Introduction

Irrigation, artificial watering of land to sustain plant growth. Irrigation is practiced in all parts of the world where rainfall does not provide enough ground moisture. In dry areas, such as the southwestern United States, irrigation must be maintained from the time a crop is planted. In areas of irregular rainfall, irrigation is used during dry spells to ensure harvests and to increase crop yields. Irrigation has greatly expanded the amount of arable land the production of food throughout the world. In 1800 about 8.1 million hectares (20 million acres) were under irrigation, a figure that rose to 41 million hectares (99 million acres) in 1900, to 105 million hectares (260 million acres) in 1950, and to more than 222 million hectares (550 million acres) today. Irrigation land represents about 15 percent of all land under cultivation but often produces over twice the yield of no irrigated fields. Irrigation, however can waterlog soil or increase a soil’s salinity (salt level) to the point where crops are damaged or destroyed. This problem is now jeopardizing about one-third of the world’s irrigated land.

In an agricultural country like India where rainfall is quite uncertain and erratic affecting agriculture, which is the mainstay of the majority of people. The importance of irrigation in agricultural development cannot be overemphasized. Being a prominent input, it not only plays a protective role of insurance against the vagaries of rainfall and drought, but also helps the
farmers in adopting new agricultural innovations, viz. high yielding varieties of seeds, chemical fertilizers and pesticides, scientific crop rotation, modern agricultural production per unit area. It promotes the spatial changes in cropping pattern and regionalization. The availability of adequate irrigation facilities transforms the subsistence agriculture landscape gradually into commercial one making agrarian-economy market oriented. Simultaneously it creates healthy atmosphere to develop several agro-based industries providing employment opportunities to rural masses. Singh has aptly remarked that irrigation being an artery pulsing heart, is an absolute constraint as well as a sufficient volitional command over the location of commercial crops, improvement in agricultural production per hectare, swing in cropping pattern, change in mechanics of land use and dynamics in the livestock structure.

Irrigation is regarded as an integral part of sound infrastructure and is one of the basic ingredients of agricultural activities. Irrigation is decisive economic milieu of the first order. In addition to economic benefits the social benefits such as improvements in health and hygiene, education levels etc. have been concomitant results of the irrigation projects. It may be serve as a social force, leveling the inequality born out of uneven distribution of fixed land resources among different sections of the village community.

The importance of irrigation is also recognized in removing inter-regional disparities in agricultural productivity and bringing about integrated rural development.
The present work is a study of the regional pattern of agricultural productivity, levels of irrigational development and their interrelationship as they obtain in Eastern Uttar Pradesh.

**Overview of Literature:**

Geographers related to irrigation and agricultural productivity, agricultural land use and cropping pattern have undertaken many studies:

**S.K. Sharma** (1980) in his study examines the regional variation in Agricultural Productivity in Madhya Pradesh and identifies the factors, which determine productivity variation.

**R.K. Raina** (1990) in his study examines the variation in land productivity in India, taking per capital cropped area, short term interest rate for agriculturist, rain fall, irrigation, soil quality index the explanatory variables.

**K.S. Sohal and A.K. Saini** (1990) according to them agricultural productivity of an area is influenced by physio-socio-economic institutional organizational factors. These factors are not uniformly distributed in any given region and similar is true in case Punjab. Physical parameters have affected the productivity levels of individual crops.

**Singh** (1967, 1970) discussed various aspect of land use and cropping pattern and their ranking and analysed pattern of crop concentration in Uttar Pradesh.

**Tripathi** (1999) studied in detail various aspect of agricultural development and planning in Faizabad district.
Pandey (2000) discussed salient features of the land use and cropping pattern of Eastern Uttar Pradesh.


Kushwaha (2008) discussed the role of agricultural sector in the economy of India including existing land use and their sustainability.

Singh, Singh and Dwivedi (2010) have analysed the different land use pattern, cropping pattern, intensity and coverage under vegetable crops in different farm size group in Eastern Uttar Pradesh.

Barakade, Tonape and Lokhande (2011) analyzed the agricultural land use pattern at micro level in Satara district, Maharashtra.

Gomatee (2012) worked out the chief characteristics of agricultural land use pattern in Bulandshahr district of upper Ganga Yamuna doab.

D.R. Gadgil in his outstanding work evaluating economic effects of irrigation with reference to Godavari and Pravana canals throws light on many direct and indirect benefits of irrigation viz. it has resulted in superior cropping pattern, higher per acre productivity, higher form income, increased demand for hired labour increased wage rate and improved economic conditions etc. Gadgil concludes that the construction and maintenance of irrigation project have reaching effects on the economic life the community living within its region and also to the same extent on the neighboring community of the region.

Singh and Singh found that there was a great change in cropping pattern and cropping intensity in the 15 villages irrigated through Bhakra canal system.
Objectives of the Study:

The main objectives of the study are:

(i) To examine the irrigation potential available, created and actually utilized.

(ii) To assess the impact of irrigation on intensification of cultivation, change in the mechanics of land use and swing in cropping pattern, speedy adoption of improved agricultural practices and resultant increase in the agricultural productivity.

(iii) To evaluate the impact of irrigation on agriculture and agricultural allied activities and the infrastructure, the existence of which depends its optimum utilization.

(iv) To adjudicate the impact of irrigation on employment generation, rise in income and standard of living of the rural masses.

(v) To identify and highlight the negative influences, the constraint and weaknesses regarding the full and optimum of irrigation resources and rural development process in the study area.

(vi) The objectives of the study is to delineate of high and low agricultural productivity, to delineate region at varying levels of irrigation facilities and to examine the relationship between irrigation and agricultural productivity.

Hypothesis:

The study aims at testing the following hypothesis:

(i) Irrigation leads to greater insularity of agriculture against the vagaries of weather.
(ii) Adequate and assured irrigation facilities tend to exercise a sufficient volitional command over expansion and intensification of cultivation, change in the mechanics of land use and cropping pattern.

(iii) Adequate and assured irrigation facilities tend to provide speedy adoption of improved agricultural practices among farmers i.e. HYV, chemical fertilizers and improved implement etc.

(iv) Adequate and assured irrigation facilities serve to increase the agricultural productivity.

(v) Progress in irrigational facilities and agricultural productivity thus be hypothesized to be interrelated. Testing of this hypothesis in the area under study is the crux of the research problem. Finding of this research may help to design plans and formulate policies for development of the area in general and reducing disparities at micro level in particular.

Database and Methodology:

Agricultural productivity is calculated by using data on area and production of all crops grown in the region. The present study is based on the secondary source of data for the year 1997-98 to 2007-08. The data for the calculation of productivity indices are obtained from Directorate of Static’s and Evaluation, Govt. of Uttar Pradesh, Lucknow. A district has been taken as the unit of study. In order to analyze irrigation facilities, the data for the study have been collected from the secondary sources. The secondary data have been collected from the published and unpublished
records viz. census report, revenue record, district statistical year book, the
data kept at the state, district, tehsil and block headquarters.

In the present study one analytical concepts of agricultural
productivity are used. Different scholars have used different numerical
methods to measure level of agricultural productivity at small area unit. In
this study one methods of measuring agricultural productivity have been
used. In this study the agricultural productivity have been calculated by the
Yang’s Yield Index methods.

**Chapter Scheme:**

The whole study has been grouped into the following chapters:

Chapter first is devoted to the presentation of the geographical background
of Eastern Uttar Pradesh, with reference to relief, drainage system, climate,
soils and cultural background. In chapter two source of irrigation has
discussed with reference to canal irrigation, tube well irrigation, well
irrigation, irrigation by ponds, tanks and other source of irrigation and
intensity of irrigation. Chapter three focuses attention on the impact of the
irrigation on major agricultural inputs, i.e. mechanical and biochemical
inputs. Chapter four analyses the impact of irrigation on general land use.
Chapter five highlights the impact of irrigation on cropping pattern. Chapter
six is about the concept of agricultural productivity and its measurement.
Chapter seven analyses the pattern of agricultural productivity in Eastern
Uttar Pradesh. Chapter eight examines the agricultural characteristics, viz.,
crop diversification, crop ranking, crop combination, levels of crop
productivity and agricultural efficiency etc.
References:


8- Ibid


17- Pandey, M.P. (1979) : op. pp. 1-191


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