RESEARCH ARTICLE

The Ramifications of Climate Change on Security and Development in the African Sahel Region: An International Perspective

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Abstract

Climate change refers to long-term shifts in temperatures and weather patterns, occurring naturally or due to human activities like burning fossil fuels, which produce greenhouse gases such as methane and carbon dioxide. These gases act like a blanket, trapping heat and raising global temperatures. Sectors like energy, transport, and agriculture contribute significantly to these emissions. The topic's importance lies in its impact on sustainable development in Sub-Saharan African countries, prompting the international community to hold conferences and agreements to address and mitigate this phenomenon

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Introduction:

Climate change is considered a significant challenge facing humanity. Interest in this phenomenon began decades ago when climatologists and earth scientists confirmed that the Earth is undergoing continuous transformation, with potentially negative impacts on all aspects of human life. These changes result from both natural and human-made causes. Since then, several definitions have been proposed in this regard, including the one offered by the United Nations Framework Convention on Climate Change, which defines climate change as: "A change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."

Several African countries, including Sudan, Eritrea, Ethiopia, and Djibouti, experienced drier conditions in 2015 compared to others such as Kenya, Somalia, and Uganda, which witnessed heavy flooding. In Ethiopia, the failure of two consecutive rainy seasons led to one of the worst droughts in decades, leaving over ten million people in urgent need of humanitarian assistance. Agricultural output declined significantly, and water shortages put natural and livestock resources at risk. Although the Ethiopian government recognized the potential consequences and began preparing in 2014—making its response more effective than in 1984, when hundreds of thousands died due to famine—certain parts of the country still require international aid.

Accordingly, the central question may be formulated as follows: What is meant by climate change? And how has the international community, particularly in the African Sahel and globally, responded to this phenomenon in light of the challenges it presents?

First Topic: The Concept of Climate Change

Climate change refers to new patterns in climate conditions that occur over a specific period and may persist for many years—ranging from hundreds to thousands or even millions of years. This phenomenon is among the oldest known to the Earth. Scientists have been able to identify several episodes of climate change throughout the planet's geological history. However, these changes were not as dangerous as they are today. Numerous causes have contributed to the increased intensity of climate change, including various weather elements such as temperature, wind, rainfall rates, and others.

Most studies dealing with the issue of climate change tend to confuse climate with weather. Weather describes atmospheric conditions in a specific region, including variations in temperature, humidity levels, wind speeds, rainfall rates, and other meteorological elements.

In Somalia, nearly one million people lacked the capacity to meet their food needs. It is worth noting that drought is not solely responsible for the situation in Somalia, despite its clear partial impact resulting from the El Niño phenomenon. Many of those in need of assistance are also internally displaced persons due to years of conflict in the country.

First Requirement: Definition of Climate Change

The fluctuations in global climate over recent decades have raised many questions and become a central focus for scientists and researchers, particularly after the Kyoto Protocol was signed in 1997. This prompted further examination of the concept of climate change, its causes, and its most likely future developments.

Climate change is a natural phenomenon that occurs over thousands of years. However, the increasing intensity of human activity has accelerated the pace of these changes.

The United Nations Framework Convention on Climate Change defines climate change in Article 1 as

> "A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."[1]

The Intergovernmental Panel on Climate Change (IPCC) defines climate change as:

> "All forms of statistically measurable climate variations that may persist for decades, caused either by human activity or by internal interactions within components of the climate system."[2]

Climate, in this context, refers to the average atmospheric conditions in a specific region over a long period of time—estimated by the World Meteorological Organization to be at least thirty years. Climate components include the atmosphere, hydrosphere, cryosphere, as well as the lithosphere (surface soils, rocks, sediments) and the biosphere (living organisms). This distinction implies that climate is not the same as weather, but rather an average of weather changes over a long period—typically decades or centuries—which is the minimum threshold for identifying climatic changes.

Accordingly, short-term changes occurring over periods less than several decades do not constitute climate change in the scientific sense, but are rather referred to as climate variability, as opposed to climate change, which results

from actual drivers. The response to these drivers may be rapid—such as sudden cooling caused by volcanic ash dispersing in the air and reflecting solar radiation, thus reducing incoming energy—or it may be gradual, such as the slow warming of ocean and sea waters.[3]

The IPCC also notes that climate, in its narrower sense, is typically defined as the average of weather, or more precisely as the statistical description of the mean and variability of relevant quantities over a time period ranging from months to thousands or millions of years. The most commonly used reference period is 30 years, as determined by the World Meteorological Organization, focusing on surface variables such as temperature, precipitation, wind, etc. In its broader sense, climate refers to the state of the entire climate system.[4]

Second Requirement: Components of Climate

Given the scale of climate change and its inevitable effects across various areas of life, adaptation must also occur on a wide scale. Our economies and societies must become more resilient to climate impacts. This will require substantial efforts, many of which must be coordinated by governments.

We may need to buildoads and bridges designed to withstand high temperatures and stronger storms. Coastal cities may need to develop flood protection systems for streets and underground transport facilities. Mountain regions may require measures to prevent landslides and flooding caused by glacial melt.[5]

First Branch: Solar Radiation

Solar radiation is the most important component of climate. It is the energy received from the sun, manifesting in several forms, including visible light, radio waves, infrared heat, X-rays, and ultraviolet rays. Solar radiation begins to affect weather and climate by heating the Earth's surface, which in turn heats the air above it. The temperature of the air determines its stability. Solar radiation also causes water to evaporate from the Earth's surface, influencing cloud formation and rainfall. The amount of solar radiation reaching different areas of the Earth varies based on geographic location, time of day, season, local weather, terrain, and natural features. Uneven heating of the Earth's surface leads to differences in air pressure, which in turn generates wind.[6]

Earth's climate depends on a delicate balance between incoming solar radiation and outgoing thermal radiation, as well as the composition of the Earth's atmosphere. Approximately 30% of solar energy is reflected back into space by clouds, atmospheric particles, ice, snow, sand, ocean surfaces, and even rooftops. The remaining 70% is absorbed by the Earth's surface, oceans, and atmosphere.[7]

Although variations in solar energy in the past have affected Earth's temperature, they are not sufficient to account for current climate change. Any increase in solar energy would heat the atmosphere, but primarily its lower layer. This warming results from changes in solar output or alterations in the Earth's reflectivity due to volcanic ash or gases.[8]

Solar radiation interacts with the Earth in various ways: some of it is scattered in the atmosphere and does not reach the surface, while other portions arrive as heat that supports life on Earth or penetrate clouds and reach the surface as usable energy, which is of interest to solar energy researchers.

Second Branch: The Southern Oscillation Phenomenon

This is a climatic cycle caused by changing sea surface temperatures in the Pacific Ocean. The warming phase is known as El Niño, while the cooling phase is La Niña. These phases influence global temperatures over short periods—ranging from months to a few years—but do not explain the ongoing warming observed today.[9]

The World Health Organization (WHO), on its official website, has confirmed that the El Niño phenomenon can cause a wide range of health issues, including disease outbreaks, malnutrition, heat stress, and respiratory illnesses.

Third Branch: Humidity

Humidity refers to the amount of water vapor in the air. It plays an important role in determining climate, though it is not the primary driver, as solar energy is the main force behind weather patterns on Earth. Regions situated at the same latitude may have vastly different climates, despite receiving similar amounts of solar radiation. This discrepancy is reflected in average temperature levels[10]

For example, Mount Everest and the Sahara Desert are located along the same latitude, yet their climates differ greatly. This is largely due to altitude differences. However, even areas with similar altitudes and latitudes may have differing climates due to humidity levels.[11]

Humidity moderates temperature fluctuations because water holds latent heat. At night in humid areas, water vapor condenses and releases this latent heat into the atmosphere, warming the air even in the absence of sunlight. During the day, solar rays heat the air, causing water to evaporate and absorb additional energy that would otherwise warm the Earth and atmosphere. As a result, temperature increases are moderated. For instance, humid

cities like Chicago—on the shore of Lake Michigan—experience minimal temperature differences between day and night, unlike dry cities like Phoenix, located in the arid desert.

Fourth Branch: Precipitation

Precipitation is part of the continuous exchange of water between the atmosphere and the Earth's surface. It is one of the three key processes in the planet's natural water cycle, alongside evaporation and condensation. Water evaporates from oceans, land, and freshwater sources and is carried upward by air currents, where it cools and condenses to form clouds. It then returns to Earth's surface as precipitation, which may take the form of rain, snow, hail, or even fog.[12]

Precipitation is a vital component of climate, as fluctuations in its quantity directly affect human life. Many daily activities, industries, and agricultural practices rely on water—of which precipitation is a primary source. Insufficient rainfall leads to dry soil, reduced stream flow, and water shortages. On the other hand, excessive rainfall or snowmelt can cause flooding, which may destroy habitats, agricultural crops, homes, and infrastructure.

Certain communities may even need to relocate entirely, as adapting to these climate effects could be extremely difficult. This is already the case in some island nations experiencing rising sea levels.

Third Requirement: Causes of Climate Change

Climate change refers to long-term transformations in temperatures and weather patterns. While these changes may occur naturally—due to variations in solar activity or major volcanic eruptions—since the 19th century, human activity has been the primary driver of climate change. This is mainly attributed to the burning of fossil fuels such as coal, oil, and gas.

With the evolution of humanity, climate has become not merely a natural phenomenon evolving over millions of years, but one increasingly shaped by human activity. Global warming, rising Earth temperatures, and increasing greenhouse gas emissions have all prompted scientists to investigate the underlying causes of climate change. These investigations have concluded that there are two c[13]ategories of contributing factors: natural and anthropogenic. These are explained as follows:

First Branch: Natural Causes

Earth has undergone natural climate changes long before the existence of humans. However, studies show that current global warming cannot be attributed to natural causes alone. Their effect is relatively minor and does not explain the rapid changes observed in recent decades. Human activities are therefore the main cause of climate change due to greenhouse gas emissions. Nonetheless, several natural factors also contribute to climate change.[14]

1. Variations in Earth's Orbit and Solar Radiation

Surface measurements indicate that the solar radiation reaching the Earth varies over time due to the following reasons:[15]

a. Changes in solar constant caused by astronomical factors, including solar activity and sunspots.

b. Variations in atmospheric transparency due to suspended particulate matter.

Among the strongest evidence for changes in solar radiation is the fluctuation in the number of sunspots, which has led to significant climatic shifts.

The geophysicist Milutin Milankovitch was the first to propose in 1920 the theory that changes in the Earth's climate are linked to variations in the solar radiation received by Earth.

2. Volcanic Activity

Volcanoes release certain greenhouse gases such as carbon dioxide, but in quantities fifty times less than those produced by human activities. Therefore, volcanoes are not the main cause of global warming. On the contrary, they may have a cooling effect on Earth's climate. Volcanic aerosols can reflect sunlight and contribute to atmospheric cooling, making the predominant impact of volcanic eruptions one of cooling rather than warming.[16]

Volcanoes affect the Earth's climate through the release of dust and gases into the atmosphere, which can block some incoming solar radiation and lead to lower temperatures. Some scientists believe that weak volcanic activity has contributed to the rise in global temperatures—contrary to popular belief that volcanic eruptions increase global warming.[17]

3. Dust Storms in Arid and Semi-Arid Regions

These occur in areas suffering from vegetation degradation, low rainfall, and limited agricultural activity.

4. Cosmic Rays

These result from the explosion of certain stars and strike the upper layers of Earth's atmosphere, generating radioactive carbon.

Second Branch: Anthropogenic Causes

Human activity is the primary driver behind the abrupt changes currently witnessed. This is due to the emission of greenhouse gases—particularly carbon dioxide and methane—into the atmosphere. While these gases are naturally occurring and essential for maintaining heat through the "greenhouse effect," their excessive and unregulated emissions have caused unnatural increases in temperature, disrupting the global climate system.

The concentration of these gases in the atmosphere has reached its highest level in the past 420,000 years. This increase is due to the proliferation of factories over the past 150 years and the sharp rise in energy consumption. These processes disturb the balance between the solar energy absorbed by the Earth and that which is reflected back into space, thus intensifying global warming.[18]

Developing countries believe that developed nations bear the primary responsibility for climate change, especially due to their substantial greenhouse gas emissions—particularly carbon dioxide—since the Industrial Revolution. Since 1750, carbon dioxide concentrations have increased by 31%, and they continue to rise by 0.3% annually. The consequences of climate change are more severe for developing countries, which already face high temperatures, increased humidity, and population pressure. These factors reduce productivity and contribute to the spread of diseases.

The United States is responsible for about 22% of global emissions, followed by China (20%), the European Union (14%), India, Russia, and Japan.[19]

Third Branch: Main Greenhouse Gases Contributing to Climate Change

Below are some of the most significant greenhouse gases contributing to global warming and climate change:

1. Water Vapor

Water vapor is the most abundant greenhouse gas. Its concentration increases with rising atmospheric temperatures, which enhances cloud formation and rainfall. It is therefore considered a direct consequence of global warming.

2. Carbon Dioxide (CO_2)

Carbon dioxide is released into the atmosphere through both natural processes (such as respiration and volcanic eruptions) and human activities (such as deforestation and the burning of fossil fuels). Human activity has increased atmospheric carbon dioxide concentrations by 47%, leading to long-term changes in the climate.[20]

Carbon dioxide emissions vary by economic sector and country. Developed and developing nations contribute differently to these emissions based on their energy use patterns.[21]

The Paris Agreement, adopted during the 21st session of the UN Climate Change Conference (COP21) held in France from 30 November to 12 December 2015, emphasized the need to reduce greenhouse gas emissions to keep global temperature increases below 2°C above pre-industrial levels. It also committed to providing $100 billion annually by 2020 to assist developing countries, with the possibility of increasing this figure.[22]

The Paris Agreement promotes a transition from fossil fuels (oil, coal, gas) to clean technologies to avert climate disasters. Scientists have warned that a 5°C increase in global temperatures could render the planet devoid of the oxygen necessary for life.

Oceans and forests can only absorb about half of total greenhouse gas emissions. French scientists have developed methods to store carbon in the Earth in a way that is environmentally safe—at double the atmospheric concentration. However, U.S. scientists caution that this storage may cause suffocation and gas imbalances if released.

Volcanic reefs and some marine organisms are also threatened by the rising absorption of carbon dioxide by oceans. Oceans currently absorb approximately 93% of the world's CO_2 and capture over 30% of annual CO_2 emissions. Much of the captured carbon is stored not just for decades or centuries—but for thousands of years.[23]

✓ Carbon dioxide remains the most critical greenhouse gas. The factors contributing to its increased concentration in the atmosphere include:[24]

✓ Emissions from fossil fuel use, in the following order of CO_2 output per unit of energy: coal, oil, natural gas.

- ✓ Aerosols emitted by industrial activities (especially cement production).
- ✓ Land use practices, including agricultural and livestock activities.

Deforestation, vegetation loss, and desertification

3. El Niño Phenomenon

El Niño is a natural climate phenomenon that appears approximately every 4 to 12 years. It causes severe climate disturbances globally, including heatwaves, droughts, floods, and hurricanes. The phenomenon is characterized by a sharp increase in surface water temperatures, especially during the summer and fall. This leads to the formation of warm ocean currents moving eastward toward the coasts of Peru and Ecuador, resulting in dramatic environmental and climatic changes across the globe.[25]

El Niño is defined as "the warming of the tropical eastern Pacific Ocean," which occurs on average every 3 to 7 years. During such events, sea surface temperatures in the Pacific Ocean may rise by 1 to 3 degrees or more for several months to two years. El Niño affects global weather patterns—some areas receive excessive rainfall, while others experience severe drought, disrupting normal climate conditions.[26]

El Niño's impact in East Africa varies. In some years, it has caused severe flooding—such as in 2006–2007, affecting over 3.4 million people—while in other years it resulted in droughts, such as in 2009–2010, when over 14 million people were affected. However, scientific analysis and historical comparisons show that human hardship and basic needs tend to be worse during years when El Niño is active.[27]

Second Topic: The Impact of Climate Change on African and International States

Climate change affects the health of the surrounding environment, as the frequency of natural disasters such as droughts and floods is likely to increase, threatening human safety and well-being directly and indirectly. Several international organizations have indicated that climate change poses potential health risks to humans, including the spread of infectious diseases through contaminated water or food. It may also impact individuals with chronic illnesses—such as heart disease or asthma—by exacerbating their conditions.

The effects of climate change extend from Mauritania to Sudan, passing through southern Algeria and Libya. The path and geographical distribution of these effects vary across landmasses in Africa and Asia. These conditions make the Arab region one of the hottest areas in the world with the highest levels of solar exposure. Humidity levels are significantly low, and years may pass with little to no rainfall—except in parts of the Levant, Iraq, Sudan, and the Mediterranean coast. When rain does fall, it often occurs as short-lived, sometimes destructive, downpours.

First Requirement: Climate Change and Food Security

Food security in sub-Saharan Africa is one of the greatest and most widespread challenges in the face of droughts, floods, and shifts in rainfall patterns. These changes are attributed to the increase in carbon dioxide emissions and the El Niño phenomenon. A scientific report commissioned by the World Bank, published on 19 June 2013, examined the risks facing the most vulnerable populations in this region and their sources of livelihood. The report paints a picture of what the consequences of climate change could look like due to rising temperatures and the resulting damage to agricultural production and water resources.[28]

The report, based on scientific analysis conducted by the Potsdam Institute for Climate Impact Research and climate analytics, uses advanced computer simulations to map out the specific risks that each region of the world might face. It describes the threats facing agriculture and livelihoods in sub-Saharan Africa. According to many studies, the availability of grazing land for livestock is expected to decline due to ecosystem changes in pasture areas—such as the transformation of savannas from grasslands into woodlands caused by rising carbon dioxide levels.[29]

According to a statement from the World Food Programme, around 14 million people in southern Africa faced food insecurity due to the drought caused by the El Niño climate phenomenon. In 2015, the countries most affected by low rainfall included Malawi, where 2.8 million people faced hunger, Madagascar with approximately 1.9 million affected individuals, and Zimbabwe, where crop yields in 2015 dropped by half compared to 2014 due to massive agricultural failures. In Zimbabwe, over a quarter of the population required food aid, prompting the European Union to urge President Robert Mugabe to declare a state of disaster so that donors and agencies could mobilize resources to meet urgent needs.

In Lesotho, the government declared a state of emergency in December 2015 due to drought, which deprived one-third of the population of adequate food. Food prices also rose sharply throughout southern Africa due to declining production and limited availability.[30]

In Sudan, the states of Darfur, Eastern Sudan, and Kordofan were among the hardest hit by below-average rainfall. Consequently, many crops were planted 4 to 8 weeks later than planned in most rain-fed agricultural areas. Only 65% of the intended agricultural area was cultivated because the crops did not have sufficient time or soil moisture to reach maturity. There are high risks of poor harvests in rain-fed zones. Reservoirs dried up, and the purchasing power of poor households in pastoral and agro-pastoral areas continued to decline. As livestock prices rose, the terms of trade and access to basic foodstuffs deteriorated, requiring external support. It is estimated that about 280,000 children in Sudan suffer from malnutrition.[31]

In Somalia, nearly one million people were unable to meet their food needs. Drought is not the sole cause of this situation, even though it had a clear partial effect due to the El Niño phenomenon. Many of those in need of assistance were internally displaced persons driven from their homes by years of conflict.

Second Requirement: Climate Change and Public Health

Heavy rainfall leads to the spread and intensification of waterborne diseases such as cholera and typhoid, as well as vector-borne diseases like malaria, which may affect millions. Among the impacts of El Niño and the increased concentration of carbon dioxide, there has been a documented rise in water- and vector-borne diseases in the region, according to the World Health Organization (WHO).

Cholera outbreaks were reported in Kenya, Uganda, Tanzania, and the Democratic Republic of the Congo. In Ethiopia, acute watery diarrhea was documented, and in southern and central Somalia, more than 10,000 cases were reported by July 2016. This marked a 140% increase compared to the number of cases in 2015, with children under the age of five accounting for 59% of those affected[32] .

According to the Joint Monitoring Programme of the WHO and UNICEF, 42% of the population in sub-Saharan Africa lacks access to improved water sources. Health outcomes related to water supply and sanitation remain a major concern in the context of climate change across many countries. Child and patient mortality rates due to diarrhea remain high in sub-Saharan Africa despite improvements in healthcare.

Climate change is expected to exacerbate water scarcity. Moreover, there is a link between infectious diseases and rainfall. The geographic distribution, intensity, and seasonality of epidemic meningitis in the African Sahel are associated with climatic and environmental factors, particularly drought. In recent years, the geographic scope of meningitis has expanded in West Africa—a development attributed to regional climate change.

Third Requirement: Climate Change and the Environmental Ecosystem

Numerous African lakes are experiencing a range of effects resulting from climate change, for which human activity is considered the primary cause. Africa's large lakes are especially sensitive to climate shifts. Rising temperatures lead to increased water loss through evaporation, and data also indicates declining rainfall levels in the basins of these lakes.

Measurements show that temperatures in tropical regions rose by 0.5°C in 1980 and by 0.3°C during the 1951–1980 period. In Lake Victoria, temperatures increased by 0.5°C at the beginning of the 1990s compared to levels recorded in 1960. In Lake Tanganyika, measurements over the past 100 years revealed an average temperature increase of 0.1°C per decade, which has affected the lake's ecological stability and caused it to lose approximately 20% of its biological productivity.[33]

Fourth Requirement: Climate Change on the International Level

Climate change has long preoccupied the international community, prompting numerous conferences and treaties. Despite the varying levels of success among these initiatives, climate change remains a critical and urgent issue—one that continues to burden global policymakers due to its escalating consequences.

In this regard, former UN Secretary-General Ban Ki-moon stated: "The threat posed by climate change to humanity is comparable to the threat of wars." He added, "Climate change can no longer be ignored, and environmental degradation on a global scale remains unchecked. We are exploiting natural resources in ways that cause significant harm."

First Branch: Climate Change in the Agenda of International Politics

The global nature of climate change has made it a top priority for the international community, prompting states and international organizations to incorporate it into the agenda of global political affairs. It has thus become a central concern, with strong emphasis on the need for cooperation among all nations and their participation in an effective international response to confront this phenomenon.

1. The Earth Summit – Rio de Janeiro, 1992

By the late 1980s, global concern had peaked over the potential for greenhouse gases—produced by human activities—to disturb the planet's energy balance and lead to a rapid rise in global temperatures and climate change. In response, the United Nations General Assembly called for a conference in Rio de Janeiro in 1992. The summit resulted in the adoption of the United Nations Framework Convention on Climate Change (UNFCCC), which aimed to stabilize greenhouse gas concentrations in the atmosphere at levels that would prevent dangerous anthropogenic interference with the climate system, allowing ecosystems to adapt naturally, securing food production, and enabling sustainable economic development.[34]

Following this, numerous climate-focused conferences were convened. In 1997, Kyoto, the capital of Japan, hosted the Kyoto Conference on Climate Change, which sought to reconcile differing views among the United States, Western Europe, and Japan regarding greenhouse gas reduction targets based on 1990 levels. The conference concluded with the Kyoto Protocol, under which signatory states committed to reducing emissions during the period from 2008 to 2012.[35]

2. The Copenhagen Conference, 2009

Held in the Danish capital from 7 to 18 December 2009, this conference brought together representatives from 199 countries to reach a new global agreement aimed at protecting the environment from the effects of climate change. The summit concluded with the Copenhagen Accord, which sought to combat global warming by limiting the rise in global temperatures to 2°C above pre-industrial levels. It also called for the creation of a financial fund to assist poor countries in addressing the impacts of climate change.[36]

Subsequent conferences aimed to establish a general framework that would include all parties responsible for greenhouse gas emissions. These included the Cancun Conference (Mexico, 2010), the Montreal Climate Change Conference (2010), the Durban Summit (South Africa, 2011), the Doha Summit (Qatar, 2012), and culminating in the Paris Summit, which was described by observers as a historic and unprecedented agreement.[37]

3. The Paris Climate Summit, 2015

As part of ongoing international efforts to address the climate crisis, a major summit was held in Paris from 30 November to 12 December 2015. This event marked the 21st session of the Conference of the Parties (COP21) to the UNFCCC and the 11th meeting of the parties to the Kyoto Protocol. More than 195 countries were represented at the conference, which was regarded as a historic turning point in global environmental policy.

The participating states ultimately reached a legally binding agreement, described by French Foreign Minister Laurent Fabius as "fair and legally binding."[38]

Conclusion:

Climate change has garnered increasing attention from humanity due to its growing and foreseeable repercussions, which intensify day after day as a result of various compounding factors. These factors together pose a significant threat to life on Earth. While some causes are natural—stemming from the Earth's dynamic processes that produce phenomena such as volcanic eruptions, which contribute to rising global temperatures by releasing smoke and harmful greenhouse gases—others are external, such as intense solar radiation and meteor strikes. However, the most prominent causes originate from human activity since the Industrial Revolution in the eighteenth century.

Climate change constitutes a security threat across the African continent, especially for countries in sub-Saharan Africa, due to the material, social, economic, and humanitarian losses it incurs—losses that exacerbate instability in the region. It has also led to other dangers, including water scarcity that threatens food security through drought and declining agricultural productivity. Moreover, these environmental challenges obstruct economic development and impact both food and public health systems throughout the African continent.

For these reasons, African leaders and representatives have called on developed nations to provide compensation for the damages the continent has suffered as a result of climate change. Environmental pressures and climate change have become drivers of conflict within Africa, many of which are linked to the region's rapid population growth. One-third of the continent's population lives in drought-prone areas that are highly vulnerable to the effects of drought. This has contributed to forced migration, displacement, cultural fragmentation, and the collapse of traditional communities and identities.

Climate change significantly impacts ecosystem services, such as access to clean water and fertile soil, particularly through rising temperatures and droughts in certain areas. Its consequences also include an increase in climate-related disasters, especially heavy rainfall and subsequent river flooding in tropical regions, as well as the spread of diseases.

The radical shifts in weather patterns in sub-Saharan Africa since 2014 have led to the destruction of crops, which in turn has reduced food security in several countries and forced them to rely on assistance from international

relief organizations. These outcomes are largely the result of increased concentrations of carbon dioxide (CO_2) and the intensification of the El Niño phenomenon. Indeed, 2015 marked a turning point, with observers and relief agencies sounding the alarm over the likely severe effects of El Niño in 2016. Food shortages were expected to peak in the sub-Saharan region.

Given that African nations are among the least responsible for global warming and least accountable for the rise in carbon dioxide emissions, they have demanded that major industrialized nations develop mechanisms to assist in preventing the environmental and climate-related risks posed by climate change—such as droughts and floods—resulting from increased CO_2 concentrations and the El Niño phenomenon.

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