Climate Security and Human Security Nexus in West Africa

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Abstract

Climate security has emerged as a critical discourse focusing on the multifaceted consequences of climate change on various security aspects. While the impact of climate change in West Africa has widely been researched, the same cannot be said about climate security. This paper uses a systematic review approach to explore the nexus between climate security and human security in the West African region. The process adopted the Preferred Reporting Items for Systematic Review and Meta-Analysis guide approach, and applying thematic analyses, the review established varied climate security threats with consequences on human security in West Africa. The threats emanate from rainfall variability, increased temperature, rising sea levels, and storms. The threats manifest in various forms, including floods, drought and heat waves, among others, affecting natural resources and magnifying human security threats such as displacements, food insecurity and, in some instances, fueling ethnic/community conflict and violent extremism with devastating consequences. High temperatures and varied rainfall patterns have reduced water availability, increasing user competition and tension. The heat waves experienced in the region in recent times have resulted in deaths and the destruction of socio-economic activities, affecting productivity in general. The rising sea level and frequent torrential rainfalls have increased displacements and adversely affected the functionality of some security installations and existing infrastructure, impacting the quality of intelligence gathering and the swiftness of response of security service providers to disasters. I conclude that climate security in West Africa is complicating security threats, negatively impacting

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sustainable development. Addressing the challenges requires broader cooperation and comprehensive strategies that could help improve resilience and climate-tolerant infrastructure that can withstand climate crises and enhance security response during climate disasters.

Key words: Climate security; climate change; vulnerability; displacement; human security

1.0 Introduction and Background

Climate security relates to the adverse effects of climate change on human security, the security of the state, and the maintenance of international peace and security (UNDP, 2020). Broadly, it looks at the effects of climate change on human well-being and security as a whole. Although the contribution of West Africa to the climate crisis is insignificant, it faces significant challenges due to the climate crisis, resulting in increased human insecurity in the region. The rate at which West Africa is experiencing climate change effects is faster than the global average (Crawford, 2015; IPCC, 2021). The region's political tensions, violent conflicts and complex humanitarian emergencies further complicate the changing climatic effects. As the changing climatic conditions impact natural resource availability, biodiversity and agricultural productivity, low levels of resilience magnify the region's human security situation (Tarif, 2023).

Security is the state of being free from danger or threats, whether for an individual or a group. (Roger et al., 2013; Arnall, 2023). In the climate change debate, climate security is conceptualized from two perspectives: state security and human security (Paris, 2001). While state security concerns countries managing threats and safeguarding their sovereignty, military strength and power (Dellmuth et al., 2018), human security covers individuals' economic, environmental, communal and personal safety (Ranasinghe, 2012; Arnall, 2023). It emphasizes the citizens' well-being rather than the state's protection (Sindico, 2007). Other writers like Brzoska (2009) grouped security into two categories: 'hard security', which refers to the actions of the

military and related institutions, and 'soft security', which concerns how people access resources such as food and water.

Climate change effects such as extreme droughts, storms, high temperatures, floods and sea level rise affect all levels of human, national and international security (UNDP, 2020). The effects correlate positively with volatile food prices, insecure livelihoods, and large-scale displacement (UN, 2021). The UN Secretary-General stated in 2021 that "*Climate disruption is a crisis amplifier and multiplier. Where climate change dries up rivers, reduces harvests, destroys critical infrastructure, and displaces communities, it exacerbates the risks of instability and conflict*" (Guterres, 2021).

Until the early 1990s, the concept of security was shaped by and focused on territorial security, equating it with threats to a country's borders (Dellmuth et al., 2018). However, this notion was challenged by UNDP in its 1994 Human Development Report, which clearly outlined that the feeling of insecurity arises more from worries about daily life than from any dreadful disastrous world event (UNDP, 1994; Busumtwi-Sam, 2008). Security, was therefore, redefined to cover job security, income security, health security, environmental security and security from crime, among others (UNDP, 1994), thus changing the concept to human development in totality. This assertion makes climate security undermine human security and, therefore, development in general. The extent to which human security is undermined varies because of entitlements to natural resources and services and the social determinants of adaptive capacity (Barnett & Adger, 2007).

The re-focus on human security has subsequently broadened discussions and research on the security-development nexus since climate change became a global topical issue. This article engages aspects of this debate with the primary objective of assessing climate security and its consequences on human security in West Africa. The paper establishes the domain of climate security (types of climate change-related security issues) and the impacts on the well-being of human beings in West Africa.

2.0 Methodology

This study adopted the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) approach of Moher et al. (2009). The search for relevant studies on climate change and its effects on security and sustainable development was conducted in large electronic databases and search systems such as Scopus, ScienceDirect, Google Scholar, academia, JSTOR, SpringerLink, World Cat and Wiley Online Library to ensure a comprehensive synthesis of published studies. Although a broader literature search approach was adopted, more emphasis was placed on articles on the Guinea (South) and the Sudan Sahel (North) zones of West Africa.

3.0 Search Approach

Relevant studies were retrieved from various study designs using quantitative, qualitative, and mixed methods, with predetermined keywords as critical inclusion criteria. Keywords of the review objective of climate security and sustainable development guided the search. Grey literature, such as reports from organizational sites, was also obtained using web search engines to minimize publication biases. Databases indexing theses and abstracts of conference proceedings were also searched, as relevant publications per the search terms were retrieved. Further search was conducted from the reference lists of key papers retrieved and reviewed, and those that met the inclusion criteria were also successfully retrieved and considered.

4.0 Selection of Studies and Analyses

Searches from the above sources resulted in the download of 800 documents for initial screening. Using Boolean operators to enable precision, recall, and reproducibility resulted in the exclusion of about half the documents downloaded. Duplicates of citations arising from the different sources occasioned a further exclusion of 220 papers, and a precise list of 209 papers were considered for review. The remaining articles were screened further, and 95 more were excluded, resulting in 114 articles identified for the final review. Further, a more detailed

screening of the titles of the articles in cognizance of the scope of the assessment resulted in the exclusion of 70 articles. The remaining 44 articles' abstracts were critically reviewed. A critical search through the reference lists of the 44 articles identified and included eight relevant articles. Hence, 52 articles passed the eligibility criteria and were subjected to the full-text review.

Factors and supporting evidence on climate security and human security were diligently summarized into codes and themes to unravel meaningful patterns. Development of the codes and themes evolved from the researcher's synthesis of the available materials (inductively), and in some cases, the researcher relied on existing concepts as themes (deductively). One major limitation of the study was the challenge of quantitative data on climate security in the region. While data on climate change is available in the region, how that affects human security is not available at the national levels.

5.0 Climate Change Effects, Trends and Projections in West Africa

In West Africa, climate change effects manifest in rainfall volume, temperature, humidity, sea level rise, and storms (IPCC, 2007). While there are diverse views by researchers on the rainfall pattern in West Africa, the same cannot be said about temperature, as it has been established that temperature has been increasing in the region since the 1970s (Berry et al., 2018; IPCC, 2021; Tarif, 2023). Researchers like Owusu (2018) and Jabik et al. (2022), among others, assert that the rainfall pattern has been varying in various forms in the past decades, leading to the frequent occurrence of drought and floods with devastating effects. Other writers like Sawadogo et al. (2024) assert that rainfall volume has been increasing in West Africa, especially the Sudan Sahel zone, while others also believe that rainfall volume has been dwindling in the region. These views confirm the assertion that there is no consensus on the rainfall pattern in the West African region.

The temperature within the region has increased by almost twice the global average since the 1970s. Projections of temperature into the

future show an increase ranging between +1.80C and +4.70C in the West African region by 2090 (IPCC, 2007), with the Sudan-Sahelian zone experiencing a higher increase than the Guinea zone. The average temperature in the region is projected to increase by about two degrees by 2065, with consequent effects like evapotranspiration, rainfall variability and ecosystem survival (Crawford, 2015; Sawadogo et al., 2024). The Sudan Sahel is projected to experience a substantial increase in temperature of more than 4.30C (Sawadogo et al., 2024) within the period. This will come with massive consequences on human well-being.

Sea level rise has also been considered one of the significant effects of climate change (Wade, 2022; Appeaning, 2023; Isiaka et al., 2023). The average sea level rise globally is 1.7 millimetres annually (Isiaka et al., 2023). The sea level rise in West Africa is estimated to be considerably higher above the global average and could rise to 1.06 meters by 2100 (IPCC, 2014; WACA, 2020; Schmidt & Muggah, 2021).

Another climate change effect is storms, specifically in southern West Africa. Storms have become more frequent and severe (Jabik et al., 2022). Storms have been classified into two, either windstorms or rainstorms, and they affect human security in various forms. These include the destruction of housing infrastructure and food crops, among others. This implies that climate change effects on human security are expected to be more severe shortly since the adaptive capacities of people in West Africa are weak. In the region, most people's livelihoods are climate dependent, and with the frequent changes in weather patterns, livelihoods are more likely to be affected negatively.

6.0 Rainfall Variability and Human Security

The variability in rainfall patterns in West Africa has resulted in severe human security concerns in the region. The common extreme events due to rainfall variability are floods, prolonged dry seasons and drought (IPCC, 2021; Jabik et al., 2022; Arnall, 2023; Jabik, 2024). In recent times, drought and prolonged dry seasons have become more frequent and severe than in the past (Jabik, 2022). As a result, human

security is affected negatively as the sub-region has a more significant proportion of the population depending on climatic conditions for their livelihoods. Farmers lose their crops and animals during drought, and drinking water sources dry up quickly. This contributes significantly to food insecurity in the region. As a response and to improve resilience, farmers who are often the most affected initiate processes to enhance their livelihood security, including drilling wells, extracting water from rivers or constructing dams through the support of government and development partners which are used for irrigation or as a source of drinking water for animals. This approach adversely affects other resource users, especially those downstream, in two ways: resource shortage and exposure to flood risk. The approach, coupled with variability in rainfall volume, more especially less volume and increased temperature, diminishes the availability of freshwater resources for other users downstream, thus risking the latter group's security (Arnall, 2023). Those downstream are more exposed to flood when rainfall volume is high.

For instance, Lake Chad lost about 90% of its potential between 1963 and 1990 due to increased extreme climate events and increased upstream irrigation activities (Gao et al., 2011), rendering people whose livelihoods depended on the lake insecure. In Ghana, as occurred in the northern sector of recent years, some of the dams constructed as a response to improving access to water for both irrigation purposes and fresh water for drinking, break banks when heavy downpour is experienced, thereby risking all economic activities, infrastructure and human lives downstream. Since 2007, flooding has become almost an annual affair in northern Ghana, as flooding was experienced in 2007, 2009, 2010, 2012, 2017, 2018, 2019, 2021 and 2023. The primary factors behind these devastating floods have been attributed to a combination of heavy rainfall and the controlled release of water from the Bagre Dam in Burkina Faso. This flooding has resulted in several deaths and the destruction of properties. For instance, on the 12 of August 2023, four farmers met their untimely deaths around the Golinga Irrigation Dam near Nyankpala in the Tolon District of the Northern Region. Also, in 2021, five individuals tragically drowned within 24 hours in the North East Region of Ghana. This places much emphasis on how the varied

rainfall pattern endangers lives across the region.

Also, several dams burst their banks in Burkina Faso due to heavy downpours. For instance, in 2006 and 2010, two dams (Poni and Dassa dams) burst their banks, leading to the loss of water, the destruction of properties and the cessation of horticultural activities around the dams (Yaméogo & Rouamba, 2023a). It is estimated that about 13,000 lives are lost annually due to flooding and changing climate conditions in four (Benin, Cote D'Ivoire, Senegal and Togo) coastal countries in West Africa (Lelia et al., 2019). This implies that some of these water bodies, such as dams that would have been constructed to serve as water sources during the drought and prolonged dry season, become a source of insecurity to some communities downstream.

Shortened rainfall season has reduced economic opportunities of individuals whose livelihoods are climate dependent, like agriculture in the region, increasing unemployment situation and turning the youth bulge to a demographic burden. The drought experienced, as a result, reduces the productivity of farmers as crops and foliage dry up during the drought. The effects go beyond those in the agricultural sector alone, as those in the supply chain, such as input suppliers, marketers, and related service providers, are affected negatively. Besides, the response to the effect by the affected people can further complicate the well-being of other areas or sectors. For instance, if the farmers affected by the impact decide to migrate to the country's urban or other rural areas, it could put more pressure on the existing social services in such areas, further compounding the risk over resources. The effect on productivity tends to derail the fight against poverty reduction in West Africa.

Again, in the event of floods and drought, which are often emergencies, coupled with poor planning by institutions, some state resources get diverted from essential sectors to respond to the needs of those affected by climate-related emergencies. This is because the states in the sub-region are not well equipped or readily able to forecast the weather situation with certainty and plan appropriately. This, therefore, makes responses to climate-related disasters ad-hoc with fewer resources, primarily from diverted sources. The diversion of resources negatively

affects other sectors, thereby affecting progress on sustainable development. The extreme weather events and their consequences further affect agricultural productivity and food supply, resulting in famine and high importation of food with consequences such as the depreciation of the local currency and migration. Famine has a direct relationship with nutritional status, which can also intensify the rate of spread of epidemics.

7.0 Sea Level Rise and Human Security

Sea level rise (SLR) is caused by the increasing temperature leading to the expansion of the oceans due to the high temperature and melting of glaciers. It is estimated that the sea level rise in West Africa is considerably above the global average of 0.76 meters and could rise to 1.06 meters by 2100 (IPCC, 2014; WACA, 2020; Schmidt & Muggah, 2021). About half of the population of West Africa live within 200 km of the ocean in the twelve coastal countries and are at risk of the effects of sea level rise. These countries include Benin, Cape Verde, Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Senegal, Sierra Leone, Togo and Nigeria.

The human security implications of SLR are enormous. The immediate consequence is the retreating inland of the shoreline, generating risk to both the natural environment and human security (Barnett, 2003; Barnett & Adger, 2007; Hauer, 2017; UNDP, 2020). As the shoreline recedes, coastal infrastructure, such as roads, ports, and homes, gets destroyed or submerged. This severely affects human life and economic and social well-being, mainly where livelihoods depend heavily on coastal resources. National security risk occurs as maritime boundaries may be lost, resulting in maritime disputes, especially where there are natural resource deposits like minerals (Hauer, 2017; UN, 2021). The territorial sea that extends seaward 12 nautical miles from the baseline may change over time, giving rise to disputes between countries. Besides, the state risks increasing government expenditure by providing basic amenities like education, health, and relief. These provisions imply government budgetary allocation and spending. It may decrease any government's ability to create opportunities, protect citizens' freedom,

and maintain institutional efforts to tackle the menace sustainably (Barnett &Adger, 2007).

SLR contributes to land loss and drinking water contamination along the coast. The loss of land, contaminated drinking water, and destruction of infrastructure due to rising sea levels displace and compel people along the coastline to migrate (Bloetscher & Romah, 2014; Hauer, 2017; Wade, 2022). The forced migration results in disharmony in communities where the displaced relocate as well as damages social relationships, which could result in mental-related challenges and other social challenges such as overcrowding, lack of shelter and competition for resources, compounding conflicts over resources and spread of infectious diseases (Patz et al., 2014; Clark et al., 2021). Besides, the human security risk intensifies as people are displaced along the coast, leading to the loss of livelihoods and properties and affecting economic development in general. The displaced people are compelled to migrate to other areas, and if they are not well integrated, this could result in disagreements over resources, leading to or escalating violent conflicts. Displacement increases the number of climates refugees and redistributes population density, putting pressure on existing social and economic infrastructure in urban areas, and placing additional pressure on inland communities, resulting in potential conflicts (Muthupriya & Sutar, 2022; Wade, 2022).

Besides, the effects of SLR on human security also include loss of physical capital, loss of social capital and an increase in expenditure for coastal protection (Hallegate, 2012). These effects are estimated to cost between 0.15% and 9.3% of global GDP by 2100 (Asuncion & Lee, 2017; Muthupriya & Sutar, 2022). Again, as the sea level rises, tidal waves become stronger and more frequent, eroding beaches, coastal communities and other coastal activities like the case of Keta in Ghana, where coastal communities are submerged into the sea, leading to displacement of communities, loss of habitats, and damage to existing infrastructure. In Fuvemeh, a farming community around Keta in the Volta Region of Ghana, the rise in sea level has left many inhabitants homeless and permanently displaced.

Other effects of sea level rise in the West African region that affect human security include coastal erosion, saltwater intrusion and health challenges (Bloetscher & Romah, 2014; WHO, 2015; Wade, 2022; Isiaka et al., 2023). Coastal erosion affects the entire coastline of West Africa. For instance, Ghana's coastline is eroding at an average of two meters per annum. This has resulted in about 37% of the coastline of 550 km being affected by coastal erosion between 2005 and 2017 (Appeaning, 2023). The erosion affects industrial activities, agriculture, tourist sites like beaches, fishing, and housing, among others, negatively affecting productivity and human security. This is because about 80% of industrial activities, such as oil and gas production, port operations, and thermal and hydroelectric power generation, are concentrated along Ghana's coast (Appeaning, 2023). This implies that coastal erosion negatively affects the power supply, affecting economic and social well-being.

Sea level rise exacerbates coastal flooding and contributes to an expansion of vector habitat, allowing the pathogens to thrive, increasing the likelihood of human exposure and the tendency of increasing the incidence of infectious diseases like vector-borne as well as water-borne diseases (Ramasamy & Surendran, 2011; Bayabil et al., 2021; Wade, 2022). Sea level rise may also influence exposure to waterborne pathogens by causing a rising water table or damaging water, sewage and sanitation infrastructure, contributing to contamination of drinking water sources and facilitating the transfer of microbial pollutants into marine environments used for recreation or food (WHO, 2015; Bayabil et al., 2021; Wade, 2022). Sea level rise and rainfall variability raise the water table in coastal areas and increase soil saturation. This, therefore, increases the chances of flooding even with less volume of rainfall. The elevated water table can also affect the effective functioning of septic systems, resulting in an increased load of bacteria and viruses in coastal areas and consequent health effects (WHO, 2015).

Saltwater intrusion due to sea level rise is a significant risk to drinking water security, specifically the salinization of drinking water in coastal areas (Wade, 2022; Isiaka et al., 2023). Saltwater intrusion has been branded "slow poison" as seawater invades fresh groundwater,

particularly during low freshwater levels. Sea level rise allows saltwater to reach further inland and causes increased salinity in the drinking water of coastal communities that rely on groundwater for their source of potable water. At high concentrations of salty water, individuals can develop hypertension, exacerbating pre-existing health conditions, putting the aged at higher risk of stroke, and increasing the frequency of hospital visits for cardiovascular disease and abdominal pain (Wade, 2022). Other high salt concentration risks are infant mortality, cholera outbreaks, renal disease, and skin and diarrheal diseases. Communities along the coast that cannot find alternative water sources or implement suitable treatment may face displacement due to dwindling water security (Muthupriya & Sutar, 2022; Wade, 2022).

This implies that over half of the population of West Africa is at risk of SLR, which is a human security threat. These vary from health to economic well-being, which adversely affects the development of the region in a sustainable manner. Communities along the coast of West Africa are more urbanized with congested environments that further endanger the inhabitants' lives as infectious diseases could spread fast in such environments. The region has already experienced many of the security effects outlined above. For instance, coastal erosion along the 580km coastline in Ghana has displaced over half the seaside town of Keta in the Volta Region. In Senegal's city of Saint-Louis, rising sea levels have destroyed houses, flooded streets and damaged crops (Schmidt & Muggah, 2021). These impacts severely compromise human security in West Africa, as they threaten livelihoods and human survival, thereby hindering overall development.

8. 0 Increasing Temperature and Human Security

In West Africa, the rate of increase in temperature is faster than the global average. Temperatures have increased between 1^0C and 3^0C since the mid-1970s (Tarif, 2023). The average decadal warming trend in West Africa in the past five decades is 0.22^0C, about 3.3 times higher than the average observed from 1901 to 2013. Projections of the trend into the future show that there will be 17-20 times more sweltering days per year than observed in preceding decades (ASSAR, 2015).

IPCC (2007) projections show a temperature increase ranging from $+1.8^0$C to $+4.7^0$C in the West African region by 2090, with the Sudan-Sahelian zone experiencing a higher increase than the Guinean zone. This implies that heat-stress-related effects, including low agricultural output and heat waves, would be more severe in the coming decades, directly impacting productivity and survival.

The temperature increased significantly between 1960 and 2010 (Berry et al., 2018; IPCC, 2021; Yaméogo & Rouamba, 2023b), although varied across the countries, with the Sudan-Sahel experiencing a significant increase (Sawadogo et al., 2024). This has led to excess heat stress and heat stroke across West Africa. The increased temperature adversely affects the availability of natural resources like water, which tends to result in inter-communal conflict (Arnall, 2023), as has been experienced in the sub-region, specifically between crop and animal farmers. The increased temperature has also resulted in frequent heatwaves in the West African region, resulting in deaths, specifically the aged. According to Arisco et al. (2023), maximum temperatures of at least 400C increase the risk of death of infants aged 0-5 and the aged. This was evident in Mali when the city Southwestern di Kayes recorded the hottest day in West African history on the 4th of April 2024, with some areas recording a temperature of 48.50C, resulting in the death of over 100 people, mostly the aged. Other studies by Alexander et al. (2013) revealed that higher temperature increases the risk of the prevalence of diarrhoea in children.

Indirectly, the higher temperature increases the risk of lower productivity due to discomfort and disruption of economic activities, including reduced time spent on jobs and higher cost of cooling. In contrast, the high evaporation affects moisture availability for crop yield and the tendency to intensify desertification in the region. Besides, the cooling systems require more energy and increase emissions and its consequent effect in the long run.

9.0 Climate Security, Conflict and Violent Extremism Nexus

Climate security exacerbates the drivers of conflict and fragility, thereby fueling the activities of violent extremism (UNDP, 2020). These exacerbations are reflected in four dimensions. In the first instance, it increases the competition for essential natural resources like water and land, thereby aggravating the root causes of violent extremism. In a natural resource-constrained context, extremist groups take control of the limited natural resources, providing fertile grounds for recruitment and extension of their reach (Crawford, 2015; UNDP, 2020; Marquette, 2020). For instance, tensions between crop farmers and cattle herders in central Mali over water and land have attracted jihadists to offer responses to unresolved grievances, especially in areas where state presence is low, and local justice and traditional conflict resolution mechanisms are weak (Marquette, 2020).

Secondly, Competition among resource users generates communal conflict in instances where resources are scarce. In cases where different users compete to utilize the resource, communal conflicts are ripe when the resource dwindles due to fluctuating weather patterns. For instance, where communities compete for water bodies, tensions escalate when one group feels the other competing users marginalize them. This is more frequent in communities where tensions already exist between users.

Thirdly, climate change effects such as flooding, sea level rise, drought and storms drive forced displacement (Wade, 2022). This fuels social tensions, more specifically between the displaced and the indigenes, thereby exacerbating the drivers of conflict and fragility, which could serve as a fertile ground for violent extremism in already tensioned communities. The displaced also lose their livelihoods, making them more vulnerable to recruitment and engagement in violent activities.

Finally, climate change risk exacerbates the drivers of conflict if policies, programs and projects that seek to increase access to scarce essential resources rather increase competition for those initiatives. Such initiatives attract competing users to access the resource, attracting

more population and rising tension. This implies that creating new sources of essential resources can provoke increased tensions and sometimes violent conflicts among users (ICG, 2020). For instance, as a response to drought, initiatives such as the drilling of wells may become necessary to address the resource shortage or address a harmful relationship between farmers and herders. The new wells may raise further tension since there will be competition for the right to use the resource. In the Mopti region of Mali, wells were constructed to support livestock farming. The wells attracted crop and vegetable farmers to settle in the communities for irrigation. The crop farmers began asserting their rights surrounding the wells which had been drilled for the herders, and this worsened the tension between the herders and the farmers, leading to violence between jihadists and self-defence groups (Marquette, 2020).

Similarly, the "Riz Pluvial" development project in the Soum province of Burkina Faso attracted crop farmers from other parts of the country to the project site. As a result, nomadic herders who initially settled on the land felt pushed off without adequate compensation. The crop farmers also bypassed the traditional local authority in the area by appointing their village chiefs. Amid these tensions, the nomadic herders approached jihadists, known for rejecting state decisions and helping people who support them gain access to the land (ICG, 2020; Marquette, 2020). This implies that it is much more appropriate to broadly involve all potential users and project the usage into the near future to improve resilience. Different users have varied ways of using the resource, which may conflict with each other and serve as grounds for conflict and even violent extremist actions.

Related to the above are also the ecosystem-based adaptation approaches used to re-green degraded environments and turn such areas into forest zones. The approach increases the forest cover and serves as a natural cooling ground and the protection of the natural environment. However, such areas become targeted locations for mobilization and training of extremist groups. Sky-based monitoring devices do not easily detect extremist activities under the forest cover.

For instance, in Nigeria, such areas are used as residences and grounds for mobilization by violent extremist before their operations. This implies that extremists exploit climate change initiatives to enhance their activities and operations.

Climate change effects disrupt economic activities, decrease sources of employment and drive many to poverty, contributing to grievances that create a conducive environment for violent extremism (UNDP, 2017; UNDP, 2023). Besides, climate change effects overstretch and weaken the capacities of both economic and social institutions like disaster management organizations and security institutions, which may struggle to respond promptly and effectively when needed. Weak responses reinforce vulnerability, and as climate impacts intensify, grievances may be exacerbated, government legitimacy may be undermined, and inter-communal tensions may be aggravated (UNDP, 2020). The inability to respond swiftly to disasters increases political exclusion and marginalization, which violent extremist groups capitalize on to react to the locals' grievances and expand their recruitment drives (UNDP, 2020).

To effectively contribute to addressing climate security issues in the West African region, there is a need to engage broadly using integrated approaches, including synergizing local knowledge with scientific methods to address climate change and climate security initiatives. Some regional-level expertise and practices are very relevant in the fight against the climate crisis. Climate security initiatives will yield many results if the perception of climate change and local adaptation approaches are integrated into the scientific climate security interventions. Also relevant is adopting robust approaches that would improve resilience to the changing climatic conditions and ensure robust governance processes that contribute to addressing climate-related risk and building strong coordination and cooperation processes in the fight against the climate crisis. Besides, research must be improved to ensure climate-tolerant devices and infrastructure can withstand climate change challenges.

10. Conclusion

West Africa faces complex climate security risks that affect human development in general. While the rate of increase in temperature is higher than the global average, rainfall patterns are less predictable, complicating responses to political tensions, violent conflicts and complex humanitarian emergencies (Tarif, 2023). Adverse effects of climate change directly impact agricultural systems, threatening food security and economic growth. The region has limited response capacities to climate-related security risks, mainly relying on external actors, mostly dominated by reactive response. Therefore, the area needs to move beyond the reactiveness by increasing collaboration, coordination, and cooperation efforts. The changing climatic conditions affect vegetation cover, natural resource availability, agricultural productivity, and biodiversity, leading to low levels of resilience and magnifying human insecurity.

Climate security is a very complex phenomenon. While the effects of climate change threaten livelihood and survival, some initiatives to improve resilience could even worsen the case. From the above, climate security risk in West Africa adversely affects human security through the loss of lives and livelihoods, disputes over natural resources and conflicts, armed group recruitment and forced displacement or migration. The effects are intertwined, affecting other sectors such as education, health, energy, and the environment. People whose livelihoods are affected end up having their wards drop out of school, while others who are displaced also drop out. Besides, some who are displaced as a result of climate-related effects end up getting recruited or joining armed groups, including terrorists.

Climate change affects the entitlement rights of humans who depend on natural resources for survival, serving as a source of human insecurity as it generates conflicts between resource owners. For instance, climate change effects such as drought or high temperatures dry up water bodies, which are sources for irrigation by crop and vegetable farmers and drinking places for animal farmers, thereby resulting in herder-farmer conflict as experienced in most parts of the region. Human insecurity, including livelihood insecurity and the risk of violence, is strongly

connected because the affected are more likely to join armed groups and engage in violent activities (Barnet & Agder, 2007). The effects impact a broad range of sectors like economics, society, environment and livelihood, as well as the survival and safety of individuals. I conclude that a change in any of the climate security domains results in reverse effects on well-being. During climate insecurity, people focus on basic survival mechanisms, including migration, with little or no opportunity to choose alternatives that can improve the quality of life. Although climate change is a transnational issue that requires concerted regional actions, the West African region is challenged by weak governance, political instability and regional tensions (Tarif, 2023). Henceforth, regional bodies like the African Union (AU) and the Economic Community of West African States (ECOWAS) need to step up their effort to strengthen coordination and collaboration in the region to address the issues of climate insecurity. Some approaches require effective natural resource management and local economic initiatives, including climate change adaptation measures and collaborative approaches at the regional level for local dispute resolution mechanisms. These approaches must adopt the bottom-up approaches to improve effective resilience at the community level.

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