



# Arth Ganga Project: District Meerut



Submitted to:

**National Mission  
for Clean Ganga (NMCG)**

**JUNE-2022**

Submitted by:

**IIM Lucknow  
IIT Roorkee**

## TABLE OF CONTENTS

---

EXECUTIVE SUMMARY	10
1 District Overview	12
1.1 Introduction	12
1.2 Demographic Profile of MEERUT	13
1.3 Economic Profile of MEERUT	14
2 Quantitative Data Analysis	17
3 Qualitative Data Analysis	36
3.1 Forestry	36
3.3 Tourism	39
4 Action Plan development	43
4.1 Forestry	43
4.3 Wetlands	47
4.4 Energy	48
5 Recommendations	49
5.1 Agriculture and allied sectors	49
5.2 Forestry	50
5.3 Wetland	51
5.4. Energy	51
5 References	55
6 Appendices	56
Auxilllary data	56

## **EXECUTIVE SUMMARY**

Meerut, an ancient metropolis, is located in the state of Uttar Pradesh. The city is traversed by the rivers Ganga and Yamuna. A city with diverse culture and festivities have known to possess a rich history.

The total geographical area of the district is 2590 km<sup>2</sup>. The primary sector showed the average annual growth rate from 2011-12 to 2018-19 is only 4.08% with its share decreasing from 23.81% to 19.43%. The share of the secondary sector decreased from 41% in 2011-12 to 38.99% in 2018-19 with a significant average annual growth rate of 6.28%. The tertiary sector occupies, on average, a 39.23% share in the district economy with a remarkable average annual growth rate of 9.45% standing out to be 41.57% in 2018-19. Overall, the district economy grew with an average annual growth rate of 6.90%.

In 2017-18, the net sown area and the gross irrigated area represents 196416 ha and 303333 ha. The cropping intensity of the district is 152.77%. The total actual irrigated area is 196408 ha. Major crop types are wheat, rice, maize, barley, millet, pulses like a variety of black pulses, pigeon pea, lahi mustard, etc. along with sugarcane, potato, etc. The total food grains along with pulses account for the production of 377892 MT. The livestock consists of cattle (indigenous and crossbred), buffalos (indigenous and crossbred), pigs (indigenous and crossbred), sheep; poultry, and fisheries.

Agriculture with the horticulture sector grew at an average annual growth rate of 5.53% from 2011-12 to 2018-19. Moreover, its share increased from 50.89% in 2011-12 to 55.59% in 2018-19. The share of cultivable wasteland increased slightly from 0.90% in 2010-11 to 0.59% in 2017-18 whereas barren and uncultivable land share decreased from 0.86% to 1.21%. The net decreased slightly over the years, from 72.46% in 2010-11 to 71.95% in 2017-18. The area for non-agricultural use increased over the period from 15.34% to 16.28%. The district's percentage of the net and gross irrigated areas have increased over the years with an average of 99.45% and 100%, respectively. In 2017-18, the nitrogen share decreased to 69.49%, while the phosphorus share increased to 25.73%, and the potassium share decreased to 4.77%. The use of nitrogen is more than the recommended ratio, while that of the Phosphorous and potassium is less than the recommended ratio. The overall use of chemical fertilizers has increased in the district from 180.63 kg/ ha GCA in 2010-11 to 224.43 kg/ ha GCA in 2016-17. The overall use of chemical fertilizers has decreased in the district from 267.43 kg/ ha GSA in 2010-11 to 224.23 kg/ ha GSA in 2017-18.

The share of the livestock subsector decreased from 41.58% to 36.42% in the same period as it grew with a low average annual growth rate of 2.43%. The fishery and aquaculture subsector share is around 0.34% in 2018-19 with a significant average annual growth rate of 70.85% from 2011-12 to 2018-19. Mines and quarrying also recorded a remarkable average annual growth rate of 8.27%.

The total forest cover of the district is 68.41 km<sup>2</sup>. The Forest area represents 7.81% of the total reported area. Out of total forest cover, the maximum area is covered by Open Forest (34.41 km<sup>2</sup>) followed by Moderately dense forest (34 km<sup>2</sup>). The district's forest cover in 2001 was 172 km<sup>2</sup> with a very dense forest covering 144 km<sup>2</sup> which has been reduced to moderately dense forest and open forest. The share of forestry and logging in the total agriculture and allied sector is small, around 7.65% in 2018-19, but it

grew with a remarkable average annual growth rate of 10.39%. The share of area under trees and gardens decreased from 0.52% in 2010-11 to 0.03% in 2017-18.

Meerut is known for its varied religious destinations and attractions along with fairs etc. The district is connected well through roads and a railway network. In the year 2019, the number of domestic tourists was 1905036 and foreign tourists was 3412. Amarnath Temple, The John's Church, Company Gardens, The Suraj Kund Park, Shahpeer Sahab ki Dargah, The Digambar Jain Temple, Shahid Smarak, and Qila are the prime tourist attractions.

The main source of lightning used by the households of the district is electricity, followed by 23.70% using kerosene and only 0.25% using solar energy. There has been solar rooftop installation in the district's various public buildings. Also, 3 solar high masts were installed in the year 2018-2019 in the district. In the district, 41% of the households use cow dung cakes, and the other 41 % use LPG for cooking. A biomass plant has been installed in M/S Amrit Bakers in the district. Also, co-generation plants have been installed in Sangal Paper Mill and Anand Triplex Board. Electricity consumption in agriculture has increased significantly from 479.07 KWH in 2014-15 to 814.20 KWH in 2019-20, a net increase of approximately 69.95%. The percentage share of the agriculture sector in the total electricity is around 16.84%. The total number of wetlands existing in the district is 954 consisting of both Man-made and Natural. Most of them are small or medium-sized and tanks/ponds/riverine and waterlogged. The district's biodiversity data includes various crop production, livestock population, bird species, and forest cover with 388 bird species and 49 threatened/rare species of bird in the district. Biogas potential from animal waste and agricultural waste was calculated approximately as two crores m<sup>3</sup>/year and sixty-four crores m<sup>3</sup>/year. Six sites have been investigated near Ganga for micro-hydel project generation in the district Meerut along with additional 3 sites that are identified.

The district needs to enhance the new technologies, High yield varieties, Farm mechanization, practice mulching for maize and sugarcane, control the over-use of fertilizer and pesticides, should control the over-use of fertilizer and pesticides, etc. Various measures such as eco-tourism should be taken to improve tourism and enhance the use of renewable energy especially by creating awareness. The monitoring and maintenance of industrial and domestic wastes and pollution is the need of the hour. Use of high-yielding seeds, micro-irrigation, constructing and maintaining harvesting structures, Vermi-composting and application of bio-fertilizer and bio-pesticides, adoption of greenhouse farming with organic farming, and encouraging farmers for adapting different crop cultivation and various irrigation methods. Along with focussing on agriculture practices Bee culture, dairy, poultry, fisheries, medicinal crops such as Aloe vera, Ashwagandha, etc. needs encouragement as they have high economic potential. Monitoring and analysis of different sectors along with providing solutions, training, etc. should also be taken into account.

# 1 DISTRICT OVERVIEW

## 1.1 INTRODUCTION

Meerut district, is one of the districts of Uttar Pradesh state of India, and Meerut is the district headquarters. Meerut district is also a part of the Meerut division. The district Meerut lies between latitude 28° 54' and 29° 15' north and longitude 77° 77' and 78° 14' east. Administratively the district is divided into 03 tahsils namely Sardhana, Mawana and Meerut. There are 459 Gram Sabhas and 663 Revenue villages with 604 inhabited villages and 59 uninhabited villages in the district

According to the 2011 census Meerut district has a population of 3,443,689. This gives it a ranking of 94th in India (out of a total of 640). The district has a population density of 1,346 inhabitants per square kilometre (3,490/sq mi). Meerut has a sex ratio of 886 females for every 1000 males. In the total population of the district of 1,090,539 as much as 31.67 per cent are workers and rest of 68.33 per cent are non-workers. Among workers, 25.87 per cent are main workers and rest 5.80 per cent are marginal workers. The extent of workers in rural areas and non-workers in urban parts is higher. In the district among workers about 17.98 per cent are cultivators and 62.11 per cent other workers

District Meerut has an important place in the field of agriculture in the entire state. Rabi and Kharif are two main harvests in the district. Main crops of Rabi are gram and wheat and main crops of Kharif are maize and paddy. The main cash crops of the district are sugarcane, potato and cotton. The sugarcane is sown mainly in the area of CD Block Parikshitgarh, Mawana Kalan and Hastinapur of Tahsil Mawana. Productions of the crops in the district are high due to its climate, soil, natural rain and ample means of irrigation. The use of chemical fertilizer and good seeds also helped to increase the production of cereals and other crops. It is traditionally known for handloom works and scissors industry.

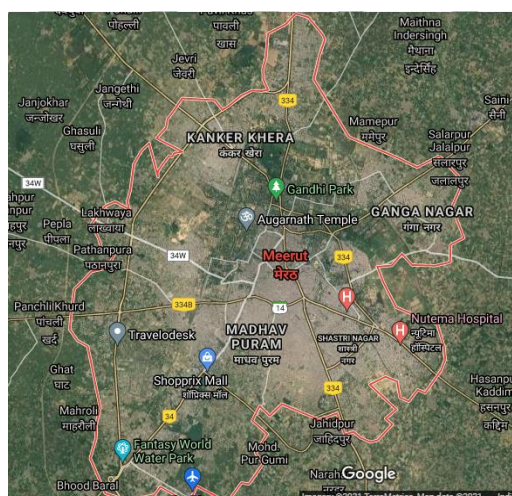


Figure 1 Map of the district

## 1.2 DEMOGRAPHIC PROFILE OF MEERUT

### 1. Economy and Livelihoods

- Geographical Area: 2590 Sq. Km.
- Administrative Divisions:<sup>1</sup>

District Headquarters: Meerut

No of Municipalities: 17

No of Tehsil: 3

No of Blocks: 12

No. Of Villages: 662

- Demographic and socio-economic indicators:<sup>2</sup>

Population: 3,443,689 (Census 2011)

Population density (Total persons per sq. km): 1346

Sex ratio: 886

Literacy: 72.8%

- Occupation/ other Livelihood source: Sports good, handloom, scissor, pharmaceuticals industry, agriculture
- Major Rivers: Ganga and Yamuna
- Forest Area: 68.41 Sq. Km. (No major forest)

---

<sup>1</sup> <https://meerut.nic.in/>

<sup>2</sup> [https://www.censusindia.gov.in/2011census/dchb/DCHB\\_A/09/0907\\_PART\\_A\\_DCHB\\_MEERUT.pdf](https://www.censusindia.gov.in/2011census/dchb/DCHB_A/09/0907_PART_A_DCHB_MEERUT.pdf)

## 1.3 ECONOMIC PROFILE OF MEERUT

### The District Economy

The primary sector has a significant impact on the district economy because it contributes, on average, 20.80% share in the district GDP. However, this sector's average annual growth rate from 2011-12 to 2018-19 is only 4.08%. Thus, its share decreased from 23.81% in 2011-12 to 19.43% in 2018-19. The share of the secondary sector decreased from 41% in 2011-12 to 38.99% in 2018-19, although the sector grew with a significant average annual growth rate of 6.28%. The tertiary sector occupies, on average, 39.23% share in the district economy. Moreover, the sector grew with a remarkable average annual growth rate of 9.45%, with its share increasing from 35.19% in 2011-12 to 41.57% in 2018-19. Overall, the district economy grew with an average annual growth rate of 6.90%. Steps should be taken to increase the productivity of the primary sector so that it can grow at a higher rate. This will improve the growth rate of the overall district GDP. The secondary and tertiary sectors have performed well during the study period.

**Table 1: Trends in Gross District Domestic product in Meerut at Constant Prices (base 2011-12) in Rs Crore**

Year	Sector-wise GDDP (Rs, Crore)				Annual Growth Rates			
	Primary	Secondary	Tertiary	Total GDDP	Primary	Secondary	Tertiary	Total
2011-12	5123.14	8822.78	7571.24	21517.16	-	-	-	-
	(23.81)	(41.00)	(35.19)	(100)				
2012-13	4822.63	9190.24	8214.16	22227.03	-5.87	4.16	8.49	3.30
	(21.70)	(41.35)	(36.96)	(100)				
2013-14	5090.37	9546.85	9266.93	23904.14	5.55	3.88	12.82	7.55
	(21.29)	(39.94)	(38.77)	(100)				
2014-15	5452.70	9551.44	10265.42	25269.56	7.12	0.05	10.77	5.71
	(21.58)	(37.80)	(40.62)	(100)				
2015-16	5098.65	10794.68	11112.31	27005.64	-6.49	13.02	8.25	6.87
	(18.88)	(39.97)	(41.15)	(100)				
2016-17	5863.67	11604.46	11891.99	29360.13	15.00	7.50	7.02	8.72
	(19.97)	(39.52)	(40.50)	(100)				
2017-18	6521.91	13580.48	12893.46	32995.85	11.23	17.03	8.42	12.38
	(19.77)	(41.16)	(39.08)	(100)				
2018-19	6652.62	13349.28	14233.16	34235.06	2.00	-1.70	10.39	3.76
	(19.43)	(38.99)	(41.57)	(100)				
Average Growth Rate					4.08	6.28	9.45	6.90

Source: UPDES, Government of Uttar Pradesh  
 Note: Figures in Parentheses are percentage share in the total GDDP

We further break down the primary sector GDP to determine which subsector is lagging and which is driving the primary sector growth. Table 2 shows that agriculture, including the horticulture sector, grew



at a significant average annual growth rate of 5.53% from 2011-12 to 2018-19. Moreover, its share increased from 50.89% in 2011-12 to 55.59% in 2018-19. On the other hand, the share of the livestock subsector decreased from 41.58% to 36.42% in the same period as it grew with a low average annual growth rate of 2.43%. The share of forestry and logging in the total agriculture and allied sector is small, around 7.65% in 2018-19, but it grew with a remarkable average annual growth rate of 10.39%. The fishery and aquaculture subsector share is very minimal, around 0.34% in 2018-19, but it also grew with a significant average annual growth rate of 70.85% from 2011-12 to 2018-19. Mines and quarrying also recorded a remarkable average annual growth rate of 8.27%. This high growth in this subsector can have serious environmental issues like deforestation, soil erosion, etc, with a long-term effect on the health of local citizens. Overall, the Primary sector performed well during the study period as the majority of the subsectors have done well. More work can be done on improving the livestock sub-sector as livestock forms an integrated part of the rural economy.

**Table 2: Trends in Gross District Domestic product from Agriculture and allied activities in Meerut at Constant Prices (base 2011-12) in Rs. Crore**

Year	Agriculture	Livestock	Forestry and Logging	Fishery and Aquaculture	Total Agriculture and allied	Mining and Quarrying	PRIMARY SECTOR
2011-12	2580.30	2108.25	377.80	3.90	5070.25	52.89	5123.14
	(50.89)	(41.58)	(7.45)	(0.08)	(100)		
	-	-	-	-	-	-	-
2012-13	2311.68	2227.61	225.55	4.09	4768.93	53.70	4822.63
	(48.47)	(46.71)	(4.73)	(0.09)	(100)		
	[-10.41]	[5.66]	[-40.30]	[4.72]	[-5.94]	[1.54]	[-5.87]
2013-14	2489.52	2343.57	199.91	4.21	5037.22	53.15	5090.37
	(49.42)	(46.53)	(3.97)	(0.08)	(100)		
	[7.69]	[5.21]	[-11.37]	[3.06]	[5.63]	[-1.03]	[5.55]
2014-15	2538.50	2645.80	209.85	4.50	5398.65	54.05	5452.70
	(47.02)	(49.01)	(3.89)	(0.08)	(100)		
	[1.97]	[12.90]	[4.97]	[6.88]	[7.18]	[1.70]	[7.12]
2015-16	2698.02	2117.64	204.30	4.60	5024.57	74.09	5098.65
	(53.70)	(42.15)	(4.07)	(0.09)	(100)		
	[6.28]	[-19.96]	[-2.64]	[2.08]	[-6.93]	[37.07]	[-6.49]
2016-17	3165.69	2201.64	399.89	5.63	5772.85	90.83	5863.67
	(54.84)	(38.14)	(6.93)	(0.10)	(100)		
	[17.33]	[3.97]	[95.73]	[22.41]	[14.89]	[22.59]	[15.00]



**ARTH GANGA PROJECT: DISTRICT MEERUT**

2017-18	3604.29	2356.17	402.68	3.77	6366.91	155.00	6521.91
	(56.61)	(37.01)	(6.32)	(0.06)	(100)		
	[13.85]	[7.02]	[0.70]	[-33.05]	[10.29]	[70.66]	[11.23]
2018-19	3676.67	2408.46	505.98	22.22	6613.33	39.29	6652.62
	(55.59)	(36.42)	(7.65)	(0.34)	(100)		
	[2.01]	[2.22]	[25.65]	[489.88]	[3.87]	[-74.65]	[2.00]
Average Growth Rate	5.53	2.43	10.39	70.85	4.14	8.27	4.08

Source: Compile from UPDES  
 Note: 1. Figures in () are percentage share in the total agriculture & allied GDDP  
 2. Figures in [] are annual growth rates.

Table 3 shows the percentage share of subsectors in secondary and tertiary sectors. Within the secondary sector, the manufacturing sector had a share of approximately 36.86% in 2018-19. The share has increased over the years as the average annual growth in this sector is 11.0%. The share of the electricity, gas and water supplies subsector has increased from 3.22% in 2011-12 to 4.24% in 2018-19. Moreover, this subsector grew with a remarkable average annual growth rate of 11.35%. The share of the construction sub-sector decreased from 67.52% to 58.90% in the same period as the average annual growth rate is low (4.13%). This indicates that the secondary sector in Meerut is heavily dependent on the Manufacturing and construction sub-sector and the electricity subsector is also growing at a faster rate.

Within the tertiary sector, the Real estate subsector made up the highest share (28.61%) in 2018-19, followed by the trade & hotel (20.06%), public administration (19.95%), transport, storage and communication (14.87%) and financial services (7.17%). Average annual growth is observed highest in Public Administration (21.04%), followed by transport, storage and communication (13.74%), real estate (7.97%), financial services (7.39%) and lowest in trade & hotels (6.92%). All the subsectors in the tertiary sector have performed well during the study period. More work needs to be done to improve construction and trade & hotels subsectors. Public Administration and Transport and Communication and Financial services are the major contributors to the growth of the Tertiary sector.

Year	Manu factur ing	Elect ricit y, Gas, Wat er Supp ly	Const ructio n	SE CO ND AR Y SE CT OR	Transpo rt, Storage & Commu nication	Trade and Hotel & Resta urant	Finan cial Servi ces	Real Estat e and Profe ssiona l Servi ces	Publi c Admi nistra tion	Other Servi ces	TERT IARY SECT OR
2011-12	29.26	3.22	67.52	100	12.38	23.80	8.37	31.49	10.98	12.99	100
2012-13	31.85	3.20	64.95	100	16.60	21.31	8.54	31.55	11.99	10.02	100
2013-14	33.38	3.60	63.02	100	13.13	21.05	8.19	29.66	18.74	9.24	100
2014-15	28.97	3.95	67.08	100	15.19	20.84	8.31	29.02	17.46	9.18	100

2015-16	33.91	3.19	62.90	100	15.76	20.16	8.54	29.52	16.74	9.28	100
2016-17	38.35	4.27	57.38	100	14.23	21.32	8.00	29.23	18.09	9.12	100
2017-18	41.62	4.10	54.29	100	13.56	21.42	6.69	29.73	19.31	9.28	100
2018-19	36.86	4.24	58.90	100	14.87	20.06	7.17	28.61	19.95	9.34	100
Average Growth Rate	11.00	11.4	4.13	6.28	13.74	6.92	7.39	7.97	21.04	4.83	9.45

Source: Compiled from District Statistical Handbooks

## 2 QUANTITATIVE DATA ANALYSIS

### 2.1 Agriculture and Allied Activities

#### 2.1.1 Trend in Land Use Pattern

The total declared area of the district is 2730.05 sq. km<sup>2</sup>. Forest area represents 7.81% of the total reported area. The share of cultivable wasteland decreased from 0.90% in 2010-11 to 0.59% in 2017-18, which is a good indicator of development. The share of barren and uncultivable land increased from 0.86% in 2010-11 to 1.21% in 2017-18. The share of area under trees and gardens decreased from 0.52% in 2010-11 to 0.03% in 2017-18. The current and other fallow land has also increased over the years, which is not good for the district economy. The net sown area (NSA) has decreased slightly over the years, from 72.46% in 2010-11 to 71.95% in 2017-18. The area for non-agricultural use increased over the period from 15.34% to 16.28% (Table 4). Overall, the land use pattern shows that area for non-agricultural use increased, while the NSA has decreased over the years.

Year	Total Reported Area (ha)	Area under forest	Cultivable wasteland	Current Fallow	Other Fallow	Barren and uncultivable land	Land other than agriculture	Pasture land	Area under trees and gardens	Net Sown Area
1	2	3	4	5	6	7	8	9	10	11
2010-11	273005	7.81	0.90	1.10	0.81	0.86	15.34	0.20	0.52	72.46
2011-12	273005	7.81	1.00	1.64	0.82	0.84	15.72	0.14	0.15	71.89
2012-13	273005	7.81	0.89	1.06	0.81	0.86	15.91	0.20	0.52	71.96
2013-14	273005	7.81	0.92	1.76	1.00	0.82	15.91	0.15	0.08	71.56
2014-15	273005	7.81	0.89	1.74	0.89	1.24	15.93	0.14	0.07	71.29
2015-16	273005	7.81	1.18	0.72	0.87	1.11	16.12	0.14	0.06	71.99
2016-17	273005	7.81	1.18	0.72	0.87	1.11	16.12	0.14	0.06	71.99
2017-18	273005	7.81	0.59	1.12	0.91	1.21	16.28	0.11	0.03	71.95

Source: Compiled from <http://updes.up.nic.in/spiderreports/initialisePage.action>

## 2.1.2 Trends in Operational Landholdings

In Meerut district, the total number of operational farms decreased from 209 thousand in 2010-11 to 194 thousand in 2015-16, a net decrease of 7.18%. While in the state, their numbers increased from 23,325 thousand in 2010-11 to 23822 thousand in 2015-16, a net increase of 2.13%. Most land positions in the district are marginal and small. These two size categories represented around 87.31% in the district in 2015-16, while the corresponding proportion in the state was 92.81% (Table 5). The two agricultural censuses of 2010-11 and 2015-16 report no significant change in the percentage share across the various categories of landholdings. Marginal land holdings decreased in 2015-16.

**Table 5: Distribution of Operational Holdings by Size-categories of farms (in %) in Meerut**

	Agri, Census	Marginal Holdings (0-1 ha)	Small Holdings (1-2 ha)	Semi-Medium Holdings (2-4 ha)	Medium Holdings (4-10 ha)	Large Holdings (10 & above, ha)	Total Holdings ('000 No.)
Meerut	2010-11	71.18	16.78	9.09	2.85	0.10	209.00
	2015-16	69.09	18.22	9.66	2.93	0.11	194.00 [-7.18]
Uttar Pradesh	2010-11	79.45	13.01	5.72	1.71	0.11	23325
	2015-16	80.18	12.63	5.51	1.58	0.1	23822 [2.13]

Source: Compiled from Statistical Diary 2018-19, UPDES. Figures in [] are percentage increase/decrease in 2015-16 over 2010-11.

## 2.1.3 Trends in Area, Production and Yield of Principal Crops

### 2.1.3.1 The Trend in Cropping Patterns

Rice, Wheat and sugarcane dominate the agriculture of the district. Table 6 shows the area devoted to various crops over the last eight years. In 2017-18, among cereals, Wheat made up the highest share of GCA (25.28%), followed by Rice (5.66%), together these two crops constitute around 30.94% of the GCA. The area shared by the total cereals has remained almost consistent (average, 31.48%) over the years. The main pulses produced are Urad and Arhar, while the rest of the pulses are not significantly produced. The total pulse acreage has decreased from 1.14% in 2010-11 to 0.97% in 2017-18. Thus, the food grains cover, on average, 32.55% of the GCA.

Mustard is the only major oilseeds crop produced and the total oilseed acreage has increased from 1.39% in 2010-11 to 1.84% in 2017-18. The areas under Sugarcane (average, 42.93%) and Potato

(average, 1.79%) have remained consistent over the years. Moreover, it is very important for the welfare of farmers to increase the area under them as both of them are high-value crops. In general, there is no significant change in the cultivation pattern reported in the district during the study period. The average cropping intensity is 152.77.

**Table 6: Trends in Cropping Pattern (as % GSA) and Cropping Intensity**

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	6.04	5.46	5.12	4.94	5.83	5.78	5.70	5.66
Wheat	25.76	26.59	25.99	25.89	25.65	25.43	25.47	25.28
Other Cereals	0.17	0.17	0.15	0.16	0.16	0.16	0.16	0.16
Total Cereals	31.97	32.21	31.26	30.99	31.64	31.37	31.33	31.10
Urad	0.49	0.52	0.52	0.49	0.48	0.47	0.46	0.46
Arhar	0.43	0.39	0.38	0.33	0.32	0.32	0.30	0.30
Other Pulses	0.23	0.30	0.29	0.23	0.22	0.22	0.22	0.22
Total Pulses	1.14	1.21	1.19	1.05	1.01	1.00	0.98	0.97
Total Foodgrains	33.11	33.42	32.45	32.04	32.65	32.37	32.31	32.07
Mustard	1.38	1.50	1.80	1.87	1.90	1.89	1.85	1.84
Total Oilseeds	1.39	1.50	1.80	1.88	1.90	1.89	1.85	1.84
Sugarcane	42.66	42.53	43.07	43.92	43.03	42.66	42.96	42.63
Potato	1.62	1.76	1.85	1.84	1.88	1.87	1.77	1.75
Net Sown Area	65.65	65.45	65.45	66.61	65.22	65.29	65.29	64.75
Gross Sown Area (in 1000 Ha)	301.33	299.88	300.15	293.28	298.41	301.04	301.04	303.34
Cropping Intensity	152.32	152.80	152.78	150.12	153.33	153.17	153.17	154.44

Source: <http://updes.up.nic.in/spiderreports/intialisePage.action>

### 2.1.3.2 Trends in per hectare yield of principal crops

Table 7 shows that the yield per hectare of most crops varies from year to year. However, the yield for most of the major crops has increased in the latter years of the study. This can be due to improved irrigation facilities along with the availability of better infrastructure. Wheat and Rice are the major crops in the district and their per hectare yield (43.03 qtls and 24.64 qtls respectively, in 2017-18) are also high. Per hectare yield of total cereals has increased from 37.07 qtls in 2010-11 to 39.63 qtls in 2017-18. Similarly, per hectare yield of total pulses increased from 6.81 qtls in 2010-11 to 13.78 qtls in 2017-18. However, the yield of Pulses is less than that of cereals, following which the total production of pulses is less.

The yield of total oilseeds has increased from 11.94 qtls in 2010-11 to 13.35 qtls in 2017-18. This can be due to the availability of hybrid seeds in the district. However, the rise in the yield of most of the crops is not uniform. In some years, it has decreased, but, on average, the yield has increased in the latter years of the study. The per hectare yield of sugarcane is very high, average, 752.52. Similarly, the yield

of Potato is also very high, average, 247.54. Since both sugarcane and Potato are high-value crops, they can help double the farmers' income if proper marketing and infrastructure support is provided to the farmers. In summary, all crop yields show year-over-year fluctuations. The lack of homogeneity of yields makes farmers' income riskier and more unstable, requiring a solid insurance protection measure.

**Table 7: Trends in Per Hectare Yield of Principal Crops in Meerut District (Qtls)**

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	21.90	25.63	27.56	27.69	29.63	29.03	22.93	24.64
Wheat	40.73	42.78	41.29	41.70	32.98	40.30	43.29	43.03
Total Cereal	37.07	39.77	38.95	39.38	32.32	38.23	39.56	39.63
Urad	6.37	6.73	6.71	4.73	5.34	3.28	5.84	9.63
Arhar	6.68	7.12	9.56	7.80	7.56	7.29	13.73	17.89
Total Pulses	6.81	7.61	8.62	6.19	6.14	6.30	9.24	13.78
Total Food Grains	36.03	38.61	37.84	38.30	31.51	37.24	38.64	38.85
Mustard	11.94	11.94	12.77	15.69	9.85	11.79	12.45	13.35
Total Oilseeds	11.94	11.94	12.77	15.63	9.84	11.80	12.45	13.35
Sugarcane	659.96	630.76	680.80	711.52	784.92	735.44	845.78	970.98
Potato	191.28	235.48	249.68	198.44	201.32	240.81	307.81	355.53

Source: <http://updes.up.nic.in/spiderreports/intialisePage.action>

### 2.1.3.3 Trends in Production of Principal Crops

Table 8 shows the trends in the production of the main crops over the years. Rice, Wheat, sugarcane and Potato dominate the production. In 2017-18, Rice (42.27 thousand tons) and Wheat (329.96 thousand tons) formed a major part of the total cereal production (373.82 thousand tons). Coming to pulses, Urad and Arhar had a production of 1.33 thousand tons and 1.63 thousand tons, respectively, in 2017-18. Although there has been a significant variation in the production of these pulses over the years, they still represent around 75% of the total pulses production. Mustard production was 7.45 thousand tons, which represented around 100% of the total oilseed production in 2017-18.

Sugarcane is another important crop whose production has been significant in the district (12556.83 thousand tons in 2017-18). Potato production has also been significant over the years (189.25 thousand tons in 2017-18). Looking at the annual production data of various crops, we find that their production has increased on average during the period, but at the same time fluctuated year to year, partly due to changes in weather and partly due to market conditions. Proper insurance arrangements are the need of the hour so that they may get assured income and can take more risk and diversify their production.

**Table 8: Trends in Production of Principal Crops in Meerut District (in 1000 Tons)**

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	39.88	41.93	42.38	40.16	51.54	50.49	39.35	42.27
Wheat	316.15	341.03	322.12	316.66	252.52	308.56	332.00	329.96
Other Cereals	1.16	1.25	1.00	1.19	1.12	1.95	1.77	1.59
Total Cereals	357.18	384.22	365.51	358.00	305.17	361.01	373.12	373.82
Urad	0.93	1.05	1.04	0.68	0.76	0.47	0.81	1.33
Arhar	0.86	0.83	1.10	0.75	0.72	0.69	1.25	1.63
Other Pulses	0.54	0.88	0.94	0.48	0.38	0.75	0.67	1.11
Total Pulses	2.33	2.75	3.08	1.90	1.85	1.90	2.73	4.07
Total Foodgrains	359.51	386.97	368.58	359.90	307.03	362.91	375.85	377.89
Mustard	4.98	5.36	6.91	8.62	5.59	6.70	6.95	7.45
Total Oilseeds	4.99	5.37	6.91	8.63	5.59	6.70	6.95	7.45
Sugarcane	8483.19	8044.84	8800.36	9165.52	10079.08	9443.74	10937.74	12556.83
Potato	93.25	124.62	138.57	107.18	113.10	135.29	163.85	189.25

Source: <http://updes.up.nic.in/spiderreports/intialisePage.action>

#### 2.1.3.4 Variability in the Area, Production, and Yields of Principal Crops

To understand the variability across the years (Table 9), we calculated the mean, standard deviation (SD), and coefficient of variation (COV) of the area, production, and yield of the main crops. Looking at the area under different crops, we observe the lowest variability in Sugarcane (0.48%), followed by Wheat (1.56%) and Potato (4.51%), and the highest in Arhar (13.84%). The variability in the area under total pulses (8.83%) is more than the variability in the area under total cereals (1.84%). Since Rice and Wheat dominate the production, the variability in the area under total food grains is, therefore, also relatively low (1.94%).

**Table 9: Variability in Area, Production, and Yield of Principal Crops (2010-11 to 2017-18)**

Crop/Year	Area (1000 Ha)			Production (1000 Ha)			Yield (Qtl./Ha)		
	Average	SD	COV	Average	SD	COV	Average	SD	COV
Rice	16.69	1.21	7.28	43.50	4.79	11.00	26.13	2.82	10.80
Wheat	77.22	1.20	1.56	314.87	27.23	8.65	40.76	3.33	8.16
Total Cereal	94.40	1.74	1.84	359.75	23.90	6.64	38.12	2.51	6.59
Urad	1.45	0.07	4.61	0.88	0.27	30.11	6.08	1.84	30.32
Arhar	1.04	0.14	13.84	0.98	0.33	33.33	9.70	4.02	41.42
Total Pulses	3.20	0.28	8.83	2.58	0.76	29.46	8.09	2.58	31.87

Total Food Grains	97.60	1.89	1.94	362.33	24.33	6.71	37.13	2.45	6.61
Mustard	5.26	0.59	11.19	6.57	1.21	18.38	12.47	1.65	13.27
Total Oilseeds	5.27	0.59	11.16	6.57	1.21	18.36	12.46	1.64	13.13
Sugarcane	128.70	0.61	0.48	9688.91	1474.40	15.22	752.52	112.11	14.90
Potato	5.38	0.24	4.51	133.14	31.32	23.52	247.54	57.57	23.26
Source: <a href="http://updes.up.nic.in/spiderreports/intialisePage.action">http://updes.up.nic.in/spiderreports/intialisePage.action</a>									

The variability in production depends on the variability of the cultivated area and the variability of the yield. Therefore, the variability in the production of different crops is greater than in the cultivated area of all crops. The highest variability in production is observed in Arhar (33.33%), followed by Urad (30.11%), Potato (23.52%), Mustard (18.38%), and Sugarcane (15.22%). High variation in the production of pulses and oilseeds is partly due to variation in the land area under them and partly due to non-availability of hybrid seeds. Improvement in crop insurance conditions and better market accessibility can lower this variation. Variability is lowest in Wheat (8.65%), followed by Rice (11%) and Sugarcane (15.22%).

In the case of yield, the greatest variability is estimated in Arhar (41.42%), Urad (30.32%), and Potato (23.26%). Yield variabilities in total cereals (6.59%) and total food grains (6.61%) are lower compared to that in total pulses (31.87%). Rice, Wheat, and Sugarcane have been the most consistent crops over the years. Several factors such as climate change, market prices, rainfall patterns, etc., influence the variability in agricultural production.

#### 2.1.4 Trends in Value of Product of Major Crops

Table 10 compares the share of the main crops in the total GCA and their share in the total value of agricultural output (VOP). It is significant to note that total cereals, total foodgrains, and total oilseeds, on average, have a relatively larger share in GCA than their share in VOP. In contrast, Potato and Sugarcane have, on average, a higher share in VOP than GCA. Foodgrains account for around 32.55% of the gross area of the crops. Similarly, total foodgrains account for nearly 16.60% of the total value of the agricultural product. Three crops - Wheat, Rice, and Sugarcane together accounted for, on average, around 74.26% of GCA and 95.39% of the total VOP. Overall, the total agricultural GCA has increased in the latter years of the study (average, 299.81 thousand hectares). The total value of the product has also increased significantly, from Rs.2657.41 Cr. in 2010-11 to Rs.4988.97 Cr. in 2017-18.

Crop	% Share in	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Wheat	GCA	25.76	26.59	25.99	25.89	25.65	25.43	25.47	25.28



**ARTH GANGA PROJECT: DISTRICT MEERUT**

	VOP	15.17	15.97	13.67	14.90	11.29	13.96	12.99	11.22
Paddy	GCA	6.04	5.46	5.12	4.94	5.83	5.78	5.70	5.66
	VOP	2.33	2.40	2.18	2.52	3.16	3.12	1.88	2.20
Total Cereals	GCA	31.97	32.21	31.26	30.99	31.64	31.37	31.33	31.10
	VOP	17.55	18.43	15.90	17.47	14.50	17.17	14.93	13.46
Total Pulses	GCA	1.14	1.21	1.19	1.05	1.01	1.00	0.98	0.97
	VOP	0.54	0.59	0.58	0.23	0.27	0.37	0.42	0.37
Total Food Grains	GCA	33.11	33.42	32.45	32.04	32.65	32.37	32.31	32.07
	VOP	18.09	19.02	16.48	17.70	14.77	17.54	15.35	13.83
Total Oilseeds	GCA	1.39	1.50	1.80	1.88	1.90	1.89	1.85	1.84
	VOP	1.42	1.44	1.66	0.85	0.53	0.76	0.62	0.55
Potato	GCA	1.62	1.76	1.85	1.84	1.88	1.87	1.77	1.75
	VOP	2.28	2.75	4.97	3.05	3.94	2.36	3.25	2.55
Sugarcane	GCA	42.66	42.53	43.07	43.92	43.03	42.66	42.96	42.63
	VOP	78.21	76.77	76.88	78.39	80.76	79.34	80.78	83.06
Paddy + wheat + sugarcane	GCA	74.46	74.57	74.18	74.76	74.51	73.86	74.13	73.57
	VOP	95.70	95.14	92.73	95.81	95.22	96.43	95.65	96.47
Total Agriculture (1000 Ha)	GCA	301.33	299.88	300.15	293.28	298.41	301.04	301.04	303.34
	VOP (in Cr Rs)	2657.41	2829.51	3205.16	3273.86	3494.44	3451.80	4468.32	4988.97
Per Worker VOP (Rs.1000 at current prices) in <b>Meerut</b>	-		93.57	113.97	128.99	137.42	135.54	146.09	178.12
Per Worker VOP (Rs.1000 at current prices) in <b>UP</b>	-		40.66	48.69	52.50	52.11	56.48	61.97	69.69

Source: <http://updes.up.nic.in/spiderreports/intialisePage.action> and District-wise Indicator reports

Table 10 shows that the total value of agricultural produce per agricultural worker in Meerut district increased from 93.57 thousand rupees in 2011-12 to 178.12 thousand rupees in 2017-18, a net increase of 90.36% at current prices, while in UP it increases from Rs. 40.66 thousand to Rs. 69.69 thousand, a net increase of 71.40%. Thus, the total value of agricultural output per agricultural worker is much higher in the district than in the state, and the rate of growth per worker value of output in the district is more than in the state. The ratio of per worker value of production of the district to the state average has increased from 2.3015 in 2011-12 to 2.5559 in 2017-18.

### 2.1.5 Consumption of Chemical Fertilizers

Table 11 shows the trends in the use of chemical fertilizers in agriculture. The recommended nitrogen to phosphorus and potassium ratio is 4:2:1, which is not maintained in the district. For example, in 2010-11,

nitrogen represented 69.78% of the total fertilizers used, while the proportions of phosphorus and potassium were 22.36% and 7.87%, respectively. In 2017-18, however, the nitrogen share decreased to 69.49%, while the phosphorus share increased to 25.73%, and the potassium share decreased to 4.77%. The use of nitrogen is more than the recommended ratio, while that of the Phosphorous and potassium is less than the recommended ratio. The table also shows that fertilizer consumption varies yearly due to several factors, including rainfall patterns, cultivation patterns, etc. The overall use of chemical fertilizers has decreased in the district from 267.43 kg/ ha GSA in 2010-11 to 224.23 kg/ ha GSA in 2017-18, which is a good sign. However, the authorities still need to take steps to further reduce their consumption as chemicalization of agriculture degrades soils and water resources. They have to promote the use of organic fertilizers and biofertilizers.

**Table 11: Trends in Use of Chemical Fertilizers in Agriculture (Kgs/per ha GSA)**

<b>Fertilizer/Year</b>	<b>2010-11</b>	<b>2011-12</b>	<b>2012-13</b>	<b>2013-14</b>	<b>2014-15</b>	<b>2015-16</b>	<b>2016-17</b>	<b>2017-18</b>
Nitrogen	186.60	197.94	201.91	142.58	150.27	134.85	135.90	155.83
Phosphorous	59.79	62.08	61.29	37.77	43.76	50.61	53.99	57.70
Potassium	21.04	9.54	8.99	5.13	9.05	9.51	11.03	10.70
Total	267.43	269.55	272.18	185.48	203.08	194.97	200.91	224.23
Gross Sown Area (Ha)	301333	299876	300149	293284	298411	301039	301039	303341

Source: <http://updes.up.nic.in/spiderreports/intialisePage.action>

## 2.1.6 Irrigation Structure and Status

### 2.1.6.1 Types of Irrigation systems

The types of irrigation systems and the percentage of the net and gross irrigated area to net and gross cropped area, respectively, are described in table 12. The length of the canal has remained constant (767 kms) over the years. The number of ground-level pump sets has also remained constant (18) over the years. The number of wells has also remained constant (22) over the years. The number of Government tube wells increased from 329 in 2010-11 to 345 in 2018-19. Shallow, medium, and deep tube wells increased by 2.94%, 184.64%, and 112.50%, respectively in 2018-19 as compared to that in 2010-11. The district's percentage of the net and gross irrigated areas have increased over the years with average of 99.45% and 100%, respectively.

**Table 12: Types of Irrigation Systems and percentage of the net and gross Irrigated Area**

<b>Name/Year</b>	<b>2010-11</b>	<b>2011-12</b>	<b>2012-13</b>	<b>2013-14</b>	<b>2014-15</b>	<b>2015-16</b>	<b>2016-17</b>	<b>2017-18</b>	<b>2018-19</b>
------------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------

**ARTH GANGA PROJECT: DISTRICT MEERUT**

Length of Canal (KM)	767	767	767	767	767	767	767	767	767
No. of Govt. Tube wells	329	329	329	329	335	335	335	345	345
No. of Wells	22	22	22	22	22	22	22	22	22
No. of Ground-level Pump sets	18	18	18	18	18	18	18	18	18
Shallow Tube well	56842	57064	57510	57954	58093	58190	58367	58454	58514
Medium Tube well	345	464	519	567	688	797	898	945	982
Deep Tube well	40	53	70	72	78	79	84	85	85
% Of NIA	95.65	100	100	100	100	100	100	100	-
% Of GIA	100	100	100	100	100	100	100	100	-

Source: <http://updes.up.nic.in/spiderreports/intialisePage.action>

### 2.1.6.2 Source-wise Area under Irrigation

Canals and groundwater (GW) both are the main source of irrigation in the district. The canal's share in the NIA (average, 16.19%) has decreased over the years, and the share of wells and tube wells in NIA (average, 83.80%) has increased over the years. This shows the increased dependency of the district on the groundwater for irrigation, and it can have serious environmental issues if such a pattern continues in the long run.

**Table 13: Source-wise Area under Irrigation in Meerut (in %)**

Source/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Canal (surface Irri.)	18.23	17.58	16.95	16.49	15.51	14.94	14.94	14.90
Wells And Tube-wells (GW Irri.)	81.69	82.42	83.04	83.51	84.49	85.06	85.06	85.10
NIA (1000 ha)	189.21	196.25	196.46	195.36	194.62	196.53	196.53	196.41

Source: <http://updes.up.nic.in/spiderreports/intialisePage.action>  
And District-wise Indicator reports

### 2.1.6.3 Crop-wise Irrigated Area

Table 14 shows that a majority area under Rice (average, 100%), wheat (average, 100%), total pulses (average, 100%), total oilseeds (average, 100%), Potato (average, 100%), and sugarcane (average, 100%) is irrigated.

**Table 14: Trends in Crop-wise Irrigated Area in Meerut District (as % of the cropped area)**

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	100	100	100	100	100	100	100	100
Wheat	100	100	100	100	100	100	100	100
Total Cereal	100	100	100	100	100	100	100	100

Total Pulses	100	100	100	100	100	100	100	100
Total Foodgrains	100	100	100	100	100	100	100	100
Total Oilseeds	100	100	100	100	100	100	100	100
Sugarcane	100	100	100	100	100	100	100	100
Potato	100	100	100	100	100	100	100	100

Source: <http://updes.up.nic.in/spiderreports/initialisePage.action>

### 2.1.7 Electricity Consumption in Agriculture

Electricity is one of the main energy sources used in agriculture. Table 15 shows that per capita electricity consumption in agriculture has increased significantly from 479.07 KWH in 2014-15 to 814.20 KWH in 2019-20, a net increase of approximately 69.95%. This is a cause of concern as this can result in an increased burden on non-renewable resources and create problems for waste disposal. The percentage share of the agriculture sector (average, 16.84%) in the total electricity consumption in the district is quite significant. It indicates the heavy usage of electricity by agricultural farmers. Since electricity consumption has increased over the years, the authorities need to switch to more sustainable modes of electricity production, such as solar panels.

**Table 15: Trends of Electricity consumption in Agriculture**

Division/ Year	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Per Capita electricity consumption (K.W.H)	479.07	501.3	759.96	845.97	811.29	814.2
% Of electricity consumed in Agriculture sector to total consumption	13.14	12.91	16.12	17.99	19.78	21.1

Source: District-wise Development Indicators file

### 2.1.8 Status of Agriculture Markets

Table 16 shows the marketing infrastructure in the district. It has four main markets and two sub-markets. The number of regulated mandis per lakh hectare of Net area sown has decreased from 3.07 in 2013-14 to 3.05 in 2018-19, which is a cause of concern as it is very important to increase the number of regulated mandis so that farmers can sell their products efficiently.

**Table 16: Status of Agriculture Markets in Meerut**

Category/Year	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Main Markets (No.)	4	4	4	4	4	4	4
Submarkets (No.)	2	2	2	2	2	2	2
Total Markets (No.)	6	6	6	6	6	6	6
No. of Regulated mandis per lakh Ha. of net area sown	3.07	2.2	-	2.04	2.06	3.05	-

Source: District-wise Development Indicators file and District-wise Statistical Report

### 2.1.9 Status of Organic Farming

To promote sustainable agricultural practices and improve the farmers' livelihood, the Government of India launched PKVY and Namami Gange schemes. Under these schemes, farmers are incentivized to form groups to do organic farming and sell their products with PGS certification. Under the programme, the beneficiary farmers get Rs.12000, Rs. 10000 and Rs.9000 per hectare respectively in the first, second and third year of the conversion period.

The transition period for the full conversion from conventional to organic is considered three years. During this period, crop yield, on average, is expected to decline by 10—15 percent. But after three years, it may reach its original level. Financial assistance received by the beneficiary farmers seems to be adequate to compensate for the yield losses and motivate them to do organic farming. There is a need to set up an integrated processing unit for organic products. Monitoring of the project should be periodically done through MIS, Geo-tagging, and monthly physical and financial reports.

However, the policy-related issue is what would be after the three years? Will the government protect their income? There may be a possibility that the beneficiary farmers may revert to conventional farming in the absence of the regulatory framework. In this context, two things need to be thought of—a well-designed regulatory and monitoring framework and introduction of payments for ecosystem services for the organic farmers after the transition period so that they may carry on the activity on a sustainable basis. Organic and zero-budget farming will provide ecological services in terms of soil health, human and animal health, saving of water, protection bio-diversity, etc. To sustain the organic farming initiative, a long-term system of payments for ecological services may be evolved to retain the existing farmers and motivate others to move towards this sustainable farming system. There is no assured market for these products, and farmers do not get premium prices. They sell their products at the same prices their conventional counterparts do. Certification and quality check and monitoring mechanisms are yet to be set up.

Table 17 shows the details of the establishment of organic clusters under the Paramparagat Krishi Vikas Yojana in the district. The district has 45 groups in two development blocks. The highest number of groups is in Parikshitgarh (25), followed by Hastinapur (20). Significantly high variation can be seen in the number of farmers per group in the district. It is reported that the maximum limit of land under a cluster per farmer is 2.00 hectares. Hence, the majority of the beneficiary farmers are small and marginal. No organic cluster under the Namami Gange scheme has been reported yet.

S. No.	Block	Scheme	No. of groups	No. of farmers in groups			
				Total	Average	Median	SD
1	Hastinapur	PKVY	20	505	25.25	25	3.49
2	Parikshitgarh	PKVY	25	603	24.12	24	2.71
3	District Total	PKVY	45	1108	24.62	24	3.09
		Total	45	1108	24.62	24	3.09

Source: <https://pgsindia-ncof.gov.in/LGList.aspx>

Since per hectare use of chemical fertilizer is quite high in district agriculture, a gradual shift of farmers from conventional to organic farming systems is likely to positively impact water quality, soil health, and farming sustainability. However, being a knowledge-intensive system of farming, farmers need proper training to know the practical details of the integrated sustainable farming system. Since economies of scale in both production and marketing matter in organic farming, some institutional framework may be needed in the forms of SHGs/ farm cooperative/PFOs/contract farming, etc. Organic farming could be an economically viable option in the district if the government builds strong marketing networks linking farmers, processors, and distributors with the easy certification process and minimizes farmers' risk by protecting their farm income through payments of ecosystem services. A long-term system of incentive and regulation needs to evolve to retain the existing farmers and motivate others to move towards the sustainable farming system in the district.

The major problem for the growth of organic farming observed are:

1. The major problem of the farmers was poor marketing of the organic products and not being able to fetch a premium.
2. Scaling up organic production is another problem. The marketing problem is even more serious in the case of perishable vegetable crops. Contract farming companies and Farmer Producers' companies can be encouraged.
3. Farmers practicing organic farming only on a small part of their land (less than one ha) to get the scheme's benefit.
4. Although organic farming clusters are formed, the farmers allocated a part of their lands to organic farming and practiced conventional farming in the rest of the area, which may contaminate the organic produce and fail the purpose of the cluster approach of organic agriculture.
5. According to the farmers, implementing policies initiated to promote organic farming in the area is not very efficient as the inspection is not conducted regularly, and the farmers did not receive subsidies in time under the scheme.
6. The knowledge and awareness level regarding practices under organic farming was inadequate among farmers.

## 2.1.10 Livestock Sector

### 2.1.10.1 Trends in Livestock Population

Livestock forms an integrated part of the rural economy. From Table 18, we can infer that the number of indigenous male and female cattle has decreased considerably from 69734 in 1997 to 5636 in 2019 and from 58491 in 1997 to 40734 in 2019, respectively. However, on the other hand, the number of exotic male and female cattle has increased considerably from 9086 in 1997 to 12894 in 2019 and from 18030 in 1997 to 185321 in 2019, respectively. Thus, the total number of cattle increased from 155341 in 1997 to 244585 in 2019, thus, a net increase of 57.45%. The population of male buffalo decreased, but the population of female buffalo increased. Thus, a net increase of 5.36% in 2019 as compared to that in 1997

is observed in the total population of buffalo. A significant reduction in the population of indigenous sheep is observed (65.97%) in 2019 as compared to that in 1997, and during the same period, the number of exotic sheep increased. Still, the number of total sheep decreased by 54.06%. The total goat population decreased from 46699 in 1997 to 43470 in 2019, a net decrease of 6.91%. The total pig population decreased considerably from 33081 in 1997 to 8276 in 2019.

It is significant to note that the number of female buffaloes has substantially increased over the period, indicating the growth of livestock products, including milk. The substantial decline in the number of male buffaloes also shows the rising farm mechanization and declining relevance of animal power, mainly because of the high maintenance cost of livestock. The livestock subsector has around 42.19% share in the agriculture and allied activities sector but grew at a low average annual growth rate of 2.43% from 2011-12 to 2018-19.

	<b>Category</b>	<b>1997</b>	<b>2003</b>	<b>2007</b>	<b>2012</b>	<b>2019</b>
Indigenous Cattle	Total Male	69734	39881	49460	11006	5636
	Total Female	58491	36168	50950	24916	40734
	Total	128225	76049	100410	35922	46370
Exotic Cattle	Total Male	9086	18806	12721	35500	12894
	Total Female	18030	38424	42207	93779	185321
	Total	27116	57230	54928	129279	198215
Total Cattle		155341	133279	155338	165201	244585
Buffalo	Total Male	174002	183670	177258	192936	80702
	Total Female	315426	383400	489614	455259	435002
	Total	489428	567070	666872	648195	515704
Sheep	Total Indigenous Sheep	8173	3490	3203	2221	2781
	Total Exotic Sheep	161	482	456	1899	1047
	Total Sheep	8334	3972	3659	4120	3828
Goat	Total	46699	44353	45145	76554	43470
Pig	Total Indigenous Pig	27553	12388	9755	10020	6233
	Total Exotic Pig	5528	8947	9297	5883	2043
	Total Pig	33081	21335	19052	15903	8276
Total Livestock		748708	784273	897568	914595	-
Total Poultry		99092	85565	70376	157916	-

Source: <http://updes.up.nic.in/spiderreports/intialisePage.action>  
 And <http://dahd.nic.in/animal-husbandry-statistics>

### 2.1.10.2 Cattle Care Centre

Table 19 shows that the Meerut district has an active network of cattle hospitals and development centres which are very necessary for the livestock sub-sector to grow. The number of cattle hospitals increased from 33 in 2010-11 to 34 in 2018-19. The number of cattle development centres (62) has remained constant over the years. The number of man-made reproduction centres decreased from 99 in 2010-11 to



86 in 2018-19, which is a cause of concern. There are very few sheep and pig development centres which might be one of the reasons for the declining sheep and pig population in the district.

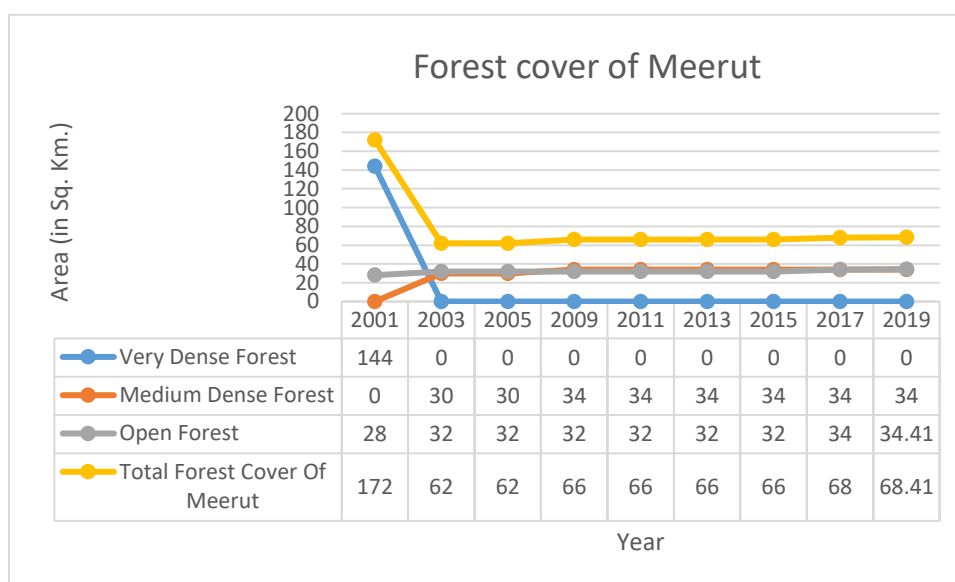
**Table 19: Year-wise number of Cattle Hospitals and Development Centers**

Category	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Cattle Hospital	33	33	35	35	35	35	35	33	34
D- category Cattle Dispensary	4	4	4	4	4	4	4	4	4
Man-Made Reproduction Centre	99	99	99	99	98	98	98	86	86

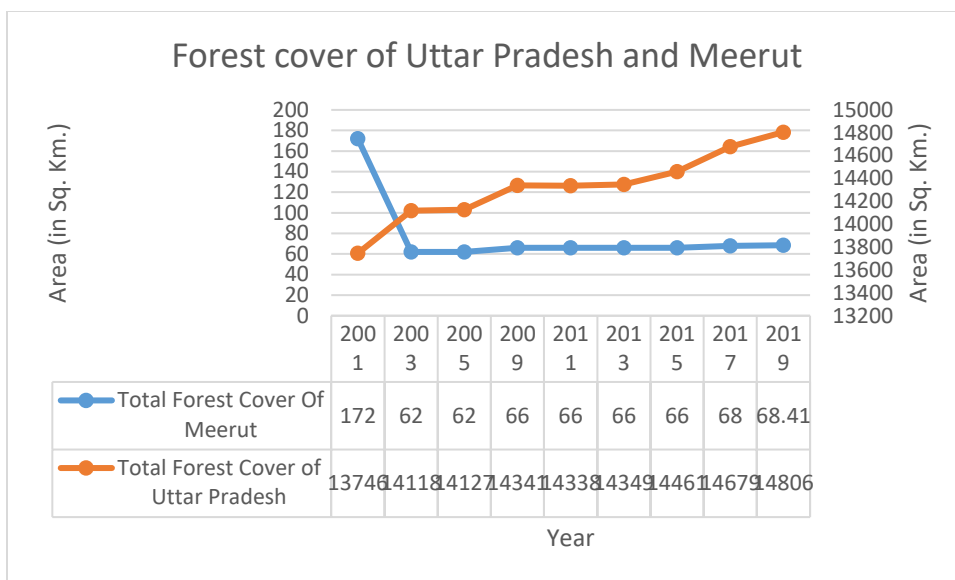
Source: <http://updes.up.nic.in/spiderreports/intialisePage.action>

## 2.2 FORESTRY

### Baseline Data Analysis/ Quantitative Data Analysis



According to the FSI survey, between the year 2001 and 2019, the forest cover of Meerut has decreased significantly. According to the latest ISFR assessment 2019, the forest cover of Meerut is approx.. 68.41 Sq. Km., slightly increased from the ISFR 2017. Majorly, open and medium dense forest are found in the district.



The forest cover of Uttar Pradesh has increased between 2001 and 2019, but the forest cover of Meerut decreased, and ranges between 62 – 68 Sq. Km.

### 2.1.1 Biodiversity

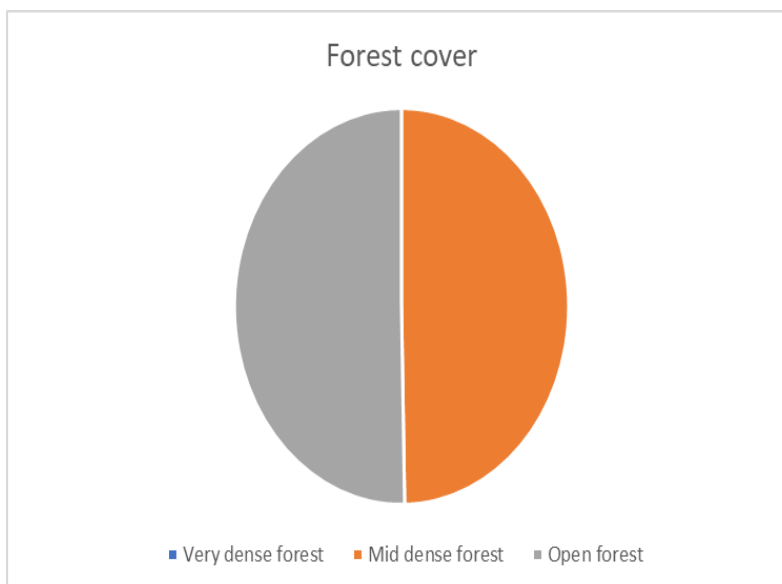
The district's biodiversity data includes various crop production, livestock population, bird species, and forest cover. The crop production trend shows an increase in crop production. Forest data shows that forest cover was decreased by 0.41 % in 2019. There are 388 bird species and forty-nine threatened/rare species of bird in the district.

Table 1 Bird species recorded in the district.

<b>Number of species</b>	388
<b>Number of rare/accidental species</b>	49

Table 2 Forest cover in a square kilometer.

Geographical area	Very dense forest	Mid dense forest	Open forest	Total	% of Geographical area`	Change with respect to 2017 assessment	Scrub
2559	0	34	34.41	68.41	2.67	0.41	0



## 2.3 TOURISM

### Baseline data/Quantitative Data

#### Total number of tourists visiting Meerut -(2016-2019)

YEAR	INDIAN	FOREIGN	TOTAL
2016	1657956	2908	1660864
2017	1740854	3055	1743909
2018	1816845	3210	1820055
2019	1905036	3412	1908448
2020	246120	948	247068

Table-1; Source: Dept. of Tourism, Uttar Pradesh Government

**a.** The above-given data table-1 is taken from the Uttar Pradesh tourism website. The data table shows the number of tourists visiting Meerut for tourism from 2016 to 2020. The tourist visits are bifurcated into two different groups – Domestic and Foreign tourists.

**b.** In the year 2016 Meerut received total **1660864** tourists. Number of Domestic travellers were 1657956 and total international travellers were **2908**.

c. In the year 2017 Meerut received total **1743909** tourists. Total number of Domestic travellers were 1740854 and total international travellers were **3055**. The district experienced a total growth of 5% in total number of tourists compared to number in the previous year.

d. In the year 2018 Meerut received total **1820055** tourists. Total number of Domestic travellers were 1816845 and total international travellers were **3210**. The district experienced a total growth of 4.3% in total number of tourists compared to number in the previous year.

e. In the year 2019 Meerut received total **1908448** tourists. Total number of Domestic travellers were 1905036 and total international travellers were **3412**. The district experienced a total growth 4.8% in total number of tourists compared to number in the previous year.

f. In the year 2020 Meerut received total **247068**. Total number of Domestic travellers were 246120 and total international travellers were **948**. The district experienced a total loss of -87% in total number of tourists compared to number in the previous year.

## 2.4 WETLANDS

The district has vast wetlands; most of them are tanks/lakes/ponds and waterlogged. Table 1 represents the number of wetlands and their area representation in the district.

**Table 1: Wetland Data of Meerut district**

Wetland Types	Total Number of												Aquatic Vegetation
	Wetlands:			Area (ha)									
Natural Wetlands	NRCD	NWIA	Diff.	<2.25	<5	<10	<20	<50	<200	<500	<1000	>1000	
Lake/ponds	1	1	0	0	1	0	0	0	0	0	0	0	1
Ox-bow lakes/cut off meanders	1	0	1	0	0	0	0	1	0	0	0	0	0
High altitude Wetlands	0	0	0	0	0	0	0	0	0	0	0	0	0
Riverine Wetlands	6	7	1	0	0	1	0	0	2	1	2	0	6
Waterlogged	12	16	4	0	4	6	0	1	1	0	0	0	4
River/Stream	0	65	65	0	0	0	0	0	0	0	0	0	0
Man-made Wetlands	NRCD	NWIA	Diff.	<2.25	<5	<10	<20	<50	<200	<500	<1000	>1000	AV
Reservoirs/Barrages	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanks/ponds	144	155	11	0	115	24	5	0	0	0	0	0	29
Waterlogged	6	8	2	0	1	3	2	0	0	0	0	0	2
Salt pans	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total (954)</b>	170	252	82	702	121	34	7	2	3	1	2	0	42

Source: National River Conservation Directorate (NRCD), National Wetland Inventory and Assessment (NWIA) Atlas

## 2.5. ENERGY

### 2.5.1. Solar

The Uttar Pradesh New and Renewable Energy Development Agency (UPNEDA) is the nodal agency which looks after the growth and expansion of renewable energy in the state. UPNEDA takes efforts to develop the capacity in renewable energy sources such as solar energy, small-scale hydro-electricity and biomass-based electricity production in the state.

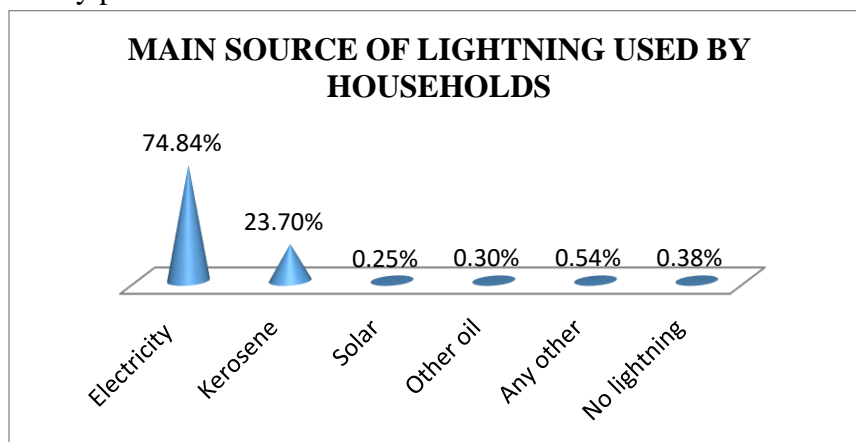


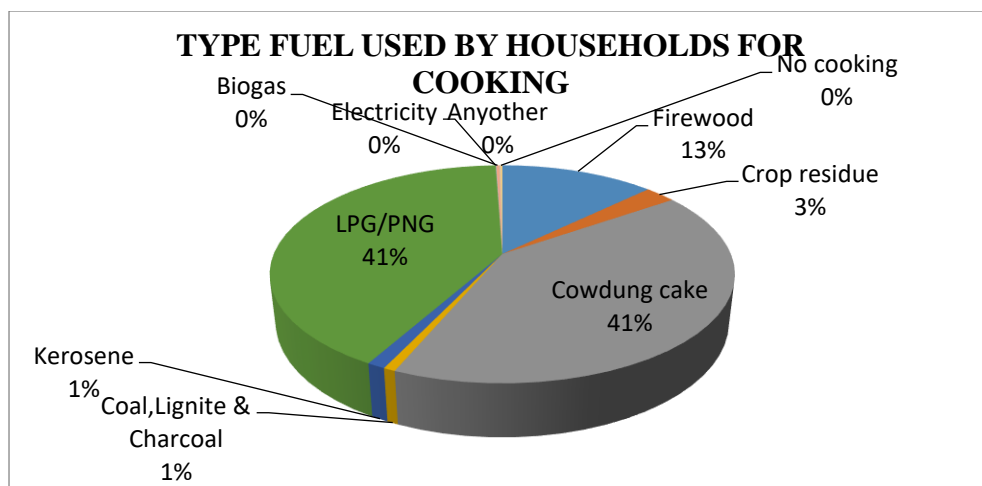
Fig. 1

According to the 2011 census, the main source of lightning used by the households of the district is electricity, followed by 23.70% using kerosene and only 0.25% using solar (Fig. 1) .

There have been solar rooftop installation sin the district’s various public buildings such as 4 kW panel at Comissioner camp office, 4 kW at Vikas Bhawan, 100 kW at Guru Teg Bahadur School, 80 kW at CGST Commissionerat, 400 kW at Sardar Vallab Bhai Patel University of Agriculture & Technology, and 5 kW at Rajkiya Inter College, Bagpath,. Also 3 solar high masts were installed in the year 2018-2019 in the district.

### 2.5.2. Biomass

The Uttar Pradesh New and Renewable Energy Development Agency (UPNEDA) is the nodal agency which looks after the growth and expansion of renewable energy in the state. UPNEDA takes efforts to develop the capacity in renewable energy sources such as solar energy, small-scale hydro-electricity and biomass-based electricity production in the state.



According to the 2011 census, 41% of the households use cowdung cakes and the other 41 % use LPG for cooking. The rest of the households are dependent on kerosene, coal, firewood, etc, for cooking. Majority of population in Meerut is mainly dependent on agriculture as their primary source of income. Rice, wheat, sugarcane maize, etc. are some of the major crops and enterprises engaged in agriculture. The net sown area of the district is 198941 ha with the cropping intensity of 152.67%. The district has a 21314 ha of forest land. A total of 2596 ha of cultivable wasteland is there in the district, with 2997 ha of current fallows. The district produces 1014.1 kT/yr of agricultural biomass and 4.1kT/yr forest based biomass (Kumar et. al. 2017)

Table.1 gives an account of productivity of some of the major crops in the district. The productivity of the crops appears to be good consequently a good amount of crop residue would be produced.

CROPS	PRODUCTIVITY (kg/ha)
Rice	2559
Maize	1903
Pulses	679
Wheat	3870
Sugarcane	63800
Mustard	1105

Table 1

A biomass plant has been installed in M/S Amrit Bakers in the district. Also co-generation plants have been installed in Sangal Paper Mill and Anand Triplex Board.

### 2.5.3. Biogas

Biogas data is not available for the district. Based on the livestock population and agricultural waste biogas potential calculated. Biogas potential from animal waste and agricultural waste was calculated approximately as two crore m<sup>3</sup>/year and sixty-four crores m<sup>3</sup>/year. This amount of biogas generation can efficiently complete the energy demand of the district.

### 2.5.4. Hydro Power

Non-conventional energy development agency, U.P. investigated three sites near Ganga for micro-hydel projects generation in the district Meerut.

Table 3. Identified/investigated sites of Small Hydro projects by NEDA

Name of project	Installed capacity (KW)	Stream/river	HEAD (m)	Discharge (cumecs)
Qutubpur	550.00	UpperGanga/ anupsahar	2.20	44.00
Akbarpur	550.00	UpperGanga/ anupsahar	3.00	44.00
Dhakoli	300.00	Anupsahar	1.77	39.02
Parichhatgarh	800.00	Anupsahar branch	3.45	27.50
Dewai	600.00	Anupsahar branch	4.00	27.50
Jakhara	400.00	Anupsahar branch	3.20	26.00

The following are the projects investigated by UPNEDA:

Project Name	Capacity (KW)
Chudiyala	550
Akbarpur	550
Dhakauli	300

## 3 QUALITATIVE DATA ANALYSIS

---

### 3.1 FORESTRY

The use of timber in house construction, furniture and agricultural implements etc. is around 61.38 million cum. By using alternatives we can reduce this which in turn will result in reduction in tree felling. In the context of State of Uttar Pradesh 10.495 million people are using fuel wood from forests. Taking an average family size of 5 persons per family it can be concluded that 2.1 million



families are directly dependent on forests for fuel wood. By giving them alternative sources of energy it will be possible to reduce Carbon dioxide to the tune of 2.1 million tonnes annually.<sup>3</sup>

To increase forest resources in the country, Ministry of Environment, Forest and Climate Change is implementing a number of Schemes under which financial assistance is provided to State/UT Governments. Some of major schemes of the Ministry are National Afforestation Programme (NAP) and Green India Mission (GIM), Integrated Development of Wildlife Habitat (IDWH), Intensification of Forest Management Scheme (IFMS), Project Tiger and Project Elephant including funds under Compensatory Afforestation Fund Management and Planning Authority (CAMPA).<sup>4</sup>

In order to promote afforestation, the forest department in **Kaushambi**, Uttar Pradesh, is putting up information boards on trees. The boards mention the tree's variety, identifying one as a medicinal tree with healing properties, urging people to save the environment by protecting it. Special attention has been given to trees in densely populated areas of the city.<sup>5</sup>

In June 2020, 94,03,240 saplings were planted in the massive plantation drive by the state government.<sup>6</sup>

### 3.1.1 Biodiversity

Meerut lost 18ha of tree cover and 5.30kt of CO<sub>2</sub>e emissions between 2001 and 2021, a 2.5 percent decline in tree cover since 2000. Meerut added 4ha of tree cover in the region from 2001 to 2012, accounting for 0.18 percent of all tree cover growth in Uttar Pradesh. Natural forest cover covered 0.24 percent of Meerut in 2000. The main fire season in Meerut usually starts in early November and lasts for around 23 weeks. There were no VIIRS fire alarms recorded between June 14th and June 6th, 2022, when only high confidence alerts were considered. When compared to prior years dating back to 2012, this is a low number. So far in 2021, 220 hectares of land have been destroyed in Meerut. This amount is typical when compared to other years' totals dating back to 2001. The year with the most fires was 2005, with 4.9kha. Between June 2nd and June 9th, 2022, there were no deforestation alarms recorded in Meerut. Between June 3 and June 10, 2022, two VIIRS fire alarms were reported in Meerut, none of which were high confidence alerts. Between June 3 and June 10, 2022, two VIIRS fire alarms were reported in Meerut, none of which were high confidence alerts. The Hastinapur Wildlife Sanctuary is located on the Ganga's northern bank. The state animal, the Swamp Deer, as well as Hog Deer, Cheetal, and Sambar, may be found in the area. The Saaras [Crane], the state bird, also makes its home in the area. Pythons may be seen in large numbers across the area. Wild Otter and a variety of fish may be found in the region's various water bodies. Baby crocodiles are released in the Ganga River at Hastinapur as part of Crocodile Breeding

<sup>3</sup> [State Action on Climate Change, Uttar Pradesh](#)

<sup>4</sup> <https://pib.gov.in/newsite/PrintRelease.aspx?relid=148508>

<sup>5</sup> <https://www.hindustantimes.com/cities/up-info-boards-put-up-on-trees-to-help-save-them-in-kaushambi/story-g2sdBxQyzbsYr56BNethnK.html>

<sup>6</sup> <https://swarajyamag.com/insta/uttar-pradesh-yogi-govt-to-set-another-record-in-plantation-25-crore-saplings-to-be-planted-in-a-day>

Projects. The Turtle Rehabilitation Program, which is run by the WWF, has a center near the Hastinapur Sanctuary.

### **3.2. ENERGY:**

As per the data of the year 2013, Bhadohi district energy consumption is around 791 TJ/year and 3.4 GJ/capita/year. GHG emission of 55,168 Ton CO<sub>2</sub> equivalent and 0.235 Ton CO<sub>2</sub> equivalent/capita has been evaluated for the district.

#### **3.2.1. Solar**

The district Meerut has been performing fairly well in the solar energy sector. According to an article in MERCOM, The Millary Engineering Services tendered a 2 MW solar project to be developed at Meerut Cantonemnt in Uttar Pradesh. The scope of the work includes design, engineering, supply, erection, unstation, and commissioning of the project. The estimated project cost is Rs. 160.8 million. Another article in The Hindustan Times with the heading ‘Vertical gardens, murals, solar panels to deck up Delhi-Meerut Expressway’ mentions- Replicas of Qutub Minar and Ashok Stambh (Ashoka Pillar), fountains, vertical gardens, solar panels, murals and greenery at Nizamuddin Bridge alongside NH-24 are all set to welcome the motorists and change their driving experience. It is aimed to generate 1 MW electricity from the solar panels on Yamuna bridges.

Efforts are required to make the economic activities solar powered as so the public places have been mostly solarised.

#### **3.2.2. Biomass**

Although there have been efforts made in the district to improve biomass energy production in the district but not much has been achieved. The district Meerut has the problem of stubble burnig, this can be proved from the news article in Hindustan Times which mentions - According to UPPCB experts, the (current) farm fire incidents are 18% more than the average seasonal farm fire incidents recorded in the state in a day, particularly in November. Chief environmental engineer (UPPCB) VK Singh said the fire incidents were reported from Saharanpur, Meerut, Baghpat, Bijnor, Bulandshahr, Hapur, Etawah, Mainpuri, Unnao, Maharajganj, Bahraich and Gonda districts of Uttar Pradesh, among others.

Not much data is available on the biomass energy from the district Meerut.

#### **3.2.3 Biogas:**

The biodegradable component is deposited at various locations and composted using temporary procedures such as culture mixing and so on. The rest of the city's solid waste, around 650 tonnes per day, is now deposited in Lohia Nagar, Hapur Road, and Mangatpura, Delhi Road, Meerut. The data shows that majority of the rubbish collected is either burned or disposed at dumping sites owing to a lack of treatment and processing facilities. This contributes to the city's worsening of air quality. This

waste should be utilised to produce compressed biomethane through biogas plant. No data is available of list of beneficiaries or biogas plant for the district.

#### **3.2.4. Hydropower:**

A total of 9 sites have been identified for micro hydel project in the district. The State's national-level program runs for hydropower generation, such as the small hydropower project program. The implementation of small hydropower in the State is carried out by Uttar Pradesh New and Renewable Energy Development Agency.

### **3.3 TOURISM**

#### **Places of Interest**

##### **● HOW TO REACH MEERUT-**

---

###### **○ BY AIR-**

The city of Meerut is in close to the capital city of India, New Delhi, Meerut is about 60 kms from the airport in Delhi. Plenty of airlines have their flights traveling to and from the airport in Delhi. This makes the access to Meerut quite easy as people can arrive in Delhi and then take a taxi or even bus to go into Meerut, which takes about one and half hour to reach through national highway 24 and then through national highway 58.

###### **○ BY TRAIN-**

Meerut located in the line of Delhi Derhadun track of North Central Railways. Both passenger and trains of super fast category are running on this track and many cities in India are connected to Meerut in Uttar Pradesh . Many cities like Lucknow, Delhi, Agra, Jaipur, Ghaziabad, etc have direct train connections with Meerut.

###### **○ BY ROAD-**

Road connectivity from Meerut to cities like Delhi, Mathura, Kanpur, Chandigarh, Varanasi, Lucknow, Agra, Jhansi, etc has been good, a number of buses of Uttar Pradesh State Road Transport Corporation, carrying passengers into meerut. Apart from general class buses, the luxury buses are also running from this destination.

#### **Cities Near Meerut –**

This is a list of the largest cities in India that are nearest to Meerut. A huge city has a population of at least 200,000 people, and you can usually fly into one of the main airports. Find the nearest airport to Meerut, India if you need to book a flight. You can also check for cities 4 hours (or 3 hours, 2 hours, or 1 hour) away from Meerut, India, or just search for cities near Meerut, India in general.

- 31 km to Hapur, India.
- 44 km to Ghaziabad, India.
- 53 km to Muzaffarnagar, India.
- 59 km to Noida, India.
- 63 km to New Delhi, India.

**Places to see in Meerut –**

Meerut is one of the significant tourist destinations of Uttar Pradesh. The city comprises many historical and cultural heritage sites. There are many beautiful gardens, monuments with great architecture and holy places in the city which are major tourist attractions here. A few of such places are:

**Augarnath Temple-**

The Augarnath Temple in Meerut is devoted to Lord Shiva. The temple has historical importance as the first war of independence of India was also witnessed here. The actual date or year of the formation of the temple is not known but it is believed that the ‘shiva linga’ in the temple emerged on its own that is treated as a miracle of God and therefore attracts lots of devotees. In the past few years, several changes have been made in the temple. In 1968, a new temple was constructed and the old architecture was replaced. In 1987, a new hexagonal hall was also constructed there and in 2001, a ‘kalash’ (pitcher) made from 4.5 kg of gold was installed at the spire.

**The John’s Church-**

The John’s Church located in Meerut was built between 1819-1821. It is the oldest church in Northern India and was built during the British colonial period. It is considered as a masterpiece of architecture. There is a cemetery near the church which has the graves of the British people and their families who were killed during the revolt of 1857. The church is built in style of English church architecture which has a large open space for worship. The English Sunday Service is held every morning and the timings for regular Sunday service is 8.30 a.m. during summers and 9.30 a.m. during winters. On the occasions of Easter, Christmas or New Year the timings for the service is 10 a.m.

**Company Gardens-**

Gandhi Bagh, locally known as the ‘company gardens’ is located on Mall Road in Meerut. It was built before independence but is recently renamed. It has lush greenery with a wide range of flora within its premises. There is a musical fountain which runs every evening in the garden. Earlier, it had many entrances, and no entry fees was there, but now only one entrance is open for the public with a nominal entry charges. The Cantonment Board of Meerut maintains the Gandhi Bagh which at present is one of the attractions for amusement and recreational activities.

**The Suraj Kund Park-**

The Suraj Kund Park is maintained by the Municipal Corporation of Meerut (Nagar Nigam). The green ambience of this place is a major attraction for the visitors. There are ample of flora within the area of this place. It offers many recreational and amusement activities for the tourists and visitors. This place has history from the times of Mahabharata; it is believed that King Karna devoted his ‘kawach and kundal’ (divine armor) to Sun God at this place. Every year, a fair is organised during the time of Dussehra, which is celebrated with full zeal and enthusiasm.

**Shahpeer Sahab ki Dargah-**

The Mughal mausoleum known as Shahpeer Sahab ki Dargah was built in 1628 by Nur Jahan, a popular Mughal Empress. It was built in the honour of a local Muslim Hazrat Shahpeer. According to the beliefs of the people, Shahpeer was the teacher of the Mughal Emperor Jahangir. The Dargah is a structure of red stones and is popular for its unique architecture. It is said that this mausoleum was constructed 24 hours before the death of Hazrat Shahpeer and the work on its construction was stopped midway and therefore, it is still believed to be incomplete. The tomb has beautiful and intricate nakshi work done on it and there is no roof on the tomb. This tomb has been listed as the national heritage monument by the Archaeological Survey of India. A local jagirdar, Rajaji is believed to have constructed the Shahpeer Gate in 1829 for the mausoleum.

**The Digambar Jain Temple**

The Digambar Jain Temple is one of the oldest temples in Meerut and dates back to thousands of years. There are seven altars with seven splendid spires within its courtyard. The first altar is known as the altar of 'Tikhhal Wale Baba' and is believed to be built by the Gods of Heaven. Thousands of devotees visit this temple to get their prayers fulfilled and offer their prayers to 'Tikhhal Wale Baba'. There are around 720 idols of 24 Teerthankaras which belong to past, present & future.

**Shahid Smarak**

The Shahid Smarak is devoted to the martyrs of India during the first war of freedom of India in 1857. There are lush green compounds in the Shahid Smarak and a Shahid Stambh which is located in the premises and devoted to the martyred freedom fighters. There is also a museum which preserves and depicts the war of independence through paintings and dioramas. The museum has two galleries that display the portraits of freedom fighters and their struggle during the revolt of 1857.

The Shahi Eid Gah was built by eighth Sultan of Delhi, Nasir ud din Mahmud who was the son of Iltutmish. It is almost 600 years old mosque and has the capacity to accommodate more than one lakh people. More than one lakh people can offer their prayers at the same time in the Eid Gah. The architecture and the carvings showcase the importance of the Mughal rule and the period of Delhi Sultanat in India. Few years ago, the gates of the Eid Gah were rebuilt for security reasons. It is one of the popular tourist spots of Meerut.

**Qila parikshitgarh**

Parikshitgarh is also known as the 'Qila parikshitgarh' and is named after the King of Hastinapur, Parikshit. It is said that this fort was built by Parikshit who was the grandson of Arjuna. It is also believed that it was restored in the eighteenth century by Nain Singh, a Gurjar king. During 1916, silver coins from the times of Shah Alam II were found in the fort.

**Data analysis**

- From the table-1 it is evident that the number of total tourists in Meerut increased from 2016 to 2019.
- The Meerut tourism encountered highest percentage change in tourists in the year 2017, which was 5% increase compared to previous year.
- The growth in the number of total tourists in Meerut is not constant in these years, although the range lies between -80-5%

**SWOT Analysis**

S.No	Strength	Weakness	Opportunities	Threat
● 1.	<ul style="list-style-type: none"> <li>● Geographically located next to Delhi.</li> <li>● Religious tourist plans can be clubbed together to propose a spiritual travel plan.</li> <li>● The district is densely fortified with temples like Digambar Jain Temple and the Gandhi Bagh.</li> </ul>	<ul style="list-style-type: none"> <li>● Poor promotion of existing temples and garden.</li> <li>● No maintenance of existing heritage sites in the district.</li> </ul>	<ul style="list-style-type: none"> <li>● Proper maintenance of existing heritage sites to attract more tourists both local and foreign.</li> <li>● By utilising cutting-edge technology to attract tourists.</li> <li>● Creating tour plans clubbing trips, artistic spaces and collaborative ventures to bring all useful collected heritage and art under one roof.</li> </ul>	<ul style="list-style-type: none"> <li>● Covid 19 can be a big threat with unpredictable arrival.</li> <li>● Lack of good budget by the government can be a big barrier.</li> </ul>

**3.4. WETLANDS:**

The wetlands create a unique ecosystem that supports many species simultaneously, like aquatic, terrestrial, and human beings. Local stakeholders directly or indirectly depend on the wetland for their

income and small-scale business. The data collected and analyzed shows the region's production and possible product that can be derived from the raw product. The list of sources and the possible outcomes are mentioned below:

- Sugarcane and wheat productions are high in the region.
- The district stats show a good amount of finger and pearl millet in the region, which can be promoted in the scheme.
- The region has a large production of dairy products, leading to increased animal husbandry. Wetlands can support the growth of fodder for animals.

## 4 ACTION PLAN DEVELOPMENT

---

### 4.1 FORESTRY

In July 2019, government of Uttar Pradesh taken the initiative to plant 22 crore saplings. The Forest Department involved the farmers as stakeholders to plant seedlings in their fields. Farmers are expected to sow quality planting material such as clonal plants, which are not available in the UP forest department nurseries. There is also the need to have minimum support price (MSP) for the timber produced by farmers with buy-back arrangement. This in turn will motivate them to plant more trees, which would benefit the economy as well as the environment.<sup>7</sup>

#### Projections & Monitoring Matrix

Outcome indicators can be forest produce, buyback of products by the state, annual gross income generated by these outputs, contribution of the forest output in the district domestic product.

#### 4.1.1 Biodiversity –

The UPPCB intends to conduct a study to develop a plan for the development of Green Infrastructures in Meerut's Non-Attainment Cities, considering environmental and economic feasibility, as well as providing Standard Operating Procedures for all types of suitable GIs in a cost-effective manner for overall city environmental improvement, with a focus on the reduction of air pollution and particulate matter.

---

<sup>7</sup> <https://www.teriin.org/article/special-drive-tree-plantations-uttar-pradesh-faces-several-challenges>



- The Central Zoo Authority's master layout plan for the rescue facility has been approved. In Meerut, work is also being done on the zoo. In addition, field workers is receiving training in dolphin counting.

## 4.2 TOURISM

- **‘Travel Uttar Pradesh’ plan-** Meerut has plethora of spiritual heritage attractions including many temples and a monastery. To provide visitors a better awareness of how humans affect the environment and to instil a greater respect for ecosystems it can be clubbed with a major city like New Delhi. In the Meerut district, there is a big chance to establish events around river ganga not only on religious grounds but also cultural grounds as well. The project will reduce the detrimental effects of traditional tourism on the environment while also enhancing local people's cultural integrity. This initiative will also increase visitor traffic in the area.
- **Sustainable tourism-** Many places in India have been transformed into significant holy sites due to spirituality. As a result, many travel aficionados have begun to flock to these hubs, in addition to the vast number of pilgrims who visit time and again with goals of sustainability in mind and its overall development. The impact of these religious locations is huge not only around the local surroundings but also among the travellers. To grow sustainably at various touch points like temples and monastery must be considered with respect to developing the local trade and involving the local folks.

Different tourists share an equal sense of responsibility for the development of sustainable tourism. Every person is responsible for the factors including many elements.

### Projections and Monitoring matrix

Sector	Intervention	Strategy	Total cost	Expected Outcomes

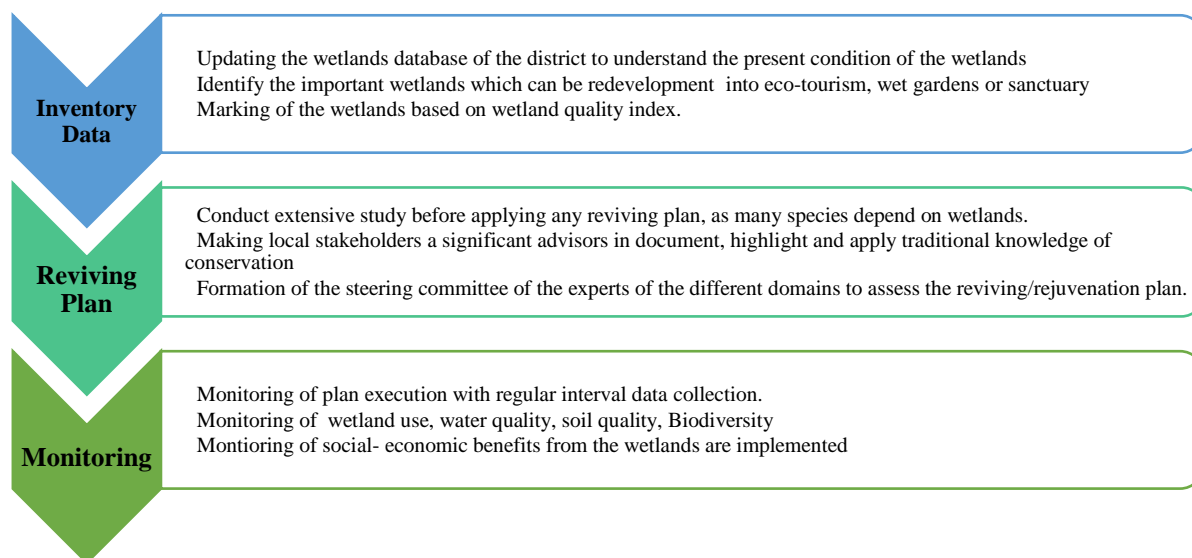
<p><b>Tourism</b></p>	<p><b>Research</b></p>	<ul style="list-style-type: none"> <li>● The cause and motive for tourism can be predicted using various data and matrices which available on various government official websites as well as private organizations have done their bit too. It is also feasible to discover the elements affecting tourism in Uttar Pradesh through significant qualitative and quantitative research.</li> <li>● All political pressures and influences must be removed from research to bring as much transparency as one can.</li> <li>● When adding new records, the researchers must ensure that the field data and secondary data are correct and unaltered. It is necessary to enlist the help of unbiased researchers.</li> </ul>	<p>As a reference for other processes, a well-researched document.</p> <p>Tourism in Uttar Pradesh is influenced by a number of factors.</p> <p>Understand multiple factors that influence tourism activity. To be able to understand and work upon all the listed factors and create a need for travel for people within and outside the country!</p> <p>Research and prior lessons will be used to inform the planning process.</p> <p>For a successful implementation, realistic planning is required.</p>
	<p><b>Planning</b></p>	<ul style="list-style-type: none"> <li>● Research and analysis of various data and reports can be used to generate action plans for intervention.</li> <li>● Developing an active action plan is critical because the results are dependent on how it is prepared and later implemented as well.</li> <li>● Planning must take into account the state's social position as well as the impression that tourists have of the country.</li> </ul>	

		<ul style="list-style-type: none"> <li>● Non-practical forecasts should be avoided at all costs.</li> <li>● Making plans for all major festivals and occasions like Ramnavmi. Finding out carious elements of the temples that can be utilized to weave stories in and around Meerut.</li> <li>● Hindu temples can be commercialised. Other involved things like flower vendors, incense sticks, and other worshipping things can be standardized across the state under the umbrella of UP Tourism. Every retailer in the vicinity of the temple does their hardest to make as much money as possible from the pilgrims and guests who come to pay their respects.</li> <li>● This standardization should be incorporated under Brand Manufacturing to increase tourism activity throughout the state.</li> <li>● Organizing various spiritual and religious events which hold meaning and significance.</li> <li>● Complete use of allocated budget.</li> </ul>		
	<p><b>Implementatio ns</b></p>	<ul style="list-style-type: none"> <li>● To attract more tourists, various schemes such as tourist packages, sustainable collaborations, and so on can be devised at ground level.</li> <li>● Mahotsavs and fairs will be held to boost the local economy and attract visitors.</li> <li>● Creating spiritual tourism circuits and to implement existing circuits like Buddhism circuit.</li> </ul>		<p>To increase total number of tourists and increase tourism earnings from all possible tangents and at every touch point.</p> <p>To boost the state's image while ensuring that no other social issue has an</p>

		<ul style="list-style-type: none"> <li>● Establishing a link between tourist and local culture and cuisine.</li> <li>● Advertorial promotion that has an over-all extensive approach to capture the right audience.</li> <li>● A significant amount of branding and marketing which can be clubbed with other cities like New Delhi.</li> <li>● The development of tourist attractions and maintenance of temples in and around Meerut.</li> <li>● Information about travel packages should be available on government websites and various other touch points like social media channels.</li> <li>● Conducting thorough market research in order to build strong strategies that will work on ground.</li> <li>● Ganga arti culture • Eco-tourism activities boosted by Ganga Festivals which happen. Along with these proper sanitisation, maintaining hygiene on the banks of river Ganga is very important.</li> </ul>	<p>impact on tourism earnings. Create a flowchart to constantly maintain the set standards of tourism and consider feedback of tourists. This must include major points of sanitation and clean drinking water.</p>
	<b>Impact Assessment of results</b>	<ul style="list-style-type: none"> <li>● Figuring out where all touchpoints.</li> <li>● The understand the cause of failure and work upon it.</li> <li>● Reasoning to comprehend all the aspects.</li> <li>● Planning for future considering all over aspects of that can be covered.</li> </ul>	<ul style="list-style-type: none"> <li>● To learn the lesson and establish the root cause of success and failure, which will be applied in the future with modifications.</li> </ul>

### 4.3 WETLANDS

Some of the known wetlands in the district need to be taken care and action on different fronts must be taken. The action plan below gives a glimpse of the action and development required to protect, conserve, and rejuvenate the wetlands existing and extinct.



## 4.4 ENERGY

### 4.4.1. Solar

The district Meerut has a good agricultural background and is also famous for its traditional handloom industry. Efforts should be made to power the tradition and the main economic activity with solar. This would then definitely raise the livelihood standards of the people of Meerut. People of the district should be made aware of the solar energy and the schemes government has for them. People should be encouraged to install decentralized solar plants in the villages under the component A of Kusum Yojana. These can be set up by the new entrepreneurs in the villages or can be community types set up by the panchayats. This would give the farmers a chance to be more dependent on electricity for farm activities and they can use various advanced tools. All these steps would lead to creation of employment and entrepreneurship in the district.

The district also has a close relation to handlooms traditionally, to upgrade the industry, the district should incorporate Mission Solar Charkha implemented by Khadi and Village Industries Commission. The scheme Mission Solar Charkha is enterprise driven scheme and envisages setting up of 'Solar Charkha'. The scheme is envisaged to generate direct employment. It is based on the success of a pilot project on Solar Charkha, set up at Khanwa village, Nawada District, Bihar in 2016 which benefitted about 1180 artisans.

### 4.4.2. Biomass

The people of the district should be made aware of the biomass energy and how in different ways they can make use of it. Sugarcane is largely grown in the district which consequently has resulted in a number

of sugar mills in the district. The mill owners should be encouraged to install bagasse based biomass plants. Production of biofuel should be promoted in the district. Each of the sugar mill or a group of them can establish bagasse based plant in the district. The villages should be encouraged to establish community based biomass in the district.

The district also cultivates rice and wheat, husk based biomass plants on the lines of Husk Power Systems from Champaran, Bihar. New entrepreneurs should be encouraged to utilize the biowaste available in the district and develop innovative ways.

#### **4.4.3. Biogas:**

- By December 2020, a solid waste management plant with a capacity of 240 TPD is expected to be constructed and operational. By December 2020, a Material Recovery Facility is also being envisaged.
- On October 28, 2015, the Environment Department announced a ban on the burning of agricultural waste and crop residue under the terms of the Air Act.
- The Department of Agriculture issued a government order on February 10, 2017 requiring the use of a combination harvesting machine and a straw ripper with binder to limit the burning of agricultural residual trash.
- Since the financial year 2018-19, a plan called "Promotion of Agriculture Mechanization for In-Situ Management of Crop Residue" has been in place.
- Ex-situ agricultural residue management has resulted in the proposal of 01 Bio CNG Plants with a capacity of 5.1 MT in Meerut, which is expected to be operational by 2022.

#### **4.4.4. Hydropower:**

The state government of Uttar Pradesh has also set rules for private engagement in the development of micro/mini/small hydropower projects in power evacuation facilities.

## **5 RECOMMENDATIONS**

---

### **5.1 AGRICULTURE AND ALLIED SECTORS**

The district needs to enhance the new technologies for the sowing and harvesting of the major crops. High yield varieties (HYV) and the qualitative seed should be provided to the farmers through the KSSC and NFSM schemes.

- 6 Farm mechanization has ample scope in the district for qualitative farm production.
- 7 The area under the drip irrigation should be increased.
- 8 The farmers should practice mulching for maize and sugarcane to reduce the number of irrigation and weed control.

- 9 Farmers should control the over-use of fertilizer and pesticides to maintain soil health.
- 10 Stepped towards organic farming under the government scheme (Namami Ganga Project) will lead to sustainable agriculture, which should be encouraged.
- 11 Vermi-composting and application bio-fertilizer and bio-pesticides should be encouraged to boost soil health.
- 12 Farmers can be encouraged for medicinal crops such as Aloe vera, Ashwagandha, kalmegh cultivation, which has a large scope in the district.
- 13 Farmers should be encouraged for the inter-cropping.
- 14 Turmeric cultivation has a large scope in the district, which should be encouraged.
- 15 Potato and sugarcane are the major cash crops of the district, so processing and storage facilities should be provided to the farmers.
- 16 Mushroom and capsicum cultivation can be more profitable to small-scale farmers.
- 17 Training should be provided for the processing and packaging of mushroom cultivators to increase the quality of the product.
- 18 Farmers should be trained over integrated pest management (IPM), integrated disease management (IDM), and post-harvest management for major fruits (Guava and Mango) production.
- 19 Turmeric processing units and mango processing units have large scope in the district,
- 20 Farmers should be trained in crop residues management.
- 21 High-value flowers, orchids, and vegetable cultivation in poly houses and shed-net houses should be promoted.
- 22 More farmers should be trained and encouraged for beekeeping to increase their earnings.
- 23 Sericulture can be promoted in the district.
- 24 Presence of one of the most populated metropolitan cities, Delhi has higher marketing access for fish, poultry, goats, and sheep, which has enormous scope in the district.
- 25 Dairy farming should be encouraged in the district, and also need to build up more marketing and transportation facilities with the neighboring districts.

## 5.2 FORESTRY

Meerut located on the bank of river Ganga and Yamuna. According to ISFR 2019, 68.41 Sq. Km. area of Meerut is covered with forest. As discussed above, the forest cover of Meerut has increased

slightly as compared to previous assessment of ISFR 2017. No major forest found in the district. There is a wide scope of Afforestation on waste land, trees outside forest (on the sides of the roads, banks of river etc.). Government can promote the afforestation, agroforestry activities by providing output based incentives

### 5.2.1 Biodiversity

- Conduct afforestation program to increase dense forest area in the district.
- Non-timber forest produce-based income-generating initiatives should be identified and promoted.
- Government should support/ promote local people to build communities and NGOs for afforestation programs.

## 5.3 WETLAND

The wetlands need to be intact, but at the same time, they need to be planned wisely to support the district economically, socially and environmentally, which will lead to indirect relief to the Ganga river to a large extent. It will also lower the local people's dependence on the Ganga river for their small-scale industry or basic daily needs. The following recommendation and interventions are required to get valuable products and solve the issues/ challenges faced by the local people of that region.

- It is recommended to introduce organic and water-efficient farming techniques for wheat and mustard production.
- It is recommended to rejuvenate and restore the wetlands under MNREGA schemes.
- It is recommended to diversify cropping culture by introducing vegetables, mushrooms, beekeeping, fruits, medicinal plants, dairy, poultry etc. for nutritional security
- It is recommended for the enhancement and conservation of green fodder for livestock.
- It is recommended to promote the production of medicinal plants in the region to support the promote ayurvedic medicine, and wetland can support the water supply for the cultivation.

## 5.4. ENERGY

### 5.4.1. Solar

- ❖ The people of the industry should be made aware of the solar energy and the schemes which are running in the state to increase its penetration.
- ❖ Kusum Yojana should be popularized among the people of the district, to bring more profits to the agriculture and to increase the entrepreneurship and employment in the district.
- ❖ Mission Solar Charkha should be also adopted on large scale to replenish the the traditional handloom business with the solar energy.

### 5.4.2. Biomass

- ❖ The people of the district should be made aware of the biomass energy.
- ❖ Biofuel generation should be encouraged in sugar mills.
- ❖ Establishment of husk based biomass plants should also be encouraged.



### 5.4.3. Biogas

- Gaushala in the district such as Gopal gaushala (108-year-old), gauhala in Uksia should utilize cow dung to produce biogas in biogas plant.
- Promotion of household biogas plant and different incentive scheme should be spread through posters, or slogans. Tourist attraction places such as Hastinapur Jain temple or Shaheed Smarak should be targeted to conduct this activity.

### 5.4.4. Hydropower

- It is recommended to identify new sites and build microhydel projects on the investigated sites in Meerut.

### 5.4.5. Tourism

- **Hygiene and Sanitation-** Many may appear to be conflicted about cleanliness, urinating in public and washing their hands excessively before each meal on the other. Thousands of people have been warned about India's open defecation problem. In India, hygiene can be an issue, but rest assured that new tourist destinations need extremely hygienic and well-kept restrooms and safe drinking water.

### Recommended Projects-

- **Spiritual tourism-** To expose oneself to various tangents of spirituality. Temples on the sides of roads, in banks, and even in underground parking garages, small temples and shrines have been very prominent. Every day, it appears as though there is some sort of religious event but to connect it to spirituality can be one move to attract global tourists. In India, people openly practise their religions and value their spiritual beliefs.

### Monitoring, Evaluation & Impact-

	Broad objectives / recommendations	Key activities / interventions to be planned			Monitoring & Evaluation	Impact
		2022	2023	2024		
1.	To find different touch points and to create tour plans to attract tourists.	Utilising Meerut as another travel city in UP Tourism plan needs to be marketed among spiritual enthusiasts.	To keep a track of ongoing process and take constant tourist feedback.	Improve upon every touch and using technology as an important tool to maintain transparency.	Process tracing, Bradford Hill criteria.  Environment Impact Assessment	More tourists visiting by the end of the year. Word of mouth spreading across the country and globe.
2.	Spiritual tourism- To maintain temples on the sides of roads, in banks and shrines.					

## 5. Discussion during the Report Presentation

- The major part of the Ganga Basin is under the Wildlife Sanctuary and hence the commercial activities cannot be taken up at a large scale but the sustainable livelihood activities can be taken up for locals.
- 4 Wetlands have been identified and is being developed as per the concept of Eco-Tourism.
- More than 300 Acre Land has been encroachment free and has been handed over to Forest Department in the last year.
- One Biodiversity Park has been proposed for 2023-24.
- The IIML Report for Arth Ganga should be a regular Agenda item for next 6-8 DGC meetings.
- Hon'ble PM during the post-Budget webinar on Tourism had spoken about market potential of destination weddings. It was suggested that suitable Ashrams in Ganga Basin may be identified for such purpose to promote blissful experience, cost reduction, livelihood opportunities and better upkeep.
- Allocate separate space for Namami Gange Awareness and Jalaj Marketing kiosk in Melas/Congregatios/Fairs for providing better marketing opportunities to the Jalaj products.
- As Dilli Haat Centre – Namami Gange Awareness and Marketing Centre – is being launched soon, it was requested that every district to identify niche products with a creative story and link it with Jalaj in their area.
- To identify Arth Ganga Tourist Trails and organize Ganga Guide training
- Promotion of Natural Farming in Ganga Basin and training workshops should be organized on a regular basis. NMCG is supporting this initiative in coordination with MoA& FW and NCOF.
- Make plans for reuse of treated waste water for agriculture, industrial etc. purpose and also the sludge.
- Training of volunteers for Ganga awareness & Aarti workshops to promote regular aartis on Ghats.

## 6. REFERENCES

---

- <https://bijnor.nic.in>
- <http://uptourism.gov.in/>
- [www.upecotourism.in](http://www.upecotourism.in)
- [https://www.researchgate.net/publication/295863538\\_Replication\\_and\\_scaling-up\\_of\\_isolated\\_mini-grid\\_type\\_of\\_off-grid\\_interventions\\_in\\_India](https://www.researchgate.net/publication/295863538_Replication_and_scaling-up_of_isolated_mini-grid_type_of_off-grid_interventions_in_India)
- [https://www.censusindia.gov.in/2011census/dchb/0903\\_PART\\_B\\_DCHB\\_BIJNOR.pdf](https://www.censusindia.gov.in/2011census/dchb/0903_PART_B_DCHB_BIJNOR.pdf)
- <https://www.indiastatdistricts.com/uttarpradesh/bijnor-district>
- <https://timesofindia.indiatimes.com/city/meerut/four-primary-schools-in-up-to-be-illuminated-with-solar-energy/articleshow/87744367.cms>
- <https://www.saurenergy.com/solar-energy-news/sunsource-energy-commissions-first-phase-of-bijnor-solar-power-project>
- <http://upneda.org.in/annual-report.aspx>
- [https://www.researchgate.net/publication/314836204\\_Survey\\_on\\_Present\\_Scenario\\_of\\_Biomass\\_energy\\_and\\_its\\_future\\_prospect\\_in\\_Uttar\\_Pradesh\\_India](https://www.researchgate.net/publication/314836204_Survey_on_Present_Scenario_of_Biomass_energy_and_its_future_prospect_in_Uttar_Pradesh_India)
- <https://cdn.s3waas.gov.in/s3ac1dd209cbcc5e5d1c6e28598e8cbbe8/uploads/2021/05/2021051929.pdf>
- [https://agricoop.nic.in/sites/default/files/UP7-Bijnor-26.7.2012\\_0.pdf](https://agricoop.nic.in/sites/default/files/UP7-Bijnor-26.7.2012_0.pdf)
- [https://www.business-standard.com/article/news-ani/yogi-government-sanctions-two-biofuel-projects-worth-rs-800-crore-119021100581\\_1.html](https://www.business-standard.com/article/news-ani/yogi-government-sanctions-two-biofuel-projects-worth-rs-800-crore-119021100581_1.html)
- [https://www.researchgate.net/publication/285632903\\_Husk\\_Power\\_Systems\\_Bringing\\_Light\\_to\\_Rural\\_India\\_and\\_Tapping\\_Fortune\\_at\\_the\\_Bottom\\_of\\_the\\_Pyramid](https://www.researchgate.net/publication/285632903_Husk_Power_Systems_Bringing_Light_to_Rural_India_and_Tapping_Fortune_at_the_Bottom_of_the_Pyramid)
-

## 5 APPENDICES

### AUXILLARY DATA

Table 1 Crop production in the district.

Crop/Year	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
<b>Non-grain crops (Metric Tonne)</b>	32465	38687	36799	42372	22457	22485	23598	44337	44249
<b>Grain crops (Metric Tonne)</b>	628736	691668	810028	788538	702012	623337	626192	864269	858606
<b>Sugarcane (Metric Tonne)</b>	241488	231057	245520	299791	212453	219085	232591	415380	356248
<b>Potato (Metric Tonne)</b>	171269	198001	213947	194754	62558	103645	133331	229259	214913

Table 2 Livestock population in district.

Livestock	2003	2007	2012
Cattle (Cow)	263580	239936	273848
Buffalos	186571	209859	233907
Sheep	18272	17435	23170
Goat	153667	168339	154580
Pigs	28989	1941	15476
Chicken	212846	225766	227593
Other Poultry	5188	64990	4412
Horses and Ponies	1703	524	1664
Others	8531	4929	6966

Table 5 Biogas potential from animal waste.

Livestock	Residue type	Total population as of 2012	Manure yield* (kg/day)	Total manure generation annually (kg)	Average collection (75%)	Dry manure after removing Moisture content	Manure required for biogas* (kg/m <sup>3</sup> )	Biogas potential (m <sup>3</sup> /yr)
-----------	--------------	-----------------------------	------------------------	---------------------------------------	--------------------------	--	--	---------------------------------------

**ARTH GANGA PROJECT: DISTRICT MEERUT**

<b>Cattle</b>	Manure	2,73,848	10	99,95,45,200	749658900	149931780	25	5997271.2
<b>Buffalo</b>	Manure	2,33,907	15	1,28,06,40,825	960480618.8	192096123.8	25	7683844.95
<b>Sheep</b>	Manure	23,170	1	84,57,050	6342787.5	1268557.5	25	50742.3
<b>Goat</b>	Manure	1,54,580	1	5,64,21,700	42316275	8463255	25	338530.2
<b>Pig</b>	Manure	15,476	2.5	1,41,21,850	10591387.5	2118277.5	25	84731.1
<b>Poultry</b>	Manure	2,32,005	0.1	84,68,183	6351136.875	1270227.375	25	50809.095
<b>Total</b>		9,32,986						14205928.85

Table 6 Biogas potential from agricultural waste.

<b>Crop</b>	<b>Residue type</b>	<b>Total crop production (tons) (2017-18)</b>	<b>Residue production ratio</b>	<b>Residue amount (tons)</b>	<b>Average collection (70%)</b>	<b>Moisture content</b>	<b>Residue amount after removing moisture (tons)</b>	<b>Biogas potential [m<sup>3</sup>/ (tons of dry matter)]</b>	<b>Overall biogas potential (m<sup>3</sup>)</b>
Maize	straw	102	1.5	153	107.1	15	91.035	800	72828
Wheat	straw	569328	1.5	853992	597794.4	30	418456.08	800	334764864
Sugarcane	Bagasse	168191350	0.33	55503145.5	38852201.85	80	7770440.37	750	5827830278
<b>Total</b>		168760780							6162667970