المؤتمر الوطني حول:

ثقافة ريادة الأعمال لدى الشباب ومساهمتهما في تحقيق الأمن الغذائي

من الفكرة إلى المائدة: ريادة الأعمال كقوة فاعلة لاستدامة الأمن الغذائي

يوم 04 نوفمبر2025 بجامعة باتنة1.

محور المداخلة: المحور الثالث

ثقافة المقاولاتية في المجال الغذائي

عنوان المداخلة :

Algerian sustanaible food in the face of climate and natural challenges

The ecological agriculture as a solution

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Abstract:

This study highlights the negative effects of climate change in Algeria on agricultural production and thus sustainable food security. It relied on the descriptive and statistical curriculum, the most important of which was that agricultural policy aimed at achieving sustainable food security and food sovereignty is obliged to ensure stricter protection of natural resources and encourage their proliferation by including measurable ecological requirements in their pattern of exploitation. Agricultural guidance plans based on the natural qualifications of regions and states must identify measures to adapt agriculture and encourage agricultural practices capable of stimulating the resilience of agro-ecosystems. Diversification of activities, selection of adapted farming systems and selection of seed types most resistant to water stress can reduce the risks associated with climate change. Climate change adaptation strategies for more water economy in water

mobilization, flood control and drought must be presented. The issue of climate change must also be given a regional dimension.

Keywords:

Climate change ;Algeria; ; Natural terrain Sustainable food security; Eco-agriculture.

Jel classification: Q01

ملخص:

تسلط هذه الدراسة الضوء على اثار السلبية لتغير المناخ في الجزائرعلى الإنتاج الزراعي وبالتالي تحقيق الأمن الغذائي المستدام .اعتمدت على المنهج الوصفي و الاحصائي و كانت اهم نتائجها ان السياسة الزراعية الرامية إلى تحقيق الأمن الغذائي المستدام والسيادة الغذائية ملزمة بضمان حماية أكثر صرامة للموارد الطبيعية وتشجيع تكاثرها بإدراج متطلبات إيكولوجية قابلة للقياس في نمط استغلالها. يجب أن تحدد خطط التوجيه الزراعي القائمة على المؤهلات الطبيعية للمناطق والولايات تدابير لتكييف الزراعة وتشجيع الممارسات الزراعية القادرة على تحفيز مقاومة النظم الزراعية البيئية. يمكن أن يؤدي تنويع الأنشطة واختيار أنظمة الزراعة المكيفة واختيار أنواع البذور الأكثر مقاومة للإجهاد المائي إلى تقليل المخاطر المرتبطة بتغير المناخ كما يجب تقديم استراتيجيات التكيف مع تغير المناخ بشأن المزيد من الاقتصاد المائي في مجال تعبئة المياه ومكافحة الفيضانات والجفاف. ويجب أيضا إعطاء مسألة تغير المناخ بعدا إقليميا.

الكلمات المفتاحية:

تغير مناخ ;الجزائر;تضاريس طبيعية; امن الغذائي المستدام ; زراعة ايكولوجية.

Jel classification: Q01

Introduction:

The world today faces a major challenge in the face of climate change, which can affect various aspects of human life, despite efforts to reduce these impacts after accumulated scientific evidence indicating that the most significant causes of climate change are due to greenhouse gas emissions that contribute to the planet's warming. Reports from international bodies concerned with climate change indicate that most of the world's regions will see an increase in average temperature over the coming decades, noting that the last period, beginning in 2011, has seen an increase that the world has never seen before and has been the warmest. Algeria is among the Mediterranean countries, classified as warm areas with many environmental problems, making them more vulnerable to climate change, notably high temperature and low rainfall. North Africa will see rainfall declines of 20% to 25% by 2050 in addition to the possibility of more frequent and severe drought (World Bank, 2019). To address this situation and to mitigate the effects of climate change, the State has developed a cross-sectoral overarching strategy for climate adaptation and action to reduce greenhouse gas emissions by developing the National Climate Plan 2025-2020 and accelerating the implementation of the Paris Convention on Climate 2015. Noting that the energy sector is responsible for the largest share of greenhouse gas emissions by 74%, the agricultural sector is among the most vulnerable to the impact of climate change because it is completely dependent on weather and climate. climate change ", unlike other sectors that can adapt to climate change through the intervention of the human component. The impact of climate changes on agricultural crop resilience varies from one product to another. Seasonal warming may have a negative impact on a given product, while this impact is positive

on other crops. In addition, a manifestation of climate change is the likelihood of natural disasters such as hurricanes, floods and periods of drought that may be more frequent and have significant impacts on agricultural crops. In this context, the following question arises:

- How has climate change affected Algeria's agricultural production?

The subject of climate change is not confined to a particular region of the world or a country, but the degree of its impact varies relatively from one region to another. Algeria's geographical location has a perceptible risk of climate change. Another factor that supports climate change, in addition to its location, is the composition of its natural terrain.

1- Characteristics of Algeria's natural terrain and its relationship to climate:

Climatic agricultural conditions are difficult and Algeria's natural resources are rare and fragile and reinforce terrain-related coercion, where slopes are characteristic of Algerian agricultural spaces, climate coercion.

The unevenly distributed terrain situation affects the natural productive power and is clearly divided into Bio-climatic areas.

Two distinct major groups can be distinguished in principle: Hill's Islands of the North and Algeria of the South. The hill region is characterized by the Mediterranean climate, while the south is characterized by extreme heat and arid lands.

The North Island extends between the Mediterranean Sea and the Sahara through an average strip of 350km wide, consisting of two heterogeneous areas:

- The following region bordering the Mediterranean coast, with an average width of 100 km. The mountainous nature of this coastal hill region, the rise of the high plains and their isolation from the sea generally determine the nature of Algeria's climate, which is less suitable for agriculture than Tunisia and Morocco.

- The steppe area, from the south of the hill to the south of the desert atlas, has an average width of between 100 and 300 km.

The South Island is characterized by its 2 million-kilometer desert character, extending over 800 km from north to south, and across 1,600 km from east to west. Agricultural activities are spread across this vast desert area in some valleys and oases planted with palm orchards.

Within these major geographical divisions, small units are formed. In the islands of the north, two mountain chains can be observed: the hill atlas, the desert atlas stretching from the western to the eastern frontiers and the two cross-directions: west-south-west and east-north-east. Between these two chains, the plains of Algeria-El Wahrani and the Upper Plains of Constantinople extend from 800 to 400 m at the low brood, reaching 1100 m at the Algerian-Moroccan border level.

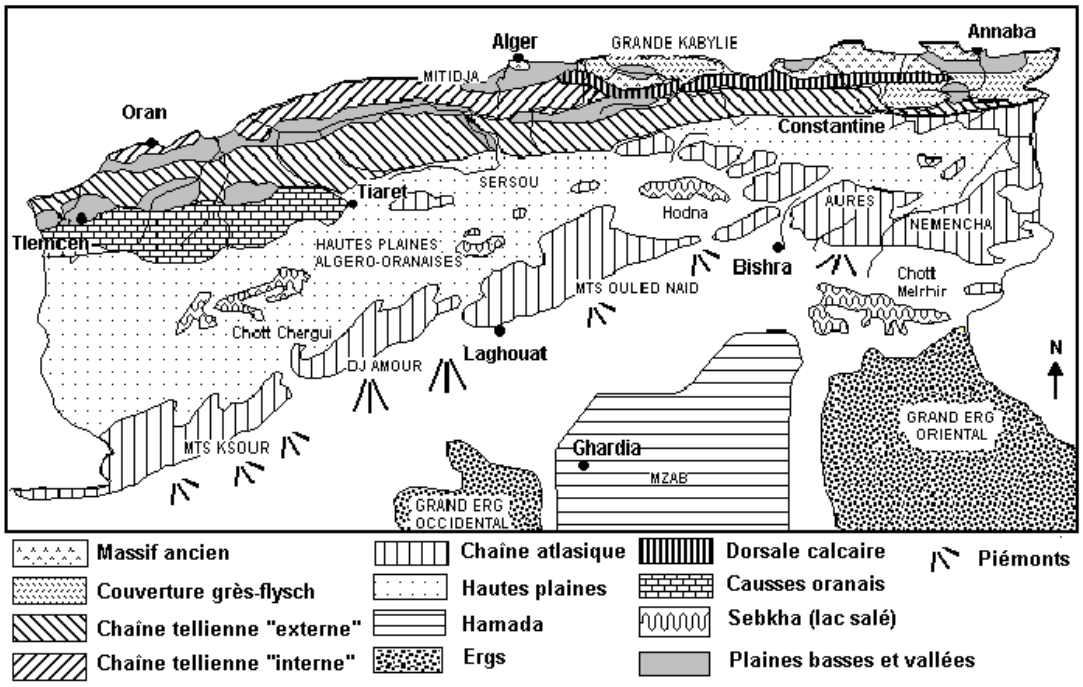
And, given the total terrain at one level, it's about 800 m high. The bumps print the whole landscape, but the outcome of these bumps and terrain "The presence of this coastal mountain range, which mediates between the sea and the interior and prevents the leakage of air currents from the north or north-west, limits the presence of major reservoirs of water in the homeland, helps to dry the air, and makes the interior of the continent climate, operating as short watercourses that quickly reach the Mediterranean Sea, preventing their intensification in a given area."

Two natural areas are highlighted in northern Algeria: limited-field coastal plains (Matijah, Annaba, and the Harani region) and the confrontation with areas of hills, low-rise plains, narrow-walled, intermittently stretching inside the field and valleys of the inner region (Sidi Belabas, Camp), and the canyons of perimeter and silo, mostly narrow and intermittent. (See Algeria's geo-morphological map).

Semi-coastal plains, inland basins and high plains form units located in the rest of the Maghreb.

- Southern Algeria is a desert area dominated by a level of prospects, with arid areas constituting 4/5 of the desert. This characteristic of terrain conditions explains the continent's climate and its cruelty.

FIGURE 1. MAP OF ALGERIA'S NATURAL TERRAIN



Degradation of natural resources is likely to be significant owing to drought, land fragility resulting from wind erosion and weak water resources.

Algeria's climate is Mediterranean, with extremely violent rains in winter leading to severe erosion. In summer rainfall is very rare, and the heat rises to extreme levels. Rainfall may reach 1600 mm per year in the highlands, which are irregular from year to year, and uneven distribution. Falls in the vast inland plains range from 100 to 400 mm per year. These spacious interior spaces feature a dry, cold winter, hot and dry summer climate. There are approximately two thirds of cultivated areas. In a combination between livestock husbandry and widespread exploitation of grain land, annual cultivation, especially grain and dry vegetables, as well as sheep and cow husbandry, is widespread. Degradation of natural resources is likely to be significant owing to drought, land fragility resulting from wind erosion, weak water resources and intensive agricultural-pastoral activities.

The climate of the vast areas of the steppe is semi-dry and even dry for some areas of the country's west. The most important activity is the breeding of sheep according to a widespread pattern, with sometimes more intensive patterns based on imported nutrition. Poor, low-organic steppe lands also show a strong sensitivity to erosion and degradation.

In short, a large section of agricultural Algeria is located in the dry and semi-dry triangle, which represents 85% of the total land area - excluding desert-60% of the agricultural population. They are prone to prolonged drought due to shortage and uneven distribution.

According to the Food and Agriculture Organization of the United Nations (FAO), water stress stood at 137.9% in 2009-2017, compared to just over 50% in Morocco, and 121.1% in Tunisia, in a region that exceeds the actual water stock. Water stress of 137.9% means over-exploitation of water available by more than 37%. Measured in neighbouring countries, the readiness of renewable water for the individual is not in Algeria's interest. In 2017, it is estimated that 232 cubic millimetres per person compared to 811 cubic millimetres per person in Morocco and 400 in Tunisia.

The compressive conditionality of Algeria's natural abilities severely affects the environmental balances of various natural areas. Land erosion affects more than 13 million hectares of national soil, which each year loses about 400 thousand hectares (World Bank of 2021). Algeria's total agricultural area (arable land, pastures and meadows) is 43.9 million hectares. There are only 8.5 million hectares of viable agriculture.

Despite the State's efforts to conserve water and land, land continues to be eroded and water resources are severely affected by exploitation or salinity. Desertification threatens more than 17 million hectares in the steppe areas, and northern Algeria's forest cover is permanently threatened by natural (fire) or human pressure (deforestation-land reclamation). According to the World Bank's latest report (2021), more than 99% of the land stripped of its forests in Algeria faces a moderate or high fire risk. The same institution also notes that "the number of fire outbreaks has

been increasing since 2010, and since the 2016 and 2020 fires the observation era has been extended and forest fire interests mobilized.

2- The threat of climate changes to natural qualifications:

The perceived effects of climate change in Algeria have been monitored by numerous reports completed at the authorities' request. Low gonorrhoea and congestion, higher erosion and higher water demand due to greater evaporation and evaporation (mainly in water areas), deteriorating water quality, shortening vegetation cycle due to a hotter climate, moving the Allied plant northward and compensating it for more drought-resistant species, sudden diseases and parasites returning in plants and desertifying more and more visible to the view of semi-dry areas, greater wind transmission of sand northward, changing migratory bird migration, and greater frequency of forest fires (more than 25 thousand hectares per year of burned areas in Algeria). The climate factor can be seen as an aggravating factor for recent forest fires. The outcome of the Public Forest Administration's 2020 forest fires shows a burned area of 15,587 hectares of forest, 13,552 forests and 13,119 forests. Annual losses are estimated at between 15 and 19 million, to which, for 2020, compensation for victims of $6 million must be added [World Bank 2021]

3- Climate changes deepen the fragility of natural capacities:

Global warming is projected to exceed the threshold of + 1.5 ° C and + 2 ° C during the 21st century unless strong reductions in greenhouse gas emissions are achieved in the coming decades. Greenhouse gases are gas components that absorb infrared radiation from the Earth's surface.

For Algeria, the diagnostic report of the 2018 National Climate Plan records that Algeria's climate is changing strongly: from the north to the south, it has moved from a humid Mediterranean to a desert and dry centre through a semi-dry climate. This climate results from a dual effect from the air cycle of the medium latitudes and orbital and desert cycles (PNC, 2018). The huge fires recorded in summer 2021 are also the result of the country's special weather conditions this year: extreme heat at the peak of the fires, 50 degrees Celsius, a sign that highlights well the nature of climate change in the region. on the risks posed by ongoing climate changes.

According to the latest report (2021) of the Group of Governmental Experts on Climate Developments (GIEC), global warming will exceed the threshold of + 1.5 ° C and + 2 ° C during the 21st century unless strong greenhouse gas emissions reductions are achieved in the coming decades. The past two decades (2000, 2020) have also been printed with the frequency of extreme climate disasters (floods, droughts, cold waves and extreme heat). The Group of Governmental Experts on Climate Developments also emphasized the role of human activity in the climate changes currently observed.

However, climate warming in the Maghreb region is more severe than the global average. Global warming in the twentieth century reached 0.74 degrees Celsius, while in the Maghreb region it reached between 1.5 and 2 degrees Celsius depending on the regions, and each additional

warming results in + 0.5 degrees Celsius, according to the group of governmental experts on climate developments, the severity and frequency of maximum heat periods of heatwaves, strong rainfall, drought...

Algeria's average temperature has fluctuated annually during the period 2020-1980, noting that the average temperature has increased by approximately half a degree Celsius over the period. This is due, in particular, to the perceived rise in the period 2020-2000, marked by an average of 23.43, the lowest average recorded in this period and 24.1, the highest average recorded. It should be noted from the foregoing that Algeria, like the various nations of the world, is affected by the global warming phenomenon that affects the globe as a result of the human factors that have increased emissions of air-damaging gases that have resulted in the ozone layer being perforated. Projections indicate that by 2050 the average temperature will increase by 1 ° C.

4- Impact of climate changes on agricultural production:

Climate changes have contributed with excellence to the mapping of Algeria's agricultural productive options for decades. In fact, the climate in Algeria is only average within coastal or coastal areas, although the continental impact is strongly observed in much of the area under cultivation.

It represents only 29% of the agricultural areas exploited (SAU) of cereals alone. It is located within areas where there is just over 450 mm of rain per year, which explains the estimated weak yield (7 drums per hectare) recorded during the last decades. Climate changes illustrate the unstable level of production recorded from year to year (grain production fell from 38 million quintals in 1991 to less than 10 million quintals in 1994).

The choice of intensifying agriculture in Algeria has become very difficult, given the deficit in the rate of rainfall as well as its volatility, as well as other climatic impacts such as southern seroco, ice and others.

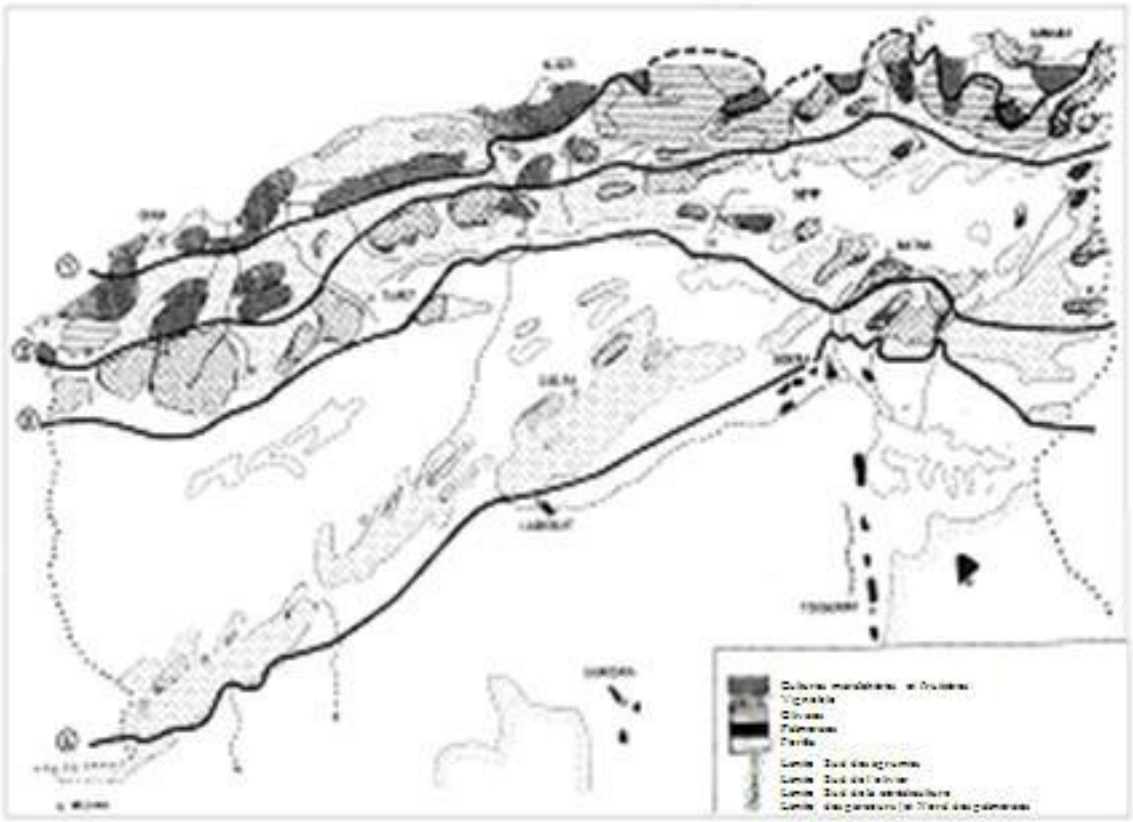
The underdeveloped soil has also been neglected and exhausted due to poor service and the use of restful land service methods, causing the depletion of organic material from the soil, thus being an ecological dysfunction

Across large areas of the High Plains, there was climate degradation, which had semi-dry climatic characteristics.

These agro-climatic difficulties have specifically painted Algeria's agricultural character. The peasant map is distributed as follows: grain, olives and grapes are cultivated in rainy areas of the north, and fruit trees and spring grains are planted in water areas.

Cow and livestock husbandry has been combined with grain cultivation. Vegetable and fruit cultivation is concentrated in coastal areas, their adjacent, low plains, valleys or indoors. (See agricultural zoning map according to agricultural orientation).

Figure 2. Algeria's agricultural choices map



1 Limite Sud des agrumes
2 Limite Sud de l'olivier
3 Limite Sud de la céréaliculture
4 Limite Sud des parcours (et Nord des palmeraies)

Livestock and goat husbandry (12 to 15 million heads) abound in the steppe region alone, in addition to grain cultivation. In areas south of the desert atlas, farming is rare, and oases are the population's preferred place for peasant activities spread across 2 million hectares. 100,000 hectares of exploited agricultural space is subject to very harsh environmental rigour.

Farmers in this agricultural field practise rudimentary techniques and resort to watering farming in small areas. The most important agricultural products in these areas are of a consumable nature as well as date palm. However, the latter decolonization disrupted the conditions under which traditional oasis technology was practised, particularly after the decision to take ownership of reclaimed land in the south in 1983 (APFA), the development of the axial watering system, the introduction of plastic houses and commercial cultivation such as those practised in the hill (grain, fruit trees and sheep husbandry).

A study of the impact of climate changes on water resources, under the supervision of the National Agency for Water Resources of Algeria (2009), based on an examination of the sequences of rainfall data since 1900, highlighted that the amounts of fall are 40% lower in the west and 30% lower in the east. All research thus confirms that Algeria will experience a

renewal of extreme climatic accidents, from severe heatwaves and growing aridity and desertification, forest fires, etc.

Climate models show that these tendencies, now confirmed by observations, will be strengthened in the next 20 years. Thus, there is a major challenge in a country where the orientation of agricultural policies is aimed at increasingly intensifying natural resource exploitation patterns under these conditions. Increasing agricultural production while conserving natural resources that are severely threatened in the future by ongoing climate changes is problematic.

With climate change there will be enhanced extreme weather events and degradation of nature's environment (drought, floods, heat waves, wildfires, water stress, desertification, erosion or severe degradation of land and marine biodiversity). Rainfall will decrease, for a country such as Algeria, and temperatures will rise, with direct consequences for water resource mobilization capabilities and agriculture systems. As the first consumer of this resource, agricultural production and thus consumer supply will be directly affected.

Results from the study of the impact of climate change on agricultural production (Bouarab, 2022) during the period 1980-2020 showed that the increase in the temperature in the spring and summer by 1% leads to a decrease in agricultural production by 0.48% and 0.34% respectively. While the results showed a negative impact between winter and summer rainfall, an increase in winter and summer rainfall by 1% 1 lead to a decrease in agricultural production by 1% 0.05 and an increase in spring and autumn rainfall by 1% increases in agricultural production by 0.05% and 0.08%, respectively.

The Group of Governmental Experts on Climate Developments expects a 21% decline in production over 2080 for the entire agricultural production of the Mediterranean Basin, with Algeria's maximum reduction of 40%. Rainfed agriculture, particularly affected by climate variability, will experience declines and the most pessimistic scenarios predict 64 per cent loss in rainfed agricultural areas. Average yield losses are expected to reach 31% to 39% for wheat cultivation, as well as a decrease in vegetable productivity from 15% to 30% on the 2030 horizon. In Algeria's Upper Steppe Plains, climate disturbances, particularly lower rainfall, will cause greater vulnerability to pastoral communities used by ranchers.

In addition, climate degradation would cause a decline in the incomes of peasant families and a rise in the prices of the most important products, threatening the purchasing power of the population and the country's food sovereignty. This diagnosis is largely agreed by the 2018 National Climate Plan adopted by the authorities.

5- Measures taken to address the risks of climate change:

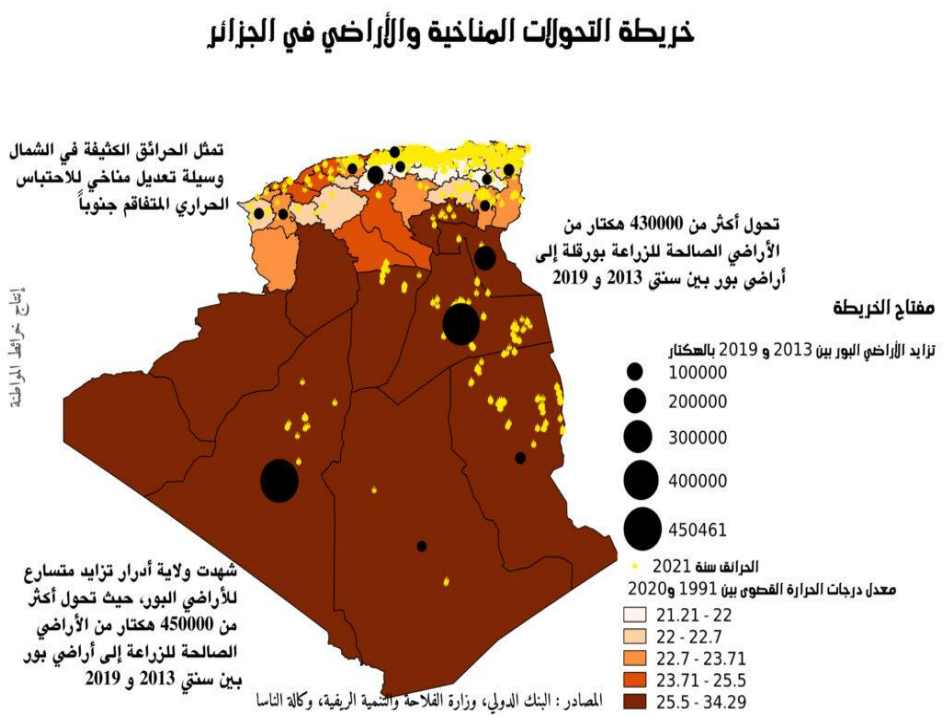
Even before climate change takes on its current character, mention should be made of various programmes launched by Algerian public authorities in 1970. including the construction of a large green dam along 1,200 km and an average depth of 20 km to combat desertification, as well as projects within the framework of the protection of natural resources undertaken by the

High Delegate to combat desertification, work to protect foothills from aquatic erosion or the development of rational forest economic activity .

The main measures to adapt to climate change, recommended since early 1980, have been the water economy, the construction of subsequent dams and dams, the adoption of new technical practices (direct seeding), the transformation of production systems, the application of programmes to combat desertification for feeding sheep cattle, the protection and rehabilitation of steppe lands, the preparation of foothills, the protection and expansion of forests and the development of agricultural insurance. In this regard, ROSELT's studies in Sehoub in southern Algeria have shown. A remote sensing map of the degree of desertification shows that more than 570 thousand hectares of land in the steppe areas is completely desertified without biological recovery, and that nearly 6 million hectares are threatened by wind erosion.

Those measures are therefore far from being investigated and their effectiveness remains limited. The following chart shows the map of Algeria's climate and land transformations.

Figure 3. Map of algeria's climate and land transformations



It was adopted by the National Climate Plan (PNC, 2012; PNC, 2018), which, according to its authors, is a work stone for adapting Algerian society and ecosystems to climate change.

The Action Plan for the Reduction of Greenhouse Gas Emissions, within the National Climate Plan, aims to meet international commitments to:

- Achieving a voluntary scenario to reach 7% reduction in the 2030 horizon.

- Achieving a conditional scenario of 22% by 2030. In the area of reduction, the target and key interventions relate to the forest sector. Key interventions concern afforestation, reforestation, forest fire avoidance and improved warfare.

The NCP's specific objectives can therefore be identified in the following points:

- Strengthen ecosystem resistance (floods and droughts) in order to reduce the risk of natural disasters associated with climate change.

- Combating erosion and rehabilitation of degraded lands in the fight against desertification

- Integrate the effects of climate change into sectoral strategies, particularly agriculture, water, human health and transport.

If the National Climate Plan's legal framework has been developed, it is incomplete because decisions to apply the main legal texts adopted have not yet been made.

The problem of climate change is not really capable of being valued today in the agricultural programmes announced by the Ministry of Agriculture, and adaptation actions to climate change are far from responding to the effectiveness of those climate changes.

Actions announced by agricultural public policies contradict the National Climate Plan, as they are always based on a growing intensification of natural resource exploitation patterns.

The existing growth model encourages a "capital-intensive pole" while millions of peasants are condemned to living in very small agricultural units.

It should be recalled that recent increases in agricultural production are being achieved through the growing mobilization of irrigation water. The Strategy for the Development of Desert Agriculture, in order to increase the area of water and the types of agricultural production known as the Strategy, which is now favoured by public authorities, does not take into account the harsh compulsions that characterize this very difficult and fragile environment. Pressures on mobilizable land and water capacities in some natural areas have reached a critical threshold (oases, mountains and steppes). The context of strong demographic growth, limited natural resources, limited financial means and short-term social imperatives seriously undermines Algeria's adaptability, as do other countries of the South.

Climate changes have been increasingly evident for years, with the consequences described above, without changing the agricultural growth model. Moreover, this growth model, based on the growing mobilization of agricultural water and the development of condensed chains (fruits, vegetables, olive oil, dates) destined for export, is based on the promotion of a "capital-intensive pole", while millions of peasants are condemned to living in very small agricultural units.

The excessively condensed technical model is the main responsibility for greenhouse gas emissions in the agricultural sector. It has reached its substantive limits and will not be able to meet the challenges of climate change, so changes in the country's consumption and production patterns are required.

For Algeria's recent Industrial Agriculture Strategy, which has established its own immunity-based office, which oversees major industrial-oriented agriculture projects and is prohibited as an industrial boom in the south, giving it the lead in food manufacturing and contributing to sustainable food security in Algeria. In fact, the strategy produced only disasters, but was greatly encouraged by decision makers' short-term perspective.

Account must be taken of the social coercions suffered by the villagers of the lower desert who, since the beginning of the twentieth century, have paid an enormous tax, with self-sufficient peasants being converted into puppy slaves when growing rent dates. A Saharan community had been subjected to real estate colonization, and agriculture, based on extractive technology, had enlarged the trade of dates for some contractors while impoverishing an entire peasant world.

The context has changed, but today we see again in the region of Wadi, a farming farm that will sabotage thousands of ancient ghouts in the foot, the death of young peasants. It is cultivated by the governors that transforms desert lands into bare spaces.

Responding to the call for industrial agriculture seems to be an option encouraged by today's agricultural policies, which, in the knowledge of certainty, cause devastating external effects. Moreover, industrial agriculture, by being subject to monoculture, reduces vital productivity by eliminating biodiversity. This contradicts the basic objectives envisaged in pursuit of a minimum food sovereignty. We can only observe, in passing reference, that the COVID-19 health crisis has abolished all the principles of food sovereignty enshrined in international institutions' perception. This crisis has reaffirmed the impossibility of food security with no minimum food sovereignty.

There is an insistence that the Sahara is a huge water reservoir that can allow for the watering of unlimited areas. Life has been organized in desert circles around water wherever the land can be farmed. Combined by scarcity of land and water, humans optimized these suppliers. It may seem incomprehensible to us that technology is being rejected in the face of the ancient humanization of desert areas. How can it be envisaged to employ huge financial means in such a way as to result in a loss while betting on imported technology filled with contaminated carbon energies, without accepting that the foundations of desert space masonry were the result of a long-standing ecological construction leading to the formation of oases' ecosystems.

In addition to the lack of understanding of collective-based diets, exclusion mechanisms have been established, which identify new relationships with regard to utilization of resources. In an arrogant manner, the institutional approach has come to impose a unilateral development model that threatens to destroy social balances and break down the management of common property inherited from previous generations.... without regard for peoples' rights in their choices of cultural, economic and community development policies.

Moreover, this capital-intensive vision results in a concentration of imported means of production and an aggravation of backward and forward dependence vis-à-vis some transnational companies in control of the world's food system.

6- The need to adopt family farming within the framework of ecological agriculture:

Climate change has serious consequences for the most vulnerable populations, especially small peasants, while their role in this phenomenon is totally weighing. Drought is the main climate risk perceived by smallholder farmers, which calls for thinking about new approaches that are better adapted to small peasants' compulsions. However, the dangers of climate change cannot be driven without overturning the social foundations of agricultural policy. As such, the small-scale agriculture sector must be at the heart of the commitments to adapt to climate change.

Small family farming, which employs hundreds of thousands of peasants, is still awaiting State recognition and active support policy. Small-scale agriculture is the main resource for channelling agricultural production towards basic products and improving the population's food security. The diversification of appropriate activities and production systems, and the selection of the most water-resistant peasant seed species used by small family production units, can reduce the risks associated with climate change.

Family agricultural production units are predominantly in Algeria in the deepest village areas (mountains, steppes, oases). Within these family units, hundreds of thousands of grain, fruit and vegetable farmers, livestock breeders (especially milk production cows) who produce and maintain local and regional markets, contribute to their families' food security, their territory and the country.

The rehabilitation of small-scale family farming is therefore the rehabilitation of many village areas, as well as the promotion of food sovereignty based on diversification of good agricultural production, farmers' access to land and respect for the environment. Give them greater ecological and socio-economic resilience to disaster recovery, such as drought, floods or hurricanes, and resist pests and diseases. Through diversification, producers reduce their vulnerability if a single crop or commodity fails.

Algeria must call for new agricultural practices and encouraging producers to phase out productivity and agricultural systems requiring large quantities of fertilizer and pesticides, in favour of sustainable and climate-resilient practices such as recycling as nature reuses what it produces by simulating natural ecosystems, and such recycling can be enhanced through specific actions such as the introduction of livestock and the use of its manure as an example; However, recycling at all levels is essential for self-support and self-correction systems.

The diversification of appropriate activities and production systems, and the selection of the most water-resistant peasant seed species used by small family production units, can reduce the risks associated with climate change. This results in efficiency that starts by not wasting resources and using agricultural inputs more efficiently. This has the indirect effect of preserving precious resources such as water, protecting biodiversity and even reducing production costs.

The need to allocate financial resources to protect natural inheritance. All adaptation measures must therefore be accompanied by funding procedures (private green funds), subsidized price policy directed at targets, tax procedures for any eco-fees that limit and curtail condensed and extractive practices and economic and social incentives to settle in village areas for activities that provide the villagers with a decent life frame and that lay one of the pillars of ecological agriculture, such as human and social values such as dignity, equity, inclusiveness and justice, which all contribute to sustainable livelihoods; Ecological agriculture seeks to address inequalities by creating opportunities for women and young people.

Significant delays in improving knowledge about the consequences for land and water need to be noted in order to identify effective adaptation measures that are compatible with climate change. In other words, there is a weakness in mobilizing relevant departments and institutions in terms of sensitization and strengthening village communities' capacities to secure sustainable local management of the natural ocean.

Building more resilient and sustainable diets has become more than necessary. We must avoid going through industrial agriculture. With the inevitability of moving towards diverse agricultural ecosystems. These results have been positively witnessed by many international bodies and organizations, such as the Food and Agriculture Organization of the United Nations (FAO), the Government's Panel of Experts on Climate Development (GIEC), the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and the World Bank. Ecological agriculture promotes resistance, by installing various plants and animals, exploiting natural harmonies rather than synthetic chemicals, for soil regeneration, agricultural fertilization and the fight against harm ", according to the International Group of Experts on Sustainable Diets (IPES-Food).

Conclusion:

An agricultural policy aimed at achieving sustainable food security and food sovereignty is binding on ensuring stricter protection of natural resources and encouraging their reproduction by incorporating measurable ecological requirements into their pattern of exploitation. Public policies should contribute to relaxing the pressures of major agricultural enterprises on land or water resources, rehabilitate natural and degraded areas, and continue the large-scale project of foothill basin numbers in order to conserve water and land. Agricultural guidance plans based on regions' and states' natural qualifications must identify measures to adapt agriculture and encourage agricultural practices capable of stimulating resistance to agro-environmental systems. Diversifying activities, choosing adapted farming systems and selecting seed species that are most resistant to water stress can reduce the risks associated with climate change. According to specialists, there are also manoeuvring margins for water-fed agricultural areas, and it is estimated that the effectiveness of water resources management could be improved by 35%.

Strategies for adaptation to climate change must be presented on more water mobilization work (dams, underground injection, recycling of wastewater, desalination and interregional transport) water economy (supplementary watering, leakage reduction, better tariff, formation and

sensitization activities) and combating floods and droughts (with the necessary mechanisms of fragile maps, the preparation and reforestation of basins in mountainous areas, and the development of surveillance and information systems).

With the need to adopt more resilient and sustainable diets. And inventory of industrial agriculture. The establishment of various agro-ecological systems in all their economic, societal and cultural dimensions.

The issue of climate change must also be given a regional dimension, as Algeria still had several steps to achieve in order to coordinate its research with neighbouring countries, share knowledge and harmonize indicators and tools for assessing vulnerability and risks associated with climate change. Regional cooperation efforts remain fragmented and would benefit from coordinated identification of common regional priorities to enhance fragile areas' resistance to climate change.

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