



Original Article

Impacts of Climate Change on Food Security in Somalia: Challenges and Adaptation Strategies

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Climate change significantly threatens food security in Somalia, a nation heavily reliant on agriculture and pastoralism. The country faces challenges such as erratic rainfall, prolonged droughts, floods, and rising temperatures, which disrupt agricultural productivity and exacerbate food insecurity. This paper explores the impacts of climate change on Somalia's food security and identifies challenges and adaptation strategies. The objectives include understanding the linkage between climate change and food insecurity and proposing actionable solutions to enhance resilience among vulnerable populations. Using a review methodology, this study synthesizes secondary data from scholarly articles, reports, and organizational publications. Major findings highlight that climate change has led to reduced crop yields, livestock losses, degraded fisheries, and increased resource conflicts. Key adaptation strategies such as climate-smart agriculture, early warning systems, livelihood diversification, and international aid demonstrate the potential to address these challenges. Despite these strategies, political instability, insufficient infrastructure, and limited governance impede progress. Building resilience requires a multi-faceted approach that integrates sustainable practices, enhanced technology, and collaborative governance to safeguard food security in Somalia. This study concludes that climate change exacerbates Somalia's existing vulnerabilities, posing an existential threat to its food security. Addressing these challenges requires an integrated approach encompassing sustainable agricultural practices, enhanced governance, and strengthened international cooperation. By prioritizing these interventions, Somalia can build resilience and safeguard the livelihoods of its most vulnerable populations in the face of ongoing climate disruptions.

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INTRODUCTION

Somalia experiences four distinct seasons and two monsoon periods. The main rainy season is known as Gu and occurs between April to June. This is followed by Xagaa, a dry period between June to October and a second rain season (Deyr) between October to December. Finally, December to March is known as the Jilaal period, which is typically dry. In regards to temperature, the annual mean temperature is close to 30°C throughout the country (World Bank, 2021). Typically, Somalia's rainfall patterns are not very regular (Eklow, & Krampe 2019). The average rainfall is about 250 millimetres (mm) across the country, but this is unequally distributed, with the northeast and north of the country seeing between 50 to 150 mm of rain annually and the south accumulating between 400-700 mm (Eklow, & Krampe 2019; Federal Republic of Somalia, 2013). The region's climate is affected by several factors, including the El Niño Southern Oscillation (ENSO) which typically causes flooding and increased rainfall in El Niño years and droughts in La Niña years. The country is also subject to climatic variability as a result of the Inter-Tropical Convergence Zone (ITCZ) as well as the variable sea surface temperatures of the Indian Ocean (Anyah, & Emazzi, 2006). Climate change poses an existential threat to global food security, disproportionately impacting nations with fragile ecosystems and limited adaptive capacities. Somalia, located in the Horn of Africa, exemplifies the vulnerability of arid and semi-arid regions to climatic extremes. With over 60% of its population dependent on agriculture and pastoralism, Somalia's food systems are highly

sensitive to climate variability and change. Prolonged droughts, erratic rainfall patterns, rising temperatures, and extreme weather events disrupt agricultural productivity and exacerbate food insecurity (Ahmed, 2020; FAO, 2021). The situation is further compounded by socio-political challenges, including resource conflicts and insufficient governance, which hinder effective climate adaptation and disaster response (OCHA, 2022; UNDP, 2020).

Recent studies indicate that recurrent droughts, such as those of 2016-2017 and 2021, have decimated livestock, reduced crop yields, and displaced millions of people in Somalia (FEWS NET, 2022; ReliefWeb, 2022). Meanwhile, unpredictable rainfall patterns disrupt traditional agricultural cycles, making it difficult for smallholder farmers to plan and sustain their livelihoods (Ali, & Hassan, 2021; Funk, & Brown, 2009). Rising temperatures and land degradation further diminish agricultural output, while extreme weather events such as floods periodically destroy infrastructure, displace communities, and destabilize markets (Hassan, & Yusuf, 2019; UNEP, 2018).

Addressing these challenges requires a multi-faceted approach that incorporates both immediate relief measures and long-term adaptation strategies. This article examines the impacts of climate change on food security in Somalia, highlights the key challenges faced by the country, and proposes adaptation strategies to build resilience among vulnerable communities. By understanding the intersection of climate change and food security, policymakers, researchers, and practitioners can identify sustainable pathways to

mitigate these impacts and ensure a more secure future for Somalia (IPCC, 2021; WFP, 2021).

This article discusses the previous discussions, findings and information and aims to address the following objectives.

- Overview of the Impacts of Climate Change on Food Security in Somalia
- Explore the challenges and adaptation strategies for enhancing food security

REVIEW OF LITERATURE

Overview of the Impact of Climate Change on Food Security

Climate change significantly threatens food security by disrupting agricultural productivity, water resources, and socio-economic stability.

Changes in temperature and rainfall patterns reduce yields of staple crops like maize and rice while promoting pests, diseases, and soil degradation through droughts and flooding. Livestock, a key food and income source, suffers from inadequate pasture and water due to altered rainfall and rising temperatures. Beyond agriculture, water scarcity and extreme weather events damage critical infrastructure, causing food waste, price volatility, and reduced access to irrigation. Coastal regions face declining fish populations as changing sea temperatures disrupt marine ecosystems. These challenges are compounded by resource scarcity, which fuels conflicts and displacements. Addressing these multifaceted impacts requires climate-resilient farming, improved water management, and socio-economic interventions to safeguard food security.

Table 1: Impact of Climate Change on Food Security

Impact	Description	Sources
Reduced Crop Yields	Changes in temperature and rainfall patterns may reduce staple foods like millet, maize, and rice yields.	Pereira (2017)
Increase in Pest and Disease	Warmer temperatures can favour the proliferation of pests and diseases that can harm crops.	Kaushik et al. (2023)
Soil Degradation	Increased droughts and flooding can lead to soil erosion, affecting crop growth.	Lal (2018)
Loss of Livestock	Increased temperatures and altered rainfall patterns can lead to inadequate pasture and water, resulting in livestock deaths.	Habte et al. (2022)
Shift in Agricultural Zones	Traditional agricultural zones may shift due to altered temperature and rainfall patterns, affecting local farming practices.	Malhi et al. (2021)
Decline in Fish Catch	Changes in sea temperature and acidity might impact the marine ecosystem, affecting fish populations vital to Nigeria's food supply.	Oluowo (2017)
Food Price Volatility	Challenges in livestock farming due to heat and reduced water and pasture availability	Udeaja, & Isah (2024), Onyeneke et al. (2023)
Socioeconomic Impacts	Reduced agricultural productivity can increase poverty rates, decreasing the ability to purchase food.	Masipa (2017)
Water Scarcity	Increased evaporation rates and changing rainfall patterns lead to water shortages, affecting irrigation and drinking water supplies across Africa.	Leal Filho et al. (2022)
Infrastructure Damage	Extreme weather events damage infrastructure critical for food storage and distribution, leading to increased food waste in Africa	Yiadom et al. (2023)
Land use Changes	Expansion of agricultural land due to population growth and displacement from climate events leads to deforestation and loss of biodiversity in Africa.	Okeleye et al. (2023)

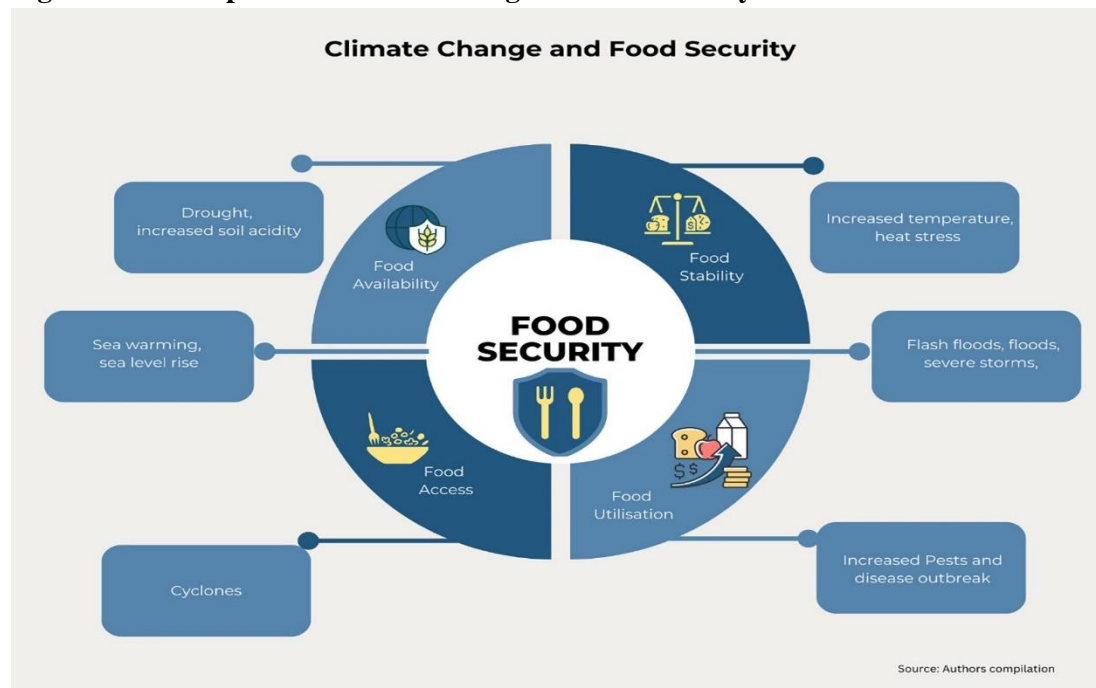
Impact	Description	Sources
Heat Stress	Rising temperatures result in heat stress for both crops and livestock, reducing productivity and quality across the continent.	Parkes et al. (2022)
Conflicts and Displacements	Climate-induced resource scarcity exacerbates conflicts, leading to displacement and further strain on food resources in Africa.	Adesete et al. (2022)
Economic instability	Fluctuations in agricultural productivity due to climate change affect income stability for farmers and food prices for consumers in Africa	Adesete et al. (2022)

The Impacts of Climate Change on Food Security in Africa

Climate change in Africa is an increasingly serious threat because Africa is among the most vulnerable to the effects of climate change. Climate change directly affects climatic and

weather conditions such as temperature, heat waves, precipitation, and wind speed, which have a knock-on effect on the quantity and quality of agricultural output and food security as shown in Figure 1 (Eitzinger et al., 2019; Molotoks et al., 2021).

Figure 1: The Impacts of Climate Change on Food Security in Africa



Source. (Onyeaka et al., 2024)

Country Overview

Somalia (officially, the Federal Republic of Somalia) is located in the eastern region of the Horn of Africa. It is an equatorial country with a warm desert climate in the north, transforming toward a semi-arid climate in the south. The country has the longest coastline of all African states (Eklow, & Krampe 2019), extending 2720km along the Gulf of Aden and the Indian

Ocean. The two main rivers flowing into Somalia, the Juba and the Shabelle, both enter from the South. Demographically the Somali population comprises 16 million people (UN, 2019). The population is growing at a rate of 2.89 per cent annually (11th in the world) (UN, 2019). The main economic sectors revolve around agriculture, with livestock farming accounting for 40 percent of GDP and over 50 percent of export earnings (CIA, 2021). Somalia is a country that has suffered

several shocks and continues to face increasing challenges. In 2020, the country saw ongoing conflict, locust swarms, prolonged and returning droughts, and flooding form some of the major challenges facing the population. These shocks are

exacerbated by the high levels of poverty prevalent across the country- where 69 percent of the population lives below the poverty line (OCHA, 2021).

Table 2: Historical Climate Change in Somalia

Aspect	Details	Source
Temperature	Somalia has experienced increases in mean annual temperature since 1991, already among the world's highest.	(Eklow, & Krampe, 2019)
	Lower Jubba Region has seen increasing average minimum and maximum temperatures.	(Ogallo et al., 2018)
	Projections show a warming trend of 0.3°C-0.7°C by 2035, varying by season and region.	(Ogallo et al., 2018)
	By the end of the century, temperatures may increase by 3.2°C to 4.3°C.	(Eklow, & Krampe, 2019)
Precipitation	Severe droughts occurred in 2007/2008, 2011/2012, 2015, and 2016.	(EM-DAT, 2021)
	From 1981 to 2015, the Lower Jubba region saw a decreasing rainfall trend in the Gu season (April-June) and an increasing trend in the Deyr season (September-November).	(Ogallo et al., 2018)
	Rainfall patterns demonstrate interannual variability and susceptibility to ENSO events, described as "low and erratic."	(Eklow, & Krampe, 2019), (NASA-IDS, 2015)
	Future rainfall increases will be less regular and more intense causing flooding and soil erosion.	(IPCC, 2014)
	Precipitation is projected to increase by 3% by 2050 relative to 1981-2000 averages.	(Federal Republic of Somalia, 2013)

Climate Vulnerability

Despite contributing to just 0.08 percent of global emissions, Somalia is ranked among the most climate-vulnerable countries in the world (LSE, 2021). It occupies a spot in the top ten percent of most vulnerable countries (Ministry of Foreign Affairs, 2018). Somalia ranks 179th on the ND-Gain Index, scoring 27.7 (low) and behind only Chad. In terms of vulnerability, Somalia scores last (181st with 0.675) (ND-GAIN, 2021). The country faces several climatic risks, including but not limited to prolonged droughts and flash floods, erratic rainfall, rising temperatures, cyclones, sandstorms and dust storms. The climate risks that Somalia faces are cascading and add to the overall vulnerability of the country. One example of the compounding of these risks is seen in 2019 when the delayed onset of regional rains left Somalia in drought. The prolonged drought period was followed by intense rainfall which consequently

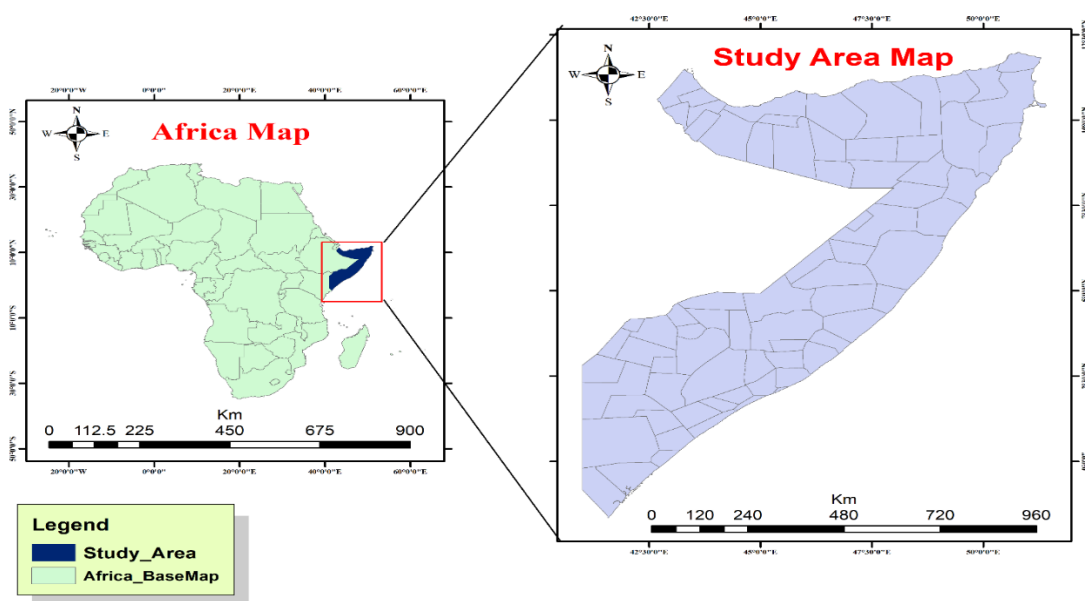
led to flooding and displacement of over 370,000 people. Infrastructure such as roads were destroyed and water sources contaminated (Soderberg et al., 2020). To add to this, Somalia is experiencing and is predicted to continue experiencing temperature increases, which add to the risks by creating the conditions necessary for unprecedented numbers of locust swarms. Somalia declared a national emergency in February 2020 when desert locusts caused catastrophic damage to crops and livelihoods (Soderberg et al., 2020). Outlined in more detail below, it is important to flag that climate vulnerability is inextricably linked to and driving overall vulnerability in the country through increased conflict over resource degradation, eroded livelihoods, and increased poverty and displacement (UNDP, 2021).

METHODOLOGY

This paper is based on secondary data. To fulfil the objectives of this paper, a variety of published and unpublished research articles, papers, books and the latest reports by some international organizations such as FAO etc., on the impacts of climate change on food security in Somalia were collected from different databases, Google Scholar, and Google. The searches included a combination of keywords and phrases such as “Impacts of climate on food security,” “Adaptation strategies,” “Climate change,” “Strategies for sustainable food systems,” “Challenges and adaptation strategies,” “Food security,” “Food security in Somalia,” “Impacts of

climate change on agriculture,” and “Impact of drought on crop production.” The review was conducted from January 2024 to December 2024 and included relevant sources published between 2000 and 2024. A total of 113 published and unpublished papers were gathered from all of the searches. To review the work, only 41 published and unpublished papers were taken into consideration. Based on the review topic's suitability, recentness, and relevance, as well as the data type, specific research was either included or excluded. The review compiled and presented evidence and information using figures and tables obtained from reliable sources and calculated by the authors themselves.

Figure 2: Map of Africa and Somalia Showing the Study Area. The Map is Prepared by ArcGIS 10.8 Software.



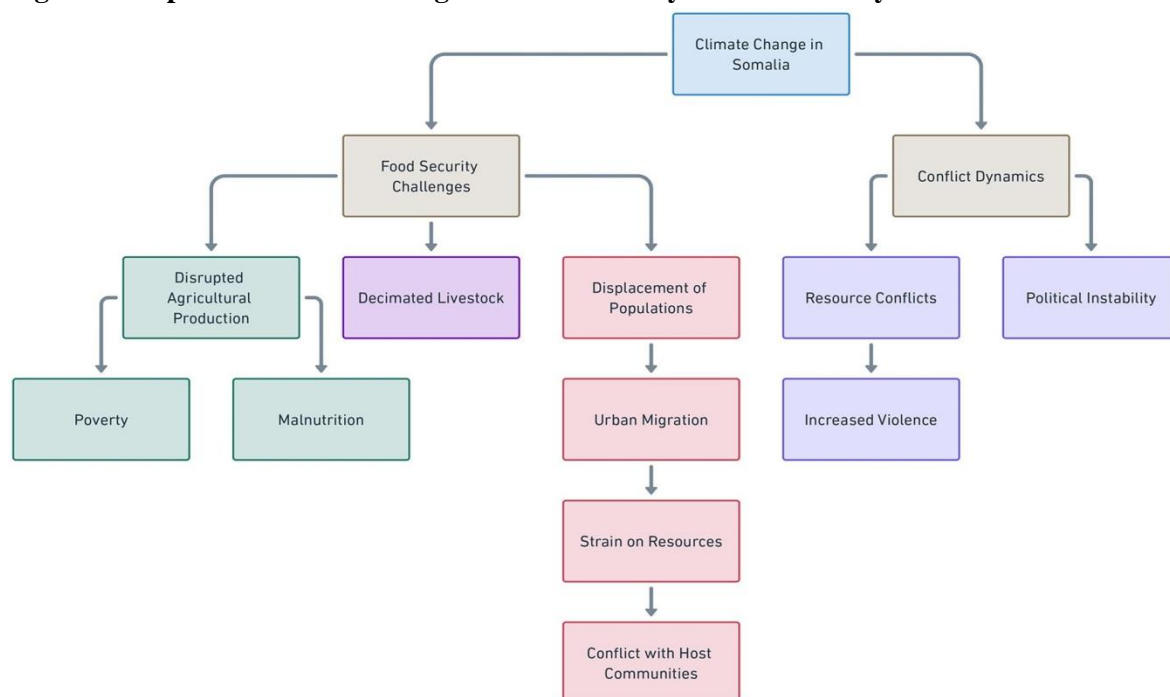
REVIEW OF MAJOR FINDINGS, DISCUSSION AND REPORTS

Impacts of Climate Change on Food Security in Somalia

Impact on Food Security and Conflict Dynamics

Somalia's food insecurity is closely related to its reduced agricultural output (Figure 3). This is worsened by the nation's ongoing crises, including

prolonged conflict, large-scale displacement of people, and unpredictable climate events (Said, & Bashir, 2023). Vulnerable populations, particularly women, children, and displaced individuals, experience the most significant impacts of these overlapping crises. They face increased malnutrition and limited access to essential resources to sustain their lives (Kim *et al.*, 2023).

Figure 3: Impact of Climate Change on Food Security and Conflict Dynamics

Source: Ahmed *et al.* (2024)

The increasing lack of essential resources, especially water and fertile land, has led to the movement of people within countries and across borders as a means for communities affected by environmental pressure to cope with their changed way of life (Said, & Bashir, 2023, Abdullah, 2021). The arrival of displaced populations in new regions can place pressure on local resources, create conflicts with host communities, and overwhelm existing humanitarian support (Meyer, 2019). In Somalia, it is estimated that hundreds of thousands of people are currently on the move because of the impacts of drought and conflict, with many ending up in camps that are still filled with those displaced during previous floods and famines (Reliefweb.int (2023).

Intensifying competition over limited natural resources has also led to more conflicts, often along clan lines, worsening communal tensions, and escalating violence (Omer, 2019) As resource availability decreases, these conflicts are likely to occur more often and with greater intensity, leading to increased instability in the region (Ali, 2021). Research shows that an increase in the average temperature in Africa by two standard deviations leads to a 31% increase in the risk of

conflict, mainly due to climate-related shocks affecting livestock prices (Eberle et al., 2020). Natural resource conflicts have become a focal issue in Somalia, gaining prominence as the country faces challenges related to climate change.⁵³ Armed groups also exploit resource scarcity and conflict to their advantage, emphasizing the need to prioritize natural resource conflict resolution as an entry point for tackling conflict drivers and fostering sustainable peace. (Gumbi, 2015). Even amidst severe droughts, it is essential to prioritize sustainable peace-building efforts through environmental restoration. These may involve activities, such as safeguarding riverbanks and implementing water catchment schemes, which can promote collaborative actions in the country (Jama et al., 2020).

Impacts of Climate Change on Agricultural Productivity in Somalia

Climate change has profoundly affected Somalia's agricultural sector, threatening food security and livelihoods. Erratic weather patterns, prolonged droughts, and rising temperatures have disrupted traditional farming and herding practices. These changes exacerbate vulnerabilities in a region already prone to environmental and socio-

economic challenges. The table below highlights specific impacts on various aspects of agriculture.

Table 3: Impacts of Climate Change on Agricultural Production in Somalia

Agricultural Sector	Climate Impact	Consequence
Crop Production	Erratic rainfall, droughts	Reduced crop yields, and increased risk of famine (Warsame et al., 2021).
Livestock	Water scarcity, heat stress	Higher mortality rates, and lower productivity (Ahmed et al., 2024).
Grazing Land	Desertification	A decline in feed availability and economic stability of pastoral communities.

Changes in Rainfall Patterns

Recent trends indicate that Somalia has been facing more erratic and unpredictable rainfall patterns, leading to both severe droughts and floods. The drought of 2022 affected more than 6 million people, with crop production falling by nearly 80% in some areas (FAO, 2023). The shifting rainfall patterns are disrupting traditional agricultural cycles, particularly in southern Somalia, where crop production has become increasingly unreliable.

The Impact of Drought

Drought is a critical challenge for agriculture in Somalia, particularly for crop production. It adversely affects yields, exacerbates poverty, and contributes to food insecurity. Researchers emphasize the importance of adopting drought-resistant crops, water harvesting techniques, and resilience strategies to mitigate these effects. Table 5 provides a detailed overview of studies focusing on the impact of drought on crop production in Somalia, highlighting key findings and recommendations for adaptation.

Table 4: Impact of Drought on Crop Production in Somalia

Study Title	Key Findings	Sources
Hudur district, Bokool region of Somalia: Impact of Drought on Sorghum Production	Drought significantly reduces sorghum output in the Hudur district. Recommendations include drought-resistant crops.	Abukar (2023)
Climate Change and Crop Production Nexus in Somalia	Rainfall positively impacts crop production in the long run; temperature has adverse effects on productivity.	Warsame et al. (2021)
The Influence of Climate Change on Crop Production	Rainfall and temperature negatively influence crop production; recommends heat-resistant crops for adaptation.	Samatar (2024)
SPEI-Based Spatial and Temporal Evaluation of Drought	Identified regions in Somalia experiencing severe drought impacts on agriculture.	Musei et al. (2021)
Impact of Drought on Sorghum Production in Baki District	Crop failure was the highest-ranked drought impact; suggesting water harvesting and drought-tolerant crop varieties.	Ali et al. (2023)
Impact of Drought on Poverty in Somalia	Drought increases poverty, hunger, and crop failures in rural Somalia; emphasizes rural resilience strategies.	Pape, & Wollburg (2019)

Impact of Flooding on Farmland

Flooding has a significant impact on agricultural land in Somalia, disrupting farming activities and threatening food security. The effects include

reduced agricultural production due to soil erosion and water contamination, damage to farmlands leading to displacement of farmers, and recurring floods that destroy essential irrigation

infrastructure. Table 6 summarizes the major impacts of flooding on farmland in Somalia, drawing insights from various sources to highlight the severity of the problem and its implications for the agricultural sector.

Table 5: Impact of Flooding on Farmland in Somalia

Impact	Details	Sources
Reduced Agricultural Production	Flooding causes soil erosion, loss of productive topsoil, and contamination of water supplies, severely impacting agricultural yields.	(Mohamed, & Sheikh, 2023)
Damage to Farmlands and Livelihood Disruption	Over 8,000 hectares of land in the Jowhar and Balcad districts were flooded, displacing thousands of farmers and reducing farming activity.	(Duale, & Owour, 2016)
Food Insecurity and Crop Losses	Flooding exacerbates food insecurity by destroying crops, reducing livestock populations, and leading to famine in affected regions.	(Said, 2023)
Recurring Loss of Floods and Agricultural Resources	Seasonal floods, especially in the Juba and Shabelle basins, lead to the destruction of irrigation infrastructure and loss of water management systems.	(Houghton-Carr et al., 2011)

Soil Erosion

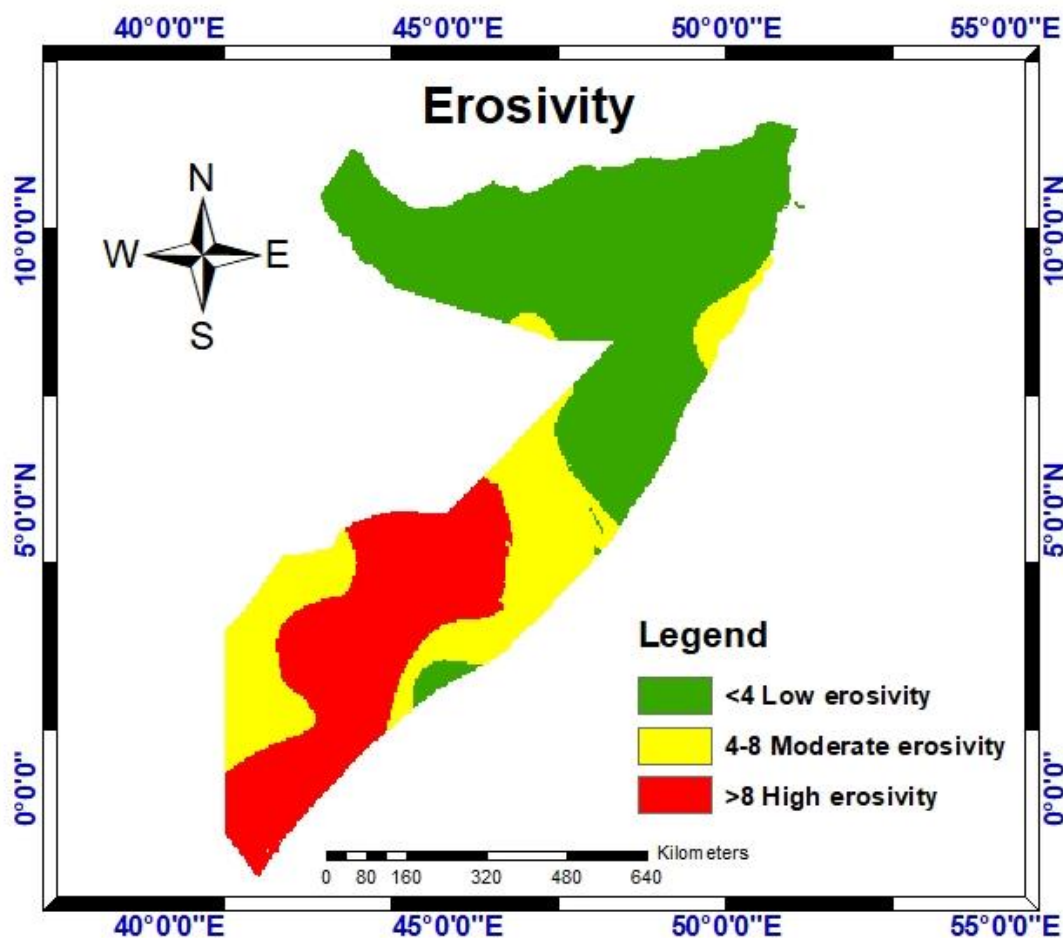
Soil erosion in Somalia, exacerbated by climate change, depletes fertile topsoil essential for agriculture, reducing crop yields and productivity. This threatens food security, leaving communities vulnerable to hunger and malnutrition, especially in already fragile ecosystems.

According to Nur et al. (2024), Spatial Assessment of Erosivity and Arid Conditions in Somalia Using the CORINE Model, integrating soil erodibility, erosivity, slope, and land cover data. Climatic indices like the Modified Fournier Index (MFI) and Bagnouls-Gaussen Index (BGI) were calculated The study found that 99.17% of the study area is at moderate erosion risk, with steep slopes increasing runoff. Low erosivity risk, covering 32.14% of the area, was mainly in the northern regions. Sparse vegetation and steep terrains were identified as key risk factors. These findings provide valuable insights for soil conservation efforts, particularly in arid environments (Nur et al., 2024).

Soil erosion and aridity are critical challenges affecting agricultural productivity in Somalia, particularly in the northwest region. Recent studies have employed geospatial tools to assess these issues comprehensively. Nur et al. (2024) utilized the CORINE model to evaluate aridity and erosivity indices in Northwest Somalia, focusing

on the Woqooyi Galbeed region. Their study integrated climatic data, including rainfall and temperature, to calculate the Modified Fournier Index and Bagnouls-Gaussen Aridity Index, providing insights into soil detachment and transport processes influenced by rain and runoff. In a related study, Nur et al. (2025) applied the Revised Universal Soil Loss Equation (RUSLE) model to estimate soil erosion in the Hirshabelle State. This research incorporated factors such as rainfall-runoff erosivity, soil erodibility, slope steepness, cover management, and support practices to map erosion-prone areas, offering valuable data for land management and conservation efforts. Additionally, Nur et al. (2024) conducted a spatial assessment of soil erosion and aridity in Somalia using the CORINE model. Their findings emphasized the importance of integrating geospatial techniques with environmental indices to identify regions at high risk of soil degradation, thereby aiding in the development of targeted mitigation strategies. Collectively, these studies underscore the effectiveness of employing geospatial assessment tools like the CORINE and RUSLE models to evaluate soil erosion and aridity in Somalia. The insights derived from these assessments are crucial for informing policymakers and stakeholders in implementing targeted interventions to mitigate soil degradation and enhance food security in the region.

Figure 4: Soil Erosion Map of Somalia from 2011-2019



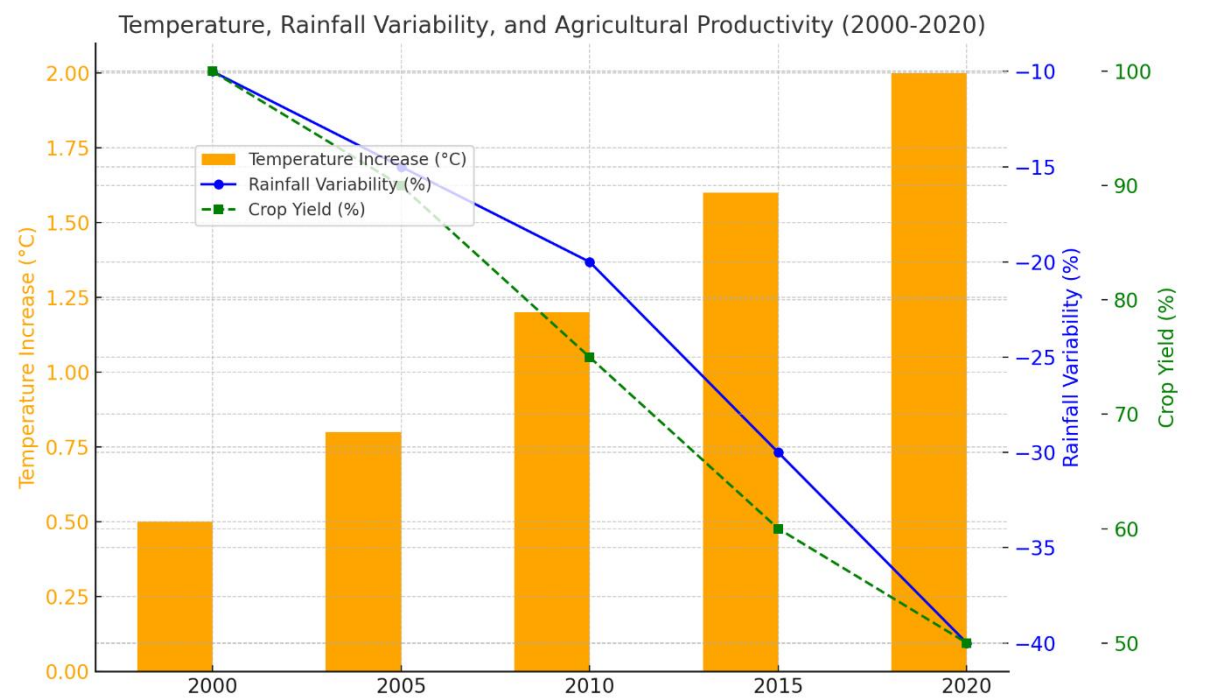
Source : (*Nur et al., 2024*)

Land Degradation

Land degradation in Somalia, driven by deforestation, overgrazing, and climate change, results in reduced soil fertility and water retention capacity. This hampers agricultural productivity, exacerbating food insecurity and increasing vulnerability to droughts and desertification.

Climate-induced factors, such as temperature increases and water scarcity, contribute to soil erosion and the degradation of arable land. This loss of fertile soil directly reduces the country's agricultural capacity, further aggravating food insecurity (Samatar, 2024).

Figure 5: Temperature, Rainfall Variability, and Agricultural Productivity in Somalia (2000-2020)



Source. Said (2023) and Samater (2024)

Impact on Livestock Production

Livestock production, which is crucial to Somalia’s food system, has been severely affected by both drought and flooding. The 2021-2022 droughts resulted in a loss of over 350,000

livestock, which directly affected the livelihoods of pastoralists and their food security (ACLED, 2023). Livestock mortality rates due to dehydration and lack of forage have been particularly high in rural areas.

Table 7: Loss of Livestock due to Drought in Somalia (2021-2022)

Year	Region Affected	Livestock Loss (Head)	Affected Pastoralists
2021	Southern Somalia	250,000	1.2 million
2022	Central Somalia	100,000	500,000

Source : Isak (2022), Yi & Y (2022), FSNAU (2021) and Abdullahi et al. (2022)

Impact on Fisheries

The fisheries sector in Somalia, particularly in coastal regions, has also been impacted by climate change. Rising sea temperatures and ocean

acidification are reducing fish stocks, impacting both food security and the economy. In 2022, fish catches decreased by 25% compared to previous years, putting pressure on coastal communities that rely on fishing as a primary livelihood.

Table 8: Decrease in Fish Catches in Somalia’s Coastal Regions (2021-2022)

Year	Region Affected	Fish Catch Decrease (%)	Impacted Fishermen
2021	Southern Coast	20%	45,000
2022	Northern Coast	25%	55,000

Source: Wehliye, & Glaser (2021)

Challenges and Adaptation Strategies for Enhancing Food Security

Scarcity of Reliable Irrigation Facilities in Rural Somalia

Somalia's agricultural sector remains underdeveloped due to limited access to modern infrastructure and technologies. Approximately more than half of the rural population has no access to irrigation systems while only a few of the rural population have access to irrigation systems, which limits their ability to cope with droughts. Climate-resilient technologies are scarce, and many farmers rely on traditional farming techniques that are ill-suited to the changing climate.

Political Instability and Conflict

Political instability continues to be a significant barrier to addressing climate change in Somalia. The ongoing conflict has prevented effective governance and implementation of climate adaptation policies, particularly in rural areas. Many studies highlighted that more than 40% of

the Somali population is unable to access climate-related support due to insecurity.

Insufficient Government Capacity

The Somali government lacks the technical expertise and resources to implement large-scale climate adaptation strategies. Although some efforts have been made, such as the creation of a National Adaptation Plan, implementation remains slow. The government has also faced challenges in coordinating aid and ensuring its reach to the most vulnerable communities.

Climate-Smart Agriculture

Adopting climate-smart agricultural practices is essential to building resilience. In Somalia, CSA practices such as drought-tolerant crops, water-efficient irrigation techniques, and soil management have shown promising results. The FAO (2023) reports that CSA has increased productivity by 20% in drought-prone areas.

Table 9: Climate-Smart Agriculture Practices in Somalia

Practice	Description	Impact on Crop Yield (%)
Drought-resistant crops	Crops such as millet and sorghum require minimal water.	+30%
Drip irrigation	A water-efficient irrigation system that reduces water use.	+20%
Soil conservation	Techniques to prevent soil erosion and retain moisture.	+25%

Source: FAO (2023)

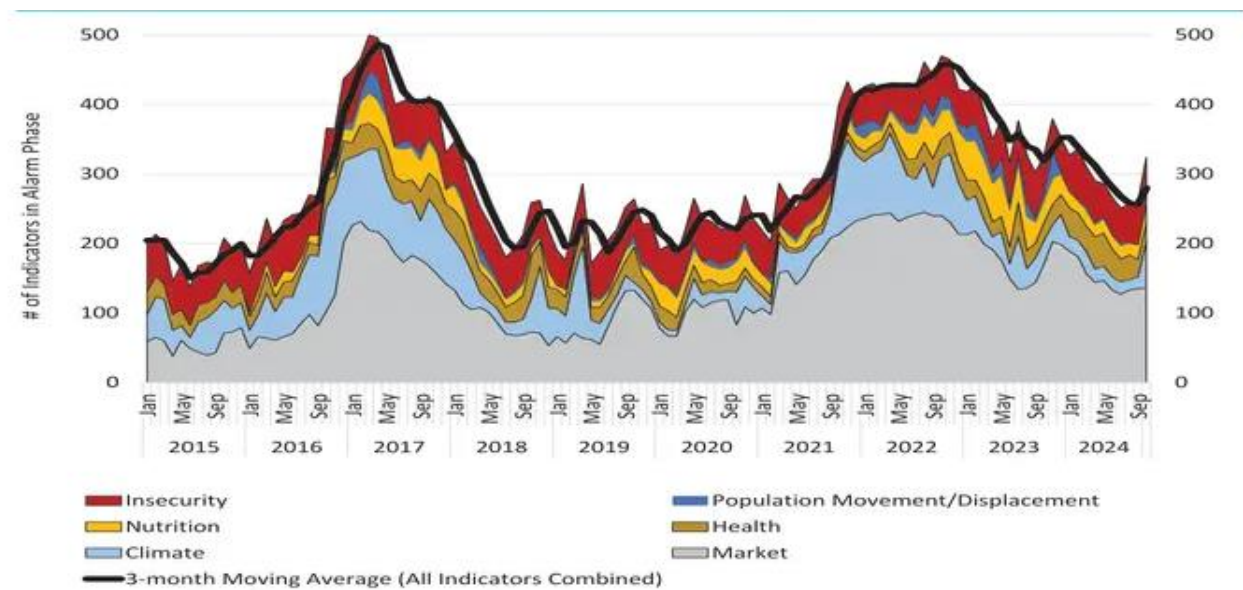
Early Warning Systems

Implementing early warning systems (EWS) is crucial for mitigating the impacts of climate change. The Somali Meteorological Department, in collaboration with international organizations, launched a national EWS in 2021. This system has improved the ability of farmers to prepare for droughts and floods, resulting in reduced losses and better food security outcomes (UNDRR, 2022).

The FSNAU Early Warning-Early Action highlights trends in risk factors impacting Somalia between 2015 and 2024, including climate,

insecurity, health, nutrition, displacement, and markets. Climatic risks (e.g., droughts and floods) dominate, with peaks during 2016–2017 and 2022–2023 linked to severe droughts. These shocks exacerbate displacement, malnutrition, and health issues, particularly in vulnerable populations. The combined risk factors consistently remain high, underscoring the compounding effects of climate change and insecurity on livelihoods. This emphasizes the urgent need for climate-resilient agriculture, conflict resolution, and strengthened early warning systems.

Figure 6: Trends in the Number of Risk Factors in the Alarm Phase (Jan 2015 - Oct 2024)



Source: (FAO, 2024)

Livelihood Diversification

Encouraging diversification into non-climate-dependent livelihoods such as agro-processing, small businesses, and tourism is another adaptation strategy. Programs supporting

livelihood diversification have been crucial in reducing dependency on agriculture and livestock. The WFP (2023) reports that over 500,000 households in Somalia have benefited from livelihood diversification programs, improving their resilience to climate shocks.

Table 10: Livelihood Diversification Programs in Somalia (2021-2023)

Program	Number of Beneficiaries	Key Activities
Agro-processing for rural women	250,000	Training in food processing
Small business grants for youth	150,000	Startup funding and training
Coastal tourism for coastal families	100,000	Eco-tourism training and initiatives

Source: WFP (2023)

International Aid and Cooperation

International organizations like the FAO, WFP, and World Bank play a critical role in supporting Somalia’s climate adaptation efforts. These agencies provide both financial resources and technical support for implementing climate-resilient agricultural practices and disaster risk reduction measures. In 2023 The FAO 2023 helped establish 50 climate-resilient agricultural projects in southern Somalia, benefiting over 1 million people.

CONCLUSION

Climate change has significantly impacted food security in Somalia by reducing agricultural productivity and exacerbating resource scarcity, leading to displacement and conflicts. Erratic weather patterns, such as prolonged droughts and unpredictable rainfall, have disrupted farming and herding practices, worsening hunger and poverty. Soil erosion and land degradation further reduce agricultural yields, while drought and flooding heavily affect livestock and fisheries, undermining rural livelihoods. These challenges are compounded by competition over limited

resources, escalating communal tensions and violence. Addressing these impacts requires sustainable practices, such as drought-resistant crops and environmental restoration, alongside conflict resolution strategies. Strengthening resilience is critical to ensuring Somalia's food security amidst climate change pressures.

Addressing food security challenges in Somalia requires overcoming political instability, limited government capacity, and inadequate infrastructure. Effective strategies include adopting climate-smart agriculture, such as drought-tolerant crops and drip irrigation, which have increased productivity by up to 30%. Early warning systems have reduced climate-related losses, while livelihood diversification into agro-processing and small businesses has improved community resilience. International aid remains pivotal, supporting climate-resilient projects benefiting over one million people. These combined efforts are essential for enhancing food security and building long-term resilience in Somalia's vulnerable regions.

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