

CLIMATE CHANGE AND ITS IMPACT ON INDIAN AGRICULTURE - A CASE STUDY OF GANGA PLAIN

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INTRODUCTION

Climate change is the increasing concentration of carbon dioxide in the atmosphere (IPCC 2007). The Intergovernmental Panel on Climate Change (IPCC) in 2001 has also indicated that the global climate is changing, largely because of human activities. Since the beginning of the 20th century, drastic changes have been recorded in surface temperature, precipitation, evaporation and extreme events like flood, drought, and cyclone. This study is mainly focused on problems faced by agriculture in Ganga plain because this area produces food for about 40 per cent of India's 1.2 billion population. (Agricultural census 2011). These plains are under tremendous stress owing to rapid urbanization, population and climate change (Madhukara putty 2015). Climate change leads to an uneven pattern of rainfall which is disturbing the crop pattern and the productivity. Irregular availability of water is going to be the biggest hazard in future. In the case of increased water supply, the Piedmont zone and river lowlands are threatened by erosion and sedimentation while in the case of decreased water supply, the upland surface is endangered by salinization, desertification, and drying-up of aquifers.

LITERATURE REVIEW

The changes in the climate will trigger long-term and potentially extensive, changes in the hydrological cycle, with significant impacts on society and the environment (Mishra A.K. 2013). Ganga plain is under the twin threat of increasing population and climate change. It is evident that the Ganga plain has witnessed medium to large scale changes in landscape and the climatic variations which appear to be one of the major factors. In the event of a decrease in rainfall in future, even a rise there are strong possibilities of the Thar Desert to spread over this region, there by changing the landscape, and making the land uncultivable. The soil salinity, already prevalent in the plains of Haryana, Punjab and western Uttar Pradesh, is bound to extend over the marginally saline areas reducing the

availability of agricultural land. This will put additional stress on the already declining water table. The groundwater exploitation is likely to be intensified, and consequently, the water stressed areas would become water scarce. (H.S. Saini 2008). The situation will be further complicated by global environmental change (GEC). GEC includes changes in the bio-physical environment caused or strongly influenced by human activities. Principal concerns are changes in land cover, atmospheric composition, climate and climate variability, water availability and quality. Broadly these are reflected as (i) changes in natural resource base and (ii) climatic changes, many of which directly affect agriculture and hence food production. (Aggarwa IP.K. et al).

Ganga plain is considered as the food bowl of India. Rice- wheat system is a main food security system of the India. It is also providing food, income, and employment to millions of people engaged with this system based related work. The changing of climatic factors (temperature and rainfall) and natural problems (floods and drought) declining the rice and wheat crop productivity. These crops are grown in rotation on of approximately 5,09,994 sq.km, consisting almost 62.5 % of the total area of the basin. It contributes to about 37 % of the total population of the country, of which about 84 % in rural areas and 16 % live in towns and cities. In India studies carried out by different workers reveals that there are increasing trends in surface temperature (Mishra A.K., 2013

Large to small scale changes have been observed in evaporation, surface temperature, rainfall and the intensity and frequency of the water related hazards like floods and drought has been increased manifold. The summer monsoon rainfall over western Indo-Gangetic plains shows increasing trend (170 mm/100-year, significant at 1 % level) from 1900 and there has been a westward shift in rainfall activities over the Indo-Gangetic plains (Singh and Sontakke 2002). There is indication that annual surface warming over the Indian sub-continent is likely to range between 3.5 and 5.5 °C by 2080s. Indian Council of Agricultural Research (ICAR), has predicted that medium-term climate change will reduce the crop yields at between 4.5 and 9 % by 2039 (Mishra A.K. 2013). Climate change would add to climate variability, leading to uncertainty in rainfall and more frequent weather extremes, such as more severe droughts and floods in Ganga plains. The direct effect of climate change would be an increase in vector-borne disease which will adversely affect crops and livestock and have a significant negative impact on crop productivity adding to food insecurity in the region (Kumari and Azam, 2016).

RELEVANCE OF STUDY

The Ganga plains of north India can be called as the 'agricultural hub' of India and its importance can be seen in the fact that more than 70 % of total population depend on the agriculture. It is believed that the results of the study would bring the factual position of the spatial variations in the level of agricultural development in the Ganga-plain region and will attract the attention of government, agriculturists, economists, agricultural land use planners and researcher.

OBJECTIVES

"Climate change and its impacts on Agricultural Production in Ganga plains" will address the following objectives:

- To understand the relationship between climate and the land productivity.
- To know the impact of climate change on crop production **and food production.**
- **To know the impact on climate change on farmers life.**
- **To understand impact of climate change on rainfall pattern .**

DATABASE

The present study is based on primary and secondary data collected from various published and unpublished sources. The primary data will be collected through interview, questionnaire and survey, secondary data relating to land use, irrigation, cropping pattern and agricultural farm implements will be collected from various government publications maintained by the patwari, and other revenue records of various districts of the study area. The database comprises of districtwise information on wide variety of items. The data regarding demographic features will be collected from census handbooks of various districts of Ganga plain (2001-2011). The data relating to various aspects of crops and other minor crops will be collected from agricultural census 2011.

METHODOLOGY

The research will use both quantitative and qualitative methods & techniques will be adopted in conducting the proposed research work. First of all, useful data related to climatic

variation in study area, crop production, cropping pattern, agricultural land use pattern, food crops, commercial crops, other minor crops, population growth, density, social & economic structure of population, size of land holdings, man-land ratio, irrigating facilities etc. collected from Annual reports of FAO, WTO, All India and state level statistics will help, then the collected data will be arranged in tabulation form and will be analysed using required statistical tools. After completing analysis work, the results will be interpreted systematically.

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