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## Climate change and its impact on changing cropping pattern in Balrampur district Uttar Pradesh

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### Abstract

The objective of this study is to examine the pattern of crops in Balrampur district, Uttar Pradesh, India. This paper also assessed the evolution of cropping patterns at the block level between 2009-2010 and 2014-2015, how farmers' cropping choices change over time, driven by modern technologies, land degradation, frequent floods, deforestation, market fluctuations, etc.

Balrampur district has been considered as the study area for this research paper. The study was done at the block level. The data were taken from the statistical manuals of the districts. Field visits and personal interviews were conducted to understand the real situations and the motivating factors for changing cultivation patterns. The results show that there is a net loss of cultivated area in the district in 2010 and 2015. The cultivation pattern has changed during these five years. The area devoted to cereal crops was reduced and sugar cane cultivation was accelerated. The market and flash floods were the main factors affecting the crop area. The effects of climate change pose many threats, one of the important consequences being changes in cultivation patterns and crop productivity. Climate change will lead to more extreme weather events. It includes drought, strong winds and heavy rain. The main objective of this study is to know the impact of irrigation, especially underground irrigation in Balrampur district and to understand the changing patterns of cultivation, production and productivity.

**Keywords:** Agriculture, cropping pattern, climate change, productivity , Balrampur District .

### Introduction

Indian agriculture is highly exposed to risks due to climate change, especially drought. 2/3 of Indian agricultural land is rainfed and even the irrigation system depends on monsoons. Flooding is also a major problem in many parts of the country. In addition, frosts in the northwest, heat waves in the central and northern regions and cyclones in the eastern coast also cause destruction. In recent years, the frequency of these climatic extremes has increased due to the increase in atmospheric temperature, which leads to increased risks with a significant loss of agricultural production.

Climate change can affect agriculture through its direct and indirect effects on crops, soils, livestock and pests. The increase in atmospheric CO<sub>2</sub> has a fertilizing effect on photosynthetic

pathway C crops and this promotes their growth and productivity. Increased temperature can reduce the length of the crop. Climate change also has a significant indirect effect on agricultural land use in India through the availability of irrigation water, the frequency and intensity of inter- and intra-seasonal droughts and floods, transformations in soil organic matter, soil erosion, changes in pest profiles, decay. In arable land due to summer coastal land and energy availability.

The critical challenges that the agricultural sector will face in case of climate change are (1) water availability due to changing rainfall patterns, changing river flow and increasing demand of crop water (2) the

deterioration of water quality due to sea water, the transport of salt. From the deeper layers of the earth due to overexploitation of aquifers and incorrect irrigation system practices (3) increasing the frequency and intensity of extreme weather events such as droughts, floods and cyclones and these winds affect production levels more than the impact of average climate changes. (4) heat stress due to higher temperature in the critical stage of plant growth (5) an unpredictable change in the burden of pests and diseases. There is also the possibility that small pests become large due to weather conditions. The cropping model is a dynamic concept concerned with the extent to which categories of arable land can be used. A crop pattern refers to the proportional area under different crops at a given time. Kanwar (1971) defines culture pattern as the temporal and spatial sequence of cultures. Previously, the cultivation patterns of a region were

Determined mainly by agroclimatic factors, i.e. only crops grown in a region

They adapted to the climate and were known as traditional cultures. Today, farmers are affected by the changes

Economic, technological, institutional and political factors (Gulati and Kelly, 1999). From the beginning of widespread agriculture until the 1960s, when the Green Revolution was not implemented in Indian agriculture, wheat, rice, pulses, coarse grains and small millets accounted for the majority of the cultivated land of India. Since then, there has been a wide change in the cultivation pattern in the region.

## OBJECTIVE

- 1- To Study the impact of climate change on cropping pattern .
- 2- To analyse the problems of the farmers and to make suggestions .
- 3- To Study the impact of climate on GDP of Region.

## LITERATURE REVIEW:

There are many publications that clearly show that the areas dedicated to legumes, coarse cereals and millets Full of crops like wheat, rice and oilseeds etc. Narain (1977) in his research.

The study examined the changes in cropping pattern during two periods from 1953-54 to 1961-62 and 1961-62 Until 1972-73. He noted that crops with little added value, such as large grains, lost a significant part of the surface.

High value added cereals such as wheat and rice.

The use of land for agriculture depends not only on physical and biological factors, but also on the social, cultural and economic value of agricultural activity. Historically, agricultural activity in the Old and the New World has probably been different for the process of human migration (Grigg, 1974, 1992). More recently, a five-pronged systematic approach uses the following criteria: location,

Ecology; social and cultural factors; technology; economic framework; physical structure and landscape (Avian 86 Eder, 1986). A combination of physical, biological and social factors combine to determine the type of culture found in each system.

Researchers from different fields, namely geography, agricultural economics and ecology, have shown great interest in studies on the evolution of crop patterns. The process and techniques involved

The changing pattern of agricultural use has been studied by many researchers i.e., Weaver (1954); Shafi (1965) and Singh (1976). Some geographers studied the implications of new technologies in changing culture model. Some have also tried to study the efficiency of agriculture in different areas, namely Mitra (1964);

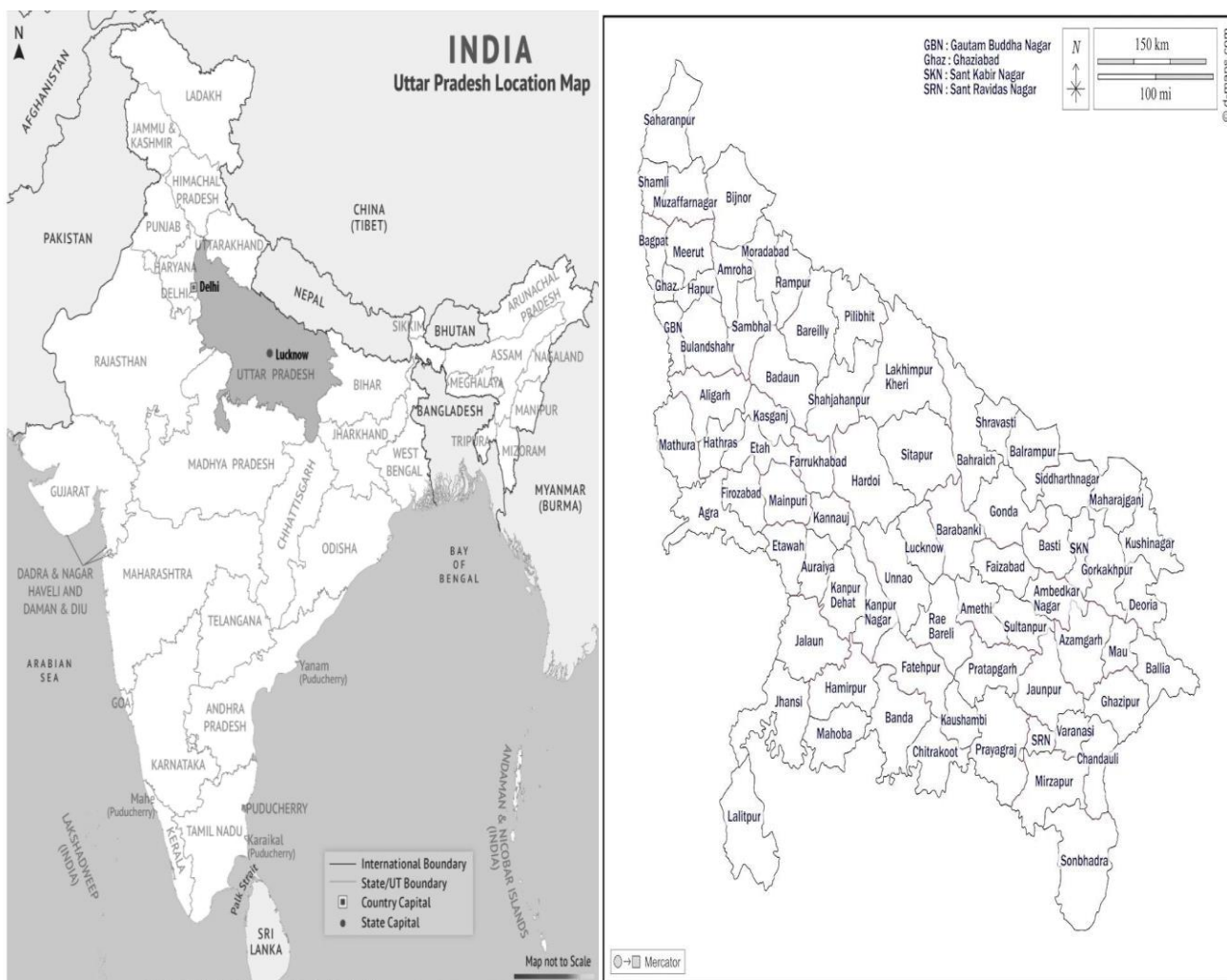
Paul (1962); and Rao (1973). Shafi (1960) tried in his article to measure the agricultural productivity of the Great Plains. Shafi 1991 studies the relative magnitude of plant impacts on different environmental components, (1) crop erosion (risk and contribution). Loss of nutrients (leaching and runoff). Water use (soil moisture depletion), nutrient demand

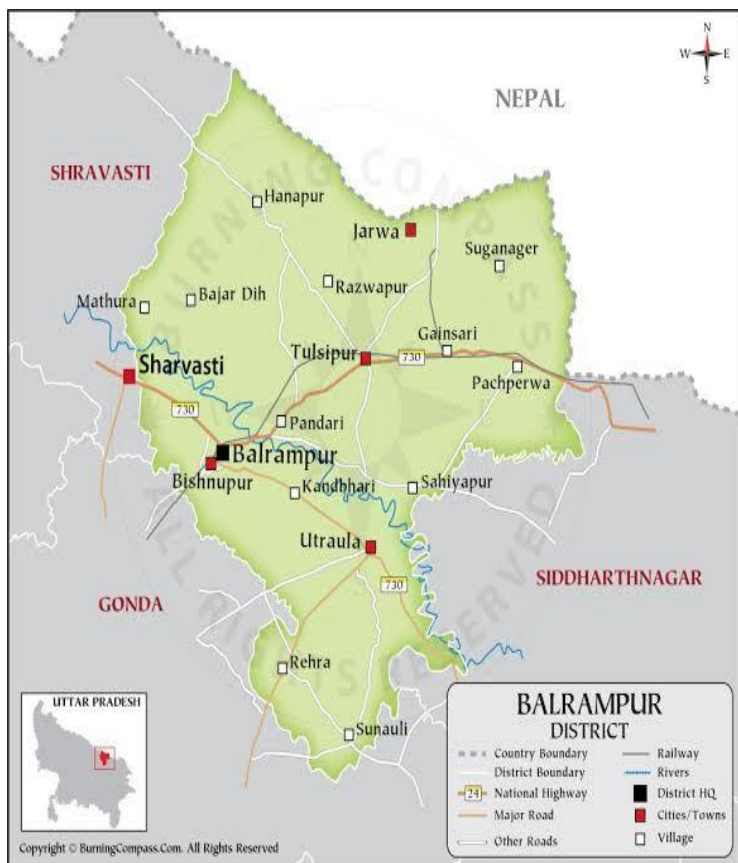
(impact on soil fertility) and pesticide use (impact on biodiversity and pollution). Batterbury, Forsth and Thomson have studied environmental transformation in developing countries in 1997: hybrid research and democratic politics.

**Methodology** - The present study focuses on the crop pattern of Balrampur district using secondary sources of data from the statistical manual of the district of the concerned year.

There are six main crops grown in Balrampur district: rice, wheat, pulses, oilseeds and sugarcane. These cultures are considered in the study. Legumes include arhar, pea, masur, moong and chana, while oils include mustard, sunflower, alsii, til and soybean. Primary and secondary data were collected for this study. The secondary data relating to various aspects of agriculture and irrigation were collected from the statistical manual published by the District Planning Officer Balrampur and the records of other concerned departments.

**Study Area**





The district of Balrampur lies in the middle of the central Ganga plain of Uttar Pradesh. In the Survey of India degree Sheets 63 E and 63 I, it is bounded by north latitudes 27° 03' And 27° 52'; east Longitudes 82° 01' and 82° 45'. It is Located in the foothills of the Shiwaliks. It is surrounded by Nepal in the north and Gonda district in the south, Shrawasti District in the west and Siddharthnagar and Basti district in The east. It geographical area is 3349 sqkm. The total

Population of the district is 21, 48,656 according to the 2011 Population census. Agricultural area Kharif and Rabi are 1, 71,229 and 1, 47,185 hectares respectively.

Administratively, the district is divided into 3 tehsils namely Balrampur, Utraula and Tulsipur and 9 developmental Blocks. These 9 development blocks are Balrampur, Tulsipur, Utraula, Haraya Satgharwa, Gainsari, Pachperwa, Sriduttaganj, Rehra Bazar and Gaindas Buzurg.

Total Numbers of revenue villages are 1017 out of which 18 are Uninhabited.

**Cropping Pattern-** Rice, wheat, sugar cane, masur, and oilseeds are the major crops grown in this district Out of 33 per cent net irrigated area about 75 per cent of the irrigated area was covered by grains. If irrigation coverage is increased diversification of agriculture will be Possible.

**Table Cropping Pattern in Balrampur District and UP**

**Table 2.8: Cropping Pattern in Balrampur District and UP**

(ha)	Balrampur District		Uttar Pradesh	
	% Cropped Area	%Irrigated Area	% Cropped Area	% Irrigated Area
Major Crops				
RICE	33.87	17.95	23.39	24.78
WHEAT	26.46	50.72	36.87	49.32
BARLEY	0.06	0.02	0.82	0.76
MAIZE	2.67	0.23	3.40	1.51
URAD	0.54	0.02	2.05	0.32
MASUR	8.33	0.90		
GRAM	0.16	0.07	2.73	0.59
TUR	2.57	0.00	1.60	0.32
TOTAL PULSES	12.14	1.89	10.39	11.08
TOTAL GRAINS	75.23	70.81	64.93	68.98
MUSTARD SEED	5.57	6.22	2.20	2.43
TOTAL OILSEEDS	5.59	6.22	3.03	3.55
SUGAR CANE	17.13	20.41	8.45	7.87
POTATO	0.48	0.99	1.71	2.34
FODDAR	0.39	0.77		

Source: Balrampur District and UP Statistical Diary, 2006

**CONCLUSION** - This study was conducted in Balrampur district, Uttar Pradesh, to understand the impact of climate change on changing cropping patterns.

In Balrampur district. The district has 18 mandals. At the mandal and district level, rainfall, temperature and its effect on cropping pattern and productivity were analyzed to obtain climatic data for a period of 10 years. It was found that there was not much difference between the maximum and minimum temperature in all the mandals of the district during this period. The above study concludes that significant changes have occurred in the cultivation pattern in Balrampur district of Uttar Pradesh and these changes are still ongoing. The area and production of small grains increased To the detriment of the area and the production of legumes, large grains and fine millet. On the one hand, the increase in the production of fine grains is valuable from the point of view of the food security of the masses, but on the other hand, the decrease in the production of pulses, coarse grains and fine millets definitely affects the food security . The availability of a number of widely adapted high-yielding varieties and different growing seasons has opened the way for small grains (wheat and rice) in different cropping sequences, rapid agricultural mechanization and energy for irrigation, better access in fertilizers, pesticides and soft credit. Provided the motivation for rapid change of the cultivation method.

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