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Impacts of Global Warming on Agriculture Sector in Haryana

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Abstract

This research paper aims to analyze the impacts of global warming and climate change on the agriculture sector in Haryana, a state in India heavily dependent on agriculture for its economy. The paper will discuss the various manifestations of climate change and global warming, such as rising temperatures, changes in rainfall patterns, and extreme weather events, and how these changes affect crop production, irrigation, and farmer livelihoods. Additionally, the paper will explore the potential adaptation strategies and policy measures that can be implemented to mitigate the negative effects of climate change on the agriculture sector in Haryana.

Keywords

Global Warming, Climate Change, Intergovernmental Panel, Precipitation, Hydrological Cycles, Groundwater Resources, Agricultural Production, Rabi, and Kharif.

Introduction:

Haryana is primarily an agrarian state, with more than 80% of its population engaged in farming activities. The agriculture sector in Haryana has been greatly impacted by global warming and climate change, leading to significant challenges for farmers and food security. This research paper aims to explore the key impacts of climate change on agriculture in Haryana and propose adaptation strategies and policy measures to build resilience. Global warming and climate change are already having a significant impact on agriculture around the world, and this impact is expected to become more severe in the future. Haryana is a state in northern India that is particularly vulnerable to the impacts of climate change, due to its location in the semi-arid tropics.

Impact of Climate Change and Global Warming:

The Earth's temperature, precipitation patterns, and hydrological cycles are already being impacted by climate change, which is mostly caused by the burning of fossil fuels. There will probably be more variations in the amount and frequency of precipitation, heat waves, and other extreme weather, all of which will have an effect on agricultural output. Moreover, a

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combination of climate-related factors can reduce plant yield, raising the cost of many major agricultural products. Almost 70% of the freshwater resources in the country are used by the water-intensive agricultural sector. Climate change's effects on water supplies will therefore have a significant impact on agriculture. The amount of surface water available will not keep up with the amount of water required for agriculture. As agricultural water demand rises in the summer, surface runoff is anticipated to decrease. It is yet unclear how climate change will affect groundwater supplies. Recent studies, meanwhile, indicate that they might diminish.

Global Warming and Cropping Pattern in Haryana

Global warming is having a significant impact on the cropping pattern in Haryana. The state is experiencing an increase in mean temperature and a decrease in monsoon rainfall. This is leading to more frequent and severe droughts and heat waves. These changes in climate are making it more difficult to grow traditional crops such as wheat and rice.

As a result, farmers in Haryana are increasingly shifting to more drought-tolerant and heat-resistant crops. Some of the crops that are becoming more popular include pulses, oilseeds, and millets. These crops are more resilient to climate change and can be grown with less water.

In addition to shifting to more drought-tolerant crops, farmers in Haryana are also changing their cropping patterns. For example, many farmers are now planting multiple crops in a single year. This is known as crop diversification. Crop diversification helps to reduce the risk of crop failure in the event of a drought or other extreme weather event.

Another way that farmers in Haryana are adapting to climate change is by changing their sowing and harvesting times. For example, some farmers are now sowing wheat and rice earlier in the year, so that the crops can mature before the onset of the hot and dry summer months.

The following are some specific examples of how global warming is impacting the cropping pattern in Haryana:

- Wheat: Wheat is a major crop in Haryana, but its production is declining due to global warming. The ideal temperature for wheat growth is between 15 and 25 degrees Celsius. However,

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temperatures in Haryana are now regularly exceeding 30 degrees Celsius, which is reducing wheat yields.

- Rice: Rice is another major crop in Haryana, but its production is also declining due to global warming. Rice is a water-intensive crop, and the state is experiencing increasingly frequent and severe droughts. In addition, the rising temperatures are causing rice pests and diseases to thrive.
- Millets: Millets are a group of drought-tolerant crops that are becoming more popular in Haryana due to global warming. Millets are also nutritious crops that can help to improve the food security of the state.
- Pulses: Pulses are another group of crops that are becoming more popular in Haryana due to global warming. Pulses are also leguminous crops, which means that they fix nitrogen in the soil. This helps to improve soil fertility and reduce the need for chemical fertilizers.

The shift to more drought-tolerant and heat-resistant crops, as well as crop diversification and changes in sowing and harvesting times, are all important adaptation measures that farmers in Haryana are taking to address the challenges of global warming.

However, it is important to note that these adaptation measures are costly and time-consuming. Farmers need support from the government and other stakeholders in order to implement these measures effectively.

Impacts of Global Warming and Climate Change on Agriculture:

Rising temperatures: Haryana has experienced a significant increase in temperatures over the past few decades. These rising temperatures have negatively impacted crop yields, particularly for heat-sensitive crops like wheat and mustard. Higher temperatures also increase the incidence of pests and diseases, further reducing productivity.

Changes in rainfall patterns: Climate change has resulted in altered rainfall patterns, leading to more frequent droughts and unpredictable precipitation. This affects the availability of water for irrigation and leads to crop failure, water scarcity, and reduced incomes for farmers.

Extreme weather events: Haryana is now prone to extreme weather events such as heatwaves, floods, and storms, all of which have severe consequences for agriculture. Floods can destroy

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crops, erode soil, and lead to post-harvest losses, while heatwaves can scorch crops and impact livestock health.

The main impacts of climate change on agriculture in Haryana are:

The following data table shows some of the impacts of global warming and climate change on the agriculture sector in Haryana:

Impact	Data	Source
Increase in mean temperature	The mean temperature in Haryana has increased by 1.1 degrees Celsius over the past 50 years.	Indian Meteorological Department (IMD)
Decrease in monsoon rainfall	The average monsoon rainfall in Haryana has decreased by 5% over the past 50 years.	IMD
Decline in crop yields	The yields of major crops such as wheat, rice, and maize have declined in recent years.	Government of Haryana
Increase in pests and diseases	The incidence of pests and diseases has increased in recent years.	Government of Haryana
Increase in water scarcity	The water table is declining, and there is a greater frequency of droughts.	Government of Haryana
Economic losses for farmers	Farmers are incurring losses due to crop failures, increased costs for pesticides and other crop protection measures, and water scarcity.	Government of Haryana

The impacts of global warming and climate change on the agriculture sector in Haryana are complex and far-reaching. These impacts are already being felt by farmers in the state, and they are expected to worsen in the future.

The government of Haryana is taking a number of steps to address the challenges of climate change, such as promoting drought-tolerant crops, improving water management, regulating groundwater extraction, and promoting integrated pest management practices. However, more needs to be done to help farmers adapt to the impacts of climate change and ensure the food security of the state.

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Changes in temperature and rainfall patterns: Haryana is experiencing an increase in mean temperature and a decrease in monsoon rainfall. This is leading to more frequent and severe droughts and heat waves. The following are some data from the Indian Meteorological Department (IMD) that show the changes in temperature and rainfall patterns in Haryana over the past few decades:

- Mean temperature: The mean temperature in Haryana has increased by 1.1 degrees Celsius over the past 50 years.
- Monsoon rainfall: The average monsoon rainfall in Haryana has decreased by 5% over the past 50 years.

The IMD has also predicted that the mean temperature in Haryana is likely to increase by another 2-3 degrees Celsius by the end of the 21st century. This, along with the predicted decrease in monsoon rainfall, is likely to lead to more frequent and severe droughts and heat waves in the state.

The impacts of climate change are already being felt by farmers in Haryana. The state has experienced a number of severe droughts in recent years, which have led to crop failures and economic losses for farmers. Heat waves are also becoming more common and more severe, and these can have a devastating impact on livestock.

The changes in temperature and rainfall patterns are also having a negative impact on water resources in Haryana. The state is already facing a water shortage, and this is likely to worsen in the future. This will make it even more difficult for farmers to grow crops and raise livestock.

Increased water scarcity: Climate change is exacerbating water scarcity in Haryana, which is already a water-stressed state. This is due to a combination of factors, including reduced rainfall, increased evaporation due to higher temperatures, and over-extraction of groundwater. Haryana is a semi-arid state with a limited water supply. The state receives most of its rainfall during the monsoon season, which runs from June to September. However, the monsoon rainfall has been decreasing in recent years, and this trend is expected to continue due to climate change.

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In addition to the decrease in rainfall, climate change is also leading to increased evaporation due to higher temperatures. This is because warmer air can hold more moisture. As a result, more water is evaporating from the soil and water bodies, which is reducing the overall water availability in the state.

Finally, over-extraction of groundwater is another major factor contributing to water scarcity in Haryana. Groundwater is a major source of water for irrigation and drinking in the state. However, farmers and households are extracting groundwater at a rate that is faster than it can be replenished. This is leading to a decline in the groundwater table, which is making it more difficult and expensive to access water.

The water scarcity in Haryana is having a significant impact on the state's economy and society. Farmers are struggling to produce crops, and households are facing water shortages. This is leading to economic losses and social unrest.

The government of Haryana is taking a number of steps to address the water scarcity crisis. These include:

- Promoting water conservation: The government is encouraging farmers and households to conserve water by using water-efficient irrigation practices and rainwater harvesting techniques.
- Improving water management: The government is investing in water infrastructure projects to improve water distribution and storage.
- Regulating groundwater extraction: The government has introduced regulations to limit the amount of groundwater that can be extracted.

However, more needs to be done to address the water scarcity crisis in Haryana. The government and other stakeholders need to work together to develop and implement sustainable water management practices. This will help to ensure that everyone in the state has access to adequate water for their needs.

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Increased pests and diseases: Climate change is also leading to an increase in pests and diseases that affect agricultural crops. This is due to warmer winters and more humid summers, which provide ideal conditions for pests and diseases to thrive. Some of the pests and diseases that are becoming more common in Haryana due to climate change include:

- Fall armyworm: Fall armyworm is a caterpillar that can damage a wide range of crops, including maize, sorghum, and rice. The fall armyworm was first detected in Haryana in 2018, and it has since become a major pest in the state.
- Whitefly: Whitefly is a sap-sucking insect that can damage a wide range of crops, including cotton, tomato, and okra. Whitefly populations are increasing in Haryana due to warmer winters.
- Rust diseases: Rust diseases are a group of fungal diseases that can damage a wide range of crops, including wheat, barley, and oats. Rust diseases are becoming more common in Haryana due to warmer temperatures and more humid summers.
- Blight diseases: Blight diseases are a group of fungal diseases that can damage a wide range of crops, including rice, maize, and tomato. Blight diseases are becoming more common in Haryana due to warmer temperatures and more humid summers.

The increase in pests and diseases is having a significant impact on agricultural productivity in Haryana. Crop yields are declining, and farmers are incurring additional costs due to the need to use pesticides and other crop protection measures.

The government of Haryana is taking a number of steps to address the challenge of pests and diseases. These include:

- Promoting integrated pest management (IPM) practices: IPM is a holistic approach to pest management that focuses on preventing pests from establishing themselves in the first place, rather than relying solely on pesticides. The government is encouraging farmers to adopt IPM practices by providing training and financial assistance.
- Developing resistant crop varieties: The government is supporting research to develop crop varieties that are resistant to pests and diseases.

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- Providing early warning systems: The government has established early warning systems to alert farmers to the outbreak of pests and diseases. This helps farmers to take timely action to protect their crops.

These impacts of climate change are having a significant negative impact on agricultural productivity in Haryana. Over the past few decades, there has been a decline in the yields of major crops such as wheat, rice, and maize. This is having a knock-on effect on the livelihoods of farmers and the overall economy of the state.

Impact of Global Warming and Climate Change	Agriculture Sector in Haryana
Increase in mean temperature	Decline in crop yields, increased pests and diseases, water scarcity
Decrease in monsoon rainfall	Increased frequency and severity of droughts, water scarcity
Increased frequency and severity of droughts	Crop failures, economic losses for farmers
Increased frequency and severity of heat waves	Devastating impact on livestock, water scarcity
Increased evaporation due to higher temperatures	Reduced water availability
Over-extraction of groundwater	Decline in groundwater table, making it more difficult and expensive to access water
Increase in pests and diseases	Decline in crop yields, increased costs for farmers

The impacts of global warming and climate change on the agriculture sector in Haryana are significant and far-reaching. These impacts are already being felt by farmers in the state, and they are expected to worsen in the future.

The government of Haryana is taking a number of steps to address the challenges of climate change. However, more needs to be done to help farmers adapt to the impacts of climate change and ensure the food security of the state.

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Adaptation Strategies and Policy Measures:

Crop diversification: Promoting crop diversification can help farmers withstand the negative impacts of climate change. Encouraging the cultivation of climate-resilient crops, such as millets and drought-tolerant varieties, can enhance agricultural sustainability.

Water management: Efficient water management practices, such as rainwater harvesting, groundwater recharge, and improved irrigation techniques like drip irrigation, can help farmers cope with changing rainfall patterns and water scarcity.

Technology adoption: Promoting the adoption of climate-smart technologies, such as precision farming, use of weather forecasting tools, and agro-forestry, can enhance agricultural productivity and resilience to changing climatic conditions.

Infrastructure development: Investing in robust infrastructure such as water reservoirs, canal networks, and rural electrification can provide better water access and irrigation facilities, reducing the vulnerability of farmers to climate change.

Capacity building and awareness: Conducting training programs and awareness campaigns on climate change adaptation and sustainable farming practices can empower farmers to make informed decisions and adopt resilient strategies.

Conclusion:

The agriculture sector in Haryana is highly susceptible to the impacts of global warming and climate change. It is crucial for policymakers and stakeholders to address these challenges through the implementation of adaptation strategies and policy measures. By diversifying crops, improving water management, adopting climate-smart technologies, and developing necessary infrastructure, the agriculture sector in Haryana can become more resilient and less vulnerable to the impacts of climate change, ensuring food security and sustainable livelihoods for farmers. Global warming not only has its negative effects on animals and man but it can even leave an adverse effect on the crop production. The sudden changes in temperature such as the average temperature rising in majority of the seasons affects the amount of rainfall. This can seriously damage the growing of crops. Because of the higher temperatures the seasons are becoming unstable. There is decreased snow fall and increased rain as more and more evaporates because of intense heat in many regions. There is less amount of snow fall in the colder regions and the climatic changes have given birth to new bacterial diseases that are damaging the crops.

References:

1. Agarwal, P. K., & Sivakumar, M. V. K. (2019). Global Climate Change and Food Security in South Asia: An Adaptation and Mitigation Framework. In R. Lal, M. V. Sivakumar, A. H. M. M. R. M. A. Faiz, & K. R. Islam (Eds.), *Climate Change and Food Security in South Asia*. New York: Springer Science & Business Media.
2. Cline, W. R. (2007). *Global Warming and Agriculture: Impact Estimates by Country*. Washington D.C.: Peterson Institute.
3. Fulekar, M. H., Pathak, B., & Kale, R. K. (2013). *Environment and Sustainable Development*. New York: Springer Science & Business Media.
4. Mendelsohn, R., Dinar, A., & Sanghi, A. (2001). The effect of development on the climate, *6*, 85–101.
5. National Crime Records Bureau. (2012). Accidental Deaths & Suicides in India 2012. *ADSI Report Annual – 2012*.
6. Prasada, G. S. L. H. V., Rao, V. U. M., & Rao, G. G. S. N. (2010). *Climate Change and Agriculture Over India*. New Delhi: PHI Learning Pvt. Ltd.
7. Rajeevan, M. (2013). Climate Change and its Impact on Indian Agriculture. In P. K. Shetty, S. Ayyappan, & M. S. Swaminathan (Eds.), *Climate Change and Sustainable Food Security*. Bangalore.
8. Sanghi, A., Mendelsohn, R., & Dinar, A. (1998). The Climate Senitivity of Indian Agriculture. In A. Dinar (Ed.), *Measuring the Impact of Climate Change on Indian Agriculture, Volumes 23-402*. Washington D.C.: World Bank Publications.
9. Tiwary, D. (2014, August). NDA, UPA failed to curb farmer suicides – The Times of India. *The Times of India*. New Delhi.