Arth Ganga Project: District Shahjahanpur

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EXECUTIVE SUMMARY

Shahjahanpur located in the state of Uttar Pradesh is a pilgrimage center. The city is traversed by the rivers The Ramganga, the Garrah, and the Gomti.

The total geographical area of the district is 4575 km^2. The primary sector showed an average annual growth rate from 2011-12 to 2018-19 is only 0.89%. Thus, its share decreased from 39.12% in 2011-12 to 28.51% in 2018-19. The share of the secondary sector increased from 17.16% in 2011-12 to 20.40% in 2018-19. The sector grew with a significant average annual growth rate of 7.53%. The tertiary sector's share increased from 43.72% in 2011-12 to 51.09% in 2018-19 with a remarkable average annual growth rate of 7.29%. Overall, the district economy grew with an average annual growth rate of 5.02%.

In 2017-18, the net sown area and the gross irrigated area represents 364614 ha and 566297 ha. The cropping intensity of the district is 168.15%. The total actual irrigated area is 344715 ha. Major crop types are wheat, rice, maize, barley, tide, millet, pulses like a variety of gram, black pulse, pigeon pea, lahi mustard, etc. along with sugarcane, potato, pea, tobacco, etc. The total food grains along with pulses account for the production of 1719719 MT. The livestock consists of cattle (indigenous and crossbred), buffalos (indigenous and crossbred), pigs (indigenous and crossbred), sheep; poultry, and fisheries.

Agriculture with the horticulture sector grew at a low average annual growth rate of 2.01% from 2011-12 to 2018-19 with its share increasing from 72.57% in 2011-12 to 81.26% in 2018-19.The district's percentage of the net and gross irrigated areas have increased over the years with an average of 93.21% and 91.48%, respectively.The net sown area has increased over the years, from 80.05% in 2010-11 to 83.35% in 2017-18. The area for non-agricultural use increased slightly over the period from 9.33% to 9.62%. The nitrogen share decreased to 72.17%, while the phosphorus share increased to 22.70%, and the potassium share decreased to 5.13%. 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 increased in the district from 210.30 kg/ ha in 2010-11 to 249.11 kg/ ha in 2017-18.

The share of the livestock subsector increased from 6.88% to 14.0% with a remarkable average annual growth rate of 11.90%. The fishery & aquaculture subsector share is very minimal, around 1.76% in 2018-19 with a significant average annual growth rate of 64.47%. Mines and

quarrying also recorded a remarkable average annual growth rate of 47.62% from 2011-12 to 2018-19.

The total forest cover of the district is 59.31 km^2. The forest area represents 2.4% of the total reported area. Out of total forest cover, the maximum area is covered by Open Forest (26.31 km^2), Very dense forest (26 km^2), and moderately dense forest (7 km^2). The district's forest cover in 2003 was 118 km^2 and it kept decreasing until now. The share of forestry and logging in the total agriculture and allied sector is small, around 2.98% in 2018-19. The area share under trees and gardens decreased from 0.83% in 2010-11 to 0.56% in 2017-18.

Sant Ravindas Nagar is known for its spiritual significance and hosts fair and festivals. The district is well connected through roads and a railway network. In the year 2019, the district received 459046 domestic tourists and 261 foreign tourists. In 2020, the number of Indian visitors increased yet the number of foreign visitors fell. The district has sites such as Hanumant Dham, Baba Vishwanath Temp, Kali Badi Temple, Shaheed Dwar, Ram Prasad Bismil Smarak, etc. for tourists to visit.

In the district, 76.54% of households use kerosene as the main source of lightning, followed by 22.22% using electricity and only 0.35% using solar energy. A solar RO water plant has been installed in the district in 2017-18. Major institute departments in the district and solar power plants installed in them. Electricity consumption in agriculture has increased significantly from 77.03 KWH in 2014-15 to 260.21 KWH in 2019-20, a net increase of approximately 237.80%. The percentage share of the agriculture sector in the total electricity is around 20.77%. 39% of households use cow dung as cooking fuel, followed by 36% using firewood, 5% crop residue, and 18% LPG/PNG. Biomass plants have been installed at MS Rice Industries and M/S Agro Industries. The total number of wetlands existing in the district is 1690 consisting of both Man-made and Natural. Most of them are small or medium-sized and riverine and waterlogged. The district's biodiversity data includes various crop production, livestock population, bird species, and forest cover with 414 bird species and 31 threatened/rare species of bird in the district Biogas potential from animal waste and agricultural waste was calculated approximately as two crore m^3/year and eleven crores m^3/year. No hydropower present or plans exist.

Various measures such as eco-tourism, and sustainable tourism, should be taken to improve tourism and enhance the use of renewable energy especially by creating awareness. Maintenance of structures and waste production and handling, hygiene, and sanitation,

wetlands, etc. should be taken proper care of. Organizing festivals and fairs and proper advertisement. Strict measures against pollution, exploitation of resources, and forest products along with suggesting alternatives for the same. Agroforestry, use of high-yielding seeds, micro-irrigation, constructing and maintaining harvesting structures, adopting greenhouse farming with organic farming, and encouraging farmers for adapting different crop cultivation and various irrigation methods. Along with focussing on agriculture practices Bee culture, dairy, poultry, fisheries, etc. needs encouragement as they have high economic potential. Also, adapting to advanced technologies, proper monitoring, MIS, Geo-tagging, monthly physical and financial reports, maintenance of places and forests, shifting cultivation, floriculture, etc., are a few measures that might be adopted in the district. 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 leveler, mulching, etc.

1. DISTRICT OVERVIEW

1.1 INTRODUCTION

Shahjahanpur district is a district of Uttar Pradesh India. It is a part of Bareilly division. The district Shahjahanpur is situated in the south-east corner of the Rohilkhand division between latitude 27^0 37' and 28^0 20' north and longitude 79^o 37' and 80o 23' east.

The total population of the district is 30,06,538 in which 24,12,446 live in rural and rest 5,94,092 in urban parts. The sex ratio in the district at 872 is lower to 912 at the state level. In the total population of the district of Shahjahanpur is 30,06,538 as much as 29.68 per cent are workers and rest 70.32 per cent are non-worker. Among worker 23.27 per cent are main workers and rest of 6.41per cent are marginal workers of total population. The extant of main workers is highest at 24.74 per cent in Jalabad tahsil and lowest at 21.79 per cent in Powayan tahsil. In case of marginal workers the proportion is highest in Powayan tahsil which is 7.61 per cent in comparison to only 4.89 per cent in Jalalabad tahsils. The extent of workers in rural parts and non-workers in urban parts is higher. In the district, among workers 38.66 per cent are cultivators, while 27.0 per cent are other workers. Over 19.32 per cent of female workers are engaged as cultivators.

The land level is plain and fertile land. Of total area available for cultivation, most of the area is used as double cropped area.The land is cover by cultivable land agriculture barren land, current fallow, other fallow land ,usar and non cultibile land.. The land holdings are generally small in size. The main crops of the district are Kharif, Rabi and Zaid. The Kharif crops are sown in June-July and reaped in September-October after the cessation of the rains, usually well before the preparations of the fields for Rabi sowing which begins in October-November and are harvested in March-May. The main crops of Rabi are wheat, gram barley, pea, masoor. The main crops of Kharif are maize, bajra, rice, and juwar Sugar cane, oil seeds (like ground nut and mustard), vegetables and fruits are the notable non-food crops in the district Cotton and tobacco were the flourishing cash crops in the district in early year.

There are 2088 inhabited villages in the districts at 2011 Census. The total rural population 24,12,446 of the district is spread over 15 CD blocks. The most populated CD Block is Bhawalkhera with a population of 2,50,424 but the maximum number of inhabited villages 180 are in Pawayan CD Block.

Shahjahanpur is a municipal corporation, town and district headquarters of Shahjahanpur District in Uttar Pradesh, India. The city is between Bareilly and Lucknow, the capital of Uttar Pradesh. Dilir Khan and Bahadur Khan, sons of Dariya Khan, a soldier in the Mughal emperor Jahangir's army, founded Shahjahanpur. Dariya Khan was born in Kandahar, Afghanistan, and grew up there. Dilir Khan and Bahadur Khan were both dignitaries during Shah Jahan's reign. Following the annihilation of the rebellious Katheria Rajputs, Shah Jahan granted Dilir Khan 17 villages and permission to build a fort in 1647, pleased with his efforts. Ram Prasad Bismil, Ashfaqulla Khan, Chandrashekhar Azad, and Rajendra Lahiri, Indian freedom fighters, robbed government cash near Kakori railway station on August 9, 1925. Bismil and Khan were both born in the city of Shahjahanpur. Enayat Ali (1883–1915), Ustad Murad Ali Khan, Ustad Mohammed Ameer Khan, Pandit Radhika Mohan Moitra, and Pandit Buddhadev Das Gupta were among the great sarod players who came from the Shahjahanpur gharana over the years. Amjad Ali Khan, the current Sarod legend, is from the Shahjahanpur gharana. Shahjahanpur city is very popular for its pilgrim centres. The Hanuman Dham in the city is very popular for its Lord Hanuman statue which is of height 104 ft and also it is one of the tallest statues of Lord Hanuman in India. The Kali temple in Shahjahanpur is one of the oldest temples in the district and the residing deity Goddess Kali statue was made as a twin statue, one in the Shahjahanpur Kali temple and the other in Kolkata Kali temple. The other popular temples in the city are Alakhnath temple, Tulasi temple both of which are very close to each other and Patnadevkali kali temple. Here is the detailed list of places of worship in Shahjahanpur.

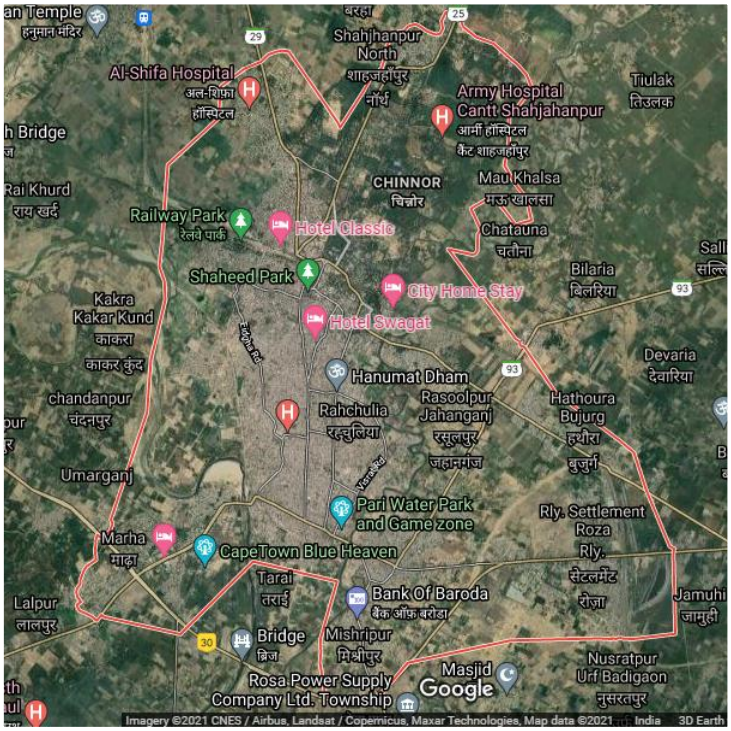


Figure 1 Map of the district

1.2 DEMOGRAPHIC PROFILE OF SHAHJAHANPUR

1. Economy and Livelihoods

- Geographical Area: 4575 Sq. Km.
- Administrative Divisions:[1]

District Headquarters: Shahjahanpur

No of Municipalities: 12

No of Tehsil: 5

No of Blocks: 15

No of Gram panchayats: 1077

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

No. Of Villages: 2325

- Demographic and socio-economic indicators:[2]

  Population: 30,06,538 (Census 2011)

  Population density (Total persons per sq. km): 685

  Sex ratio: 872

  Literacy: 59.5%

- Occupation/ other Livelihood source: Agriculture
- Major Rivers: The Ramganga, the Garrah and the Gomti
- Forest Area: 59.31 Sq. Km. (ISFR 2019)

1.3 ECONOMIC PROFILE OF SHAHJAHANPUR

The District Economy

The primary sector has a significant impact on the district economy because it contributes, on average, 32.67% share in the district GDP. However, this sector's average annual growth rate from 2011-12 to 2018-19 is only 0.89%. Thus, its share decreased from 39.12% in 2011-12 to 28.51% in 2018-19. The share of the secondary sector increased from 17.16% in 2011-12 to 20.40% in 2018-19. The sector grew with a significant average annual growth rate of 7.53%. The tertiary sector occupies, on average, 48.03% share in the district economy. Moreover, the sector grew with a remarkable average annual growth rate of 7.29%, with its share increasing from 43.72% in 2011-12 to 51.09% in 2018-19. Overall, the district economy grew with an average annual growth rate of 5.02%. Steps should be taken to increase the productivity of the primary sector so that it can grow at a higher rate. This will improve the growth rate of the overall district economy. The secondary and tertiary sectors have performed better during the study period.

[2] https://censusindia.gov.in/2011census/dchb/DCHB_A/09/0921_PART_A_DCHB_SHAHJAHANPUR.pdf

Table 1: Trends in Gross District Domestic product in Shahjahanpur 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	3912.75	1716.21	4373.17	10002.14	-	-	-	-
	(39.12)	(17.16)	(43.72)	(100)				
2012-13	3041.95	1781.67	4210.87	9034.49	-22.26	3.81	-3.71	-9.67
	(33.67)	(19.72)	(46.61)	(100)				
2013-14	3204.52	1953.68	4698.77	9856.97	5.34	9.65	11.59	9.10
	(32.51)	(19.82)	(47.67)	(100)				
2014-15	3732.25	1971.56	5274.97	10978.77	16.47	0.92	12.26	11.38
	(34.00)	(17.96)	(48.05)	(100)				
2015-16	3629.28	2223.75	5772.56	11625.58	-2.76	12.79	9.43	5.89
	(31.22)	(19.13)	(49.65)	(100)				
2016-17	4075.20	2454.29	6203.40	12732.89	12.29	10.37	7.46	9.52
	(32.01)	(19.28)	(48.72)	(100)				
2017-18	4016.82	2761.81	6457.54	13236.17	-1.43	12.53	4.10	3.95
	(30.35)	(20.87)	(48.79)	(100)				
2018-19	3959.63	2833.90	7097.07	13890.61	-1.42	2.61	9.90	4.94
	(28.51)	(20.40)	(51.09)	(100)				
Average Growth Rate					0.89	7.53	7.29	5.02

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

We further break down the primary sector GDP to find which subsector is lagging and which is driving the primary sector growth. Table 2 shows that agriculture, including the horticulture sector, grew at a low average annual growth rate of 2.01% from 2011-12 to 2018-19. However, its share increased from 72.57% in 2011-12 to 81.26% in 2018-19. Similarly, the share of the livestock subsector increased from 6.88% to 14.0% in the same period as it grew, with a remarkable average annual growth rate of 11.90%. It shows the importance of livestock in Shahjahanpur 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 2.98% in 2018-19, as it grew with a negative average annual growth rate of 10.71%. The fishery & aquaculture subsector share is very minimal, around 1.76% in 2018-19, but it grew with a significant average annual growth rate of 64.47% from 2011-12 to 2018-19. Mines and quarrying also recorded a remarkable average annual growth rate of 47.62%. 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: Trends in Gross District Domestic product from Agriculture and allied activities in Shahjahanpur 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	2810.75	266.46	786.40	9.50	3873.12	39.63	3912.75
	(72.57)	(6.88)	(20.30)	(0.25)	(100)		
	-	-	-	-	-	-	-
2012-13	2478.70	293.82	218.72	9.95	3001.19	40.76	3041.95
	(82.59)	(9.79)	(7.29)	(0.33)	(100)		
	[-11.81]	[10.27]	[-72.19]	[4.77]	[-22.51]	[2.84]	[-22.26]
2013-14	2718.86	332.10	100.50	10.26	3161.72	42.80	3204.52
	(85.99)	(10.50)	(3.18)	(0.32)	(100)		
	[9.69]	[13.03]	[-54.05]	[3.11]	[5.35]	[5.02]	[5.34]
2014-15	3166.86	365.09	130.43	10.97	3673.36	58.89	3732.25
	(86.14)	(9.93)	(3.55)	(0.30)	(100)		
	[16.48]	[9.93]	[29.79]	[6.91]	[16.18]	[37.58]	[16.47]
2015-16	3150.74	363.47	86.04	11.20	3611.45	17.82	3629.28
	(87.24)	(10.06)	(2.38)	(0.31)	(100)		
	[-0.51]	[-0.44]	[-34.03]	[2.07]	[-1.69]	[-69.73]	[-2.76]
2016-17	3352.20	515.47	118.70	13.71	4000.07	75.13	4075.20
	(83.80)	(12.89)	(2.97)	(0.34)	(100)		
	[6.39]	[41.82]	[37.96]	[22.40]	[10.76]	[321.48]	[12.29]
2017-18	3251.88	440.06	183.46	13.21	3888.61	128.21	4016.82
	(83.63)	(11.32)	(4.72)	(0.34)	(100)		
	[-2.99]	[-14.63]	[54.56]	[-3.61]	[-2.79]	[70.66]	[-1.43]
2018-19	3149.31	542.62	115.57	68.12	3875.62	84.01	3959.63
	(81.26)	(14.00)	(2.98)	(1.76)	(100)		
	[-3.15]	[23.31]	[-37.01]	[415.63]	[-0.33]	[-34.47]	[-1.42]
Average Growth Rate	2.01	11.90	-10.71	64.47	0.71	47.62	0.89

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

Table 3 shows the percentage share of subsectors in secondary and tertiary sectors. Within the secondary sector, the manufacturing sector had a share of approximately 60.70% in 2018-19. The share has increased over the years as the average annual growth in this sector is 9.29%. The share of the electricity, gas, and water supplies subsector has increased from 6.34% in 2011-12 to 7.69% in 2018-19. Moreover, this subsector grew with a remarkable average annual growth rate of 10.67%. The share of the construction sub-sector decreased from 38.80% to 31.61% in the same period, and the average annual growth rate is low (4.41%). It indicates that the secondary sector in Shahjahanpur is heavily dependent on the Manufacturing and construction sub-sectors. Within the tertiary sector, the Real estate made

up the highest share (31.08%) in 2018-19, followed by Trade & Hotel (22.31%), transport, storage, and communication (13.55%), and public administration (13.44%). Average annual growth is observed highest in transport, storage, and communication (19.62%), followed by Public Administration (9.63%), financial services (6.25%), real estate (5.89%) and lowest in trade & hotel (4.29%). All the subsectors in the tertiary sector have performed well during the study period. More work needs to be done to improve Construction and trade & hotels subsectors. Public Administration and Transport and Communication and Financial

Table 3: Trends in percentage share of non-agriculture sub-sectors in DGDP in Shahjahanpur 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	54.86	6.34	38.80	100	6.98	28.17	8.11	33.82	12.15	10.78	100
2012-13	55.89	6.59	37.53	100	7.99	24.43	8.77	37.83	10.77	10.22	100
2013-14	58.56	6.84	34.60	100	9.06	24.68	8.96	35.63	11.49	10.18	100
2014-15	55.67	7.07	37.26	100	9.18	26.45	9.02	33.72	10.33	11.30	100
2015-16	58.16	7.90	33.94	100	14.33	24.36	8.65	32.43	9.34	10.89	100
2016-17	61.53	7.77	30.71	100	13.72	24.98	7.88	31.33	10.84	11.25	100
2017-18	62.08	7.78	30.14	100	13.12	22.87	6.77	32.57	12.96	11.71	100
2018-19	60.70	7.69	31.61	100	13.55	22.31	7.42	31.08	13.44	12.20	100
Average Growth Rate	9.29	10.67	4.41	7.53	19.62	4.29	6.25	5.89	9.63	9.49	7.29

Source: Compiled from District Statistical Handbooks

2. Quantitative Data Analysis

2.1 Agriculture and Allied Activities

The total declared area of the district is 4374.69 sq. km². Forest area represents 2.4% of the total reported area. The share of cultivable wasteland decreased from 0.81% in 2010-11 to 0.51% in 2017-18, which is a good development indicator. Barren and uncultivable land share decreased slightly from 1.56% in 2010-11 to 1.22% in 2017-18. The area share under trees and gardens decreased from 0.83% in 2010-11 to 0.56% 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 80.05% in 2010-11 to 83.35% in 2017-18. The

area for non-agricultural use increased slightly over the period from 9.33% to 9.62% (Table 4). Overall, the land use pattern shows that the fallow and uncultivable land area has decreased while the NSA has increased over the years.

Table 4: Trends in Land-use Pattern in Shahjahanpur (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
2010-11	437469	2.40	0.81	3.21	1.56	1.56	9.33	0.24	0.83	80.05
2011-12	437469	2.40	0.82	3.52	1.50	1.17	9.39	0.24	0.88	80.08
2012-13	437469	2.40	0.81	3.09	1.56	1.55	9.25	0.24	0.82	80.28
2013-14	437469	2.40	0.82	3.04	1.28	1.63	9.39	0.24	0.89	80.35
2014-15	437469	2.40	0.81	3.06	1.13	1.63	9.47	0.24	0.87	80.40
2015-16	437469	2.40	0.53	1.20	0.50	1.62	9.52	0.24	0.67	83.32
2016-17	437469	2.40	0.52	1.05	0.74	1.51	9.59	0.24	0.60	83.35
2017-18	437469	2.40	0.51	1.37	0.73	1.22	9.62	0.24	0.56	83.35

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

2.1.2 Trends in Operational Land Holdings

In Shahjahanpur district, the total number of operational farms increased from 409 thousand in 2010-11 to 425 thousand in 2015-16, a net increase of 3.91%. While in the state, their numbers increased from 23,325 thousand in 2010-11 to 23822 thousand in 2015-16, a net increase of 2.13%. Most land positions in the district are marginal and small. These two size categories represented around 91.48% 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 show no significant change in the percentage share across the various categories of landholdings.

Table 5: Distribution of Operational Holdings by Size-categories of farms (in %) in Shahajahanpur							
	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.)
Shahjahanpur	2010-11	74.85	15.97	7.23	1.86	0.09	409
	2015-16	76.22	15.26	6.72	1.71	0.08	425
							[3.91]
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 different crops over the last eight years. In 2017-18, Wheat made up the highest share of GCA (40.84%), followed by Rice (31.40%); these two crops constitute around 72.4% of the GCA. The area shared by the total cereals has decreased from 77.08% in 2010-11 to 73.44% in 2017-18. The main pulses produced are Urad and Masoor, while the rest of the pulses are not significantly produced. The total pulse acreage has decreased from 5.45% in 2010-11 to 2.02% in 2017-18. Thus, the food grains cover a majority (average, 80.49%) of the GCA. Mustard and Til are the only major oilseeds crop produced, and the total oilseeds acreage has decreased from 4.82% in 2010-11 to 3.64% in 2017-18. The area under Sugarcane has increased over the years, but at the same time, the area under Potato has decreased. Moreover, it is essential 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 has increased over the years, from 58.41% in 2010-11 to 60.07% in 2017-18. The average cropping intensity in the district is 168.15.

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	33.60	34.28	35.30	35.25	33.40	33.03	31.41	31.40
Wheat	42.06	41.36	42.14	41.71	43.43	42.96	40.85	40.84
Other Cereals	1.42	1.19	1.14	1.37	1.27	1.26	1.20	1.20
Total Cereals	77.08	76.83	78.57	78.33	78.10	77.25	73.45	73.44
Urad	1.50	1.39	1.46	1.43	1.00	0.99	0.94	0.94
Masoor	3.78	5.14	3.61	3.60	0.96	0.95	0.90	0.90
Other Pulses	0.17	0.16	0.16	0.15	0.19	0.19	0.18	0.18
Total Pulses	5.45	6.69	5.23	5.18	2.15	2.13	2.02	2.02
Total Foodgrains	82.53	83.52	83.80	83.50	80.25	79.38	75.48	75.47

Mustard	2.46	2.05	2.14	2.10	1.33	1.32	1.25	1.25
Til (Net)	1.55	1.36	1.41	1.39	1.75	1.73	1.65	1.65
Other Oilseeds	0.80	0.69	0.71	0.71	0.79	0.78	0.74	0.74
Total Oilseeds	4.82	4.10	4.25	4.20	3.87	3.83	3.64	3.64
Sugarcane	6.29	6.25	6.26	6.33	11.37	11.25	10.69	10.69
Potato	1.59	1.52	1.37	1.39	0.84	0.83	0.79	0.79
Net Sown Area	58.41	56.33	58.53	58.13	61.62	63.16	60.08	60.07
Gross Sown Area (in 1000 Ha)	599.52	621.90	600.07	604.75	570.81	577.08	606.91	607.01
Cropping Intensity	171.20	177.52	170.86	172.04	162.29	158.32	166.45	166.48
Source: http://updes.up.nic.in/spiderreports/intialisePage.action								

2.1.3.2 Trends in per hectare yield of principal crops

Table 7 shows that the yield per hectare of most crops varies from year to year. However, the yield for most of the major crops has increased in the latter years of the study. It can be due to improved irrigation facilities and the availability of better infrastructure. Wheat and Rice are the major crops in the district, and their per hectare yield (39.93 qtls and 36.03 qtls respectively, in 2017-18) are also high. Per hectare yield of total cereals has increased from 29.01 qtls in 2010-11 to 37.88 qtls in 2017-18. Similarly, per hectare yield of total pulses increased from 6.17 qtls in 2010-11 to 25.24 qtls in 2017-18. However, the yield of Pulses is less than that of cereals, following which the total production of pulses is less. The yield of total oilseeds has increased from 6.36 qtls in 2010-11 to 10.96 qtls in 2017-18. This can be due to the availability of hybrid seeds in the district. However, the rise in the yield of most 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 average yield of sugarcane is only 586.93 qtls/ha. The yield of Potato is high, average, 294.17. Since Sugarcane and Potato are high-value crops, they can help double farmers' income if proper marketing and infrastructure support are provided. In summary, all crop yields show yearly fluctuations. The lack of homogeneity of yields makes farmers' income riskier and more unstable, requiring a solid insurance protection measure.

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

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	21.38	26.04	26.84	26.92	28.50	25.77	32.90	36.03
Wheat	35.96	38.61	36.36	35.25	19.79	35.86	42.53	39.93
Total Cereal	29.01	32.60	31.75	31.16	23.41	31.13	37.96	37.88
Urad	1.96	6.60	5.81	6.18	6.51	4.15	16.67	15.84
Masoor	7.49	7.90	9.68	8.19	6.08	8.69	48.78	35.62
Total Pulses	6.17	7.75	8.79	7.81	6.40	6.45	30.36	25.24
Total Food Grains	27.50	30.61	30.32	29.71	22.95	30.47	37.76	37.54
Mustard	8.74	8.71	9.43	8.10	5.08	9.36	15.39	23.30
Til (Net)	0.99	1.09	1.02	0.84	1.20	1.29	1.19	0.77
Total Oilseeds	6.36	6.63	6.38	7.01	4.44	5.69	8.38	10.96

Sugarcane	563.24	591.72	614.00	609.08	675.64	612.47	457.59	571.69
Potato	182.27	240.91	215.06	308.96	103.05	258.33	497.09	547.69
Source: http://updes.up.nic.in/spiderreports/intialisePage.action								

2.1.3.3 Trends in Production of Principal Crops

Table 8 shows the trends in the production of the main crops over the years. Rice, Wheat, and Sugarcane dominate the production. In 2017-18, Rice (686.88 thousand tons) and Wheat (989.81 thousand tons) formed a major part of the total cereal production (1688.71 thousand tons). In the case of pulses, Urad and Masoor occupied the highest production. Production of Urad and Massor was 9.05 thousand tons and 19.50 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 92% of the total pulse production. Pulses production in the district was quite low, indicating that pulses are not an important part of the district's agriculture. Mustard production was 17.73 thousand tons, which represented around 73% of the total oilseeds production in 2017-18. Sugarcane is another important crop whose production has been significant in the district (3710.82 thousand tons in 2017-18). Potato production has also been significant over the years (1263.33 thousand tons in 2017-18). Looking at the annual production data of various crops, we find that their production has increased on average during the period, but at the same time 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 Shahjahanpur District (in 1000 Tons)

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	430.75	555.12	568.57	574.02	543.28	491.22	627.06	686.88
Wheat	906.58	993.15	919.40	889.07	490.53	889.04	1054.36	989.81
Other Cereals	3.23	9.56	8.98	12.66	9.80	7.70	10.98	12.02
Total Cereals	1340.56	1557.83	1496.95	1475.74	1043.60	1387.96	1692.39	1688.71
Urad	1.77	5.72	5.08	5.33	3.72	2.37	9.53	9.05
Masoor	16.99	25.27	20.95	17.83	3.33	4.76	26.71	19.50
Other Pulses	1.39	1.24	1.55	1.31	0.81	0.79	1.06	2.45
Total Pulses	20.14	32.23	27.58	24.47	7.86	7.92	37.30	31.01
Total Foodgrains	1360.70	1590.06	1524.53	1500.21	1051.47	1395.88	1729.69	1719.72
Mustard	12.89	11.12	12.10	10.31	3.86	7.13	11.71	17.73
Til (Net)	0.92	0.92	0.86	0.71	1.20	1.29	1.19	0.77
Other Oilseeds	4.56	4.89	3.32	6.79	4.77	4.18	5.64	5.73
Total Oilseeds	18.38	16.93	16.28	17.81	9.83	12.60	18.54	24.24
Sugarcane	2124.09	2300.43	2307.23	2330.95	4385.51	3975.49	2970.18	3710.82
Potato	173.50	227.76	176.61	259.16	49.55	124.21	239.00	263.33
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 in the areas is observed in Wheat (1.37%), followed by Rice (5.47%) and Til (8.24%), and the highest in Masoor (71.30%). The variability in the area under total pulses (52.33%) is more as compared to the variability in the area under total cereals (3.12%). Since Rice and Wheat dominate the production, the variability in the area under total food grains is also relatively low (5.44%).

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

	Area (1000 Ha)			Production (1000 Tons)			Yield (Qtl./Ha)		
Crop/Year	Average	SD	COV	Average	SD	COV	Average	SD	COV
Rice	200.27	10.96	5.47	559.61	78.01	13.94	28.05	4.53	16.16
Wheat	250.76	3.43	1.37	891.49	172.51	19.35	35.54	6.83	19.23
Total Cereal	458.53	14.29	3.12	1460.47	210.56	14.42	31.86	4.70	14.75
Urad	7.23	1.63	22.49	5.32	2.82	53.03	7.97	5.35	67.11
Masoor	15.00	10.69	71.30	16.92	8.63	51.04	16.55	16.25	98.15
Total Pulses	23.26	12.17	52.33	23.56	10.95	46.46	12.37	9.66	78.10
Total Food Grains	481.80	26.22	5.44	1484.03	220.11	14.83	30.86	4.90	15.87
Mustard	10.44	3.09	29.62	10.86	4.09	37.64	11.01	5.73	52.00
Til (Net)	9.32	0.77	8.24	0.98	0.22	21.97	1.05	0.18	17.19
Total Oilseeds	24.22	2.51	10.37	16.82	4.28	25.45	6.98	1.95	27.98
Sugarcane	51.51	14.33	27.82	3013.09	891.24	29.58	586.93	62.44	10.64
Potato	6.85	2.23	32.55	189.14	74.15	39.20	294.17	153.57	52.21

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 higher than in the cultivated area of all crops. The highest variability in production is observed in Urad (53.03%), followed by Masoor (51.04%), Potato (39.20%), mustard (37.64%), and sugarcane (29.58%). High variation in the production of pulses and oilseeds is partly due to variation in the land area under them and partly due to the high rate of seeds and non-availability of hybrid seeds. Improvement in crop insurance conditions and better market accessibility can lower this variation. Variability is lowest in Rice (13.94%), followed by Wheat (19.35%) and till (21.97%).

In the case of yield, the greatest variability is estimated in Masoor (98.15%), Urad (67.11%), and Potato (52.21%). Yield variability in total cereals (14.75%) and total food grains (15.87%) is lower as compared to that in total pulses (78.10%). Rice, Wheat, and Sugarcane are the most consistent crops over the years. Several factors, such as climate change, market prices, rainfall patterns, etc., influence the variability in agricultural production.

2.1.4 Trends in Value of production of major crops

Table 10 compares the share of the main crops in the total GCA and their share in the total value of agricultural output (VOP). It is significant to note that total cereals, total foodgrains, and total oilseeds, on average, have a relatively larger share in GCA than their share in VOP. Potato and sugarcane have, on average, a greater share in VOP than GCA. Food grains accounted for around 80.49% of the GCA, while their share in total value of the agricultural product was only 67.49%. Three crops - Wheat, Rice, and Sugarcane together accounted for 83% of GCA and 90% of the total VOP. Overall, the total agricultural GCA has increased in the latter years of the study (average, 598.50 thousand hectares). The total value of the product has also increased significantly, that is, Rs.3003.85 Cr. in 2010-11 to Rs.5551.30 Cr. in 2017-18.

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

Crop	% Share in	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Wheat	GCA	42.06	41.36	42.14	41.71	43.43	42.96	40.85	40.84
	VOP	38.78	32.91	30.38	27.90	19.93	34.14	35.04	30.76
Paddy	GCA	33.60	34.28	35.30	35.25	33.40	33.03	31.41	31.40
	VOP	31.55	32.80	33.41	32.82	37.31	30.57	33.35	27.84
Total Cereals	GCA	77.08	76.83	78.57	78.33	78.10	77.25	73.45	73.44
	VOP	70.46	66.03	64.08	61.11	57.58	64.97	68.71	58.93
Total Pulses	GCA	5.45	6.69	5.23	5.18	2.15	2.13	2.02	2.02
	VOP	4.14	5.17	4.15	3.69	1.16	1.42	5.25	3.04
Total Food Grains	GCA	82.53	83.52	83.80	83.50	80.25	79.38	75.48	75.47
	VOP	74.61	71.19	68.23	64.80	58.75	66.39	73.96	61.97
Total Oilseeds	GCA	4.82	4.10	4.25	4.20	3.87	3.83	3.64	3.64
	VOP	2.43	1.76	1.72	2.20	1.57	1.54	1.84	1.93
Potato	GCA	1.59	1.52	1.37	1.39	0.84	0.83	0.79	0.79
	VOP	6.05	6.13	5.38	7.54	0.61	1.48	2.70	3.98
Sugarcane	GCA	6.29	6.25	6.26	6.33	11.37	11.25	10.69	10.69
	VOP	16.62	20.72	24.46	25.26	39.01	30.53	21.39	31.42
Paddy + wheat + sugarcane	GCA	81.95	81.89	83.70	83.29	88.20	87.24	82.95	82.94
	VOP	86.95	86.43	88.24	85.98	96.25	95.25	89.78	90.01
Total Agriculture	GCA (1000 Ha)	599.52	621.90	600.07	604.75	570.81	577.08	606.91	607.01
	VOP (in Cr Rs)	3003.85	4163.92	4509.72	4844.44	3260.55	3775.82	4513.18	5551.30
Per Worker VOP (Rs.1000 at current prices) in **Shahjahanpur**		-	57.74	61.47	78.18	72.65	85.81	96.47	107.98

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 Shahjahanpur district increased from Rs.57.74 thousand in 2011-12 to Rs. 107.98 thousand rupees in 2017-18, a net increase of 87.02% at current prices, while in UP it increased from Rs.40.66 thousand to Rs.69.69 thousand, a net increase of 71.40%. The per worker agricultural output is higher in the district than in the state. The per worker value of output grew faster in the district than in the state. The ratio of per worker value of the district's output to the state average has increased from 1.4202 in 2011-12 to 1.5495 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 76.37% of the total fertilizers used, while the proportions of phosphorus and potassium were 17.71% and 5.91%, respectively. In 2017-18, however, the nitrogen share decreased to 72.17%, while the phosphorus share increased to 22.70%, and the potassium share decreased to 5.13%. 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 increased in the district from 210.30 kg/ ha in 2010-11 to 249.11 kg/ ha in 2017-18, which is not a good sign. The authorities need to take steps to reduce their consumption 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	160.61	162.64	150.06	119.45	134.71	123.87	115.54	179.79
Phosphorous	37.25	30.55	42.36	30.49	38.83	46.40	45.16	56.54
Potassium	12.44	5.47	5.02	4.19	7.92	8.49	9.53	12.78
Total	210.30	198.66	197.45	154.13	181.46	178.76	170.22	249.11
Gross Sown Area (Ha)	599519	621897	600065	604746	570805	577078	606913	607012
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 (892 km) over the years. A number of ground-level pump sets have also remained constant (150) over the years. Government tube wells increased from 451 in 2010-11 to 561 in 2018-19. Shallow, medium, and deep tube wells increased by 1.67%, 259.63%, and 143.75%, respectively, in 2018-19 compared to 2010-11. The district's percentage of the net and gross irrigated areas have increased over the years with an average of 93.21% and 91.48%, 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)	892	892	892	892	892	892	892	892	892
No. of Govt. Tube wells	451	451	451	451	451	505	548	548	561
No. of Ground-level Pump set	150	150	150	150	150	150	150	150	150
Shallow Tube well	105544	106027	106408	106840	107059	107059	107260	107316	107316
Medium Tube well	109	122	141	207	373	373	392	392	392
Deep Tube well	48	76	79	94	116	115	117	117	117
% Of NIA	92.01	91.95	91.92	91.91	94.30	94.54	94.54	94.54	-
% Of GIA	89.57	88.84	90.33	90.39	93.13	92.95	93.30	93.29	-

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, 1.97%) has decreased over the years, and the share of wells and tube wells in NIA (average, 96.99%) has increased over the years. It shows the increased dependency of the district on the groundwater for irrigation purposes, and it can have serious environmental issues if such a pattern continues in the long run.

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

Source/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Canal (surface Irri.)	3.10	1.66	3.56	2.96	3.04	0.49	0.49	0.49
Wells And Tube-wells (GW Irri.)	96.90	98.34	96.44	97.04	96.96	96.71	96.71	96.84
Others	0.00	0.00	0.00	0.00	0.00	2.80	2.80	2.67
NIA (1000 ha)	322.21	322.11	322.83	323.10	331.65	344.61	344.72	344.72

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

2.1.6.3 Crop-wise Irrigated Area

Table 14 shows that a majority area under Rice (average, 100%), Wheat (average, 100%), Potato (average, 100%), and Sugarcane (average, 100%) is irrigated. Percentages of the irrigated area under pulses (average, 7.79%) and oilseeds (average, 42.50%) are relatively less.

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

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	100	100	100	100	100	100	100	100
Wheat	100	100	100	100	100	100	100	100
Total Cereal	98.31	98.55	98.64	98.68	98.59	98.59	98.59	98.59
Total Pulses	4.65	3.73	5.27	4.74	10.97	10.97	10.97	10.97
Total Foodgrains	92.13	90.95	92.82	92.86	96.24	96.24	96.24	96.24
Total Oilseeds	50.38	49.61	49.90	49.80	35.08	35.08	35.08	35.08
Sugarcane	100	100	100	100	100	100	100	100
Potato	100	100	100	100	99.96	99.96	99.96	99.96

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 77.03 KWH in 2014-15 to 260.21 KWH in 2019-20, a net increase of approximately 237.80%. This is a cause of concern as this can result in an increased burden on non-renewable resources and create waste disposal problems. The percentage share of the agriculture sector (average, 20.77%) 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 power.

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)	77.03	90.64	185.56	221.18	225.51	260.21
% Of electricity consumed in Agriculture sector to total consumption	20.05	18.43	19.90	21.89	24.94	23.01

Source: District-wise Development Indicators file

2.1.8 Status of Agriculture Market

Table 16 shows the marketing infrastructure in the district. It has five main markets and eight sub-markets. The number of regulated mandis per lakh hectare of Net area sown has decreased from 3.42 in 2013-14 to 3.29 in 2018-19, which is a cause of concern as it is very important to increase the number of regulated mandis so that farmers are able to sell their products efficiently.

Table 16: Status of Agriculture Markets in Shahjahanpur

Category/Year	2013 -14	2014 -15	2015 -16	2016 -17	2017 -18	2018 -19	2019 -20
Main Markets (No.)	5	5	5	5	5	5	5
Sub Markets (No.)	7	7	7	7	7	8	8
Total Markets (No.)	12	12	12	12	12	13	13
No. of Regulated mandis per lakh Ha. of net area sown	3.42	2.74	-	1.42	1.37	3.29	-

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

2.1.9 Status of Organic Farming

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

The transition period for the full conversion from conventional to organic is considered three years. During this period, crop yield, on average, is expected to decline by 10—15 percent. 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 of the project should be periodically done through MIS, Geo-tagging, and monthly physical and financial reports.

However, the policy-related issue is what would be after the three years? Will the government protect their income? There may be a possibility that the beneficiary farmers may revert to conventional farming in the absence of the regulatory framework. In this context, two things need to be thought of—a well-designed regulatory and monitoring framework and introduction of payments for ecosystem services for the organic farmers after the transition period 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 fifteen groups in two development blocks. The highest number of groups are in Kalan (13), followed by Mirzapur (2). 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 Shahjahanpur (as on June 30, 2021)

S. No.	Block	Scheme	No. of groups	No. of farmers in groups			
				Total	Average	Median	SD
1	Kalan	PKVY	13	377	29	28	6.5
2	Mirzapur	PKVY	2	71	35.5	35.5	3.53
3	District Total	PKVY	15	448	29.86	30	6.51
		Total	15	448	29.86	30	6.51

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 marketing problem is even more serious in the case of perishable vegetable crops. Contract farming companies and Farmer Producers' companies can be encouraged.
3. To get the scheme's benefit, farmers generally practice organic farming only on a small part of their land (less than one ha).
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. Table 18 reveals that indigenous and exotic male cattle decreased considerably from 141127 in 1997 to 34037 in 2019 and from 6909 in 1997 to 1390 in 2019, respectively. On the other hand, indigenous and exotic female cattle increased considerably from 153884 in 1997 to 211206 in 2019, and from 7373 in 1997 to 14510 in 2019, respectively. Thus, the total number of cattle decreased only slightly from 309290 in 1997 to 261143 in 2019, thus, a net decrease of 15.56%. 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 51.37% 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 (59.43%) in 2019 compared to that in 1997. During the same period, the population of exotic sheep also decreased, thus, indicating a decrease in the total sheep population by 60.79%. The total population of goats decreased from 228936 in 1997 to 113702 in 2019, a net decrease of 50.33%. The total pig population decreased considerably from 42969 in 1997 to 4505 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 10.67% share in the agriculture and allied activities sector and grew at a significant average annual growth rate of 11.90% from 2011-12 to 2018-19.

Table 18: Trends in Livestock population (in numbers) in Shahjahanpur

	Category	1997	2003	2007	2012	2019
Indigenous Cattle	Total Male	141127	107882	109781	106213	34037
	Total Female	153884	122170	118402	161021	211206
	Total	295011	230052	228183	267234	245243
Exotic Cattle	Total Male	6906	6698	6281	7008	1390
	Total Female	7373	7785	9382	14236	14510
	Total	14279	14483	15663	21244	15900
Total Cattle		309290	244535	243846	288478	261143
Buffalo	Total Male	163899	136252	78888	148316	42050
	Total Female	236020	178938	237914	341911	563337
	Total	399919	315190	316802	490227	605387
Sheep	Total Indigenous Sheep	7407	4193	3079	3084	3005
	Total Exotic Sheep	257	0	120	1748	0

	Total Sheep	7664	4193	3199	4832	3005
Goat	Total	228936	242550	274754	203681	113702
Pig	Total Indigenous Pig	34932	28185	20806	19851	4502
	Total Exotic Pig	8037	3893	3578	3761	3
	Total Pig	42969	32078	24384	23612	4505
Total Livestock		997093	846947	866199	1016388	-
Total Poultry		129433	125023	108362	71188	-
Source: http://updes.up.nic.in/spiderreports/intialisePage.action And http://dahd.nic.in/animal-husbandry-statistics						

2.1.10.2 Cattle Care Centre

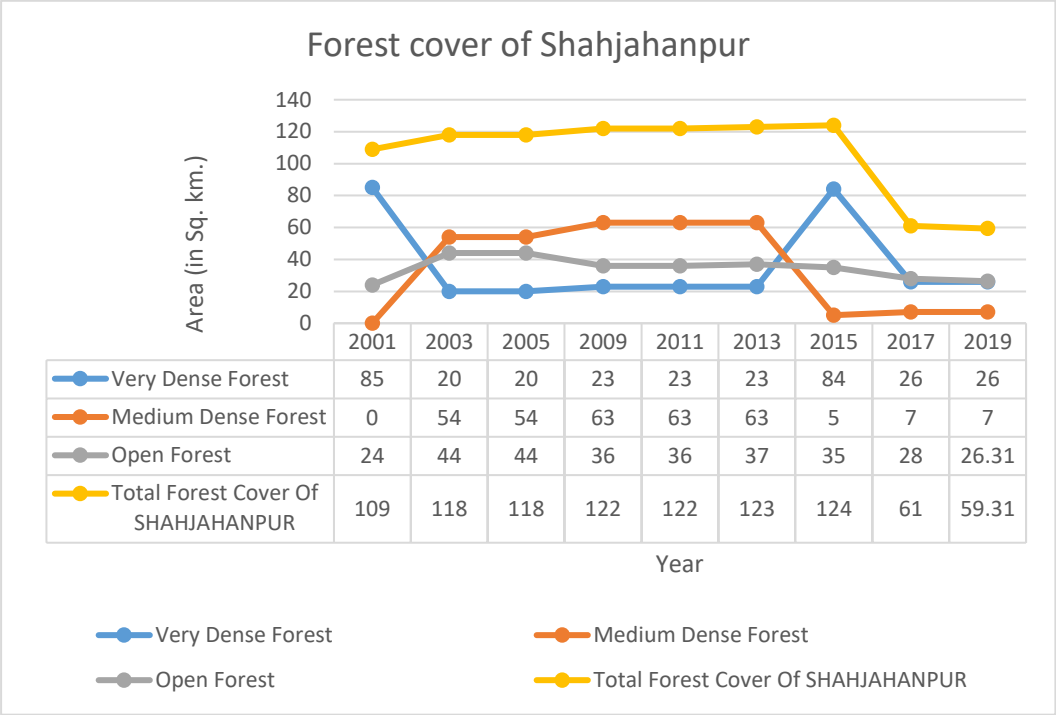
Table 19 shows that the Shahjahanpur district has an active network of cattle hospitals and development centres which are very necessary for the livestock sub-sector to grow. The number of cattle hospitals (31) and cattle development centres (26) remained constant over the years. The number of man-made reproduction centres increased from 45 in 2010-11 to 60 in 2018-19. The number of poultry units increased from 181 in 2010-11 to 207 in 2018-19. There are very few sheep and pig development centres which might be one of the reasons for the declining sheep and pig population in the district.

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

Category	2010 -11	2011 -12	2012 -13	2013 -14	2014 -15	2015 -16	2016 -17	2017 -18	2018 -19
Cattle Hospital	28	28	28	31	31	31	31	31	31
D- category Cattle Dispensary	3	3	3	3	3	3	3	3	3
Cattle Development Centre	25	25	25	25	26	26	26	26	26
Man-Made Reproduction Centre	45	45	45	45	45	45	60	60	60
Sheep Development Center	0	0	0	2	2	0	2	2	2
Pig Development Center	5	5	5	5	5	5	9	9	9
Poultry Unit	181	187	620	392	330	400	200	200	207
Source: http://updes.up.nic.in/spiderreports/intialisePage.action									

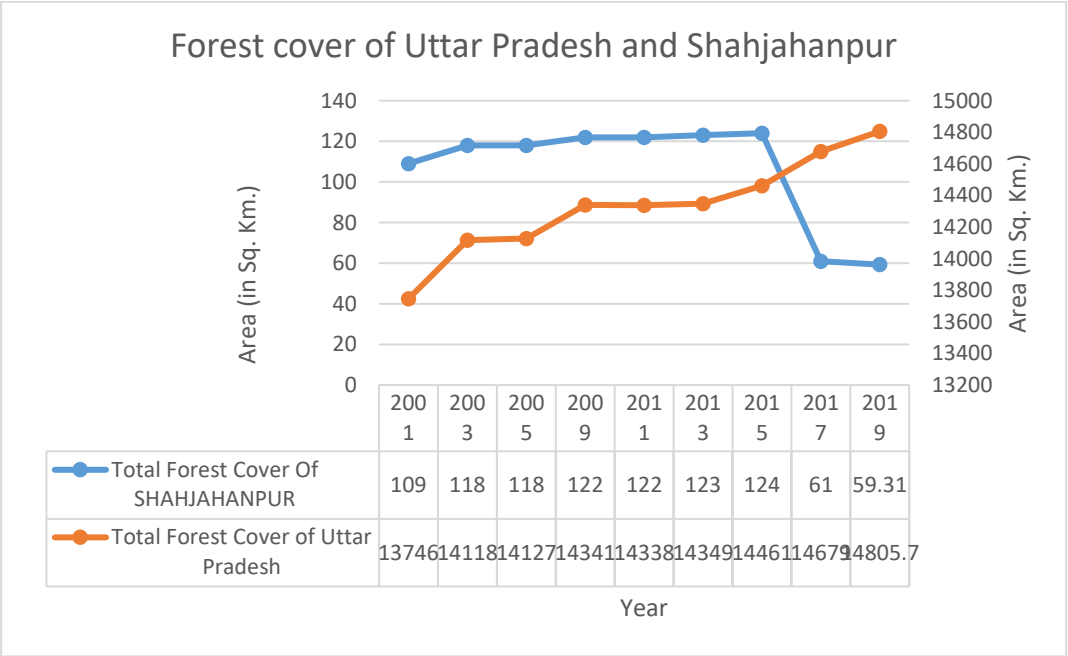
2.2 FORESTRY

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



	2001	2003	2005	2009	2011	2013	2015	2017	2019
Very Dense Forest	85	20	20	23	23	23	84	26	26
Medium Dense Forest	0	54	54	63	63	63	5	7	7
Open Forest	24	44	44	36	36	37	35	28	26.31
Total Forest Cover Of SHAHJAHANPUR	109	118	118	122	122	123	124	61	59.31

According to the ISFR reports, over the years, the forest cover of Shahjahanpur has decreased. In the recent ISFR 2019, the forest cover of the district is about 59.31 Sq. Km. Majorly open and very dense forest followed by medium dense forest are found.



	2001	2003	2005	2009	2011	2013	2015	2017	2019
Total Forest Cover Of SHAHJAHANPUR	109	118	118	122	122	123	124	61	59.31
Total Forest Cover of Uttar Pradesh	13746	14118	14127	14341	14338	14349	14461	14679	14805.7

The forest cover of Uttar Pradesh has increased significantly between 2001 and 2019, but the forest cover of Shahjahanpur has decreased significantly.

2.1.1. Biodiversity

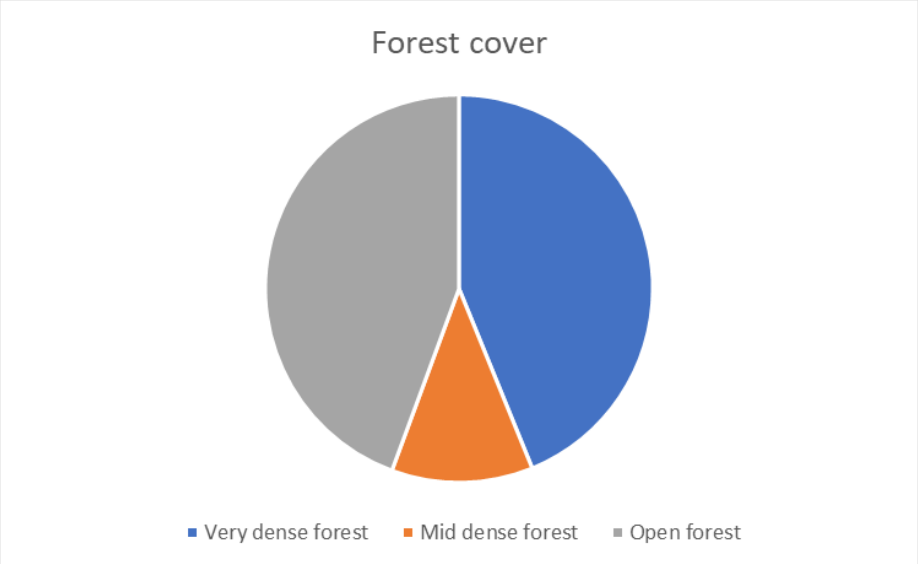
The district's biodiversity data includes various crop production, livestock population, bird species, and forest cover. The crop production trend shows an increase in crop production. Forest data shows that forest cover was decreased by 1.69 % in 2019. There are 414 bird species and thirty-one globally threatened species of bird in the district.

Table 1 Bird species recorded in the district.

Number of species	414
Number of rare/accidental species	31

Table 2 Forest cover in a square kilometer.

Geographical area	**Very dense forest**	**Mid dense forest**	**Open forest**	**Total**	**% of Geographical area `**	**Change with respect to 2017 assessment**	**Scrub**
4388	26	7	26.31	59.31	1.35	-1.69	1.17



2.3. TOURISM

Baseline data/Quantitative Data
Total number of tourists visiting Mirzapur

YEAR	INDIAN	FOREIGN	TOTAL
2015	234665	135	234800
2016	280819	150	280969
2017	321479	167	321646
2018	394902	211	395113
2019	459046	261	459307

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

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

a. In the year 2015 Shahjahanpur received total **234665** tourists. Number of Domestic travellers were **234665** and total international travellers were 135.

b. In the year 2016 Shahjahanpur received total **280969** tourists. Number of Domestic travellers were 280819 and total international travellers were 150. The district experienced a total growth of 19.7% in total number of tourists compared to number in the previous year.

c. In the year 2017 Shahjahanpur received total **321646** tourists. Total number of Domestic travellers were **321479** and total international travellers were 167. The district experienced a total growth of 14.4% in total number of tourists compared to number in the previous year.

d. In the year 2018 Shahjahanpur received total **395113** tourists. Total number of Domestic travellers were **394902** and total international travellers were 211. The district experienced a total growth of 22.8% in total number of tourists compared to number in the previous year.

e. In the year 2019 Shahjahanpur received total **459307** tourists. Total number of Domestic travellers were **459046** and total international travellers were 261. The district experienced a total growth 16.2% in total number of tourists compared to number in the previous year.

2.4. WETLANDS

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

Table 1: Wetland Data of Shahjahanpur 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	72	75	3	0	8	17	18	22	7	0	0	0	55
Ox-bow lakes/cut-off meanders	32	38	6	0	6	7	10	6	2	1	0	0	17
High altitude Wetlands	0	0	0	0	0	0	0	0	0	0	0	0	0
Riverine Wetlands	110	130	20	0	9	13	22	30	33	3	0	0	19
Waterlogged	90	94	4	0	17	20	23	22	8	0	0	0	48
River/Stream	0	178	178	0	0	0	0	0	0	0	0	0	0
Man-made Wetlands	**NRCD**	**NWIA**	**Diff.**	**<2.25**	**<5**	**<10**	**<20**	**<50**	**<200**	**<500**	**<1000**	**>1000**	**AV**
Reservoirs/Barrages	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanks/ponds	11	11	0	0	6	4	1	0	0	0	0	0	0
Waterlogged	73	75	2	0	20	22	15	11	5	0	0	0	23
Salt pans	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (1690)	**388**	**601**	**213**	**1089**	**66**	**83**	**89**	**91**	**55**	**4**	**0**	**0**	**162**

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

2.5. ENERGY

2.5.1. Solar

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

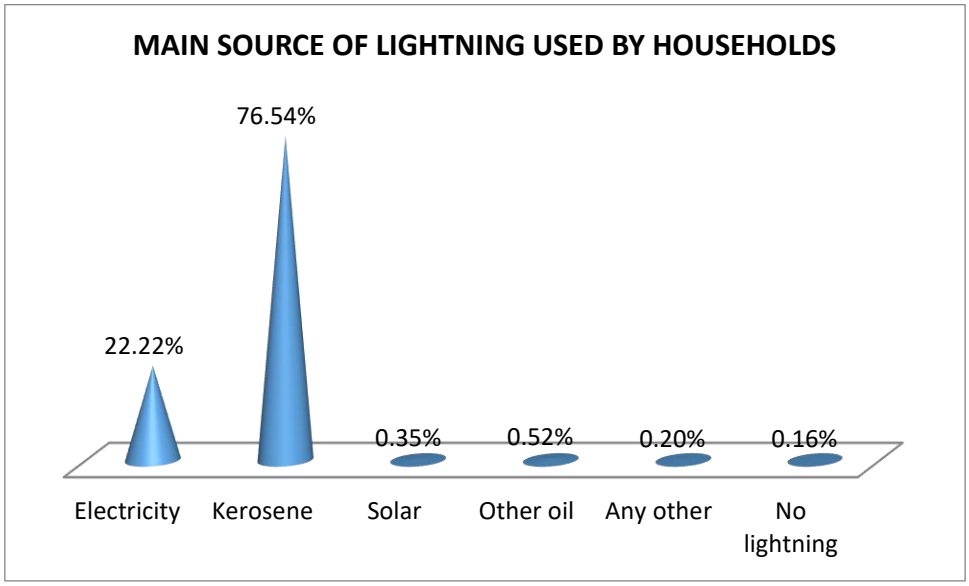


Fig. 1

According to the 2011 census, 76.54% households use .kerosene as the main source of lightning, followed by 22.22% using electricity and only 0.35% using solar energy.
A solar RO water plant has been installed in the district in 2017-18.
_Major institute departments in the district and solar power plants installed in them - IOCL Banthra : 100 KW, Shukdevanand La College : 72 KW, Collectorate : 50, Market Committee Rosa: 55kW, SS Law College : 45, Vikas Bhawan : 25, Arun Khandelwal Taxila : 25, ITI Roza : 20, Shashibala, Sudama Prasad School : 17, Divisional Engineer Railway: 16, Akhilesh Dixit Diagnostic Pathology: 15, Sanjay Saxena Pratap Enclave : 10, Renu Khandelwal, Tareen Bahadur Ganj : 8, Arif Baduzai: 8 Ashok Agarwal, Friends Colony : 8, Sant Kripal Academy : 6 and others about 100 people : 400 kW The department buys electricity from consumers at Rs 3.81 per unit.. The cost of the solar plant is paid in five years and Solar power plant version lasts for 20 to 25 years.
Commercial power plants of solar energy in the district are - 50 MW Adani Solar Jalalabad, 10 MW MP Solar Tilhar, 50 MW Tata Banda under construction and 2 MW Sukhveer Agro Puwayan.

2.5.2. Biomass

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

According to the 2011 census 39% households use cow dung as cooking fuel, followed by 36% using firewood, 5% crop residue and 18% LPG/PNG. Majority of population in Shahjahanpur is mainly dependent on agriculture as their primary source of income. Rice, jowar, maize, pigeon pea, wheat chick pea, lentils, etc. are some of the major crops grown in the district.

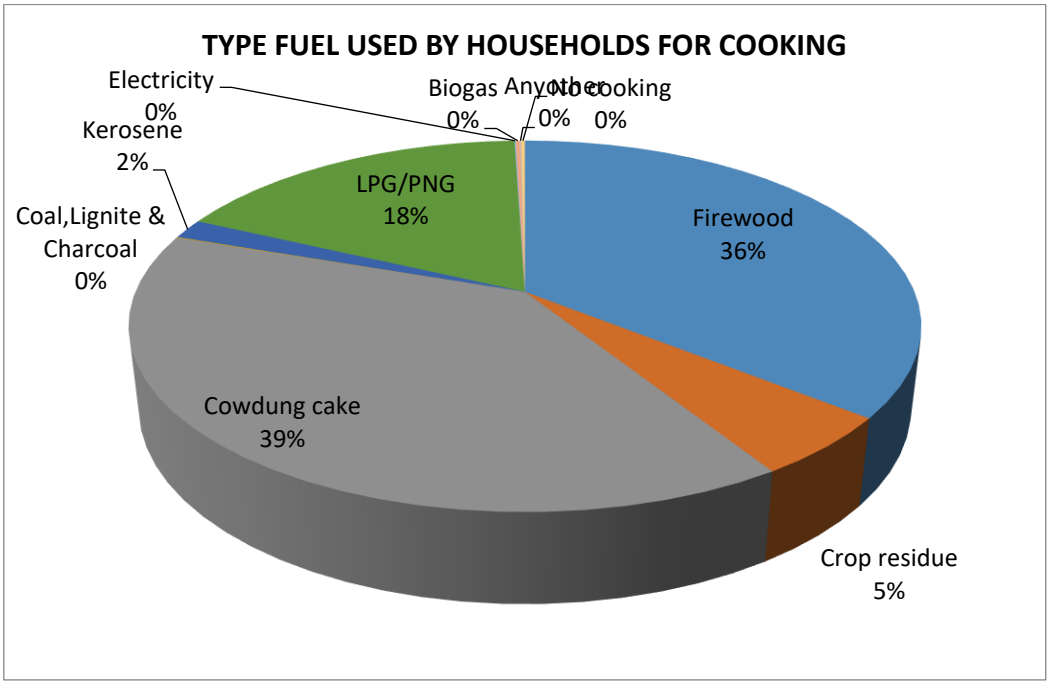


Fig. 1

The gross cropped area of the district is 206768 ha with the cropping intensity 172.41%. The district has a of forest land of 4093 ha. The district produces of agricultural biomass of 1852.3 kt/yr and forest based biomass 21.7kt/yr. (Kumar et. al. 2017)

Table.1 gives an account of productivity of some of the major crops in the district.

CROPS	PRODUCTIVITY (kg/ha)
Rice	29.62
Jowar	89.70
Maize	17.09
Pigeon pea	1132
Wheat	27.22
Chick pea	12.90
Lentil	9.89

Table 1

Biomass plants have been installed at MS Rice Industries and M/S Agro Industries.

2.5.3. Biogas

. Biogas data is not available for the district. Based on the livestock population and agricultural waste biogas potential calculated. Biogas potential from animal waste and

agricultural waste was calculated approximately as two crore m^3/year and eleven crores m^3/year. This amount of biogas generation can efficiently complete the energy demand of the district.

2.5.4. Hydro Power

No hydropower plant exists nor the site has been identified in the district. The Ramganga, Garrah, and Gomti are the district's three major rivers. The rivers Kathana, Jhukma, and Mensi all run into the Gomti. The Garrah is fed by the Khannaut, Suketa, and Kai Rivers. A survey or identification of the site must require for the construction of hydropower plants.

3 QUALITATIVE DATA ANALYSIS

3.1 FORESTRY

To increase forest resources in the country, Ministry of Environment, Forest and Climate Change is implementing a number of Schemes under which financial assistance is provided to State/UT Governments. Some of major schemes of the Ministry are National Afforestation Programme (NAP) and Green India Mission (GIM), Integrated Development of Wildlife Habitat (IDWH), Intensification of Forest Management Scheme (IFMS), Project Tiger and Project Elephant including funds under Compensatory Afforestation Fund Management and Planning Authority (CAMPA).[3]

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.[4]

[3] https://pib.gov.in/newsite/PrintRelease.aspx?relid=148508

[4] State Action on Climate Change, Uttar Pradesh

3.1.1. Biodiversity

Shahjahanpur has 5.28kha of tree cover in 2010, covering 1.1 percent of the total land area. It lost 13.7 hectares of forest cover in 2012, resulting in 6.48 kt of CO2 emissions. The main fire season in Shahjahanpur usually starts in late October and lasts for around 15 weeks. Between the 14th of June 2021 and the 6th of June 2022, there were 28 VIIRS fire alarms recorded, based on high confidence alerts alone. When compared to recent years, dating back to 2012, this is typical. Rivers and ponds like as the Ganga, Gomti, Ramganga, Bahgul, Garra, and Khannaut are boosting biodiversity in the district. As a result, numerous different animals have been discovered here, including black buck, chital, sehi, iguanas, brock tiger, and leopard.

3.2. ENERGY:

As per the data of the year 2013, Shahjhanpur district energy consumption is around 1263 TJ/year and 3.6 GJ/capita/year. GHG emission of 86,757 Ton CO_2 equivalent and 0.249 Ton CO_2 equivalent/capita has been evaluated for the district.

3.2.1. Solar

The district has a good potential of solar energy and has been able to exploit its potential to some extent. An article in Business Today, with the heading ‘Adani Green Energy commissions 100 MW solar power plant in Jalalabad’ reads- Adani Green Energy on Monday said that its arm ASE4PL has commissioned a 100 MW solar power project at Jalalabad in Uttar Pradesh.

"ASE4PL (Adani Solar Energy Four Private Ltd), a subsidiary of Adani Green Energy Ltd (AGEL), commissioned 100 MW (2x50 MW) Solar Power Plants at Jalalabad in Shahjahanpur district and Sahaswan in Budaun district of Uttar Pradesh," a company statement said.

Another article in a local daily reads- Solar power plants and LED equipment are playing a major role in the power crisis produced by the nationwide shortage of coal. With the use of new options, about 80 percent power consumption on lighting has been reduced. About 500 kW electricity is being saved by installing net meters along with solar plants at about 200 houses and establishments in the district.

The district has a power consumption of 300 to 360 MW. Adani Group is producing 50 MW in Jalalabad, MP Solar 10 MW in Tilhar, Tata Solar producing 50 MW in Banda and Sukhveer Agro producing 2 KW of electricity. Electricity is being exchanged by installing solar energy net meters up to 500 kW in about 200 big establishments and houses. This saves a lot of electricity. By using LED lights, about 80 percent of the cost of lighting has been saved and reduced to 10 MW. This is giving great relief.

The Municipal Corporation reduced the electricity bill by 41 percent by replacing the traditional lighting equipment with solar and LED lights. While the light capacity has become

depleted. Municipal Corporation Additional Commissioner SK Singh says that in 2017-18, the electricity bill of more than 27.30 lakhs came on the lighting system. The Municipal Corporation changed the traditional light to LED and solar in 8604. With this the bill has come down to 15.95 lakhs. While 218 new solar lights have been installed. 55 Highmast LED lights of 200 watts have been installed. Nine watt LED gives the same light as a 100 watt bulb.

3.2.2. Biomass

There have been not many biomass energy plants installed in the district. Moreover the district also deals with the problem of power supply and stubble burning. According to an article in The Times of India, with the heading, 'Over 100 farmers booked for stubble burning in west UP's Shahjahanpur' , More than 100 farmers have been booked in Shahjahanpur under section 24 of National Green Tribunal Act, even as despite repeated requests and warnings, they continued to burn stubble in their farmlands. The maximum number of cases was reported from Powayan tehsil of Shahjahanpur which is considered as the state's most productive agriculture belt. Most of the farmers here have migrated from Punjab and developed large farmhouses here. In fact, most of the stubble burning cases were reported from this area. A farmer on condition of anonymity, said, "What is the alternative given to us and what people will eat if we do not ready our field for sowing wheat? The decisions are given while sitting in AC rooms which are also emitting pollution. And why no action is taken against the mills operating in our district for polluting our air and water. Factories in Shahjahanpur openly dump untreated water with toxic materials in rivers and politicians and administration look the other way."

Another article in a local daily, reads, Due to nationwide shortage of coal, 380 MW power generation has come to a standstill in the district. With the closure of 300 MW unit of Reliance's Rosa thermal project, 80 MW Bajaj Energy unit in Maksudapur also stalled power generation for a week. Due to this, out of 640 MW power available locally, the district is getting only MW power from two solar power plants. Due to this there is also an emergency power cut in the entire district. If there is no coal crisis in two days, emergency reduction will also start in the city.So in order to make the district self reliant in terms of power biomass energy can prove as one of the options among the other renewable energy sources of the district.

3.2.3 Biogas:

National Agricultural Cooperative Marketing Federation of India is planning to build ten biogas plants in Shahjahanpur. As per the authors knowledge, no data of biogas plant is given for Shahjahanpur district. In order to check the environmental pollution caused by paddy straw, the state government and Indian Oil Corporation Limited (IOC) have jointly decided to set up compressed biogas production depots in five districts including Gorakhpur and Shahjahanpur of the state.

3.2.4. Hydropower:

The State's national-level program runs for hydropower generation, such as the small hydropower project program. The implementation of small hydropower in the State is carried

out by Uttar Pradesh New and Renewable Energy Development Agency. There is no information on the district's hydropower future.

3.3 TOURISM

- **HOW TO REACH SHAHJAHANPUR-**

■ **BY FLIGHT**

Instead of Shahjahanpur you can a get flight to Amausi Airport on regular basis.

Shahjahanpur

153 km away

Amausi Airport (LKO), Lucknow, Uttar Pradesh

■ **BY TRAIN**

There are regular trains from other major cities of the country to Shahjahanpur.

Railway Station(s): Shahjehanpur (SPN), Roza Junction (ROZA)

■ **BY BUS**

Shahjahanpur is well connected on N.H. 24 to other major cities of the country via

regular buses.

Bus Station(s): Shahjahanpur

Cities Near Shahjahanpur -

- 64 km to Farrukhabad, India.
- 72 km to Bareilly, India.
- 135 km to Rampur, India.
- 151 km to Lucknow, India.
- 152 km to Etawah, India.
- 154 km to Moradabad, India.
- 165 km to Kanpur, India.

Places to see in Shahjahanpur -

- **Hanumant Dham -** Virat Bajrangi of Shahjahanpur removes everyone's troubles. The shade of Hanumat Dham, built on the island in the middle of the Khannaut river, is unique. It took about ten years to build the Hanuman Dham on the island in the middle of the river, a 104 feet high statue of Hanuman ji was established. People come here from far-flung districts to have darshan. Hanumat Dham can now be seen on the tourist map of Uttar Pradesh as well.

- **Baba Vishwanath Temple -** Baba Vishwanath Mandir is a well-known Shiva Temple in India. Because Baba Vishwanath is one of Lord Shiva's names, this Mahadeva Temple is named after him. This illustrious Hindu Temple may be found in the city of Shahjahanpur's Sadar Bazar. It is a well-known Shiva Temple in Uttar Pradesh.This well-known temple holds fervent celebrations for a variety of prominent festivals. Thousands of worshippers swarm the temple on Mahashivratri, with prayers on their lips and offerings in their hands. People go from all over the world to get Shiva's blessings, and they notice a sacred atmosphere in the air during this auspicious day. On the night of Shivratri, fairs are held, and many people fast. Tourists and locals alike sing hymns and praises in the name of Lord Shiva in order to receive several blessings for their loved ones. Large carcades are held around the city, with crowds lining the streets to catch a glimpse of Mahadeva's revered idol.

- **Kali Badi Temple-**
  The city of Shahjahanpur is well-known for its pilgrimage sites. The Hanuman Dham in the city is well-known for its 104-foot-tall Lord Hanuman statue, which is also one of India's tallest Lord Hanuman statues. The Kali temple at Shahjahanpur is one of the district's oldest temples, and the residing goddess Goddess Kali statue was created as a twin statue, one in Shahjahanpur and the other in Kolkata. Other prominent temples in the city are Alakhnath temple, Tulasi temple, and Patnadevkali kali temple, all of which are adjacent to one other. The following is a comprehensive list of places of worship in Shahjahanpur.

- **Shaheed Dwar**
  The Shaheed Dwar in Shahjahanpur is an excellent place to spend quality time with friends and family. This location provides the ultimate recreation; get drenched in the spirit of adventure that you will find at Shahjahanpur's Shaheed Dwar. Enjoy all of the popular points of interest together and relive various great occasions. Shahjahanpur's shaheed dwar is not only a great site to go sightseeing, but it also allows you to indulge in some self-indulgence. So, check out the shaheed dwar tourist destination for all of the attractions it has to offer, and come here on weekends. This location is a highly sought tourist attraction because to its world-class standards, outstanding architecture, unique layouts, and well-thought-out execution.

- **Ram Prasad Bismil Smarak**
  The Shaheed Smarak Samiti of Shahjahanpur has created a memorial in Khirni Bagh mohalla in Shahjahanpur city, where Bismil was born in 1897, and titled it "Amar Shaheed Ram Prasad Bismil Smarak." A white marble statue of the freedom hero, on whose memory this place is created, stands here. This is undoubtedly a must-see destination and a well-known tourist attraction in the city.

Data analysis

- From the table-1 it is evident that the number of total tourists in Shahjahanpur increased from 2015 to 2019.
- The Shahjahanpur tourism encountered highest percentage change in tourists in the year 2018, which was 22.8% increase compared to previous year.
- The growth in the number of total tourists in Shahjahanpur is not constant in these years, although the range lies between 14-22.8%**.**

SWOT Analysis

S.No	Strength	Weakness	Opportunities	Threat
1.	• Geographically located next to Agra, Aligarh, Lucknow in Uttar Pradesh. • Religious tourist plans can be clubbed together to propose a spiritual travel plan. • The district is densely fortified with temples like Kali Badi Temple and Shaheed Smarak Samiti.	• Poor promotion of existing temples and monasteries . • No maintenance of existing heritage sites in the district.	• Proper maintenance of existing heritage sites to attract more tourists both local and foreign. . • Creating museums, artistic spaces and collaborative ventures to bring all useful collected heritage and art under one roof.	• Covid 19 can be a big threat with unpredictable arrival. • Lack of good budget by the government can be a big barrier. .

3.4. WELANDS:

The wetlands create a unique ecosystem that supports many species simultaneously like aquatic, terrestrial, and human beings. Local stakeholders directly or indirectly depend on the wetland for their income and small-scale business. District in U.P. selected for development of agri export zone for basmati rice. 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:

- Wheat, paddy (rice), sugarcane and groundnut production is high in the region.

- Gram, pea and arhar are the main pulses grown in the region
- bajra, jowar and maize are the main millet grown in the region
- Production of oils like mustard, lahi is reasonably high

4 ACTION PLAN DEVELOPMENT

4.1 FORESTRY

Culturable Waste Land includes land available for cultivation, whether taken up or not taken up for cultivation once, but not cultivated during the last five years or more in succession including the current year for some reason or the other. This area is about 440 thousand hectares and can be taken up for plantations by Forest Department. Scrub forest area 74500 ha should also be taken up for plantations. Similarly, Fallow Lands other than Current Fallows include all land which was taken up for cultivation but is temporarily out of cultivation for a period of not less than one year and not more than five years. The total of such area available is 540 thousand hectares. This area can be brought under plantations by the land owners or by forest department by taking recourse under section 8 and 9 of UP Tree Protection Act, 1976. If the target period is 20 years the target of plantations should be as follows:

	Target for 20 Years	**Target per year**
Plantation by Forest Department	514,500 ha	52725 ha
Plantation by Private Land Owners	540,000 ha	27000 ha

Figure 5 Targets to increase forest and agro-forestry plantation

Source: State Action on Climate Change, Uttar Pradesh

Plantations along canals embankments and roadsides, Conversion of Moderately Dense Forest, Open Forest and Scrub into Very Dense Forest up to maximum possible extent, Agroforestry, afforestation.

Projections & Monitoring Matrix

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

4.1.1 Biodiversity –

The proposed Biodiversity Park on the Ganga's lap would be a tourism hotspot: For river conservation, environmental preservation, and water conservation, a Biodiversity Park is proposed in Majra Mohkampur Maholia of Gutteti, Gram Panchayat of Namami Gange Yojana. This park, which would cover around 20 hectares and be located five kilometers from the Ganges, will also serve as a tourist attraction.

The district's climate is proven to be beneficial to aquatic and terrestrial creatures, as well as plant-eating animals. In three years, their number has risen from 40% to 80%. The Divisional Forest Officer's initiative to plant rare types of plants is also helping to preserve biodiversity. In Kakra, the Municipal Corporation has created a park.

4.2 TOURISM

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

  Different tourists share an equal sense of responsibility for the development of sustainable tourism. Every person is responsible for the factors including many elements. For example, using organic biodegradable stuff is so important for tourists

across multiple places in Shahjahanpur to keep it presentable for next tourists to join in.

Projections and Monitoring matrix

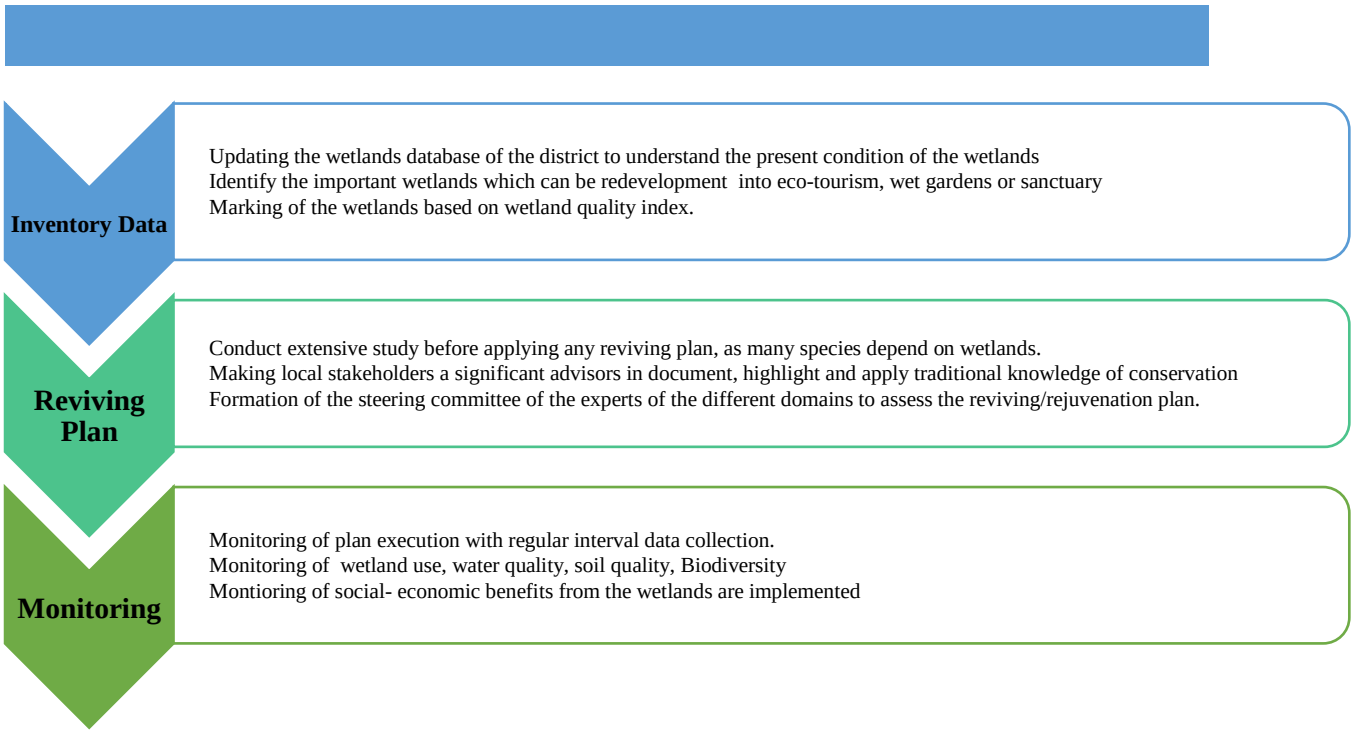
Sector	Intervention	Strategy	Total cost	Expected Outcomes
Tourism	**Research**	● The cause and motive for tourism can be predicted using various data and matrices which available on various government official websites as well as private organizations have done their bit too. It is also feasible to discover the elements affecting tourism in Uttar Pradesh through significant qualitative and quantitative research. ● All political pressures and influences must be removed from research to bring as much transparency as one can. ● When adding new records, the researchers must ensure that the field data and secondary data are correct and unaltered.		As a reference for other processes, a well-researched document. Tourism in Uttar Pradesh is influenced by a number of factors. Understand multiple factors that influence tourism activity. To be able to understand and work upon all the listed factors and create a need for travel for people within and outside the country! Research and prior lessons will be used to inform the planning process. For a successful implementation, realistic planning is required.
	Planning	● Research and analysis of various data and reports can be used to generate action plans for intervention. ● Developing an active action plan is critical because the results are dependent on how it is prepared and later implemented as well. ● Planning must take into account the state's social position as well as the impression that tourists have of the country. ● Non-practical forecasts should be avoided at all costs.		

		• Making plans for all major festivals and occasions like Ramnavmi. Finding out carious elements of the temples that can be utilized to weave stories in and around Shahjahanpur. • 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.		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.

		• A significant amount of branding and marketing which can be clubbed with other cities like Aligarh, Agra and Bareily. • The development of tourist attractions and maintenance of temples in and around Shahjahanpur. • Information about travel packages should be available on government websites and various other touch points like social media channels. • Conducting thorough market research in order to build strong strategies that will work on ground. • Ganga arti culture • Eco-tourism activities boosted by Ganga Festivals which happen. Along with these proper sanitisation, maintaining hygiene on the banks of river Ganga is very important.		
	Impact Assessment of results	• Figuring out where all touchpoints. • The understand the cause of failure and work upon it. • Reasoning to comprehend all the aspects. • Planning for future considering all over aspects of that can be covered.		• To learn the lesson and establish the root cause of success and failure, which will be applied in the future with modifications.

4.3 WETLANDS

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



4.4 ENERGY

4.4.1. Solar

There district has witnessed quite a good number of installations of solar energy units in the government offices and various institites. There have also been commercial installations in the district. Farmers should be made aware of the Kusum Yojana since they have stayed aloof to solar energy in the district. A small district oriented survey would definitely help the administration decide which component of Kusum Yojana best suits the district. Feeder segregation should be done in the villages, so that DICSOMs are able to fulfill the power requirement at cheap prices in the district.

Solar rooftop panel should be popularized in the district, and people especially in urban areas should be encouraged to install them, under the National solar mission. Moreover the small cottage industries and the MSMEs should be provided with financial assistance so that they flourish. This would definitely help the district to upgrade its livelihood.

4.4.2. Biomass

The district depends mainly on agriculture and hence produces a lot of biomass waste. Unfortunately, not much has been done in the biomass energy sector in the district. The first thing which should be done is to make people aware of the biomass energy and its benefits. Farmers should be educated about the importance of the bio-waste produced in their fields. Moreover new entrepreneurs should be encouraged to develop and work on the technology that

would utilize all types of field biowaste produced from agricultural lands. These biomass plants could be developed similar to of Husk Power Systems from Champaran, Bihar.

There should be provision for the rice mill owners to set up biomass plants in the district. These could also be opened in a group of two to three, so the infrastructural cost would get reduced. The biomass plants should be established at such places which are on the mid way to urban and rural areas.

4.4.3. Biogas:

- The government is pushing businesses to build biogas facilities. The federal government is also providing financial incentives. The state government will supply all the required infrastructure for the biogas plant to be built.

4.4.4. Hydropower:

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

5 RECOMMENDATIONS

5.1 AGRICULTURE AND ALLIED SECTORS

1. The productivity of paddy is lower compared to the national average; quality seeds and high-yield seeds need to be popularised.
2. Micro-irrigation should be promoted instead of flood irrigation to increase the water use efficiency and facilitate a proper fertigation system.
3. Dependency on bore wells and tube wells should be reduced.
4. Sustainable agriculture should be promoted in the district.
5. Farmers should follow the inter-cropping in the sugarcane such as cereals, legumes, oilseeds, vegetables, and spices in autumn sugarcane will be enhanced productivity, natural resources use efficiency, and profit margins.
6. Farmers should control the over-use of fertilizers and pesticides.
7. Farmers should be trained over the use of vermicompost and biofertilizer applications.
8. Mentha can be grown as a medicinal crop in the district.

9. Farmers should be trained for Integrated Pest Management (IPM), Integrated Nutrient Management (INM), and post-harvest management for the major fruits like mango and guava.
10. High-value vegetables, flowers, and orchids can be grown in the greenhouse and shed houses, and poly houses.
11. Beekeeping can be an alternative source of income for small landholding farmers, which should be encouraged.
12. The district has scope for expansion of fruits and vegetables-based processing units.
13. Insect invasion and crop diseases are a major threat to the farmers in the district, which can be controlled by following a proper advisory.
14. Poultry farming and fish culture can be promoted under the cooperative farming model.
15. The district has scope for expansion of mini dairy.

5.2 FORESTRY

Shahjahanpur located on the bank of river Ramganga, Garrah and Gomti. According to ISFR 2019, 59.31 Sq. Km. area of Shahjahanpur is covered with forest. No major forest found in the district. As discussed above, the forest cover of Shahjahanpur has decreased as compared to previous assessment of ISFR 2017, there is a wide scope of Afforestation on waste land, trees outside forest (on the sides of the roads, banks of river etc.). Government can promote the afforestation, agroforestry activities by providing output based incentives.

5.2.1 Biodiversity

- Non-timber forest produce-based income-generating initiatives should be identified and promoted.
- Forest areas need to be protected, treated, and regenerated.
- Forest and scrublands have opportunities to improve productivity and other services of land cover.

- To successfully organize, implement, and monitor operations, provide trainings, meetings, and exposure visits to communities, village volunteers, and employees.

5.3 WETLAND

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

- It is recommended to introduce organic and water-efficient farming techniques for rice, pulses and oilseeds production.
- It is recommended to support fishing and water chestnut production
- It is recommended to rejuvenate and restore the wetlands under MNREGA schemes.
- It is recommended to develop the outer periphery of the wetlands with shrubs, flower gardens or medicinal plants. These wetlands can be turned into an eco-tourism site.

5.4. ENERGY

5.4.1. Solar

- ❖ People should be made aware of the schemes that are presently being run to increase the solar energy penetration.
- ❖ Solar Rooftops Panels should be popularized in the district under the National Solar Mission, Phase II.
- ❖ The administration should make provision of providing financial aid to the small cottage industries and the MSMEs for solar rooftop installation.
- ❖ Kusum Yojana should be popularized among the farmers.

5.4.2. Biomass

- ❖ People should be made aware of the biomass energy.
- ❖ Rice husk based biomass plants should be developed and promoted in the district.

5.4.3. Biogas

- It is recommended to connect existing gaushala to biogas plant.
- Promotion of household biogas plant and different incentive scheme should be spread through posters, or slogans. Tourist attraction places should be targeted to conduct this activity.

5.4.4. Hydropower

- It is recommended to investigate sites for hydropower potential on the banks of the Garra river are the settlements of Rata, Chitibuzhi, and Dhakia.

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	**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.	**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.	**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.	**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.

drinking water.						
					Intervention impact- RCTs, regression analysis, propensity scores, econometrics , structural equation modelling, Contribution analysis, process tracing, Bradford Hill criteria. Through Participatory approaches and impact evaluations use the standard OECD-DAC criteria. Based on satisfaction of pre decided key questions.	Performance of interventions . Working model and scalability of ideas from incubation Centre. More tourist footfall. Trained youth to be a part of Tourism industry. Upgraded staff and facilities associated with UP State Tourism Corporation

5. Discussion during the Report Presentation

- Shahjahanpur is actively working on the implementation of the interventions which were discussed in the presentation.
- Organic Farming has been taken up in the villages in the Ganga Basin.
- There is major potential in the fisheries but there is very less awareness among the locals. The interventions are being taken up to sensitize people and develop fisheries as one of the livelihood opportunity for the locals.
- A special variety of wheat flour (Kaala Aata) is famous in Shahjahanpur. Currently Shahjahanpur is focused on horticulture production under which the cultivation of dragon fruit has been taken up. The studies have shown that Ganga basin belt is very suitable for horticulture production.
- Shahjahanpur has a historical importance and is known as "Shaheedo ki Nagri" (The City of Martyrs) but the tourism is not developed as per its potential.
- Tourism: The ghats are being constructed. The challenge is that the scope of tourism development is very limited but the initiatives for tourism development is being undertaken on priority.
- 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

AUXILLLARY DATA

Table 3 Biogas potential from animal waste in the district.

Livestock	Residue type	Total population as of 2012	Manure yield * (kg/day)	Total manure generation annually (kg)	Average collection (75%)	Dry manure after removing Moisture content	Manure required for biogas* (kg/m^3)	Biogas potential (m^3/yr)	m3/day	Dry matter per day
Cattle	Manure	288478	10	1,05,29,44,700	789708525	157941705	25	6317668.2	17308.68	432717
Buffalo	Manure	490227	15	2,68,39,92,825	201299461 9	402598923.8	25	16103956.95	44120.43	1E+06
Sheep	Manure	4832	1	17,63,680	1322760	264552	25	10582.08	28.992	724.8
Goat	Manure	203681	1	7,43,43,565	55757673.75	11151534.75	25	446061.39	1222.086	30552
Pig	Manure	23612	2.5	2,15,45,950	16159462.5	3231892.5	25	129275.7	354.18	8854.5
Poultry	manure	98,490	0.1	35,94,885	2696163.75	539232.75	25	21569.31	59.094	1477.4
Total		**11,09,320**						**23029113.63**		

Table 4 Biogas potential from agricultural waste in the district.

Crop	Residue type	Total crop production (tons) (2017-18)	Residue production ratio	Residue amount (tons)	Average collection (70%)	Moisture content	Residue amount after removing moisture (tons)	Biogas potential [m3/(tons of dry matter)]	Overall biogas potential (m3)
Maize	straw	3138	1.5	4707	3294.9	15	2800.665	800	2240532

Wheat	straw	1216792	1.5	1825188	1277631.6	30	894342.12	800	715473696
sugarcane	bagasse	3188234	0.33	1052117.22	736482.054	80	147296.4108	750	110472308.1
Total		**4408164**							**828186536.1**
rice	husk	3910722	0.28	1095002.16	766501.512	80	153300.3024	750	114975226.8