) is only 32.8 percent, almost half of the employment rate of males which is 59 percent.⁷ These gendered differences in agricultural employment demonstrate that existing inequalities increase as the effects of the climate crisis worsen.

⁶ Maisonnave and Mamboundou (2022).

⁷ Maisonnave and Mamboundou (2022).

IV.2.c. Climate Change and Migration

Climate change's effects on agriculture heavily contribute to climate migration as well. When natural disasters render land unusable or make crops extremely economically unviable to cultivate, populations are forced to migrate to find new sources of labor. Globally, migration is highly impacted by climate change; the IPCC writes that the greatest single impact of climate change is migration. According to the World Economic Forum (2020), there are an estimated 272 million international migrants (i.e., 3.5 percent of the world's population). Even though most people leave their home countries for work, millions have been driven away due to conflict, violence, and climate change.⁸ These migration numbers are — in relative terms — more drastic for Uganda and Senegal: From 2017 to 2020 at least 62 percent of displaced Ugandans were forced to migrate due to natural disasters.⁹ Rigaud et al. (2021) have estimated that internal climate migration in Senegal could reach up to 1.0 million people by 2050.

V. Ethical Analysis

This section focuses on three ethical aspects related to climate change: first, the unethical neocolonial resource extraction currently underway in Senegal and Uganda; second, the ethical principles to guide a fair adaptation to climate change proposed in Paavola, Adger and Huq (2006); and third, the Markkula Center's (2021) six approaches for ethical decision making applied to climate change in Senegal and Uganda.

V.1. Neocolonial Resource Extraction

The historical responsibility for the climate crisis (as shown in Figure 5 above) is an important ethical consideration in the analysis of the effects of the climate crisis causing harm in Senegal and Uganda. An additional complication is that both Uganda and Senegal have discovered fossil fuels within their borders which wealthy industrialized nations are eager to exploit. A large portion of the East Africa Oil Pipeline (EACOP) runs through Uganda, while the construction of Liquefied Natural Gas (LNG) export ports has begun in Senegal.

Both Senegal's LNG and Uganda's EACOP involve the exportation of fossil fuel resources out of their respective nations of origin. Multinational corporations from European countries have financed EACOP, the largest of which is Total Energies, a French company, giving the relationship extremely colonial overtones. Many brave activists from Uganda are working to oppose EACOP and fight its construction, but they face severe human rights violations. Seven activists have recently been unjustly jailed in inhumane conditions in Uganda for their work opposing the pipeline. Senegal's LNG will be exported to Europe, and EACOP's oil will be shipped to international markets from its destination in the port of Tanga. This blatantly neocolonial resource extraction has severe consequences for the communities along the route of this extraction, with obvious ethical consequences.

V.2. Ethical Principles to Guide Fair Adaptation

Paavola, Adger and Huq (2006) analyze the ethical implications of climate change. They examine the vulnerabilities developing nations face due to the climate crisis geographically, economically,

⁸ World Economic Forum (2020).

⁹ Twinomuhangi, Sseviiri and Kato (2023) and Abrahams (2021).

and politically. They point out that developing nations are not treated as equal partners in international intergovernmental climate change negotiations. Instead, the very developed nations that are historically responsible for climate change have disproportionately very high negotiating power in international forums and are not held accountable or forced to be transparent about their emissions practices. Paavola, Adger and Huq (2006) write that due to past and current injustice, developing nations do not have the ability to further their national interests in said international negotiations, which they consider ethically unjust.

As a response to said injustices, Paavola, Adger and Huq (2006) put forward four ethical principles to guide a fair adaptation process to climate change globally. The first ethical principal is to limit emissions as to avoid dangerous levels of climate change. This requires reducing greenhouse gas emissions, which is happening in some countries but not yet at the global level. Both, Senegal and Uganda have agreed to reduce their greenhouse gas emissions in accordance with the Paris Climate Agreement of 2015. Senegal's government created a list of Nationally Determined Contribution (NDC) to greenhouse gas mitigation, prioritizing an investment in solar, wind, and hydroelectric power to aid in a 4-15 percent reduction in greenhouse gas emissions by 2030.¹⁰ Uganda updated its NDC in September 2022, presenting an ambitious economy-wide mitigation target in 2030 of 24.7 percent reduction below the Business as Usual (BAU).¹¹

The second approach focuses on the implementation of emissions responsibility framework moving forward, such as a uniform carbon tax whose revenue is allocated for adaptation to climate change based upon the vulnerabilities faced by different regions. There are several emissions responsibility frameworks available besides a universal carbon tax, which is complicated by issues of national sovereignty. Loss and damages, colloquially known as climate reparations are in various stages of international negotiations have taken center stage at the COP28 negotiations in December 2023.

The third principle is to prioritize vulnerable populations. The authors define vulnerability as a region or population's exposure and sensitivity to climate chaos as well as their current capacity for adaptation. Both Senegal and Uganda are highly vulnerable to climate change and have relatively little capacity for adaptation. Hence, Senegal and Uganda rely on climate reparations.

The fourth and final principle calls for fair participation for all nations with a system of one country having one vote. This concept is complicated by differing population levels and geographic sizes of nations, and a bicameral-like voting system has been proposed by others as a means of making the principle of fair participation more democratic for global populations.

V.3. Climate Change and Lenses of Ethical Decision Making

Applying the six ethical sources, approaches or lenses of ethical standards listed by the Markkula Center (2021) to make decisions related to climate change is complicated by the fact that decisions related to climate change mitigation are typically different from climate change adaptation as climate change mitigation focuses on reducing greenhouse gas emissions while climate change adaptation focuses on dealing with place-specific negative side effects of climate change resulting from global emissions.

¹⁰ United States Agency for International Development (USAID) (2022).

¹¹ Republic of Uganda, Ministry of Water and Environment (2022).

Considering that the Utilitarian Approach tries to increase the good and reduce the harm, an argument could be made that the Utilitarian Approach would suggest prioritizing climate change mitigation in the countries that contribute the most to climate change but to prioritize climate change adaptation in countries like Senegal and Uganda as they are the most affected by climate change. Applying the Fairness or Justice Approach to the climate crisis might suggest compensating Senegal and Uganda as they contributed the least to climate change yet are among the worst affected. A similar conclusion could be reached for the Virtue Approach as virtues like compassion, integrity, and fairness might also suggest compensating Senegal and Uganda for the loss and damages resulting from global emissions.

Given that the Care Ethic Lens suggests that the ethical action must account for the relationships, concern, and feelings of all stakeholders, it could be argued that all countries have to contribute to climate change mitigation efforts while no country should be prioritized with regards to climate change adaptation. It is also unclear how the Common Good Approach might suggest a prioritization of Senegal and Uganda as all countries contribute to climate change (even though to different degrees) and all countries are affected by climate change (though again to different degrees). Considering the Rights Approach might suggest no prioritization of Senegal and Uganda as citizens of all nations deserve the right to be protected from the effects of the climate crisis.

VI. Conclusion

This article explored the historical inequities in carbon emissions and the monetary consequences of that inequity as well as current calls for climate reparations from the Group of 77 countries (G77). It explores the underlying economic scene in Uganda and Senegal and applies these results to climate change. The article also explores changes in agriculture, gendered work, and migration due to the climate crisis, introduces neocolonial fossil fuel extraction in these nations, and examines the ethical arguments experts have made about the subject.

As COP28 ended on December 13, 2023, it is important to note that the United States — the by far biggest historic carbon emitter — has committed relatively very small amounts of loss and damage reparations, all in loans. State department negotiators justify this policy decision by stressing that the current U.S. Congress would not agree to allocate funds to climate reparations. However, based on ethical considerations, the low U.S. allocations do not seem justified. Ethically speaking, a solution could be the establishment of an objective international climate court to settle disputes such as climate reparations and implement punishments for international polluters. However, given the level of power the world's most polluting sovereign nations have in international negotiations, this solution is unlikely to occur.

Another possible next step would be seeking compensation from polluting companies rather than polluting nations, as these companies also received the bulk of the profit from global carbon emissions. Additionally, countries with more United Nations power might be more likely to support reparations from companies rather than nations as to have a scapegoat to turn the blame onto. Uganda and Senegal are currently reaping massive repercussions from global climate change and neocolonialism, and they deserve not only compensatory reparations but clean environments in which their populations could flourish.

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