

Analysis Report  
January 2025

## **African Biodiversity Loss: Food Insecurity and the Rising Risk to Human Security**

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### **To Cite this Report**

Njoku, I. K. (2025). *African Biodiversity Loss: Food Insecurity and the Rising Risk to Human Security*. Institute for Peace and Security Studies.

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*Abstract*

According to the International Union for the Conservation of Nature (IUCN), over 6,400 animals and 3,100 plants in Africa are at risk of extinction. The decline of Africa's abundant ecological biodiversity poses a significant threat to millions of livelihoods. It exacerbates food insecurity and conflicts over land, leading to volatile agropastoral and geopolitical contentions over grazing land. The conversion of natural habitat to low-yielding cultivated land and climate change are dominant drivers amongst other primary human-induced factors contributing to biodiversity loss in Africa. In arid and semi-arid areas, the decline in biodiversity and the degradation of ecosystems adversely affect soil quality and vegetation, influencing agricultural productivity. In this paper, it will be argued that the loss of biodiversity is a result of human pressure and climate change, along with other factors contributing to food and rising human insecurity in Africa. This paper attempts to provide strategic pathways for climate actions in mitigating biodiversity loss and improving human security. It suggests that for Africa to address the challenges of biodiversity loss and improve food and human security in the short and mid-term, effective multilateral ecological diplomacy should be adopted through the African Union (AU) and Regional Economic Communities (RECs). For the methodological approach, qualitative and quantitative descriptive and interdisciplinary research methodology, which allows the use of primary and secondary sources, was adopted in this study.

**Keywords:** Africa, Biodiversity, Food Insecurity and Human Security.

## Introduction

Africa harbours approximately 25% of the planet's biodiversity, and the decline in biodiversity constitutes a critical global concern (African Development Bank, 2020). In Africa, the deterioration of varied ecosystems threatens the livelihoods of millions, intensifies food insecurity, and incites conflicts over land resources (African Development Bank, 2020). Based on reports from the International Union for the Conservation of Nature (IUCN), over 6,400 animal species and 3,100 plant species in Africa are at risk of extinction (UNEP, 2016). Additionally, the continent is home to nine of the world's 36 biodiversity hotspots, with more than 1,500 endemic plant species and losing at least 70% of their original native vegetation (UNEP, 2016).

This paper examines the nexus between biodiversity loss, food insecurity and the rising risk of human insecurity. Altering natural ecosystems with low-productivity agricultural land is the main driver of biodiversity loss in sub-Saharan Africa. In arid and semi-arid regions, the degradation of ecosystems and the decline in biodiversity negatively impact soil health and plant life, subsequently affecting agricultural yields. The decrease in grassland ecosystems further reduces the availability of rangeland, which has repercussions for livestock farming (Africa Center for Strategic Studies, 2022). Additionally, escalating land pressures result in population displacements and conflicts between farmers and herders. Biodiversity is, therefore, crucial for the survival of humanity, the functioning of economic systems, the enhancement of individual well-being, and the fulfilment of human rights. Biodiversity provides indispensable resources, including food, livestock feed, energy sources, pharmaceuticals, genetic resources, timber, and numerous other essential materials.

Furthermore, biodiversity is instrumental in climate regulation and the maintenance of diverse ecological systems. Consequently, the significance of biodiversity is well represented in the framework of the Sustainable Development Goals (SDGs) (United Nations Environment Management Group, 2020). Specifically, fourteen of the seventeen SDGs incorporate elements of biodiversity vital for their successful implementation, underscoring the importance of integrating biodiversity more thoroughly across all economic and societal sectors.

The ongoing human exploitation of natural systems and the consequent deterioration observed in various regions globally have led to significant economic gains; however, these benefits are accompanied by escalating costs, particularly affecting impoverished populations. Concurrently, nations are grappling with diminished capacities to address the repercussions in conjunction with the

economic and other ramifications of the COVID-19 pandemic (Convention on Biological Diversity, 2022). More than half of the global economy exhibits a moderate to strong dependence on biodiversity, which encompasses essential services, including pollination, soil vitality, water quality, and the supply of natural resources. The three predominant sectors of the economy are construction, agriculture, food and beverage, which exhibit the highest dependence on biodiversity. Thus, biodiversity is a crucial foundation for business supply chains and is integral to sustainable development (Convention on Biological Diversity, 2022).

Marine and coastal ecosystems hold considerable ecological and socio-economic significance for the African continent, yet they face substantial threats resulting from the economic activities of societies. The biodiversity and ecosystems in these locations are varied and offer essential economic, social, and cultural benefits to the African populace. In certain regions, these environments account for over 35% of the gross domestic product (GDP) (United Nations Environment Management Group, 2020). Nevertheless, they are jeopardised by numerous human-induced factors, including climate variations, infrastructure projects (such as ports), urban expansion, tourism, mining, and the overexploitation of marine and coastal resources. These activities result in biodiversity loss and severe damage to critical ecosystems, including coral reefs, estuaries, and mangroves (United Nations Environment Programme, 2020). The degradation of coral reef systems, primarily driven by pollution and climate change, poses significant risks to fisheries, food security, tourism, and overall marine biodiversity. Furthermore, the combination of overexploitation, habitat degradation, acidification, pollution from terrestrial sources, invasive alien species, and rising sea levels places invaluable ecosystem services in grave jeopardy.

Biodiversity further plays an important role in improving the resilience of food systems and communities across Africa. This is evident in the diverse livestock breeds and crop varieties developed from their wild ancestors. The continent is home to a diverse population of subsistence agriculturalists, small-scale livestock breeders, and pastoral communities who preserve various genetic resources in plants and animals for agricultural purposes. Such diversity helps to alleviate the impacts of drought, pests, and shifting environmental conditions. Their contributions are vital for achieving food security and maintaining biological diversity, which is essential for African farmers. Consequently, food insecurity poses a significant risk to human security, underscoring the importance of this research (ADB, 2012; Africa Ecological Footprint Report, 2012).

Africa possesses the potential to fully harness the advantages of its abundant biodiversity and investigate sustainable methods for utilising these resources to foster economic and technological advancement. However, there is a concerning trend of diminishing Indigenous and local knowledge regarding biodiversity management and its benefits to communities in some areas of the continent. While Africa's benefits are characterised by comparatively minimal ecological and carbon footprints compared to other global regions, difficulties are still anticipated in reconciling economic growth needs. A rapidly increasing population and rising population densities necessitate the urgent need to safeguard, conserve, and improve biodiversity and ecosystem services (Intergovernmental Panel on Climate Change, IPCC, 2022). This makes it crucial for Africans to retain their abundant natural resources and the Indigenous expertise required for their stewardship, which is particularly significant in an era where such knowledge is increasingly acknowledged as vital for promoting a low-carbon, sustainable, and knowledge-based economy.

This study aims to establish that factors contributing to human insecurity in Africa stem from political and socio-economic crises and the loss of biodiversity due to human pressure and climate change. Moreover, it aims to encourage the inclusion of climate actions in mitigating the loss of biodiversity in the government's non-kinetic approach to human insecurity to provide grassroots knowledge for the domestication of multilateral environmental agreements into the African peculiarities to tackling the loss of biodiversity and rising human insecurity; to bridge the gap between frameworks and actual implementation of climate policies by harnessing the power and knowledge of local communities, civil society, and law enforcement. It argues that human pressure on the environment alongside natural climate factors greatly affects biological lives, from agriculture to coral resources and the entire biosphere. Biodiversity loss results in diminished ecosystem services, thereby affecting livelihoods. This human pressure (earlier highlighted) negatively affects the economy, leading to scarce resources and food security and rising risks to human security.

While existing literature does not primarily focus on the direct consequences of biodiversity loss concerning conflict, some studies indicate that existing natural resource conflicts may become exacerbated. New conflicts may arise when biodiversity loss diminishes ecosystem services, affecting livelihoods (Rist et al., 2024). This clearly illustrates the potential for food security conflicts (IPBES, 2019). Given the essential role of biodiversity in maintaining ecosystem integrity and delivering ecosystem services, it can be inferred that there is a direct link between security and biodiversity, even if this connection is not frequently articulated (Cardinale et al., 2012). Additionally, considering the insights into ecosystem resilience and the protective function of biodiversity, it is essential to

emphasise the direct impacts of biodiversity loss when evaluating the potential for increased conflict arising from environmental degradation rather than concentrating solely on climate change (Loreau et al., 2021). This paper, therefore, provides an empirical analysis of the current state of biodiversity in Africa, food insecurity, and rising risk to human security, as well as strategies and pathways for Africa to halt biodiversity loss. It concluded with a recommendation aimed at addressing Africa's biodiversity loss challenges.

### *Theoretical Framework*

For conceptual discourse and theoretical framing, this research first adopts the climate change school of thought on natural and human-induced environmental change and its implications for international security, socio-economic development and social disruptions in various regions. Secondly, the human security school of thought on environmental impacts on individuals and society - "people-centred" security- is closely related to sustainable development issues like food security, health, education, welfare and gender issues, among others. Both theories underscore the implication of human activities on environmental change. Recently, there has been a resurgence of interest in the issue of environmental crimes associated with warfare. The potential impacts of a nuclear conflict are also being explored through modelling studies (Xia et al., 2022). This line of inquiry was prompted by the discovery of abandoned military training sites in Europe and the United States (Warren et al., 2007), and conservationists have historically partnered with military organisations to leverage the conservation potential of these locations. This topic has been notably examined in the context of gemstones, mineral resources, "conflict timber," "conflict ivory," and the bushmeat trade (Gaynor et al., 2016). The primary objective has been determining whether there is a general correlation between resource wealth and civil unrest. Subsequent studies indicated that factors such as reliance on resource exports are more closely associated with conflict than mere resource abundance (Collier, 1998).

This hypothesis gained significant attention in conservation literature, particularly through research on the bushmeat trade in West and Central Africa and illegal logging (Robinson, Redford, Bennett, 1999). It has been a persistent theme in discussions surrounding natural resource management and conservation, such as the concept of 'conflict of use' species in tropical forest management (Rist et al., 2012), as well as in fisheries, notably in the Horn of Africa, and in grazing and land use practices in rangelands and forests (Brottem, McDonnell, 2020). Recently, this topic has intersected with the 'environment-security hypothesis,' leading to a convergence of these fields and their relationship with climate change (Black et al., 2022). Historically, the focus on environmental security risks has centred

on freshwater resources, exemplified by the Indus Water Treaty between India and Pakistan (Williams, 2022). More recently, the hypothesis has resurfaced with an intensified emphasis on climate change. This renewed interest traces back to the concept of 'Peace parks,' which gained popularity from 2005 to 2010 but has since diminished in prominence. A similar core idea has emerged among development and peacebuilding professionals, who have recognised the importance of addressing factors beyond the conflict itself to facilitate peacebuilding efforts (Lucy et al., 2024), such as prioritising natural resource management in post-conflict environments, sometimes referred to as ecological diplomacy.

## **The State of Biodiversity in Africa**

Biological lives are facing threats from various human-induced factors—including climate change, habitat alteration, over-exploitation, poaching, illegal wildlife trafficking, pollution, and invasive species as well as natural factors such as diseases, pests, and natural calamities, has risen significantly (Amel-Zadeh & Serafeim, 2018). The drivers engaging in activities that exacerbate climate-related hazards lead to the deterioration of land and result in the loss of habitats for migratory and various other species. The deterioration of soil fertility and productivity poses significant threats to economic opportunities. These challenges further jeopardise food, water, energy, and health security, severely adversely affecting livelihoods (CBD, 2020). The various prospective future scenarios examined in the Africa assessment of progress towards the 20 Aichi Biodiversity Targets indicate that these factors are expected to escalate, leading to detrimental consequences for biodiversity, the benefits nature provides to humanity and overall human well-being.

Additionally, indirect drivers such as rapid population growth, urbanisation, misguided economic policies and technologies, poaching, illegal wildlife trade, and socio-political and cultural pressures have intensified the decline of biodiversity and the loss of nature's benefits to people. Neglecting to tackle the fundamental causes of biodiversity decline will persistently jeopardise efforts aimed at conserving biodiversity and enhancing the quality of life for the people of Africa through sustainable practices and fair distribution of benefits derived from natural resources. Additional contributors to biodiversity loss and the diminishing benefits provided by nature include uncontrolled infrastructure development and urbanisation, excessive exploitation of biological resources, the introduction of non-native species, and pollution affecting air, water, and soil. Furthermore, climate change, characterised by rising temperatures, increasing sea levels, and alterations in rainfall patterns, intensifies all other direct factors leading to biodiversity loss.

The government of African states are largely struggling to meet the biodiversity targets set by the United Nations (UNEP-WCMC 2016). This shortfall can be attributed to the insufficient integration of biodiversity policies into key sectors, including agriculture, fisheries, the economy, and tourism (UNEP, African Environment Outlook, 2019). The UNEP research on Africa indicates that, in addition to sectors that directly address biodiversity and environmental concerns, numerous other sectors within African nations have attempted, yet ultimately failed, to incorporate biodiversity considerations into their strategic frameworks and initiatives (UNEP, African Environment Outlook, 2019). Additionally, climate change discourse has eclipsed various other environmental issues, leading to a reallocation of resources intended for biodiversity towards climate-related matters. Certain governments have indicated that the inability to meet biodiversity targets can be primarily linked to deficiencies in technical capabilities, insufficient financial resources, and a lack of political commitment.

Comparatively, the biodiversity target set in 2010 has motivated initiatives across various levels. In Africa, over 40 states have established national strategies and action plans to promote biodiversity. Additionally, 35 countries have finalised their fourth national reports, which detail the actions taken to implement the Convention on Biological Diversity and assess the effectiveness of these actions (Penelope et al., 2019). The number and size of protected areas have increased in land and marine environments. Specifically, 14.6% of the total land area in Eastern and Southern Africa is designated as protected. This contrasts 10.5% in Western and Central Africa and 7% in Northern Africa, where the latter seeks to establish a protection level of 10% of its territory within the next ten years. Implementing environmental impact assessments is becoming increasingly prevalent, with most states indicating that they have established measures to execute them (Penelope et al., 2019).

Regarding the issue of access to genetic resources and the fair allocation of benefits arising from these resources, African Governments have noted that advancements have been limited, primarily due to the reluctance of user countries to engage in benefit-sharing. Furthermore, numerous African Governments lack regulations pertaining to bioprospecting, which has led to the uncontrolled utilisation of their biological and genetic resources and has been recognised as problematic. It has been noted that the lack of a legal framework creates considerable obstacles in providing regulated and legally secure access to potential users of locally available biological and genetic resources. Consequently, African nations actively participate in the ongoing negotiations concerning international conventions on access and benefit-sharing (African Union, 2023). The unregulated harvesting of medicinal and aromatic plants poses a significant risk to the survival of numerous



endemic species and the preservation of soil and vegetation cover in various regions of the Atlas Mountains. Furthermore, the overharvesting of oak branches for charcoal production, combined with the increased need for livestock feed during the winter, results in significant overgrazing and deterioration of the soil in the forest ecosystem (Arneth, 2020).

The Horn of Africa is home to the highest diversity of endemic reptiles on the continent and several endemic and endangered antelope species, including the Gerenuk (*Litocraniuswalleri*). This long-necked antelope inhabits the arid bushy scrub of the Horn of Africa, specifically in Djibouti, Ethiopia, and Somalia, and is also found in parts of East Africa, including Kenya and northeastern Tanzania (UNEP Annual Report, 2009; Kenya Wildlife Service Annual Report 2008). The population of Gerenuks is experiencing a decline due to factors such as over-hunting, drought, and habitat destruction, particularly in Somalia. Additionally, African forests are home to numerous wild vertebrate species, including Chimpanzees, Jentink's Duiker, Mandrills, and the Pygmy Hippopotamus, all of which face threats or are at risk of extinction. More than twenty different species of primates are among the more than 25% of mammalian species found in West Africa's lowland forests. Remarkably, nine of these species are exclusive to the forests of Cameroon and Nigeria, while six are native to the forests of Upper Guinea. Of these animals, Mandrills are the biggest in the world and are distinguished by their vivid colouring. They live in the Congo Basin's jungles, including Gabon, Equatorial Guinea, the Republic of the Congo, the Democratic Republic of the Congo, Cameroon, and the Central African Republic. This area constitutes the world's second-largest natural tropical rainforest after the Amazon (UNEP Annual Report, 2009).

However, there is insufficient protection for this species, and the illicit hunting of Mandrills for bushmeat persists. The pressure that human activities like mining, logging, hunting, and population increase are placing on the woods is also causing an alarming pace of habitat loss. Many species are in danger of extinction as rainforests are cleared for lumber and other natural resources. Less commercially viable timber is one of the most apparent effects of logging in places like the Sangha Tri-National Park (UNEP-WCMC, 2008).

Numerous vast transboundary habitats, or areas of land or sea that span one or more national borders, are found in Africa (UNEP, Geo Data Portal, 2021). A significant portion of these places are protected zones, vital to preserving Africa's varied wildlife populations and their native environments. For animals that travel across borders, transboundary protected areas are critical—the Great Limpopo Transfrontier Park, which spans Mozambique, South Africa, and Zimbabwe. The Nyungwe Forest in

Rwanda and Kibira National Park in Burundi, and the W-Arly-Pendjari complex in Benin, Burkina Faso, and Niger are notable examples of such places in Africa (UNEP, Geo Data Portal, 2021). As natural resources in unprotected areas diminish, protected areas progressively become the final strongholds for fuelwood, fodder, and other vital supplies. The viability of these protected zones is being threatened by increased poaching, illegal grazing, and other human activities due to this predicament. Thus, international cooperation is necessary to preserve these common areas, underscoring the need for cooperative management approaches across neighbouring countries.

Furthermore, the Convention on Wetlands of International Importance, Particularly as Waterfowl Habitat (Ramsar Convention), recognises many wetlands found in Africa that are of international significance. These wetlands are found in almost every nation on the continent and makeup 1% of its total land area (Palmer, 2012). Four additional locations in Africa have been named Ramsar sites in the last year: two are in the Democratic Republic of the Congo, and two are along the coast of Sudan. (Ramsar, 2017). Wetlands are an important supply of water and nutrients for agriculture in Africa. They also provide habitats for various animals and significantly contribute to food security. Thus, these wetlands must be managed sustainably to protect many African communities' long-term health, safety, and well-being. Wetlands are routinely changed or reclaimed despite their importance, typically due to financial and economic incentives. They provide various products and services that are economically valuable to both the people living in the area and those who live farther away. Regretfully, neither the economic consequences of their degradation nor the significance of wetlands to African local populations are fully appreciated (Palmer, 2012).

Africa has an abundance of water resources, with many lakes and rivers. There are 677 lakes in the continent, 88 of which are considered significant. There are also about 80 transboundary rivers and lake basins in Africa; the catchment areas of the 17 major rivers are larger than 100,000 square kilometres (Africa's Lakes Atlas, 2006). This abundance is best shown by Lake Victoria, The largest freshwater lake on the African continent and the second largest globally. The Lake Victoria Basin is home to a substantial amount of agricultural and natural biodiversity on land and in the water. Nevertheless, the increasing pollution brought about by human activity poses a threat to these natural environments. The loss of biodiversity has been significantly attributed to invasive alien species. The native fish populations have suffered greatly due to the introduction of the Nile perch into the lake in the mid-1950s. Furthermore, the diversity and quantity of aquatic species in Lake Victoria are significantly impacted by non-native aquatic plants, especially water hyacinths. The swift spread of water hyacinth has caused significant disruptions to nearby communities, the economy, and the

ecology. Because pastoralist groups and traders removed trees for firewood and fodder, human activity drastically altered species' habitats in the Sahara Desert. These plants are facing more difficulties due to a number of issues. Overcrowding of domestic animals has occurred in some regions, especially around waterholes or wells (Global Desert Outlook, 2006). Namibia's deserts support a wide variety of succulent plants and show off amazing plant endemism, with 69% of the plant species found there being exclusive to the area. –In addition to specific reptile species, this fragile desert ecosystem is seriously threatened by grazing, farming, mining, habitat fragmentation from road construction, illegal reptile exploitation, and other human activities (Global Desert Outlook, 2006).

Moreover, marginalised people are disproportionately affected by the loss of biodiversity and the deterioration of ecosystems; public incentives and subsidies that could negatively affect biodiversity are estimated to be worth roughly US\$ 500 billion yearly (OECD, 2019; Kehinde et al., 2024). Funding for biodiversity support ranges from US\$ 50 to 80 billion annually, whereas bilateral official development assistance (ODA) for biodiversity is less than US\$ 10 billion annually (Kehinde et al., 2024). An estimated \$300–400 billion is needed annually globally to protect the environment. In addition to producing major co-benefits, including reducing the danger of climate change, enhancing health and food security, and actively raising carbon stocks in the biosphere while lowering carbon emissions, this amount of financing would greatly improve biodiversity conservation (IUFRO, 2012, Max Planck Institute for Biogeochemistry, 2018).

Africa must increase its participation in and put into practice the Kunming-Montreal Global Biodiversity Framework (GBF) of the 2022 United Nations Biodiversity Conference to effectively engage with global and multilateral initiatives meant to address the ongoing loss of biodiversity. It has been called a "Paris Agreement for Nature" and was adopted on December 19, 2022, during the 15th Conference of Parties (COP15) to the Convention on Biological Diversity (CBD) (Convention on Biological Diversity, 2022). It is thought to be the most important agreement to date and is one of the few made under the CBD. Many have hailed this framework as a "monumental, historic achievement" and a "substantial victory for our planet and all of humanity" (Convention on Biological Diversity, 2022). The United Nations system supports innovative projects that protect. The text emphasises the importance of improving biodiversity and ecosystem services in critical sectors such as food production and agriculture, forest management, ecosystems, biosafety, governance, and human rights. The Kunming-Montreal Global Biodiversity Framework's twenty-three key targets emphasise minimising threats to biodiversity, addressing human requirements through sustainable

methods and equitable benefit-sharing, and developing instruments and strategies for effective implementation and integration.

However, human well-being is fundamentally linked to a resilient biosphere, encompassing the delicate balance of ecosystems and biodiversity necessary to ensure food security and foster social, economic, and political stability. The prevalence of armed conflict, including state and non-state violence, is rising (Davies & Pettersson, 2022). For instance, the number of state-based armed conflicts increased twofold from 2010 to 2020, paralleled by a surge in the number of refugees and forcibly displaced individuals, which escalated from 41 million in 2010 to 82.4 million in 2020 (UNHCR, 2022). Additionally, there is a growing trend in national militarisation and nuclear proliferation (Bayer, 2021), coupled with a significant decline in international diplomatic efforts (SIPRI, 2021). These developments do not bode well for the immediate future. Furthermore, the interrelationship between biodiversity loss and conflict underscores the necessity of comprehending the links between biodiversity decline, the cycles of war and peace, and the patterns of conflict.

### **Biodiversity Loss and Food Insecurity**

The primary factors contributing to the rising levels of food insecurity on a global scale include violent conflict, climate change, and the ongoing cost-of-living crisis. Additionally, the increasing mechanised pressure exerted by humans on the environment, coupled with a decline in biodiversity, is significantly exacerbating food insecurity in Africa, adversely affecting the continent's food systems. In this context, the "food system" encompasses the various activities related to food production, processing, transportation, and consumption (IFAD, 2020). Food systems are integral to all facets of human life. When these systems falter, the ensuing chaos jeopardises public health, economic stability, human rights, peace, and security. As is often the case, those already impoverished or marginalised bear the brunt of these challenges. Africa is home to a substantial share of the world's armed conflicts and is particularly vulnerable to the impacts of climate change compared to other regions. Since 2020, the Covid-19 pandemic has driven approximately 40 million individuals in Africa into extreme poverty (FAO: Rome, 2022).

The spike in food and commodity prices brought on by Russia's invasion of Ukraine in February 2022 have combined to create an unprecedented cost-of-living catastrophe that disproportionately affects people who are poor or living close to it. The governments and parties responsible for resolving the consequences of this intricate situation face significant obstacles. There is a basic link between violent

conflict and food insecurity (SIPRI, 2021). Armed conflict significantly disrupts food production since agricultural lands and nearby rural areas frequently turn into combat zones (International Food Policy Research Institute, 2020). Armed groups regularly attack and destroy production facilities, take control of agricultural land, and murder, maim, or force agricultural labourers and other food industry participants to flee their homes (Olaniyan & Okeke 2021). As a result, public spending and private sector investments are frequently cut or diverted, which has long-term effects on food security (IMF, 2019).

Furthermore, the distribution and marketing of food goods are hindered by violent conflict. Supply chains may be weakened or disrupted by increased transportation hazards and distribution delays (Quak, 2018). Violent conflicts can have long-lasting effects on agricultural systems, especially as many post-conflict countries take decades to stabilise.

According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), food security is seriously threatened by the loss of biodiversity. Their research indicates that 3.5% of domesticated bird breeds and 10% of domesticated mammal species have already been declared extinct (IPBES, 2019). The threat of extinction also affects the wild cousins of these domesticated animals, lowering the amount of genetic variety available. Because pollinator diversity has declined, IPBES argues that this biodiversity loss will make agricultural systems more vulnerable to various problems, such as pests, diseases, and climate change. This decrease has a negative impact on the horticulture industry and increases the risk of crop failures.

Dasgupta (2021) posited that the loss of biodiversity poses a danger to food security and the global economy because it has a negative impact on soil health, which is crucial for food production. He further asserts that soil organic matter and plant residues are broken down by bacteria, fungi, and archaea, which operate as chemical engineers and promote nutrient cycling and the restoration of contaminated soils. Other creatures act as biological regulators, controlling plant diseases and improving food security (Dasgupta, 2021). Larger creatures that alter the composition of the soil matrix, such as termites, earthworms, and tiny mammals, play an important role as ecosystem engineers. Thus, the ability of soils to support the global food chain would be compromised in the absence of these diverse species, each of which plays a unique role.

Consequently, the main factor causing biodiversity loss is human desire for commodities and services to rise above what nature can supply. Dasgupta further argued that the fundamental value of nature

and the environment, or what he called "natural capital," had not been adequately acknowledged by governments. He also pointed out that the use of pesticides and intensive farming methods harms the ecosystems necessary to guarantee food production's sustainability in the long run (Dasgupta, 2021).

### **Rising Risk of Biodiversity Loss to Human Security**

The increasing loss of biodiversity in the Sahel region, particularly in Nigeria, has made conflicts over the dire effects of climate change and drought and the geopolitical struggle over transboundary resources within rangeland biomes more vulnerable. The region's unpredictable agropastoral and geopolitical conditions exacerbate this predicament. The Sahelian insurgency has had serious environmental effects; landmines, unexploded bombs, and depleted uranium have contaminated the region, and human-induced conflict has negatively impacted the native flora and fauna. Africa's natural environment has been vital to conflict, frequently becoming its first fatality. This is evident with the surge in political tensions on the continent, with waves of conflict from the Arab Spring to the current waves of coups in Africa.

**Infrastructural Decay, Air and Water Pollution:** The degradation of vital services and infrastructure brought on by armed conflict can have a negative effect on public health and the local environment. Water supply lines may become contaminated or shut down entirely due to bomb explosions. Toxic dust also seriously threatens the environment in regions heavily frequented by big military vehicles. The presence of heavy metals, including cobalt, barium, arsenic, lead, and aluminium, in this dust puts both locals and military personnel in considerable danger of respiratory ailments (Tar, 2024).

Nigeria's 2016 National Policy on the Environment strongly emphasises the need to protect the natural environment from the damaging impacts of car emissions from military vehicles in the Northeast. It draws attention to the emissions and effects of burning biomass and the release of several pollutants into the atmosphere, such as Sulphur Dioxide, nitrogen oxides, carbon monoxide, hydrocarbons, and particulate matter. Public health, as well as the productivity of agriculture and forests, are all significantly impacted by these elements. Moreover, the Lake Chad Basin Desk Review (2016) describes how armed conflict exacerbates poor sanitation and hygiene standards in the Northeast, pointing out that significant migration pressures from mass displacements and climate change exacerbate the problem.

Greenhouse gas emissions cause a serious risk of air pollution in the Northeast. The area has seen ten years of military activities, so Boko Haram and military vehicles require more fuel. Significant amounts of Carbon dioxide, Hydrocarbons, Nitrogen oxides, and Carbon monoxide have been released due to this circumstance, endangering the safety of the environment and public health (Lake Chad Basin Desk Review, 2016).

**Destruction of Biodiversity:** On a similar note, the Northeast's main vegetation, which has structural similarities, will probably be harmed by the ongoing war, which will have a severe impact on vegetation and the climate. The continuous hostilities are making the physical environment in the Northeast worse, which is already facing environmental deterioration.

**Chronic Food Insecurity:** The employment of explosives and military hardware has resulted in previously unheard-of rates of habitat damage and deforestation. The deployment of big military vehicles across agricultural terrain and widespread bombardment can have a negative impact on agricultural output (Omeje, 2020). Moreover, the presence of land mines can render large areas of fertile ground unusable, and trench excavation causes grasslands to be trampled, plants and animals to be crushed, and soil structures to be disturbed (UNEP, 2003). Due to considerable changes in soil structures, military operations like clearing forests in Sambisa to drive out Boko Haram and building trench networks to protect important cities like Maiduguri, Damaturu, and Bama will likely cause soil erosion. Systematic violence by Boko Haram and the ongoing insurgency has impacted productive industries, including agriculture, fishing, cattle rearing, and related trade. Due to this, food stockpiles and community assets have been destroyed, worsening the already serious problems with food security and the incidence of global acute malnutrition (GAM) in the Northeast (Lake Chad Basin Desk Review, 2016).

**Unexploded Ordnance (UXO):** Military operations, including insurgency, terrorism, and counter-terrorism/counter-insurgency efforts, necessitate the use of substantial amounts of explosive munitions. A portion of these munitions may fail to detonate as intended, resulting in unexploded ordnance (UXO). This situation poses significant physical and chemical risks to both military personnel and the civilian population residing in former conflict zones due to the potential for detonation long after hostilities have ceased. Additionally, leaching hazardous chemicals into the soil and groundwater presents ongoing threats (Robinson, 1997). Landmines, which are activated by victims and are indiscriminate, can harm anyone who triggers them, be it a child or a soldier. Mines that were placed during conflicts against opposing forces can continue to inflict casualties on civilians

for many years. Explosive devices that do not detonate as planned become which, like landmines, remain a persistent danger during and after conflicts.

**Threat of Depleted Uranium Munitions:** Research indicates that depleted uranium could contain carcinogenic components. The residue of this toxic metal often ends up in water sources, which can lead to serious health problems for humans and plant and animal life long after the cessation of hostilities. Specifically, this possibility potentially puts Lake Chad, which is in the centre of the theatre of the ongoing Boko Haram insurgency, in serious jeopardy. Though exact figures and data on the tonnes of bombs so far expended in the ongoing CT-COIN operation by the Nigerian military and the insurgents is unknown, what is certain is that the rate of bombing is likely to generate a level of radioactive exposure capable of making the Northeast environment carcinogenic (Tar & Bala, 2020).

## **Strategies and Pathways for Africa to Halt Biodiversity Loss**

**Integrating and domesticating biodiversity Conventions:** To effectively address the myriad threats to biodiversity in Africa, it is crucial to incorporate biodiversity considerations into national development planning and policies. There is a significant demand for continental support to embed biodiversity conservation goals within Africa's sectoral policies, programs, strategies, regulations, and educational initiatives. International agreements, such as the Kunming-Montreal Global Biodiversity Framework established by the United Nations Conference of the Parties, must be tailored by Africa's environmental policymakers in multinational organisations such as the AU, RECs and respective national governments to align with Africa's unique solutions for combating biodiversity loss, particularly concerning food insecurity and escalating human insecurity. Africa should entrench Kunming-Montreal Global Biodiversity's goal to build integrity, connectivity and resilience of all ecosystems to maintain and substantially increase the area of natural ecosystems by 2050 and help Human-induced extinction of known threatened species by 2050. Current trends underscore the necessity of adopting an ecosystem-based approach to biodiversity conservation, ensuring its sustainable utilisation, and promoting the fair and equitable distribution of its benefits. Additional measures that can aid in curbing biodiversity loss include minimising the negative impacts of agricultural practices and extractive industries, rehabilitating damaged ecosystems, developing alternative sources of income for local populations, and promoting improved partnerships with private entities and non-governmental organisations involved in conservation efforts.



**Biodiversity Education and Regional Research Programs:** Substantial scientific uncertainties remain that require resolution through national and regional research initiatives. African nations ought to strategically allocate their research and financial resources to address the continent's unique challenges. A vigorous campaign promoting environmentally sustainable policies should be incorporated into grassroots educational frameworks to confront pressing environmental concerns, such as plastic pollution, to mitigate biodiversity loss.

**Africa Environment Bill:** Africa requires comprehensive environmental legislation to achieve a net positive impact on biodiversity while establishing local strategies for nature recovery and the restoration of degraded ecosystems. This legislation will act as a renewed commitment to nature, fostering international cooperation and solidarity. By enhancing land restoration and implementing nature-based solutions for climate action, Africa can secure benefits for future generations. Cultivating this renewed contract with the environment requires strong leadership guided by trustworthy and readily available data. The United Nations can play a pivotal role in ensuring that economic and social recovery initiatives incorporate strategies that promote biodiversity and climate action.

**Institutionalising Indigenous Knowledge of Biodiversity:** There is a discernible reduction in the indigenous and local knowledge pertaining to managing biodiversity and nature's contributions to human well-being in various areas across the continent. Although Africa enjoys relatively low ecological and carbon footprints compared to other regions worldwide, it continues to encounter considerable challenges in balancing economic development needs. The expanding population and rising population densities underscore the urgent need to safeguard, preserve, and improve biodiversity and ecosystem services. The African populace must safeguard their abundant natural resources alongside the indigenous and local knowledge fundamental for their stewardship. This is particularly important in the current context, where such knowledge is increasingly acknowledged as essential for fostering a low-carbon, sustainable, and knowledge-driven economy.

**Synergizing Multilateral Environmental Agreements:** Member states of the African Union have pledged to fully execute essential multilateral environmental agreements (African Union, Multilateral Environmental Agreements 2021). Leveraging synergies between these agreements and the Sustainable Development Goals, in conjunction with relevant regional and national initiatives, can significantly improve the effective execution of policies and strategies at multiple levels, thus fostering greater resource efficiency. Leveraging current opportunities, including regional economic

communities and diverse funding sources—such as the Global Environment Facility, the Green Climate Fund, and the Land Degradation Neutrality Fund—can significantly enhance the execution of policies at both the regional and national scales. States are encouraged to capitalise on the resources support for biodiversity-related policies provided by regional economic communities, technical agencies, and various funding sources, aiming to integrate these policies into broader environmental initiatives. Governance strategies that incorporate ecosystem-based adaptation offer a range of advantages and can play a significant role in tackling equity challenges while aiding in alleviating poverty. Furthermore, the African Union, in collaboration with United Nations agencies, can facilitate continental biodiversity conservation through monitoring and identification efforts and by enhancing centres dedicated to exchanging relevant data and information concerning the preservation of biological diversity.

## **Conclusion**

The decline of biodiversity is occurring at an unprecedented rate in human history, posing significant risks and uncertainties for our economies and overall well-being. This situation necessitates urgent measures to counteract these negative trends. The research underscores the economic, social, and cultural significance of biodiversity and nature's contributions in Africa, which are vital for providing essential resources such as food, water, energy, health, and secure livelihoods. These elements are crucial for sustainable development and the realisation of the Sustainable Development Goals. Furthermore, the research identifies a critical link between biodiversity loss, food insecurity, and increasing risks to human populations in Africa and argues that human pressure on the environment alongside natural climate factors greatly depicts biological lives from agricultural to coral resources and the entire biosphere, biodiversity loss results in diminished ecosystem services, thereby affecting livelihoods. This human pressure negatively affects the economy, leading to scarce resources, resulting in food security and rising risks to human security. The outlined policy strategies emphasise the extensive milestones required to address these challenges, significantly as Africa's population is projected to double by 2050, alongside rapid urbanisation, which will exert immense additional pressure on the continent's biodiversity and the natural resources that support its people.

This paper calls for African States to domesticate global conventions on biodiversity to solve Africa's loss of biodiversity and reduce food insecurity and rising risks to human security. These risks' global and continental dimensions have prompted demands for more comprehensive solutions and enhanced international collaboration. It is increasingly clear that no nation or coalition of nations, regardless of

their political influence or economic strength, can independently address the challenges of biodiversity loss. The factors contributing to biodiversity loss are significantly exacerbated by conflict, which operates through a complex interplay of social, political, and economic dynamics that ultimately affect land use and result in food insecurity. In its many manifestations, conflict is arguably one of the most underestimated yet critical indirect drivers of global biodiversity decline. Additionally, conflict may be viewed as a fundamental sustainability challenge for the future, primarily because of its profound and far-reaching impact on all other sustainability issues.

## **Acknowledgements**

I would like to sincerely thank God for the enablement to conduct this research and also massive thanks to the reviewers for their invaluable feedback and thoughtful comments on this report. Their insights have greatly enhanced the quality and clarity of this work and I appreciate the time and effort they dedicated to reviewing this report from the initial stage up to the final publication.

## **Declaration of Interest Statement**

The author has reported no potential conflict of interest.

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