

Algerian Food Security Challenges In The Face Of Climate Change

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Abstract:

Algeria, like other countries around the world, faces significant challenges in food security. These challenges are exacerbated by accelerating climate change, which directly impacts agricultural production and water availability.

The Algerian government is working to implement climate change adaptation strategies to achieve food security. These strategies include developing sustainable agriculture, enhancing water resource management, encouraging the use of modern agricultural technologies, and working to diversify food sources.

Despite the significant challenges Algeria faces in achieving food security, there are opportunities to overcome them through investment in research and development, strengthening international cooperation, supporting farmers, and raising public awareness of the importance of food security

Keywords: climate change; food security; water resources; Algeria, national strategy; sustainable agriculture.

Jel Classification Codes: XN1, XN2.

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1. INTRODUCTION

Climate change and its impact on food security have become a central contemporary issue. It is one of the most complex topics in international relations, due to its connection to the security, political, economic, and social issues of countries.

Algeria, like other countries, has experienced significant impacts from climate change. As a Mediterranean country, it is vulnerable to environmental problems, such as rising temperatures and declining rainfall, leading to drought, desertification, and water scarcity.

These changes have directly impacted agriculture, leading to a decline in domestic production and threatening its food security. Algeria relies on imports to meet its food needs, leaving it vulnerable to dependency that threatens national sovereignty and security.

To overcome these challenges, Algeria has adopted urgent policies and strategies in the agricultural and water resources sectors to enhance its food security, achieve self-sufficiency, and eliminate economic dependency and reliance on domestic resources.

In this study, we will try to answer the following problem:

What are the national strategies for adapting to climate change and ways to enhance food security in Algeria?

2. Food Security and Climate Change: A Conceptual Study

2.1- Food Security

2.1.1 The Concept of Food Security

There are a number of definitions related to food security developed by various international bodies, organizations, and governments. Despite minor differences, they are largely similar in the basic content of the concept.

The term food security dates back to the early 1970s, when the world witnessed the development and spread of the global food crisis in 1972. We will review the most important definitions below. Food security was defined in the 1974 World Food Summit as:

“availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices” .(United Nations, 1974).

The 1996 World Food Summit adopted a still more complex definition:

“Food security, at the individual, household, national, regional and global levels [is achieved] when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life”. (FAO, 1996). In Algerian law, the Algerian legislator defined food security, according to Article 3, paragraph 1, of Law No. 08/16, which includes the Agricultural Directive, as follows: "Food security is the easy and regular access of every person to safe and sufficient food that allows them to enjoy an active life." (law 08-16, 2008,p6).

Based on the above definitions, we conclude that the comprehensive definition of food security is the access of individuals to a sufficient quantity of food at all times to meet their needs, ensuring its availability and stable prices at both the international and national levels.

2.1.2 Pillars of food security

Based on the above, food security has undergone transformations over time, due to its association with diverse concepts and issues. Accordingly, experts from the Food and Agriculture Organization of the United Nations have identified the following pillars as conditions for achieving food security:

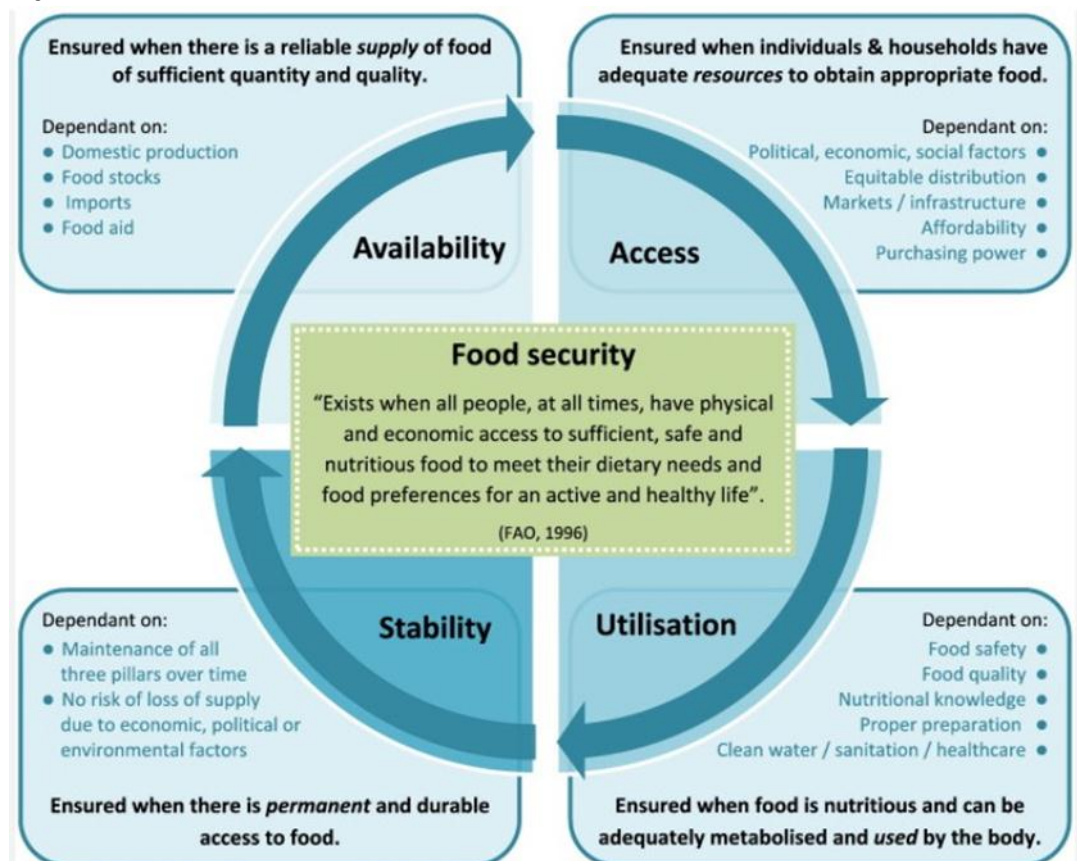


Figure 1: Pillars of food security

Source : <https://publichealthnotes.com/food-security-determinants-and-urbanization/>

2.1.3 Food Security Indicators: (H ,Allah, 2024 ,pp 217-218).

To determine a country's food security status, a set of specific indicators must be used to measure it, relying on available data. This helps determine the level and status of a country's food security and ensure its stability or sustainability. The most prominent indicators are as follows:

a. Food Gap Index:

This indicator reflects the extent to which food self-sufficiency is achieved at the local level. It is calculated by measuring the difference between local food production and consumption. The closer production is to consumption, the higher the degree of self-sufficiency and food security.

b. Food Self-Sufficiency Index:

Food self-sufficiency can be defined as a country's ability to produce enough food to meet the needs of its population in terms of quality and quantity, through optimal utilization of available natural and human resources. This level is usually measured by the Food Self-Sufficiency Index, which is calculated as a percentage representing the ratio of domestic food production to total domestic consumption. The higher the value of this index, the higher the degree of self-sufficiency.

c. Trade Balance Index:

This index measures the actual food security gap in absolute and relative terms. The trade balance is expressed as the difference between food imports and exports. If this difference is zero or positive, this indicates the absence of a food gap.

2.1.4 Food security is divided into two levels:

Absolute food security: This level is defined as a country's food production equal to or exceeding domestic demand. It is also known as self-sufficiency. This level is difficult to achieve and hinders trade between countries.

Relative food security: This level refers to a country's ability to fully or partially meet the basic food needs of its society and ensure regular access to a minimum level of food. (Abdullah Belqafuzia Ammar, 2021 ,p496).

2.2.Climate Change:**2.2.1 Official definitions issued by international institutions concerned with climate change:**

The United Nations Framework Convention on Climate Change defines the concept of climate change as:

that climate change is the change that can be 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”. (UNFCCC, 1992).

The Intergovernmental Panel on Climate Change (IPCC) defines “climate change” as “a change in the state of the climate that can be identified ... by changes in the mean and / or the variability of its properties, and that persists for an extended period, typically decades or longer”. (IPCC, 2022).

2.2.2 Causes of Climate Change:

There are several reasons for the development of climate change and the emergence of global warming. These causes are generally divided into natural causes, while natural causes of climate change include changes in solar activity, successive volcanic eruptions, and others.

Human causes: Human activity is the primary driver of this sudden change, as the emission of greenhouse gases into the atmosphere, particularly carbon dioxide and methane, leads to an abnormal rise in temperature. The excessive and uncontrolled emission of these gases alters the entire climate system. The concentration of these gases in the atmosphere has increased significantly as a result of the expansion of factories over the past century and a half, and the

significant increase in energy consumption by humans. (Mohamed Tayer, 2024 ,p29).

2.3. International agreements to combat climate change:

International efforts to combat global climate change have resulted in a number of important agreements and protocols. These changes have prompted many countries around the world to exert efforts and take a series of measures to contribute to confronting and mitigating the problem of climate change. The most prominent of these efforts are represented in the following points:

2.3.1 United Nations Framework Convention on Climate Change:

The United Nations Framework Convention on Climate Change (UNFCCC) is an international treaty adopted in 1992 and entered into force in 1994. It aims to combat climate change and mitigate its negative environmental impacts. This agreement has formed the basis for international cooperation on climate change. Member states meet annually to monitor and measure progress toward agreed targets and negotiate multilateral responses to climate change. The Conference of the Parties (COP) to the UNFCCC is held annually, where world leaders meet to negotiate and make decisions on climate change. Each conference aims to encourage countries to make further commitments to reduce emissions and provide financial and technical support to developing countries to help them adapt to the impacts of climate change. International cooperation within this agreement and its affiliated conferences has resulted in reduced greenhouse gas and carbon emissions, enhanced environmental sustainability, and increased the use of renewable energy as an alternative to fossil fuels and their derivatives.(Hadid,2024).

2.3 .2 The Kyoto Protocol 2005 :

This protocol was adopted in 1997 and entered into force in 2005. It had been signed by 192 countries as of July 2020. Algeria ratified it by presidential decree dated April 28, 2004, No. 04-144.

It became the first legally binding international climate agreement: it required developed countries to reduce greenhouse gas emissions by 5% below 1990 levels, and established a system for monitoring countries' progress in achieving this goal. However, the Kyoto Protocol did not require developing countries, including major recent carbon emitters such as China and India, to take any action to reduce these emissions. This led to the United States not ratifying the protocol, even though Washington had signed it in 1998 and later withdrew from it. (Qandil, 2022)

2.3.3 The Paris Agreement on Climate Change 2015;

This agreement is one of the most important international documents specifically designed to address the climate change crisis. It represents the beginning of the transition to a low-carbon world, as it primarily aims to significantly reduce global greenhouse gas emissions (GHGs), limit the global temperature increase to 2 degrees Celsius, and strive to limit the increase to 1.5 degrees Celsius.

Under the agreement, states parties are obligated to submit a national climate action plan, known

as a Nationally Determined Contribution (NDC), every five years, during which they provide data on the actions taken to reduce greenhouse gases. Although many countries have submitted their national pledges to reduce emissions and achieve carbon neutrality, this agreement has faced significant criticism, most notably the lack of binding mechanisms to ensure the implementation of these pledges. Furthermore, developed countries have not provided the financial contributions stipulated in the agreement to help developing countries address global climate change. (Bishina, 2024,pp 2098-2099).

3. The impact of climate change on food security in Algeria:

In recent years, Algeria has witnessed rising temperatures and declining rainfall. These climate changes have led to environmental problems such as drought, desertification, changes in soil quality, water scarcity, and the emergence of agricultural pests. Given that the agricultural sector is vulnerable to these changes, they threaten the ecological balance and directly impact the quantity and efficiency of agricultural products.

3.1. The Current Situation of Food Security in Algeria:

Food security in Algeria is a strategic challenge, influenced by several factors, including local food production, which depends on climatic conditions and agricultural technologies, as well as the ability to import food from abroad to meet the population's needs.

3.1.1 The Agricultural Sector:

The climate change crisis has worsened in Algeria and has become the greatest threat to food security. The agricultural sector has been affected by declining rainfall, deteriorating soil quality, and coastal erosion. Statistics reveal the seriousness of these developments, with more than 13 million hectares of land being eroded, and Algeria losing approximately 400,000 hectares annually due to this phenomenon. Since the 1970s, Algeria has suffered from recurrent drought, which has disrupted the agricultural calendar and reduced grain production by up to 50%. This crisis is set to become more pronounced in 2023 with the loss of massive amounts of rainfall, negatively impacting annual crops of wheat, barley, vegetables, and some other crops. Pests and plant diseases are also on the rise, and experts expect the situation to continue to deteriorate by 2040, with an expected decline in agricultural production of 10% to 20% compared to previous years. Desertification has also worsened, as a one-degree increase in temperature can shift barren areas 100 kilometers north. A World Bank report warns of the threat of desertification to more than 17 million hectares in the steppe regions of Algeria. Algeria is witnessing unprecedented climate changes, with floods representing 60% of natural disasters, causing damage to crops and livestock. (Mohamed Tayer, op.cit , p37).

3.1.2 Water Resources Sector:

Water resources are closely linked to climate change, as these changes disrupt natural rainfall cycles. This shift reduces the predictability of available water availability and impacts its quality.

The current situation in Algeria is characterized by an imbalance between demand and available resources, leading to conflict over the distribution of this resource and difficulty

controlling it. Water needs extend to all sectors. This shortage of water resources poses a threat to food security and sustainable development in the country.

The Ministry of Water Resources announced that Algeria is suffering from a water shortage due to the impact of climate change on rainfall cycles. The ministry attributed the crisis to a significant decline in water levels in dams in the central and western regions of the country, with reserves falling to 25% of dam capacity. In another statement, the ministry classified Algeria among the water-poor countries due to prolonged and recurring droughts and low rainfall. Both 2020 and 2021 witnessed a severe water deficit due to scant rainfall.(ibid,p 37).

4. The Algerian strategy for achieving food security:

Algeria considers achieving its food and water security a strategic challenge. Therefore, it has developed a comprehensive program to achieve self-sufficiency and develop the agricultural sector to cover the deficit and eliminate dependency. This program aims to achieve food sovereignty by mobilizing all sectors and providing all the conditions and mechanisms for its implementation, which will have positive results on the country's economic and social development indicators, particularly the sovereignty of the state's political and economic decision-making.

President Abdel madjid Tebboune pledged to achieve food security for the country as part of Commitment No. 18 out of 54, which constituted a comprehensive program for establishing a new Algeria. This program stipulated the development of an urgent plan to modernize agriculture to ensure food security and meet national needs (livestock and agricultural production, vegetables, fruits, and imported products such as sugar, oil, and corn).

The water resources sector was included in Commitment No. 30 of the President's program, which stipulated putting a definitive end to water outages and ensuring that all citizens have access to potable water across the country through efficient mobilization of water resources and improving and rationalizing the means of water distribution and consumption.

4.1 Commitment No 18 of the program of the President of the Republic of Algeria, Abdelmadjid Tebboune, to modernize agriculture: (The 54 Commitments of the Algerian Presidency)

- Rehabilitation and development of agricultural lands (possible partnerships) in the steppe, desert, and mountainous regions;
- Clearing the agricultural land file and recovering unused agricultural lands;
- Development of agriculture as a means of diversifying the national economy and reducing the imbalance in the trade balance of basic commodities;
- Urgent development of fish production through :Construction of maintenance workshops for the fishing fleet; Establishment of a deep-sea fishing fleet ;Transformation and processing of fishing resources and the promotion of small and medium-sized enterprises in this field.

4.1.1 The Algerian Strategy for Agricultural Sector Development:

This strategy aims to strengthen Algeria's agricultural sector, a fundamental pillar of

sustainable economic development. It seeks to increase productivity and ensure food security, in addition to creating new job opportunities and contributing to balanced rural development. This is achieved through an integrated set of measures and procedures covering various aspects of the agricultural sector.

To embody this commitment, the state has taken the following measures:

a. Supportive measures for farmers and investors: Providing them with financial support and facilitating loans to implement refrigeration and product storage projects, which helps increase production capacity and stabilize prices in the domestic market.

Raising the purchase prices of grains and dry legumes to support farmers.

Increasing the fertilizer subsidy rate to 50% of its reference price to mitigate the impact of rising global prices.

Connecting tens of thousands of agricultural investments to electricity.

These measures aim to support farmers and encourage young agricultural professionals to invest in this field to achieve self-sufficiency, particularly in strategic crops such as durum wheat, yellow corn, and barley.

b- Land reclamation and expansion of agricultural production: The state has developed a plan to reclaim one million hectares of agricultural land using irrigation technologies by 2027, with a focus on the south of the country. The plan also opens the door for national and foreign investors to contribute to achieving these goals within the framework of the provided facilities. The expansion of irrigated areas will be achieved by relying on water purification technology as part of the 2021-2030 National Water Security Strategy.

c- The importance of modernization and digitization in agriculture: Emphasizing the importance of modernization and digitization in developing the agricultural sector, and the use of modern technologies; and the move towards smart agriculture by relying on start-ups and youth competencies.

All of these measures were praised by the President in his speech during the fiftieth anniversary of the founding of the National Union of Algerian Farmers. (.radio algerie.2024).

4.2 National Water Strategy (Algeria 2021-2030):

This strategy aims to invest in, conserve, and rationalize water resources to address the challenges of climate change, which has affected Algeria's water reserves and caused a water deficit. The state has implemented a comprehensive national program to build seawater desalination plants, construct dams, and drill wells to enhance water security and exploit it in agriculture to increase production, as well as in industry to develop them with the goal of achieving food security.

4.2.1 The national strategy addresses water security through three main axes: (echaab, 2024)

a- Construction seawater desalination plants:

Thanks to the forward-looking vision of the President of the Republic, who, during the Council of Ministers meeting on July 25, 2021, ordered a major national program to build seawater desalination plants along the country's coastline.

The National Water Strategy 2021-2030 aims to meet the population's drinking water needs by desalinating seawater at a rate of up to 60 percent. This program has been divided into two phases.

✚ **The first phase, 2022-2024**, includes the construction of five major desalination plants with a capacity of 300,000 m³/day each, equivalent to a total of 1.5 million m³/day. These plants will be located in Oran, Algeria's West and East, and Bejaia and El Tarf. The Energy and Mines Sector is overseeing the construction of these plants, while the Irrigation Sector is overseeing the construction of systems to connect these plants to the drinking water transmission and distribution networks.

✚ **The second phase, 2025-2030**, includes the construction of seven more major stations in the provinces of Tlemcen, Mostaganem, Chlef, Jijel, Skikda, and two stations in the province of Tizi Ouzou. This program, in its two phases, aims to ensure national water security, as these stations will provide drinking water to the population of coastal provinces, in addition to the residents of cities located within a 150-km radius of these stations, where more than 70% of the country's total population resides.

These stations are expected to be operational by 2027.

b-Wastewater Treatment:

In implementation of the directives of the President of the Republic, who ordered the reuse of 60 percent of treated water annually in agriculture and industry, which represents the second axis of the national strategy based on the non-conventional water option, "reliance on treated wastewater in agriculture and industry," a program with 21 wastewater treatment operations has been implemented.

The first phase includes 21 operations to rehabilitate and modernize a number of wastewater treatment systems in various states, equipping them with the latest technologies that allow for unrestricted water reuse, in conjunction with the implementation of new wastewater treatment systems.

Using and exploiting traditional water resources, through the continued construction of dams, water barriers, and their related diversions, continuing the construction of wells intended to supplement the drinking water supply, and granting licenses to drill wells intended for agricultural irrigation, in addition to modernizing and developing wastewater drainage systems, thus providing a public wastewater service. (haimar, 2024).

c- Rationalization of consumption:

which is considered an important axis in water consumption, and rationalization is used as a new national policy.

5. CONCLUSION

In the context of adapting to climate change and its impact on food security and economic and social development indicators, relying on Algeria's national material and human resources, the President of the Republic has made achieving food and water security a strategic goal among the state's priorities. To achieve these strategies, the government seeks to implement the National

Agricultural Development Plan, which aims to exploit available resources to achieve self-sufficiency in consumer and strategic crops, meet national needs, increase the agricultural sector's contribution to exports, reduce imports, strengthen the agricultural sector with modern technologies and digital mechanisms, provide financial support to farmers, facilitate all procedures, and support them through financial institutions and departments.

Policies have also been developed to promote national and foreign agricultural investment in land reclamation in the southern states, with the aim of establishing specialized centers for strategic agriculture and expanding irrigated areas using modern water purification technology.

This is within the framework of the National Water Strategy (2021-2030), which also includes an integrated national program to build seawater desalination plants, construct dams, and drill wells to enhance water security and exploit it in the agricultural sector to increase production, as well as in the industrial sector to develop them with the aim of achieving food security..

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