Impact of Climate Change on Agricultural Crops Yield on the Territory of the Republic of Azerbaijan

Elnur Allahverdiyev
Baku Business and Cooperation College, Azerbaijan
aelnur786@gmail.com

Abstract

There are a number of variables that have contributed to the growing worry over the influence that climate change would have on agricultural crop production in the Republic of Azerbaijan. These factors include rising temperatures, altering patterns of precipitation, and severe weather events. The purpose of this research is to investigate the ways in which the unpredictability of climate has an effect on key crops including wheat, barley, maize, and cotton, which are the foundation of Azerbaijan's agricultural industry. The economy of the nation relies heavily on each and every one of these crops. We emphasize patterns in temperature rise, changes in the distribution of rainfall, and an increase in the frequency of droughts via the research, which makes use of historical climate data and yield statistics. Specifically, we highlight these trends by quantitative analysis. Policy ideas include investments in environmentally responsible agriculture, advancements in weather forecasting, and educational initiatives for farmers to strengthen their ability to withstand adverse conditions. These recommendations are among a variety of policy recommendations. Azerbaijan's agricultural sector is facing a number of challenges as a result of climate change, and the results of this study demonstrate how important it is to solve these challenges. This is of utmost significance when it comes to ensuring the nation's economic stability and the safety of its food supply.

Keywords: Issues in climate change, products in the agricultural sector, measuring yield, assessing impacts, country indicators.

1. Introduction

Climate change is one of the most significant problems of the 21st century, impacting ecosystems, economies and livelihoods worldwide. One of the industries most affected by such changes is agriculture, which is sensitive to climatic elements like temperature, precipitation, and soil moisture. Since the South Caucasus region is diverse with various geographical features and semi-arid climatic conditions, the Republic of Azerbaijan is a vulnerable region to climate variations. Azerbaijan is an agricultural country with a strong farming tradition as well as significant dependence of economic output and food security on farming, which results in strong risks in the way of changing weather patterns and rising climate extremes (Azernews, 2025).

1.1. Azerbaijan: Geographical and Climatic Context

Azerbaijan features one of the largest complexity of climates in the world, as it consists of nine out of eleven existing climate zones. The climate of Azerbaijan varies from humid subtropical in the Lankaran lowlands to dry, semi-desert and steppe conditions further to the central and eastern regions of the country. The coastal climate is influenced by the Caspian Sea, which offers moderating impact on temperature extremes but also increasing sea levels with adverse impact on surrounding agricultural lands. There are mountains, plains and valleys, each of which offers its own distinct agricultural opportunities, as well as challenges and vulnerabilities to climate change (State Statistical Committee of the Republic of Azerbaijan, 2025).

Remains a key sector in Azerbaijan's economy, employing around 36% of the total workforce and is significantly contributing to generating GDP. The country grows a range of crops, from wheat, barley, and cotton to grapes, tea, and fruit, which paves the way for agricultural exports. Furthermore, livestock farming and dairy being significant sectors of the rural economy. But agriculture relies heavily on rainfall and irrigation from rivers like the Kura and Aras, so variability in the climate is an immediate threat to food production and rural livelihoods.

1.2. Climate Change Manifestations in Azerbaijan

Azerbaijan has experienced rising average temperatures, rising extreme weather events, changing precipitation regimes, and longer-lasting droughts over the past few decades. According to the United Nations Framework Convention on Climate Change (UNFCCC) as well as the data of the State Hydrometeorological Service of Azerbaijan, over the last century, temperature has increased constantly by an average of 1.3°C, and warming will continue in the following decades. Soils dry, evapotranspiration becomes more intense, and crop/vegetation productivity can be altered adversely as temperatures are raised (ResearchGate, 2020).

Other countries have also experienced shifts in precipitation patterns), with smaller amounts of precipitation falling on areas where they are needed so that water scarcity and desertification is now seen. Declining water availability threatens especially the eastern and central regions, including the Kura-Aras lowland, which are among the most agriculturally productive areas. By contrast, others have had stronger and more erratic rainfall, which has caused soil erosion and flooding, complicating agricultural planning and production.

1.3. Effect of Climate Change on Agricultural Productivity

Azerbaijan has many different aspects of climate change situations on crop yield. Increased temperatures may shorten the growing season for some crops, and excessive heat stress can lower yields and degrade crop quality. Per example, wheat and barley which are two staple crops grown in Azerbaijan, are very sensitive to heat stress reducing grain filling and yield in general. Also, cotton, also a major cash crop,

depends on regular water supply, and extended periods of drought are already reducing yields in some areas.

So is fruit and vegetable production, a pillar of Azerbaijan's agricultural exports. Temperature and humidity fluctuations can also promote pest infusion and plant diseases, which result in crop loss. Climate-Impacts on Grape Quality Grapevine cultivars in the Ganja-Gazakh region, also the Shamakhi region, with important functions for the winemaking and viticulture industry, is also affected due to climate conditions changing. Regular precipitation is also necessary for tea plantations, which are primarily in Lankaran, and therefore there are also concerns about production in this sector.

Water availability is another critical challenge. The country is highly dependent on irrigation and in fact, most of the irrigation water used for farming is supplied by two rivers, Kura and Aras. But upstream water uses across borders, as well as changes in precipitation patterns, have reduced water flows and prompted water disputes. This challenge is compounded by inefficient irrigation systems which lead to water loss and soil degradation.

1.4. Strategies for Adaptation and Expectations for the Future

Azerbaijan agroclimatic resources and its food security are under threat from climate change, as it is for many other areas of the world. The Government, in collaboration with international organizations, such as Food and Agriculture Organization (FAO), World Bank, has also started projects to increase climate resilience in agriculture. These involve the shifting to drought-tolerant crop varieties, the updating of irrigation infrastructure, the adoption of climate-smart farming practices, and the expansion of agroforestry programs (Open Knowledge World Bank, 2021). Steps are also being taken to enhance metrological forecasting and early warning systems, which will enable farmers to foresee and tackle risk from climate change. Policies to foster sustainable land management, afforestation, and soil conservation are also being adopted to address the consequences of desertification and soil degradation. As a conclusion, climate change poses a major threat to Azerbaijan's agrarian sector having direct impacts on food security, rural livelihoods, and the economic sustainability of the country. Higher temperatures, altered precipitation patterns, and erratic water availability lead to lower crop yields and uncertain production. Nevertheless, through proactive adaptation, innovative technology and effective policy measures, Azerbaijan has the potential to reduce the negative impact of climate change and create a more resilient agriculture sector. With climate change posing a significant threat to food production and security, understanding the impact of these measures is critical as the country works to implement them across its agricultural policies and practices, alongside these efforts, further investment into research, innovative solutions and infrastructure will be vital to create conditions in which food production and agricultural sectors can thrive sustainably in the long term (Open Knowledge World Bank, 2020).

2. Analysis of the Current Situation

Over the course of the years 2019 through 2021, the following table provides indices of agricultural and livestock productivity across various regions of Azerbaijan. It is possible to see regional differences in agricultural performance by categorizing the data according to total agricultural output, plant-growing, and livestock production. By reflecting the economic, environmental, and policy-driven impacts on the agricultural sector, it offers insights into the trends and fluctuations that have occurred in agricultural productivity over the course of the years. It is possible to compare significant regions, such as the Republic of Azerbaijan, Baku City, and a number of economic districts, with regard to overall growth, shifts in plant-growing versus livestock farming, and notable deviations in agricultural output. When it comes to evaluating the effectiveness of agricultural policies, the efficiency of regional agricultural practices, and the economic growth of the agricultural sector, these figures are absolutely essential.

Table 1. Physical volume indeces of agricultural output, in comparative prices, compared to the previous year

	2019			2020			2021		
	Total	plant-growing	livestock	Total	plant-growing	livestock	Total	plant-growing	livestock
Republic of Azerbaijan	107,2	111,7	103,5	102,0	100,8	103,1	103,4	104,0	102,8
Baku city	147,6	124,3	227,5	102,1	97,4	111,7	112,2	129,5	72,4
Nakhchivan Autonomous Republic	104,5	105,6	102,7	104,6	105,9	102,1	105,3	106,3	103,5
Absheron-Khizi economic region	112,2	116,9	109,6	118,5	133,5	113,4	89,8	100,3	86,9
Daghlig Shirvan economic region	106,7	107,7	105,6	95,5	87,1	103,6	107,9	113,7	103,4
Ganja-Dashkasan economic region	105,1	109,4	102,0	99,5	103,8	96,7	99,2	96,1	101,9
Karabakh economic region	110,9	116,4	108,0	99,5	95,9	102,9	101,9	102,6	101,9
Gazakh-Tovuz economic region	107,7	112,4	99,1	107,6	109,7	103,4	102,7	102,5	103,0
Guba-Khachmaz economic region	100,8	107,8	94,6	101,5	101,7	101,1	104,5	104,8	104,2
Lankaran-Astara economic region	108,3	119,0	99,0	96,5	96,5	97,0	102,0	104,1	100,3
Central Aran economic region	108,0	112,6	104,4	97,3	93,1	101,2	112,4	108,5	116,2
Mil-Mughan economic region	108,5	115,5	102,8	102,6	103,4	101,7	99,9	96,8	102,7
Shaki-Zagatala economic region	102,2	103,1	100,6	98,6	96,4	101,0	103,6	105,7	101,8
Eastern Zangazur economic	99,6	98,4	99,8	100,	88,2	101,2	107,	163,2	103,7

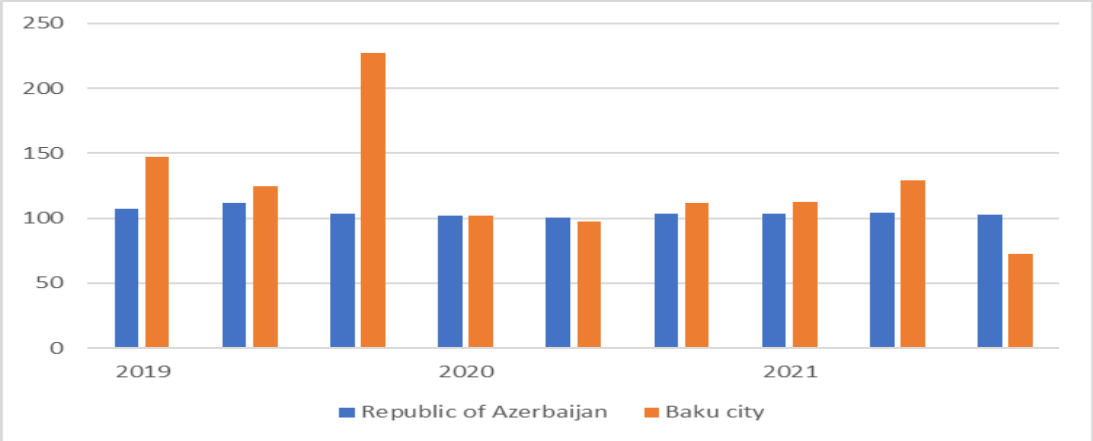
region				*3*			*3*		
Shirvan-Salyan economic region	*108,0*	*113,2*	*103,3*	*103,7*	*97,2*	*108,1*	*97,5*	*99,9*	*95,8*

Source: State Statistical Committee of the Republic of Azerbaijan, 2025

For the period from 2019 to 2021, the overall analysis of agricultural efficiency in Azerbaijan demonstrates pronounced regional distinctions in the existing growth trends. Certain regions, like Baku City and the Absheron-Khizi economic region, saw ups and downs in plants production, as well as livestock production. Conversely, some other areas, namely the Nakhchivan Autonomous Republic and the Gazakh-Tovuz economic region showed relatively stable growth (State Statistical Committee of the Republic of Azerbaijan, 2025).

The data also reflected more considerable variability in livestock production than crop production, suggesting that climatic, resource management, or market challenges have been more significant constraints on livestock than plants. Some districts even demonstrated considerable changes, which could also be attributed to other particular external influences, such as the recovery of land or geopolitical power.

Graphic 1. Physical volume indeces of agricultural output, in comparative prices, compared to the previous year



Source: State Statistical Committee of the Republic of Azerbaijan, 2025

Overall, the results underscore the need for area specific agricultural policy to promote growth (both plant and livestock farming). The analysis and insights derived from this table can be utilized in the strategic planning of agriculture, investment decisions and sustainability efforts for the development of the agricultural sector of Azerbaijan.

Table 2. Total sown area under agricultural crops, ha

	2017	2018	2019	2020	2021
Republic of Azerbaijan	***1665710***	***1738040***	***1717054***	***1630935***	***1644450***
Baku city	***1227***	***1233***	***1000***	***1018***	***1033***
Nakhchivan Autonomous Republic	***61531***	***61935***	***62970***	***63405***	***64259***
Nakhchivan city	*2095*	*2095*	*2095*	*2095*	*2248*
Babak district	*16172*	*16172*	*16172*	*16172*	*16172*
Julfa district	*7718*	*7718*	*8213*	*8213*	*8213*
Kangarli district	*8261*	*8665*	*9205*	*9567*	*10158*
Ordubad district	*3937*	*3937*	*3937*	*3937*	*3937*
Sadarak district	*3574*	*3574*	*3574*	*3647*	*4528*
Shahbuz district	*2659*	*2659*	*2659*	*2659*	*2769*
Sharur district	*17115*	*17115*	*17115*	*17115*	*16234*
Absheron-Khizi economic region	***5543***	***6818***	***8152***	***7486***	***6680***
Sumgayit city	*33*	*32*	*32*	*26*	*26*
Absheron district	*1894*	*2388*	*2140*	*1811*	*1849*
Khizi district	*3616*	*4398*	*5980*	*5649*	*4805*
Daghlig Shirvan economic region	***123809***	***147101***	***150364***	***117677***	***137283***
Aghsu district	*40159*	*39808*	*40353*	*38030*	*37784*
Ismayilli district	*33376*	*33332*	*33731*	*33421*	*33734*
Gobustan district	*26091*	*31673*	*32215*	*24026*	*30977*
Shamakhi district	*24183*	*42288*	*44065*	*22200*	*34788*
Ganja-Dashkasan economic region	***76768***	***78495***	***80785***	***78132***	***79098***
Ganja city	*421*	*413*	*472*	*114*	*61*
Naftalan city	*320*	*285*	*376*	*259*	*283*
Dashkasan district	*2503*	*2017*	*1874*	*1741*	*1101*
Goranboy district	*42119*	*42635*	*44866*	*45972*	*46214*
Goygol district	*10159*	*10329*	*10830*	*7642*	*9069*
Samukh district	*21246*	*22816*	*22367*	*22404*	*22370*
Karabakh economic region	***222345***	***239029***	***241688***	***240936***	***227332***
Khankandi city	*...*	*...*	*...*	*...*	*...*
Aghjabadi district	*58950*	*65863*	*67950*	*68621*	*67728*
Aghdam district	*25574*	*30954*	*30802*	*30695*	*28011*
Barda district	*54484*	*54860*	*54850*	*54825*	*55101*
Fuzuli district	*45764*	*46066*	*46287*	*46862*	*43976*
Khojaly district	*2117*	*3336*	*2898*	*2880*	*2736*
Khojavand district	*6285*	*8691*	*9002*	*9216*	*1809*
Shusha district	*3135*	*3150*	*3046*	*2264*	*2420*

Tartar district	*26036*	*26109*	*26853*	*25573*	*25551*
Gazakh-Tovuz economic region	***128578***	***131610***	***124400***	***118410***	***116295***
Aghstafa district	*22221*	*21407*	*22041*	*17659*	*18273*
Gadabay district	*13674*	*13794*	*12896*	*13244*	*13412*
Gazakh district	*17018*	*18964*	*19804*	*18631*	*17510*
Shamkir district	*41561*	*43010*	*40556*	*40664*	*41120*
Tovuz district	*34104*	*34435*	*29103*	*28212*	*25980*
Guba-Khachmaz economic region	***101359***	***105344***	***109808***	***106177***	***99857***
Khachmaz district	*32751*	*33398*	*34627*	*33056*	*30381*
Guba district	*16302*	*16160*	*16403*	*15808*	*15266*
Gusar district	*33427*	*33512*	*35825*	*33872*	*31166*
Siyazan district	*5024*	*6970*	*6958*	*7093*	*6742*
Shabran district	*13855*	*15304*	*15995*	*16348*	*16302*
Lankaran-Astara economic region	***120880***	***116367***	***115548***	***114624***	***119049***
Astara district	*6544*	*6522*	*5972*	*5733*	*5551*
Jalilabad district	*79363*	*74271*	*74500*	*74199*	*75079*
Lerik district	*5050*	*5193*	*5299*	*5128*	*5595*
Lankaran district	*8165*	*7212*	*7254*	*7456*	*9888*
Masalli district	*16782*	*18004*	*17330*	*16897*	*17830*
Yardimli district	*4976*	*5165*	*5193*	*5211*	*5106*
Central Aran economic region	***216977***	***220931***	***223347***	***203949***	***206918***
Mingachevir city	*207*	*190*	*221*	*219*	*222*
Agdash district	*27160*	*27209*	*27851*	*29492*	*29805*
Goychay district	*22324*	*22063*	*22904*	*20643*	*19706*
Kurdamir district	*65441*	*67551*	*67895*	*59960*	*57326*
Ujar district	*28446*	*29955*	*29088*	*21340*	*26942*
Yevlakh district	*30731*	*31164*	*32137*	*32173*	*32353*
Zardab district	*42668*	*42799*	*43251*	*40122*	*40564*
Mil-Mughan economic region	***227101***	***222740***	***216910***	***215063***	***215468***
Beylagan district	*49532*	*49874*	*48777*	*48559*	*48651*
Imishli district	*53178*	*50030*	*45514*	*43950*	*44210*
Saatli district	*56122*	*55710*	*55416*	*55344*	*55384*
Sabirabad district	*68269*	*67126*	*67203*	*67210*	*67223*
Shaki-Zagatala economic region	***186967***	***183144***	***183774***	***178017***	***176805***
Balakan district	*15288*	*15458*	*15495*	*15542*	*15624*
Gakh district	*20317*	*19907*	*20120*	*18734*	*19285*
Gabala district	*25840*	*23885*	*23785*	*22820*	*22559*
Oghuz district	*20593*	*19353*	*19118*	*18660*	*18642*
Shaki district	*76340*	*75936*	*76632*	*73583*	*71886*

Zagatala district	*28589*	*28605*	*28624*	*28678*	*28809*
Eastern Zangazur economic region	***7452***	***7846***	***6990***	***6168***	***10720***
Jabrayil district	*4031*	*4113*	*4035*	*3494*	*7076*
Kalbajar district	*516*	*554*	*325*	*430*	*318*
Gubadli district	*44*	*62*	*77*	*46*	*328*
Lachin district	*2600*	*2964*	*2440*	*2073*	*1628*
Zangilan district	*261*	*153*	*113*	*125*	*1370*
Shirvan-Salyan economic region	***185173***	***215447***	***191318***	***179873***	***183653***
Shirvan city	*76*	*76*	*76*	*76*	*76*
Bilasuvar district	*43637*	*51232*	*51246*	*52735*	*53276*
Hajigabul district	*21527*	*49468*	*37552*	*18868*	*24087*
Neftchala district	*72169*	*67768*	*55116*	*60807*	*59126*
Salyan district	*47764*	*46903*	*47328*	*47387*	*47088*

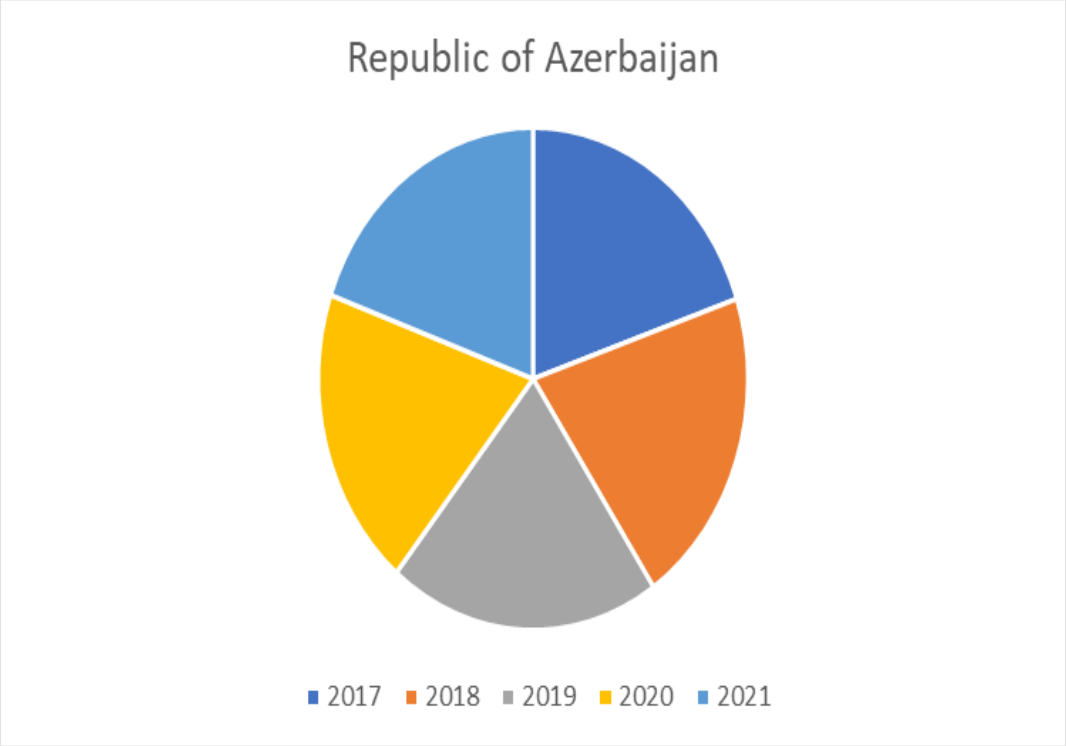
Source: State Statistical Committee of the Republic of Azerbaijan, 2025

Climate change is already one of the major threats to the World agricultural production, the Republic of Azerbaijan is not out of it. Shifts in temperature, precipitation, and extreme weather act as multitudes of evidence for the impact of climate change on agricultural crop yields. Such climatic changes directly impact soil health, water quality and quantity, plant growth cycle, which all together affects crop yield (Ministry of Agriculture of Azerbaijan, 2025).

Azerbaijan's rich lands and hydroclimatic zones experience different levels of climate-induced pressure on agricultural production depending on their status. Rising temperatures have caused evaporation rates to rise, changing soil moisture levels and adding pressure to irrigation systems. In addition, abnormal rainfall will lead to the risk of drought and flood, which will have a great impact on the total sown area and yield of megacities.

Understanding the impacts of climate change on agricultural land use and productivity is essential for devising appropriate adaptation measures. All of these changes have had an impact on the land-use land-cover, which also has implications on data as indicated in this report, where the total amount of sown area under agricultural crops in Azerbaijan has fluctuated between 2017 and 2021 in accordance with climatic shifts. With the incorporation of climate adaptation strategies, namely better irrigation systems, soil conservation methods, and climate-resilient crop species, Azerbaijan can improve its agricultural coping mechanisms and sustain food production (State Statistical Committee of the Republic of Azerbaijan, 2025).

Garphic 2. Total sown area under agricultural crops, ha in Azerbaijan



Source: State Statistical Committee of the Republic of Azerbaijan, 2025

The total sown area under agri-food crops in the Republic of Azerbaijan per the analysis from 2017–2021 reveals a17 different trends and regional differences. As the total sown area has remained more or less constant with variations, the agroecological regions have shown a considerable increase/decrease in agricultural land use (E3S Conferences, 2020).

The total sown area in the Republic of Azerbaijan has had fluctuations, with the highest level in 2018 (1,738,040 hectares) and a decrease in the following years, with 1,644,450 hectares recorded in 2021. The regional analysis does not identify anything unexpected in terms of past agriculture, but Karabakh, Mil-Mugan and Central Aran economic regions were continuously mentioned as havens of cultivated regions according to their figures. In some districts, especially located in conflict-affected areas like Khojavand, Shusha, and Jabrayil, the numbers reflect the social and political dynamics that effect on agricultural land use.

Beyond geopolitics and economics, climate change has been a decisive factor in the evolution of Azerbaijan's agriculture. Global average temperature rises, irregularities in precipitation, and extreme weather events have likely influenced changes in total sown areas. Drought conditions have been especially difficult for farmers, lowering fertility of soil and capping water supplies. By contrast, some regions with better irrigation systems and climate-friendly farming practices have been able to sustain or grow their agricultural output.

Investing in climate adaptation strategies among the agriculture sector in Azerbaijan would help mitigate these effects of climate change. Farmers can adapt to climate variability with modern irrigation systems, crop diversification and better early warning systems for extreme weather events. In addition, adopting sustainable land management practices and strengthening research on climate-resilient crop varieties will be critical for ensuring long-term agricultural productivity (Asian Development Bank, 2021).

This report highlights the relationship between climate change and land use in the agricultural sector across Azerbaijan. Therefore, the pursuit of climate adaptation initiatives is imperative for better environmental conditions of agricultural sustainability stability under the changing climate conditions which can only be figured out by policymakers and stakeholders. Strengthening agriculture can not only protect food security in Azerbaijan, but also promote rural livelihoods and contribute to overall economic sustainability, and invests in the development of agriculture has good economic effect.

3. Conclusion

Climate change and its effect on agricultural crop yield in the Republic of Azerbaijan is one of the most urgent issues with not only immediate but also eventual consequences for food security, economic sustainability, and rural way of life. The shift in climate has led to rising temperatures, changes in precipitation regimes, and more frequent droughts and extreme weather events, each of which have already begun to negatively affect the yields of important crops like wheat, barley, maize, and cotton. As agriculture continues to be a pillar of Azerbaijan's economy, with a considerable share in both employment and GDP, such climatic shocks pose significant threats that must be addressed with timely policy responses and adaptation means.

In the course of the past decades, the country has been gradually exposed to surface air temperature rise, measuring about 1.3°C, with local projections estimating that temperatures in Azerbaijan will continue to increase in the upcoming years. This increasing temperature boosts the process of evapotranspiration, leads to the depletion of soil moisture, and reduces the grow days of numerous crops making them more vulnerable to heat stress and declining productivity. For example, wheat and barley, integral staple food crops for the country, experience fewer grains and lower yields under extreme heat conditions. Similarly, cotton a major cash crop and an essential input into Azerbaijan's textile industry needs a stable and adequate supply of water, which is both increasingly jeopardized by a reduced availability of water and inefficient irrigation systems (State Statistical Committee of the Republic of Azerbaijan, 2025).

Fluctuations in precipitation patterns is a major and alarming impact of climate change on agricultural activities in Azerbaijan. The country's dependence on rain-fed agriculture renders it particularly susceptible to changes in rainfall distribution. Some

areas are receiving less and less rain and suffer longer droughts and desertification, while others experience too much, too untimely and soil erosion and flooding. Such extremes upend agricultural planning and make crop production less predictable, adding strain to farmers and the larger agricultural supply chain. Raising the bar for food production are reduced water availability, and notably in the Kura-Aras lowland, Azerbaijan's most fertile agricultural area. Water scarcity not only restricts how much a crop can be farmed, but also jeopardizes livestock farming, an equally critical strand of the country's rural economy.

The statistical analysis of agricultural output from 2019 to 2021 reveals stark regional disparities and variability in productivity, underscoring the differing climatic and environmental pressures on different regions. But some regions: Nakhchivan Autonomous Republic, and Gazakh-Tovuz economic region showed relative stability of agricultural performance, while Baku City and Absheron-Khizi economic region experienced fluctuations in plant and livestock production. These differences indicate that local climatic conditions alongside resource use management and investments in infrastructure, are critical in shaping the resilience of agricultural productivity to climate stressors.

The analysis further suggests that livestock farming has been more vulnerable to climate variability than plant-based agriculture, thus sharpening the need for targeted interventions in this sector to build resilience. Another highlight is the range of total sowed area under agricultural crops in 2017-2021, based on climatic, land-use, and geopolitical changes. The area with the highest sown area ranged in 2018 and continued to drop over the next several years, possibly due to worsening drought conditions, poor water management, and, in some locations, socio-political catastrophes in some areas (State Statistical Committee of the Republic of Azerbaijan, 2025).

Traditionally, the Karabakh, Mil-Mughan, and Central Aran economic regions were the most productive in terms of cultivated land, but climate-induced changes have overlaid on socio-political dynamics, resulting in shifts in agricultural land use. The same cannot be said for conflict-affected regions like Khojavand, Shusha, and Jabrayil, however, where there is an apparent decline in agricultural productivity indicating the wider socio-economic effects of enduring instability and displacement on agrarian societies.

In light of these complications, Azerbaijan will need a holistic, multifaceted approach to climate adaptation within the agricultural sector. Investments in climate-smart agricultural practices drought-resistant crop varieties, advanced irrigation technologies, soil conservation methods will be critical for mitigating the negative impacts of climate change. Developing meteorological forecasting and early warning systems can guide farmers in preparing well for extreme weather events and minimize the threats posed by unpredictable climatic changes.

In addition, the Kura and Aras river basins are facing challenges that require improving water resource managements to guarantee sustainable irrigation and efforts

to prevent fighting over the utilization of this limited resource. The other important aspect which deals with the issue of climate adaptation is adhering to land management programs and afforestation.

In addition, outreach programs and hands-on education are going to help farmers and the agricultural base be better trained on how adaptive farming might be achieved. International cooperation with organizations like the Food and Agriculture Organization (FAO) and the World Bank can provide technical advisory and financial support in large-scale climate resilience projects in the agricultural sector of Azerbaijan.

Furthermore, policy making, needs to take into consideration the necessary economic incentives for farmers to shift towards more sustainable and climate resilient systems of agriculture. This could include subsidies for water-efficient irrigation systems, tax breaks for employing eco-friendly farming techniques and grants for research and development in climate-proof agriculture, all of which can help the sector become more resilient to climate-induced shocks. It will also be critical to create a strong insurance mechanism for farmers who suffer from climate-related losses.

Overall, climate change poses a significant threat to Azerbaijan's agricultural sector, with far-reaching consequences for food security, rural livelihoods, and economic sustainability. Increased temperatures, unpredictable rainfall patterns, and water scarcity endanger the yield of major crops and livestock production, which requires urgent adaptations. Lasers have already been proven as a viable option in particular areas, but climatic and socio-political conditions make it unaffordable in other parts.

Azerbaijan can minimize the adverse effects of climate change and establish a more resilient agricultural sector by investing in climate-smart agriculture, improving water resource management, and practicing forward-looking policies. Long-term sustainability will hinge on strengthening research and innovation, farmer education, and more. Whether these efforts are successful will be critical for the country’s capacity to produce food on a stable basis, protect its rural economy and respond to the changing demands of a changing climate.

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