Arth Ganga Project: District Ghazipur

Submitted to:

National Mission for Clean Ganga (NMCG)

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EXECUTIVE SUMMARY

Ghazipur is one of the oldest holy cities in the state of Uttar Pradesh. The city traversed by many rivers such as Ganga, Gomti, Gangi, Beson, Magai, Bhaisi, Tons and Karmnasa which accounts for a large number ghats in the district.

The total geographical area of the district is 3377 km2. The primary sector's average annual growth rate from 2011-12 to 2018-19 is only 0.84% whereas its share decreased from 28.02% 23.13%. The tertiary sector's share is about 62.23%, with a growth with an average annual growth rate of 6.41%, with its share increasing from 55.58% in 2011-12 to 67.41% in 2018-19. Overall, the district economy grew with an average annual growth rate of 3.55%.

In 2017-18, the net sown area and pure irrigated area represents 259882 ha and 228531 ha. The cropping intensity of the district is 142.35%. The total irrigated area is 229609 ha. Major crop types are wheat, rice, maize, barley, corn, pulses like 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 production of 948684 MT. The livestock consists of cattle (indigenous and crossbred), buffalos (indigenous and crossbred), pigs (indigenous and crossbred), sheep; along with poultry and fisheries.

The net sown area increased 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%. The share of cultivable wasteland decreased from 1.06% in 2009-10 to 1.0% in 2017-18 whereas the share of Barren and uncultivable land remained constant (0.89%) over the years. The net and gross irrigated areas have increased over the years with an average of 87.53% and 87.17%.

Agriculture, including the horticulture sector, grew with an average annual growth rate of 0.07% from 2011-12 to 2018-19 with its share decreased from 64.86% to 60.94%. The share of the livestock subsector increased from 30.66% to 31.53% in the same period as it grew with an average annual growth rate of 1.19%. The fishery & aquaculture subsector share is very minimal, around 3.13% in 2018-19, but it grew with a significant average annual growth rate of 54.80% from 2011-12 to 2018-19. Mines and quarrying also recorded an average annual growth rate of 20.58%. In 2017-18, 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 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.

The total forest cover of the district is 29 km2. The share of forestry and logging in the total agriculture and allied sector is small, around 4.41% in 2018-19, but it grew with a significant average annual growth rate of 15.08%. In the year 2019, out of total forest cover, the maximum area is covered by Open Forest (28 km2) followed by Moderately dense forest (1 km2). The share of area under trees and gardens

increased from 1.02% in 2009-10 to 1.34% in 2017-18. The district's forest cover has been continuously decreasing since 2001 which is reflected by the figures of forest cover and very dense forest covered 16 km2 which has been reduced to moderately dense forest covering only 4 km2 and where open forests covered 47 km2. In the year 2019, Ghazipur received total 709448 tourists. Total number of Domestic travellers were 709388 and total international travellers were 60. The district is well connected to other parts through road and railways. There are different touristic attractions in the city such as, Aunrihar, Bahadurganj, Bhitari (archaeological site), Cheru Raja's fort, etc.

The main source of lightning is Kerosene (80%) closely followed by electricity (18%) while only 0.52% is the usage of Solar energy. There are not many solar installations witnessed in the district. The main fuel source is cow dung cake (55.87%) and firewood (28.28%) with LPG/PNG usage of about 7.01% only. biomass gasifiers have been installed in the district at Nagraj rice mill, kamta cold storage and Sharda mini rice mill. 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%.The percentage share of the agriculture in the total electricity consumption is around 45.20%. The total number of wetlands existing in the district is 2645 consisting of both Man-made and Natural. Most of them are small or medium size and waterlogged and riverine wetlands. The district's biodiversity data includes various crop production, livestock population, bird species, and forest cover with 318 bird species and 3 threatened/rare species of bird in the district. Biogas potential from animal waste and agricultural waste was calculated approximately as 1 crore m3/year and 30 crores m3/year. A waste-to-energy facility at the Ghazipur poultry and fish wholesale market, transforming around 15 tonnes of organic waste per day into electricity

The active measures should be taken to support and promote sustainable economy and development. The monitoring and maintenance of industrial wastes and mining activities is the need of the hour. Creating awareness and strict implementation of laws along with the use of technologies, training, marketing needs and advisory services and conducting the research could aid in sustainable development. Various measures such as eco-tourism should be taken to improve tourism and enhance the use of renewable energy especially by creating awareness. Use of high-yielding seeds, micro-irrigation, constructing and maintaining harvesting structures, farm mechanization, adopting greenhouse farming with organic farming, and encouraging farmers for adapting different crop cultivation and various irrigation methods. Along with focusing on agriculture practices Bee culture, dairy, poultry, fisheries, sericulture etc. needs encouragement as they have high economic potential. Promoting micro and small units for horticulture products processing. Introducing PM Matsya Yojana, payments of ecosystem services, vermicomposting and green manuring, poly house, medicinal crops like tulsi, mentha, commercialization of flower cultivation like Rose, subsidized crop insurance system , resources conservation technologies such as zero-tillage, laser land leveller, mulching, etc.

1. DISTRICT OVERVIEW

1.1 INTRODUCTION

Ghazipur is one of the oldest holy cities in the state of Uttar Pradesh. The city traversed by many rivers such as Ganga, Gomti, Gangi, Beson, Magai, Bhaisi, Tons and Karmnasa which accounts for a large number ghats in the district.

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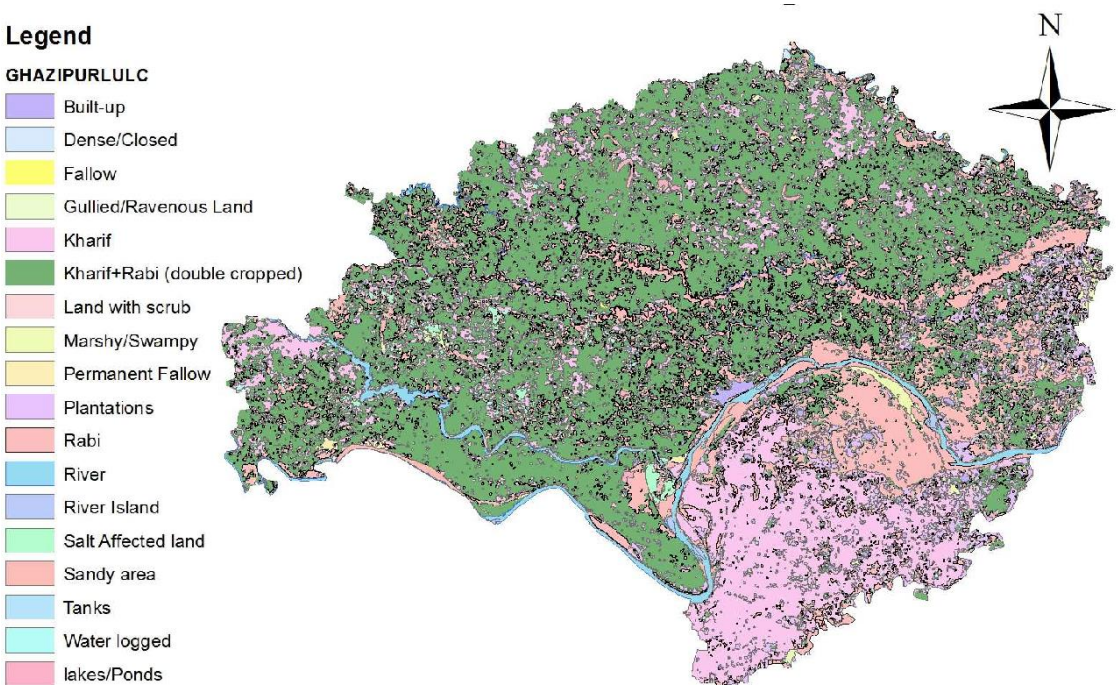


Figure 1 Map of the district

1.2 DEMOGRAPHIC PROFILE OF GHAZIPUR

1. Economy and Livelihoods

- Geographical Area: 3377 Sq. Km.
- Administrative Divisions:

  District Headquarters: Ghazipur

  No of Municipalities: 8

  No of Tehsil: 7

  No of Blocks: 16

  No of Gram panchayats:

No. Of Villages: 3385[1]

- Demographic and socio-economic indicators:[2]

  Population: 36,20,268 (Census 2011)

  Population density (Total persons per sq. km): 1072

  Sex ratio: 952

  Literacy: 71.8%

- Occupation/ other Livelihood source: Agriculture
- Major Rivers: Ganga, Gomti, Gangi, Beson, Magai, Bhaisi, Tons and Karmnasa
- Forest Area: 29 Sq. Km., (ISFR 2019) (No major forest)

1.3 ECONOMIC PROFILE OF GHAZIPUR

The District Economy

The primary sector has a significant impact on the district economy because it contributes, on average, 26.86% share in the district GDP. However, this sector's average annual growth rate from 2011-12 to 2018-19 is only 0.84%. Thus, its share decreased from 28.02% in 2011-12 to 23.13% in 2018-19. The share of the secondary sector decreased from 16.40% in 2011-12 to 9.45% in 2018-19. The sector grew with a negative average annual growth rate of 2.92%. The tertiary sector occupied, on average, 62.23% share in the district economy. Moreover, it grew with a remarkable average annual growth rate of 6.41%, with its share increasing from 55.58% in 2011-12 to 67.41% in 2018-19. Overall, the district economy grew with an average annual growth rate of 3.55%. The growth in the tertiary sector is more than in the other two sectors. Steps should be taken to increase the productivity of primary and secondary sectors to grow at a higher rate. It will improve the growth rate of the overall district. The tertiary sectors have performed well during the period of the study.

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

[2] https://censusindia.gov.in/2011census/dchb/DCHB_A/09/0964_PART_A_DCHB_GHAZIPUR.pdf

Table 1: Trends in Gross District Domestic product in Ghazipur 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	2374.85 (28.02)	1390.14 (16.40)	4711.84 (55.58)	8476.83 (100)	-	-	-	-
2012-13	2569.68 (30.37)	898.09 (10.61)	4993.66 (59.02)	8461.44 (100)	8.20	-35.40	5.98	-0.18
2013-14	2355.22 (29.16)	808.45 (10.01)	4914.57 (60.84)	8078.24 (100)	-8.35	-9.98	-1.58	-4.53
2014-15	2289.70 (27.08)	828.48 (9.80)	5336.04 (63.12)	8454.22 (100)	-2.78	2.48	8.58	4.65
2015-16	2492.76 (26.87)	1007.76 (10.86)	5777.90 (62.27)	9278.43 (100)	8.87	21.64	8.28	9.75
2016-17	2485.06 (26.05)	954.52 (10.01)	6100.69 (63.95)	9540.27 (100)	-0.31	-5.28	5.59	2.82
2017-18	2329.16 (24.20)	972.12 (10.10)	6322.11 (65.70)	9623.38 (100)	-6.27	1.84	3.63	0.87
2018-19	2481.39 (23.13)	1013.82 (9.45)	7230.51 (67.41)	10725.72 (100)	6.54	4.29	14.37	11.45
Average Growth Rate					0.84	-2.92	6.41	3.55

Source: UPDES

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

We further break down the primary sector GDP to know which subsector is lagging and which one is driving the primary sector growth. Table 2 shows that agriculture, including the horticulture sector, grew at a low average annual growth rate of 0.07% from 2011-12 to 2018-19. Moreover, its share decreased from 64.86% in 2011-12 to 60.94% in 2018-19. On the other hand, the share of the livestock subsector increased from 30.66% to 31.53% in the same period as it grew with an average annual growth rate of 1.19%. It shows the importance of livestock in Ghazipur 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 4.41% in 2018-19, but it grew with a significant average annual growth rate of 15.08%. The fishery & aquaculture subsector share is very minimal, around 3.13% in 2018-19, but it grew with a significant average annual growth rate of 54.80% from 2011-12 to 2018-19.

Mines and quarrying also recorded a remarkable average annual growth rate of 20.58%. 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 below expectations during the study period as the majority of the subsectors have not done well. More work can be done on improving the agriculture (including horticulture) sub-sector as it has the most significant impact on the primary sector.

Table 2: Gross District Domestic Product Trends from Agriculture and allied activities in Ghazipur 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	1502.09	710.05	92.76	11.04	2315.93	58.91	2374.85
	(64.86)	(30.66)	(4.01)	(0.48)	(100)		
	-	-	-	-	-	-	-
2012-13	1589.78	758.00	173.22	11.57	2532.57	37.11	2569.68
	(62.77)	(29.93)	(6.84)	(0.46)	(100)		
	[5.84]	[6.75]	[86.74]	[4.76]	[9.35]	[-37.01]	[8.20]
2013-14	1399.77	808.05	94.50	11.92	2314.24	40.97	2355.22
	(60.48)	(34.92)	(4.08)	(0.52)	(100)		
	[-11.95]	[6.60]	[-45.45]	[3.10]	[-8.62]	[10.41]	[-8.35]
2014-15	1308.37	846.19	90.61	12.75	2257.92	31.79	2289.70
	(57.95)	(37.48)	(4.01)	(0.56)	(100)		
	[-6.53]	[4.72]	[-4.11]	[6.90]	[-2.43]	[-22.42]	[-2.78]
2015-16	1475.31	776.58	146.61	13.01	2411.52	81.24	2492.76
	(61.18)	(32.20)	(6.08)	(0.54)	(100)		
	[12.76]	[-8.23]	[61.80]	[2.07]	[6.80]	[155.60]	[8.87]
2016-17	1446.43	712.76	206.52	15.92	2381.63	103.43	2485.06
	(60.73)	(29.93)	(8.67)	(0.67)	(100)		
	[-1.96]	[-8.22]	[40.86]	[22.37]	[-1.24]	[27.30]	[-0.31]
2017-18	1336.24	713.50	85.60	17.31	2152.65	176.50	2329.16
	(62.07)	(33.15)	(3.98)	(0.80)	(100)		
	[-7.62]	[0.10]	[-58.55]	[8.71]	[-9.61]	[70.66]	[-6.27]
2018-19	1469.56	760.31	106.37	75.41	2411.65	69.74	2481.39
	(60.94)	(31.53)	(4.41)	(3.13)	(100)		
	[9.98]	[6.56]	[24.26]	[335.72]	[12.03]	[-60.49]	[6.54]
Average Growth Rate	0.07	1.19	15.08	54.80	0.90	20.58	0.84

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 44.97% in 2018-19. The share has decreased over the years as the average annual growth in this sector is negative (-6.72%). The share of the electricity, gas, and water supplies subsector has increased from 8.50% in 2011-12 to 15.95% in 2018-19. Moreover, this subsector grew with a remarkable average annual growth rate of 8.92%. The

share of the construction sub-sector increased from 24.38% to 39.08% during the same period. The table indicates that the secondary sector in Ghazipur 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 (26.16%) in 2018-19, followed by the transport, storage, and communication subsector (19.92%), public administration subsector (18.08%), and Trade & Hotel subsector (13.11%). Average annual growth is observed highest in transport, storage, and communication (18.91%), followed by Public Administration (8.58%), financial services (6.94%), real estate subsector (3.34%) and lastly lowest in trade & hotel (1.59%). All the subsectors in the tertiary sector have performed well during the period of the study. More work needs to be done to improve Manufacturing and trade and hotels subsectors. Public Administration and Transport and Communication and Financial services sub-sectors are the major contributors to the Tertiary sector's growth.

Table 3: Trends in percentage share of non-agriculture sub-sectors in DGDP in Ghazipur 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	67.11	8.50	24.38	100	9.46	18.40	8.55	31.94	16.94	14.72	100
2012-13	49.96	13.49	36.55	100	10.43	15.67	8.54	31.97	19.77	13.62	100
2013-14	47.65	16.38	35.97	100	12.21	15.79	9.66	33.66	14.88	13.80	100
2014-15	42.76	16.49	40.75	100	13.12	15.39	9.83	32.23	15.47	13.97	100
2015-16	41.33	24.61	34.06	100	16.79	15.38	9.79	30.02	14.56	13.47	100
2016-17	47.63	16.61	35.75	100	17.05	14.95	9.53	28.72	15.95	13.80	100
2017-18	46.27	17.02	36.72	100	16.73	13.23	8.28	29.18	18.17	14.41	100
2018-19	44.97	15.95	39.08	100	19.92	13.11	8.70	26.16	18.08	14.04	100
Average Growth Rate	-6.72	8.92	2.60	-2.92	18.91	1.59	6.94	3.34	8.58	5.70	6.41

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 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 waste land	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
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 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 assessment 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 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 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

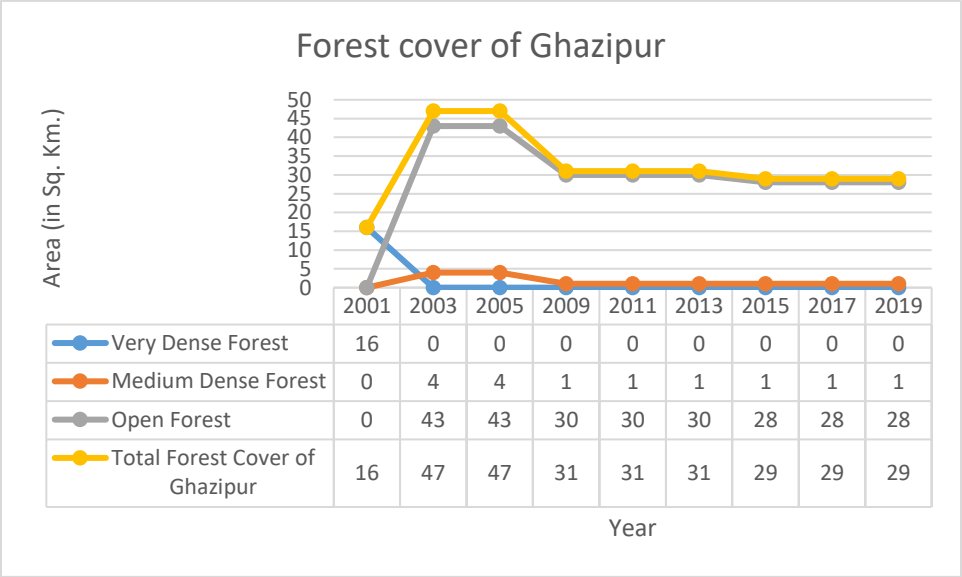
Table 19 shows that the Ghazipur district has an active network of cattle hospitals and development centres. The number of cattle hospitals has increased from 40 in 2010-11 to 50 in 2018-19. The number of cattle development centres (48) remained constant over the years. The number of man-made reproduction 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									

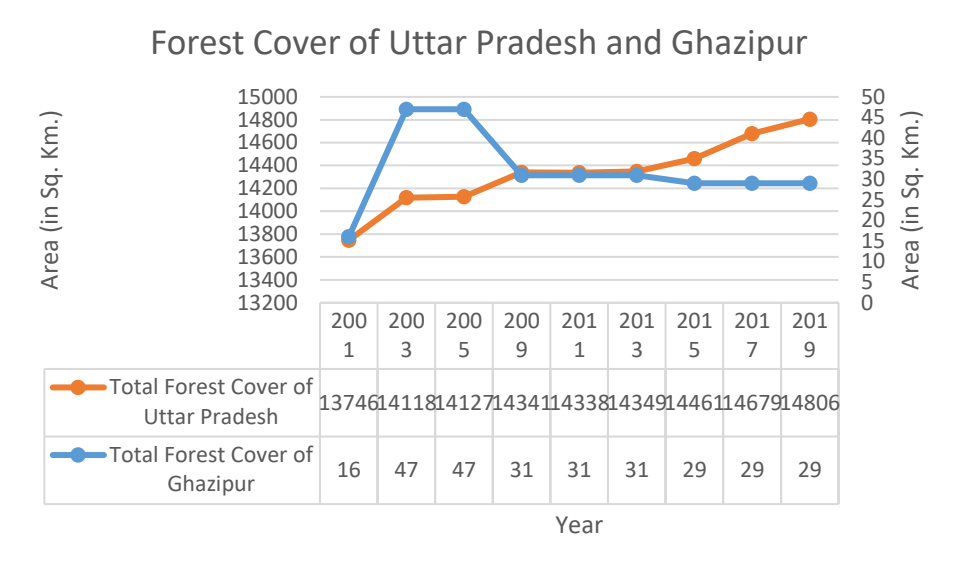
2.2 FORESTRY

1. **Baseline Data Analysis/ Quantitative Data Analysis**



	2001	2003	2005	2009	2011	2013	2015	2017	2019
Very Dense Forest	16	0	0	0	0	0	0	0	0
Medium Dense Forest	0	4	4	1	1	1	1	1	1
Open Forest	0	43	43	30	30	30	28	28	28
Total Forest Cover of Ghazipur	16	47	47	31	31	31	29	29	29

According to Forest Survey of India assessment, between the year 2001 and 2019, the forest cover has decreased significantly from the year 2005. In the last assessment, the forest cover of Ghazipur is 29 Sq. Km., majorly open forest, followed by medium dense forest.



The forest cover of Uttar Pradesh has increased over the years, and in the case of Ghazipur, the forest has decreased significantly.

2.2.1 Biodiversity

The district's biodiversity data includes crop production, livestock population, bird species, and forest cover. The crop production trend shows an increase in all other crops. Forest data shows that no forest cover has been decreased or increased in the district.

Table 1 Bird species recorded in the district.

Number of species	318
Number of rare/accidental species	3

Table 2 Forest cover in square kilometer.

Geographical area	**Very dense forest**	**Mid dense forest**	**Open forest**	**Total**	**% of Geographical area `**	**Change with respect to 2017 assessment**	**Scrub**
3377	0	1.00	28.00	29.00	0.86	0.00	0.00

2.3 TOURISM

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

YEAR	INDIAN	FOREIGN	TOTAL
2015	NA	NA	NA
2016	NA	NA	NA
2017	NA	NA	NA
2018	718168	0	718168
2019	709388	60	709448

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

1. The above-given data table-1 is taken from the Uttar Pradesh tourism website. The data table shows the number of tourists visiting Ghazipur for tourism from 2015 to 2019. The tourist visits are bifurcated into two different groups – Domestic and Foreign tourists..
2. In the year 2018 Ghazipur received total **718168** tourists. Total number of Domestic travellers were 718168 and total international travellers were 0.
3. In the year 2019 Ghazipur received total **709448** tourists. Total number of Domestic travellers were 709388 and total international travellers were 60. The district experienced a total decline of 0.9% in total number of tourists compared to number in the previous year.

2.4 WETLANDS

The district is known for huge number of wetlands with some of them renowned one's. The district consists of lakes and ponds like Dari Tal (152.79 Ha), Ujain Jhil (150.5 Ha), Nadah tal/Manjhan tal (141.42 Ha). The data in Table 3 represent the number of wetlands and their area representation in the district. There are around 301 wetlands sized greater than 2.25 Ha and 1442 less than 2.25 Ha areas. The region consists of mix of large, small, medium sized wetlands generally less than 200 Ha in area and there are around 2 wetland with size for than 200 Ha.

Table 3: Wetland Data of Ghazipur District

Wetland Types	Total Number of												
	Wetlands:			Area (ha)									Aquatic Vegetation
Natural Wetlands	**NRCD**	**NWIA**	**Diff.**	**<2.25**	**<5**	**<10**	**<20**	**<50**	**<200**	**<500**	**<1000**	**>1000**	
Lake/ponds	60	75	15	0	7	13	17	11	12	0	0	0	243
Ox-bow lakes/cut off meanders	27	27	0	0	2	3	5	8	8	1	0	0	42
High altitude Wetlands	0	0	0	0	0	0	0	0	0	0	0	0	0
Riverine Wetlands	9	13	4	0	0	1	4	1	2	1	0	0	24
Waterlogged	69	76	7	0	4	8	10	29	18	0	0	0	90
River/Stream	0	62	62	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	1	1	0	0	1	0	0	0	0	0	0	0	0
Tanks/ponds	3	3	0	0	2	1	0	0	0	0	0	0	143

Waterlogged	35	44	9	0	11	9	3	6	6	0	0	0	45
Salt pans	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (2645)	**204**	**301**	**97**	**2344**	**27**	**35**	**39**	**55**	**46**	**2**	**0**	**0**	**587**

Source: (National River Conservation Directorate, 2008), (Space Application Centre-ISRO, 2007)

- District comprises 2645 wetlands; most of them are waterlogged and lake/ponds/tanks.
- The wetland size is small and medium sized in general.
- The number of natural wetlands is more than man-made.
- Many wetlands both man-made and natural are waterlogged one's or lake/pond type
- Many wetlands have aquatic vegetation.

2.5 ENERGY

2.5.1. Solar

The district's biodiversity data includes crop production, livestock population, bird species, and forest cover. The crop production trend shows an increase in all other crops. Forest data shows that no forest cover has been decreased or increased in the district.

Table 1 Bird species recorded in the district.

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3377	0	1.00	28.00	29.00	0.86	0.00	0.00

2.5.2. Biomass

The district's biodiversity data includes crop production, livestock population, bird species, and forest cover. The crop production trend shows an increase in all other crops. Forest data shows that no forest cover has been decreased or increased in the district.

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3377	0	1.00	28.00	29.00	0.86	0.00	0.00

2.5.3. Biogas

No biogas plant exists in the district as per the data. Biogas potential from animal waste is calculated as approximately two crore m^3/year and thirty crore m^3/year. This amount of biogas generation can efficiently complete the energy demand of the district.

2.5.4. Hydro Power

Available data shows no hydropower plant exists in the district, and no site has been investigated for future projects. The main river in the district is Ganga (north-east part) and then Kali and Ishan river. Ganga canal present in the district can serve the purpose of electricity generation by constructing small hydropower plants.

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.

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).

3.1.1. Biodiversity

In 1970-71, the district's entire forest area was around 8553 hectares. The trees that grow in these forests include the Safed siris, Neem, imli, Bargad or Banyan, Pipal, Gular, Pakar, Semal, Jamun, and Shishsam. Because the region lacks deep and vast woods, the population of wild animals and species diversity is limited. The Nilgai or Dharrose, Wild pig, Jackal, Fox, Hare, Blackbuck, and Wolf may be seen in the district. Birds of the district include Peacock, Grey quail, Indian parakeet, Roseinged parakeet, Crow, Mainah, Swallow. Various snakes and other reptiles can be found throughout the district, particularly in rural areas, including the Cobra, Karait, Rat snake, greeko, common house lizards, Goh, Green Lizards, or Girgit.

3.2 ENERGY:

As per the data of the year 2013, Ghazipur district energy consumption is around 403 TJ/year and 3.3 GJ/capita/year. GHG emission of 28,235 Ton CO_2 equivalent and 0.233 Ton CO_2 equivalent/capita has been evaluated for the district.

3.2.1. Solar

The district Ghazipur has been dealing with power cutoff every summers mainly. A newspaper article mentions that in Ghazipur district, people are upset due to power cuts from the city to the countryside. Government works are also getting affected due to the reduction. Due to this people in the city are not getting water on time. There is resentment among the people about the cuts being done by the department without prior notice, which can take the form of agitation at any time.
According to Pugazenthi et. al. 2016, total solar power potential available in the district is 0.0440.

3.2.2. Biomass

The district Ghazipur has a few of the biomass gasifiers installed and needs to progress at a faster pace to bring in biomass energy to a large scale. The district also faces the problem of stubble burning. An article in Down To Earth with the heading 'Stubble burning: A problem for the environment, agriculture and humans' reads that crop residue burning in Punjab, Haryana and western Uttar Pradesh has been known, but nowadays it's spreading more frequently in other parts of country.Wheat stubble burning is a relatively new issue which started with mechanised harvesting using combine harvesters. In the last four to five years, farmers from UP's Ghazipur district, especially Zamania and Chandauli areas, have been burning wheat stubble at a large scale.

3.2.3. Biogas:

According to the "The Hindu" report 2020, the Delhi chief minister inaugurated a waste-to-energy facility at the Ghazipur poultry and fish wholesale market, transforming around 15 tonnes of organic waste per day into electricity. A national program such as the New national Biogas and organic manure program (NNBOMP) and Biogas power generation and thermal energy application program (BPGTP) are running by State and should be applied to this district generation decentralized energy source.

3.2.4. Hydropower:

For hydropower generation, the National level program, such as the small hydropower project program, runs in the State. The implementation of small hydropower in the State is carried out by Uttar Pradesh New and Renewable Energy Development Agency and Uttar Pradesh Jal Vidyut Nigam. Neither sites have been investigated so far nor exist at present in the district.

3.3 TOURISM

- **HOW TO REACH GHAZIPUR-**

By Air

Varanasi is the closest airport to Ghazipur. Ghazipur is roughly 70 kilometres from Varanasi (Babatpur) Airport. The airport is well connected to both domestic and international destinations via a variety of aircraft operated by both commercial and public airlines.

By Rail/Train

Ghazipur station is well connected to other cities in Uttar Pradesh and India, including New Delhi, Mumbai, Kolkata, Agra, Lucknow, Varanasi, Allahabad, Bihar, Jammu & Kashmir, Ballia, and so on.

By Road

By road, Ghazipur is well connected to the rest of Uttar Pradesh. The nearest major terminal is Varanasi, which is 76 kilometres distant. Lucknow, Gorakhpur, Mau, Ballia, Varanasi, Jaunpur, Kanpur, Azamgarh, Allahabad, Agra, and Mathura are all well-connected by bus from Ghazipur. These buses are operated by both the Uttar Pradesh State Road Transport Corporation and private companies.

Cities Near Ghazipur -

Places to see in Ghazipur –

Aunrihar

Aunrihar is located in latitude 25° 32′ N and longitude 83° 11′ E on the main road leading from Varanasi to Kushinagar on NH 29, about 42 kilometres west of Ghazipur city and 3.2 kilometres from Saidpur. This location is archaeologically significant. One of the oldest and most important sites in the district is a ring of mounds that stretches from Saidpur to Aunrihar. The entire surface of the earth in Aunrihar is strewn with shards, massive carved stones, and fine pieces of sculpture that are used as common building stone. Every few yards, vestiges of a stone wall can be seen.

Bahadurganj- The town is located on the Saryu River's bank. It is around 35 kilometres from Ghazipur. Sheikh Abdullah, Governor of Ghazipur, is reported to have founded the town in 1742 AD, and he also erected a massive fort here. On the occasion of Ram Navami, a small fair is conducted here.

Bhitari (Saidpur)

Bhitari is located around 32 kilometres from Ghazipur, near the town of Saidpur. The name Bhitari is derived from the name Bhimutri. The Bhitari is a significant archaeological site. It is a site of immense antiquity and has many archaeologically significant remnants. It is likely that Bhitari was once in the hands of Buddhists, although it most likely reached its peak during the Gupta era. The most visible artefact of the epoch is the iconic red sandstone monolith that stands in the fort enclosure on the block of ruff stone. It bears a meter-high bell-shaped capital, similar to those found on Akhoka pillars. It bears an inscription related to Skanda Gupta's reign and his successor to Kumar Gupta.

The latter name appears on numerous huge bricks uncovered at the foot of the pillar in 1885, when an oval silver plate inscribed with Kumar Gupta's name was discovered in the neighbouring ruins. Aside from the pillar, the most precious finds were a seal and coins depicting the genealogy of nine

generations of Gupta kings. The Bhitari was most likely one of the royal mansions and a symbol of the Gupta Kings' authority in the area.

Virpur (Muhammadabad)

Virpur is located on the banks of the Ganga, approximately 35 kilometres from Ghazipur. Tikam Deo, a great Cheru Raja, made it his capital. Old coins and sculpture pieces have been discovered in Cheru Raja's fort.

Dildarnagar

Dildarnaar is located on the road from Varanasi and Zamania to Buxar, and it is 20 kilometres from Ghazipur. Between the town and the station lies a hill known as Akhandha, which is claimed to have been Raja Nal's seat, and the enormous tank to the west is known as Rani Sagar, after his legendary queen Damayanti. The remnants of two temples may be found in the mound's centre.

Gauspur

Gauspur, a major village, located 14 kilometres from Ghazipur. The previous Jamidars of the area were Bhumihar, who claimed ancestry from those who cured Raja Mandhata of his leprosy and so got a land grant. The tank in which the Raja bathed is still visible on the village's eastern outskirts, and it has long been a destination for those suffering from similar ailments. The Raja's fort was located in Kathot, a nearby village to the east. Traces of a Hindu civilisation may be seen in both Ghauspur and Kathot; vast quantities of stone and old bricks have been excavated, and some spectacular pieces of Hindu artwork can be found in the temple. Oldham attributed these to Buddhism and linked the location to the "monastery of unpierced ears" mentioned by Chinese travellers Hiuen Tsang and Fa Hien.

Saidpur

Saipur town is located on NH 29, around 30 kilometres from Ghazipur. There are two Muslim dargahs in town, one of which is a modest domed structure supported by a square pillar. Other structures are larger and more notable, with a vast stone roof. These urban structures could be Chaiyas connected to Buddhist monasteries. One is the tomb of Sheikh Samman, who died in 1595, while the other is that of Makhdoom Shah.

Zamania

It is an old, high bank of the Ganga about 16 kilometres south of Ghazipur. Ali Quli Khan, governor of Jaunpur, built the town in 1560 and named it Khan Zaman after his status. According to Hindu legend, the name Jamadagnia was derived from Rishi Jamadagni. Lathiya pillar is located 3 kilometres southeast of town and is a circular monolith of polished sandstone 50cm in diameter and 6mt in height. There is a bell-shaped capital with a group of eight lions looking outwards above it.

Data analysis

- From the table-1 it is evident that the number of total tourists in Ghazipur decrease from 2018 to 2019.
- The Ghazipur tourism encountered highest percentage change in tourists in the year 2019, which was 0.9% decrease compared to previous year.
- The growth in the number of total tourists in Ghazipur is not constant in these years.

SWOT Analysis

S.No	Strength	Weakness	Opportunities	Threat
1.	• Geographically located next to Varanasi in Uttar Pradesh. • Religious tourist plans can be clubbed together to propose development and maintenance spiritual temples and **Zamania**. • Has local folk music and art.	• Poor promotion of existing temples. • 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 local art and craft. • 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 are the source of many ecosystems and habitats for a variety of species. The wetlands create a unique ecosystem that supports many species simultaneously like aquatic, terrestrial, and human beings.

The district has many potential sources and opportunities to harness valuable products using the scheme and start the pilot project. Local stakeholders directly or indirectly depend on the wetland for their income and small-scale business. These businesses can be a great opportunity can be turned into a large-scale production hub using the right approach. The region has a good amount of production of sugarcane, maize and mustard. The region is known for the sugarcane and rose water (Gulab Jal). 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:

- Medicinal plants, flowers like rose and lotus production is recommended as commercial crops in the region, leading to products like product related like ayurvedic medicine, fragrance spray.
- Production of sugarcane is reasonably high, which can turn into the products like sugar and other products.
- India Govt. has proposed a mission like India's Millet Mission, which creates an opportunity for the district to become a production hub. The district stats show a good amount of barley, jowar, bajara in the region, which can be promoted in the scheme.
- Also, products like oil, finished pulses can be derived from the crops and millets grown in the region.
- Also, this region is a belt of large varieties of oil production in the region like mustard, til seeds and groundnut which can turn into valuable market for oil production in the region.
- The district is famous for its small wetlands which can be join together.
- The region has a large production of dairy products, which lead to an increase in animal husbandry. Wetlands can support the growth of fodder for the animals in the region.

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.[3]

[3] https://www.teriin.org/article/special-drive-tree-plantations-uttar-pradesh-faces-several-challenges

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.

4.1.1 Biodiversity –

33 drains in the district are directly falling into the Ganga river and affecting its biodiversity. Constructing more sewage treatment plants can solve this problem and save aquatic biodiversity as only one STP is working in the district.

4.2 Tourism

- **'Travel Uttar Pradesh' plan-** 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 Varanasi . In the Ghazipur district, there is a big chance to establish events around river ganga not only on religious grounds but also cultural grounds as well. The Delhi government resumed the **'Mukhyamantri Tirth Yojana'** in November of the previous year, allowing elderly inhabitants of Delhi to go on an all-expense-paid pilgrimage to various temples around the country. The Prime Minister of India, Narendra Modi, also launched the **INR 9 billion Kashi Vishwanath project,** which has piqued the interest of devotees and made travel to Varanasi, Uttar Pradesh, easier. 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.

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		As a reference for other processes, a well-researched document. Tourism in Uttar Pradesh is influenced by a number of factors.

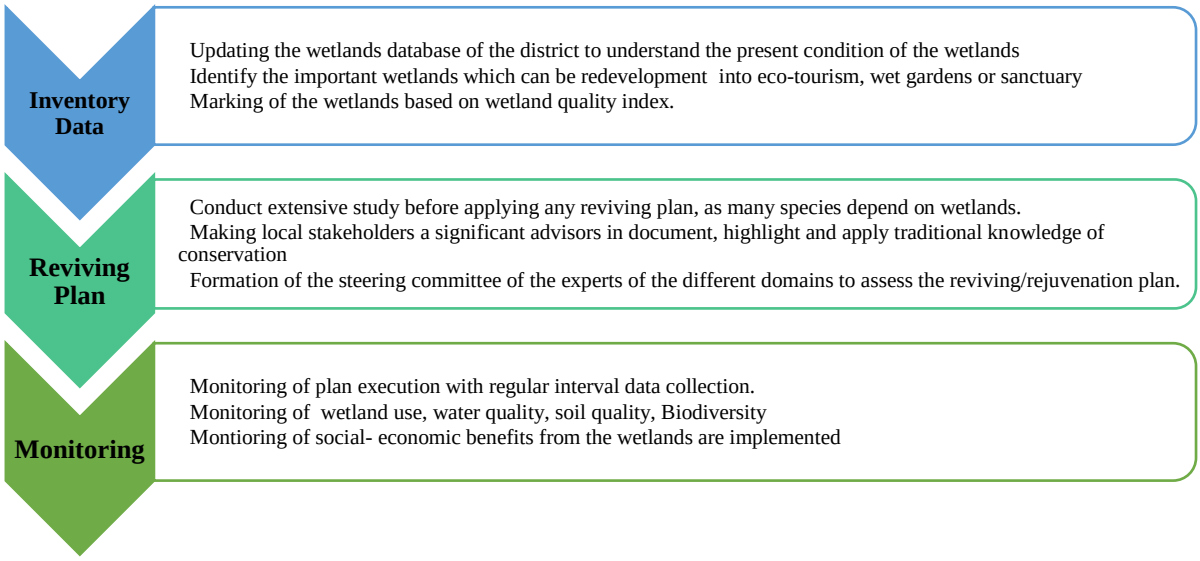
		qualitative and quantitative research. ● All political pressures and influences must be removed from research to bring as much transparency as one can. ● When adding new records, the researchers must ensure that the field data and secondary data are correct and unaltered. This would be specific prizes 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.It is necessary to enlist the help of unbiased researchers.		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 Ghazipur. ● 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. ● Creating spiritual tourism circuits and to implement existing circuits like Buddhism circuit. ● 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 significant amount of branding and marketing which can be clubbed with other cities like Varanasi. ● The development of tourist attractions and maintenance of temples in and around Ghazipur. ● Information about travel packages should be available on		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 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.

		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.		
	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.

4.3WETLANDS

The district is comprising of some of the healthy and wealthy wetland ecosystems. They directly or indirectly support millions of people and provide goods and services to them. They support all life forms through extensive food webs. They are a habitat to aquatic flora and fauna and numerous species of birds, including migratory species. They mitigate floods and recharge the groundwater. They need to be taken care and action on different fronts needs to 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 Ghazipur deals with the problem of power cutoff and is affected in summers severely. To overcome this problem, solar energy can be one of the potential solutions to this. Installation of solar power units would decrease the burden on the DISCOMs due to increased demand. For this it becomes important that people are made aware of the solar energy. The people of the district should be made aware of the solar energy as there are not many solar installations witnessed in the district. This can be done by organizing awareness camps etc. at smaller levels so that people are able to get knowledge at personal levels. Also the schemes of the government related to solar energy should be popularized. Farmers should be made acquainted with the Kusum Yojana. The DISCOMs should work towards developing infrastructure required for solar segregation. This would help the DISCOMs in providing uninterrupted power supply to the farmers at low costs without facing any losses. Attention should also be paid on encouraging more and more people for installing solar roof panels under the National Solar Mission, Phase II.

4.4.2. Biomass

The district Ghazipur faces the problem of stubble burning and it can take forward its economy by powering the farmers of the district with the renewable forms of energy; one of them being biomass energy. This can be done by bringing in the production of biomass energy, which will not only help to keep the environment clean but also add to the farmers' income. Moreover it will also solve the problem of stubble burning in the district. The district mainly cultivates sugarcane, rice and wheat, 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.

There is a need to develop awareness among people about the biomass energy, this responsibility should be given to those who can connect directly on one to one basis to the people such as village self-help groups, panchayats, etc. A proper transportation system should be developed so that there is easy transportation of the biomass wastes to the plants. The authorities responsible should make a easy business environment in the district, so that more and more people are attracted to it. Biofuel production should also be promoted in the district as it cultivates sugarcane on large scale.

4.4.3. Biogas:

- The biogas plant of at least $1m^3$ capacity should be constructed in the Gaushala that could benefit villages such as Rajdepur.

4.4.4. Hydropower:

The construction of a small hydropower plant in the Zamania canal could provide electricity in rural areas.

5. RECOMMENDATIONS

5.4. AGRICULTURE AND ALLIED SECTORS

1. Groundwater shares over 76 of NIA in the district and number of medium tube-wells increased substantially during the study period, indicating the depletion of water table. Therefore, Drip and Sprinkler irrigation systems should be encouraged, especially for vegetable and fruits cultivations. It will help to increase the water use efficiency and productivity of crops. To reduce groundwater exploration, the district needs to construct more tanks and ponds under MGNREGA.

2. Farmers should be sensitized to the overuse of fertilizer and pesticides application. They should be trained on the uses of fertilizer and chemical pesticides applications.

3. Food grains constituted about 91% of the GCA in the district, while their share in the total value of agricultural output is about 83. This calls for diversification towards high-value horticulture and livestock activities. The government can promote micro and small units for horticulture products processing. There is a needs to introduce more horticultural crops, mainly vegetables like cauliflower, cabbage, brinjal, tomato, etc., for more profits.

4. 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, on average, contributed 32.5% to the value of output of agriculture and allied activities. This indicates that it is the key driver of agriculture growth in the district, which

need to be promoted through creating an efficient marketing network and setting up dairy and dairy-based processing units. There is also a need to upgradation of local breeds for cattle and buffaloes.

5. Although, the fishery & aquaculture has only 3.13% share in the value of agriculture and allied sectors in 2018-19, but it grew with a significant average annual growth rate of 54.80% from 2011-12 to 2018-19. It indicates that there is a huge scope for raining income and livelihood through effective implementation of PM Matsya Yojana.

6. Organic farming should be encouraged to boost soil health, reduce water-use and ensure ecological, economic and social sustainability of agriculture. It could be an economically viable option 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.

7. Training to prepare the Vermicomposting and Green manuring should be organized for the farmers. Moreover, salt-tolerant crops varieties and gypsum application should be promoted in the salt-affected areas.

8. Farmers should follow the crop advisory under the drought condition and adopt techniques like drought resistance variety and maintaining moisture of soil by covering the soil.

9. About 96% of farmers in the district are small and marginal with landholdings less than two hectares. They can contribute substantial to livestock, vegetables and other labour-intensive allied farm activities.

10. There is a huge scope for mushroom cultivation for the rural youth and farm women to enhance the farmer’s income. Poly house and greenhouse could be commercially used for the high revenue crops, like capsicum, chili, onion, garlic, and strawberry, flower like rose and marigold for much returns to the farmers. Medicinal crops like tulsi, mentha, lemongrass, etc. and fruits like papaya, mango, guava, and banana should also be promoted by establishing local market, processing units and cold storage.

11. The district has scope for beekeeping and Sericulture. It should be encouraged among the farmers.

12. Per capita electricity consumption in the district agriculture increased from161.60 KWH in 2014-15 to 282.99 KWH in 2019-20, a net increase of approximately 75.11%. Since electricity consumption has increased over the years and more than 45% of total electricity consumption is in agriculture, there is a need to promote the use of solar energy in agriculture.

13. Agriculture production is vulnerable to natural and market risks. A compulsory and subsidized crop insurance system must be adopted to protect farmers' livelihood and income.

14. A new institutional framework needs to be set up at the district level where the concerned line departments' technical, human and financial resources may be pooled or converged together to provide customized solutions to the farmers related to technology, training, marketing needs and advisory services.

15. 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.

5.5. FORESTRY

Ghazipur located on the bank of river Ganga, Gomti, Gangi, Beson, Magai, Bhaisi, Tons and Karmnasa. According to ISFR 2019, 29 Sq. Km. area of Ghazipur is covered with forest. As discussed above, the forest cover of Ghazipur has decreased significantly from previous assessment. 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.

5.6. Biodiversity

It is recommended to spread awareness about biomass conservation and its importance from tourist and religious places such as Bada Mahadev Mandir, Shri Ganga Das Baba Ashram. These places can collaborate with biodiversity conservation trusts for the preservation of biodiversity.

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 indirectly relieving of stress from 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.

- Sugarcane producing farmers need learn about crop rotation as sugarcane is water intensive and draws lots of nutrients from soil too.

- It is recommended to rejuvenate and restore the water bodies of the district. This can be done by recharging old ponds and lakes present and preserving them.

- A scheme like millet mission will give a boost to crops like millets, oats, and pulses.

- It is recommended to promote animal husbandry, medicinal plants in the area to support the promote ayurvedic medicine and wetland can support the water supply for the cultivation.

- It is recommended to promote eco-tourism in the region. As the region can be development with flower garden around the wetlands area and biodiversity's. It will attract visitors and help in economy growth of the region.

5.4 ENERGY

5.4.1. Solar

- ❖ People should be made aware of the solar energy and the schemes related to it.
- ❖ Kusum Yojana should be popularized among the farmers of the district.
- ❖ Solar rooftop installations should be popularized under the National solar Mission- Phase II.
- ❖ Infrastructure for feeder segregation should be developed in the district.

5.4.2. Biomass

- ❖ People should be made aware of the biomass energy and the policies government has made to take the biomass mass energy forward.
- ❖ Husk based biomass gasifier and the bagasse based biomass plants should be promoted in the district.
- ❖ Biofuel production should also be promoted in the district as it cultivates sugarcane on large scale.

5.4.3. Biogas

- It is recommended to regularly check the condition of the existing cowshed and provide funds for biogas production generation.

5.4.4. Hydropower

- It is recommended to construct a small hydropower plant of 5MW capacity in the Zamania district.

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.
- **Bahadurganj's Ram Navmi Fair-** Celebrated in April, thousands of devotees visit the Ram Navami Mela to celebrate the birth of Lord Ram on the ninth day of the Navratri festival. This festival falls under the Hindu month of Chaitra and is considered one among the five most sacred festivals according to the Hindu religion. One of the special features of this fair is the Ram-leela act (depicting the life and times of Lord Ram) organised widely in the city. Temples all over the city are widely decorated for the mela.

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.

- **Opium Factory Tour-** Government Opium and Alkaloid Factories tour in Ghazipur can be a great tour for science students. Opium is a miracle of nature and India's gift to the world, with therapeutic benefits unrivalled in the medical world. It is also used in the indigenous medicine systems of Homeopathy and Ayurveda or Unani. Opium is a medical herb that is used as an analgesic, anti-tussive, anti-spasmodic, and a source of edible seed oil.

Monitoring, Evaluation & Impact-

	Broad objectives / recommendations	Key activities / interventions to be planned			Monitoring & Evaluation	Impact
		2022	2023	2024		
1.	To mesmerising music made by Harmonium, Tabla, Dhol, Majeera, Nagara, Jhanjh, and Kartal, the Dhobia and Poorbi Nautanki of this district. Spiritual tourism- To maintain temples on the sides of roads, in banks and shrines.	Utilising Ghazipur as the birthplace of Sitarist Pt. Ravi Shankar and famous dancer Pt. Udayshankar, for it's musical importance and festivals.	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.

6. Discussion during the Report Presentation

- Ghazipur wall hangings are interior decor items these traditional handloom products are woven by skilled craftspeople using: blend of different colors.
- A large range of designs bears testimony to the skill of the weavers from representation of figures of Hindu gods and goddesses to intricate and detailed landscape arts with patterns of houses, lawns, forests, interiors, birds and animals.
- Promotion of unique Rose Scented Spray called 'Gulab Jal'. The "Government Opium and Alkaloid works" situated in Ghazipur city is the biggest opium factory of Asia.
- 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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6 APPENDICES

6.3 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/m³)**	**Biogas potential (m³/yr)**
Cattle	Manure	3,81,891	10	1,39,39,02,150	1045426613	209085322.5	25	8363412.9
Buffalo	Manure	4,78,776	15	2,62,12,98,600	1965973950	393194790	25	15727791.6
Sheep	Manure	56,624	1	2,06,67,760	15500820	3100164	25	124006.56

Goat	Manure	37,656	1	1,37,44,440	10308330	2061666	25	82466.64
Pig	Manure	11,727	2.5	1,07,00,888	8025665.625	1605133.125	25	64205.325
Poultry	manure	22,798	0.1	8,32,127	624095.25	124819.05	25	4992.762
TOTAL		9,89,472						24,366,875.79

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/yr.)**
Maize	straw	1029	1.5	1543.5	1080.45	15	918.3825	800	734706
Wheat	straw	494151	1.5	741226.5	518858.55	30	363200.985	800	290560788
Sugarcane	Bagasse	452544	0.33	149339.52	104537.664	80	20907.5328	750	15680649.6
TOTAL									306976143.6

Table 3: Trends in Crop Production

Crop/Year	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**
Non-grain crops (Metric Tonne)	23732	26291	30355	29856	19867	16431	18010	36201	33880
Grain crops (Metric Tonne)	790572	816924	866932	885039	797360	702044	834769	934134	915443
Sugarcane (Metric Tonne)	256046	216639	334786	334722	341829	302383	316441	427842	452544
Potato (Metric Tonne)	172040	162557	144899	157882	148597	233243	193776	200517	218497

Table 4: Livestock trend in District.

Livestock	**2003**	**2007**	**2012**
Cattle (Cow)	352864	371572	381891
Buffalos	345882	374706	478776
Sheep	46528	42645	56624
Goat	250994	278716	37656
Pigs	15232	12043	11727
Chicken	8181	4532	5132
Other Poultry	19623	112035	17666
Horses and Ponies	569	264	522
Others	8181	4532	5132