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Review Article

Impact of Rising Temperature on Global Food Security

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ABSTRACT

Today, Climate change is a complicated and widespread matter that needs an inclusive global strategy. Rising temperatures has a contrary effect on our agriculture and food security. It is the major threat and challenge for the countries having large population. The purpose of this paper is to evaluate the effect of change in weather conditions on agriculture production of advanced and emerging nations and their strategies to deal with it. The main etiology of rise in temperature is the release of green- house gases in the environment. As a result, temperatures are rising due to the change in weather conditions. Rising temperatures is affecting precipitation patterns, changing growing seasons, affecting quality and quantity of crops. Mainly, anthropogenic activities are contributing for the climatic conditions. Weather alteration has great impact on agriculture productivity and may threaten our future food supply. The 2022 report of the "intergovernmental panel on climate change, depicts a faint picture of forthcoming of life on earth". A large number of populations may face hunger by the year 2050. It has been found that developing countries are facing more problems to deal with these climatic conditions. There is a need for more government policies to make our future generations safe and to achieve food security, there is a need to develop weather resilient irrigation structures.

INTRODUCTION

Climate change is associated with various negative effects such as food insecurity, loss of biodiversity, various health problems etc.

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Agriculture depends on climate. In recent years, the consequence of weather alteration on agricultural productivity has become a severe global issue. Climate change includes temperature fluctuations, change in weather conditions, shifting of weathers and changing precipitation patterns. Glaciers are melting, sea level is increasing resulting in heavy floods and affecting crops at a large scale. Green- house gases have a great contribution in the changing of climatic conditions globally. The main green- house gases defined by, "Kyoto Protocol are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and fluorinated gases such as hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) (UNFCCC 2008)". "According to a report prepared by UNDP (United Nations Development Programme) in 2019, total green- house gas emission in 2018 was 55.3 $GtCO_2e$, of which 37.5 $GtCO_2$ are attributed to fossil CO_2 emissions from energy production and industrial activities". The emission from fossil fuel oxidation and cutting of trees have contributed to a rise in the concentration of green -house gases in atmosphere. Global agricultural division is responsible for 30-40% of all green- house gas release and contributing to climate change.

Food safety was defined at the 1996 world food submits as, "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food, that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2008). Changing nature of climate predictability impacts crop production, with global yields projected to decline by 3.1%-7.4% for each 1degree Celsius temperature increase. As per 2005 baseline there will be a rise in worldwide yield demand of 100%-110% by 2050, which is boosted by population evolution and larger per capita income. According to a report "A 60% increase in global food demand will occur by the year 2050" due to the population increases.

Droughts, floods and heat waves affect agriculture drastically. "Extreme temperature and famines have minimized global cereal production by 9-10%". In India heating temperatures have reduced wheat yields by 5.2%. "International panel on climate change (IPCC) 2018 proclaims that emission of CO_2 caused by human activity must reach net zero by 2050 to keep the average rise in global temperature at 1.5 degree C above preindustrial levels to reduce catastrophic climate change risk on populations". Use of Acs in cars as well as in homes contributing in usual temperature increase at large scale.

Hunger Index has increased due to the effects of weather alteration in developing countries because of the large population. The figure of individuals suffering from continuing appetite has enlarged. So, we can say food security is linked with climate change directly or indirectly.

According to IPCC's sixth assessment report anthropogenic emissions have resulted in a global temperature rise of 1.1 degree Celsius since last few years. The report states that unless there are immediate, rapid and collective reduction in green -house gases emissions, the curtailment in worldwide temperature upsurge to 1.5 or even 2 degrees Celsius which will be beyond our reach. As per the IPCC (2019) a projected 23% of total human caused green -house gas releases from 2007-2016 have resulted from agriculture.

Global Scenario of Weather Alteration

Agriculture is the main segment of every country and responsible for food security. Rice is the main staple food of Asian countries and considered the second biggest cereal crop produced in the world. Rice is cultivated in 114 countries of the world over a total land of about 153 MHA. Asia produces 90% of global rice. But the increasing levels of green -house Gases in the Environment have

reduced the production of rice and other commodities like wheat and maize drastically. Because of the consequence of weather alteration rainfall pattern has altered. There is a reduced precipitation in "Asia and South East Asia". Snow on glaciers is melting. Projected scenario of worldwide heating shows that the worldwide usual surface heating could increase by 1.4 to 5.8 degree C by the year 2100. Increased global population has contributed in deforestation because of the increased demand of land for construction of houses for such a large population. Asian agriculture is responsible for two thirds of global agricultural GDP. The concentration on biological farming in emerging nations is rising as it places more trust on chemical free and human resources existing. The utmost effect of biological cultivation is on the mind of the people. It uses old-style and native agricultural information. But because of climate change and the large people in some of the countries the agricultural production as a result of organic farming is insufficient.

Indian Scenario of Climate Change

As far as India is concerned, global heating may be extra noticeable in the northern regions of the country. Some spots are predictable to experience extra rain while the other places may continue to dry. In this year 2024, all the previous records of temperature have been broken as summers were comparatively hot and there was a longer summer season. In the monsoon season there was rain deficit in northern parts of the country. Forest fires in the states of Himachal Pradesh and Uttarakhand has affected the biodiversity at large scale. Population is also the major factor responsible for climate change as land is needed to construct the houses and forest area is decreasing. India's agriculture predominantly depends on the monsoons. So, any change in the monsoon season or rain pattern definitely effects the crop quantity. "In the Indo- Gangetic plain, these monsoon changes will affect the wheat production (IPCC 2007)". In the eastern parts of India paddy crop is being affected due to drought like situations. One Degree Celsius upsurge in heating may lessen production of wheat, soyabean, mustard, groundnut and potato by 3-7%. Himalayan regions like mountains of Himachal Pradesh and Kashmir are experiencing less snow due to the consequence of weather alteration and apple production is likely declining. Studies at the, "Indian Agricultural Research Institute predicts the possibilities of loss of 4-5 million tons in wheat production in future". IPCC has predicted to rise winter temperature and it will adversely affect the wheat production. Every year many farmers commit suicide who are totally depend on the agriculture for their livelihood.

"According to A.K Singh, deputy director-General (natural resource management) of the Indian Council of Agricultural Research, medium term climate change predictions have projected the reduction in crop productions due to climate change at between 4.5 and 9 % by 2039". The effects of climate change on farming differ across diverse parts of India. Studies shows that July to September monsoon rainfall is anticipated to decrease and winter rainfall is anticipated to increase. This could lead to high incidence of famines and deluges in some areas. The effect of climate change can be lessened with appropriate climate change adaptation.

Strategies to combat climate change

Many strategies have been taken by developed and developing nations to combat climate change. electric vehicles may have significant control on air pollution. Growing more and trees even on the road First and fore-most method is to reduce the level of green-house gases in the environment. Practice of low carbon energy sources should be

encouraged more and more. Low energy bulbs should be used in homes and passengers should switch from road to rail to decrease the pollution level in the environment. Car pool system or maximum use of public transportation, less use of private transportation and use of sides of the cities also reduces the pollution level in the environment. Certain lifestyle changes, purchasing local produce and eating less meat. Forests should be cared well to reduce forest fire. Green your home, insulate your home, minimize the use of wasteful goods and recycle the goods you do use.

Government should provide more and more funds to strengthen research in agricultural sector to increase its productivity level. So that new techniques can be used for growing crops. Farmers should be given financial support and incentives for resource conservation. National grid grain storages at different levels like local, block and district level should be established for storage and food security. Seasonal weather forecast system should be strengthened for sowing and irrigation patterns. Crop rotation is also a best method to increase productivity level. High variety crops, drip irrigation methods should be encouraged. Make an extended- period land use strategy for guaranteeing food safety. More and more land use should be encouraged for agriculture purpose. Guidance and awareness camps should be organized for small scale farmers to give proper knowledge about new agricultural techniques so that the crop production will increase.

Several nations have executed National weather policies to deal with climate change. Paris Climate Agreement is one of them. The main objective of this treaty is to grip usual worldwide heating to under 2 degree C above pre-industrial levels and to chase efforts to control the temperature increases to 1.5 degrees C. This objective was framed at the global level and the success of this agreement depends on execution of climate policies at the National levels. According to this agreement, countries have to submit nationally determined contributions (NDCs).

Current Scenario

Climate change is linked to the well-being of individuals and communities. Its opposite effects extend to the health of future generations. “A recent poll conducted by the center for excellence in climate change communication research, indicates that fewer than half of Americans perceive themselves as personally vulnerable to the impacts of global warming, however a larger proportion recognizes it as a significant threat to future generations (60%) and to all forms of life (57%)”. “The World Health Organizations has reported that anthropogenic changes to the earth’s climate are currently responsible for at least 5 million cases of illness and over 150000 fatalities annually.” In current decades the scientific community has started to expand a detailed understanding of the harmful consequences of weather alteration on public health and the prevailing stresses on health care systems. The consequences of weather alteration can be minimized to some extent if every community will contribute in this process. The idea of sustainable growth can also help in this process.

The other health issues increasing are: heatstroke, hypothermia, asthma, cardiovascular and pulmonary illness. Heatwaves, flooding, wildfire and drought are all effects of climate change. People may want or enforced to shift to new places because of the series of aspects such as increasing ocean levels, melting glaciers, or desertification. It has become the most critical worries of the world and it’s a danger to the worldwide agriculture. An upsurge of 2.5-4.5 degrees C is predictable in the worldwide heat until the end of 21st century. The impact of climate change caused a decline in

agricultural production and even crop failure. Agriculture contributes to the economy largely. The growing need of food due to over growing of population has resulted in intensive agricultural practices including increasing number of use of chemicals. Weather alteration is contributing to a significant rise in the soil erosion which in turns causing higher desertification and nutrient lacking soils. The danger of soil erosion is growing day by day and its now a major global threat.

Climate change would not only have negative consequences on food supply forms but also on its quality and access. Climate change can affect livestock and dairy production as well. Agricultural area is the greatest reactive area to the weather variations as the weather of a nation regulates the nature and features of plants and yields. Dealing with the outcome of atmosphere alteration on farming will need watchful supervision of all the resources. To deal with with the consequences of weather alteration on farming and food production, our country needs to act at the worldwide, provincial, nationwide and local levels. Food safety can be an indicator for evaluating susceptibility to risky actions and unhurried beginning alterations. The figure of masses suffering from long-lasting lack of food has enlarged from under 800 million in 1996 to over 1 billion till date. Combined countries people facts and estimates demonstrate the worldwide people reaching 9.1 billion by 2050. Food creation structures are very susceptible to climate change like variation in temperatures.

The consequence of weather transformation on agricultural produce will profit both beneficiaries and adversely affected regions. Certain areas may experience improvements in agricultural output, whereas others may face failures in production level globally. Climate change also effects the economy of a country. The local upsurges and declines connected with climate change are not anticipated to result in big fluctuations in food production over the next era on a worldwide scale. Therefore, impacts on local and regional good supplies in some low height areas could amount to large percentage changes in current production.

CONCLUSION

Climate change is affecting not only the environment, but it is a psychological problem also. The risk of health and environment problems are rising because of the outcome of weather alterations. Agriculture and food security are the crucial areas which are to be taken care of sincerely, to save the population from hunger. The issue of global climate change can be tackled with cooperation of countries and global strategies to combat its effect. We need proper laws, which should be implemented in letter and spirit from across the border and worldwide. Research in this field is needed how we will tackle this grave situation.

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