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Impact of climate change on agriculture:

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Abstract: Changes in climate are not uniform across the Earth. In particular, most land areas have warmed faster than most ocean areas. The Arctic is warming faster than most other regions. Climate change is having many effects on the oceans. These include rising ocean temperatures, sea level rise due to ocean warming and melting ice sheets. These include increased ocean stratification. These also include changes in ocean currents, including a weakening of the Atlantic Meridional Reversing Circulation. 10 Carbon dioxide from the atmosphere is making the ocean acidic.Recent warming has had major impacts on natural biological systems. It has degraded the land by raising temperatures, drying out the soil and increasing the risk of wildfires. Climate change causes soils in some areas to become drier, so they can absorb rainfall more quickly. This reduces floods. Dry soil can also become hard. In this situation heavy rainfall flows into rivers and lakes. This increases the risk of floods.

Key Words: Climate change physical environment, ecosystems and human society.

Climate plays an important role in determining the lifestyle, food habits, agricultural economy etc. of a particular nation. Today the world is facing a serious problem. The ill effects of this problem are gradually becoming visible to the world. At present, it remains a debatable issue due to the global and regional effects of climate change. Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activities. Climate change is a significant and lasting change in the statistical distribution of weather patterns over a period of several decades to millions of years. Human life and natural environment are closely related to each other. The disturbance of one does not leave the other unaffected. Behavioral scientists have discovered a new dimension these days. According to him, environmental imbalance is an important reason for the behavioral disturbances of human society spread all over the world. They believe that for a good society and a good man, it is necessary that nature should be rich and prosperous. This is also correct. Nowadays the mutual interaction between nature and society is so widespread that the entire human race is being affected by it. The causes of environmental anomalies are said to be industrialization, urbanization, depletion of traditional sources of energy and raw materials, disruption of natural imbalances, destruction of the means of food and drink of various animals, trees and plants. Free scientific progress and technological capabilities have given great strength to man. We can move mountains. The course of rivers can be changed. Can create new oceans.

It is okay to transform the environment to suit human needs to a certain extent. This means that we can make a lot of changes in the natural world. But which changes are appropriate and which are inappropriate? What will bring good results and what will bring bad results? We will also have to fight destructive natural forces like earthquakes, typhoons, cyclones, floods and droughts, magnetic and solar storms. But this can be done only according to the rules by which the biosphere works and develops as an integral and self-regulating system. Today's environmental issues are not limited to pollution and other negative consequences of human economic

activities. It is also related to shaping our lifestyle. Indiscriminate material development without thinking about it has posed a threat to the existence of the earth today.

Due to global warming, the average temperature of the Earth's atmosphere has increased by 0.74 ± 0.18 °C (1.33 ± 0.32 °C) over the 100 years to 2005. The Intergovernmental Panel on Climate Change has concluded that "the increase in the world's average temperature since the mid-20th century is largely due to human-produced greenhouse gases. As the name suggests, the continuous worldwide increase in the temperature of the earth's atmosphere is being called 'global warming'. Our earth receives heat from the sun's rays. These rays pass through the atmosphere and hit the earth's surface and then get reflected from there and return again. The Earth's atmosphere is made up of many gases, including some greenhouse gases. Most of these form a kind of natural cover over the earth which blocks a part of the returning rays and thus keeps the earth's atmosphere warm. It is noteworthy that a temperature of at least 16 degrees Celsius is necessary for the survival of humans, animals and plants. Scientists believe that as greenhouse gases increase, this cover becomes even denser or thicker. In such a situation, this cover starts blocking more rays of the sun and then the side effects of global warming start from here. Climate change models produced by the IPCC indicate that average global surface temperatures may increase further during the 21st century. This increase in temperatures around the world is causing sea level rise, an increase in extreme weather, and significant changes in the amount and composition of rainfall. Other effects of global warming include changes in agricultural yields, modifications in trade routes, retreat of glaciers, threat of extinction of species, etc. As long as there is environment, there is human life and this is the whole world. But consumerist culture is destroying our earth and our environment. We are deliberately cutting the branch on which we are sitting. The habit of enjoyment and luxury which the multinational companies and the neo-liberal system have so deeply nurtured in us, is now bent on destroying us. How long will the human species continue to exist? Which areas will be destroyed by sea storm, tsunami or excessive rain, and on what scale will there be loss of life and property. How many areas will turn into desert? How much havoc will flood, drought or untimely rain wreak on so many people? First, it is important to know what global warming or climate change is and what its consequences are and what are going to happen, to protect the existence of the earth and mankind.

Climate change is the result of natural changes happening around us. The scientific community also agrees with this. Surface temperatures have increased over the past century. And we are seeing its effect on physical and biological systems. All parts of human life are affected by climate change. Special areas are human health, economy and agriculture. India has 2.4% of the world's land area, 18% of human population and 15% of livestock. Although agriculture accounts for about 15% of India's GDP, about 46% of India's geographical land is under cultivation, with agriculture being the source of income for more than 50% of the population. Although Indian agriculture has grown tremendously since the 1960s, and we have addressed food insecurity, new challenges have emerged. On the one hand, there is the continuing problem of feeding India's population, while on the other hand, the problem of maintaining agriculture as an economic resource and the impact of climate change have compounded the already severe challenges. Risk management under the impact of climate change (drought, flood, hailstorm, heavy rain) is a major challenge. About 86% of Indian agriculture is small-holder agriculture, and a significant portion of it, especially in arid areas, is subsistence agriculture. The agricultural land area, which is exclusively dependent on rainfall, is becoming more vulnerable to climate change. The Government of India's Economic Survey 2020 has conducted a detailed analysis of the impact of climate change on the Indian agriculture sector. According to this analysis, a one degree increase in temperature will result in a decline of 6.31% in agricultural income during the Kharif season and 6.17% during Rabi in non-irrigated areas of the country. Along with this, a decrease of 100 mm in average rainfall will lead to a decline of 16.5% in farmers' income during Kharif season and 7.25% during Rabi season. Considering the fact that 67% of the net sown agricultural area is rainfed, these impacts are going to be huge for Indian farmers. 84% of the country's

rural people live in non-irrigated rain-fed agricultural areas. This reflects the potential impacts of climate change on agricultural production, rural economy and thus the country's GDP growth. A recent estimate suggests that agricultural production could decline by 4% to 25% of current agricultural output by 2050. Climate change will affect not only crop yields but also Indian livestock. According to one analysis, an increase in 2-6 °C would lead to increased disease and mortality in cattle, decline in milk yield (0.63% in crossbreeds, 0.5% in buffalo, 0.4% in native cattle) and adverse effects on cattle fertility. There will be an impact. Thus, changes in aquatic and ecological systems are expected to affect the behaviour, distribution and migration of fisheries, as well as their reproductive potential.

India has started paying attention to the impacts of climate change on agriculture and this is also included in its priority. The National Action Plans on Climate Change (AAPCC), India's national action plan on climate change, consists of eight missions - sustainable agriculture (developing abiotic stress-tolerant varieties, insurance mechanisms), Green India (conserving forests and maintaining ecological balance), water conservation and supporting research on climate. They were launched in 2008 to deal with issues related to climate change. Research on the impact of climate change on agriculture is a high priority for India. In these, special attention has been given mainly to the following schemes.

1. Soil management (organic farming, zero tillage, retention of agricultural residues), crop diversification, cropping system adaptation.
2. Management (crop rotation, changing cropping patterns and crop mixing, short duration crop varieties, development of seed varieties adapted to biotic and abiotic stresses)
3. Water management (expanding irrigation coverage and improving water use efficiency through laser land leveling, micro irrigation systems)
4. Sustainable land management (agriculture, conservation agriculture); Risk sharing (co-investment, community engagement), risk transfer (crop/livestock insurance)
5. Better forecasting and agri-advisory (localized weather forecast, SMS and dedicated web portal for farmers)
6. Various development programs like food security, livelihood like PDS and MNREGA can be adapted keeping climate change in mind.

Focusing on climate change adaptation (Kanchajanjpavd) policy and developing adaptive capacity of farmers is a major concern in Indian agriculture. This can be understood from the fact that agriculture is a primary source of livelihood, with more than 50% of the population dependent on agriculture as the main source of income. Given the scale and scope of potential climate impacts in the agricultural sector, there is a need to change the practice of individual sectors and specific programs and to mainstream climate change considerations into various development programs in agriculture and allied sectors. Furthermore, various development programs for food security and livelihoods such as PDS and MNREGA can be adapted to take into account climate change. Adaptation to climate change in the agricultural sector will require large and sustained investments not only economically, but also in terms of knowledge and human capacity.

Impact of climate change on agriculture: Agriculture has been negatively affected on a large scale by climate change. It is worth noting that most of India's agriculture is rain-dependent, due to which there is uncertainty about the monsoon. Climate change has made the monsoon more uncertain. Also, due to abnormal distribution of rainfall, situations like floods at some places and drought at others are becoming visible. Other than this

- Floods in North-East India, cyclones in eastern coastal areas, drought in North-West, increase in frequency and intensity of heat waves in central and northern areas.
- Decrease in soil moisture and increase in intensity of infection by pests and diseases. Due to increase in concentration of CO2 in the atmosphere, deficiency of protein and other essential elements has been observed in most of the food crops like wheat, rice, soybean.

- The intensity of heat waves due to climate change has not only increased the vulnerability of animals to diseases but has also reduced fertility and milk production.
- According to the Food and Agriculture Organization (FAO), India has lost about 125 million tonnes of food grain production by the year 2015.
- According to an estimate, the intensity of the Indian summer monsoon may increase by only 10 percent by the year 2100.
- According to the Indian Agricultural Research Institute (IAR), for every 1°C increase in temperature, wheat production decreases by 4-5 million tonnes.
- Due to extreme heat, the wheat yield in the Indo-Gangetic plains may decrease by up to 51 percent.
- Due to climate change, agricultural production is being negatively affected by the decline in the number of pollinating insects like butterflies and bees.

Impact of climate change on the economy:

I. 1°C increase in temperature could reduce economic growth in middle-income emerging markets by 0.9% per year.
II. Climate change will have the greatest impact on middle-low income economies.

According to one estimate, about 5-20% of the annual global GDP may be spent on reducing emissions as a result of climate change. According to a World Bank report, climate change could push 45 million Indians into extreme poverty in 15 years, hampering economic progress.

A. Rising sea temperature can pose a threat to coral reefs.
B. It is noteworthy that Coral Reef produces an estimated $375 billion annually in the form of goods and services.
C. Climate change will increase income inequality, as well as it will increase migration at national and international levels.

We need to make conservation of the earth and its resources a part of our lifestyle. Nature nourishes us. In return, we have to give priority to the care and conservation of nature. There is a need to promote research and development in the related field. At the same time, India also needs to develop indigenous green technology. Climate change has a visible impact on the environment. Glaciers have shrunk. The areas of plants and animals have shifted and trees are flowering much earlier. Future climate scenarios project that summer temperatures are expected to increase by 20 to 50 Celsius and rainfall is expected to decrease by about 15 percent. Recently, the United Nations-backed Intergovernmental Panel on Climate Change (IPCC) has warned that the world will not survive if carbon emissions are not stopped. If the world is to be saved from dangerous climate changes, then indiscriminate use of fossil fuels will have to be stopped soon. IPCC has said that by the year 2050, it is necessary to produce most of the world's electricity from low-carbon sources and this can be done. After this, without carbon capture and storage, the use of fossil fuels should be completely stopped by 2100. The Secretary General of the United Nations said that science has made its point. There is no doubt about it. Now leaders must take action. We don't have much time. He said that just like you do when your child has fever, first of all we need to bring down the temperature. For this, action needs to be taken immediately and on a large scale.

Conclusion: Therefore, it is clear that changes in climate are having a negative impact on the environment. According to researchers, human activities during the last few decades have played an important role in accelerating this change. To control climate change and maintain a healthy environment on Earth, the impacts caused by human activities on Earth need to be controlled. Developed and developing countries of the world will have to come together and find a solution to this problem. This is not the problem of any one country or one person. This is a problem of the whole world and its solution will have to be solved by the whole world together.

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