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AN OVERVIEW OF FOOD SECURITY AND CLIMATE CHANGE IN INDIA

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A b s t r a c t : -
Planning for the long-term impacts of climate change on Indian agriculture would, therefore, be rather low on the government's priority list. Climate change has added to the enormity of India's food-security challenges. While the relationship between climate change and food security is complex, most studies focus on one dimension of food security, i.e., food availability. According to the Indian Meteorological Department, the annual mean temperature in the country has increased by 0.6 degrees Celsius between 1901 and 2018, when compared to pre-industrial levels. Eleven of the 15 warmest years have so far all been within the last 15 years with 2018 being the sixth warmest year in India's recorded history. This paper provides an overview of the impact of climate change on India's food security, keeping in mind three dimensions — availability, access, and absorption.
Key words:- Food insecurity, Poverty, Determinants, Indian Meteorological Department, Sustainable Development Goals (SDGs), Indian Council of Agricultural Research (ICAR),
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Introduction:-

It finds that ensuring food security in the face of climate change will be a formidable challenge and recommends, among others, the adoption of sustainable agricultural practices, greater emphasis on urban food security and public health, provision of livelihood security, and long-term relief measures in the event of natural disasters.

The extent and degree of warming are going to get more severe. As carbon emissions continue and those which are built into the climate system take effect, temperatures across the world are expected to increase between 3-5 degree Celsius by 2100. India is among the countries which are likely to bear the worst of a warming planet due to its tropical location and relatively lower levels of income.

At the heart of the Sustainable Development Goals (SDGs) are targets to end hunger, achieve food security, and improve nutrition. For India, food security continues to be high on its list of development priorities because the country's relatively high rates of economic growth have not led to a reduction in hunger and undernutrition. India's gross domestic product at factor cost and per capita income grew at seven percent and five percent per annum, 1 respectively, from 1990-91 to 2013-14. However, the incidence of undernutrition has dropped only marginally from 210.1 million in 2 1990 to 194.6 million in 2014, and India has failed to meet the Millennium Development Goal of halving the proportion of people who suffer from hunger. About 12 Indian states fall under the 'alarming' category of the Global Hunger Index. According to the National Family Health Survey 2015-16, the proportion of children under five years who are underweight is significantly high in states such as Bihar (43.9 percent), Madhya Pradesh (42.8 percent) and 3 Andhra Pradesh (31.9 percent)

Agriculture and food production are likely to be significantly affected by climate change. According to one estimate, yields of major crops could decline by up to 25%. A recent IPCC report also warned that in the years to come, food security will stand threatened due to climate change coupled with increasing demands of the rising population.

HOW DOES CLIMATE CHANGE AFFECT FOOD SECURITY?

Providing food and nutritional security to an entire population needs some serious planning and effective implementation. And we need to start now. Climatic factors like increased temperatures and extreme rainfall will affect productivity by causing physiological changes. In addition, they will affect soil fertility, the

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incidence of pest infestation and the availability of water. This will impact crops, animal husbandry as well as fisheries.

The solution to climate change will come from science alone. In 2011, research on the impact of climate change on agriculture and possible ideas to mitigate the risk was started by the Union agriculture ministry, and the National Innovations on Climate Resilient Agriculture (NICRA) was launched through the Indian Council of Agricultural Research (ICAR). The primary objective was to develop suitable technologies for production and risk management for crops, livestock and fisheries.

Food security is one of the leading concerns 10 associated with climate change. Climate change affects food security in complex ways. It impacts crops, livestock, forestry, fisheries and aquaculture, and can cause grave social and economic consequences in the form of reduced incomes, eroded livelihoods, trade disruption and adverse health impacts. However, it is important to note that the net impact of climate change depends not only on the extent of the climatic shock but also on the underlying vulnerabilities. According to the Food and Agriculture Organization (2016), both biophysical and social vulnerabilities determine the net impact of climate change on food 11 security.

Research on impact assessment on crops was conducted using simulation models for climate projections for 2020, 2050 and 2080. Simulations show that the yield of rice in irrigated areas may decrease by 7% in 2050 and 10% in 2080. The yield of maize in irrigated areas of kharif was projected to decline by 18% by 2020.

The yield of maize did decline in 2018-19 due to low rainfall in several maize growing areas but better rainfall in July and August 2019 may have ensured that the projection of decrease in maize yield may not happen again in 2019-20.

Research at the National Dairy Research Institute, Karnal has found that heat stress has a negative impact on the reproduction traits of cows and buffaloes and their fertility will be adversely impacted.

Scientists of the Central Marine Fisheries Research Institute have found that fish species on the east coast may be much more vulnerable to climate change than fish varieties found on the west coast. Climate change will impact ocean current, acidification, temperature and food availability. All of this will affect the production of fish.

The impact of climate change on water availability will be particularly severe for India because large parts of the country already suffer from water scarcity, to begin with, and largely depend on groundwater for irrigation. According to Cruz et al. (2007), the decline in precipitation and droughts in India has led to the drying up of wetlands and severe 14 degradation of ecosystems. About 54 percent of India faces high to extremely high water 15 stress. Large parts of north-western India, notably the states of Punjab and Haryana, which account for the bulk of the country's rice and 16 wheat output, are extremely water-stressed. Figure 1 shows that groundwater levels are declining across India. About 54 percent of India's groundwater wells are decreasing, with 16 percent of them decreasing by more than one 17 meter per year. North-western India again stands out as highly vulnerable; of the 550 wells studied in the region, 58 percent had declining groundwater levels. With increased periods of low precipitation and dry spells due to climate Climate Change and Food Security in India . According to the World Bank projections, with a global mean warming of 2°C above pre4 industrial levels, food water requirements in 18 India will exceed green water availability. The mismatch between demand and supply of water is likely to have far-reaching implications on foodgrain production and India's food security.

WAY FORWARD: RECOMMENDATIONS

Adoption of sustainable agricultural practices

There have been plenty of studies investigating farmers' decision to adopt sustainable agricultural practices but a lot more segregated studies exist, highlighting the importance of individual factors affecting adoption. This review

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addresses this gap and provides a suggestion to effectively understand adoption of sustainable agricultural practices by farmers from a comprehensive perspective. The study underscores and justifies the use of the integrated framework of Reasoned Action Approach/Theory of Planned Behavior**,** to present a new perspective on studying sustainable agriculture.. Till now, only a handful of studies have incorporated the usage of this framework, which has significant relevance in studying the adoption behaviour of farmers. As suggested by previous studies about the use of socio-psychological models in agriculture, and the importance of studying adoption from multi-disciplinary a perspective, this study justifies the use and significance of Reasoned Action Approach/Theory of Planned Behaviour by providing evidences from past literature.

Stronger emphasis on public health

India is presently in a state of transition — economically, demographically, and epidemiologically — in terms of health. While the last decade has seen remarkable economic development particularly in terms of gross domestic product (GDP) growth rate

,(1) unfortunately this progress is accompanied by growing disparities between the rich and the poor. There is strong evidence to suggest that this income inequality or disparity between the different socioeconomic classes is associated with worse health outcomes.

(2) Widening the gap between the rich and the poor has damaging health and social consequences. While financial inclusion and social security measures are being implemented by the Government to bridge economic inequalities, health sector too must ensure that health disparities between and among social and economic classes are also addressed adequately.

The unprecedented demographic changes underway are likely to contribute to a substantially increased labor force. However, it will benefit the country only if the population is healthy. The country at present suffers from the triple burden of disease — the unfinished agenda of infectious diseases; the challenge of noncommunicable diseases (NCDs), linked with lifestyle changes; and emergence of new pathogens causing epidemics and pandemics. In addition, the health infrastructure is already over-stretched and needs to be strengthened to enable it confront these challenges in the twenty-first century.

Enhance livelihood security

Achieving food security in the context of climate change calls for an improvement in the Climate Change and Food Security in India . livelihoods of the poor and food-insecure to not only help them escape poverty and hunger but also withstand, recover from, and adapt to the climate risks they are exposed to. India's National Rural Employment Guarantee Act (NREGA) of 2005 marked a global milestone in the history of poverty alleviation. NREGA has had several positive effects: increasing rural wages, reducing gender wage gaps, enabling better access to food, and reducing distress migration from rural areas. NREGA has also made an important contribution to child wellbeing, through the reduction of hunger and 55 improvement of health and education. Moreover, the scheme contributes to ecological restoration and natural resource regeneration in dry regions. Water conservation accounted for about half of the total projects supported by NREGA from 2006 to 2008, with 850,000 56 completed works. Although some gaps have been observed in the implementation of NREGA, the scheme has various benefits for the rural poor, particularly the marginalised sections, women, scheduled castes and scheduled tribes. Therefore, funding allocations for NREGA should be maintained and efforts should be made to more effectively streamline the funds to plug existing leakages. Given the level of urban poverty, undernutrition, and lack of remunerative employment, there is a strong case for providing guaranteed employment on the lines of NREGA in urban areas as well. Such a scheme should be tailored to not only provide livelihood security to the urban poor but also create climateresilient urban infrastructure in Indian cities. Additional efforts are required for the vulnerable populations residing in the ecologically fragile coastal and forest regions

Greater emphasis on urban food insecurity

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After decades of decline, global hunger is increasing. In 2019, UN agencies estimate that more than 2 billion people do not have regular access to safe, nutritious and sufficient food, and more than 820 million – one out of every nine people – face chronic food deprivation.
At the same time, overweight and obesity continue to increase, especially among adults and school-age children. This is now described as an epidemic: more than one in eight adults is obese.

This 'new' form of malnutrition is concentrated in cities and towns. Urban areas are home to the majority of overweight and obese adults and one in three stunted children. To achieve Sustainable Development Goal target 2.2 of eliminating all forms of malnutrition, we need to understand and address what drives malnutrition in urban areas.

Indian cities have an extremely poor record in disaster management. Therefore, public investment in climate-resilient infrastructure should be enhanced. In India, flood control efforts, sanitation infrastructure and surveillance activities are not very effective. Better infrastructure in urban areas will minimise the disease risks caused by flooding

Scientists have been working hard to breed varieties of different crops which are climate-resilient. One such success is Sahbhagidhan, a variety of paddy which was jointly developed by the International Rice Research Institute and Central Rainfed Upland Rice Research Station of ICAR at Hazaribagh.

Long-term relief measures in the event of natural disasters

Sudden-onset natural and technological disasters impose a substantial health burden, either directly on the population or indirectly on the capacity of the health services to address primary health care needs. The relationship between communicable diseases and disasters merits special attention. This chapter does not address epidemics of emerging or reemerging diseases, chronic degradation of the environment, progressive climatic change, or health problems associated with famine and temporary settlements.

In line with the definition of *health* adopted in the constitution of the World Health Organization (WHO), the chapter treats disasters as a health condition or risk, which, as any other "disease," should be the subject of epidemiological analysis, systematic control, and prevention, rather than merely as an emergency medicine or humanitarian matter. The chapter stresses the interdependency between long-term sustainable development and catastrophic events, leading to the conclusion that neither can be addressed in isolation

Conclusion:-

India policymakers cannot indefinitely wait for disastrous effects of climate change to hit farmers. In north-west Indian states of Punjab, Haryana and western UP, falling water table has posed the need for modification in cropping patterns.

The study is an effort to deeply analyze the situation of food insecurity and factor affecting the food insecurity of deprived group in India. It is evident that food insecurity is significantly increased in last few years. So, the results suggest a serious effort to be made by Government in form of welfare policies to improve the food insecurity situation. Moreover, agriculture sector plays a vital role in decreasing food insecurity and increasing caloric intake. Livestock ownership is also another significant element that can reduce food insecurity, so policies are needed to enhance the livestock business at small and medium level. On the other hand, women empowerment plays a good role to increase caloric intake. Education is the most important factor that has negative impact on food insecurity and positive relation with caloric intake. Thus, educational policies in general and particularly for females must be focused by government.

At last I can say that, The study concludes that the framework is comprehensive enough to look at the multidisciplinary aspects, necessary to investigate farmers' adoption decisions, and thereby provides more than a starting point for contributing to the existing body of literature.

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