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Sources of Irrigation and Agricultural Productivity in Meerut-Baghpat District

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ABSTRACT

Agricultural growth has been made one of the important components of the development strategy in India. Within the overall strategy of agricultural growth, irrigation has been accepted as major programme for modernizing Indian agriculture. Irrigation has been assigned such a crucial role because this is a single most important factor which can facilitate the further utilization of our scarce farm land resources and can facilitate acceptance of improved technology at the farm level.

Key words: Development strategy, agricultural growth, technology farm.

INTRODUCTION

Irrigation in an agrarian economy assumes the same importance as blood in human body. Irrigation is defined as the artificial application of water to soil, for the purpose of supplying water essential to plant growth. Water has the potential to increase yield facilitate the adoption of high yielding varieties and contribute to agricultural stability raise cropping intensity and give a boost to labour absorption to agriculture. It is a means by which water is conveyed to arid areas from river, reservoirs or wells to increase the fertility of land.

Irrigation is become more and more important from the point of view of the development of the whole world's agricultural economy. The impact of irrigation is all pervading as it leads to change in cropping pattern, increased yields rates and labour utilization and ultimately it bring prosperity to the areas, hence irrigation is regarding as a catalyst for socio-economic change that sets in motion the productive forces in the agricultural sector.

Objectives

The study has the following objectives.

1) To asses the major sources and their contribution in irrigated area.
2) To find out the volume of change in irrigated area.
3) To analized the impact of irrigation on agricultural productivity.

Study Area

The districts of Meerut and Baghpat are situated between 28^0 6' to 29^0 15' north latitudes and 77^0 13' to 78^0 5' east longitudes. The study area is a part of upper Ganga-Yamuna Doab and extended over 3911 sq.km. According to 2011 census, the total population is 4749561 (53.27% male & 46.76% female) persons with the average density of 730 persons per km^2, while sex ratio is 844 females per 1000 of male. There are 901 villages, 18 blocks and 6 tehsils in the region area.

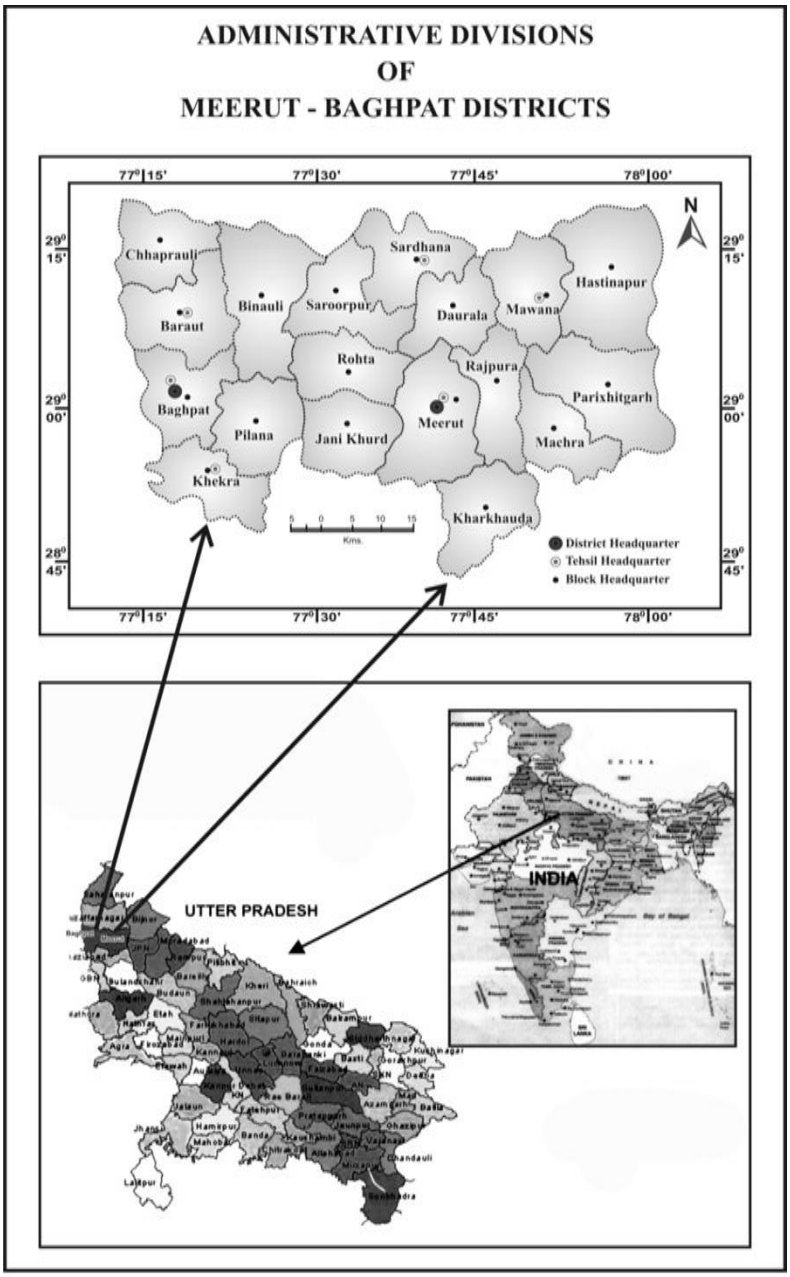

Fig. 1

Date base and Methodology

The present study is base on the secondary sources of data. The data has been used for the year 1980-81 and 2010-11. With the simple percentage method, the Crop Yield Index method propounded by Yang has also been used to analysed the agricultural productivity indices.

RESULT AND DISCUSSION

Sources of Irrigation

In the pre-independence period, there was not much use of water for irrigation. Crops were grown mainly with the help of rain water supplemented by indigenous methods of irrigation depending on the rain water accumulated in natural depression and ponds.

After independence, the food shortage in the country in the face of rapidly growing population attracted the attention of the government which realized that the creation of dependable irrigation facilities was inevitable for intensification of agriculture resulting in increased agricultural production. Extension of the tube well irrigation was given top priority, as the construction of extensive canal system in a short period was not feasible.

Canals

Canal is the second important source of irrigation. Farmers make the maximum use of canals where this facility is available. Although, irrigation by canal is cheaper than the other-sources but still the farmers prefer to have their own tube wells. The canals are subjected too much criticism such as the supply of water being in the hands of inefficient and corrupt bureaucrats which led to the non-availability of canal water in desired amount and at desired time.

During 1980-81, the total length of canals in the study area was 969 km. and expanded up to 1202 km. in 2010-11. Baraut (156), Parixitgarh (111), Sardhana (103) and Jani Khurd (100) blocks recorded the highest length of canal (Table 1). They irrigate an area of about 99253 hectares in 1980-81, which is 34.69%. But the uncertainty of water and time, the irrigated area has been decrease and recorded 33493 ha. (12.05%) in 2010-11, which show a negative growth of 66.25 per cent.

Table 1: Sources of Irrigation in the Study Area

Block	Canal		Tube Well		Others	
	Length (km.)		Nos.		Nos.	
	1980-81	2010-11	1980-81	2010-11	1980-81	2010-11
Meerut	23	36	1570	1875	38	14
Jani Khurd	93	100	1631	4017	209	25
Rohta	39	51	2049	3800	128	67
Rajpura	2	15	2513	3392	67	34
Kharkhauda	3	4	2326	3711	53	36
Mawana	15	84	3526	7888	105	20
Hastinapur	95	84	1624	7889	72	48
Parixitgarh	80	111	2725	6388	139	35
Machra	45	70	2838	4775	86	39
Sardhana	75	103	1201	4648	89	15
Saroorpur	46	58	2079	4443	236	35
Daurala	35	51	2136	4565	35	20
Chhaprauli	94	76	2613	4464	649	111
Baraut	96	156	3161	5788	1391	110
Baghpat	55	86	2318	4688	858	130
Pilana	40	56	2446	3858	434	145
Khekra	121	47	1806	3336	233	113
Binauli	12	14	3060	4426	176	87
Total	969	1202	41622	83951	4998	1102

Source: Office, Statistical Officer Meerut & Baghpat

Spatial Pattern of Canal Irrigation

Fig. 2 and table 2 show that there are micro level disparities in the spatial distribution of canal irrigation. During 2010-11, only one block of Jani Khurd, canals claim more than 40 per cent of the net irrigated area, while 20-40 per cent canal irrigated area lies in 4 blocks. There are 13 other blocks in which the canal irrigated area is below 20 per cent.

It is clear from the above facts that only 5 blocks shows medium to height proportion of canal irrigated area and the rest blocks have low proportion, where either there is a lack of these irrigation cannels or due to end parts of these channels, the supply of water is quite inadequate.

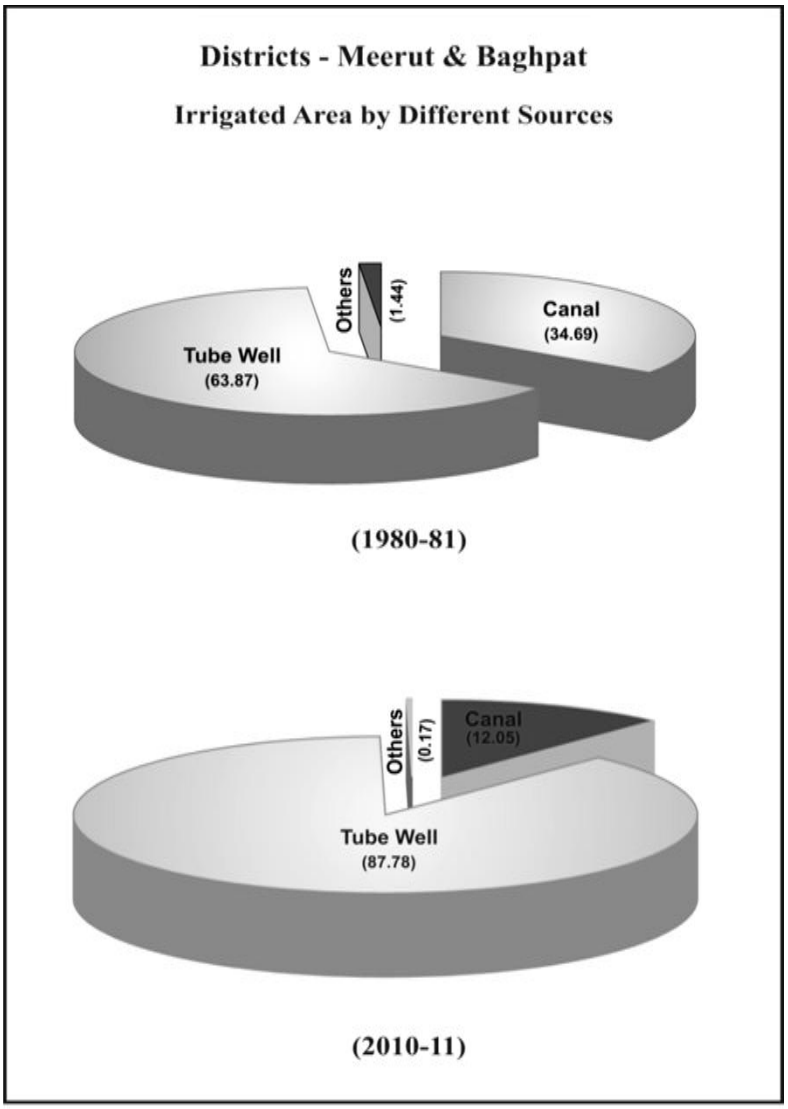
Districts - Meerut & Baghpat
Irrigated Area by Different Sources
Others
(1.44)
Canal
(34.69)
Tube Well
(63.87)
(1980-81)
Others
(0.17)
Canal
(12.05)
Tube Well
(87.78)
(2010-11)

Fig. 2

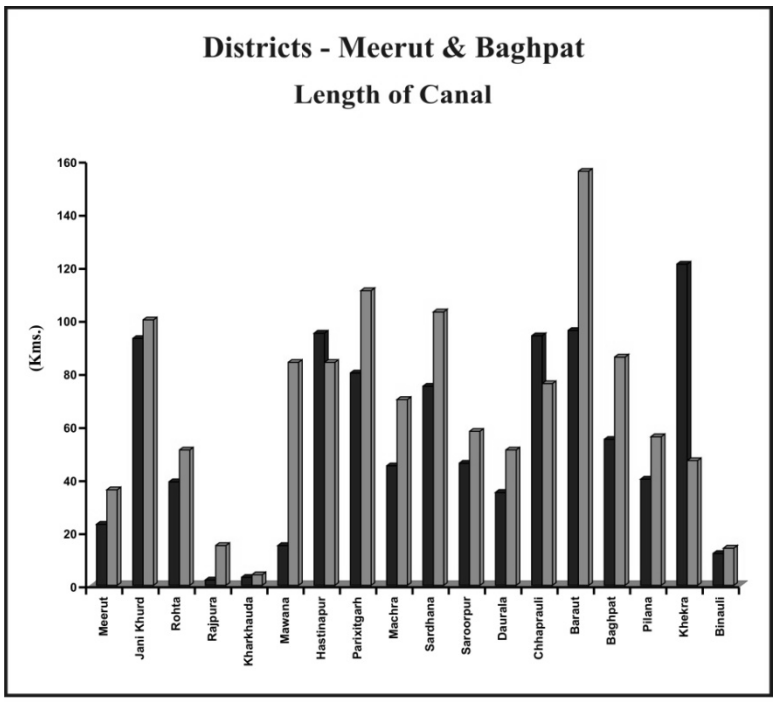
Districts - Meerut & Baghpat
Length of Canal
(Kms.)
160
140
120
100
80
60
40
20
0
Meerut
Jani Khurd
Rohta
Rajpura
Kharkhauda
Mawana
Hastinapur
Parixitgarh
Machra
Sardhana
Saroorpur
Daurala
Chhaprauli
Baraut
Baghpat
Pilana
Khekra
Binauli

Fig. 3

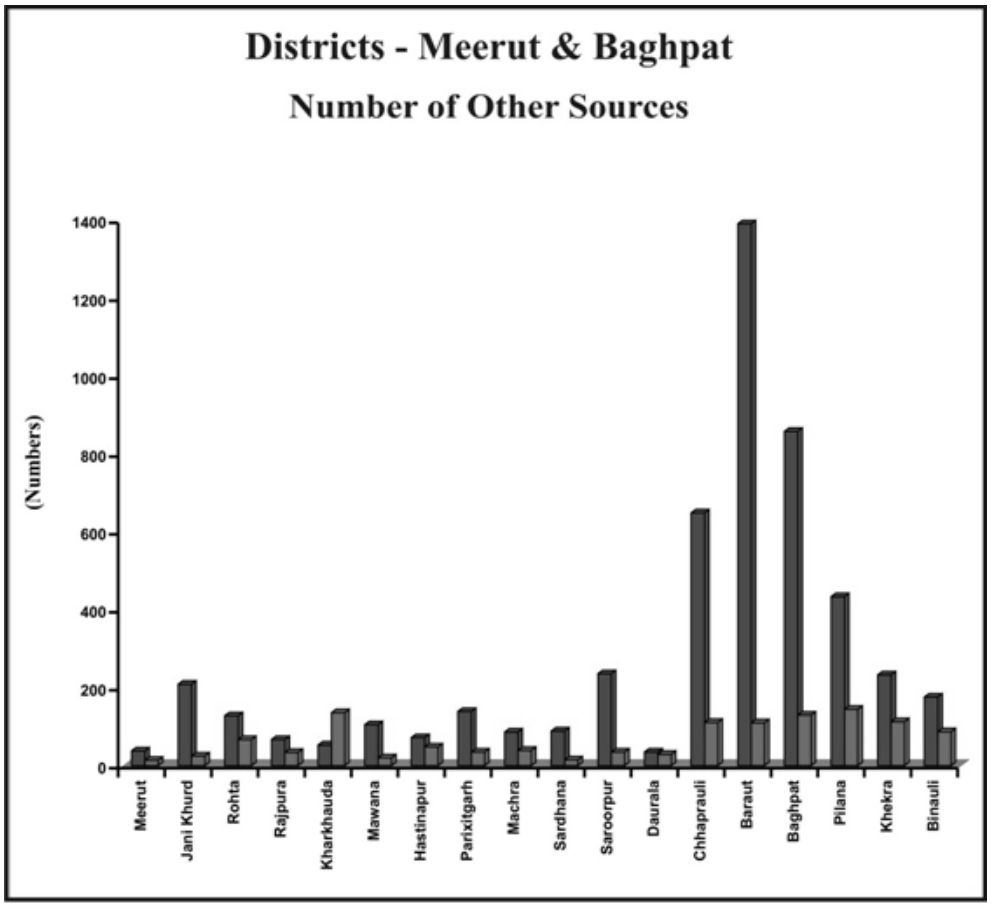
Districts - Meerut & Baghpat
Number of Other Sources
(Numbers)
0
200
400
600
800
1000
1200
1400
Meerut
Jani Khurd
Rohta
Rajpura
Kharkhauda
Mawana
Hastinapur
Parixitgarh
Machra
Sardhana
Saroorpur
Daurala
Chhaprauli
Baraut
Baghpat
Pilana
Khekra
Binauli

Fig. 4

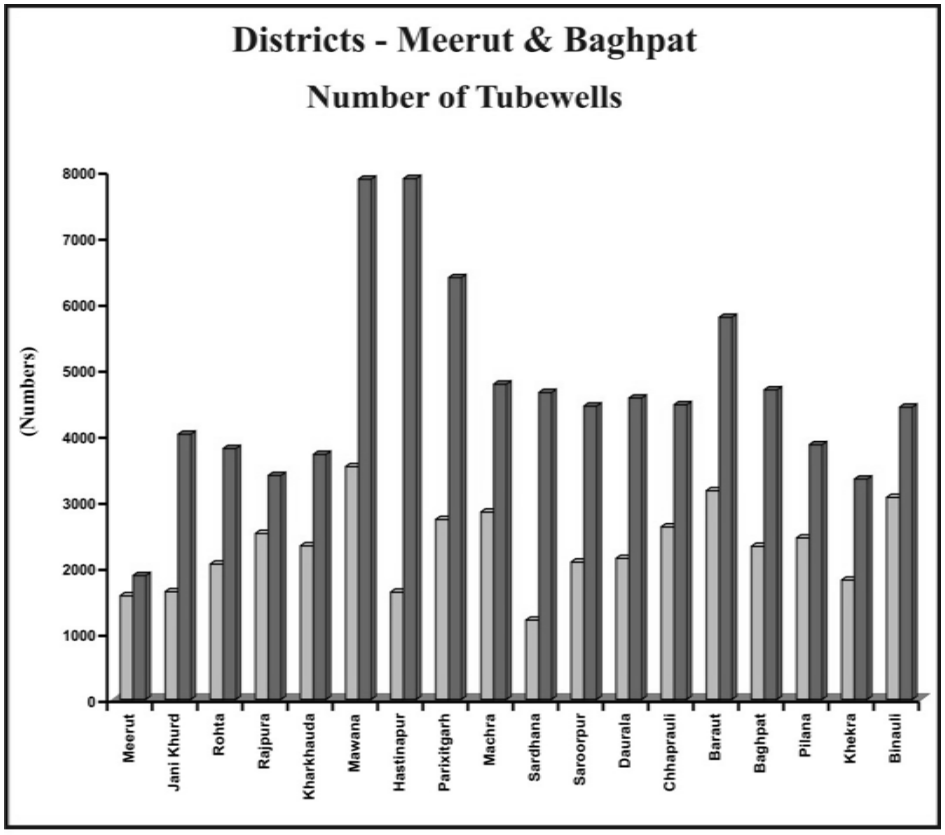
Districts - Meerut & Baghpat
Number of Tubewells
(Numbers)
0
1000
2000
3000
4000
5000
6000
7000
8000
Meerut
Jani Khurd
Rohta
Rajpura
Kharkhauda
Mawana
Hastinapur
Parixitgarh
Machra
Sardhana
Saroorpur
Daurala
Chhaprauli
Baraut
Baghpat
Pilana
Khekra
Binauli

Fig. 5

Table 3 Canal Irrigated Area

Category	% of net Irrigated Area	2010-11	1980-81	Volume of Change (1980-81 to 2010-11)	
		No. of Blocks	No. of Blocks		
High	> 40	1	8	>20	9
Medium	20-40	4	7	10-20	5
Low	<20	13	3	<10	4

Table 3 shows that there has been a decrease in the canal irrigation. During 1980-81, in 3 blocks canal irrigation was 20 per cent. There were 7 blocks in moderate category. The number of blocks in the high category was 8 and now there is only one block.

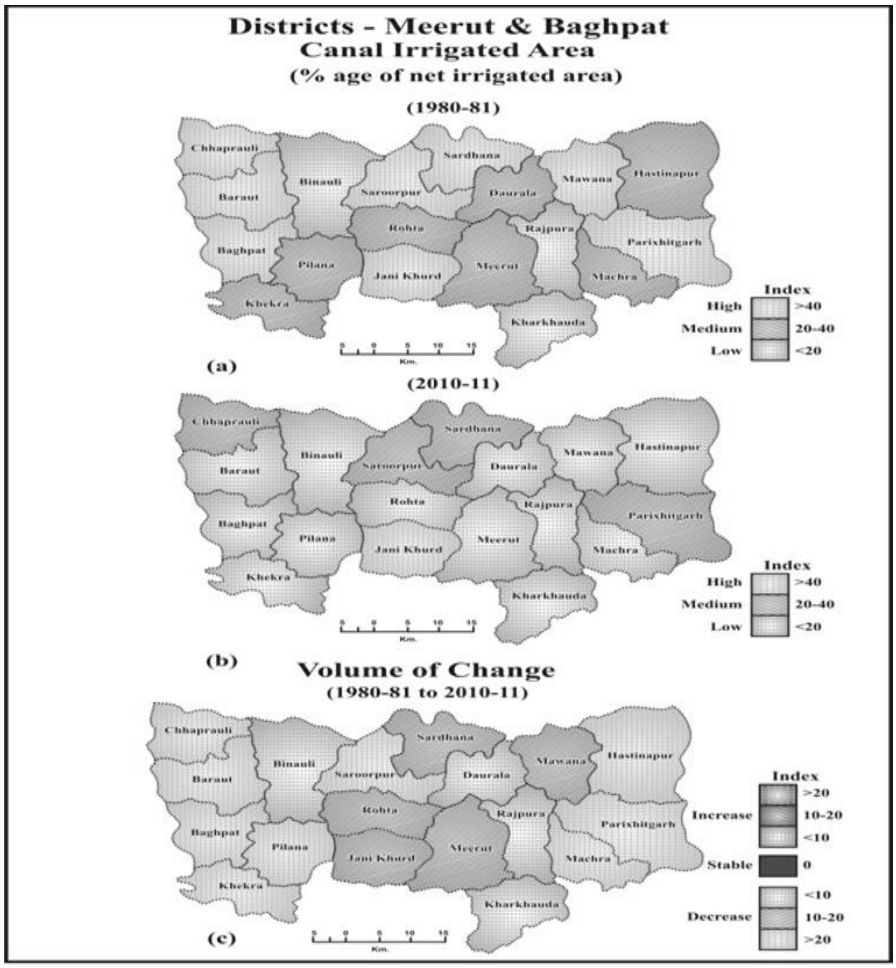

Fig. 6

Fig. 6 (c) and Table 3 show the volume of change in the canal irrigated area. It is clear that all blocks have experienced decreases. In 9 blocks, the decrease is to the tune of above 20 per cent and 5 blocks recorded between 10 to 20% and in 4 blocks less than 10 per cent.

Tube Wells

Tube Wells are the most preferred source of irrigation amongst large, medium and small farmers. Even in those areas where there is a dense network of cannels, farmers depend on tubwells because of the timeliness and adequacy of water supply. The irrigation water is in the hands of the farmers and they can use it is whatever time and whatever amount it is required.

In this category public, private, electric and diesel tube wells have been included. During 1980-81, the total number of tube wells was 41622, which increased to 83951 in 2010-11. There is a growth of 101.70 per cent.

Spatial Pattern of Tube Well Irrigation

The tube well irrigation accounts for 243895 hectares, i.e., 87.78% of the total net irrigated area in 2010-11, as against 63.87% (182733 hectares) in 1980-81. There are spatial variations in its distribution in the study area. The highest proportion (99.32%) is in Rohta block and the lowest (54.24%) in Jani Khurd.

Fig. 5.10 and Table 4 show that in 7 blocks the share of tube well irrigated area is above 90 per cent and in 11 blocks, there is between 45-90 per cent areas. It may be seen that the proportion of the tube well irrigated area is higher in the west mainly in Baghpat district and the southern part of Meerut district, where canal irrigated area is comparatively less. It is low generally in the northern or in some other blocks where the proportion of canal irrigated area is higher.

Table 4: Tube Wells Irrigated Area

Category	% of net Irrigated Area	2010-11 No. of Blocks	1980-81 No. of Blocks	Volume of Change (1980-81 to 2010-11)	
High	> 90	7	3	>20	10
Medium	45-90	11	12	10-20	4
Low	<45	-	3	<10	4

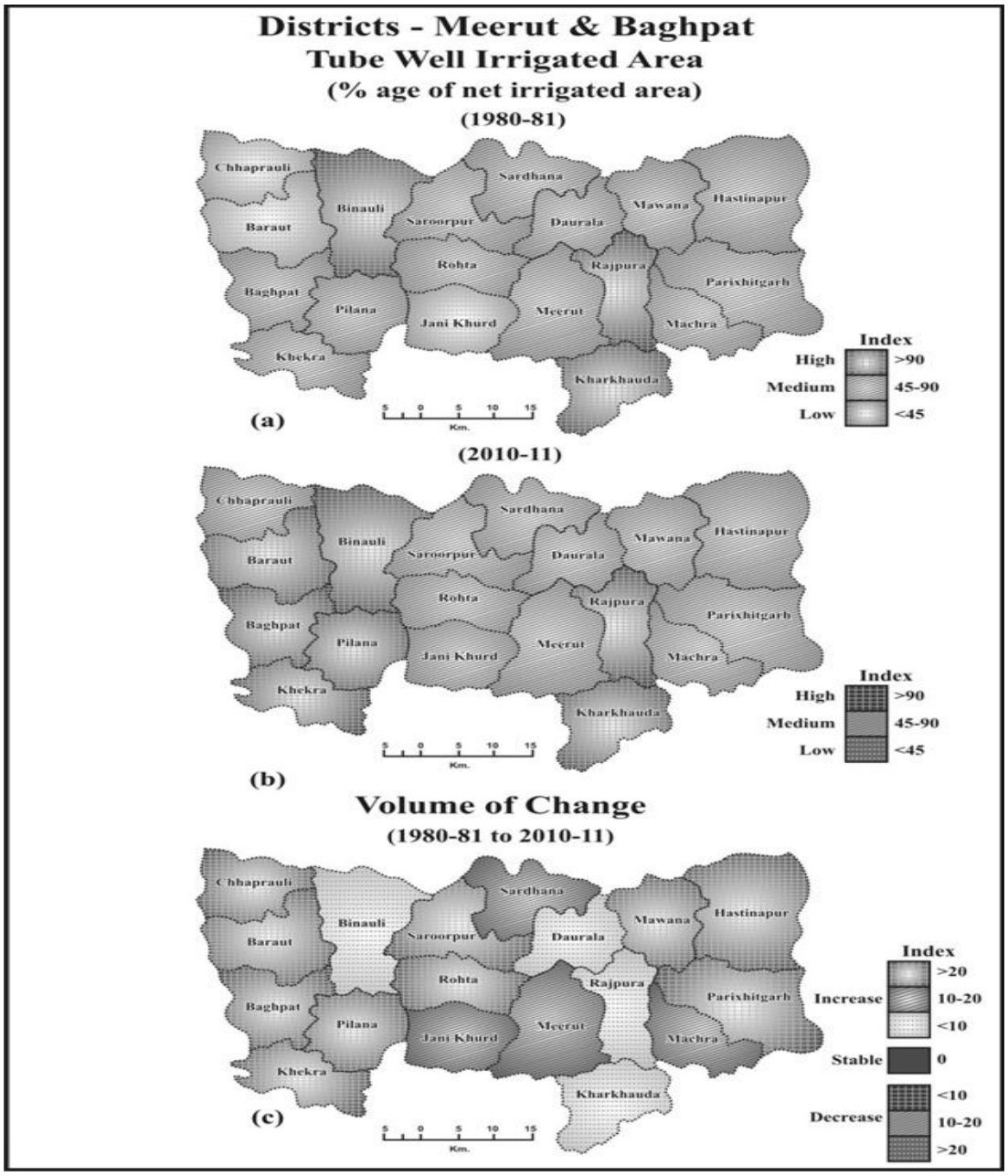

Fig. 7

Although, there is slight increase in the tube well irrigated area in most of the blocks, its proportion has decreased significantly. As in the year of 1980-81, there were 3 blocks in the high (>90%) category, which is 7 per cent. In the medium category (45-90%), the number has decreased from 12 to 11. In 1980-81, there were 3 blocks and not a single block has registered below 45% of net irrigated area in 2010-11.

The volume of change also substantiates this fact. In the region as a whole, there is an increase of 23.91 per cent. Only 10 blocks have experienced an increase of more than 20%, while 4 blocks between 10-20 per cent and the remaining (4) blocks below 10 per cent. This is due to the decrease in the canal irrigated area.

Other Sources

Among these well, tank, ponds and natural depression have been included. During 1980-81 the total other sources were 4998 and decreased to 1102 in 2010-11. This is a minor source of irrigation. The hectareage under net irrigation area by well, ponds and other sources has decreased from 4130 (1.44%) to 465 hectares (0.17%). Table 5 shows that there is no block in high and very high category during 2010-11 (>2 and 1-2%).

Table 5: Irrigated Area of Other Sources

Category	% of net Irrigated Area	2010-11	1980-81	Volume of Change (1980-81 to 2010-11)	
		No. of Blocks	No. of Blocks		
High	> 2	-	6	>2	5
Medium	1-2	-	3	1-2	4
Low	<1	18	9	<1	9

Categories (high and medium), which were formerly 6 and 3 blocks in 1980-81, while 18 blocks have experienced decreases ranging below 1 per cent.

The volume of change amounts to 1.27 per cent. All blocks registered a significant decrease of below 2 per cent. The decreasing trend in the magnitude of irrigation by well, ponds and other sources is due to an increase in the importance of tube well and canal irrigation.

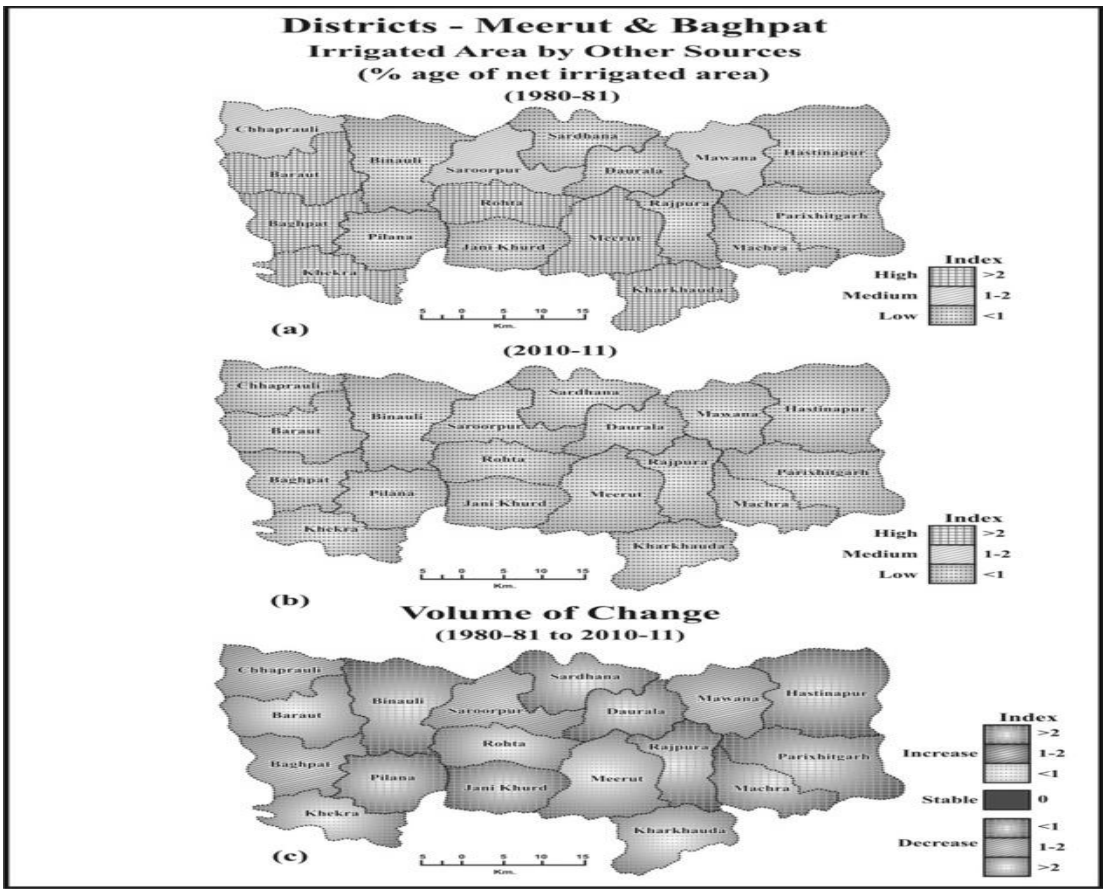

Fig. 8

Agricultural Productivity

The spatial variations in the levels of agricultural productivity have been measured by Yang's 'Crop Yield Index' method. One the basis of indicies the region may be categorised into three groups.

Table 6: Levels of Agricultural Productivity

Category	No. of Blocks	Percentage to total
High	7	38.89
Medium	6	33.33
Low	5	27.78
Total	18	100.00

Table 6 shows that seven blocks fall in high agricultural productivity region. In this region average productivity is about 100.78 per cent. It is highest in Saroorpur (101.56%), Sardhana (100.47) and followed by Mawana, Jani Khurd, Baraut and Baghpat. The main crops grown in these blocks are sugarcane, wheat and rice. Superior technology, irrigation facilities, large amount of inputs used per hectare and agro-based industries account for the high level of production.

Medium level of agricultural productivity comprises of 6 blocks which extended from the east to the west. Parixitgarh, Meerut, Rohta and Dhorala are in Meerut, while Chhaprauili and Binauli in Baghpat. The agricultural productivity ranges from 99.01 to 100.20 per cent.

The region of low productivity includes 5 blocks, which is 27.78% of total. These blocks from 2 patches in the south, one is in the north-east. The productivity index is below 99 per cent. This region has vast area under wheat. Mainly low value and low yield crops are grown here. Intensity of cropping is also low.

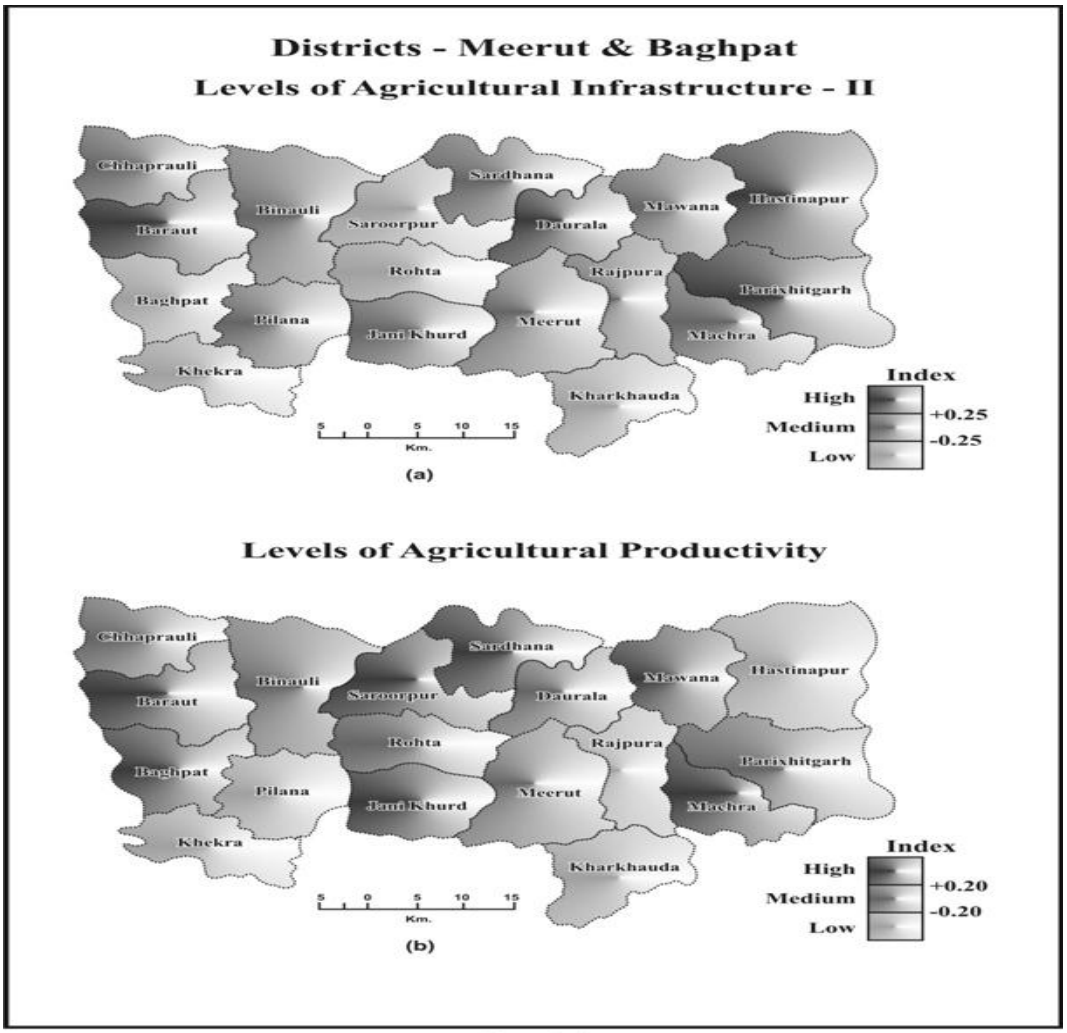

Fig. 9

CONCLUSION

It is concluded that irrigation plays a protective role against the vagaries of monsoon. It acts as a catalytic agent and one of crucial factors in the package of improved inputs and new technology. Due to irrigation, India has been in a comfortable position. With regard to availability of food grains and has highly contributed to increase in income such as farm income, return to family labour and management and net income in irrigated farming.

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