

# The study of land utilisation patterns in different divisions of Uttar Pradesh

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## ABSTRACT

*Although the state of Uttar Pradesh is divided among different divisions and further, each division is comprised of few districts. In total eight divisions and districts under each of them have been taken for study. Number of districts under each division ranges from 4 to 6 and therefore size of each division varies. It is found that on closer look, these divisions can be studied for their utilisation of various natural resources including land along with administrative focus and support, primarily to agriculture. In this paper, different divisions have been studied based on certain premises, like gross sown area, net sown area and irrigated area in each district and thereafter under each division. The study is done for a specific period between 2012-13 to 2016-17. Different patterns are observed during the study period. In brief, pattern was in relation to area under gross & net sown and irrigated area. It is found that year to year, changes are reflected in the variables taken. It is also studied to know what the ratio between gross sown area and net irrigated area is and certain patterns are also found on this aspect.*

**Key words:** Division, Districts, Land Utilization pattern, Irrigated area, gross sown area, net sown area,

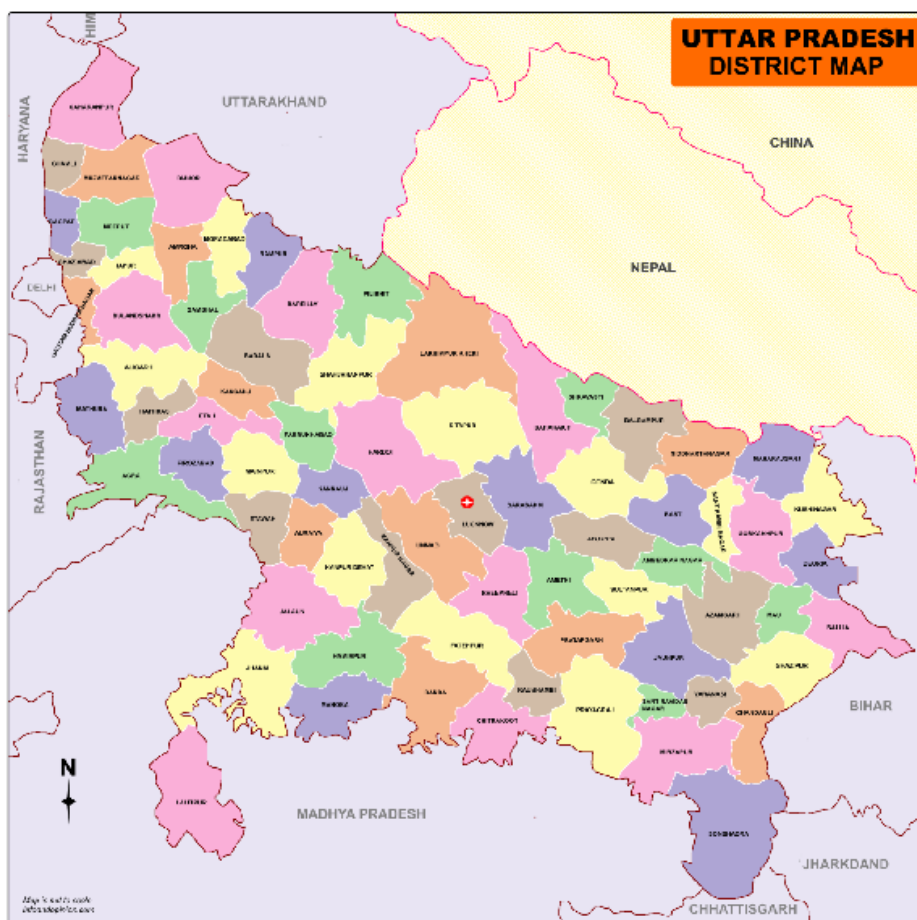
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## INTRODUCTION

Uttar Pradesh is one of the main states in the country which contributes mostly to total food grains production. Naturally, most of the area in the state is having most fertile land in the country. It has extensive network of many big rivers and other natural resources. Land quality along with water availability makes agriculture a main source of livelihood for majority of people in the state.

With advancements in the field of agriculture, the state is also observing increase in area of utilisation, production per hectare, per hectare productivity along with cultivation of many crops which were not grown earlier in the region, naturally. The change is reflected in the data which has been collected and studies under this paper. The data shows that there is increase in total area sown along with net irrigated area. It thus means that more and more land which was unusable earlier is being brought under cultivation. Similarly, increase in irrigated area can be assigned to better irrigation means now available to farmers in the state. All governments including state and local bodies are now involved rigorously in the improvement of agriculture practices and betterment of people involved in agriculture in the state, today. Advancements, however, bring along with it many challenges & concerns as well. Once can be construed from the increase in gross sown area which may be happening due to converting forest area into agricultural land. Other concern could be extensive use of agrichemicals that is rendering land unusable. Water table is another area of concern. Extensive use underground water for irrigation lowering water table year by year. Climatic changes are universally known to all and are impacting northern part of India including Uttar Pradesh also.

In the current study, Uttar Pradesh is studied based on different divisions and districts under each of them. The focus is on to look at which all districts or their divisions have observed changes in areas under cultivation. Changes, if any have also looked at from ratio between gross to irrigated area. Changes will give indication of how much area within a specific district or division is still not fully utilised and if irrigation sources are developed in that district or division, there is opportunity for higher production and productivity per hectare in the state. We have taken all eight divisions and districts under them to study; and utilisation pattern for each of district and division.



### Objectives of the paper

- To study land utilisation changes in different divisions of Uttar Pradesh
- To study year-on-year changes in the gross area in a division and each district under a division.
- To study changes in the gross area, net sown area and net irrigated area during the study year.

### MATERIALS & METHODS

The paper has studied varying patterns of land utilisation in different Commissionerate of Uttar Pradesh 2012-13 to 2016-17. The secondary data from different sources has been collected under the study. Tabulation and interpretation have been done in line with the paper objectives. Statistical tools used in the study, primarily are percentage, ratio, and absolute change. To remain area specific, the paper has collected information about districts in different Commissionerate in the state.

### RESULTS & DISCUSSION

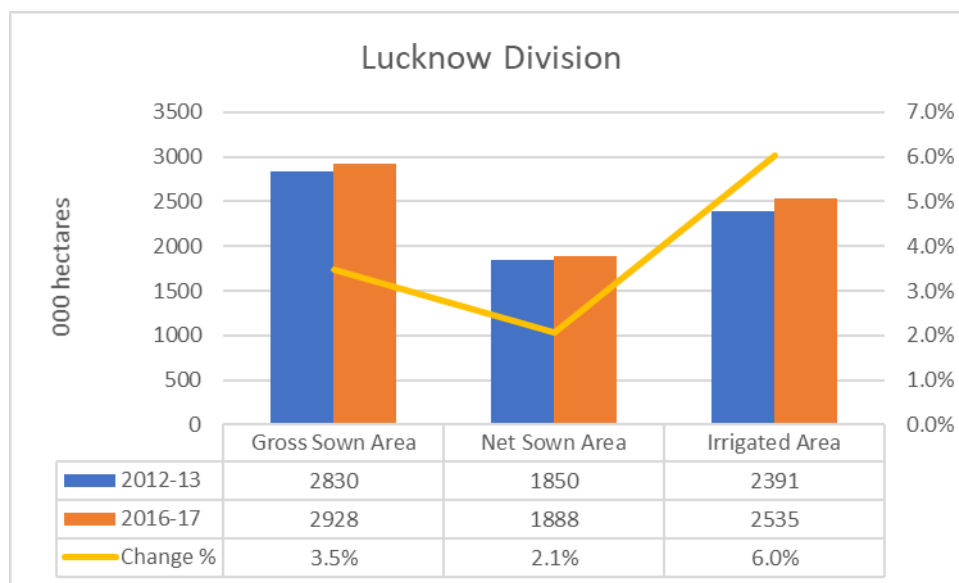
At the time of this study, there were total eight divisions functioning in the state of Uttar Pradesh. Each division was having districts varying from 4 to 6. Highest being in Lucknow division with 6 districts and lowest being in the divisions of Bareilly, Meerut, Agra, Prayagraj, Varanasi & Gorakhpur with four each. Division of Kanpur was having 5 districts under it, as shown in the table below:

Division	Lucknow	Bareilly	Meerut	Agra	Kanpur	Prayagraj	Varanasi	Gorakhpur
Districts	Lucknow							
	Rural	Bareilly	Meerut	Agra	Kanpur	Prayagraj	Varanasi	Gorakhpur
	Unnao	Sahajanpur	Baghpat	Mathura	Auraiya	Kaushambi	Chandauli	Gorakhpur
	Sitapur	Pilibhit	Ghaziabad	Firozabad	Kannauj	Pratapgarh	Jaunpur	Mahajganj
	Hardoi	Badaun	Bulandshar	Mainpuri	Farrukhabad	Fatehpur	Ghazipur	Deoria
	Rae Bareilly				Etawah			
	Kheri							

Division wise data information and interpretation is given below:

### LUCKNOW DIVISION

Gross sown area, net sown area & net irrigated area for the division of Lucknow were 2830,000 hectares, 1850,000 & 2391,000 hectares respectively in the year 2012-13. From the data available, it evident that there was significant increase in all the three in the year 2016-17. Gross sown area changed by 3.5% to 2928,000 hectares, while net sown area increased by 2.1% to 1888000 hectares and net irrigated area by 6.0% to 2391,000 hectares. The maximum increase is in net irrigated area in the division. This indicates that there were better irrigation facilities in the year 2016-17 then in 2012-13.



Further, each district under the Lucknow division is studies for any change in gross sown area, net sown area and net irrigated area. In total there are 6 districts covered under the Lucknow division. From the gross area sown point of view, the two largest districts are Lakhimpur Kheri & Sitapur. Lakhimpur Kheri is having 711,000 hectares whereas Sitpur is having 689 000 hectares land under gross sown area. The smallest being Rae Bareilly with only 286000 hectares gross sown area.

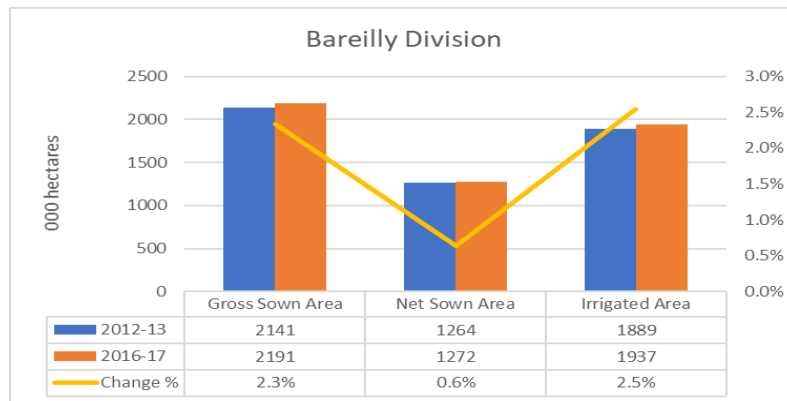
From the land utilisation point of view, while Sitapur with 1: 0.87 was ahead of other districts for gross sown area to net irrigated area in the year 2012-13, Lakhimpur Kheri was ahead of all other districts in the division with ration 1:0.91.

Average ratio between gross sown area to net irrigated area has changed from 1:0.70 in 2012-13 to 1: 0.72 in the year 2016-17. Giving an indication that irrigation means have increased in four years of study.

Districts	2012-13			2016-17			Ratio between Gross Sown Area to Irrigated Area	
	Gross Sown Area	Net Sown Area	Irrigated Area	Gross Sown Area	Net Sown Area	Irrigated Area	2012-13	2016-17
Lucknow Rural							0.0	0.0
Unnao	495	312	400	503	315	411	0.81	0.82
Sitapur	689	445	596	671	441	591	0.87	0.88
Hardoi	649	432	545	676	422	555	0.84	0.82
Rae bareilly	286	185	244	369	224	330	0.85	0.89
Kheri	711	476	606	709	486	648	0.85	0.91
Average ratio between Gross Sown Area to Irrigated Area							0.70	0.72

### Bareilly Division

In the year 2012-13, gross sown area, net sown area & net irrigated area for the division of Bareilly were 2141, 000 hectares, 1264 0000 & 1889 0000 hectares respectively. From the data available, it is evident that there was significant increase in all the three areas in the year 2016-17. Gross sown area changed by 2.3% to 2191,000 hectares, while net sown area increased by 0.6% to 1272,000 hectares and net irrigated area by 2.5% to 1937,000 hectares. The maximum increase is in net irrigated area in the division. This indicates that there were better irrigation facilities in the year 2016-17 then in 2012-13.



Further, each district under the Bareilly division is studied for any change in gross sown area, net sown area and net irrigated area. In total there are 4 districts covered under the Bareilly division. From the gross area sown point of view, the two largest districts are Badaun & Shahjahanpur. Badaun is having 616,000 hectares whereas Shahjahanpur is having 600,000 hectares land under gross sown area. The smallest being Pilibhit with only 389,000 hectares gross sown area.

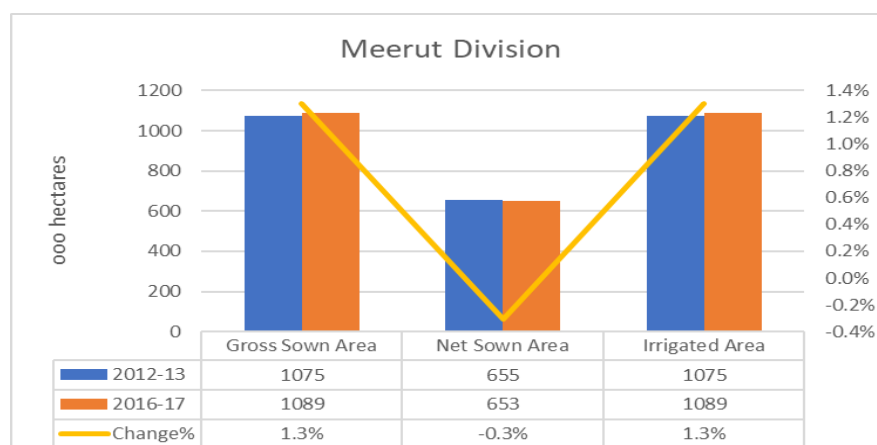
From the land utilisation point of view, while Pilibhit with 1: 0.98 was ahead of other districts for gross sown area to net irrigated area in the year 2012-13, Pilibhit was ahead of all other districts in the division with ratio 1:0.98 in 2016-17.

Average ratio between gross sown area to net irrigated area has changed from 1:0.89 in 2012-13 to 1: 0.89 in the year 2016-17. Giving an indication that irrigation means have same in four years of study.

Districts	2012-13			2016-17			Ratio Gross Sown Area to Irrigated Area	
	Gross Sown Area	Net Sown Area	Irrigated Area	Gross Sown Area	Net Sown Area	Irrigated Area	2012-13	2016-17
Bareilly	536	329	505	540	327	503	0.94	0.93
Sahajanpur	600	351	542	607	365	566	0.90	0.93
Pilibhit	389	234	381	412	233	402	0.98	0.98
Badaun	616	350	462	632	347	466	0.75	0.74
Average ratio between Gross Sown Area to Irrigated Area							0.89	0.89

### Meerut Division

In the Meerut division, gross sown area, net sown area & net irrigated area for the division of Meerut were 1,075,000 hectares, 655,000 & 1,075,000 hectares respectively in the year 2012-13. It is evident from the available data that there was significant increase in the year 2016-17. Gross sown area changed by 1.3% to 1,089,000 hectares, while net sown area increased by -0.3% to 653,000 hectares and net irrigated area by 1.3% to 1,089,000 hectares. The minimum increase is in net irrigated area in the division. This indicates that there were better irrigation facilities in the year 2016-17 than in 2012-13.



Further, each district under the Meerut division is studies for any change in gross sown area, net sown area and net irrigated area. In total there are 4 districts covered under the Meerut division. From the gross area sown point of view, the two largest districts are Bulandshahar & Meerut. Bulandshar is having 521,000 hectares whereas Meerut is having 300, 000 hectares land under gross sown area. The smallest being Ghaziabad with only 81,000 hectares gross sown area.

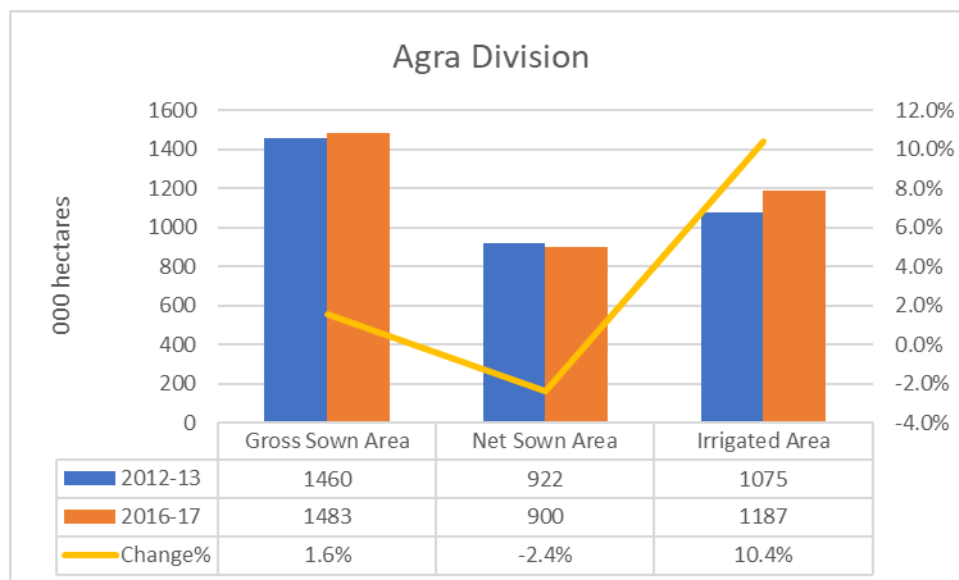
From the land utilisation point of view, while Bulandshar with 1: 00 was ahead of other districts for gross sown area to net irrigated area in the year 2012-13, Meerut was the same of all other districts in the division with ration 1:00 in 2016-17.

Average ratio between gross sown area to net irrigated area hasnot changed from 1:00 in 2012-13 to 1: 00 in the year 2016-17. Giving an indication that irrigation means have same in the four years of study.

Districts	2012-13			2016-17			Ratio between Gross Sown Area to Irrigated Area	
	Gross Sown Area	Net Sown Area	Irrigated Area	Gross Sown Area	Net Sown Area	Irrigated Area	2012-13	2016-17
Meerut	300	196	300	302	196	302	1.00	1.00
Baghpat	173	108	173	174	107	174	1.00	1.00
Ghaziabad	81	53	81	78	51	78	1.00	1.00
Bulandshar	521	298	521	535	299	535	1.00	1.00
Average ratio between Gross Sown Area to Irrigated Area							1.00	1.00

### Agra Division

Gross sown area, net sown area & net irrigated area for the division of Agrawere1460, 000 hectares, 922, 000 &1075, 000 hectares respectively in the year 2012-13. From the data available, it is evident that there was significant increase in all the three in the year 2016-17. Gross sown area changed by 1.6% to 1483,000 hectares, while net sown area decreased by - -2.4% to900, 000 hectares and net irrigated area by 10.4% to 1187,000 hectares. The maximum increase is in net irrigated area in the division. This indicates that there were better irrigation facilities in the year 2016-17 then in 2012-13.



Further, each district under the Agra division is studies for any change in gross sown area, net sown area and net irrigated area. In total there are 4 districts covered under the Agra division. From the gross area sown point of view, the two largest districts are Agra&Mathura. Agra is having 420,000 hectares whereas Mathura is having 400, 000 hectares land under gross sown area. The smallest being Firozabad with only 307,000 hectares gross sown area.

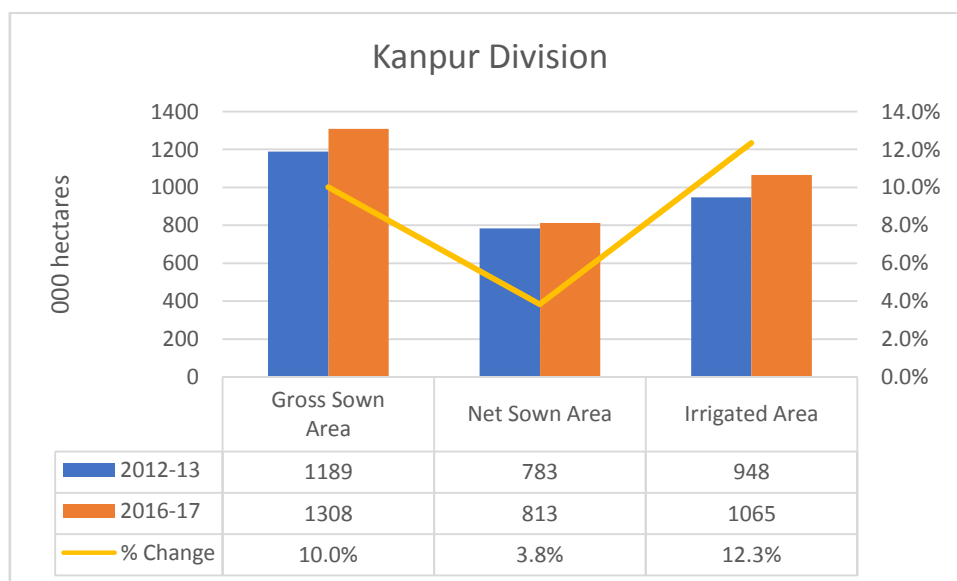
From the land utilisation point of view, while Mainpuri with 1: 0.97 was ahead of other districts for gross sown area to net irrigated area in the year 2012-13, Mainpuri was ahead of all other districts in the division with ratio 1.00.

Average ratio between gross sown area to net irrigated area has changed from 1:0.80 in 2012-13 to 1: 0.81 in the year 2016-17. Giving an indication that irrigation means have increased in four years of study.

Districts	2012-13			2016-17			Ratio between Gross Sown Area to Irrigated Area	
	Gross Sown Area	Net Sown Area	Irrigated Area	Gross Sown Area	Net Sown Area	Irrigated Area	2012-13	2016-17
Agra	420	284	280	435	259	288	0.67	0.66
Mathura	400	269	331	406	267	336	0.83	0.83
Firozabad	307	184	224	315	177	236	0.73	0.75
Mainpuri	333	185	324	327	197	327	0.97	1.00
Average ratio between Gross Sown Area to Irrigated Area							0.80	0.81

### Kanpur Division

Kanpur division was having gross sown area of 1189, 000 hectares, net sown area of 783, 000 hectares & net irrigated area of 948, 000 hectares in the year 2012-13. From the data available, significant increase is evident in all the three in the year 2016-17. Gross sown area changed by 10.0% to 1308,000 hectares, while net sown area increased by 3.8% to 813,000 hectares and net irrigated area by 12.3% to 1065,000 hectares. The maximum increase is in net irrigated area in the division. This indicates that there were better irrigation facilities in the year 2016-17 then in 2012-13.



Further, each district under the Kanpur division is studies for any change in gross sown area, net sown area and net irrigated area. In total there are five districts covered under the Kanpur division. From the gross area sown point of view, the two largest districts are Kanpur & Etawah. Kanpur is having 261,000 hectares whereas Etawah is having 247, 000 hectares land under gross sown area. The smallest being Farrukhabad with only 212,000 hectares gross sown area.

From the land utilisation point of view, while Kannauj with 1: 0.87 was ahead of other districts for gross sown area to net irrigated area in the year 2012-13, Farrukhabad was ahead of all other districts in the division with ration 1:0.94.

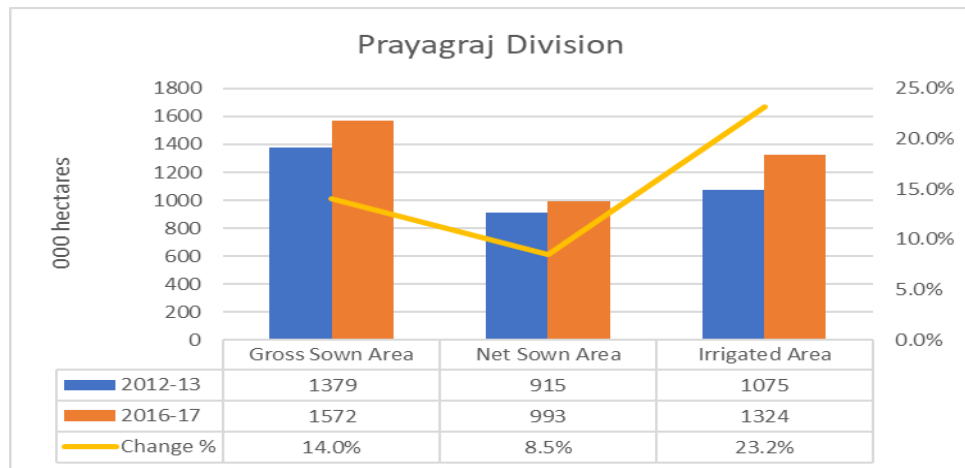
Average ratio between gross sown area to net irrigated area has changed from 1:0.85 in 2012-13 to 1: 0.94 in the year 2016-17. Giving an indication that irrigation means have increased in four years of study.

Districts	2012-13			2016-17			Ratio between Gross Sown Area to Irrigated Area	
	Gross Sown Area	Net Sown Area	Irrigated Area	Gross Sown Area	Net Sown Area	Irrigated Area	2012-13	2016-17
Kanpur	261	186	179	264	191	179	0.69	0.68
Auraiya	236	146	194	255	145	219	0.82	0.86
Kannauj	233	153	203	264	155	245	0.87	0.93
Farrukhabad	212	149	181	229	173	215	0.85	0.94
Etawah	247	149	196	296	149	207	0.79	0.70
Average ratio between Gross Sown Area to Irrigated Area							0.81	0.82

### Prayagraj Division

Gross sown area, net sown area & net irrigated area for the division of Prayagraj was 1379, 000 hectares, 915,000 & 1075,000 hectares respectively in the year 2012-13. From the data available, it evident that there was significant increase in all the three in the year 2016-17. Gross sown area changed by 14.0% to 1572,000 hectares, while net sown area increased by 8.5% to 993,000 hectares and net irrigated area by 23.2% to 1324,000 hectares. The maximum increase is in net irrigated area in the division. This indicates that there were better irrigation facilities in the year 2016-17 then in 2012-13.





Further, each district under the Prayagraj division is studied for any change in gross sown area, net sown area and net irrigated area. In total there are 4 districts covered under the Prayagraj division. From the gross area sown point of view, the two largest districts are Prayagraj & Fatehpur. Prayagraj is having 484,000 hectares whereas Fatehpur is having 417,000 hectares land under gross sown area. The smallest being Kaushambi with only 176,000 hectares gross sown area.

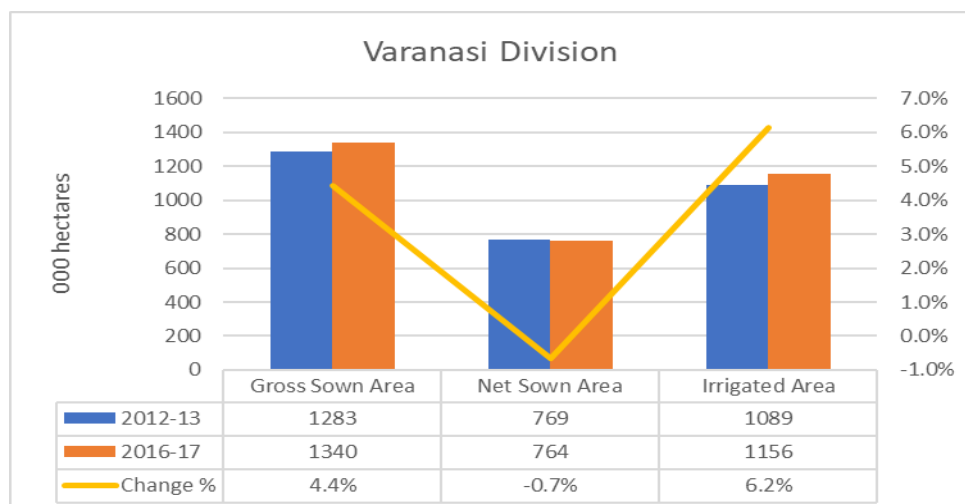
From the land utilisation point of view, while Pratapgarh with 1: 0.89 was ahead of other districts for gross sown area to net irrigated area in the year 2012-13, Pratapgarh was ahead of all other districts in the division with ratio 1:0.91.

Average ratio between gross sown area to net irrigated area has changed from 1:0.78 in 2012-13 to 1: 0.83 in the year 2016-17. Giving an indication that irrigation means have increased in four years of study.

Districts	2012-13			2016-17			Ratio between Gross Sown Area to Irrigated Area	
	Gross Sown Area	Net Sown Area	Irrigated Area	Gross Sown Area	Net Sown Area	Irrigated Area	2012-13	2016-17
Prayagraj	484	302	381	572	352	510	0.79	0.89
Kaushambi	176	134	128	202	124	158	0.73	0.78
Pratapgarh	302	289	268	370	229	338	0.89	0.91
Fatehpur	417		298	428	288	318	0.71	0.74
Average ratio between Gross Sown Area to Irrigated Area							0.78	0.83

### Varanasi Division

Gross sown area, net sown area & net irrigated area for the division of Varanasi were 1283,000 hectares, 769,000 & 1089,000 hectares respectively in the year 2012-13. From the data available, it is evident that there was significant increase in all the three in the year 2016-17. Gross sown area changed by 4.4% to 1340,000 hectares, while net sown area increased by -0.7% to 764,000 hectares and net irrigated area by 6.2% to 1156,000 hectares. The maximum increase is in net irrigated area in the division. This indicates that there were better irrigation facilities in the year 2016-17 than in 2012-13.



Further, each district under the Lucknow division is studies for any change in gross sown area, net sown area and net irrigated area. In total there are 4 districts covered under the Varansi division. From the gross area sown point of view, the two largest districts are Jaunpur & Ghazipur. Jaunpur is having 471,000 hectares whereas Ghazipur is having 409 000 hectares land under gross sown area. The smallest being Chandauli with only 245,000 hectares gross sown area.

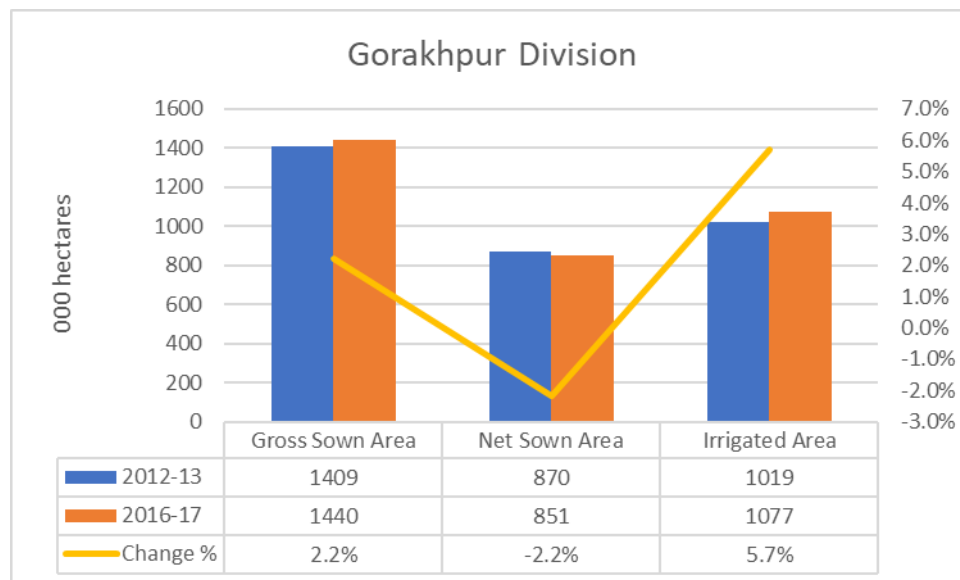
From the land utilisation point of view, while Ghazipur with 1: 0.85 was ahead of other districts for gross sown area to net irrigated area in the year 2012-13, Ghazipur was ahead of all other districts in the division with ration 1:089.

Average ratio between gross sown area to net irrigated area has changed from 1:0.85 in 2012-13 to 1: 0.87 in the year 2016-17. Giving an indication that irrigation means have increased in four years of study.

Districts	2012-13			2016-17			Ratio between Gross Sown Area to Irrigated Area	
	Gross Sown Area	Net Sown Area	Irrigated Area	Gross Sown Area	Net Sown Area	Irrigated Area	2012-13	2016-17
Varanasi	158	95	132	165	101	138	0.84	0.84
Chandauli	245	136	219	234	128	215	0.89	0.92
Jaunpur	471	279	389	499	276	411	0.83	0.82
Ghazipur	409	254	349	442	259	392	0.85	0.89
Average ratio between Gross Sown Area to Irrigated Area							0.85	0.87

### Gorakhpur Division

Gross sown area, net sown area & net irrigated area for the division of Gorakhpur were 1409, 000 hectares, 870, 0000 & 1019,000 hectares respectively in the year 2012-13. From the data available, it is evident that there was significant increase in all the three in the year 2016-17. Gross sown area changed by 2.2% to 1440,000 hectares, while net sown area increased by 0-2.2% to 851,000 hectares and net irrigated area by 5.7% to 1077,000 hectares. The maximum increase is in net irrigated area in the division. This indicates that there were better irrigation facilities in the year 2016-17 then in 2012-13.



Further, each district under the Gorakhpur division is studies for any change in gross sown area, net sown area and net irrigated area. In total there are 4 districts covered under the Gorakhpur division. From the gross area sown point of view, the two largest districts are & Sitapur. Lakhimpur Kheri is having 711,000 hectares whereas Sitpur is having 689 000 hectares land under gross sown area. The smallest being Deoria with only 320,000 hectares gross sown area.

From the land utilisation point of view, while Deoria with 1: 0.90 was ahead of other districts for gross sown area to net irrigated area in the year 2012-13, Deoria was ahead of all other districts in the division with ration 1:0.92.

Average ratio between gross sown area to net irrigated area has changed from 1:0.73 in 2012-13 to 1: 0.92 in the year 2016-17. Giving an indication that irrigation means have increased in four years of study.



Districts	2012-13			2016-17			Ratio between Gross Sown Area to Irrigated Area	
	Gross Sown Area	Net Sown Area	Irrigated Area	Gross Sown Area	Net Sown Area	Irrigated Area	2012-13	2016-17
Gorakhpur	379	246	275	402	238	286	0.73	0.71
Gorakhpur	362	201	180	369	199	183	0.50	0.50
Mahajganj	348	225	277	340	217	305	0.80	0.90
Deoria	320	198	287	329	197	303	0.90	0.92
Average ratio between Gross Sown Area to Irrigated Area							0.73	0.76

## CONCLUSION

The study of data finds that there were many changes happened between the two study years in the districts under various divisions in the state of Uttar Pradesh.

Starting with the Lucknow division, the division witnessed considerable increase of 3.5% from the year 2012-13 to 2016-17 in its gross sown area. However, the highest change is found to be in the irrigated area. In the irrigated area, the increase is 6.0%, followed by net sown area by 2.1%. These changes can be interpreted as additional land was brought under the sown area in the division. Not only the change in net sown area seems to be due to increase water for irrigation which led to increase in irrigated areas as well. It can very well be assumed that increase in all three areas must have resulted in increase in the contribution of the division in the overall food production in the state.

Bareilly division also witnessed changes in all types of areas. In this division, gross sown area increased by 2.3%, net irrigated area by 2.5% and marginal increase of 0.6% in net sown area.

In case of Meerut division, although this division has land which is believed to fully brought under agriculture and irrigation resources are umpteen, still increase in gross sown area and irrigated areas make it to believe that some land which may be under forest might have been brought under the agriculture. Although very minimal, but still decrease in net sown area of 0.3% may be a result of urbanisation in the districts of Ghaziabad & Baghpat.

Agra division witnessed a very positive change from the year 2012-13 to 2016-17. The division saw a significant increase in the net irrigated area by 10.4%. Gross sown area has also seen increase, but it could be a point of concern for authorities as the division has seen considerable decrease in the net sown area. The decrease is by 2.4%; in absolute terms the decrease in net sown areas is by 2000 hectares.

All divisions in the Eastern Uttar Pradesh have seen significant changes in terms of all types of areas, starting with Kanpur division which has seen increase in gross sown area by 10%, followed by Prayagraj division by 14%, Varanasi division by 4.4% and Gorakhpur by 2.2%, the lowest among all. In terms of net sown area eastern Uttar Pradesh divisions, Kanpur witnessed increase by 3.8%, Prayagraj by 8.5%, the highest in the region. Other two divisions of the region have seen decrease. Varanasi division by 0.7% and Gorakhpur by 2.2%. Most satisfactory revelation is significant increase in net irrigated area in all the four divisions. Kanpur division which has seen increase of 12.3%, on the other hand stands biggest change was in Prayagraj with 23.2% increase in net irrigated area. Varanasi division has seen increase of 6.2%, likewise Gorakhpur by 5.7%.

From the above data, it can easily be assumed that the eastern region has seen increase in irrigation water. This could be a result of government efforts or may be increase in number of private tube wells.

On other aspect of ratio between gross sown area to irrigated area, Lucknow & Varanasi divisions saw change by 0.02% from 2012-13 to 2016-17; followed by Agra & Kanpur divisions by 0.01%. The highest increase was seen in the division of Prayagraj by 0.05%, followed by Gorakhpur division by 0.03%. There was no change observed in the ratio of gross sown area to net irrigated area in the divisions of Meerut & Bareilly divisions during the study year.

## SUGGESTIONS

1. Government and local administrative should increase irrigation sources, as this is the region, which is having challenges in availability of water, thereby its contribution to overall state food production increases further.
2. Although, western Uttar Pradesh is said to be fully better agriculture facilities, it is always possible to increase production, productivity by motivating farmers to adopt new age agriculture practices.
3. As some of districts in western region have seen rapid urbanisation, they may lose some agriculture land. Government should see to it that urbanisation do not eat up agriculture land and only waste or barren land is used for construction purpose.
4. In the divisions of eastern Uttar Pradesh, there is huge opportunity for improvements by increasing gross sown area and net irrigated area. If net sown area could be increased along with increase in irrigation resources, then

there is possibility of this area of India, taking care of food grains requirement of a large population within and outside state.

5. in the district on how to increase production of different crops by using modern day agricultural means and techniques.
6. Farmers should acquire knowledge about use of fertilisers, agrichemicals etc in such a way that should help in decreasing cost of production, as well as do not impact climate negatively. Local administration to help farmers in this area as well.

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