



Reviewing the climate-security nexus: The impacts of climate vulnerability on pastoralist conflicts in the Unity State region, South Sudan

Peter Machieng Chan Gaduel

qmul.co.uk/gpi

Executive summary

Climate change is one of the most serious policy issues of our time. Various national governments have now incorporated climate change into their national planning and programming. It is understood that climate change vulnerability has a direct link with national and human security because it is a cause of food insecurity, population displacement, poverty and water crises, which trigger localised conflicts and insecurity (German Advisory Council on Global Change 2007). Such impacts derail sub-national peace-building processes among the nations emerging from war, leading to the prioritisation of policy interventions aimed at climate adaptation and community resiliency programming.

South Sudan has recently emerged from the armed conflict in 2018 and continued to experience increasing trends of sub-national violence. The dramatic changes in climatic variations such as increased rainfall and flooding in South Sudan have led to poor agricultural productivity and disruption of civilian livelihoods. Consequently, local communities are displaced and compete over scarce resources. The environmental-related vulnerabilities combine with political and socio-

economic grievances to increase instability in the young African nation. With fragile political institutions, South Sudan may not cope with a climate-related crisis if policymakers do not make early interventions to mitigate perennial climate hazards such as flooding and droughts.

South Sudan is ranked fifth among nations that are the most vulnerable to climate shocks (Republic of South Sudan Ministry of Environment and Forestry 2021). ***Pastoralists and farmers are the most vulnerable groups affected by climate variability due to their dependence on surface water.*** Widespread poverty and lack of economic opportunities have increased youth involvement in militarised cattle raiding, robbery, and other forms of crime.

This report focuses on the Unity State region of South Sudan in which climate shocks and militarised cattle raiding have disrupted livelihood systems at county levels while increasing internal displacement and dependence on humanitarian agencies for food and basic services.

Policy recommendations

This report makes the following recommendation:

- Stakeholders should develop **integrated peacebuilding and climate adaptation approaches** involving public, private and non-profit sectors that are focused on community resilience to enable them to mitigate environmental shocks.
- There is a need for a **comprehensive environmental audit** to understand the implications of environmental shocks on pastoralist conflicts throughout Unity State. These assessments will generate deeper knowledge and climate change mitigation actions.
- It is necessary to create **employment opportunities for young people to reduce economic disparities** that lead to cattle raiding and violence in Unity State. Providing economic opportunities to young people would increase their resilience to natural calamities and involve them in disaster mitigation and response planning.
- **Removal of small arms and light weapons** from the hands of civilians to reduce the lethality of violent conflicts in the Unity State.
- Need for state-level and local **environmental legislation** that regulate unsustainable use of forests such as logging, charcoal burning, and bush burning, which cause desertification and environmental degradation.
- **Timely sharing of weather forecasts** between stakeholders and local communities to inform choice of crops and farming strategies. There is a need for stakeholders to disseminate early warning indicators on weather forecasts, food insecurity and market conditions among public agencies, NGOs and communities to improve social resilience and awareness.
- **Early flooding mitigation interventions** in counties vulnerable to flooding disasters to mitigate the effect of hazards. State authorities should make early interventions to divert flooding away from farmlands through improved drainage and the construction of dykes. Early intervention at the mitigation phase would reduce the impact of a disaster compared to later responses.

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Acronyms

ACLED	Armed conflict location and event data
ASPF	Agriculture Sector Policy Framework
CPA	Comprehensive Peace Agreement
GHG	Green House Gases
ICCG	Inter-cluster coordination Group
IDMC	Internal Displacement Monitoring Centre
IDP	Internally Displaced Persons
IPCC	Intergovernmental Panel on Climate Change
NBSAP	National Biodiversity Strategic Action Plan
R-ARCSS	Revitalised Agreement on the Resolution of Conflicts in South Sudan
SALW	Small Arms and Light Weapons
SPLM	Sudan People Liberation Movement
SPLM-IO	Sudan People Liberation Movement in Opposition
SSOA	South Sudan Opposition Alliance
UNCBD	United Nations Convention on Biodiversity
UNCCD	United Nations Convention to Combat Desertification
UNEP	United Nations Environment Programme
UNFCC	United Nations Convention on Climate Change
UNHCR	United Nations High Commissioner for Refugees
UNMISS	United Nations Mission in South Sudan

1. Background of climate-induced conflicts in South Sudan

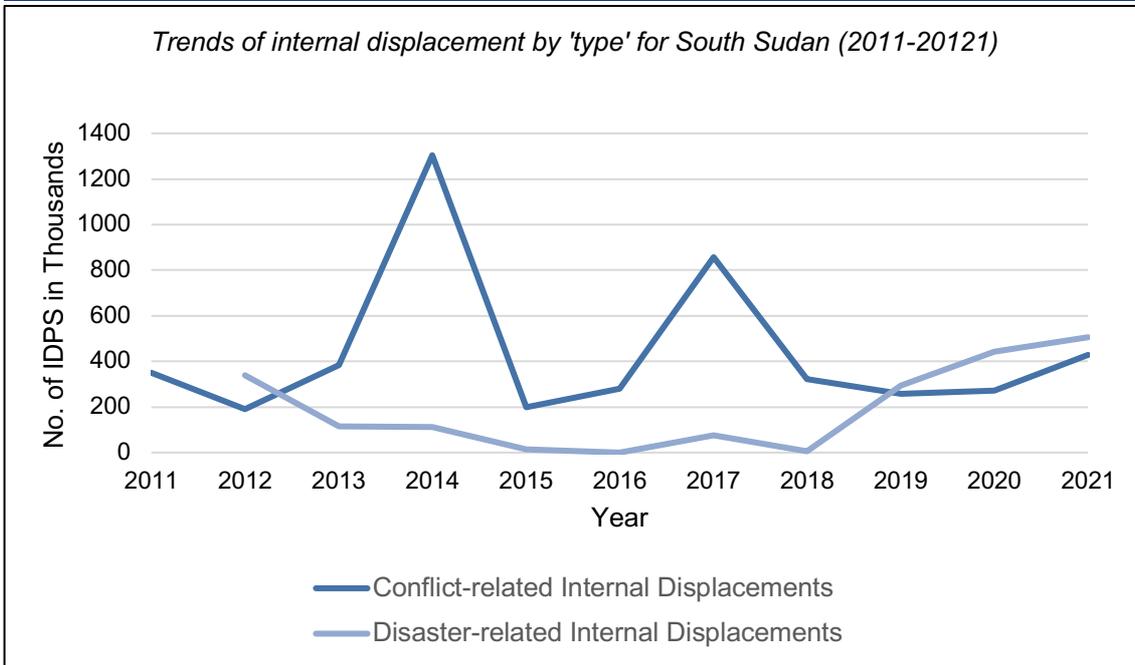
In the period 2018-2022, transitional security arrangements and wide availability of small arms and light weapons degenerated into security gaps that combined with environmental scarcity and climate vulnerability to increase the lethality of localised conflicts in South Sudan and Unity State in particular. Despite the end of armed conflict in 2018, communal conflicts have characterised the post-conflict transition in Unity State.

Climate hazards such as drought and famine that affected Unity State in 2017 are intertwined with the security crisis, leading to an increase in social vulnerability and tensions. These tensions are manifested in the form of boundaries and tribal territorial disputes expressed through conflicts over grazing zones and militarised cattle raiding (Pendle 2017). Since 2018, isolated armed youth groups that had fought alongside warring factions in 2013 resorted to forming community security groups (Craze et al. 2016) and took the advantage of lawlessness to continue sowing fear and insecurity among civilians (International Peace Institute 2021).

Due to flooding and drought, there is low agricultural productivity and high market inflation which became a source of inequality among working-class and agropastoral groups. In the same manner, violent cattle raiding, and intra-communal violence has displaced communities from homes and disrupted livelihood activities due to fear of revenge killing and attacks (Saferworld 2018). As a result, there is high poverty in the region and dependency on humanitarian aid. A few groups who lived in rural areas joined cattle raiding expeditions within Unity State and neighbouring regions to replenish their animal wealth (Stringham and Forney 2017). Cattle raiding has been a source of a vicious cycle of violence among the Nuer sub-ethnic groups in Unity State and Dinka communities from nearby regions such as lakes and Warrap states.

The chart on page nine, shows the interrelationship between climate vulnerability and conflicts in the South for the last decade since independence in 2011. It is evident that the onset of disaster goes hand in hand with conflict incidents since the end of armed conflict in 2018.

Figure 1: Interrelationship between climate vulnerability and conflicts



Source of dataset: IDMC displacement data

While there may be some missing data due to insecurity and lack of accessibility in parts of the country, IDMC (n.d.) estimated that about 62 per cent of internal displacements from South Sudan in 2020 are disaster-related compared to 38 per cent of displacements which were caused by violent inter-communal conflicts. On the other hand, there is an upward trend in disaster-related displacements which corresponds with rising trends of violent conflicts since 2018. This shows that there is a close interrelationship between climate vulnerability and conflicts. The higher the magnitude of the disaster the bigger the impact on social tensions and conflicts in South Sudan. There has been a steady increase in disaster and conflict-related displacements from 2019 and beyond. This trend may continue if underlying causes of climate vulnerability and communal conflicts are not addressed.

1.1 The state of climate change in South Sudan

This report focuses on the implications of climate variability on pastoralist conflicts in South Sudan. South Sudan depends on subsistence agriculture and livestock keeping as the primary source of livelihood for its local populations. About 11.7 million cattle and 12.1 million goats and sheep make South Sudan the highest livestock per capita holding in Africa (JICA 2015). The human population is about 13 million, with over 65 per cent

depending on livestock for their livelihoods. South Sudan benefits from large surface water reservoirs and the extensive Sudd Wetland, which covers about 30,000 to 40,000 square kilometres and produces about 100,000 to 300,000 tons of fish per year (Republic of South Sudan Ministry of Agriculture, Cooperatives, and Rural Development 2012).

The annual temperatures range between 26°C to 30° C and are higher in the North, while yearly rainfall ranges from 500mm to 1500mm per annum (JICA 2015). Accordingly, the vegetation cover is mainly shrubs (26 million Hectares), forest woodlands (21.3 million Ha), and Savanah grassland (15 million Ha) ((Ministry of Agriculture and Food Security 2020). The natural forest is used by the local populations as a source of wood and charcoal for cooking. It is estimated that there is an increasing emission rate of greenhouse gases (GHG) at 1.22 per cent (Republic of South Sudan Ministry of Environment and Forestry 2018). Research has highlighted that communities in South Sudan are exposed to climate shocks such as droughts, frequent flooding, and decreased rainfall (Ajak 2018)). Consequently, the soil is degraded, and agriculture production is declining.

Land degradation in South Sudan is increasing at an alarming rate. About 26,7776 square kilometres of land is degraded annually (Ministry of Agriculture and Food Security 2020). Land degradation rose from 0.8 per cent in 1973 to 15.4 per cent in 2006 (Republic of South Sudan Ministry of Agriculture, Cooperatives, and Rural Development 2012). Much of this soil degradation occurs in the Northern borders and Southeast of South Sudan. The tropical rainforest in Western Equatoria is also receding faster. The primary triggers for environmental destruction include charcoal making, wood collection, illegal logging, overgrazing from pastoralists, mineral exploitation, and water abstraction (Republic of South Sudan Ministry of Agriculture, Cooperatives, and Rural Development 2012).

South Sudan has been ranked the fifth most vulnerable nation to climate shocks (Republic of South Sudan Ministry of Environment and Forestry 2021). It is projected that South Sudan will be warmer by more than 1.5°C by 2060 (Grasso and Singh 2009) while facing a temperature increase of 0.4°C per decade (Republic of South Sudan Ministry of Agriculture, Cooperatives, and Rural Development 2012). It is anticipated that the populations in South Sudan will be exposed to climate vulnerability, with is likely going to increase competition over resources and conflict. The Greater Bahr el Ghazal region, Unity State and Central Equatoria are expected to experience a severe dry spell. Similarly, decreased rainfall will lead to loss of agricultural land and a decline in fish diversity (Grasso and Singh 2009).

Responding to climate adaptation commitments, South Sudan ratified the Rio Climate regimes in 2014, namely the; United Nations Framework for Climate Change (UNFCCC), the United Nations Conventions to Biodiversity (UNBD), and the United Nations Convention to Combat Desertification (UNCCD) (Republic of South Sudan Ministry of Environment and Forestry 2021). South Sudan has formulated the Agriculture Sector Policy Framework 2012-2017 and National Environmental Policy (2013). Nevertheless, inadequate legislation on environmental conservation hinders the commitment to achieving climate adaptation targets in South Sudan.

On the other hand, there is a discrepancy between peacebuilding and climate resilience strategies. Many national adaptation targets do not consider conflict sensitivity in resolving climate vulnerabilities.

2. The climate-security nexus

The interplay between resource scarcity and intractable social conflicts has dominated policy research since the 1990s. In 1994, Thomas Homer-Dixon first contributed to the understanding of how human interaction and the natural environment is a factor in social conflict (Homer-Dixon 1994). He predicted that the growth in the human population would increase the scarcity of renewable resources such as water, increase the degradation of agricultural land and forests, and trigger social tensions and localised conflicts. Homer-Dixon envisioned that a lack of renewable resources would increase social vulnerability and lead to the displacement of the population, which in turn will increase the pressure on scarce resources and eventually conflicts (Homer-Dixon 1994). His understanding of environmental change implies a human-induced decline in the quality or quantity of renewable resources, which reduces faster than being replaced by nature. His prediction provided a causal link between environment, climate change and civil conflicts. Nevertheless, some argue that linking environmental change to conflict only diverts the attention away from those responsible for political and socio-economic triggers of conflict (Mach et al. 2020).

In recent years, however, there has been growing emphasis among policy researchers on how climate change threatens ecological conditions and human survival. Climate change is the long-term variability in average weather patterns usually observed for three decades or a century (Koubi 2019; Barrie Pittock 2009). While climate study is approached through interdisciplinary lenses, the climate science experts noted that global temperatures are rising at an alarming rate, implying a $0.13 \pm 0.3^\circ\text{C}$ increase every ten years (Barrie Pittock 2009). The changing climatic conditions affect group violence through competition over scarce renewable resources such as water, arable land, forest, and fish stocks (Barrie Pittock 2009; Homer-Dixon 1994). It is understood that the concentration of natural greenhouse gases (GHGs) such as carbon dioxide and methane in the atmosphere, in addition to human activities since the industrial revolution, have been the triggers for global warming.

Climate variability is a manifest trigger for shocks or climate-induced vulnerability. The IPCC defines climate vulnerability as the susceptibility of the social system to harm, and a lack of human capacity to cope and adapt to crises due to their interaction with climate hazards such as floods, water crises, drought, and land degradation (Intergovernmental Panel on Climate Change 2022). There is a consensus that climate vulnerability is influenced by the ecological, economic, sociological, and political effects of climate change (Daoudy et al. 2022). Nevertheless, the capacity to adapt to climate change differs from place to place depending on the level of socio-economic development or existing socio-cultural inequality and marginalisation. However, the vulnerability to climate change is considered a threat to human survival due to unsustainable production, scarcity of resources, and disruption of coping mechanisms of local populations, which is a trigger for tensions and a cause for intractable social conflicts.

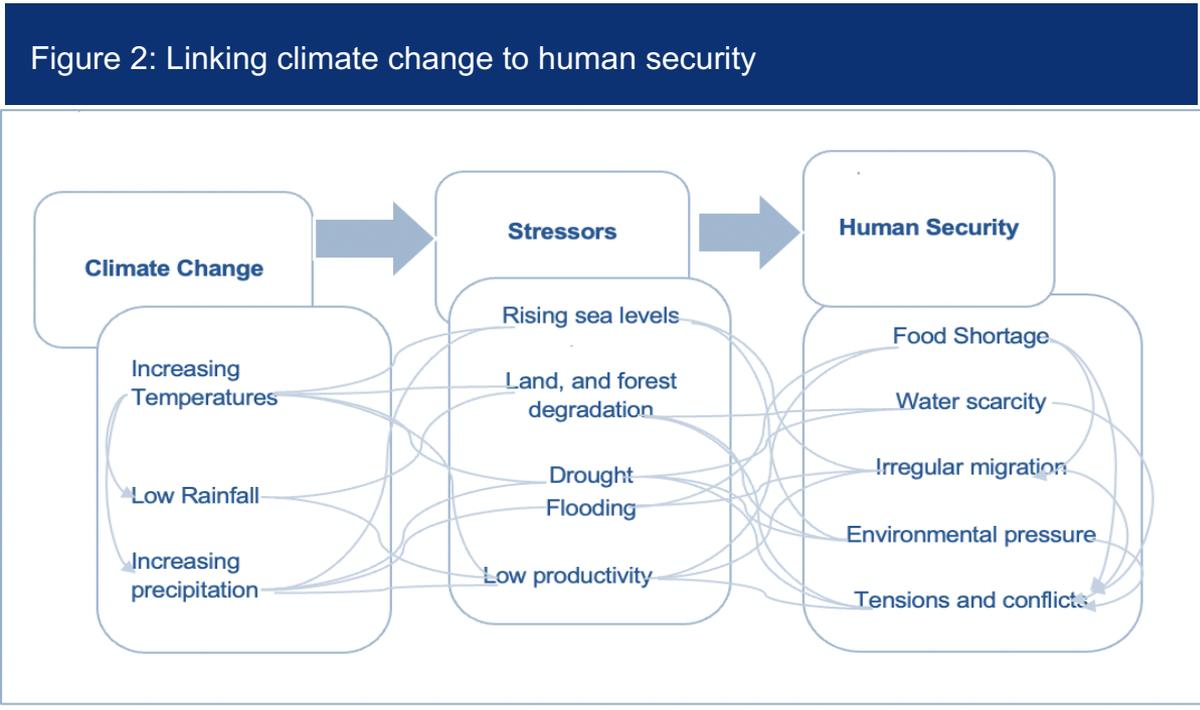
Based on scientific findings linking climate change to ecological and human vulnerability, scholars of peace and international relations sought to understand the causal relationship between climate change and security. Some argue that climate change is a security threat. In contrast, others are concerned that security is too broad because it involves national security defined in terms of political, economic, and military power (CNA Military Advisory Board 2014; Kameyama and Takamura 2021) while, on the other hand, there is an aspect of human security which is understood in terms of necessary conditions for human survival, dignity, and freedom (Mach et al. 2020; Lewis and Lenton 2015). However, Buhaug is critical to how policy researchers securitise climate change without being explicit about the aspects of climate change that threaten security (Buhaug 2015). Despite this, Mach et al. (2020) suggest civil conflict triggers climate change because its impacts increase climate vulnerability. Such scholars tend to caution against using climate change as the cause of conflict, suggesting that it is diverting the attention of triggers of social conflicts such as policies on food, water, and land, which may be directly linked to the grievances that cause conflict (Daoudy et al. 2022). However, such disagreements are only based on the choice of research methods because those seeking causal relations between climate change and conflict find it challenging to establish a correlation when applying quantitative analysis using large datasets (Lewis and Lenton 2015; Mach et al., 2020).

Despite the controversy, however, human security research acknowledges that there is a direct and indirect relationship between climate change and social conflict, although it is not the only cause of conflict (Krampe et al. 2020). Conca and Wallace show that the inability of policymakers to correct environmental problems or contested access to renewable resources tends to frustrate reconciliation and increase the risks of renewed conflicts (Conca and Wallace 2012). Similarly, a change in temperature or precipitation patterns increases the dangers of civil unrest, crimes and insecurity (Burke et al. 2015) through disruption of livelihoods, migration and the capacity of states to provide protection and security (Adger, W.N., J.M. Pulhin, J. Barnett, G.D. Dabelko, G.K. Hovelsrud, M. Levy, Ú. Oswald Spring, and C.H. Vogel 2014). The plausibility of the climate-security discourse is thus reflected in how various national governments perceive climate change as a security threat in their strategic planning. According to McDonald (2018), strategic planning documents from more than 70 states acknowledge climate change as a security threat. This is also the same with the conferences and proceedings of international institutions such as the United Nations, which are also dominated by climate-security debates (Busby 2021).

2.1 Climate change as a trigger of conflict

While it is understood that climate change could indirectly and directly trigger conflicts, important causal mechanisms of climate security are food scarcity and poverty, migration, violent tactics of non-state groups and the associated tendency to amplify existing vulnerabilities. Regarding the impact of climate on livelihoods systems, reduced or increased precipitation and temperature tend to impact productivity and lead to resource scarcity (Adger, W.N. et al., 2014), especially in nations entirely dependent on rain-fed agriculture (Burke et al. 2015, (Burke et al. 2009). Reduced rainfall and increased temperature bring about a dry spelt which affects the

availability of water, soil productivity and forests leading to a scarcity of resources. In the same way, increased precipitation increases the risk of flooding and rising sea levels, which cause the loss of property while increasing social vulnerability to shock and stress (CNA Military Advisory Board 2014). While on the other hand, the destruction of ecosystems, including soil, grass cover and forest degradation, impact the livelihoods of groups centred around livestock keeping leading to migration and conflict. Due to the loss of properties and decline in economic and agricultural productivity, groups would compete for access to scarce resources, which brings about tensions and social conflicts. The figure below illustrates the relationship between climate vulnerability and conflicts.



Source: Constructed by the author¹

In the same way, reduced agricultural production due to land degradation leads to water scarcity which is a trigger for population movement. Rising sea levels are brought about by rising temperatures which cause melting of ice in polar regions or small islands or increasing precipitation because of climate change forces people to move from their areas of origin to find safety in other locations. According to Krampe, Van de goor, et al. (2020), population movement brings about social conflicts when social, economic, and political factors bring groups into collisions. It is argued that impacts of climate change escalate pre-existing vulnerabilities causing risks for migrants and security issues for host communities (Krampe, Van de goor, et al. 2020). Consequently, the interaction of displaced people with host communities in new environments exacerbates tensions and conflict. This is due to the difference in cultural, linguistic and belief systems between climate migrants and host communities which create suspicion and mistrust.

¹ © Peter Gaduel

Meanwhile, it is understood that climate change impacts security because of the changing tactics of armed groups. The armed groups are capitalising on national climate vulnerabilities to wage war and force the agenda of regime changes (Krampe et al. 2020). The regimes faced with climate vulnerability could not provide security, leading to deterioration in law and order. As resources become scarce, armed groups tend to invent adaptive strategies focusing on resource control which in turn has the probability of prolonging civil conflicts. A study by (Bannon and Collier 2003) shows that resource-dependent nations are vulnerable to civil wars. While these may seem an implication of climate change, there is very limited evidence on how climate change strengthens the position of non-state actors in civil conflicts. The other sense is that armed actors depend on the sale of timbers or charcoal, which is a significant trigger for climate change due to uncontrolled destruction through logging.

3. Case study of climate change on security and social conflicts in Unity State (2017-2022)

3.1 Overview

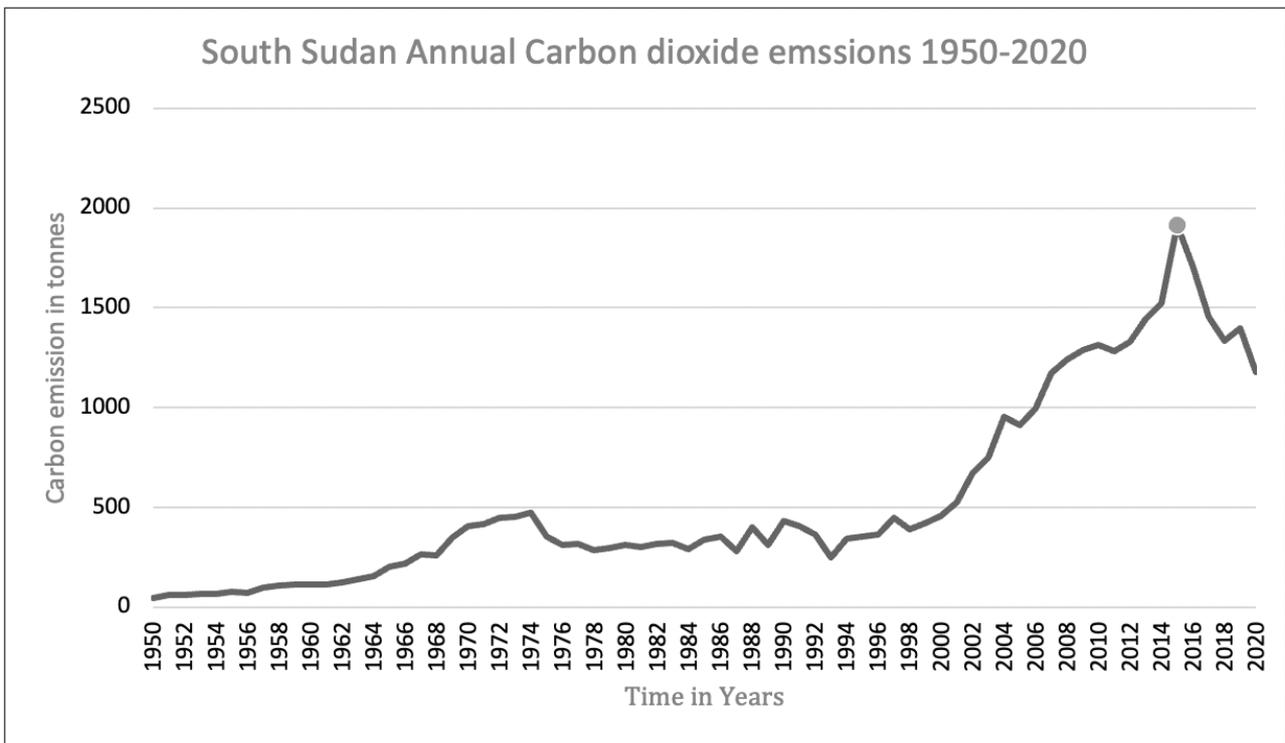
The Unity State region predominantly comprises ethnic Nuer and minority Ruweng and Alor Dinka pastoralist groups who depend on the Nile valley and the Sudd wetland for subsistence agriculture and animal pasture and fishing. With the changing climatic patterns, their livelihoods are challenged, and they face recurring intra-communal conflicts over access to water points and grazing zones. The communities in Unity State also face natural resources access competition with Misseriya Arab nomads and neighbouring Dinka pastoralist communities from lakes and Warrap states of Bhar el Gazel region of South Sudan. With the illicit flows of small arms and light weapons, the lethality of communal conflicts has increased over the years. This section discusses the implications of changing climatic and environmental conditions and how they impact communal conflict and human security.

3.2 The Impact of temperature variability on agropastoral communities in Unity State

Temperatures continue to rise in Unity State due to increasing carbon emissions. Industrial activities from oil fields in Unity State contribute to the emission of GHGs while other pollutants contribute to the degradation of land. It is difficult to quantify the exact sub-national emissions in Unity State due to a lack of data. However, it has been reported that South Sudan produces about 109.87 million tonnes of carbon emissions a year which has a direct impact on global warming (Republic of South Sudan Ministry of Environment and Forestry, 2021).

In addition, illegal logging, and deforestation in Northern Unity State are increasing at an alarming rate. The presence of different armed groups in the area during the conflict has increased illegal logging, especially in Rubkona county (Ministry of Agriculture and Food Security 2020). The burning of charcoal has further increased the rate of carbon emissions and deforestation in the area. Town residents and IDPs rely on wood energy which contributes to carbon emissions through charcoal burning. The figure below shows the trends of carbon emissions in South Sudan since the 1950s. It is evident that the concentration of GHs is getting higher at an alarming rate.

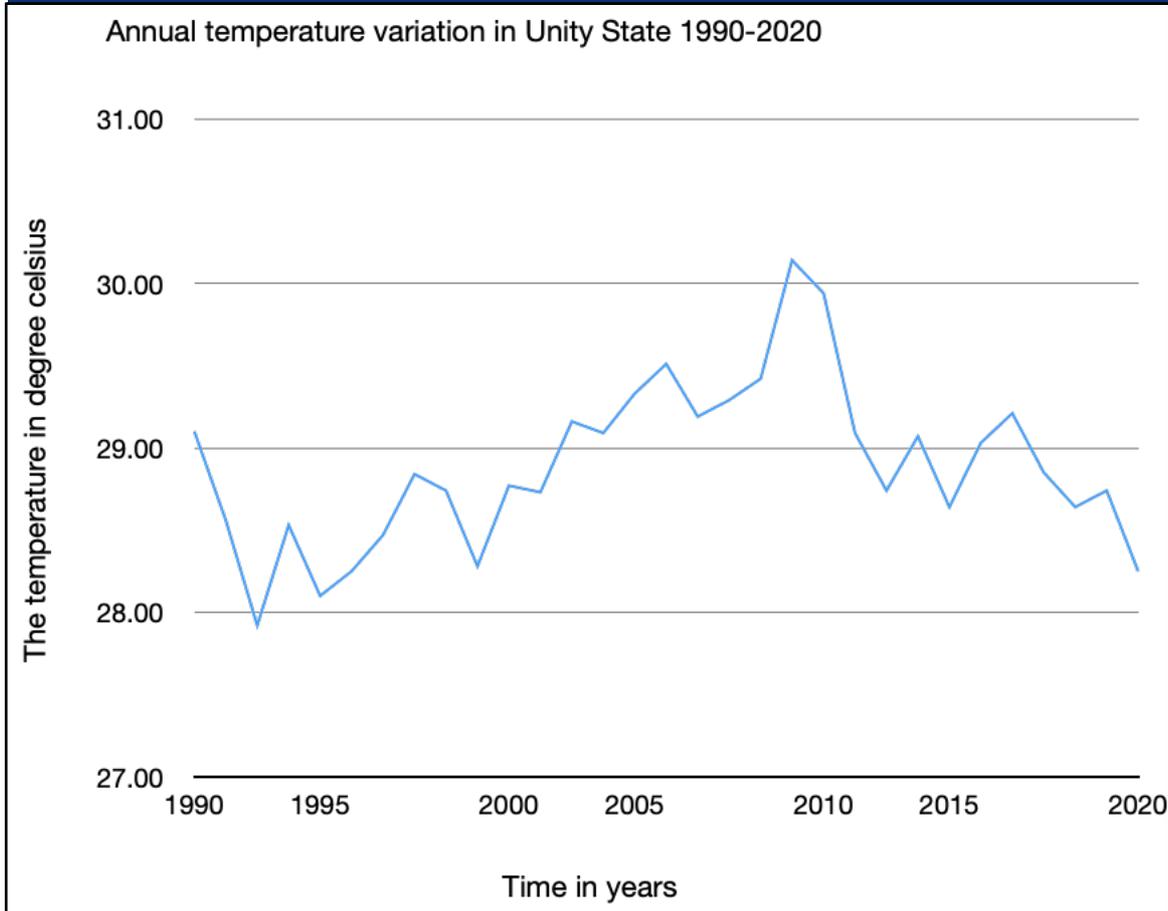
Figure 2: The trends of South Sudan's carbon emissions



Source of dataset: (Ritchie et al. 2020)

The increase in GHGs has impacted high temperatures. The high temperatures have influenced the onset of dry spelt owing to the high rate of surface water loss due to vaporisation (Kew et al. 2021). The graph below shows the mean annual temperature variability in the region since the 1990s.

Figure 3: Annual temperature variation in Unity State 1990-2020



Source of dataset: (World Bank n.d.)

The annual temperature in Unity State ranges between 28°C and 30°C. A high increase in temperature prior to 1989 coincided with severe drought and famine (REACH 2018). In 2010, dry spells caused the loss of surface water in main streams throughout Unity State, while an increase in temperature in 2017 caused severe drought and famine in Southern Unity State (REACH, 2018). An increase in temperature impacts the lives of agropastoral communities in many ways. High-temperature results in the reduction in surface water which is used for domestic consumption and animal survival. On the other hand, high temperature also reduces soil moisture, leading to recession of vegetation cover and failure of crops (Kew et al., 2021) which eventually lead to land degradation. The pastoralists are identified among high-risk groups vulnerable to the impacts of climate change because environmental hazards have brought about low precipitation and high temperatures challenge their coping mechanism (UNICEF and WHO n.d.).

Figure 4: Pastoralists incinerating a livestock carcass which died due to environmental degradation, Mayom town, Unity State

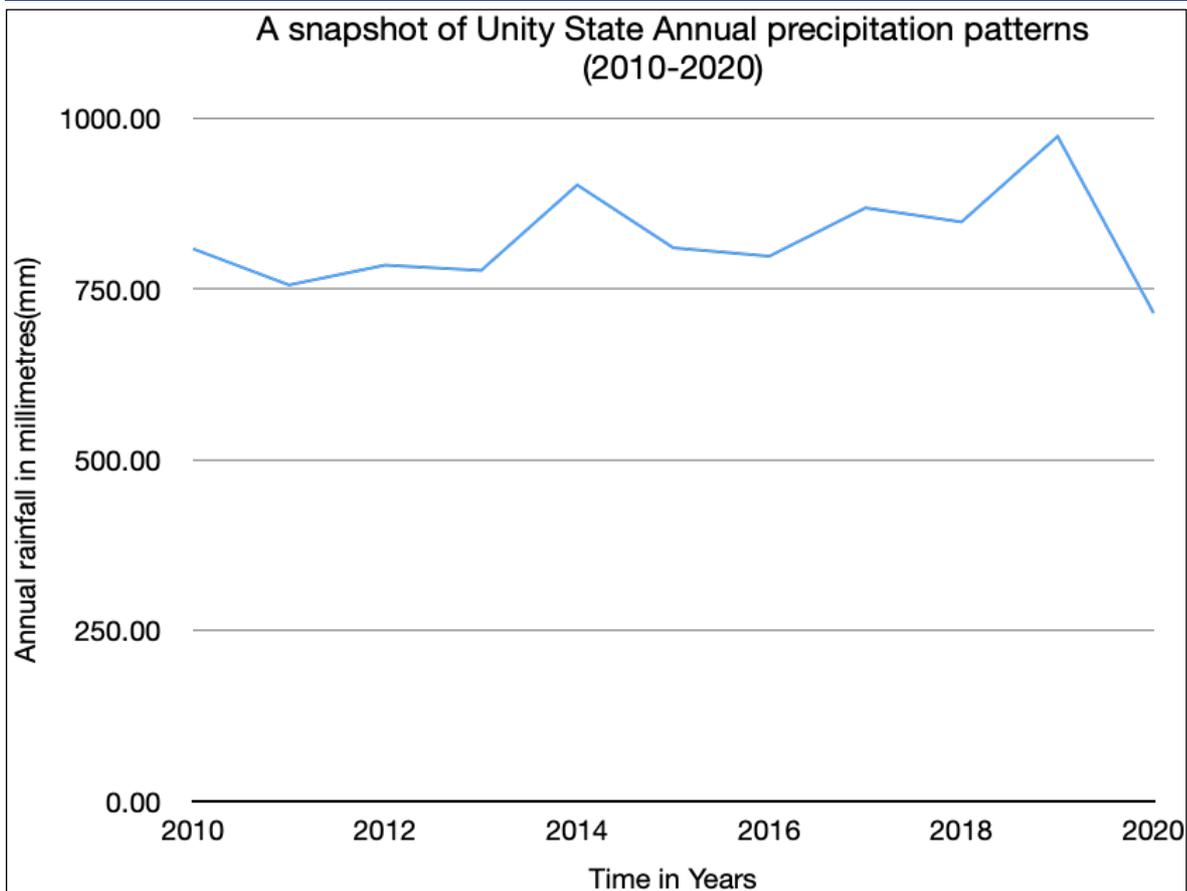


Photograph supplied by ©Peter Puok, 2022

3.3 The Impact of precipitation variability on agropastoral communities in Unity State

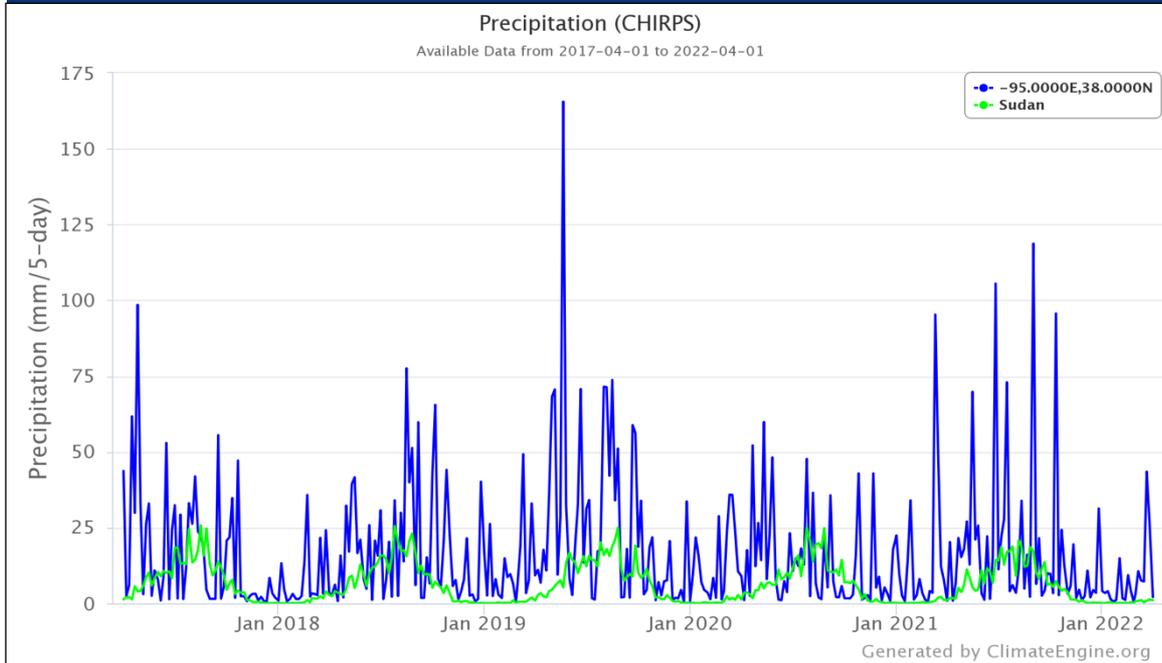
The variability of rain has direct implications for soil moisture, drought, or flooding. Low precipitation contributes to a low quantity of soil moisture and drought. Agropastoral communities in Unity State depend on rainwater for farming, pasture for animals and surface water for domestic use. Insufficient rain affects agricultural production and animal livestock health. The graph below shows precipitation trends in the region between 2017 and 2022.

Figure 5: A snapshot of annual precipitation patterns in Unity State (2016-2020)



Source of dataset: (World Bank, n.d.)

Figure 6: Monthly Precipitation patterns in Unity State (January 2017 to January 2022)



Source: (Daudert et al. n.d.)

From figures 6 and 7 above, there are variations in annual rainfall between 2017 and 2022. There have been low precipitation levels between the 2017-2018 and 2020-2021 planting seasons. Relatedly, precipitation was higher between the 2019-2021 and 2021 to 2022 planting seasons. The low levels of precipitation in 2017 impacted severe drought and famine which affected most parts of Southern Unity State. Relatedly, the heavy rainfall between 2019 and 2022 caused massive flooding throughout Unity State.

Between 2016 and 2018, Unity State experienced severe dry spells that triggered low agriculture productivity and livestock deaths. Consequently, market prices went up due to scarcity of food and low milk production from cattle keepers (BRACED 2018). The scarcity of surface water and pasture for livestock forced civilians to migrate to the Nile River basin in the case of Rubkona, Guit, Koch, Mayiendit, Leer and Panyijiar counties. Pastoralists in Mayom migrated South of River Naam, River Jur (Gor) and Northwards to River Lol basin. Such movements triggered intercommunal clashes over cattle theft and tensions over grazing lands. The dynamics of conflict will be explained later in section 3.3. There were also reports of looting of humanitarian supply warehouse looting and robbery by armed youth.

Between 2018 and 2022, high precipitation caused flooding and disrupted communities' livelihood systems. The Panyijiar, Mayiendit, Leer and Koch were the most affected by flooding during the 2019 planting season. In the 2021 planting season, most parts of Unity State were submerged. Civilians survived on wild fruits and water lilies. There was a high influx of IDPs into the Temporary Protection Area in Leer and IDP camp in

Bentiu. The (Inter-Cluster Coordination Group 2021) noted that 220,000 individuals were affected by flooding in Unity State which placed the state second after Jonglei. Farmlands and villages, and pasturelands for livestock were submerged resulting in irregular migration to some of the contested areas.

Figure 8: Flooding affected pastoralists from Nhialdiu moving toward Bentiu Town



Photograph supplied by © Michael Gorjin, 2022

The insufficiency of grazing land affects animal health and reduces milk production (REACH 2018). The reduction in lactating livestock signals food insecurity and hunger. Accordingly, climate variability is seen as the cause of the irregular pattern of rainfall (Kruk, 2021) which increases social vulnerability to food insecurity and hunger.

Figure 7: Photograph of women preparing waterlilies for a family meal



Photograph supplied by © Thiey Madeng, 2022

3.4 The dynamics of Pastoralist conflicts in Unity State and surrounding neighbourhood

The changing climate and environmental conditions have been a trigger for localised conflicts in Unity State. Climate change is linked with land degradation and natural disasters that impact food insecurity and intergroup competition over scarce resources. The flooding and water scarcity affect pastoralist groups who compete for access to limited resources, which have been a source of tension and conflict in the Unity State.

Figure 8: Climate security word cloud



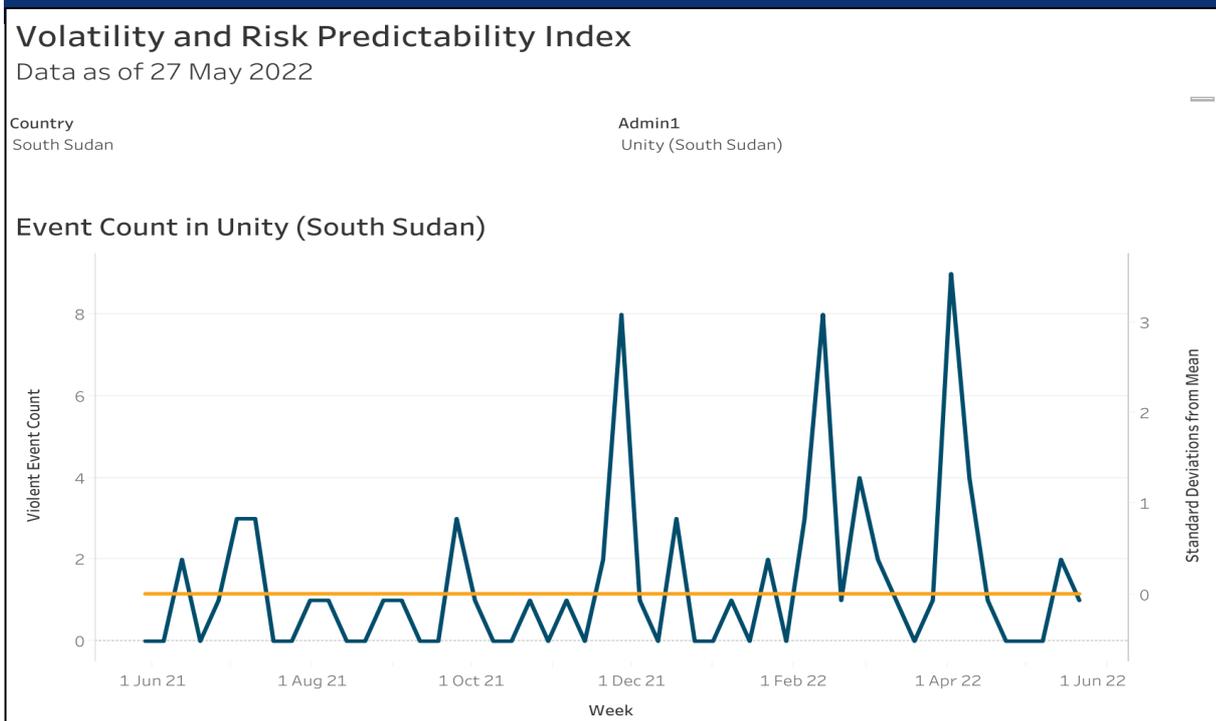
Constructed by the Author

As a consequence of civil war, the absence of strong local governance structures at the community levels influenced communities to make their security establishments (Gaduel 2022). Faced with the wide availability of small arms and light weapons and the breakdown of the rule of law institutions, ethnic groups are pitted against each other. Although the civil war ended through the Revitalised Agreement on the Resolution of Conflicts in South Sudan (R-ARCSS) in 2018, sub-national violence has increased. Climate change, therefore, has been a trigger for the growing incidents of ethnic violence fought by pastoralist groups in Unity State and neighbourhood during the post-conflict period.

The incidents of communal violence involving armed youth who clash over cattle rustling and arable land have been on the rise since 2017 (International Peace Institute, 2021). Cattle raiding is the most frequent form of violent conflict that involved communities from Unity State and neighbourhoods (UNMISS 2019; Human Rights 2015). There are also incidents of intra-communal conflicts and retaliatory attacks based on past grudges among the local communities in Unity State. This implies that climate vulnerability is combined with political and socio-economic factors to influence violent conflict. Figure 11 shows the annual trends of sub-national violence between June 2021 and June 2022 based on Armed Conflict Location and Event Data (ACLED) project monitoring reports (ACLED 2021). The highest incidents were recorded between November 2021 and June 2022 which was a period of severe flooding in Unity State. The movement of pastoralists displaced by flooding to other locations triggered tensions and violence leading to a high number of incidents during the period.

Figure 11 below shows that there are at least eight incidents or more during the flooding period, which is contrary to the perception that flooding reduces the mobility of armed youth to attack those in the neighbourhood.

Figure 9: Chart showing the number of violent incidents per month from 2021 to 2022



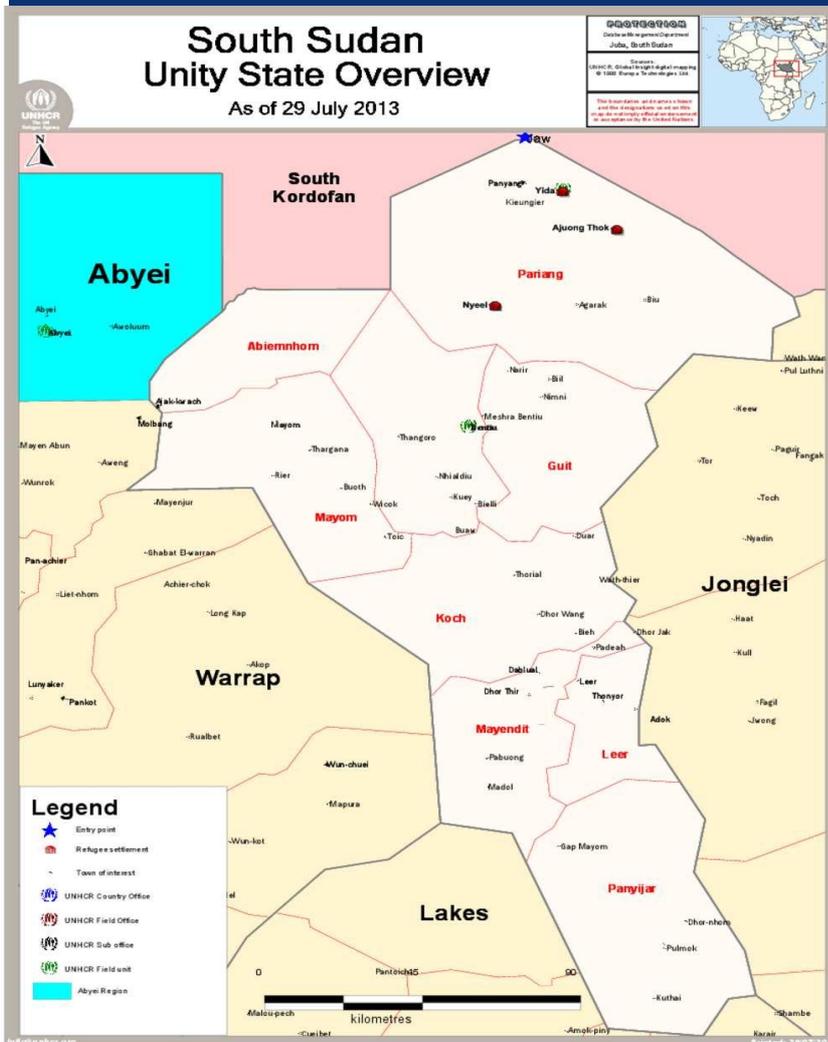
(ACLED, 2021)

The failed post-conflict security arrangements in 2005 and post-2016 increased the flow of arms into the hands of civilians. During the recent conflict, various armed groups recruited youth into their ranks and failed to recover the weapons after the peace agreement (Madut 2020). It is argued that indiscipline from organised security forces provided civilians easy access to small arms and light weapons.

3.5 Triggers of conflicts involving communities in Unity State and neighbourhood

There is a mix of factors that have political, historical, and socio-economic dimensions combined with climate vulnerability that triggers tensions and conflicts in Unity State. Historically, the colonial legacy of divide and rule distorted social bonds and created a century of enmity between Nuer and neighbouring Dinka communities in South Sudan. It initially manifested in the form of identity conflicts between the Christian South and the Arab North (Deng 1995). Such patterns of violent conflict continue to characterise the Misseriya Arabs of Sudan and the Nuer and Dinka Ruweng of Unity State. It is noteworthy mentioning that the Unity State region has been an epicentre of conflict during the Sudanese second civil war (1983-2005) which ended through the Comprehensive Peace Agreement (CPA).

Figure 10: Map of Unity State showing administrative divisions and neighbourhood



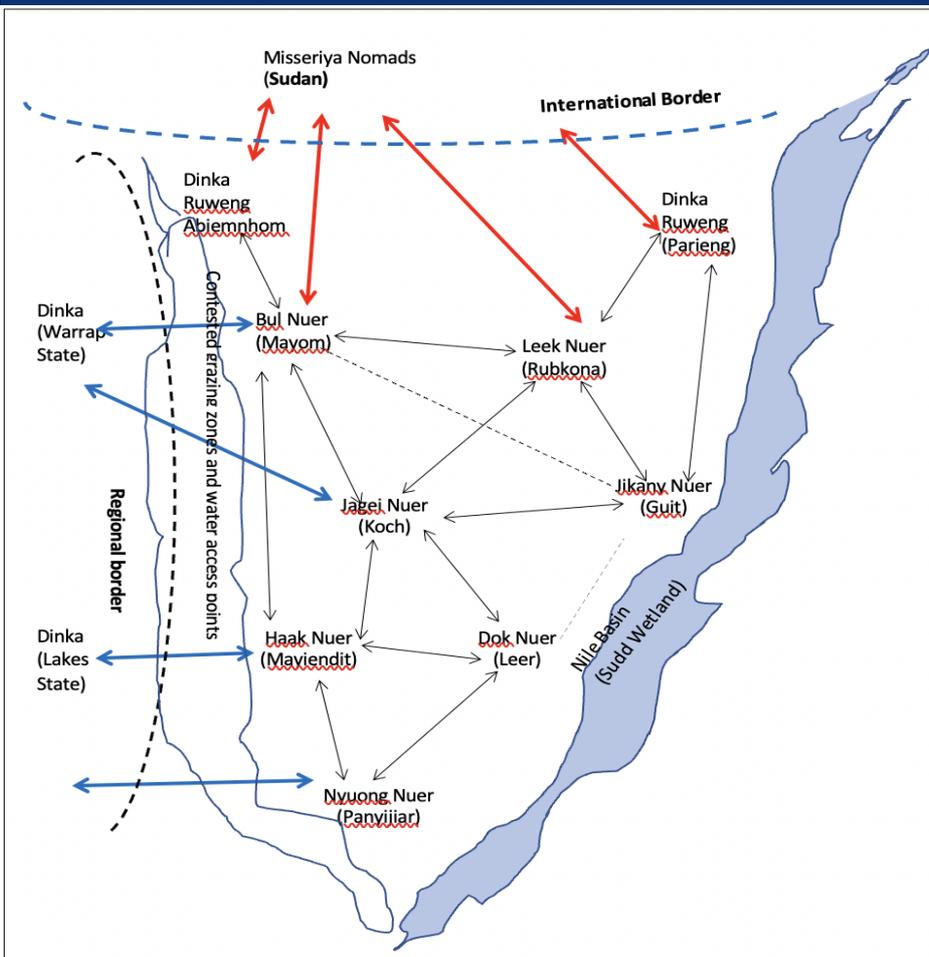
Source: UNHCR (n.d) , online²

² <https://data.unhcr.org/es/documents/details/28834>

There are also political factors that are linked to the volatility of security in Unity State. Shortly before the independence of South Sudan in 2011, the disputed gubernatorial elections in 2010 provoked a rebellion which increased the circulation of small arms and light weapons among the civilians (Craze et al. n.d.). The emotions of post-2010 electoral violence and 2013 civil conflict caused deep divisions among the local communities who split behind former Governor Taban Deng versus independent candidate Angelina Teny and current governor Nguen Monytuil (Naomi R. Pendle 2020). Other events such as the militarized interstate disputes (MID) between South Sudan and Sudan in 2012 (Craze 2013), over a demarcated border, affected Unity as a result of Sudan's strategy to wage proxy wars by arming the Misseriya nomads to displace local communities in Unity State southwards.

Moreover, tensions over natural resources and contested ownership of land containing oil deposits and water sources have been a source of friction among the local communities. The local boundary disputes are influenced by political actors and continue to increase tensions over access to shared resources (Justin and De Vries 2019)

Figure 12: Illustration of pastoralists' interactions and tensions in Unity State and neighbourhood



Source: Constructed by the author

The diagram above shows a web of agropastoral group interactions and tensions which have been a trigger for environmental conflict in Unity State. The conflicts can be grouped into those involving communities across an international border (cross-border conflicts), those involving rival ethnic groups within South Sudan (Intercommunal conflicts), and those involving local communities within Unity State (intra-communal conflicts). Most of these conflicts are fuelled by access to scarce resources.

3.5.1 Cross-border conflicts

The northern part of the Unity State region is an arid zone (Ministry of Agriculture and Food Security 2020) which forces Sudanese Misseriya nomads to move with their livestock southwards in search of water and pasture (de Simone 2013; Wambugu 2017). On the other hand, the Southern and central part of Unity State is a low-lying plain which is prone to flooding during heavy rainfall owing to proximity to the Sudd Wetlands leading to displacement northwards, especially in Mayom, Rubkona and Guit counties. The movement of pastoralists from Mayom, Rubkona and Guit northwards increases interaction with armed Misseriya nomads which have been a trigger of tension and clashes (Pendle, 2017; Wambugu, 2017). Check all references for uniformity: either Pendle, 2017 or Pendle 2017 throughout. Current references vary in format throughout the report.

Meanwhile, the movement of the Misseriya southwards is governed by peace treaties which guarantee the Arab nomad's protection from the local authorities. In the process, clashes with local pastoralists are minimised despite isolated clashes during Misseriya's return to the North. The locals in Unity State have always blamed Misseriya nomads for kidnapping children for forced labour which continues to undermine the trust-building between the Unity State communities and Misseriya Arabs (de Simone, 2013).

During the recent flooding in 2020 and 2021, the Nuer Bul, Leek, and Jikany migrated northwards to escape disastrous submerging. Over the period, Bul Nuer armed youth faced intermittent attacks from Messirya nomads who stole animals and frightening locals who settled close to the international border. Meanwhile, Leek Nuer and Jikany settled closer to Parieng County which is arid and located in high ground.

3.5.2 Intercommunal conflicts

Intercommunal conflicts involve Nilotic Nuer speaking groups and Nilotic Dinka speaking groups from lakes, and the Warrap state (Wild et al. 2018). During the dry season, local communities in Koch, Mayom and Rubkona migrate westwards South of the Gazelle River basin which increased competition over access to water points and grazing zones with neighbouring Dinka from Warrap State. In the past, Bul Nuer and Leek Nuer pastoralists migrate Eastwards towards the Nile Bank in the direction of Koch and Guit County. Since the civil war, social cohesion in Unity State deteriorated. The direction of pastoralists' migration depends on the authority controlling the area. Civilians in Mayom predominantly controlled by the government drive their animals' westwards. Consequently, there are more Intercommunal clashes between Bul Nuer and Twic Mayardit, Bul Nuer and Luach Jang Dinka who are in the Bhar el Ghazal region (ACLEDD, 2021).

Equally, Panyijiar, Koch and Mayiendit have borders with Bhar el Ghazel which have been frequent flashpoints among the civilians. However, it is believed there are other socio-cultural beliefs that increased violence among the Nuer and Dinka. Some would say the traditional spiritual leaders among the Nuer and Dinka are a centre of communal power who influence conflicts in the neighbourhoods (Naomi Ruth Pendle 2020); Wild et al. 2018). Nevertheless, some spiritual leaders promote social cohesion through intermarriage around the communal borders.

The intercommunal conflicts have been the source of national fragility. There is a high armed youth to police ratio which frustrated the law enforcement agencies' effort to contain inter-communal violence (Gaduel, 2022). Despite this, indiscipline from organised security forces is the cause proliferation of small arms and light weapons into the hands of civilians which increases the lethality of environmental conflicts (Madut, 2020; Pendle 2021).

3.5.3 Intra-communal conflicts

The lack of economic opportunities, access to water points, pastureland and environmental fees from oil production sites have been the source of tensions in Unity State. Since 2017, incidents of intra-communal violence continue to shape the post-conflict security in Unity State (Saferworld 2018). The pastoralists exploited the mistrust between the government and the main oppositions who control different areas in Unity State.

The frequent environmental shocks increased food insecurity and market inflation across the different counties of the Unity State region. Most young people were mainly ex-combatants during the civil war, remain unemployed and lacked economic opportunities. The youth find it easy to join cattle raiding expeditions to earn an income (Naomi Ruth Pendle 2020)). While there is no direct conflict between county and county or one sub-ethnic group and the other, the armed youth have their own structures and commands which are separate from the major armed groups they aligned with during the conflict (Naomi Ruth Pendle, 2021). Due to frustration, they are engaged in cattle rustling and exchanging stolen livestock in different counties. In certain situations, local authorities are perceived to inflame tensions due to claims of land and territorial control. The worst form of intra-communal violence was recorded between February to April 2022 involving youth from Koch, Mayiendit on one side and Leer on the other. The conflict impacted human rights abuses, destruction of livelihoods and displacement of civilians (Amad 2022). While this conflict may have political drivers, actors and victims are mainly agropastoral communities.

Access to economic zones also increases the boundary disputes. Since independence in 2011, local boundaries are yet delineated causing confusion among local actors regarding who should govern certain spaces. The oil production zones and northern border access which is a dry land during flooding disasters are the most congested areas by local communities in Unity State. While the laws of South Sudan have given communities the rights over land ownership (National Legislative Bodies 2009), President Kiir made a controversial decision in 2015 by drawing local boundaries through the establishment of the Ruweng Administrative area North of

Unity State (Justin and De Vries 2019) which comprises Abiemnhom and Parieng Counties are Dinka minority groups. The creation of the Ruweng administrative area did not only increase tensions over ownership of oil fields, but also a serious land dispute where Bul, Leek, and Jikany Nuer protested the annexation of their ancestral land to the newly created Ruweng Administrative area (Deng 2021)). During the recent flooding disaster in 2021, the Leek and Jikany Nuer were trapped in endless clashes with Ruweng Dinka from Parieng County while the Bul Nuer were involved in conflict with those in Abiemnom.

The oil production zones are a source of employment and economic income for local councils due to the government's five per cent share of revenues to the production locality. The creation of the Ruweng administrative area caused disagreements between authorities based in Bentiu and those in Parieng over who the right of should have received the 5 per cent share of revenues. On the other hand, the community claims over the environmental hazard's compensation fees due to the impact on human and livestock health is a source of contention among various counties with shared access to oil zones. Eventually, such disputes trigger wider discontent which has political and security implications for the region (Voller 2021).

3.5.4 Gaps in governance

Mistrust among policymakers, inadequate coordination mechanisms among actors, and a lack of competence to interpret early warning systems on climate change all contributed to the inability to resolve climate-related shocks and conflicts. Due to the 5 years of civil conflict that ended in 2018, national, state, and local level actors are politically divided and are driven by partisan interests rather than what concerns the grassroots community. The mistrust had led to the prolonged implementation of the peace agreement which gives room for community armed groups to derail peacebuilding and weaponised the environmental conflicts (Onapa 2019). The divisions among political elites also created mistrust at the grassroots where civilians from counties governed by the government and those of opposition perceive themselves as adversaries (Krystalli et al. 2019). Such deep levels of mistrust have been a cause of tensions that triggered environmental conflicts among sub-ethnic groups in Unity State.

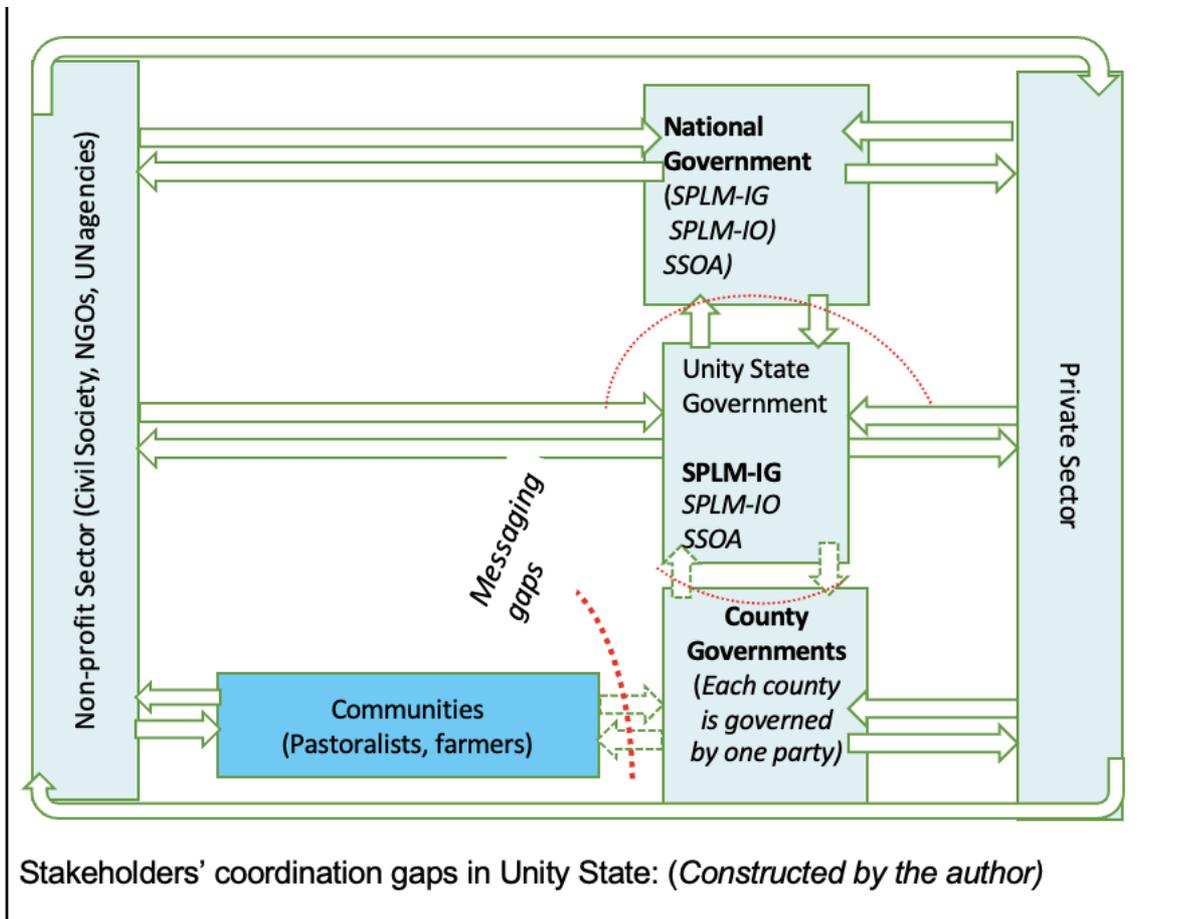
From 2019 to 2022, although Unity State suffered a severe flooding disaster that displaced civilians and destroyed farmlands, actors could not agree on the flooding response approaches. About 1.5 million civilians have been trapped in hard-to-reach areas across South Sudan due to the flooding disaster (d'Errico et al. 2021). The Ministry of Water, Irrigation and Dams favoured dredging of the Naam River to ease the water flow and reduce flooding, while the Ministry of Environment and the office of the President opposed the process and argue it may result in environmental degradation (Tamazuj n.d.). Such a misunderstanding filtered into government and opposition conflict as each party have their own preferences. Similarly, local think tanks, opinion leaders and civil society are also divided in their perception of the response strategy. There are those who think it is better to save human life and those who fear the process may cause unforeseen problems to the environment.

Relatedly, the hybridity of governance in South Sudan has complicated the stakeholders' engagement (Hagemann 2020). The transitional government of national unity at the regional levels do not provide clear policy guidelines to international peace actors and the profit sector to bridge the development gaps. Similarly, the former warring factions and parties to the R-ARCSS are yet to build enough confidence at local levels to penetrate grassroots communities and enforce rule of law. The communities at the grassroots based their trust on customary authorities who coordinate between the communities and formal institutions. Consequently, the non-profit and private sectors are still caught in a dilemma because there is no agreeable framework to support since the state government and parliament are only formed recently. Such gaps make it difficult to avert climate-related shocks and conflicts in Unity State.

On the other hand, coordination gaps between national regional and local actors and other stakeholders frustrate decision-making efforts during the emergency response in Unity State. South Sudan is a three tiers level government comprising the national government, state-level government, and county (local) government. At the national level, the Ministry of Environment and Forestry, Ministry of Agriculture and Ministry of Water Irrigation and Dams work closely with private and non-profit agencies with expertise in natural resources governance yet do not enjoy programme complementarities that would help state-level actors and county governments address environmental shocks, food insecurity and displacement challenges. The institutions operate in parallel and are represented at the state level through regional ministries, commissions, or departments.

There is very poor coordination and information exchange between national-level actors, state-level actors, and counties. The weather forecasts about changing precipitation patterns do not reach the farmers due to communication barriers between grassroots institutions and national-level institutions (Integrated Food Security Phase Classification (IPC) 2020). Consequently, the delay and lack of information dissemination fail the efforts for disaster mitigation at the grassroots. While the national institutions have the primary mandate to implement climate change adaption and resilience programmes, they lacked the capacity and expertise to deliver their mandate. The lack of awareness about potential environmental issues such as the impact of deforestation and land degradation is a setback to the enforcement of the national climate change adaptation plans at the local levels. The local level actors do not have the necessary training on environmental conservation and climate change mitigation strategies. As a result, there is a poor choice of response strategy which only increases social vulnerability.

Figure 11: Governance and coordination gaps



On the other hand, the capacity to address climate-related insecurity challenges is another major gap. Peacebuilding actors do not incorporate climate adaptation measures as part of conflict mitigation. There is a lack of integrated peacebuilding between the public and non-profit sectors. The state-level actors do not fully integrate their plans with those of international actors. Non-governmental organisations see certain aspects of peacebuilding and sustainability as the role of national actors which results in gaps of synergies in sustainable peacebuilding and climate resilience.

3.5.5 Long-term security implications of climate change

South Sudan is a young nation with fragile political institutions. The impact of climate change on irregular pastoralists' migrations presents a threat to the stability of the nation due to militarised cattle raiding and the intractability of social conflicts. Such vulnerability will combine with economic and political factors to deteriorate the security situation in the region and nationally.

It is well-known that human security is often defined as freedom from want. The persistent patterns of communal conflicts will disrupt communities' livelihood systems hence increasing their vulnerability to shocks. It is

therefore important that critical steps are taken to mitigate the future security implications brought about by the climate vulnerability. The following section highlights key policy recommendations for policymakers and practitioners to implement to avert and minimise the effect of the environmental crisis.

4. Policy recommendations

This report recommends the following policy actions to mitigate climate vulnerability and its impact on localised conflicts in Unity State:

i. Developing integrated peacebuilding and climate adaptation approaches involving the public, private and non-profit sectors that are community resilience centred to be able to mitigate environmental shocks.

A fundamental operational gap is the lack of programmatic synergies across the governmental, non-profit, and corporate sectors. Peacebuilding programmes in the private and non-profit sectors should complement public agendas and incorporate climate change into the development policies. Addressing the core causes of conflict while ignoring common environmental challenges can not lead to long-term peace. To alleviate environmental-related calamities and tensions, agencies dealing with conflict prevention should engage with those supporting environmental conservation.

ii. Need for state-level and local environmental legislation that regulates unsustainable use of forests such as logging, charcoal burning, and bush burning which are causes of desertification and environmental degradation.

Because such practices increase the dangers of land degradation, which affects the productivity of arable land, the Unity State government should regulate the destruction of indigenous forests by placing limitations on unlicensed logging, charcoal production, and bush burning. To be able to invest in the environment for the economic benefit of all community groups, environmental policy should contemplate transferring ownership of critical environmental zones from customary authority to the state government. Present land regulations force ownership of land on communities, which is not economically profitable. Transferring this to the state would ensure that conflicts over natural resources are minimised and that all groups benefit equitably.

iii. Implementation of the national return strategy for a secure and safe reintegration of IDPs into their areas of origin and host communities to minimise ecological distress due to unsustainable logging in Western parts of Rubkona town.

The presence of huge populations of conflict displaced IDPs and flood victims in parts of Rubkona town has increased environmental pressure in the area. Addressing environmental-related disasters and security-related conditions in line with R-ARCSS and national return strategy would ensure minimum competition over scarce resources and tensions.

iv. Need for a comprehensive environmental audit to understand the implications of environmental shocks on pastoralists' conflicts throughout Unity State.

In Unity State, there are several information and knowledge gaps about the environmental crisis. Further study and environmental assessments in the region would aid in the generation of more knowledge and desirable climate change mitigation actions. The effects of water and air pollution from oil production locations on local people, as well as what is needed to protect public health and environmental awareness, are possible subjects of investigation. Despite many evaluations, little is known about the prospective effects of environmental contamination on societal vulnerability and conflict in the Unity State region.

v. Creation of employment opportunities for youth to reduce economic disparities that influence cattle raiding and violence in Unity State.

Lack of employment and economic opportunities among young people in Unity State easily increases their vulnerability to environmental shocks and involvement in conflicts. Providing economic opportunities to the youth would increase their resilience to natural calamities and involve them in disaster mitigation and response planning. Due to unemployment, young people easily participate in localised conflicts as a way of expressing their grievances by defending their threatened communities' livelihood zones when facing a particular group.

vi. Removal of small arms and light weapons from the hands of civilians to reduce the lethality of violent conflicts in the Unity State.

Unsuccessful security and justice sector reforms during the various transitional periods (2005-2011; 2016-2022) have increased civilians' access to the widely available small arms and light weapons circulating in the country. Getting rid of the illicit weapons would reduce the lethality of environmental conflicts and lower the risk of state fragility. The disarmament campaign should be simultaneous and done in all states to reduce the risks of relation to already disarmed populations.

vii. Promotion of environmental conservation activities, sustainable agriculture, and afforestation in counties to reduce the effect of receding vegetation cover and aridity, especially in North of Unity State.

Environmental awareness is lacking throughout Unity State. There is a need to promote environmental education and tree planting at grassroots levels to counter the effect of receding vegetation cover destroyed through illicit logging and charcoal making.

viii. Timely sharing of weather forecasts between stakeholders and local communities to be able to inform the choice of crops and farming strategies.

Poor coordination between national institutions, regional departments in Unity State and counties affects information sharing with pastoralists and farmers to be able to make informed decisions about their livelihoods. There is a need for stakeholders to disseminate early warning indicators on weather forecasts, food insecurity and market conditions among public agencies, NGOs and communities to improve social resilience and awareness.

ix. Early interventions in counties vulnerable to flooding disasters to mitigate the effect of hazards.

State authorities should make early interventions to divert flooding away from farmlands through improved drainage and the construction of dykes. Early intervention at the mitigation phase would reduce the impact of a disaster compared to later responses.

x. Investment of environmental fees as part of corporate social responsibility contributed by oil companies at the county levels to educate communities on risks of climate hazards.

There is a need to improve transparency on private sector environmental corporate social responsibility commitments. Little is known about how much each company pays to the local council. A transparent record and management of such contributions would reduce financial deficits and contribute to environmental awareness and sustainability programmes.

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Queen Mary
University of London
Global Policy Institute

Queen Mary University of London Global Policy Institute
327 Mile End Road
London
E1 4NS

Email: qmgpi@qmul.ac.uk

qmul.ac.uk/gpi
