

## The climatic changes and their effects on the food security in the African Horn



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### **Abstract:**

*The climatic changes make an important issue that threatens the international society due to the big risks and long and short-term implications, which negatively affect the human life and the basic rights such as health, food, and security. Therefore, the international society made institutional measures and mechanisms to reduce the emissions of the warm gases, improve the adaptation with the present and future climatic changes, and build the abilities of the developing countries. In this context, the African continent seems to be the most subject to the climatic changes as its climate knows a high increase in temperatures and fluctuations in the rainfalls that lead sometimes to floods or drought; the latter represents a real menace to many countries, namely those of the African Horn, which suffer food insecurity.*

**Keywords:** climatic changes; African Horn; food security; temperatures; fluctuations.

### **Résumé :**

*Les changements climatiques constituent un problème important qui menace la société internationale en raison des risques importants et des implications à long et à court terme, qui affectent négativement la vie humaine et les droits fondamentaux tels que la santé, l'alimentation et la sécurité. C'est pourquoi la société internationale a pris des mesures et des mécanismes institutionnels pour réduire les émissions de gaz chauds, améliorer l'adaptation aux changements climatiques présents et futurs et renforcer les capacités des pays en développement. Dans ce contexte, le continent africain semble être le plus soumis aux changements climatiques puisque son climat connaît une forte augmentation des températures et des fluctuations des précipitations qui conduisent parfois à des inondations ou à des sécheresses ; cette dernière représente une réelle menace pour de nombreux pays, notamment ceux de la Corne de l'Afrique, qui souffrent d'insécurité alimentaire.*

**Mots-clés :** changements climatiques, Corne africaine, la sécurité alimentaire, températures, fluctuations.

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## **Introduction :**

Earth had known climatic changes during hundreds of years and interacted with them in a way that guarantees the continuity of life. Nevertheless, the increase of the effects of the anthropic activities and their implications that include the gaseous emissions brought about big changes at the level of the atmosphere. In addition, they added to the concentration of the warm gases, mainly CO<sub>2</sub>, leading to a big change in the climate of the Earth. Moreover, they increased Earth temperatures, caused global warming which represents one of the big threats to the current environment, and had devastating effects on the different economic activities and the growth opportunities mainly in the developing countries.

## **Problematic of the study:**

The problematic of the study can be raised as follows: “To what extent do the climatic changes affect the food security in the African Horn?”

## **Study hypothesis:**

In response to this question, two hypotheses are put forward, namely;

- Loss of terrestrial and inland water ecosystems, and livelihoods led to Food insecurity and breakdown of food systems.
- The implementation of an adequate agrarian policy may constitute a sustainable mechanism to fight the climatic changes.

The study aims through Analytical Methods at knowing the reality and size of the climatic changes and the reasons behind classifying them among the big environmental issues in the 21<sup>st</sup> century. Moreover, the study sheds light on the responsibility of the countries of the African Horn in this issue and on its present and future effects on the sectors of growth. To answer the problematic, we adopted the following outline:

- The climatic changes: an epistemological approach.
- The reality of the climatic changes in the African Horn.
- The reflections of the climatic changes on the food security in Africa horn.
- The regional efforts to alleviate the effects of the climatic changes.

## **1. The climatic changes: an epistemological approach:**

### **A. the concept of the climatic changes:**

**Climate:** It is defined as the average state of the weather and its variation in a given period of time and a given geographic region. It differs from a season to another, from a year to another, from a decade to another, and from an age to another such as the Ice Age. Besides, it can be defined as the average type of weather of a specific region in a long period. It relies basically on the average temperature degrees and on the average rainfall. (Bothe, 2018)



**Weather:** The term is given to the meteorological state of a specific region in a relatively short period (unlike the climate that refers to the study of the weather for a long time). It refers to the fluctuating conditions of the atmosphere that surrounds the Earth and includes the temperature, the winds, the rainfall, the clouds, etc. (Bothe, 2018)

**The Climate system:** It designates all the processes of the atmosphere, the hydrosphere, the vital environment, the land environment, and their interactions. External mechanisms, mainly the Sun, affect these elements. Besides, the effect of the human is an external force. In this line, the atmosphere is one of the components of the climate system where the climatic changes take place.

#### **Climatic change:**

The UN framework Convention on the climate defined the climatic changes as any change in the climate directly or indirectly attributed to the anthropic activity that leads to a change in the universal atmosphere. The change can be noticed, all along with the natural climatic changes, in a similar period. (Khalid, 2021) This definition attributes the climate change to the human activities and distinguishes it from the natural climate change. In addition, this Convention confirms in its preamble that the climate change became a common worry for the whole world due to the negative effects it has. Besides, it's international nature requires cooperation between the countries to face the challenges.

Among the widely recognized scientific definitions of this issue, we find that of the intergovernmental group of experts on the climate which states that the climate change refers to those changes in the average state of the climate or to its characteristics that can be identified with statistical tests in long periods which may reach decades.

#### **B. securing the climatic change:**

Julia Grauvogel attempted to handle the issue of the climate change through three approaches: (Franziskus von Lucke, 2014)

- The climate change as a source for struggle inside or between the states through the change of the flow of the resources such as water, or the change in the regional safety of the country due to the increase of the sea level.
- The climate change as a daily threat to the human security, which threatens the humans due to the recurrent natural catastrophes.
- The climate change as a threat for the environment and the biological diversity.

The changes in the climate system such as in temperature and rain affect the environmental systems and the natural resources (such as the soil, the ecological systems, the forests, and the biological diversity) through a series of complex interactions. In this line, the environmental changes may have negative effects on the human needs and values and trigger human reactions that affect the social systems. Due to the structural weakness, social and economic worries increase due to the absence of the water and food security, the health



problems, the immigration, the economic deterioration, and the societies' corrosion. In this regard, the correlation of these factors may lead to social instability, which many manifests in turbulence and violence in the urban regions. Based on the cycle of the feedback, the societies may adapt with the situation and alleviate the climate exhaustion through a set of strategies and institutions that use technology, the necessary financial resources to regulate the economy, and the energy systems according to the environmental measures. (scheffran, 2014)

### **C. reasons behind the environmental changes:**

Scientists and experts of the climatic phenomenon gave many divisions to the factors that trigger the climatic changes. However, the most common is the division that attributes the phenomenon to natural causes from one side, and the anthropic causes from another side; which interacts and overlap.

- **natural causes**

**1. Solarspots:** solar radiations appear around the solar spots and produce huge radiation energy due to the increase of the temperature. Thus, a bigger amount of radiation reaches Earth with the increase of the solar spots. Therefore, the increase or decrease of the solar spots leads to a change in the Earth temperature with about one degree. (Benichou Fethi, 2023)

**2. The theory of the astronomic phenomena:** it supposes that the position of Earth to the Sun is changeable and that the solar radiation, as well, is changeable.

These astronomic phenomena are the changes in the engineering center of the Earth orbit (a turn each 96000 years) or the type of the eccentricity.

**3. The continental drift and the plate movement:**

Land makes up around 29% of the Earth while the rest is water in the oceans and seas. The land is divided on 05 attached and unattached continents; however, they were all attached in one block millions of years ago before separation due to many factors that led to the appearance of new landmarks such as the mountains. Besides, the separation of that block led to the appearance of continents, which have many effects on the maritime currents, the movement of the air blocks, the temperature, and the rainfall.

**4. Atmospheric factors:**

This refers to the exposure of the elements of the atmosphere and its phenomena to periodical and circumstantial changes which lead to changes in the universal climate.

- **anthropic factors and causes:**

Many geographers and climatologists see that the current climate leans towards change clearly due to the various anthropic activities and the human intervention in the nature of the environmental systems through felling trees, polluting the waters of the seas and oceans and the gaseous atmosphere, and making other interventions whose effects are



seen in the long-run and in the change of the types of the climate (Marcia McNutt, 2020). In this line, CO<sub>2</sub> and the water vapor play an important role in the global warming because they are the two main gases of the global warming. In addition, CO<sub>2</sub> is the main engine of the climate change while the water vapor is a reaction to the change in CO<sub>2</sub>. In this line, temperature would decrease less than 33°C from the current level if these gases were not found. The last UN statistics show the increase of the CO<sub>2</sub> of the human source in the atmosphere.

### **1. The industrial activities and the use of the fossil energy:**

The increase of the warm gases in the air is at the top of the problems resulting from the industrial activities and the use of the fossil energy. It is the main cause for the climatic changes and the increase of the Earth temperature. The existence of the warm gases in the air is a natural phenomenon because they contribute to warming Earth and play a key role in keeping the Earth temperature in its ordinary level. The last statistics of the program of the international control of the atmosphere by the international weather forecast organization in 2014 showed a record level of the warm gases, mainly CO<sub>2</sub> whose concentration reached 397 parts in million.

Burning the fossil fuel (in transportation, construction, air conditioning, etc.) is among the anthropic activities that increase the CO<sub>2</sub> releases which amount up to around 05 billion tons annually. In this context, the transportation activities cause 1/4 of the international CO<sub>2</sub> emissions internationally.

### **2. the reality of the climatic changes in the African Horn:**

#### **A. the effect of the climatic change on Africa:**

The African countries are among the most affected by this phenomenon worldwide because they do not contribute to it. Antonio Gutiérrez confirms that the contribution of Africa to the climatic change is little; however, it suffers some of its most devastating and sharpest effects. If the emissions are not immediately reduced, the climatic change will have dangerous repercussions that hinder the sustainable development and security in the whole Africa. Besides, a report by the intergovernmental organization concerned with the climatic change revealed in 2007 that Africa is one of the most continents subject to the climatic change as it deteriorates with time and its adaptability decreases (Dir). (Speranza, 2010)

The aspects of the climatic changes in Africa are clearly seen in:

- 90% of the ice covers of Kilimanjaro Mountain and 92% of the ice of Kenya Mountain melted. (Bronkhorst, 2021)
- There is drought in many rivers such as Chad River whose surface decreased with around 90%. Besides, the big waters in Niger and Senegal Lake decreased with 40% and 60%.



- The sea level increased due to the increase of the melted waters in the world oceans and due to the thermal expansion resulting from the increase of the temperatures. Since 1993, the average increase of the sea level had been reaching 03 mm annually.
- The average annual temperatures increased in Africa with about 0.5°C throughout the 20<sup>th</sup> century.

**B. the reality of the environmental changes in the countries of the African Horn:**

This region is subject of debates due to the troubles it witnesses such as wars, revolutions, and coups. The countries of this region have wide regional and international interest because of the geopolitical importance of the African Horn. This region is that Horn in the Eastern part of Africa, which includes Somalia, Djibouti, Ethiopia, Eritrea, Sudan, Kenya, and Uganda. It draws its strategic importance from the fact that its countries open to the Indian Ocean and manage the Southern entry of the Red Sea where there is the Strait of Bab el Mandeb. (Massoudi), 2004)

The region witnessed a big contradiction in the rainfall and clear changes in the temperatures that increased in the high regions compared to the low ones. For instance, the temperature increased with 2°C in Kenya and Uganda and the global warming decreased the agricultural production and the water supplies. With the temperature increase, there was a gradual melting of the mountains of Kenya and Uganda. (Bronkhorst, 2021) This increases the rates of the material and human losses in the African Horn due to the drought between 2010 and 2011 caused by the decrease of the rainfall in Somalia, Djibouti, North Kenya, and Ethiopia. In Kenya, the temperatures reached the highest level in 2012 for 13 years pushing the government to secure water for humans and animals. Besides, Djibouti witnessed a sharp decrease in water that made 1 out of 8 people in need in 2011. In return, it is expected that the rainfall shall increase in the East Africa.

**The drought:**

The African Horn is affected by droughts and floods mainly in the regions of South Ethiopia, South Somalia, and East Kenya. Besides, rains are the most important climatic factor for many countries of the African Horn. The yearly fluctuation in the rainfall has big effects on the national economies in the region which witnessed in the last millennium long periods of drought and, then, floods. This is one of the factors that led to food insecurity. In 2003, like its neighbours Somalia and Kenya, southern Ethiopia is enduring the Horn of Africa's worst drought in decades. Five consecutive rainy seasons have failed and the one underway is expected to as well, prompting warnings from aid agencies that more help is needed to head off a humanitarian crisis. The needs of Ethiopia to the food supplies reached around 1.34 million tons more than the half to meet the needs of North Africa. This can be explained with the drought that results from the human aggression against the nature through felling trees and natural plants, which leads to the decrease of the production, humidity in the air, and increase of the rainwater evaporation. Besides, overgrazing harms the vegetation that preserves the soil from desertification. (IFRC, 22 January 2008)



The main natural danger against the region is the drought as there are big arid and semi-arid parts. In addition, the rain level is low and unequal. Despite the previous cycles of floods and droughts, there are evidences that the climate moves towards more fluctuation and the climatic phenomena tougher.

**Land degradation and desertification:**

Land degradation is one of the environmental issues that endanger the region. Estimations show the loss and degradation of the arable lands and their inability to provide the goods and services. In addition, 65% of the lands in the African Horn show desertification aspects, which include the salinization of the soil and the corrosion of the soil due to droughts and winds. The land degradation is tightly linked to the forest's degradation. It is one of the most dangerous environmental issues that menace the region and decrease the productivity of the lands. (Supports, MARCH, 2020)

**C. the reflections of the climatic changes on the food security in Africa Horn:**

The population of the African Horn relies on the rain fed agriculture and pastoral life. Agriculture employs 80% of the population in Ethiopia, Eretria, and Sudan, 75% in Kenya, and 65% in Somalia. As for Uganda, around 63% of the land is used for agriculture which contributes with 39% to the GDP. In return, this sector faces many challenges including the natural disasters such as the floods and droughts which cause big damages to the agro-pastoral society. In this line, it is expected that 25 million cattle ranchers of the African Horn may be victimized. The region is among the most subject to food insecurity as more than 40% of the population of the whole region suffers malnutrition; the rate reaches 70% in Eretria and Somalia. (Thompson, 2010)

Drought, desertification, and climate change are among the environmental menaces that hugely affect the food security in the region due to many factors such as the clear variation in the climate of the region which varies between the tropical to the Saharan and affect the food chain. Moreover, most of the lands are arid and semi-arid and are sensitive to the environmental exhaustion such as the rain fed agriculture that relies on the rainfall, the overgrazing, and the non-sustainable styles that lead to the severe land degradation.

The UN Food and Agriculture Organization reported that food security in the region is getting worse due to the decrease of the rainfall rates which led 22 million including cattle ranchers, farmers, and urban people with limited incomes to rely on the food supplies. (Nearly 12 million people, a tenth of the population, are estimated to be food insecure in Ethiopia's drought-affected areas, according to the United Nations, which defines insecurity as a lack of regular access to the safe and nutritious food needed for growth, development and daily life.) (Endeshaw, 2023)

Estimations indicate that the climate change shall lead to an annual loss of about 2 to 4% in the GDP of the region in 2040. The effects of the climatic change on the region can be summed up in the following lines:



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- The climatic changes that include the drought and the accompanying results such as the devastation of plantations and natural prairies led to the exodus of more than one million people while some died of hunger and famine during the exodus.
- The drought in the region led to the death of 8.9 million heads after that the drought had devastated the natural watercourses and the prairies in the 03 countries.
- More than 16.3 million people of the region face difficult access to drinkable water due to drought.
- 986000.1 women in Ethiopia, Somalia, and Kenya suffer diseases from malnutrition due to the small supply of crops because of the climatic changes and drought.
- The region of the African Horn had faced more than 42 famines between 2000 and 2020, which affected more than 109 people due to the climatic changes and the big demographic increase. Therefore, the countries were not able to face drought and food crises. (IFRC, 22January2008).
- The rate of the population who live under the poverty line is 72% in Ethiopia and 66% in Somalia. Besides, the GDP per capita is low; asit does not exceed 369 USD in about half of the countries of the region.
- The loss of the main assets of the animal wealth in the African Horn represents a real threat to the economic security for the majority of the population. The decrease of the grazing resources and the prairies in Kenya lead to the deterioration of the health of the cattle. In this line, the UN bureau of the humanitarian affairs confirms that drought brought about the death of about 60% of the cattle in Ethiopia. Besides, the animalistic wealth decreased to 50% during the last 05 years in Djibouti. In addition, the lack of water in Somalia led to the losses of 40% of the animalistic wealth. (United Nations Environment Programme, Africa: Atlas of Our Changing Environment, 2018).
- The climatic changes generally affect the health level of the population. WHO report of 2000 revealed that the climate change led to the spread of Malaria from 03 regions in West of Kenya to 13. This would spread infection to Rwanda and Tanzania. Malaria is an infectious disease that threatens the public health in Africa, which knows a big spread of this disease that kills millions of people annually.
- The African Union had confirmed in the Peace and Security Council in March 2016 that there is a link between the climatic changes and the vulnerability of peace and security in East Africa. This link manifests in the destruction of the development and the economic losses in the field of investment in nature and the low funding. The environmental threat affects the national and international security, as it is a security problem. In addition, the Council confirmed that the effect of this phenomenon is among the potential motives of sectarian violence, mainly in the pastoral societies.



- The periodical food insecurity affects millions of people. Generally, there is a struggle over the resources between the agricultural and the pastoral societies. These struggles take place mainly in the arid and semi-arid regions. For instance, there are struggles in East Uganda in Karamoja that is in the borders with Kenya. Besides, there is violence in Darfour due to many causes that developed and reached the peak in the 1<sup>st</sup> half of the 1990s and changed from negative social phenomena such as armed aggression to struggles between the cattle ranchers and the farmers over the natural resources, and then to political struggles against the state leading to the formation of armed tribal militia. All this caused the decomposition of the social fabric and coexistence and created a regional and national crisis. Later, this resulted in the division of Sudan in 2011 and the establishment of South Sudan.
- Somalia has been affected by 30 years of conflict; it has a high level of deforestation and one of the highest populations of IDPs in the world. As of August 2022, there were an estimated 2.97 million IDPs; more than 630,000 Somalis were refugees, most of whom were hosted in Kenya and Ethiopia. The drivers of displacement are complex and interlinked, but are predominantly related to conflict and climate shocks such as drought and floods. (United Nations High, 2023)

#### **4. the regional efforts to alleviate the effects of the climatic changes:**

##### **A. the concept of the African strategy of the climate change:**

The reports by the intergovernmental organization concerned with the climate change confirmed that the climate change is real and that Africa is the most subject to the threats. Besides, it explained that it should cause climate and weather phenomena such as drought, floods, increase of the sea level, storms, landfalls, and socioeconomic losses. Therefore, it was necessary to set a special plan to face the climatic changes. The African strategy against the climate change is a basic pillar in the environmental policy of the African Union. This policy drives the African countries towards increasing the adaptability and flexibility with the climate change and towards adopting the green economy principles. Besides, the strategy relies on basic pillars and encourages research, education, awareness, counseling, and integrating the sides of the climatic change in the planning, budget, development, and the regional and national cooperation. These pillars can be promoted through the adoption of the principles of governance by the governments to limit the effects of the change of the climate, the societies, the ecosystems, and the environment in general. In addition, it can be promoted through the development of the legislations, the policies, and the institutional and administrative frames at the continental, regional, and national levels; in addition to the mutual accountancy among the African Union at the national, regional, and international levels.

The strategy aims, as well, at being an international frame to combat the climate change in the continent. It can be implemented through partnership and the increase of



cooperation in the various fields and institutions at the national, regional, and international levels. Furthermore, there are many measures followed by the African Union to implement the climate change strategy. The most important are the related institutions and programs that speak in one voice to handle the effects of the climate change at all the African levels and initiatives. Moreover, their institutions and programs aim to guarantee the implementation of the conventions and plans related to the climate by the member states of the African Union. These plans include the Climate Change Convention, KIOTO Protocol, the declarations of the African Union, the measures of mitigation, and the mechanisms such as the Plan of 2036 to face the environmental changes including the climate change. (Africaine, mai 2014)

**B. the role of the intergovernmental organization concerned with development:**

It is a regional international organization in East Africa that was established in 1996 to substitute the international governmental authority for development and desertification that had been established in 1986 due to drought and natural catastrophes that took place between 1974 and 1984 and caused wide range famine and environmental degradation. Its main mission was coordinating the efforts of the member states for food security, the protection of the environment, the preservation of the peace and security, the support of the human rights, and the establishment of economic complementarity. This organization includes Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan, and Uganda.

The environmental strategies and responses of the organization include: (United Nations High, 2023)

**First: the environment of the organization and the strategy of the natural resources:**

The main goal here is supporting the integration of the natural environmental issues and the natural resources in the developmental frames of the environmental and economic sustainable development in the region. This shall go with the institutional goals and strategy and the general goals of the organization, the agenda of the 21<sup>st</sup> century, the proceedings of the international summit of the sustainable development, the developmental goals of the millennium, and the environment expectations.

**The early alert initiatives:**

Some initiatives are implemented at the national and regional levels. However, their efficiency is generally limited in range and time and does not always allow handling the catastrophes and managing the risks in a coherent and comprehensive manner. In addition, the organization established many specialized institutions to handle some aspects of the early alert as follows:

**“Climate Prediction and Applications Centers”:**

It is a specialized institution of the intergovernmental organization concerned with development in charge of coordinating the efforts in the region to limit the risks of climate. Besides, it provides the climatic information, prediction, and early alert in the suitable time



to support the environmental administration, enable the region to deal with the various risks related to climate change, limit the natural catastrophes, manage the environment and the sustainable development, and improve the ability to predict the weather in the field of climatic risks administration through developing the anticipation styles.

### **Conclusion:**

The one who follows the environmental issues and the international efforts for the environment protection deduces the importance of environment in the international relations. The shift in the concept of security in the post-Cold War era gave the concept of environment and its menaces a big importance in the field of the international studies. Then, with the emergence of the concept of the human security, a strong base emerged for the environmental dimension with its other various dimensions such as the economic, political, health, food, and personal securities. Thus, linking the environment with the security fears is very important to guarantee the maximum security and safety.

To sum up, the region of the African Horn witnesses' environmental menaces against the human security with all its various dimensions. The failure of the regional organizations of the region in handling the aspects of drought and desertification through the systems of catastrophes' management and the political conflicts between the countries of the African Horn led to the stagnation of many environmental initiatives in the region.

### **Recommendations:**

- The countries must take advantage of the experience in alleviating the effects of the climate change including the participation to building abilities and the coordination of the international efforts in alleviating the effects of the climate change. Besides, it is necessary to show solidarity with the countries affected by climate change in Africa and provide the humanitarian aids to those affected by the human crises related to the climate change.
- Climate change will intensify the already adverse conditions of crop production in the drylands. Considering the socio-economic and political contexts of climate change in African Horn, a central argument is that adaptations to climate change need to be resilient, that is, to have the ability to deal with stresses and disturbances as a result of change, while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to learn and adapt to change.
- in African Horn is a region struggling with underdevelopment, and the high proportion of the population that is currently food insecure is undoubtedly linked. If in African Horn is ever to achieve a reality of development, it must break the cycle of poverty and malnutrition in which it is currently stuck. Climate change may be seen as another challenge in the way in African Horn reaching its potential, but it could also provide the impetus to push for the adaptation strategies that will not only mitigate further food



insecurity, but could also diminish that which has already set in. Climate change is an unavoidable future for Africa, but food insecurity need not be.

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