Arth Ganga Project: District Hapur

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EXECUTIVE SUMMARY

Hapur is a religious and spiritual city located in the state of Uttar Pradesh. The city is situated on the banks of the river Ganga.

The total geographical area of the district is 660 km^2. The primary sector showed an annual growth rate of 18.57% from 2011-12 to 2018-19 with its share increasing marginally from 25.25% to 26.51%. The share of the secondary sector increased from 24.84% in 2011-12 to 31.24% in 2018-19 with a significant average annual growth rate of 15.51%. The tertiary sector holds a 42.15% share in the district economy with growth with a significant average annual growth rate of 8.42%, but its share decreased from 49.92% to 42.25% Overall, the district economy grew with an average annual growth rate of 11.73%.

In 2017-18, the net sown area and the pure irrigated area represents 87508 ha and 87508 ha. The cropping intensity of the district is 164.85%. The total irrigated area is 87508 ha. Major crop types are wheat, rice, maize, barley, pulses like the variety of black pulse, pigeon pea, pea, lahi mustard, etc. along with sugarcane, potato, groundnut, etc. The total food grains along with pulses account for the production of 241063 MT. The livestock consists of cattle (indigenous and crossbred), buffalos (indigenous and crossbred), pigs (indigenous and crossbred), sheep; along with poultry.

Agriculture with the horticulture sector grew at a significant average annual growth rate of 30.47% from 2011-12 to 2018-19 although its share decreased during this period. The share of cultivable wasteland and barren and uncultivable land decreased from 0.78% in 2010-11 to 0.75% in 2017-18, and 2.27% in 2010-11 to 1.30% in 2017-18 respectively. The net sown increased from 73.69% in 2010-11 to 76.58% in 2017-18. The area for non-agricultural use increased steadily over the period from 13.02% to 16.76%. The district's percentage of the net and gross irrigated areas have increased over the years with an average of 99.99% and 99.72%, respectively. In 2017-18, the nitrogen share increased to 75.09%, while the phosphorus share decreased to 21.08%, and the potassium share increased to 3.82%. The use of nitrogen is more than the recommended ratio, while the Phosphorous and potassium ratio is less than the recommended ratio. The overall use of chemical fertilizers has decreased from 297.22 kg/ ha GCA in 2010-11 to 294.37 kg/ ha GCA in 2017-18.

The share of livestock increased from 42.72% to 44.86% (from 2011-12 to 2018-19) with a remarkable average annual growth rate of 18.24%. The fishery & aquaculture subsector share is very minimal, around

0.27% in 2018-19, but it grew with a significant average annual growth rate of 15.46% from 2011-12 to 2018-19. Mines and quarrying recorded an average annual growth rate of 11.63%.

The total forest cover of the district is 846 km^2. There is no major forest cover in the district. Out of total forest cover, the maximum area is covered by Open Forest (60%) followed by Moderately dense forest (25%). The share of Forest area in the total reported area has decreased from 2.52% in 2010-11 to 0.74% in 2017-18. The share of area under trees and gardens decreased from 0.20% in 2010-11 to 0.07% in 2017-18. The share of forestry and logging was around 4.08% in 2018-19 with a significant average annual growth rate of 35.45%.

Hapur is known for its spiritual significance and hosts fair and festivals. The district is not connected well through roads or airways but the railway network is developed better. In the year 2019, the district received a total of 1732335 tourists which has been increasing since 2016 but decreased drastically in 2020 due to COVID-19. There are a variety of places to visit in the district such as GARH (pilgrimage site), Pilukhwa, Puth Pushpavati, Mukimpu, Garhmukteshwar, Brijghat, etc.

Electricity consumption in agriculture has increased significantly from 473.22 KWH in 2016-17 to 809.03 KWH in 2019-20, a net increase of approximately 70.96%. The percentage share of the agriculture sector in the total electricity is around 25.81%. 77.37 % of rural households in the state, out of which 76.23% are unelectrified. In the district of Hapur 12 Solar high mast lighting systems have in installed in the year 2018-2019. Also solar rooftop system of 75 kW at animal husbandry (government building) and a 75 kW at A I Production Centre, Hapur. There are only 28 wetlands in the district. The district's biodiversity data includes various crop production, livestock population, bird species, and forest cover with 355 bird species and 28 threatened/rare species of bird in the district. Biogas potential from animal waste and agricultural waste was calculated approximately as one crore m^3/year and twenty-one crores m^3/year. M/s Mittal enterprises installed biogas plant unit for BioCNG bottling or power generation. No hydropower present or plans exist.

The implementation of various schemes, promoting local participation, taking measures for utilization of timber products and cultivating medicinal plants, increasing irrigation, improving storage and transportation, creating awareness, horticulture, agroforestry, organic farming, etc. can aid the overall development of the district.

The district should practice Agroforestry, afforestation, using cultivable wasteland, reducing exploitation of different resources and forest products, etc for sustainable development. Various measures such as eco-tourism should be taken to improve tourism along with introducing plans like Travel Uttar Pradesh, fairs, festivities, etc., and encouraging sustainable tourism along with stressing hygiene, safety, transportation, and maintenance ance of buildings, etc. Enhance the use of renewable energy especially by creating awareness. Use of high-yielding seeds, micro-irrigation, constructing and maintaining harvesting structures, adopting 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, etc. needs encouragement as they have high economic potential. The district can adopt or promote the following activities like adopting scientific cultivation practices, vermicompost, bio-fertilizers, and FYM, sustainable agriculture, SRI technology for paddy cultivation, resources conservation technologies like mulching, zero tillage, proper management of fertilizer and pesticides, micro-enterprise development, processing units, storage, and export facilities, creating Poly houses and shed net houses, corporative farming model, and monitoring and inspection of all sectors.

1. DISTRICT OVERVIEW

1.1 INTRODUCTION

Hapur district is a recently formed district in the Indian state of Uttar Pradesh with a population of 1,338,211 at the 2011 Census. Hapur is located at 28.72°N 77.78°E. It has an average elevation of 213 meters (699 feet) (higher than its neighbors). This district on the Ganges river is 60 kilometres (37 mi) from New Delhi. The new district was created from the tehsils of Hapur, Garhmukteshwar and Dhaulana (which were previously part of Ghaziabad district) as one of three new districts of Uttar Pradesh on 28 September 2011. Hapur has a humid subtropical climate that is influenced by monsoon. The place experiences very hot summers and the winters are cold and chilly. The average rainfall is 80 cm to 100 cm per year received during monsoon, which is ideal for growing crops. Hapur does not receive snow during winters. Located at the doab makes the land of Hapur pretty much fertile which makes agricultural usage of land as a modest use. The land usage pattern in Hapur resembles an agrarian state like Punjab and Haryana.

Administratively, the district has 3 tehsils, 4 blocks, 3 Nagar Palika Parishad, 1 Nagar Panchayat, 272 gram panchayat, 353 revenue villages and 3 towns. In Hapur district out of total population, 1338310 were engaged in work activities. The district is primarily an agrarian economy and there is huge absorption of workers in this. On the other hand, there are some industries which are at the verge of closing down but the micro or home-based industries are running smoothly. The district population as the 2011 census was 1.3 million, which was split into 30% urban, 70% rural.

Hapur is a holy place and has a considerable religious importance in the Hindu religion. Garhmukteshwar is situated at the banks of River Ganges and is famous for Ganga Fair that is organized every year on the full-moon day in the month of kartika. People come to take a dip in the holy Ganga. Another fair is held in the month of Jyaistha on the occasion of Dussehra and attracts lakhs of people every year. Shiv Bari Mandir is an ancient temple which was built around 700 years ago. Panchsheel Nagar consists of Hapur,Garhmukteshwar and Dhaulana tehsils.

This beautiful temple is located at 'sabli' village and is dedicated to Lord Shiva. It is believed that the 'Shivling' in this temple rises a little upwards every year. People also believe that if a person visits this temple with a good and true intention, Lord Shiva fulfills all their wishes and dreams. It is around 8 km from Hapur city center (Tehsil Chopla). Dudheshwar Nath Temple was built around 200 years ago. The temple is dedicated to Dudheshwar Nath and it attracts thousands of devotees on Janmashtmi. There is a story behind this temple which states that a Brahmana happened to cross the town and saw a cow digging a hole in the ground and she let her milk flow in that hole. People got impressed by this and built a temple here.

Figure 1 Map of the district

1.2 DEMOGRAPHIC PROFILE OF HAPUR

1. Economy and Livelihoods

- Geographical Area: 1116 Sq. Km.
- Administrative Divisions:[1]

  District Headquarters: Hapur

  No of Municipalities: 4

  No of Tehsil: 3

  No of Blocks: 4

  No. Of Villages: 352

  No. of Gram Panchayat: 273

- Demographic and socio-economic indicators:

  Population: 13,38,000 (Census 2011)

- Occupation/ other Livelihood source: Stainless Steel Pipes and Tubes
- Major Rivers: Ganga
- Forest Area: 846 ha. (MoAFW)

[1] https://hapur.nic.in/

1.3 ECONOMIC PROFILE OF HAPUR

The District Economy

The primary sector has a significant impact on the district economy. It grew with an annual growth rate of 18.57% from 2011-12 to 2018-19. Its share increased marginally from 25.25% in 2011-12 to 26.51% in 2018-19. The share of the secondary sector increased from 24.84% in 2011-12 to 31.24% in 2018-19. It grew with a significant average annual growth rate of 15.51%. The tertiary sector occupied, on average, 42.15% share in the district economy. Although the sector grew with a significant average annual growth rate of 8.42%, its share decreased from 49.92% in 2011-12 to 42.25% in 2018-19, as the growth rates in other sectors are relatively higher. Overall, the district economy grew with an average annual growth rate of 11.73%. The growth in the tertiary sector is less than the other two sectors. Steps should be taken to increase the productivity of the tertiary sector. It will improve the growth rate of the overall district. The primary and secondary sectors have performed well during the study period.

Table 1: Trends in Gross District Domestic product in Hapur 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	1189.36	1169.98	2351.45	4710.79	-	-	-	-
	(25.25)	(24.84))	(49.92)	(100)				
2012-13	2660.80	1168.83	2766.22	6595.84	123.72	-0.10	17.64	40.02
	(40.34)	(17.72)	(41.94)	(100)				
2013-14	2995.56	1778.39	3062.95	7836.89	12.58	52.15	10.73	18.82
	(38.22)	(22.69)	(39.08)	(100)				
2014-15	3542.22	1822.73	3607.89	8972.85	18.25	2.49	17.79	14.49
	(39.48)	(20.31)	(40.21)	(100)				
2015-16	3663.36	2310.48	3990.18	9964.01	3.42	26.76	10.60	11.05
	(36.77)	(23.19)	(40.05)	(100)				
2016-17	2358.81	2486.28	3588.74	8433.83	-35.61	7.61	-10.06	-15.36
	(27.97)	(29.48)	(42.55)	(100)				
2017-18	2558.26	2884.65	3813.96	9256.87	8.46	16.02	6.28	9.76
	(27.64)	(31.16)	(41.20)	(100)				
2018-19	2536.37	2988.94	4042.18	9567.49	-0.86	3.62	5.98	3.36
	(26.51)	(31.24)	(42.25)	(100)				
Average Growth Rate					18.57	15.51	8.42	11.73

Source: UPDES
Note: Figures in Parentheses are percentage share in the total GDDP

We further break down the primary sector GDP to find which subsector is lagging and which is driving the primary sector growth. Table 2 shows that agriculture with the horticulture sector grew at a significant average annual growth rate of 30.47% from 2011-12 to 2018-19. However, its share decreased

slightly from 51.75% in 2011-12 to 50.79% in 2018-19. On the other hand, the share of the livestock subsector increased from 42.72% to 44.86% in the same period as it grew, with a remarkable average annual growth rate of 18.24%. It shows the importance of livestock in Hapur District and the increased dependency of citizens on livestock products. The share of forestry and logging in the total agriculture and allied sector is small, around 4.08% in 2018-19, but it grew with a significant average annual growth rate of 35.45%. The fishery & aquaculture subsector share is very minimal, around 0.27% in 2018-19, but it grew with a significant average annual growth rate of 15.46% from 2011-12 to 2018-19. Mines and quarrying also recorded a remarkable average annual growth rate of 11.63%. This high growth in this subsector can have serious environmental issues like deforestation, soil erosion, etc., with long-term effects on the health of local citizens. Overall, the Primary sector performed well during the study period as most of the subsectors have done well. More work can be done on improving the livestock sub-sector as its growth is less than the growth in other sub-sectors, and it has a significant impact on the primary sector.

Table 2: Gross District Domestic Product Trends from Agriculture and allied activities in Hapur 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	594.62	490.90	55.84	7.76	1149.13	40.24	1189.36
	(51.75)	(42.72)	(4.86)	(0.68)	(100)		
	-	-	-	-	-	-	-
2012-13	2047.77	505.69	74.18	8.14	2635.77	25.03	2660.80
	(77.69)	(19.19)	(2.81)	(0.31)	(100)		
	[244.38]	[3.01]	[32.84]	[4.80]	[129.37]	[-37.79]	[123.72]
2013-14	2255.27	589.68	123.11	8.39	2976.46	19.10	2995.56
	(75.77)	(19.81)	(4.14)	(0.28)	(100)		
	[10.13]	[16.61]	[65.97]	[3.11]	[12.93]	[-23.68]	[12.58]
2014-15	2150.03	1287.04	70.58	8.97	3516.62	25.61	3542.22
	(61.14)	(36.60)	(2.01)	(0.26)	(100)		
	[-4.67]	[118.26]	[-42.67]	[6.89]	[18.15]	[34.06]	[18.25]
2015-16	2070.19	1315.19	222.37	9.16	3616.91	46.45	3663.36
	(57.24)	(36.36)	(6.15)	(0.25)	(100)		
	[-3.71]	[2.19]	[215.05]	[2.09]	[2.85]	[81.37]	[3.42]
2016-17	1124.87	1040.13	124.85	11.20	2301.06	57.75	2358.81
	(48.88)	(45.20)	(5.43)	(0.49)	(100)		
	[-45.66]	[-20.91]	[-43.85]	[22.38]	[-36.38]	[24.35]	[-35.61]

2017-18	1241.89	998.16	216.84	2.82	2459.70	98.56	2558.26
	(50.49)	(40.58)	(8.82)	(0.11)	(100)		
	[10.40]	[-4.04]	[73.68]	[-74.87]	[6.89]	[70.66]	[8.46]
2018-19	1271.93	1123.38	102.23	6.87	2504.39	31.98	2536.37
	(50.79)	(44.86)	(4.08)	(0.27)	(100)		
	[2.42]	[12.55]	[-52.86]	[143.86]	[1.82]	[-67.56]	[-0.86]
Average Growth Rate	30.47	18.24	35.45	15.46	19.38	11.63	18.57
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 60.40% in 2018-19. The share has increased over the years as the average annual growth in this sector is 43.48%. The share of the electricity, gas, and water supplies subsector has decreased from 3.11% in 2011-12 to 1.85% in 2018-19. However, this subsector grew with a significant average annual growth rate of 8.37%. The share of the construction sub-sector decreased from 75.23% to 37.75% in the same period, and the average annual growth rate is low (3.72%). It indicates that the secondary sector in Hapur is heavily dependent on the Manufacturing sub-sector.

Within the tertiary sector, the Real estate subsector made up the highest share (43.09%) in 2018-19, followed by Trade and Hotel subsector (26.51%), transport, storage, and communication subsector (11.09%), and financial services subsector (7.58%). Average annual growth is observed highest in Trade & hotel (21.22%), Public Administration (15.50%), followed by real estate (8.47%), financial services subsector (7.69%), and lastly lowest in transport, storage and communication (6.09%). All the subsectors in the tertiary sector have performed well during the study period. More work needs to be done to improve construction, transport, storage, and communication subsectors. Trade & hotel, real estate, and financial services are the major contributors to the Tertiary sector's growth.

Table 3: Trends in percentage share of non-agriculture sub-sectors in DGDP in Hapur at Constant Prices (base 2011-12) in Rs Crore											
Year	Manufacturing	Electricity, Gas, Water Supply	Construction	SECONDARY SECTOR	Transport, Storage & Communication	Trade and Hotel & Restaurant	Financial Services	Real Estate and Professional Services	Public Administration	Other Services	TERTIARY SECTOR
2011-12	21.66	3.11	75.23	100	17.20	14.74	7.96	41.97	8.81	9.31	100
2012-13	23.78	2.83	73.39	100	18.95	23.19	7.23	38.75	3.27	8.62	100
2013-14	48.39	2.14	49.47	100	8.87	28.90	7.23	37.12	9.49	8.40	100
2014-15	47.70	2.14	50.15	100	11.19	30.72	6.60	34.30	9.37	7.83	100
2015-16	54.72	2.76	42.53	100	11.65	30.45	6.86	34.50	8.76	7.77	100
2016-17	59.16	2.49	38.35	100	13.81	26.40	7.82	40.97	1.62	9.38	100
2017-18	61.42	1.88	36.70	100	13.40	25.92	6.63	42.68	1.51	9.86	100
2018-19	60.40	1.85	37.75	100	11.09	26.51	7.58	43.09	1.53	10.20	100
Average Growth Rate	43.48	8.37	3.72	15.51	6.09	21.22	7.69	8.47	15.50	9.47	8.42

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 3332.14 sq. km². Forest area represents 0.04% of the total reported area. The share of cultivable wasteland decreased from 1.06% in 2009-10 to 1.0% in 2017-18, which is a good development indicator. The share of Barren and uncultivable land remained constant (0.89%) over the years. The share of area under trees and gardens increased from 1.02% in 2009-10 to 1.34% in 2017-18. The current and other fallow land has also decreased over the years, which is good for the district economy. The net sown area (NSA) has increased over the years, from 76.32% in 2009-10 to 77.99% in 2017-18. The area for non-agricultural use increased slightly over the period from 14.74% to 15.34% (Table 4). Overall, the land use pattern shows that the fallow and uncultivable land areas decreased while the NSA increased over the years.

Table 4: Trends in Land-use Pattern in Ghazipur (as % of the total reported area)										
Year	Total Reported Area (ha)	Area under forest	Cultivable wasteland	Current Fallow	Other Fallow	Barren and uncultivable land	Land other than agriculture	Pastureland	Area under trees and gardens	Net Sown Area
1	2	3	4	5	6	7	8	9	10	11
2009-10	333214	0.04	1.06	4.72	0.96	0.89	14.74	0.24	1.02	76.32
2010-11	333214	0.04	1.03	4.90	0.94	0.84	14.87	0.24	1.02	76.13
2011-12	333214	0.04	0.98	4.96	0.96	0.69	14.90	0.24	1.04	76.18
2012-13	333214	0.04	1.02	4.73	0.93	0.83	14.98	0.24	1.00	76.23
2013-14	333214	0.04	0.94	4.57	1.09	0.90	15.01	0.24	0.97	76.23
2014-15	333214	0.04	0.93	4.08	1.08	0.90	15.02	0.19	1.02	76.74
2015-16	333214	0.04	0.93	2.91	0.85	0.89	15.23	0.19	1.01	77.96
2016-17	333214	0.04	0.93	2.91	0.85	0.89	15.23	0.19	1.01	77.96
2017-18	333214	0.03	1.00	2.76	0.75	0.89	15.34	0.19	1.34	77.99
Source: Compiled from http://updes.up.nic.in/spiderreports/intialisePage.action										

2.1.2 Trends in Operational Land Holdings

In Ghazipur district, the total number of operational farms increased from 416 thousand in 2010-11 to 418 thousand in 2015-16, a net increase of 0.48%. While in the state, their numbers increased from 23325 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 95.76% 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 increased in 2015-16.

Table 5: Distribution of Operational Holdings by Size-categories of farms (in %) in Ghazipur							
	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.)
Ghazipur	2010-11	84.53	10.18	4.14	1.09	0.07	416
	2015-16	86.80	8.96	3.34	0.84	0.06	418
							[0.48]
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 2.1.2. Trends in Area, Production, and Yield of Principal Crops

2.1.3.1 The Trend in Cropping Patterns

Rice and Wheat dominate the agriculture of the district. Table 6 shows the area under various crops over the last eight years. In 2017-18, Wheat made up the highest share of GCA (42.83%), followed by Rice (34.71%). These two crops constitute around 77.54% of the GCA. The area shared by the total cereals has decreased from 84.51% in 2010-11 to 82.77% in 2017-18. The main pulses produced are Masoor, Chickpeas, and Arhar, while the rest of the pulses are not significantly produced. The total pulse acreage has decreased from 6.39% in 2010-11 to 3.69% in 2017-18. Thus, the food grains cover a majority (average, 91.32%) of the GCA.

Mustard is the only major oilseeds crop produced, and the total oilseed acreage has increased from 0.13% in 2010-11 to 0.16% in 2017-18. The area under Sugarcane has decreased over the years, but at the same time, the area under Potato has increased. Moreover, it is vital for the welfare of farmers to further 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, except that the net sown area has decreased over the years, from 61.88% in 2010-11 to 58.21% in 2017-18. The average cropping intensity is 161.90.

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	36.56	36.38	36.18	35.98	36.88	37.78	37.78	34.71
Wheat	41.96	42.22	42.28	42.74	45.51	46.62	46.62	42.83
Bajara	3.37	3.56	3.70	3.25	4.33	4.44	4.44	4.08
Other Cereals	2.62	2.57	2.55	2.57	1.23	1.26	1.26	1.16
Total Cereals	84.51	84.73	84.71	84.54	87.94	90.10	90.10	82.77
Masoor	2.55	2.63	2.63	2.71	1.24	1.27	1.27	1.17
Chana	1.02	1.02	1.03	1.04	0.56	0.58	0.58	0.53
Arhar	1.47	1.42	1.44	1.45	1.23	1.26	1.26	1.15
Other Pulses	1.35	2.67	2.68	2.72	2.11	2.16	2.16	1.99
Total Pulses	6.39	6.32	6.35	6.47	3.92	4.01	4.01	3.69
Total Foodgrains	90.90	91.05	91.06	91.01	91.86	94.12	94.12	86.46
Mustard	0.10	0.11	0.11	0.11	0.15	0.16	0.16	0.14
Other Oilseeds	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.02
Total Oilseeds	0.13	0.13	0.14	0.14	0.17	0.18	0.18	0.16
Sugarcane	1.78	1.78	1.77	1.74	1.32	1.35	1.35	1.24
Potato	1.91	1.90	1.92	1.92	2.00	2.05	2.05	1.88
Net Sown Area	61.88	62.04	62.07	62.71	60.86	63.34	63.34	58.21
Gross Sown Area (in 1000 Ha)	409.99	409.18	409.18	405.06	420.18	410.11	410.11	446.44
Cropping Intensity	161.62	161.19	161.10	159.47	164.31	157.87	157.87	171.78

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 per hectare yield of most crops varies from year to year. However, it has increased in the latter years of the study, which can be due to improved irrigation facilities along with the availability of better infrastructure. Wheat and Rice are the major crops, and their per hectare yield (25.84 qtls and 24.80 qtls respectively, in 2017-18) are also high. Per hectare yield of total cereals increased from 23.58 qtls in 2010-11 to 24.77 qtls in 2017-18. Similarly, per hectare yield of total pulses increased from 9.80 qtls in 2010-11 to 20.19 qtls in 2017-18. However, the yield of Pulses is less than that of cereals.

The yield of total oilseeds has increased from 11.13 qtls in 2010-11 to 13.57 qtls in 2016-17. 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 as well, but on average, the yield has increased in the latter years of the study. The per hectare yield of Sugarcane, on average, is only 551.95 qtls/ha. Similarly, the yield of Potato is high, average, 224.04. These two crops have insignificant presence in the district agriculture. In summary, all crop yields show year-over-year fluctuations, with the lowest in 2014-15. 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 Ghazipur District (Qtls)

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	21.02	22.86	23.40	21.53	20.91	21.58	20.46	24.80
Wheat	27.01	28.11	28.73	26.21	17.68	24.10	30.23	25.84
Bajara	14.13	15.44	15.32	8.07	17.29	16.48	5.79	8.50
Total Cereal	23.58	25.01	25.53	23.28	19.00	22.59	25.28	24.77
Masoor	9.08	10.97	11.19	6.00	7.77	9.98	22.19	23.58
Chana	9.57	12.43	11.48	9.22	10.40	16.37	55.73	31.22
Arhar	7.74	9.02	11.44	8.49	11.10	8.43	10.34	13.27
Total Pulses	9.80	11.46	11.25	7.37	9.63	10.73	21.39	20.19
Total Food Grains	22.61	24.07	24.54	22.15	18.60	22.08	25.11	24.58
Mustard	11.92	13.73	12.61	10.04	7.80	4.10	13.82	8.13
Total Oilseeds	11.13	13.11	11.27	9.93	8.00	4.81	13.57	8.81
Sugarcane	296.36	459.24	461.24	485.76	547.20	572.64	774.23	818.94
Potato	207.29	186.27	201.20	191.54	277.34	230.41	238.43	259.81

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 and Wheat, dominate the production. In 2017-18, Rice (384.25 thousand tons) and Wheat (494.15 thousand tons) formed a major part of the total cereal production (915.44 thousand tons). Coming to pulses, Masoor, Chickpeas, and Arhar occupied the highest production. Total productions of Masoor, Chickpeas, and Arhar were 12.31 thousand tons, 7.39 thousand tons, and 6.84 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 80% of the total pulse production.

Mustard production was 0.52 thousand tons, which represented around 81% of the total oilseed production in 2017-18. Sugarcane is another crop whose production was 452.54 thousand tons in 2017-18. Potato production has also been significant over the years (218.50 thousand tons in 2017-18). Looking at the annual production data of various crops, we find that their production has increased during the period, but at the same time fluctuates year to year, partly due to weather changes and partly due to market conditions. Proper insurance arrangements are the need of the hour to get assured income and take more risk and diversify their production.

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

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	315.09	340.25	346.39	313.79	323.95	334.30	317.05	384.25
Wheat	464.67	485.56	496.94	453.77	338.02	460.78	577.94	494.15
Bajara	19.55	22.48	23.20	10.61	31.48	30.00	10.54	15.48
Other Cereals	17.61	18.64	18.50	19.19	8.60	9.69	28.59	21.56
Total Cereals	816.92	866.93	885.04	797.36	702.04	834.77	934.13	915.44
Masoor	9.51	11.83	12.04	6.58	4.06	5.21	11.58	12.31
Chana	4.02	5.20	4.86	3.89	2.46	3.87	13.19	7.39
Arhar	4.66	5.25	6.73	5.00	5.72	4.34	5.33	6.84
Other Pulses	7.50	7.37	5.57	3.84	3.62	4.24	5.12	6.71
Total Pulses	25.68	29.64	29.21	19.31	15.85	17.66	35.22	33.24
Total Foodgrains	842.60	896.58	914.25	816.67	717.90	852.43	969.35	948.68
Mustard	0.51	0.61	0.56	0.46	0.50	0.26	0.89	0.52
Other Oilseeds	0.10	0.10	0.09	0.09	0.08	0.09	0.10	0.12
Total Oilseeds	0.61	0.71	0.65	0.55	0.58	0.35	0.98	0.64
Sugarcane	216.64	334.79	334.72	341.83	302.38	316.44	427.84	452.54
Potato	162.56	144.90	157.88	148.60	233.24	193.78	200.52	218.50

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

2.1.3.4 Variability in the Area, Production, and Yield

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. Among different crops, the lowest variability is observed in Rice (2.52%), followed by Potato (3.99%) and Wheat (5.43%), and the highest in Masoor (37.03%). The variability in the area under total pulses (24.14%) is more than the variability in the area under total cereals (3.60%). Since Rice and Wheat dominate the production, the variability in the area under total food grains is also relatively low (2.06%).

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

	Area (1000 Ha)			Production (1000 Ha)			Yield (Qtl./Ha)		
Crop/Year	**Average**	**SD**	**COV**	**Average**	**SD**	**COV**	**Average**	**SD**	**COV**
Rice	151.54	3.82	2.52	334.39	23.52	7.03	22.07	1.48	6.72
Wheat	181.96	9.88	5.43	471.48	66.53	14.11	25.99	3.85	14.81
Bajara	16.19	2.23	13.76	20.42	7.97	39.05	12.63	4.45	35.23
Total Cereal	357.54	12.88	3.60	844.08	74.24	8.80	23.63	2.14	9.08
Masoor	7.98	2.96	37.03	9.14	3.37	36.89	12.60	6.58	52.26
Chana	3.29	0.98	29.96	5.61	3.37	60.16	19.55	16.31	83.40
Arhar	5.53	0.40	7.33	5.48	0.91	16.53	9.98	1.89	18.91
Total Pulses	21.26	5.13	24.14	25.73	7.35	28.55	12.73	5.15	40.44
Total Food Grains	378.81	7.79	2.06	869.81	80.86	9.30	22.97	2.12	9.24
Mustard	0.54	0.11	19.53	0.54	0.17	32.24	10.27	3.41	33.24
Total Oilseeds	0.64	0.09	14.16	0.63	0.18	27.94	10.08	2.87	28.46
Sugarcane	6.37	0.91	14.29	340.90	73.31	21.51	551.95	172.24	31.21
Potato	8.11	0.32	3.99	182.50	33.57	18.40	224.04	33.06	14.76

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

The variability of 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 Chickpeas (60.16%), followed by Bajra (39.05%), Masoor (36.89%), Mustard (32.24%), and Sugarcane (21.51%). Improvement in crop insurance conditions and better market accessibility can lower this variation. Variability is lowest in Rice (7.03%), followed by Wheat (14.11%) and Arhar (16.53%).

In the case of yield, the greatest variability is estimated in chickpeas (83.40%), Masoor (52.26%), and Bajra (35.23%). Yield variabilities in total cereals (9.08%) and total food grains (9.24%) are lower compared to that in total pulses (40.44%). Several factors such as climate change, market prices, rainfall patterns, etc., influence the variability in agricultural production.

2.1.4 Trends in Value of production 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 and total foodgrains, on average, have a relatively larger share in GCA than their share in VOP, while total oilseeds, Potato, and Sugarcane have, on average, a greater share in VOP than GCA. Ghazipur is mainly a food grain production district. Therefore, food grains account for around 91.32% of the gross area of the crops. Similarly, total foodgrains account for nearly 83.26% of the total value of the agricultural product. Three crops - Wheat, Rice, and Potato together accounted for, on average, around 82.33% of GCA and 83.99% of the total VOP. Overall, the total agricultural GCA has increased in the latter years of the study (average, 415.03 thousand hectares). The total value of the product has also increased significantly, that is, 1407.84 Cr. Rs. in 2010-11 to 2623.51 Cr. Rs in 2017-18.

Table 10: Share of Principal crops Total GCA and Total Value of agriculture products in Ghazipur

Crop	% Share in	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Wheat	GCA	41.96	42.22	42.28	42.74	45.51	46.62	46.62	42.83
	VOP	36.64	36.90	36.93	36.11	28.83	38.72	41.68	35.79
Paddy	GCA	36.56	36.38	36.18	35.98	36.88	37.78	37.78	34.71
	VOP	35.14	36.65	36.52	37.96	37.13	37.46	30.25	36.62
Total Cereals	GCA	84.51	84.73	84.71	84.54	87.94	90.10	90.10	82.77
	VOP	74.56	76.37	76.17	76.24	69.06	79.01	74.13	74.88
Total Pulses	GCA	6.39	6.32	6.35	6.47	3.92	4.01	4.01	3.69
	VOP	9.33	9.10	8.94	6.79	6.25	6.33	9.67	9.26
Total Food Grains	GCA	90.90	91.05	91.06	91.01	91.86	94.12	94.12	86.46
	VOP	83.89	85.47	85.11	83.03	75.31	85.34	83.80	84.15
Total Oil seeds	GCA	0.13	0.13	0.14	0.14	0.17	0.18	0.18	0.16
	VOP	0.17	0.26	0.20	0.21	0.23	0.14	0.40	0.14
Potato	GCA	1.91	1.90	1.92	1.92	2.00	2.05	2.05	1.88
	VOP	13.86	9.51	9.82	11.29	19.43	8.88	10.66	9.16
Sugarcane	GCA	1.78	1.78	1.77	1.74	1.32	1.35	1.35	1.24
	VOP	2.08	4.76	4.86	5.47	5.04	5.64	5.13	6.55
Paddy + wheat + potato	GCA	80.43	80.50	80.38	80.64	84.38	86.46	86.46	79.42
	VOP	85.63	83.06	83.27	85.35	85.38	85.06	82.59	81.56
Total Agriculture	GCA (1000 Ha)	409.99	409.18	409.18	405.06	420.18	410.11	410.11	446.44
	VOP (in Cr Rs)	1407.84	1828.98	1928.41	1843.47	1800.99	1963.49	2576.25	2623.51

Per Worker VOP (Rs.1000 at current prices) in **Ghazipur**	-	20.77	24.86	23.30	25.79	28.72	34.93	40.01
Per Worker VOP (Rs.1000 at current prices) in **UP**	-	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 Ghazipur district increased from Rs. 20.77 thousand in 2011-12 to Rs.40.01 thousand in 2017-18, a net increase of 92.67% 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 per worker value of agricultural output is higher in the state than in the district. 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 the district's output to the state average has increased from 0.5107 in 2011-12 to 0.5741 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 65.85% of the total fertilizers used, while the proportions of phosphorus and potassium were 27.86% and 6.29%, respectively. In 2017-18, however, the nitrogen share increased to 69.72%, while the phosphorus share decreased to 26.67%, and the potassium share decreased to 3.61%. The use of nitrogen is more than the recommended ratio, while the Phosphorous and potassium ratio is less than the recommended ratio. The table also shows that fertilizer consumption varies from year to year, which can be due to several factors, including rainfall patterns, cultivation patterns, etc.

The overall use of chemical fertilizers has decreased in the district from 169.49 kg/ ha GSA in 2010-11 to 152.90 kg/ ha GSA in 2017-18, which is a good sign. However, still, the authorities need to take steps to reduce their consumption further, as the chemicalization of agriculture degrades soils and water resources, requiring the use of organic fertilizers and biofertilizers.

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

Fertilizer/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Nitrogen	111.61	96.96	111.07	105.51	108.29	103.05	101.18	106.60
Phosphorous	47.22	34.49	41.88	26.97	31.22	38.61	39.57	40.78
Potassium	10.66	5.12	4.14	3.70	6.38	7.07	8.34	5.52
Total	169.49	136.57	157.08	136.18	145.89	148.73	149.10	152.90
Gross Sown Area (Ha)	409990	409179	409181	405059	420179	410106	410106	446438
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 the net and gross cropped area, respectively, are described in Table 12. The length of the canal has remained constant (1490 km) over the years. The number of wells sets also remained constant (78) over the years. Government tube wells increased from 768 in 2010-11 to 806 in 2018-19. Shallow and medium tube wells increased by 3.37%, 297.30%, 0.0% respectively, in 2018-19 compared to 2010-11, while the deep tube wells have remained constant (689) over the years. The district's percentage of the net and gross irrigated areas have increased over the years with an average of 87.53% and 87.17%, respectively.

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

Name/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Length of Canal (KM)	1490	1490	1490	1490	1490	1490	1490	1490	1490
No. of Govt. Tube wells	768	768	768	768	788	812	806	806	806
No of Wells	78	78	78	78	78	78	78	78	78
No. of Ground-level Pump set	2	2	2	172	172	172	172	172	172
Shallow Tube well	73625	73625	74583	75291	75321	75321	75481	75682	76107
Medium Tube well	37	91	105	125	125	125	134	147	147
Deep Tube well	689	689	689	689	689	689	689	689	689
% Of NIA	86.27	85.51	85.99	86.44	91.32	88.39	88.39	87.94	-
% Of GIA	85.58	85.62	85.40	87.86	89.23	87.76	87.76	88.14	-
Source: http://updes.up.nic.in/spiderreports/intialisePage.action									

2.1.6.2 Source-wise area under Irrigation

Canals and groundwater (GW) are the main irrigation sources in the district. The canal's share in the NIA (average, 23.75%) has decreased over the years, and the share of wells and tube wells in NIA (average, 76.25%) has increased over the years. It shows the increased dependency of the district on the groundwater for irrigation purposes.

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

Source/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Canal (surface Irri.)	24.83	29.09	23.92	23.99	27.69	20.16	20.16	20.16
Wells And Tube-wells (GW Irri.)	75.17	70.91	76.08	76.01	72.31	79.83	79.83	79.83
NIA (1000 ha)	218.85	217.07	218.40	219.57	233.53	229.61	229.61	229.61
Source: http://updes.up.nic.in/spiderreports/intialisePage.action								

2.1.6.3 Crop-wise Irrigated Area

Table 14 shows that a majority of cultivated areas under Rice (average, 99.21%), Wheat (average, 99.91%), Potato (average, 99.90%), and Sugarcane (average, 100%) is irrigated. Percentages of the irrigated area under pulses (average, 21.87%) and oilseeds (average, 51.60%) are relatively less.

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

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	98.40	98.47	98.49	98.84	99.87	99.87	99.87	99.87
Wheat	99.83	99.82	99.83	99.82	99.99	99.99	99.99	99.99
Total Cereal	93.25	93.11	93.00	93.65	94.13	94.13	94.13	94.13
Total Pulses	16.09	16.25	15.81	16.20	27.66	27.66	27.66	27.66
Total Foodgrains	87.82	87.78	87.62	88.15	91.29	91.29	91.29	91.29
Total Oilseeds	43.17	44.75	44.79	45.60	58.62	58.62	58.62	58.62
Sugarcane	100	100	100	100	100	100	100	100
Potato	100	99.73	99.73	99.73	100	100	100	100
Source: http://updes.up.nic.in/spiderreports/intialisePage.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 161.60 KWH in 2014-15 to 282.99 KWH in 2019-20, a net increase of approximately 75.11%. It is a cause of concern, resulting in an increased burden on non-renewable resources and creating waste disposal problems. The percentage share of the agriculture sector (average, 45.20%) 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 energy.

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 (KWH)	161.6	164.24	240.92	280.88	284.98	282.99
% Of electricity consumed in Agriculture sector to total consumption	50.75	54.22	47.15	41.06	39.94	38.11
Source: District-wise Development Indicators file.						

2.1.8 Status of Agriculture Market

Table 16 shows the marketing infrastructure in the district. It has four main markets and seven sub-markets. The number of regulated mandis per lakh hectare of Net area sown has decreased from 4.33 in 2013-14 to 1.54 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 Ghazipur

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.)	7	7	7	7	7	7	7
Total Markets (No.)	11	11	11	11	11	11	11
No. of Regulated mandis per lakh Ha. of net area sown	4.33	3.3	-	1.56	1.55	1.54	-

Source: District-wise Development Indicators file.

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 years 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. However, 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 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 to 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 one hundred three groups in six development blocks. The highest number of groups are in Devkali (27), followed by Karanda (20), Revatipur (19), Ghazipur (18), Zamania (11), and Sadat (8). 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.

Table 17: Status of Organic Farming PGS Groups under PKVY and Namami Gange Schemes in Ghazipur (as on June 30, 2021)

S. No.	Block	Scheme	No. of groups	No. of farmers in groups			
				Total	Average	Median	SD
1	Devkali	PKVY	27	865	32.03	31	6.02
2	Ghazipur	PKVY	18	445	24.72	23.5	4.77
3	Karanda	PKVY	20	553	27.65	25	6.63
4	Revatipur	PKVY	19	465	24.47	24	3.94
5	Sadat	PKVY	8	172	21.5	21	2.2
6	Zamania	PKVY	11	277	25.18	27	3.97
7	District Total	PKVY	103	2777	26.96	26	6.12
		Total	103	2777	26.96	26	6.12

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 the organic farming system is likely to positively impact water quality and soil health along with farming sustainability. However, being a knowledge-intensive farming system, 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 be evolved 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 problem of marketing 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 in organic farming.
5. 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 and exotic male cattle has decreased considerably from 199744 in 1997 to 7402 in 2019 and from 9621 in 1997 to 3230 in 2019, respectively. However, on the other hand, the number of indigenous and exotic female cattle has increased considerably from 179900 in 1997 to 267132 in 2019 and from 19504 in 1997 to 108508 in 2019. Thus, the total number of cattle decreased only slightly from 408769 in 1997 to 386272 in 2019, thus, a net decrease of 5.5%. Similar inferences can be drawn from the buffalo data as the number of male buffalo decreased, but the number of female buffalo increased. Thus, a net increase of 85.90% in 2019 compared to that in 1997 is observed in the total population of buffalo. A significant reduction in the indigenous sheep population is observed (74.66%) in 2019 compared to that in 1997. During the same period, the population of exotic sheep increased, thus, indicating a net decrease in the total sheep population by 73.18%. The total population of goats decreased from 241161 in 1997 to 151400 in 2019, a net decrease of 37.22%. The total pig population decreased considerably from 26649 in 1997 to 2732 in 2019.

It is significant to note that the number of female cattle and buffaloes has substantially increased over the period, indicating the growth of livestock products, including milk. The substantial decline in the number of male cattle and 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 32.47% share in the agriculture and allied activities sector and grew at an average annual growth rate of 1.19% from 2011-12 to 2018-19.

Table 18: Trends in Livestock population (in numbers) in Ghazipur						
	Category	**1997**	**2003**	**2007**	**2012**	**2019**
Indigenous Cattle	Total Male	199744	143022	149431	92020	7402
	Total Female	179900	177364	191067	233747	267132
	Total	379644	320386	340498	325767	274534
Exotic Cattle	Total Male	9621	8891	9339	13750	3230
	Total Female	19504	23587	21735	42374	108508
	Total	29125	32478	31074	56124	111738
Total Cattle		408769	352864	371572	381891	386272
Buffalo	Total Male	63302	86310	103741	114058	10193
	Total Female	208862	259572	270965	364718	495772
	Total	272164	345882	374706	478776	505965
Sheep	Total Indigenous Sheep	70279	44539	41106	54077	17808
	Total Exotic Sheep	1202	1989	1539	2547	1363
	Total Sheep	71481	46528	42645	56624	19171
Goat	Total	241161	250194	278716	307656	151400
Pig	Total Indigenous Pig	20235	13388	10591	8738	2522
	Total Exotic Pig	6414	1844	1452	2989	210
	Total Pig	26649	15232	12043	11727	2732
Total Livestock		1031049	1019450	1084478	1242328	-
Total Poultry		469005	449974	448307	358295	-
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 Ghazipur district has an active network of cattle hospitals and development centres. The number of cattle hospitals has increased from 40 in 2010-11 to 50 in 2018-19. The number of cattle development centres (48) remained constant over the years. The number of man-made reproduction centres (92) also remained constant over the years. There are very few sheep (2) and pig (8) development centres.

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	40	40	40	40	50	50	50	50	50
D- category Cattle Dispensary	4	3	4	4	4	4	4	4	4
Cattle Development Centre	48	48	48	48	48	48	48	48	48
Man-Made Reproduction Centre	92	92	92	92	92	92	92	92	92

Cattle Reproduction Center	1	1	1	1	1	1	1	1	1
Sheep Development Center	2	2	2	2	2	2	2	2	2
Pig Development Centre	8	8	8	8	8	8	8	8	8
Source: http://updes.up.nic.in/spiderreports/intialisePage.action									

2.2 FORESTRY

Baseline Data Analysis/ Quantitative Data Analysis

1. According to Directorate of Economics and Statistics, Department of Agriculture and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India, the forest cover of Hapur is 846 ha. No major forest are found in the district.

2.2.1 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. Less than 1.3% of area is forest. There are 355 bird species and twenty-eight threatened/rare species of bird in the district.

Table 1 Bird species recorded in the district.

Number of species	355
Number of rare/accidental species	28

Table 2 Forest cover in a square kilometer.

Geographical area	Forest	Cultivable area	Non-agricultural use	Cultivable waste land	Current follow	Other follow	Barren and uncultivable land
114.3	1.6	94.9	16.0	0.9	4.6	2.2	1.7

2.3 TOURISM

Baseline data/Quantitative Data
Total number of tourists visiting Ghazipur -(2015-2019)

2016	2017	2018	2019	2020
1466960	1540310	1617550	1732335	45685

2.4 WETLANDS

The district doesn't have a vast number of wetlands. There are around 28 wetlands covering 52.17 Ha of area.

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.

As per the Census 2011, there are 77.37 % of rural households in the state, out of which 76.23% are unelectrified. In Uttar Pradesh state, there are 2.89 crore rural households. Of these, 0.92 crore rural households already exist in distribution company's records and there are around 1.12 crore un-electrified households in the state. Since the launch of Saubhagya Yojana, 74.4 Lakh willing households have been electrified and the state government has declared saturation of all 75 districts, as stated in Sharma et. al. (2021).

According to the revised definition in the Electricity Act - 2003, a village is said to be electrified, if the public places like schools, Panchayat offices, health centers and 10 percent of the total households are connected to the grid i.e., it needs only one out of 10 households to have electricity supply for a village to be considered "electrified". Table 1 is a list of number of electrified households in in the district as on January 2019 (Sharma et. al. 2021). It can be seen that almost all households have been electrified so we can say that efforts are required in providing electricity, moreover its generation. In order to reduce the burden of electricity production, solar energy should be promoted in the district.

Total households	114949
Electrified Households as on 10th Oct,2017	84113
Balance Unelectrified Households as on 10th Oct, 2017	30836
Progress from 10th Oct, 2017 to 31st Jan, 2019	31255
Additional Households progress from 1st Feb 2019 till date	2105

Table 1

According to the progress report by UPNEDA in the district Hapur 12 Solar highmast lightning systems have in installed in the year 2018-2019. Also solar rooftop system of 75 kw at animal husbandry (government building) and a 75 kw at A I Production Centre, Hapur (institution).

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.

Majority of population in the district is mainly dependent on agriculture as their primary source of income. Rice, wheat, sugarcane, maize, .potato and arhar are some of the major crops and enterprises engaged in agriculture.

The net sown area of the district is 8700 ha with the cropping intensity of 164.9%. The gross cropped area of the district is 143600 ha out of which 56500 ha is sown more than once a year. The district has 1600 ha of forest land. A total of 900 ha of cultivable wasteland, 1700 ha of barren and uncultivable land is there in the district.

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	2774
Wheat	4466
Maize	2137
Sugarcane	63500
Potato	25357
Arhar	711

Table 1

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 one crore m^3/year and twenty-one crores m^3/year. This amount of biogas generation can efficiently complete the energy demand of the district.

2.5.4. Hydro Power

No hydropower plant exists, nor the site has been identified in the district. The Ganga is the sole significant river that runs across the district's borders.

3 QUALITATIVE DATA ANALYSIS

3.1 FORESTRY

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).

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.

3.2.1. Biodiversity

Hapur lost 12 ha of tree cover and 3.96kt of CO2e emissions between 2001 and 2021, a 37 percent decline in tree cover since 2000. Hapur lost 12ha of tree cover and 3.96kt of CO2e emissions between 2001 and 2021, a 37 percent decline in tree cover since 2000. Natural forest cover covered 0.1 percent in Hapur in 2000. The main fire season in Hapur usually starts in early April and lasts for around 11 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 recent years, dating back to 2012, this is typical. So far in 2021, 0ha of land in Hapur has been burnt. This amount is typical when compared to other years' totals dating back to 2001. The year with the most fires was 2014, with 610ha. Between the 10th of June 2019 and the 6th of June 2022, there were 318 VIIRS Alerts fire alerts in Hapur.or Girgit.

3.2 ENERGY:

As per the data of the year 2013, Bhadohi district energy consumption is around 936 TJ/year and 3.6 GJ/capita/year. GHG emission of 64,515 Ton CO2 equivalent and 0.245 Ton CO2 equivalent/capita has been evaluated for the district.

3.2.1. Solar

In the district not much work has been done in the solar energy sector. The district also deals with the problem of power cut offs. An article in Saurenergy mentions that the state is embarking upon a significant journey in the direction of power generation based on solar energy. Over the last two decades, there has been a constant 10-15% gap in state's power supply and demand, so much so that UP has purchased power from other states. Lack of power caused industrial development to shift to other states while financial losses to the state incurred through power purchase adversely affected government's budget for public health and education. Solar steam cooking systems installed at Dayal Bagh Institute, Agra and Rama educational society, Hapur.

Another article in the Times of India with the heading Delayed monsoon causes power outages in western Uttar Pradesh, mentions that the the delayed monsoon has caused severe power outages in the western Uttar Pradesh, adding to the woes of people who are reeling under the scorching heat. Not just the Meerut Commissionary but small neighbouring towns like Muzaffarnagar, Shamli, Hapur and Baghpat are facing unscheduled power outages even as temperatures hover over 42 degrees Celsius. Fourteen districts --Meerut, Baghpat, Ghaziabad, Gautambudh Naagar, Bulandshahr, Hapur, Muzaffarnagar, Saharanpur, Shamli, Bijno r, , Moradabad, Sambhal, JP Nagar and Rampur -- fall under PVVNL. The average load of electricity in May was 4,212 MW. The load increased to 5,562 MW in June and since the last week of June, the demand has peaked between 7,500 and 8,000 MV.

3.2.2 Biomass

The district has been quite progressive in the biomass energy sector in the recent times. As a news article in Business Standard mentions that in a boost to its green energy roadmap, the Yogi Adityanath

government has cleared six biofuel investment proposals worth almost Rs 17 billion.These private projects are proposed to be set up in 5 districts, including Sitapur, Hapur, Meerut, Bareilly and Muzaffarnagar.

Another article in Hindustan Times mentions that stubble burning more prevalent in western UP, Hapur, Bulandshahr, Ghaziabad and Baghpat record severe air pollution as AQI crosses 401. The fires are a reflection of the incidents of stubble burning that continue. Farm fires are a major contributor to air pollution in winter and the effect is palpable in the AQI (air quality index) data of the Central Pollution Control Board (CPCB). Four Uttar Pradesh cities, Hapur, Bulandshahr, Ghaziabad and Baghpat, recorded severe air pollution with their air quality index (AQI) crossing 401 during the day.

3.2.3 Biogas:

M/s Mittal enterprises, Hapur, Uttar Pradesh tender awarded by Uttar Pradesh new and renewable energy development agency, government of UP for installing 14000 cum/ day biogas plant unit for BioCNG bottling or power generation. No data is available of list of beneficiaries or biogas plant for the district. According to the HNP's estimations (2009), Hapur generates roughly 84 tons of solid trash each day, with a per capita waste generation rate of 305 grams per day (projected population of 275,000 in 2009).

3.2.4. Hydropower:

The Ganga is the sole significant river that runs across the district's borders. At Kutubpur, it first reaches the Hapur district. The river flows for roughly 88 kilometers along the district's eastern border in a southerly direction. Before running along the Bulandshahr district line, the river passes through Raharwa. The Kali nadi, which runs through the area, is a perennial stream. 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

- **HOW TO REACH HAPUR-**

By Flight There is no airport in Hapur. Indira Gandhi International Airport is the closest airport. By Train Hapur is easily accessible by train from all of the country's main cities. Railway Stations: hapur junction (HPU) By Bus There are no bus lines connecting Hapur to other major cities. Modinagar is the closest bus stop.

Cities Near Hapur -

Places to see in Hapur –

GARH- located on the Hapur-Moradabad Road, is a well-known pilgrimage site in the Hapur district. In mythological and religious contexts, it is known as Khandavavan. Uma had come to take a bath with

Kalaash Mountain. Parshuram established Shivalinga. Shiva has arrived and has wrested control of Vampire Yoni from him.

PILUKHWA

This town, on the Hapur-Moradabad Road, is well-known across the country for its Khadi and other textile industry. Near Pilkhuva, there are 144 grammes of Rajputa, 60 of whom are Tanwaro and 84 of whom are Rajputs, hence the name Satara-Chirasi.

Puth Pushpavati-

During the Mahabharata time, Puth Pushpavati, an abandoned village on the banks of the Ganges, was famous. Ganga would come to wash here. In adjacent Laharai village, it was King Karna's palace. He used to give gold to the Brahmans when he came to visit. There are still remnants of the Marathas' mud fort and temple.

Mukimpur

It is around 4 kilometres from Pilkhuwa and is a patriots' settlement. In 1857, King Gulabsih ruled over the region's painters. They'd constructed a fort here. When he found out about the British, he began a 60-mile assault on the Kue region of the fort.

Garhmukteshwar-

Garhmukteshwar has long been revered as a sacred site. Shivvallambibpur was its old name. This offers the convenience of a railway station as well as access to highways. The name Garhmukteshwar Pada comes from Lord Ganesha's emancipation in the name of Lord Shiva. Other spectacular landmarks include Ganga Mandir, Kanka Kuo, Jama Masjid, Mira Bai Ki Sandi, and others. Garhmukteshwar can be reached by road or train.

Brijghat

On the National Moradabad National Highway No.24, Brijghat is located on the banks of the Ganga, 5 kilometres from Garhmukteshwar, a popular pilgrimage place, and approximately 35 kilometres from the district seat, Harpud. This location has grown into a new pilgrimage destination. On Kartik Purnima, a great historic fair is held at Brijghat on the Ganga Ghat.

Data analysis-

There has been an increase in the number of tourists visiting Hapur every year, however, foreign tourists do not visit according to UP Tourism website and there is need to promote and increase the number of tourists in Hapur.

SWOT Analysis

S.No	Strength	Weakness	Opportunities	Threat
• **1.**	• Geographically located next to Moradabad in Uttar Pradesh. • Religious tourist plans can be clubbed together to propose a spiritual travel plan. • The district is densely fortified with temples like Kara Dham Sheetla temple and the Prabhosa Jain temple. • Archaeologists from Allahabad University, IIT-K excavating Ghositarama monastery	• Poor promotion of existing temples and monasteries. • No maintenance of existing heritage sites in the district.	• Proper maintenance of existing heritage sites to attract more tourists both local and foreign. • By utilising cutting-edge technology to promote tourism. • Creating museums, artistic spaces and collaborative ventures to bring all useful collected heritage and art under one roof.	• Covid 19 can be a big threat with unpredictable arrival. • Lack of good budget by the government can be a big barrier. .

3.4. WELANDS:

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 products are mentioned below:

- The district stats show a good amount of sugarcane, potato, wheat and, maize in the region, which can be turned into products like sugar juice, chips, and bagasse.
- The region is part of the dairy revolution, which leads to increased animal husbandry. Wetlands can support the growth of fodder forth animals in the region.

4 ACTION PLAN DEVELOPMENT

4.1 FORESTRY

Culturable Waste Land includes land available for cultivation, whether taken up or not taken up for cultivation once, but not cultivated during the last five years or more in succession including the current year for some reason or the other. This area is about 440 thousand hectares and can be taken up for plantations by Forest Department. Scrub forest area 74500 ha should also be taken up for plantations. Similarly, Fallow Lands other than Current Fallows include all land which was taken up for cultivation but is temporarily out of cultivation for a period of not less than one year and not more than five years. The total of such area available is 540 thousand hectares. This area can be brought under plantations by the land owners or by forest department by taking recourse under section 8 and 9 of UP Tree Protection Act, 1976.

2. **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.

4.2.1 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.
- Initiate daily door-to-door collection; cover 100 % houses in 5 years.
- Develop an integrated waste processing & disposal facility.
- 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.

4.2 Tourism

- **Travel Uttar Pradesh' plan-** To create Hapur a spiritual heritage attraction including many temples and a ghats. 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 Bareilly . In the Hapur 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. For example, using organic biodegradable stuff is so important for tourists across multiple places in Hapur to keep it presentable for next tourists to join in.

Projections and Monitoring matrix

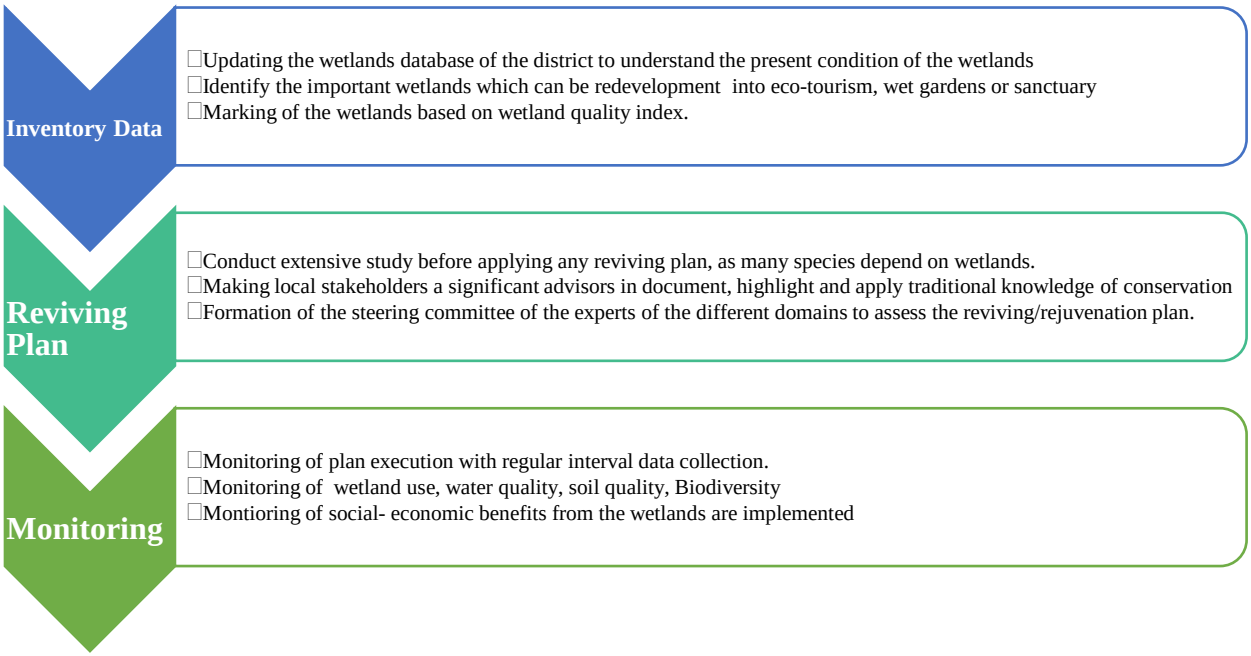
Sector	Intervention	Strategy	Total cost	Expected Outcomes
Tourism	**Research**	• The cause and motive for tourism can be predicted using various data and matrices which available on various government official websites as well as private organizations have done their bit too. It is also feasible to discover the elements affecting tourism in Uttar Pradesh through significant qualitative and quantitative research. • All political pressures and influences must be removed from research to bring as much transparency as one can. • When adding new records, the researchers must ensure that the field data and secondary data are correct and unaltered. This would be specific prizes to the competition's winners. Hundreds of players competed in numerous international competitions, including the Olympics and Para Olympics. The players have returned to India with medals, setting new records. Garhmukteshwar is famous as a religious place since ancient times. Its ancient name was Shivvallambibpur.. It is necessary to enlist the help of unbiased researchers.		As a reference for other processes, a well-researched document. Tourism in Uttar Pradesh is influenced by a number of factors. 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! Research and prior lessons will be used to inform the planning process. For a successful implementation, realistic planning is required.
	Planning	• Research and analysis of various data and reports can be used to generate action plans for intervention. • Developing an active action plan is critical because the results are		

		dependent on how it is prepared and later implemented as well. • Planning must take into account the state's social position as well as the impression that tourists have of the country. • Non-practical forecasts should be avoided at all costs. • 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 Hapur... • 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. • This standardization should be incorporated under Brand Manufacturing to increase tourism activity throughout the state. • Organizing various spiritual and religious events which hold meaning and significance. • Complete use of allocated budget.		
	Implementations	• To attract more tourists, various schemes such as tourist packages, sustainable collaborations, and so on can be devised at ground level. • Mahotsavs and fairs will be held to boost the local economy and attract visitors.		To increase total number of tourists and increase tourism earnings from all possible tangents and at every touch point. To boost the state's image while ensuring

		• Establishing a link between tourist and local culture and cuisine. • Advertorial promotion that has an over-all extensive approach to capture the right audience. • A well-known figure serves as brand ambassador. • A significant amount of branding and marketing which can be clubbed with other cities like Bareilly. • The development of tourist attractions and maintenance of temples in and around Hapur. • Information about travel packages should be available on government websites and various other touch points like social media channels. • Conducting thorough market research in order to build strong strategies that will work on ground. • 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.		that no other social issue has an 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.
	Impact Assessment of results	• Figuring out where all touchpoints. • The understand the cause of failure and work upon it. • Reasoning to comprehend all the aspects. • Planning for future considering all over aspects of that can be covered.		• To learn the lesson and establish the root cause of success and failure, which will be applied in the future with modifications.

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, rejuvenate the wetlands existing and extinct.



4.4 ENERGY

4.4.1. Solar

The district deals with the problem of power cut offs which can be solved if solar energy is promoted in the district. The people of the district should be made aware of the solar energy through various awareness programs. Since the district is agrarian most of the people in the district depend on agriculture and the farmers should be made aware of the solar energy and the schemes run by government related to solar energy. The administration should pay attention on making people aware about the schemes that are being run by the government to increase the solar energy penetration in the district among the households. Kusum Yojana should be popularized among the farmers. The Kusum Yojana should be implemented as on the lines similar to the Maharashtra. In Maharashtra component A of Kusum Yojana has been successfully implemented under Government of Maharashtra's Krishi Vahini Yojana. Government should pay attention on strengthening the infrastructure of the district. This would help in increasing the Solar rooftop panel installations under the National Solar Mission- Phase II.

Provisions for financial assistance in off grid connections used for commercial purposes such as cold storages etc. should also be given a thought.

Example can be taken from one of the villages in the Amroha district which is totally managing its need from the solar energy. The solar-powered village in Chakanwala Panchayat named 'Mandironwala Bhuddi' has no electricity poles but is completely lit up using solar power. Development in other villages in solar energy sector can be made on similar lines.

4.4.2. Biomass

The district depends mainly on agriculture and hence produces a lot of biomass waste. Most of the waste is burnt in the district. The first thing which should be done is to make people aware of the biomass energy and its benefits. Farmers should be educated about the importance of the bio-waste produced in their fields. Moreover new entrepreneurs should be encouraged to develop and work on the technology that would utilize all types of field bio-waste produced from agricultural lands. . The district cultivates sugarcane, rice and wheat mainly, so the best suited projects for the district can be husk based biomass gasifier and the bagasse based biomass plants. The husk based biomass plants can be developed on the lines of the Husk Power Systems from Champaran, Bihar. Community based biomass plants should be encouraged in the district, so that the investment is divided among the group of people. A proper channel should be created by the administration, where transport, cost of raw material etc. is given attention so that people develop their interests towards biomass energy.

There should be provision for the rice mill owners to set up biomass plants in the district. These could also be opened in a group of two to three, so the infrastructural cost would get reduced. The biomass plants should be established at such places which are on the mid way to urban and rural areas for this a district based survey should be conducted so that the barren lands could be utilized. Biofuel production should also be promoted in the district as it cultivates sugarcane on large scale.

4.4.3. Biogas:

- Initiate daily door-to-door collection; cover 100 % houses in 5 years.
- Develop an integrated waste processing & disposal facility.

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

1. The district's farmers should adopt scientific cultivation practices to increase the yield and quality of major crops.
2. Farmers should adopt the SRI technology for paddy cultivation, which will increase production and efficient water management.
3. There is a lot of scope for expansion of resources conservation technologies like mulching, zero tillage.
4. Intercropping should be encouraged to improve cultivation efficiency and boost income per unit area.
5. Micro-irrigation should be promoted under the different government schemes to increase the water use efficiency. And also, fertigation units should be facilitated to achieve efficient fertilizer application.
6. Application of fertilizer and pesticides should be limited, farmers should follow proper management of fertilizer and pesticides.
7. Organic farming can be promoted under the Paramparagat Krishi Vikas Yojana (PKVY) model cluster.
8. The district has scope for micro-Enterprise development, especially for organic vegetables, oilseeds, and flowers.
9. Beekeeping and mushroom cultivation should be promoted in the district to generate additional income for the small land-holding farmer.
10. As the district is very near to India's capital New Delhi, micro-enterprise development like fruits processing units, dehydration of fruits and vegetables have a large scope.
11. Promotion of goatary and poultry farming among the small farmers has the scope in the district.
12. Processing units, storage, and export facilities for potatoes should be provided to ensure farmer's income.
13. Farmers should be encouraged to application of vermicompost, bio-fertilizers, and FYM to boost health and sustainable agriculture.
14. Due to good connectivity and marketing access to the adjacent cities, there is a scope for small-scale dairy units.
15. Poly houses, shed net houses can be used for high-value off-season vegetables, orchids and flowers.
16. Corporative farming model can be adopted to enhance the fish culture and market access.

5.2 FORESTRY

Hapur located on the bank of river Ganga. According to Land Use Statistics, Ministry of Agriculture and Farmer Welfare, 846 ha. area of Hapur is covered with forest. 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 improved cultivars and production technologies for pulses and oilseeds.
- Some known wetlands are Sherpur Talab and Bhadsiyana Talab. It is recommended to rejuvenate and restore these wetlands under MNREGA schemes. (Source: INTACH, "Ganga Cultural Documentation")
- 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.
- It is recommended to develop the outer periphery of the wetlands with wet gardens, flower gardens or medicinal plants. Vegetation like riparian vegetation and buffel grass can be used for the purpose.
- It is recommended to create awareness about the Fisheries and Aquaculture Infrastructure Development Fund (FIDF) scheme and Pradhan Mantri Matsya Sampada Yojana (PMMSY).

- Species like Gangetic Dolphin, Gharial and turtles are found in the wetland areas of the distrcit. These species need to be protected by developing (restriction in the area) wetlands found in the district.

5.4ENERGY

5.4.1. Solar

- ❖ The people of the district should be made aware of the solar energy.
- ❖ Kusum Yojana should be popularized among the farmers in the district.
- ❖ Solar rooftop installations should be popularized under the National solar Mission- Phase II.

5.4.2. Biomass

- ❖ People should be made aware of the biomass energy so that the district does not only has to depend on conventional sources of energy for power supply.
- ❖ The district produces wheat, rice, and other agricultural products, which consequently give rise to biomass wastes in large amounts. Hence husk based biomass gasifiers should be encouraged in the district.
- ❖ Biofuel production should also be promoted in the district as it cultivates sugarcane on large scale.
- ❖ A proper channel should be created by the administration, where transport, cost of raw material etc. is given attention so that people develop their interests towards biomass energy.

5.4.3. Biogas

- There is no scientific solid waste processing or disposal facility in Hapur; waste collected from the city is disposed at a site along Rampur Road by crude open dumping method. This practice is very unhealthy and environmentally unsafe. Area of this site is 5 acres. Biogas plant construction help to get rid of this waste and produce biogas that can be purified, compressed, and used as vehicle fuel.
- 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 Hapur.

5.5. 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 create proper ghats to attract tourists. Spiritual tourism- To maintain temples on the sides of roads, in banks and shrines.	Garhmukteshwar is famous as a religious place since ancient times. Its ancient name was Shivvallambibpur.	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.						

6. Discussion during the Report Presentation

- Organic Farming has been taken up in 20 villages near the Ganga Basin.
- Hapur is actively working on the development of the district by the convergence of the different government schemes.
- The Ganga Ghaats are majorly used for cremation. Gadh Ganga is the only nearest Ghat for NCR region.
- Gadh Ganga Fair is one the major attraction for the locals and people nearby. For the upcoming Ganga Fair, there will be a plan for setting up the stalls for promotion of local produce, Jalaj and Namami Gange.
- Forest Department is developing one Ganga Biodiversity Project, the proposal has been received for the same as a five-year project. The work has been started for the same. Further, a plan for construction of Ganga trails will be laid.
- 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.

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8. APPENDICES

AUXILLLARY DATA

Table 1: Biogas potential from animal waste in the district.

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^3)	Biogas potential (m^3/yr)	m3/day	Dry matter per day
Cattle	Manure	72986	10	26,63,98,900	199799175	39959835	25	1598393.4	4379.16	109479
Buffalo	Manure	296999	15	1,62,60,69,525	1219552144	243910428.8	25	9756417.15	26729.91	668248
Sheep	Manure	1335	1	4,87,275	365456.25	73091.25	25	2923.65	8.01	200.25
Goat	Manure	37523	1	1,36,95,895	10271921.25	2054384.25	25	82175.37	225.138	5628.5
Pig	Manure	4672	2.5	42,63,200	3197400	639480	25	25579.2	70.08	1752
Poultry	manure	39,057	0.1	14,25,581	1069185.375	213837.075	25	8553.483	23.4342	585.86
Total		**4,52,572**						**11474042.25**		

Table 2 Biogas potential from agricultural waste in the district.

Crop	residue type	Total crop production (tons) (2017-18)	Residue production ratio	Residue amount (tons)	Average collection (70%)	Moisture content	Residue amount after removing moisture (tons)	Biogas potential [m3/(tons of dry matter)]	Overall biogas potential (m3)
Maize	straw	1830	1.5	2745	1921.5	15	1633.275	800	1306620

Wheat	straw	177848	1.5	266772	186740.4	30	130718.28	800	104574624
sugarcane	bagasse	3114241	0.33	1027699.53	719389.671	80	143877.9342	750	107908450.7
Total		**3293919**							**213789694.7**