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The Effects of Climate Change on Food Security

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Introduction

In the current situation, ensuring food security and maintaining it, especially due to growing demand and significant population growth on the one hand and excessive and incorrect use of limited and non-renewable resources and reserves and the emergence of challenges such as climate change on the other hand is very important. According to the World Bank, food security is achieved when all people have access to enough food at all times to live a healthy life. This has three aspects: "food availability", "access to food" and "sustainability in food intake" (Eslami AR, 2021). The threat of declining food security due to climate change is one of the major challenges of the 21st century. The impact of climate change on agricultural benefits and food security depends on the scale of climate change (Marzban *et al.*, 2023) .

Today, the issue of climate change is viewed as a common global issue. Observations from the last hundred years show that the Earth's climate has undergone relatively drastic changes (Kiani Ghalehsard S *et al.*, 2020). The Fifth Report of the Intergovernmental Panel on Climate Change (IPCC) has also predicted that climate change such as floods, droughts, hurricanes, and extreme heat waves will have severe impacts on natural and human conditions worldwide (Tumushabe, 2018). These severe events have adverse effects on water access and supply, economic infrastructure, food security, and economic well-being, especially for vulnerable people around the world who often live in rural areas (Fujimori *et al.*, 2019). Climate change affects food security in two ways:

Changes in agricultural productivity

The current world population is expected to reach 9 billion by 2050. The results of models have also shown that if the increase in the yield of important crops such as wheat, corn, and rice continues at the current level, crop systems will not be able to produce enough food to feed the world's population in the future. There is a big gap between the current

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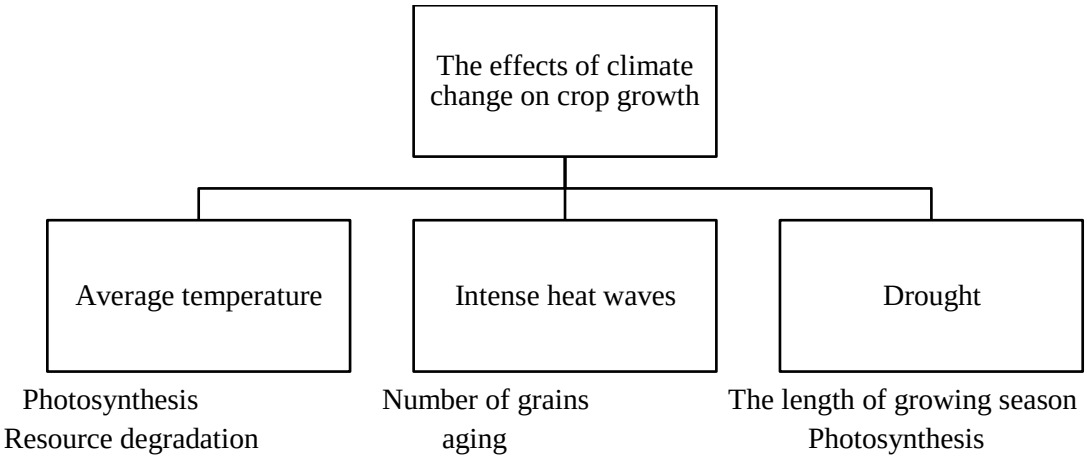
performance and the required performance trend. Increasing the production and quality of production space is needed by human society and at the same time we must be careful about environmental issues. However, climate change has made it very difficult to achieve these goals. The average temperature of the earth is about 1 °C warmer than previous decades. In this regard, temperature is expected to rise between 2 and 4 °C for decades to come. The number of climate shocks such as severe heat stress, drought, and floods will increase and continue (Eslami AR, 2021).

The first direct impact of climate change is water scarcity, which in turn reduces agricultural production. Global warming is likely to increase the length and productivity of growing seasons at higher latitudes, but drastically reduce growing conditions at lower latitudes (Alemu and Mengistu, 2019). A study, for example, attributed a 25% increase in Scottish potato yield between 1960 and 2007 to rising temperature, yet high-latitude soil quality, such as in Canada, is unsuitable for agricultural products. These changes are unlikely to be fully offset elsewhere (Skelsey *et al.*, 2018).

At the same time, increasing the level of carbon dioxide can have a positive effect on the yield of C3 crops, such as wheat and rice. However, whether these positive effects can completely neutralize other negative effects, such as the effect of rising temperature on cropping systems or not, is a matter for experts. Climate change, on the one hand, increases the average temperature and, on the other hand, increases the probability of high temperature shocks in the future. In other words, climate change is causing a new temperature norm (Eslami AR, 2021).



Changes in the economy of society (Ecosocial)

Climate change can affect the three aspects of "food availability", "access to food" and "sustainability in food intake". As a result of these changes, food production will increase in price, and as a result, food will become a scarce commodity (Bryson *et al.*, 2021).

The stability of food supply can be affected by changes in the amount of rainfall caused by climate change, and in fact climate change affects food availability as well as food prices by increasing the prevalence and severity of drought or floods (Ghalehsard *et al.*, 2021). Microbial growth rate at high temperatures, especially in fresh fruits and vegetables, increases and threatens many diseases, especially children and the elderly (Molotoks *et al.*, 2021). In the Caribbean, climate change in this way has increased the challenge of food security (Lincoln Lenderking *et al.*, 2021).

The researchers examined the impact of disruptions in global food markets on the economic activity of 75 developed and developing countries and the impact of changes in global food prices for each country affected by harvest disruptions and atmospheric shocks in other parts of the world (Kiani Ghalehsard S *et al.*, 2020). Production disturbances are unforeseen shocks to the total volume of the four major

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foodstuffs (corn, wheat, rice, and soy). Several indicators of economic activity are declining as a result of food market disruptions, while consumer prices are rising significantly. Research results for the United States and the euro area have shown that rising food prices through the food supply chain affects retail price of food, and also have indirect inflationary effects through wage increases and exchange rate fluctuations. In addition, households not only reduce food consumption, but also reduce sustainable consumption and investment, and it is partly the result of monetary policy to stabilize the consequences of inflation. In general, macroeconomic effects are several times the maximum effect of the share of foodstuffs in the consumer price index and household consumption (Eslami AR, 2021). Therefore, to reduce the effects of climate change on food security, methods and policies must be adopted. The first step can be changing the irrigation pattern and replacing irrigation farming with dry farming. Changing cultivation methods as well as cultivation patterns and moving towards modern irrigation patterns and cultivating crops with less water requirements can also be effective in reducing the effects of climate change.

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