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CLIMATE CHANGE INFLUENCING AGRICULTURE AND LIVES OF PEOPLE

Dr. Shruti Naik[1], Dr Satyajeet Nanda[2], Swarupa.V[3]

[1,2,3]Department of Agriculture, JAIN (Deemed-to-be University), Bengaluru, India
[1]dr.srinath.tk@cms.ac.in, [2]dr.satyajeetnanda@cms.ac.in, [3]v.swarupa@jainuniversity.ac.in

Abstract

Climate plays an important role in agriculture as well as the population that is involved in the farming business. Increased temperature, alteration with in frequency, intensities of rainfall, and severe weather patterns as well as a rise within the available amount of CO2 for plant growth are the most important climate characteristics predicted to have on agricultural production. The study explores different studies and papers on climate change-agricultural relationships. In general, for developing nations, since they largely depend on agricultural practices as lives and health and the lack of adaptive facilities compared with developed nations, the bilateral ties between changing climate and farming are of significant importance. Climate change (CC) has a direct dependence on climatic conditions affecting agricultural practices. The atmosphere is affected by greenhouse gas (GHG) pollution (e.g., nitrous, methane and carbon dioxide oxide). Such pollutants are directly caused by the use of fossil energy, labor, fertilized land and animal waste insignificant percentage. By taking broad-based adaptation and mitigation measures, agriculture may be a response to climate change. This is done through best practices like organic agriculture, agroforestry and manure disposal, and many others. The current study will help the reader to get a better understanding of the changes in climate and its effects on agriculture as well it also suggests recommendations to reduce the effects of climate changes.

Key words: Agriculture, Climate Change, Farming, Fertilizer, Land, Crop, Soil, Cultivation

Introduction

The most significant environmental challenge to agriculture production worldwide is climate change. Climate change refers to changes in climate over time, caused by natural variations or because of anthropogenic sources, as the Intergovernmental Commission on Climate Change reports. This climate change is largely caused by the deposition in the atmosphere of greenhouse gases (GHG). The interconnected cycles of climate change and agricultural production all occur globally and have a special significance as the disparity between the worldwide people and the world's food supply grows [1]. Some forecasts are likely to decrease crop yields in many developed world areas, in small Sub Africa and Asia, depending on weather fluctuations, precipitation and weather extremes. For areas with better initial temperatures, areas with poor or deteriorated soils and lower growth levels with low adaptation potential, the role and effects of climate change in farming are much more serious.

On the other side, different research shows that existing agricultural practices are a major source of GHGs that exacerbate the disturbance of the atmosphere. The agricultural activity differs greatly among developing countries and advanced regions, which means that the relation of farmers to climate change is varied. The high number of cattle and insufficient manure control, misuse of fertilizers and pesticides and soil bad management are more important in developed nations than the GHG emissions from agriculture. In contrast, since they are dependent on agriculture, the effect of the CC is more common in developing countries. In Ethiopia, agriculture provides 80% of jobs to sustain the living standards of the bulk of the public and generates 43% of (gross domestic product) GDP. The effect of climate change on poor rural populations in the developed world may be a common example of this context. On the other hand, the farming industry has great potential for climate change mitigation and adaptation. As per IPCC [1], adaptation is the interference in reducing or enhancing pollution sources of GHG sinks, while adaptation is an adaptation to natural or humanitarian processes, to mitigate damage or maximizes beneficial resources as a consequence of real or anticipated climate changes or their impact. Via energy saving, lower levels and usage of synthetic fertilizers as well as other feature minimizing

Greenhouse gases and sequestering of soil carbon, natural and healthier farming systems can contribute to reducing the emission of agriculture GHG [2].

Climate change is accompanied by the removal into the atmosphere of greenhouse gases. Such gases build up in the atmosphere, leading to global warming. Climate changes relating to weather, rainfall, surface humidity, rising ocean level, global climate change etc. The efficacy of climate change forecasts is, however, unclear. It is not certain what the rise in greenhouse gas concentrations in the atmosphere would certainly lead to and no fixed timetables are established. Agriculture, in regards to climate change, is a field that must be considered. All lead to climate change and the agricultural industry will be impacted by climate change [3]. Agriculture and the environment: farming facilities contribute about 20% to the annual rise in greenhouse gas emissions from anthropogenies. Global warming in this field is driven by the combustion of carbon (CO), methane (CH) and nitrous (NO) oxides. Greenhouse gases enable light to enter the earth, blocking heat transmission (infrared radiation) which attempts to escapes from the atmosphere and therefore attracts the heat like in a 'greenhouse'. CH has 4 world warming potentials, approximately 300 times CO and approximately 20 times NO possibility. Nitrogen fertilizers, rice fields flooding, farming practices, land conversions, wood combustion and animal processing and related manure application are the principal sources of methane. Around 5%-10% of the total effect on the environment is made by the livestock sector [4], [5].

Global emissions decrease: Enhanced land use strategies will help reduce greenhouse gas emissions. For example, a substantial decrease in agricultural CH emissions could be achieved by improving rice paddy management. Besides, more CH than rice was discovered in irrigated rice fields. Also, it would mitigate pollution for these land areas thanks to occasional 4-soil drying and decreased land disruption, like zero tillage and mulching. Adjustments in growing activities like the transition from transplantation to active planting and proper management of water will also lead to reducing CH emission. The decline in utilization of organic and natural fertilizers helps to reduce pollution and the effective use of fertilizers. Any agricultural productivity shifts may be helpful and minimize soil disruption requirements, such as a transition from conventional to high return variety, or a change from rice to other farm crops. But rice in Asia is a significant crop [5], [6].

1.1. Effects of Climate Change on Agriculture

1.1.1. Soil

The net rise in the number of greenhouse gases in Indian agriculture is presumed to have a marginal impact. This is due to the limited use in a nation of fertilizers and poor rates of soil quality. The shift in the rates, forms and frequencies of different animal insects and cropland; the nature and limit of supply of irrigated water; and the severity of changes in land degradation resulting from climate change. Because of the severe and inadequate weather conditions in India, soil instability is strong and the quantities and efficiency of the cultivation are declining. Climate issues can influence soil regeneration and humidity, as well as drought and flooding intensity, as well as soil levels in various regions. Enhanced soil temperatures can also contribute to a rise in autotrophic soil CO_2 loss due to base, exudates of root and fine-root rotation.

Usually the current knowledge, in mathematical formulas for growing, developing and yielding a crop using cropped models, from different methods like soil chemical properties, soil physics, agrometeorology, plant breeding, plant physiology, and agronomy. Longer-term prehistoric weather information is used for climate change systems as feedback for crop simulations [4].

1.1.2. Crop production

Dry season under temperature might delay the growth of crops and even destroy crop yield. The brunt pattern of annual average net earnings excitement is seasonal; the median can be definitive (if warm) or adverse (if chilly). Swaminathan *et al*. showed that the 10 °C temperature rise reduced the yield of wheat by four to five percent. A study of the reasons that a 10 °C increase in temperature will cut farm demand by 1.7% for increasing market economies and a 100-millimeter drop in the rain would minimize productivity by 0.35%. Animals are damaged as well as detrimental to marine animal development due to climate change. Nevertheless, maintenance of rice production replaces hectares to increase the fertility of the land and to evaluate flooding limits the second harvest [7].

1.1.3. Livestock

Weather and therefore global warming will also impact animals. In particular, the impact of climate change on animals would be two-fold: efficiency and quantity of grasslands drilling could be impacted and warmer temperatures could directly have an impact on the livestock sector. Few experiments explore the impact of climate change on animals, but some have successful effects. In the warmer summer months, for instance, it is calculated that the impact on eating in animals is reducing, leading to less gaining weight. Particularly, Adams *et al*. [8] found that, underneath a rise in temperature of 5.0 °C in Appalachia, Southeastern, Delta States, Southern Plains and Texas, livestock productivity in the U.S. dropped by 10% for cow and calf and livestock activities; for 1.5 °C, yield reduction was measured by 1%. In 3 simulations of the Global Climate Model (GCM), Hanson *et al*. [9] modeled effects on farmland livestock manufacturing. Climate change has been affected by both decreasing quality of the food and rising environment temperature on animal agriculture (e.g. poor milk production). There has been confirmation that heavily run livestock programs could be more able to adapt than agricultural systems to climate change as they may be more adapted to severe events. Any surveys of grasslands of medium to high latitudes find increased climate change production [10].

1.1.4. Water

Climate change is also going to disrupt the water cycle. Increasing the level of the sea will however raise the risk of steady and seasonal salty intervention in soil waters and waterways, which will influence the natural, residential, industrial and agricultural uses of water. The impact of climate change on farming will be various. Soil fertility, salinity increase, groundwater improvement, water quality depletion, and pesticide resistance in north-western India are now very worrying. Further harmful consequences may be increased by shift rates of river flux and ground waters, disrupting water supply, improvements in capital needs or technology, like irrigation systems and storing of surface water. Due to the normal topographical conditions of its mountainous areas, there are also constantly changing climatic conditions like flash flooding and less period for assembling between crucial amounts of water and precipitation. The simulations show that in 2050, the B2 scheme of NW Vietnam has shown that the rainfall decreased by 0.7% to 3.0%, by 5.0% and 7.6% in the 21st century. In the dry season, with decreases in precipitation and severe low plumage throughout the summer months, Tran [11] claimed that the groundwater for development and life was scarce. Reduction of irrigation sources of water due to rainfall deficiencies and reducing irrigation water plant fields and possibly expanded rainfed areas in the following season. Reports by UKMO GCM prototype by Bhaskaran et al. discussed that the increased monsoon plant rainfall is usually caused by an increased atmospheric water volume, boosts defined precipitation by 19 percent [12].

1.1.5. Temperatures

Based upon projections findings from North-West Vietnam's special scenarios B2, it was found that an expansion in 2050, 2.2 °C and 3.0 °C in 2100 to 1.1 C and 1.5 °C. Employing the UKMO GCM model, Bhaskaran *et al*. [12] determine that the average precipitation is up by comparatively 20% and the temperature rises by 1 to 4 °C in winter and rabbit crops, and even the CO_2 concentration increases. The net income definitely impacts the crops to a degree that is more detrimental to temperatures or precipitation. Few crops grow more rapidly and produce and wages are stronger in hotter areas. Although it is detrimental to crop production whether the climate is very poor or high and extended. In the higher mountainous regions, the temperature in the hot period is exceptionally low, even below temperatures, the minimum temperature was reported, less than 3.7 °C [13].

1.1.6. Diseases and Pests

The mechanisms of agricultural production are highly vulnerable to climate variations including temperature and precipitation variations that, by influencing crop production, lead to an outbreak of diseases and pesticides, thus decreasing national food safety. Variability of pests and disease prevalence and dissemination has indirect consequences. Agricultural development decline is caused by variations in the occurrences of plagues and climatic diseases. During this period it is possible to promote viruses and insect pests by raising gradually the precipitation and temperature. Climate change raises the rate of mosquitoes and pests' reproduction period. Supply for further pesticide utilization due to rising populations of insects, that poses damage to the environment and human civilization [14].

1.2. Adjustments and Adaptations of Agricultural to Climate Changes

It has been well known that farming techniques respond to the current environment. The steady growth patterns in the world return over the past fifty years (about 2% annually) show that agricultural production both with and without environmental issues would be higher than current. Part of this development is attributed to emerging innovations being adopted. As far as climate changes are concerned, is it a crucial issue whether farming is capable of adapting rapidly and independently? The essence of the answer is critical because refusal to take note of adaptation reactions will overestimate potentially adverse consequences or underestimate possible positive benefits from climate change.

Numerous research (both systemic and analog spatial) identifies significant prospects for adaptation, but an adjustment is not cost-free. Technological changes include research and development costs, involving potential physical and human resources invested, alongside the expense of farm-level acceptance. Climate patterns will bring stress to the already long-term agrarian societies of local and provincial agrarian economies. Additionally, adjustment obstacles can be introduced that restrict responses including the accessibility to technological and financial support services and other supplies, including water and fertilizers. Unsafe weather and climate change rates may limit adjustment and could add to the expenses involved with transformation and imbalance if projections are wrong. Adding emerging technology is influenced by other influences. For instance, adjustment levels and rates are dependent on farmers' investment decisions. Poor farmers have established farming techniques suitable for a variety of crops, targeting mostly local or provincial markets. These plants, however, can be more sensitive to weather patterns, do not provide the highest predicted financial profits. In comparison, technology-driven agriculture capabilities enable to dramatically increase global agricultural production. For instance, high return wheat, rice and coarse grains, including maize, barley and sorghum have contributed to strategic organic farming that has made a major contribution to the global food supply. The intense research efforts led by continued expenditures are the outcome of sustainable agriculture and other technical progress. These technology-oriented agricultural systems can, nevertheless, be more vulnerable to climate fluctuations [15][2].

1.3. Water Productivity and Availability

Climate changes would affect water supplies by their effects on precipitation volume, variability, timing, shape and intense conditions. Water productivity is the proportion to the quantity of water necessary for producing these advantages from the perceived value of the crops, forests, fisheries, livestock and mixed farming systems. Water requirement is a term that can be described as the quantity of ready-for-harvest produce collected per volume of water. Essentially, water efficiency means that the current strategies for maintenance and climate change provide more output per unit of water. Forecasts on changing climate suggest that with the rising populace there would be a rise in water consumption. Water demanded worldwide to fed the planet in 2050 will rise by 4500 km^3/year from the present 7000 km^3/year, thus efficiently tackling food shortages and alleviating poverty by boost in water efficiency [16].

Falkenmark reports that increasing water and food production helps reduce water scarcity by between 2000-3000 km^3 a year, and related projections by SEI show that enhancements in water use efficiency might decrease potential water consumption (water added requirements) by 2200 km^3/year. The improvement and maximization on the water supply of the crops, optimizing water intake of the plant and the use of additional irrigation can be accomplished, as per Rockström, Barron and Fox [17].

A productive and quite well-optimized approach focused on the demand for crop water and additional irrigation deficiency, improves crop productivity and stabilizes production while reducing yield losses in regions whereby humidity strain and precipitation are prevalent. Climate change mitigation recommendations for enhancing water efficiency in the arid and semi-arid zones are critical for rainwater harvests, irrigation, soil conservation, and additional irrigation [18]. Rainfall-dependent farming accounts for 80% of world agricultural land and two-thirds of global grain supply. Food farming has a crucial role in 80 percent of the world's agriculture space, which causes poor crop yields and rising water shortages on a field. The biggest problem for rural populations in some countries covering 80% of the population is to increase available farmland quality and water supply access [19].

Discussion

1.4. Agriculture as a solution for climate change

The farming industry has considerable capacity for mitigating climate change by reducing emissions of GHGs and improving agricultural deficit reduction. Moreover, adaptation to climate change seems to have an important function. Adaptation on its own is not sufficient to compensate for climate change and thus sustained prevention strategies will need to be complemented. Much of our progress in the area of adjustment will allow us to secure a significant amount of coal in the field, reducing emissions of methane and nitrous Oxide, the major pollution media. This can be done by various land management measures (soil and water protection measures, manure and fertilizers maintenance) and in the cropland. Management practices are also interconnected and allow them to accommodate and combat climate change. Agricultural practices are a comparatively inexpensive method of prevention that already contains several technological choices. Global implementation of organic farming (OE) is likely to secure up to 32 percent of all existing emissions of human-made GHGs. OA is a method of development that maintains soil, ecosystems and human health. Soil productivity is primarily preserved in OA by inputs mostly on the field (e.g., organic manures, legume compost, broad agricultural practices); conventional fertilizers and plant protection additives are refused as a need of resources and fossil energy usage is reduced or not reduced.

The effective management (reduced use of artificial engravings, reduced tillage etc.) of farmland, the reduction of industrial farming, enhanced farming, maintenance of pasture and grassland; the conservation of soil structure as well as deteriorated farmland to improve carbon sequestration in soils; enhanced groundwater and grain processing. As previously discussed, agricultural production has the capacity to respond in several regions to climate change. Adapting climate change is an ongoing phenomenon that has to be addressed by the venue. The adjustment can make farming processes more responsive to climate change impacts. Agricultural processes and farmers may vary considerably in their ability to adapt to climate change. Contracting the effects of climate change requires distinct coping plans and improved climatic risk control assistance to agriculture and agricultural communities [20]. These initiatives may also include, in general, the selection and alteration of different species, adjustment of field activities to the timetable (more flexibility), adaptation of crop manufacturing practices (i.e., factory-protection, irrigation, etc.) or implementation of plant manufacturing methods increasing plant-soil organic matter or soil covering, etc.

1.4.1. Changes crops varieties

In addressing environmental pressures and transitions, it entails changing from one particular crop to the other. Research by Komba and Muchapondwa in Tanzania has shown that peasants in Tanzania attempt to respond to climate change through crops that avoid scarcity. The introduction of Avena (Ingedo) crops as a feed crop to Ethiopia and over time the prevailing stable crop (i.e., corn in the highland) is replaced by barley and the adaptation to CC is possible [21][22].

1.4.2. Changes in cropping patterns

Changes in the way plants are bicycled in a season. Farmworkers in the semi-arid Brazilian drought vulnerable regions have found out that several varieties with one grain will take up an area with multiple bean species, maize and sorghum, to improve harvest capacity for arid climatic stresses, amongst others. In Ethiopia, growers also aim to adjust CCs by growing crops that diversify (homestead maize and other crops) [22][23].

1.4.3. Changes in cropping dates

This is just another typical adjustment at agricultural production to climate change that mostly entails modifying the schedule of farms to meet environmental change or adjustments. Filipino farmers respond to earlier heavy rain by increasing highlands crops, leading to a season especially increased land output and higher family incomes as a result of land practices. Planting dates have also been used by growers in Tanzania to adjust CCs. In contrast, many West African countries like Burkina Faso, Niger and Senegal, as per Rhodes et al, have indeed developed and implemented computational models for various plants to crop underneath the climate with modified planting dates that are adapted to the CC. Shifting crop patterns of crops significantly contribute to adapting CCs for the farmers living in East Gojam and East Hararghe [24].

1.4.4. Farm Managing Strategies

Changing existing farm management activities like the practice of OA also contributes to a wide range of agriculture (i.e., planting different crop) sources, thereby allowing the households quite resistant to negative climatic consequences for agricultural produce. This would enable farmers to diversify future sources of income for agriculture. As per Rhodes et al., among the best climate-resilient measures is also the management systems for crop residues. Moreover, Southwestern Cameroon's sub-humidity farmers have adapted themselves for differences in precipitation employing various methods to conserve water and soil. The big water and soil preservation activity (SWC) that manages to adjust CC in Ethiopia is the tearing and control building of the dam. Likewise, studies in Ethiopia have shown that terracing and various water harvesting methods are commonly used to adjust the climate crisis [24].

1.4.5. Livestock's managing

It was linked to the treatment of animals and waste. Growers from Central Africa, in specific, respond to climate change and adopt diverse methods for an adaptation like raising specific regional species of animals, expanding livestock classes, appropriate water conservation and alternative feed production technologies. In Ethiopia, producers have created a separate local change to escape the impacts of CC's, for example, growing crops that function as a hut for the cattle, place their cattle nearby the hospital (with enhanced plagues and diseases) and keeping the livestock at house and eat them in periods of water and food shortage by cutting and carrying systems [22].

Furthermore, manure must be obtained as soon as practicable through animal waste treatment in order to reduce emissions of GHG and to achieve high potential energy by compost. Few breeders in South Asia and China are developing novel methods of stocking and retrieving animal waste and manufacturing biogas and the system is collapsing bio-solids in buried fermentation plants that provide fuel to cook, energy and electricity for on-farm operations. Fermentation systems of broken-down solid particles could also be used in the cultivation or exchanged for cash as fertilizers. This will help to mitigate and respond to climate change by managing animal manure.

1.4.6. Agroforestry

Due to the significant contributions that forestry industry and field usage transformation make to GHG emissions, agroforestry provides opportunities in collective mitigation and adaptation to offset the negative effects of climate change. Forests on farmland strengthen local producers' managing strength to deal with climatic risks by diversifying crops and revenue, conserving land and water and making recycling and conserving nutrients productive. Various scientific studies on climate change agroforestry in West Africa focuses on its capacity for sequestering carbon and its impact on soil quality. Likewise, several Central African nations reports a substantial increase in crop production in the vicinity of Faidherbia albida tree for millet, sorghum, maize, groundnut and cotton[25].

1.5. Barrier to mitigate and adapt CC in agriculture

As per the reports, the principal obstacle to CC's mitigation the following conditions are regarded; maximum storage (15-60 years) required to be obtained, based on administration, management background and the changed method, in sequestering carbon in soil or indigenous residues. A further obstacle is the expense of calculation, reporting and transaction fees (incentive-based structure): If property ownership is lacking, there are fewer incentives to undertake various agricultural practices [26].

Conclusion

From this thorough analysis, it has been established that climate change is linked globally to farming in one form or the other. This interaction gets intense in developing nations since their life relies mainly on agriculture and the weather, for example in Ethiopia and India, all the agricultural practices are rain-feed. In terms of its small adaptation potential and infrastructure shortages, climate change's effects are very severe in developing countries, and non-carbon GHGs are the major emitter of their livestock and agriculture, primarily by the use of synesthetic fertilizers. They are the principal direct issuers. There are indeed secondary emissaries, like land-use changes; fertilizer rinsing and laxation; mechanizing usage of fossil energy; transportation and the processing of agrochemical and fertilizer.

Agriculture, on the other side, maybe a key climate change strategy by adaptation and mitigation strategies by means including its appropriate agricultural practices. Even climate change mitigation is insufficient in the forecasting circumstance of climate change worldwide because a long-term remedy is necessary by incorporating adjustment of climate change into agriculture. These activities might include organic farming, manure disposal, agroforestry, etc. Now-a-Days, we are becoming fully informed about the important connection between agriculture and climate changes. The important relationship between agriculture and climate changes has been recognized in recent times, even though interest is not sufficient. With the study position, multinational laws and treaties play a major role.

The following guidelines are submitted based on this review:

- Agriculture has considerable repentance for the destruction of climate change, but there is a poor level of attention. Further studies and awareness-raising must therefore be done on this issue.

- Changing climate, especially for farmworkers from developed nations, plays a major detrimental role. There should also be extensive practices for appropriate prevention and mitigation measures to be taken.

- International negotiations and conventions on agriculture and climate changes will lead to the widespread distribution of knowledge around the globe, which do need to work further on this connection because they are concerned with CO_2 emissions.

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