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RELATIVE CONTRIBUTION OF CLIMATE VARIABLES SUCH AS TEMPERATURE, WIND, SNOW, ETC. ON NATIVE GRASSLAND VEGETATION

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ABSTRACT

"Behavioral, ecological, and evolutionary responses to catastrophic climatic occurrences" is the topic of this article. There is convincing evidence that some severe weather and climate phenomena are now more common and severe in recent decades. Although a link between these shifts and human-caused climate change has been established, assessing the impact of specific extreme climatic events (ECEs) is challenging. Recent advancements in the field of measured and predicted climatic variation, event attribution tools, and mathematical analysis have facilitated rapid event attribution progress. Extreme temperature events, especially those involving the hydrological cycle, have a higher level of attribution than other types of events. Based on observations and representations in cutting-edge climate models, a new understanding of ECEs has opened up new alternatives for analysing their impact on human and biological systems. Thanks to improved geographical resolution in climate projections and breakthroughs in analytical and dynamic downsampling, climate data is now available at appropriate timescales.We may be able to establish a mechanistic knowledge of how ECEs influence biochemical mechanisms, ecological functions, and adaptive potential using Earth System Models which simulate biogeochemical cycles and interacts with the ecosystem at high levels of uncertainty.

KEYWORDS – Ecological, climatic, Rapid, Biological, Potential, Data, System

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INTRODUCTION

Climate change is defined as any significant long-term shift in the anticipated trends of ordinary weather in a region beyond a longer duration. It's about out-of-the-ordinary climatic fluctuations and their consequences for other parts of the world. It could take tens, hundreds, or even millions of years for these changes to occur. Growing temperatures, shifting rainfall patterns, and rising CO2 concentrations in the atmosphere are all examples of climatic variables. Agriculture could be impacted in three ways by the Greenhouse Effect. For starters, rising CO2 levels in the atmosphere can impact the rate at which crop plants and weeds develop. Second, CO2-induced climate change can impair plant and animal productivity by altering temperature, rainfall, and sunshine. Finally, rising sea levels may cause inundation of farms and an increase in the salinity of coastal groundwater.

The greenhouse effect is a natural phenomenon that has a substantial impact on the world's climate. It generates a somewhat warm and comfortable atmosphere close to surface of Earth, allowing people and other living forms to survive and evolve. As a result of anthropogenic activities, have led to a significant rise in the surface climate, resulting in global warming.CO2 concentrations in the atmosphere increased from 280 ppm to 395 ppm between 1750 and 2012.

CLIMATE CHANGE SCENARIO AT A GLOBAL LEVEL

According to all climate models, temperatures are rising. The precipitation pattern has shifted due to less rain in South and Southeast Asia. Droughts have been harsher and more last longer since the 1970s. In terms of both depth and area, permanent snow cover has shrunk. By the turn of the era, the globally averaged sea level is expected to increase 0.18 to 0.59 metres. Asia-Pacific is home to six of the top ten nation’s most environmentally vulnerable. Bangladesh is at the top of the list, closely followed by India, Nepal, the Philippines, Afghanistan, and Myanmar.

INDIAN SCENARIO OF CLIMATE CHANGE

In India's northwestern regions, the warming could be more dramatic. As the climate changes, anomalies in peak and lowest temperatures are projected to grow. Only some locations are forecast to receive additional rainfall, whilst others continue drier.

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Summer temperatures in the Indian Ocean will soon surpass those experienced in the previous 20 years, putting corals in jeopardy. By 2050, coral bleaching will very probably be a certainty. Odisha's Jagatsinghpur and Kendrapara, Andhra's Nellore and Nagapattinam, and Gujarat's Junagadh and Porabandar are currently the most exposed to the effects of rising cyclone severity and frequency.According to historical observations, the average sea level along the Indian coast has been increasing at a pace of roughly 1.0 mm/year for the last 100 years. However, fresh research reveals that the Indian coastline's sea level is rising at a rate of 2.5 millimeters each year.

More than half of India's forests are expected to change forest types, posing a hazard to biodiversity, regional climate dynamics, and forest-dependent livelihoods. Even within a fairly short period of time of roughly 50 years, the bulk of India's forest biomass appears to be extremely susceptible to future climate change.Furthermore, by 2085, 77 percent and 68 percent of India's wooded grids are predicted to have undergone a change in forest types.

OVER THE NEXT 50 YEARS, THE EFFECT OF CLIMATE CHANGE ON AGRICULTURE IS EXPECTED TO BE SIGNIFICANT.

Warming will speed a variety of microbial activity in the soil-floodwater system, which will have an impact on the carbon and nitrogen cycles. As a result of climate change, rising sea levels will have an impact on rice production. For a temperature increase of 2–3.5°C, most research shows reduced harvests in non-irrigated rice and wheat, as well as a 9–25 percent reduction in agricultural total earnings.Rice and wheat grain yields were lowered by 15–17 percent with a 2°C rise in temperature, according to Aggarwal In locations where rainfall rises, bacterial and fungal illnesses seem prone to become more severe. Cereals would be more prone to pest and disease outbreaks in hotter and also more moist circumstances, resulting in lower yields.

Climatic element	Expected changes by 2050	Confidence predication
CO2	Increase from 360 ppm 450-600 ppm	Very high

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Sea level rise	Rise by 10-15 cm Increased in south and offset in north rebound	Very high
Temperature	Rise by 1-2 Celsius. Winters warning more than summers	High
Precipitation	Seasonal changes by 10%	Low
Storminess	Increased wind speeds.	Very low
Variability	Increase climatic variable.	Very low

Source – Climate change and Agriculture, MAFF

THE EFFECTS OF CLIMATE CHANGE ON WORLDWIDE AGRICULTURE

Climate change is expected to have a direct effect on food production around the world. Many crops' growing seasons can be shortened by a rise in the average seasonal temperature, resulting in decreased final output. In locations wherein temperatures already are near to their physiologic optimum, warming will have a more direct impact on agricultural production (IPCC, 2007). Global agriculture is likely to decline significantly this century. Global agricultural productivity is predicted to decline by 3 to 16 percent by 2080. By the 2080s, developing countries are anticipated to lose 10 to 25% of their agricultural productivity due to average temperatures near or above crop tolerance levels.

According to the maps, rising temperatures will have an impact on food production in many parts of Africa. The decrease in rainfall in Australia will have an impact on agriculture production, however in some cases this can be compensated by irrigation. Increased rainfall in North America, combined with a modest rise in temperature, may help to boost food output. The underdeveloped nations of the globe will bear a disproportionate share of the responsibility of global warming.Keep in mind that the maps' findings are influenced by the climate, the effect of CO2 levels on agricultural development, and socioeconomic changes while interpreting them. In wealthy countries, for example, reduced rainfall levels can be dealt with by irrigation, but such technical innovations are often not available in less developed nation

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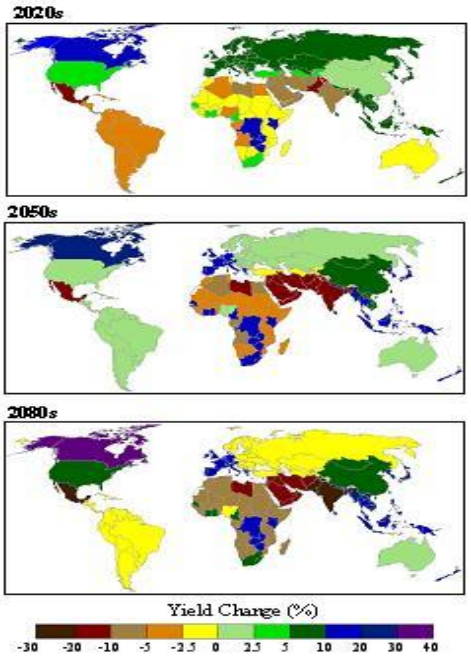
CLIMATE CHANGE'S IMPACT ON INDIA'S LANDSCAPE

Since antiquity, India's agriculture has been more reliant on the rain. Monsoon patterns change, and this has a big impact on agriculture. Rising temperatures are having an influence on Indian agriculture as well. The wheat crop on the Indo-Gangetic Plain will be primarily affected by these pre-Monsoon changes. During severe droughts, rice production losses average over 40% of total production in the states of Jharkhand, Odisha, and Chhattisgarh alone, totaling $800 million.When CO2 levels reach 550 parts per million, rice, wheat, legumes, and oilseed yields increase by 10-20%. A 1°C increase in temperature can affect wheat, soybean, mustard, peanut, and potato yields can increase by 3 – 7 or decrease by 3 -7. There are a lot more losses at higher temperatures. As a result of rising temperatures, shifting rainfall patterns, and lower irrigation water availability, most agricultural productivity would decline just marginally by 2020, but by 10-40% by 2100. Rain-fed or non-irrigated crops, which account for around 60% of cropland, will be the most affected by climate change.In India, a 0.5-degree increase in cold season will decrease monsoon wheat yield around 0.45 tonnes / ha. Yields of chickpeas, rabi maize, sorghum, and millets, as well as coconut harvests on the west coast, may improve. In northwestern India, less frost damage has resulted in less loss of potato, mustard, and vegetables. Droughts and floods are expected to grow more common, adding to the volatility of production.



SOURCE - http://klimat.czn.uj.edu.pl/enid/2__The_climate_change_issue/-_future_food_production_268.html

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AGRICULTURE AND CLIMATE CHANGE - MITIGATION AND ADAPTATION

1. Crops having a quick maturity period which can develop before the maximum temperature phase are being developed.

2. Drought-prevention strategies include growing legumes and oilseeds rather than rice in highlands, grooves, and tillage systems in cotton fields, growing intercrops instead of sheer crops in highlands, land grading and smoothening, field bund stabilisation with rocks and grasses, graded line bunds, contour tunnelling for runoff gathering, conservation furrows, and mowing (FYM).

3. Approaches such as regular yet deep irrigation, drip and spray watering for elevated crops, and irrigation at critical phases are all examples of water conservation techniques.

4. Periodic climate predictions can be used to help with sowing and watering patterns optimization.

5. Increase the amount of weather-related crop insurance coverage.

6. Improve the technology and input delivery system to intensify the food production system.

7. To produce enough food and climate adaptation, develop a protracted land-use strategy.

8. Provide credit to farmers for transitioning to adaption technology as an incentive for resource conservation and efficiency.

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OBJECTIVE

Climate change is putting India's farm economy in jeopardy. The growth of pests and weeds is aided by elevated temperature, which reduce crop yields and stimulate the growth of invasive plants. Climate change can have a negative influence on irrigated agriculture production throughout agro-ecological zones induced by temperature increase and changes in water supply.

LITERATURE REVIEW

According to researcher Grassland degradation has been a source of worry due to its negative influence on agronomic productivity and the ability of the land to generate products and services. Two key root causes of grassland degradation are well acknowledged: climate change and human activity. Between 2000 and 2010, a holistic solution based on net primary productivity (NPP) was developed to assess the relative impact of global warming and human disturbances on worldwide grassland degradation. On a global basis, 49.25 percent of grassland ecosystems were found to be degraded, according to the findings. Nearly 5% of these grasslands have suffered significant deterioration, ranging from moderate to severe. Climate change was the leading cause of degradation, accounting for 45.51 percent of the total, with human activities accounting for 32.53 percent. Human involvement was responsible for 39.40 percent of grassland restoration, while climate change was responsible for 30.6 percent. Asia was home to both the most damaged and recovered areas. NPP losses from grassland degradation. As a result, new grassland management and administration strategies should progressively incorporate global climate concerns.

This study shows grasslands cover a huge amount of the earth's surface and provide essential ecosystem services to humanity. The Tibetan Plateau (TP), the world's highest plateau, has seen significant changes in recent decades, most notably degradation caused by escalating climatic and quasi factors. However, it is uncertain how different factors lead to quantitative grassland alterations, which is important for partners to make informed choices on how to prevent these changes. To address this problem, we presented a two-step methodology. The initial step was to investigate how changes in land use affect grassland distribution. The

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differences among measured and modeled Normalized Difference Vegetation Index (NDVI) based on General Linear Models were then utilised to discriminate between climatic and non-climatic influences (GLM). Land use changes resulted in a decline in grassland area between 1980 and 2010. Non-climatic factors promoted grassland quality, however overgrazing could degrade grassland quality. In the last three decades, non-climatic causes had a greater impact on grassland changes than climatic drivers, according to our data. Non-climatic drivers (66.07 percent) contributed nearly twice as much to grassland changes as climatic drivers (33.93 percent). The effects of climate drivers were gradual but long-lasting.

• The aridity index (AI), computed as the ratio of yearly potential evapotranspiration over annual precipitation, is a widely used measure for distinguishing climatic regimes and tracking drought events. Using climatological data covering 135 weather stations from 1993 to 2015, we studied the fluctuation of AI and its environmental causation over Southwestern China utilising rainfall data and suitable variables in calculating radiation from the sun.The data showed that from 1993 to 2015, AI rose significantly (0.0053 year1, p 0.05), with an abrupt increase around 2002. Approximately 85 percent of stations exhibited a rising trend, with 24 percent reaching a considerable increase threshold, indicating that Southwest China has been getting drier for the past 20 years. Dropping rainfall and rising peak air temperature have been the primary drivers of the aridity index's growth from 1993 to 2015, accounting for 38.98% and 36.26% of the AI change, correspondingly. The findings highlighted the importance of temperature in determining aridity in Southwestern China.

This study is a collection of four briefing papers for USDA Forest Service policy analysts and decision makers, based on literature reviews and Syntheses. Concerning certain climate-change-related issues. Climate change's impacts on animal habitation, other natural ecosystems, and land values; climate change's socioeconomic consequences for remote regions; and the viability of carbon offset programs on nonindustrial private forests in the United States are only a few of the topics covered.Private forest offsets in the United States are less expensive than in Europe, but they are harder to execute than in tropical rainforests in developing countries. Impacts on certain ecological systems, such as wildlife habitat, as well as setting baselines and additionality, are also significant policy considerations for any mitigation measures. Increasing private forest owners' participation may require combining

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ecosystem services payments or credits with carbon offset payments. Climate change's potential social consequences Are explored in terms of rural populations' health and climate change. Indigenous communities' sensitivity. Agriculture, forestry, recreation and tourism, fisheries, water resources, and energy all have potential economic benefits on rural communities. The synthesis of the literature summarizes key findings from the literature, as well as highlighted research needs.

The connection among stable carbon isotope composition (13C-CO2) of soil CO2 flow, plant cover, and meteorological conditions was examined in a brief study at a moderate re-established Grasslands in Germany.The 13C-CO2 of soil flows decreased during sampling period under "dry-warm" conditions and canopy alteration. The 13C-CO2 readings came from ecosystems, with soil and rhizosphere respiration being the most common. Variations in plant physiology towards the end of the vegetative cycle might explain the decline, which corresponded with a decrease in CO2 flow at the end of the vegetative season.Although branch ablation had no influence on 13C-CO2 readings when compared to the control, the trend of subsequent 13C-CO2 decreases indicated that live plants are needed to feed 13C-enriched CO2 to ecological metabolism.

CONCULSION

Climate change has begun to have worldwide implications as a cause of "Global Warming." Climate is by far the most important driver of agricultural output because it has such a large impact on worldwide food production. Agriculture has been the most susceptible industry to changing climate since the environment of a region/country influences the various facets of flora and grains.Many crops' growing seasons can be shortened if the average seasonal temperature increases, resulting in decreased desired outcome.Climate change, such as variations in temperature and precipitation, is especially hard on food production systems, resulting in pest and disease outbreaks.As a result, the harvest is diminished, putting the country's food security in jeopardy. The capacity to adapt with and recover through climate changes, as well as the level of exposure to global environmental change, will determine the entire impact on food security.To bear the consequences of changing climate on agribusiness, it will be necessary to carefully manage necessities such as soil, water, and biodiversity.India

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will have to take action at the international as well as other levels to mitigate the effects of global warming on agricultural and food production.

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