Arth Ganga Project: District Amroha

Submitted

National Mission for Clean Ganga (NMCG)

Submitted by:

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EXECUTIVE SUMMARY

Amroha, in the state of Uttar Pradesh, is a district of spiritual and religious significance that is diverse in the religions but united by humanity. The city well known for mango cultivation is flourished by the rivers Ganga, Baha & Krishna.

The total geographical area of the district is 2249 km^2. The district is dominated by the secondary sector economy with a share of 40.01% in 2018-19. The sector grew with an average annual growth rate of 7.90%. The primary sector grew with an annual growth rate of 4.67% during the study period. The tertiary sector had a growth rate of 7.71% with a share increase to 34.58% in 2018-19.

The total irrigated area stands out to be 28931 ha. The cropping intensity of the district is 154.91%. The net sown increased from 79.21% in 2010-11 to 80.73% in 2017-18. The area for non-agricultural use increased steadily over the period from 8.04% to 8.49%. The share of cultivable wasteland and barren and uncultivable land decreased from 0.41% in 2010-11 to 0.08% in 2017-18, and 0.53% in 2010-11 to 0.19% in 2017-18 respectively. The major crop types are sugarcane, rice, wheat, potato, mustard, urd, oilseed, etc. The total food grains along with pulses account for the production of 390729 MT. Along with these Rabi, vegetables acquire a significant proportion of the area. In 2018-19, the net sown area and pure irrigated were rea were 29781 and 172040 hectares, respectively. The net sown area has slightly increased from 79.21% in 2010-11 to 80.73% in 2017-18. The area for non-agricultural use also increased from 8.04% in 2010-11 to 8.94% in 2017-18. The district's net and gross irrigated areas increased over the years with an average of 94.64% and 88.28%, respectively. Use of the chemical fertilizers has been prominent with the use of nitrogen higher and phosphorus and potassium used in lesser amounts than the prescribed ratio. In 2017-18, the nitrogen share, after declining, became 66.23%, while the phosphorus share increased to 25%, and the potassium share rose to 8.76%. The overall use of chemical fertilizers has reduced in the district from 321.91 kg/ ha GSA in 2010-11 to 220.30 kg/ ha GSA in 2017-18.

The livestock consists of cattle, buffalos, pigs, and sheep; along with poultry and fisheries. The share of livestock increased from 15.16% to 32.79% from 2011-12 to 2018-19. The fishery & aquaculture subsector share grew with a significant average annual growth rate of 94.25% from 2011-12 to 2018-19. Mines and quarrying also recorded a remarkable average annual growth rate of 17.07%.

The total forest cover of the district is 86 km^2. There is no major forest cover in the district. Out of total forest cover, the maximum area is covered by Open Forest (60%) followed by Moderately dense forest (25%). The district has increased forest cover and contribution to GDP up to 2019 with an annual average growth rate of about 20.37%. The share of area under trees and gardens decreased from 0.10% in 2010-11 to 0.05% in 2017-18. The share of forestry and logging is around 2.08% in 2018-19 with a negative average annual growth rate of 3.61%. Amroha is known for its spiritual significance and is home to some Islamic shrines. In the year 2019, Amroha received a total of 979353 tourists which has been increasing since 2016 but decreased drastically in 2020 due to COVID-19. There are a variety of places to visit in the district such as Dargah Bhure Shah, Majaar Shah Vilayat Sahib, Vasudev Tirtha temple, etc. The district also holds melas and festival celebrations but the connectivity is mainly through the road.

The main source of lightning is Kerosene (61.13%) followed by electricity (36.82%) whereas the major power source for cooking is cowdung(40.02%) followed by firewood(36.72%). Only 0.99% of households are using solar energy. According to Pugazenthi et. al. 2016, the total solar power potential available in the district is 0.2143. There have been a few installations of solar energy units in the district. A 2 MW biomass energy plant (Industrial waste) at Vam organic, Gajraula, and a biomass gasifier at Insilco Limited, Gajaraula are installed in the district. Electricity consumption in agriculture has increased significantly from 276.72 kWh in 2014-15 to 527.23 kWh in 2019-20, a net increase of approximately 90.53%. The percentage share of the agriculture sector in the total electricity consumption is about 46.37%. The total number of wetlands existing in the district is 542 consisting of both Man-made and Natural. Most of them are small and tanks/lakes/ponds and waterlogged. The district's biodiversity data includes various crop production, livestock population, bird species, and forest cover with 401 bird species and 49 threatened/rare species of bird in the district. Biogas potential from animal waste and agricultural waste was calculated approximately as 2 crores m^3/year and 41 crores m^3/year. No hydropower present or plans exist.

There have been many active measures taken to support and promote sustainable development which shows the government’s strenuous efforts to comply with green and clean strategies along with economic development yet lack of monitoring, local participation, expansion of practices, etc. are some of the barriers that are needed to be overcome. The government should maintain historical structures like temples, etc., organize and advertise the festivities like mango festivals, fairs, art and culture, hygienic and well-kept restrooms, and safe drinking

water. Thus, practices like agroforestry, drip and sprinkler irrigation, cluster farming, greenhouse farming, organic farming; adopting modern technologies, increasing aromatic and medicinal plantations, enhancing animal husbandry productions, etc. should be taken into consideration. A subsidized crop insurance system must be adopted to protect farmers' livelihood and income. Use of high-yielding seeds, micro-irrigation, constructing and maintaining harvesting structures, and encouraging farmers for adapting different crop cultivation and various irrigation methods. Also, adapting to advanced technologies, proper monitoring, MIS, Geo-tagging, monthly physical and financial reports, maintenance of places and forests, shifting cultivation, promoting bee keeping, floriculture, etc., are a few measures that might be adopted in the district.

1 DISTRICT OVERVIEW

1.1 INTRODUCTION

Amroha (Jyotibha Phule Nagar) district was created on 15th April, 1997. Before becoming a separate district, it was part of Moradabad district. It is situated between 28º20' and 29º 16' north latitude and 78º4' and 79º6' east longitude. The district has 03 tahsils namely Dhanaura, Amroha and Hasanpur. Total area of the district is 2249.0 Sq. Km. There are 484 Gram Sabhas and 1123 Revenue villages out of which 959 inhabited villages and 164 uninhabited villages in the district. In urban area there are 8 statutory Towns and 1 Census Towns. River Ganga separates this district from districts Meerut, Ghaziabad and Bulandshahr in the west.

According to 2011 census, total population of the district is 1840221 in which 1381508 live in rural and rest 458713 in urban parts of the district. Out of the total population of the district Amroha 32.56 percent are workers and rest of 67.44 percent are non-worker. Among workers 24.65 percent are main workers and 7.91 percent are marginal workers of total population. In the district among workers 36.33 percent are cultivators and 36.38 percent are other workers.

The economy of the district is predominantly agricultural as greater part of the working force is engaged as cultivators and agricultural laboures. Kharif and Rabi are the two main harvests grown in the district. Wheat occupies the predominant place followed by paddy both in terms of area and production. Sugarcane is the most important commercial crop in the district grown. Other main Kharif crops of the district are Arhar, Urd, Moong. After the Kharif harvest, in the middle of September, the fields are prepared for the Rabi crop of which wheat is the most important. It is grown in all tahsils of the district. It is cultivated separately as well as mixed with other crops like barley, Gram, pea and mustard. The harvesting commences in the latter half of March and continues throughout April. The main non-food crops of the district are sugar-cane, oil- seeds, ground- nut, potato, onion, garlic and other vegetables and fruits, sun-hemp and tobacco.

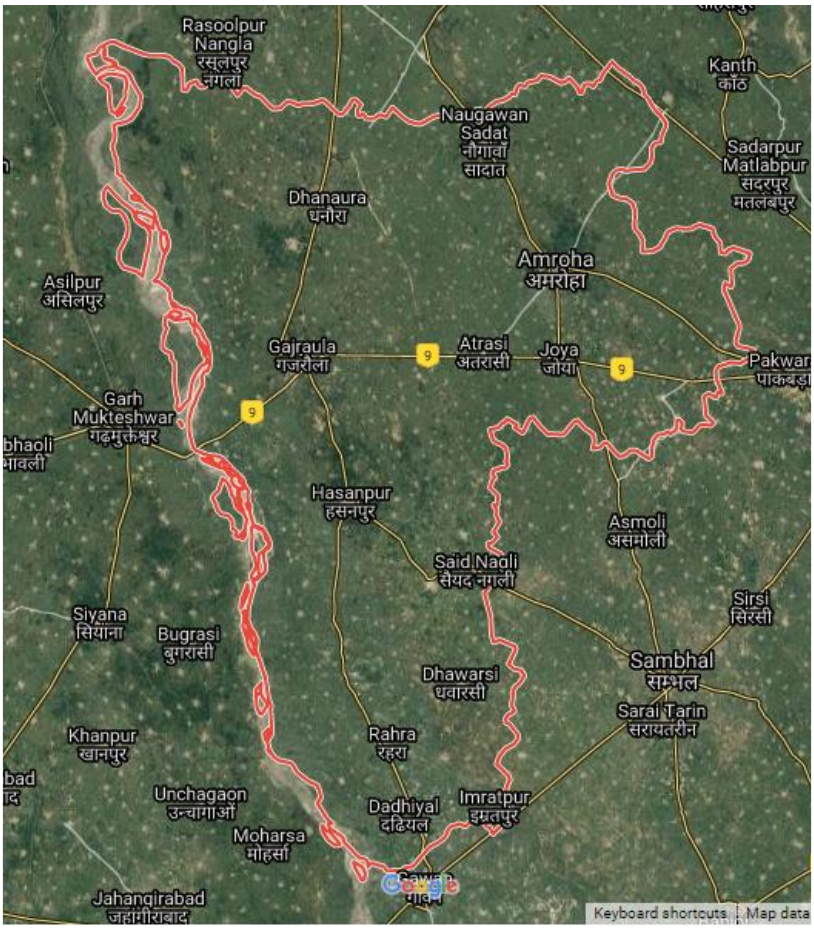


Figure 1 Map of the district

1.2 DEMOGRAPHIC PROFILE OF AMROHA

1. Economy and Livelihoods

- Geographical Area: 2249 Sq. Km.
- Administrative Divisions:[1]

District Headquarters: Amroha

No of Nagar Palika/Panchayat: 5/4

No of Tehsil: 4

No of Blocks: 6

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

No. Of Villages: 1133

No. of Gram Panchayat: 601

- Demographic and socio-economic indicators:[2]

  Population: 18,40,221 (Census 2011)

  Population density (Total persons per sq. km): 818

  Sex ratio: 910

  Literacy: 63.8%

- Occupation/ other Livelihood source: Production of Mango, Cotton & Textiles
- Major Rivers: Ganga, Baha & Krishna
- Forest Area: 86 Sq. Km. (ISFR 2019, No major fores

[2] https://www.censusindia.gov.in/2011census/dchb/DCHB_A/09/0906_PART_A_DCHB_JYOTIBA%20PHULE%20NAGAR.pdf

1.3 ECONOMIC PROFILE OF AMROHA

The primary sector has a significant impact on the district economy because it contributes, on average, 27.15% share to the district GDP. This sector's average annual growth rate from 2011-12 to 2018-19 has been fairly high at 4.67%. However, its share decreased from 29.81% in 2011-12 to 24.85% in 2018-19 because of faster growth of other sectors during the same period. The share of the secondary sector increased from 37.29% in 2011-12 to 40.01% in 2018-19. The sector grew with a significant average annual growth rate of 7.90%. The tertiary sector occupies, on average, 34.58% share of the district economy. Moreover, the sector grew with a remarkable average annual growth rate of 7.71%, with its share increasing from 32.90% in 2011-12 to 35.14% in 2018-19.

Overall, the district economy grew with an average annual growth rate of 6.83%. Although the District. Steps should be taken to further increase the productivity of the primary sector so that it can grow at a higher rate. It will improve the growth rate of the overall district economy and the primary sector. The secondary and tertiary sectors have performed relatively well during the study period.

Table 1: Trends in Gross District Domestic product in Amroha 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	2737.80	3424.52	3020.94	9183.26	-	-	-	-
	(29.81)	(37.29)	(32.90)	(100)				
2012-13	2544.24	3565.83	3192.62	9302.69	-7.07	4.13	5.68	1.30
	(27.35)	(38.33)	(34.32)	(100)				
2013-14	2902.15	3740.02	3373.70	10015.87	14.07	4.88	5.67	7.67
	(28.98)	(37.34)	(33.68)	(100)				
2014-15	2544.66	3757.86	3566.65	9869.17	-12.32	0.48	5.72	-1.46
	(25.78)	(38.08)	(36.14)	(100)				
2015-16	3205.18	4249.45	4017.44	11472.07	25.96	13.08	12.64	16.24
	(27.94)	(37.04)	(35.02)	(100)				
2016-17	3214.90	4669.17	4350.93	12235.00	0.30	9.88	8.30	6.65
	(26.28)	(38.16)	(35.56)	(100)				
2017-18	3622.32	5501.82	4684.50	13808.65	12.67	17.83	7.67	12.86
	(26.23)	(39.84)	(33.92)	(100)				
2018-19	3588.15	5776.76	5072.87	14437.78	-0.94	5.00	8.29	4.56
	(24.85)	(40.01)	(35.14)	(100)				
Average Growth Rate					4.67	7.90	7.71	6.83

Source: http://updes.up.nic.in/
Note: Figures in Parentheses are percentage share in the total GDDP

We further break down the primary sector GDP to know which subsector is lagging and which one is driving the primary sector growth. Table 2 shows that agriculture with the horticulture sector grew at a low average annual growth rate of 3.67% from 2011-12 to 2018-19. Moreover, its share decreased from 67.19% in 2011-12 to 64.76% in 2018-19. On the other hand, the share of the livestock

subsector increased from 15.16% to 32.79% in the same period as it grew, with a remarkable average annual growth rate of 18.66%. It shows the importance of livestock in Amroha 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 2.08% in 2018-19, as it grew with a negative average annual growth rate of 3.61%. The fishery & aquaculture subsector share is very minimal, around 0.37% in 2018-19, but it grew with a significant average annual growth rate of 94.25% from 2011-12 to 2018-19. Mines and quarrying also recorded a remarkable average annual growth rate of 17.07%. 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 crop sub-sector grew at the lower rate than the livestock, fishery and mining sub-sectors. More work can be done on improving the agriculture, including horticulture sub-sector as it has the vital impact on the rural economy.

Table 2: Gross District Domestic Product Trends from Agriculture and allied activities in Amroha 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	1817.87	410.28	476.27	1.27	2705.69	32.11	2737.80
	(67.19)	(15.16)	(17.60)	(0.05)	(100)		
	-	-	-	-	-	-	-
2012-13	1856.83	465.04	184.24	1.32	2507.44	36.80	2544.24
	(74.05)	(18.55)	(7.35)	(0.05)	(100)		
	[2.14]	[13.35]	[-61.32]	[4.45]	[-7.33]	[14.64]	[-7.07]
2013-14	1986.29	486.42	379.23	1.36	2853.30	48.85	2902.15
	(69.61)	(17.05)	(13.29)	(0.05)	(100)		
	[6.97]	[4.60]	[105.84]	[2.94]	[13.79]	[32.74]	[14.07]
2014-15	1897.05	508.03	91.10	1.45	2497.63	47.03	2544.66
	(75.95)	(20.34)	(3.65)	(0.06)	(100)		
	[-4.49]	[4.44]	[-75.98]	[6.86]	[-12.47]	[-3.73]	[-12.32]
2015-16	2118.98	946.49	83.25	1.49	3150.21	54.97	3205.18
	(67.26)	(30.05)	(2.64)	(0.05)	(100)		
	[11.70]	[86.31]	[-8.61]	[2.17]	[26.13]	[16.89]	[25.96]
2016-17	1967.93	1079.84	82.27	1.82	3131.85	83.05	3214.90
	(62.84)	(34.48)	(2.63)	(0.06)	(100)		
	[-7.13]	[14.09]	[-1.18]	[22.25]	[-0.58]	[51.07]	[0.30]
2017-18	2311.59	1035.27	131.91	1.84	3480.60	141.73	3622.32
	(66.41)	(29.74)	(3.79)	(0.05)	(100)		
	[17.46]	[-4.13]	[60.33]	[1.31]	[11.14]	[70.66]	[12.67]
2018-19	2289.66	1159.09	73.37	13.24	3535.36	52.79	3588.15
	(64.76)	(32.79)	(2.08)	(0.37)	(100)		
	[-0.95]	[11.96]	[-44.38]	[619.79]	[1.57]	[-62.75]	[-0.94]
Average Growth Rate	3.67	18.66	-3.61	94.25	4.61	17.07	4.67

Source: Compile from UPDES

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

Table 3 shows the percentage share of subsectors in secondary and tertiary sectors. Within the secondary sector, the manufacturing sector had a share of approximately 44.94% in 2018-19. The share has decreased over the years as the average annual growth in this sector (7.54%) is less as compared to the growth in other subsectors of the secondary sector. The share of the electricity, gas, and water supplies subsector has increased from 1.92% in 2011-12 to 2.81% in 2018-19. Moreover, this subsector grew with a remarkable average annual growth rate of 14.38%. The share of the construction sub-sector increased from 50.43% to 52.26% in the same period, and the average annual growth rate is significant (8.35%). It indicates that the secondary sector in Amroha is heavily dependent on the Manufacturing and construction sub-sector, but the electricity subsector is also growing at a faster rate.

Within the tertiary sector, Trade & hotel made up the highest share (31.62%) in 2018-19, followed by the Real estates (24.67%), transport, storage, and communication (13.50%), and financial services (8.85%). Average annual growth is observed highest in transport, storage, and communication (12.24%), followed by Financial services (9.74%), trade & hotel (6.63%), Real Estates 5.92%), and lastly lowest in public administration (3.24%). All the subsectors in the tertiary sector have performed well during the study period. More work needs to be done to improve real estate and public administration subsectors. Trend and hotels, Transport and Communication, and Financial services sub-sectors are the major contributors to the Tertiary sector's growth.

Table 3: Trends in percentage share of non-agriculture sub-sectors in DGDP in Amroha 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	47.65	1.92	50.43	100	10.32	34.55	7.93	27.71	12.39	7.10	100
2012-13	46.22	1.98	51.81	100	10.54	31.00	8.95	28.14	13.72	7.66	100
2013-14	46.41	2.25	51.34	100	10.91	33.84	8.60	27.94	10.47	8.24	100
2014-15	40.28	3.14	56.58	100	12.72	31.53	8.59	28.00	10.19	8.98	100
2015-16	43.17	2.81	54.02	100	13.15	33.35	9.20	25.86	9.33	9.12	100
2016-17	45.58	2.91	51.51	100	15.19	32.38	8.52	24.96	7.60	11.36	100
2017-18	47.37	2.83	49.81	100	14.70	31.75	8.08	25.13	8.28	12.06	100
2018-19	44.94	2.81	52.26	100	13.50	31.62	8.85	24.67	8.68	12.68	100
Average Growth Rate	7.54	14.38	8.35	7.90	12.24	6.63	9.74	5.92	3.24	17.20	7.71

Source: Estimated from statistical handbooks

2 QUANTITATIVE DATA ANALYSIS

2.1 Agriculture and Allied Activities

2.1.1 Trend in Land Use Pattern

The total declared area of the district is 2168.79 sq. km². Forest area represents 9.68% of the total reported area. The share of cultivable wasteland decreased from 0.41% in 2010-11 to 0.08% in 2017-18, which is a good development indicator. Barren and uncultivable land share decreased from 0.53% in 2010-11 to 0.19% in 2017-18. The share of area under trees and gardens decreased from 0.10% in 2010-11 to 0.05% 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 slightly increased from 79.21% in 2010-11 to 80.73% in 2017-18. The area for non-agricultural use also increased from 8.04% in 2010-11 to 8.94% in 2017-18 (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 Amroha (as % of 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	216879	9.63	0.41	1.47	0.52	0.53	8.04	0.09	0.10	79.21
2011-12	216879	9.63	0.29	1.08	0.71	0.58	8.28	0.09	0.13	79.22
2012-13	216879	9.68	0.41	1.41	0.52	0.49	8.10	0.09	0.10	79.19
2013-14	216879	9.68	0.33	1.27	0.48	0.49	8.28	0.09	0.09	79.28
2014-15	216879	9.68	0.33	1.25	0.44	0.49	8.49	0.09	0.14	79.09
2015-16	216879	9.68	0.06	0.23	0.11	0.24	8.82	0.09	0.05	80.72
2016-17	216879	9.68	0.08	0.15	0.10	0.19	8.94	0.09	0.05	80.73
2017-18	216879	9.68	0.08	0.15	0.10	0.19	8.94	0.09	0.05	80.73

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

2.1.2 Trends in Operational Land Holdings

In Amroha district, the total number of operational farms increased from 194 thousand in 2010-11 to 205 thousand in 2015-16, a net increase of 5.67%. 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. in the state was These two size categories represented around 90.12% in the district in 2015-16, while the corresponding proportion 92.81% (Table 5). The two agricultural censuses of 2010-11 and 2015-16 report no significant change in the percentage share across the various categories of landholdings. Marginal land holdings increased in 2015-16.

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

	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.)
Amroha	2010-11	74.29	15.45	7.83	2.37	0.07	194
	2015-16	75.49	14.63	7.55	2.26	0.06	205
							[5.67]
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	0.10	23822
							[2.13]

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

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

2.1.3.1 The Trend in Cropping Patterns

Rice, Wheat, and Sugarcane dominate the agriculture of the district. Table 6 shows the area under various crops over the last eight years. In 2017-18, wheat made up the highest share of GCA (33.44%), followed by Rice (8.63%). These two crops constitute around 42.08% of the GCA. The area shared by the total cereals has decreased from 48.84% in 2010-11 to 44.10% in 2017-18. The main pulse produced is Urad, while the rest of the pulses are not significantly produced. The total pulse acreage has decreased from 1.40% in 2010-11 to 1.24% in 2017-18. Thus, the food grains cover a majority (average, 47.58%) of the GCA. Mustard is the only major oilseeds crop produced, and the total oilseed acreage has increased from 1.04% in 2010-11 to 1.05% in 2017-18. The area under Sugarcane has decreased slightly over the years, but at the same time, the area under Potato has increased. Three water guzzling crops—Sugarcane, Rice and Wheat together constituted about 70% of GCA. In general, there is no significant change in cropping pattern, except that the NSA decreased from 65.80% in 2010-11 to 62.50% in 2017-18. The average cropping intensity is 154.91.

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

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	10.75	9.51	10.25	8.98	9.22	8.64	8.63	8.63
Wheat	36.05	36.17	35.05	35.27	35.70	33.47	33.44	33.44
Bajara	1.22	1.56	1.26	1.56	1.54	1.44	1.44	1.44
Other Cereals	0.82	0.62	0.86	0.64	0.62	0.59	0.59	0.59
Total Cereals	48.84	47.86	47.42	46.45	47.08	44.14	44.10	44.10
Urad	1.19	1.26	1.11	1.23	1.19	1.12	1.12	1.12

Other Pulses	0.21	0.16	0.25	0.18	0.13	0.12	0.12	0.12
Total Pulses	1.40	1.43	1.36	1.41	1.32	1.24	1.24	1.24
Total Foodgrains	50.24	49.29	48.79	47.86	48.40	45.37	45.34	45.34
Mustard	1.03	1.04	1.15	1.19	1.08	1.01	1.01	1.01
Total Oilseeds	1.04	1.05	1.15	1.19	1.12	1.05	1.05	1.05
Sugarcane	28.15	29.57	28.91	29.74	29.64	27.79	27.76	27.76
Potato	1.15	1.19	1.21	1.17	1.23	1.16	1.16	1.16
Net Sown Area	65.80	66.30	65.36	66.40	65.36	62.54	62.50	62.50
Gross Sown Area (in 1000 Ha)	261.07	259.16	262.76	258.98	262.43	279.92	280.14	280.14
Cropping Intensity	151.98	150.83	152.99	150.61	153.00	159.90	160.0	160.0
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 across years. 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 (35.62 qtls and 19.61 qtls respectively, in 2017-18) are also high. Per hectare yield of total cereals has increased from 28.10 qtls in 2010-11 to 31.44 qtls in 2017-18. On the other hand, per hectare yield of total pulses decreased from 8.41 qtls in 2010-11 to 6.74 qtls in 2017-18.

The yield of total oilseeds has increased from 11.02 qtls in 2010-11 to 14.95 qtls in 2017-18. It can be due to the availability of hybrid seeds in the district. However, the rise in the yield of most of the crops is not uniform. In some years, it has decreased as well, but on average, the yield has increased in the latter years of the study. The per hectare yield of Sugarcane is, on average, 698.11qtls/ha. Similarly, the yield of Potato is also very high, average, 219.56. Since both Sugarcane and Potato are high-value crops, they can help in doubling the income of farmers if proper marketing and infrastructure support is provided to the farmers. In summary, all crop yields show year-over-year fluctuations, with the lowest in 2014-15. The lack of homogeneity of yields makes farmers' income riskier and more unstable, requiring a solid insurance protection measure.

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

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	18.95	20.46	18.37	21.35	22.62	22.16	22.70	19.61
Wheat	31.90	31.70	32.40	32.67	21.04	29.23	34.74	35.62
bajara	7.74	8.35	6.83	6.78	10.36	13.00	7.92	7.30
Maize	10.94	14.64	9.59	13.02	14.87	20.75	29.81	25.49
Total Cereal	28.10	28.49	28.28	29.34	20.92	27.20	31.46	31.44
Urad	8.53	7.62	8.92	8.00	8.39	6.57	8.38	5.62
Total Pulses	8.41	7.74	8.91	8.21	8.20	6.86	9.82	6.74
Total Food Grains	27.55	27.89	27.74	28.72	20.57	26.64	30.87	30.76
Mustard	11.06	8.31	11.50	11.76	10.41	14.88	11.01	15.52
Total Oilseeds	11.02	8.28	11.50	11.75	10.10	14.43	10.61	14.95
Sugarcane	630.00	609.36	642.48	696.76	705.36	696.79	739.00	865.14
Potato	173.55	190.00	148.80	220.24	174.30	248.15	291.21	310.23
Source: http://updes.up.nic.in/spiderreports/intialisePage.action								

2.1.3.3 Trends in Production of Principal Crops

Table 8 shows the trends in the production of the main crops over the years. Rice, Wheat, Sugarcane, and Potato dominate the production. In 2017-18, Rice (47.42 thousand tons) and Wheat (333.76 thousand tons) formed a major part of the total cereal production (388.40 thousand tons). Coming to pulses, Urad occupied the highest production (1.76 thousand tons) in 2017-18. Although there has been a significant variation in its production across years, it still represents around 75% of the total pulse production. Pulses production in the district was relatively low, indicating that pulses are not an essential part of the district's agriculture.

Mustard production was 4.40 thousand tons, representing around 100% of the total oilseed production in 2017-18. Sugarcane is another essential crop whose production has been significant in the district (6729.12 thousand tons in 2017-18). Potato production has also been significant over the years (100.54 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 Amroha District (in 1000 Tons)

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	53.19	50.45	49.47	49.65	54.70	53.59	54.90	47.42
Wheat	300.24	297.15	298.36	298.42	197.10	273.87	325.48	333.76
Bajara	2.46	3.38	2.27	2.74	4.18	5.25	3.20	2.94
Other Cereals	2.37	2.38	2.25	2.22	2.48	3.34	5.11	4.27
Total Cereals	358.26	353.36	352.34	353.02	258.46	336.04	388.69	388.40
Urad	2.65	2.50	2.61	2.55	2.62	2.05	2.62	1.76
Other Pulses	0.43	0.36	0.58	0.44	0.22	0.32	0.78	0.58
Total Pulses	3.08	2.86	3.19	2.99	2.84	2.37	3.40	2.33
Total Foodgrains	361.34	356.22	355.54	356.01	261.30	338.42	392.09	390.73
Mustard	2.98	2.25	3.47	3.63	2.95	4.22	3.12	4.40
Total Oilseeds	2.99	2.26	3.47	3.63	2.97	4.25	3.12	4.40
Sugarcane	4629.11	4669.40	4880.02	5367.21	5486.36	5419.67	5748.04	6729.12
Potato	52.01	58.67	47.45	66.91	56.49	80.43	94.38	100.54

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) in the area, production, and yield of the main crops. Among different crops, the lowest variability in the area is observed in Wheat (1.05%), followed by Sugarcane (1.95%) and Urad (3.11%), and the highest in Bajra (9.57%). The variability in the area under total pulses (2.89%) is more than the variability in the area under total cereals (1.58%). Since Rice and

Wheat dominate the production, the variability in the area under total food grains is, therefore, also relatively low (1.55%).

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

Crop/Year	Area (1000 Ha)			Production (1000 Ha)			Yield (Qty. /Ha)		
	Average	SD	COV	Average	SD	COV	Average	SD	COV
Rice	24.96	1.65	6.60	51.67	2.78	5.38	20.78	1.69	8.12
Wheat	93.26	0.98	1.05	290.55	42.02	14.46	31.16	4.53	14.53
bajara	3.84	0.37	9.57	3.30	0.99	29.83	8.54	2.13	25.00
Total Cereal	123.83	1.96	1.58	348.57	40.75	11.69	28.15	3.31	11.74
Urad	3.12	0.10	3.11	2.42	0.33	13.71	7.75	1.12	14.48
Total Pulses	3.55	0.10	2.89	2.88	0.37	12.95	8.11	1.02	12.55
Total Food Grains	127.38	1.98	1.55	351.45	40.80	11.61	27.59	3.22	11.65
Mustard	2.85	0.14	4.78	3.38	0.71	20.95	11.81	2.35	19.91
Total Oilseeds	2.91	0.13	4.51	3.39	0.71	20.91	11.58	2.20	19.00
Sugarcane	76.78	1.50	1.95	5366.12	685.13	12.77	698.11	80.39	11.52
Potato	3.16	0.10	3.25	69.61	19.95	28.67	219.56	58.82	26.79

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

The variability of production depends on the variability of the cultivated area and the variability of the yield. Therefore, the variability in the production of different crops is greater than in the cultivated area of all crops. The highest variability in production is observed in Bajra (29.83%), followed by Potato (28.67%), Mustard (20.95%), Wheat (14.46%), and Urad (13.71%). High variation in the production of pulses and oilseeds is partly due to variation in the land area under them and partly due to non-availability of hybrid seeds. Improvement in crop insurance conditions and better market accessibility can lower this variation. Variability is lowest in Rice (5.38%), followed by Sugarcane (12.77%) and Urad (13.71%).

In the case of yield, the greatest variability is estimated in Potato (26.01%), Bajra (24.67%), and Mustard (19.73%). Yield variability in total cereals (11.74%) and total food grains (11.65%) is lower as compared the total pulses (12.62%). 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 Product of Major Crops

Table 10 compares the share of the main crops in the total GCA and their share in the total value of agricultural output (VOP). It is significant to note that total cereals, total foodgrains, and total oilseeds, on average, have a relatively larger share in GCA than their share in VOP. In contrast, Potato and Sugarcane have, on average, a greater share in VOP than GCA. Amroha is mainly a food grain production district; therefore, food grains account for around 47.58% of the gross area of the crops. Similarly, total foodgrains account for nearly 29.91% of the total value of the agricultural product.

Three crops - Wheat, Rice, and Sugarcane together accounted for, on average, around 73% of GCA and 94% of the total VOP. Overall, the total agricultural GCA has increased in the latter years of the study (average, 268.07 thousand hectares), and the total value of the product has also increased significantly, that is, 1501.38 Cr. Rs. in 2010-11 to 3091.69 Cr. Rs in 2017-18.

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

Crop	% Share in	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Wheat	GCA	36.05	36.17	35.05	35.27	35.70	33.47	33.44	33.44
	VOP	23.00	26.41	21.32	21.39	15.62	21.76	23.67	20.08
Paddy	GCA	10.75	9.51	10.25	8.98	9.22	8.64	8.63	8.63
	VOP	7.08	7.83	8.15	5.64	6.31	7.27	6.79	5.38
Total Cereals	GCA	48.84	47.86	47.42	46.45	47.08	44.14	44.10	44.10
	VOP	30.51	34.77	29.82	27.36	22.47	29.87	31.03	25.91
Total Pulses	GCA	1.40	1.43	1.36	1.41	1.32	1.24	1.24	1.24
	VOP	1.20	1.05	0.99	0.91	1.21	0.82	0.80	0.52
Total Food Grains	GCA	50.24	49.29	48.79	47.86	48.40	45.37	45.34	45.34
	VOP	31.71	35.82	30.81	28.27	23.68	30.68	31.84	26.43
Total Oilseeds	GCA	1.04	1.05	1.15	1.19	1.12	1.05	1.05	1.05
	VOP	0.60	0.46	0.61	0.55	0.50	0.69	0.96	1.32
Potato	GCA	1.15	1.19	1.21	1.17	1.23	1.16	1.16	1.16
	VOP	2.94	3.33	3.18	4.89	2.03	3.23	2.40	4.75
Sugarcane	GCA	28.15	29.57	28.91	29.74	29.64	27.79	27.76	27.76
	VOP	64.75	60.39	65.40	66.28	73.78	65.39	64.80	67.47
Paddy + wheat + sugarcane	GCA	74.95	75.25	74.21	73.99	74.56	69.9	69.83	69.83
	VOP	94.83	94.63	94.87	93.31	95.71	94.43	89.15	92.93
Total Agriculture	GCA (1000 Ha)	261.07	259.16	262.76	258.98	262.43	279.92	280.14	280.14
	VOP (in Cr Rs)	1501.38	1623.64	2014.80	2348.28	2081.98	2486.29	2749.97	3091.69
Per Worker VOP (Rs.1000- at current prices) in **Amroha**			65.52	80.21	86.51	72.73	90.48	97.78	114.33
Per Worker VOP (Rs.1000- at current prices) in **UP**			40.66	48.69	52.5	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 Amroha district increased from Rs.65.52 thousand in 2011-12 to Rs.114.33 thousand in 2017-18, a net increase of 74.50% at current prices, while in UP it increases from Rs. 40.66 thousand to Rs.69.69 thousand, a net increase of 71.40%. Thus, the total value of agricultural output per worker is much higher in the district than in the state. The growth rate per worker value of output in the district is more than in the state. The ratio of per worker value of the district's output to the state average has increased from 1.6113 in 2011-12 to 1.6405 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 77.93% of the total fertilizers used, while the Sproportions of phosphorus and potassium were 15.84% and 6.23%, respectively. In 2017-18, however, the nitrogen share increased to 78.13%, while the phosphorus share increased to 17.35%, and the potassium share decreased to 4.52%. 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 across years, which can be due to several factors, including rainfall patterns and cultivation patterns, etc. The overall use of chemical fertilizers has decreased in the district from 251.64 kg/ ha GSA in 2010-11 to 146.78 kg/ ha GSA in 2017-18, which is a good sign. However, the authorities still need to take steps to reduce their consumption further as the chemicalization of agriculture degrades soils and water resources, requiring the use of organic fertilizers and biofertilizers.

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

Fertilizer/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Nitrogen	196.10	161.70	157.25	148.04	127.67	108.61	109.11	114.67
Phosphorous	39.85	36.07	41.22	40.71	37.14	40.75	43.29	25.47
Potassium	15.69	6.24	5.48	14.58	7.67	7.65	8.86	6.64
Total	251.64	204.01	203.95	203.33	172.49	157.01	161.27	146.78
Gross Sown Area (Ha)	261068	259156	262758	258977	262432	279920	280143	280143

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 (53 km) over the years. Government tube wells increased from 288 in 2010-11 to 308 in 2018-19. Shallow, medium, and deep tube wells increased by 1.06%, 121.62%, and 34.29%, 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 94.64% and 88.28%, 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)	53	53	53	53	53	53	53	53	53
No. of Govt. Tube wells	288	294	294	136	136	136	136	134	308
Shallow Tube well	71497	71712	71949	72107	72171	72171	72236	72256	72256
Medium Tube well	370	488	591	641	725	725	725	820	820
Deep Tube well	277	321	349	357	364	364	371	372	372
% Of NIA	65.12	99.29	99.33	99.32	99.24	98.27	98.27	98.27	-

% Of GIA	88.32	88.69	88.47	89.40	89.38	87.31	87.33	87.33	-
Source: http://updes.up.nic.in/spiderreports/intialisePage.action									

2.1.6.2 Source-wise Area under Irrigation

Groundwater is the main source of irrigation in the district. The share of wells and tube wells (GW) in NIA (average, 99.98%) has increased over the years. This 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 Amroha (in %)

Source/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Wells And Tube-wells (GW Irri.)	99.98	100	100	100	100	99.94	99.96	99.96
NIA (1000 ha)	111.86	170.59	170.60	170.78	170.22	172.04	172.07	172.07
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, 99.95%), wheat (average, 100%), total oilseeds (average, 98.34%), Potato (average, 100%), and Sugarcane (average, 100%) is irrigated. Percentage of the irrigated area under pulses (average, 34.46%) are relatively less

Table 14: Trends in Crop-wise Irrigated Area in Amroha (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	99.63	100	100	100	100	100
Wheat	100	100	100	100	100	100	100	100
Total Cereal	97.54	96.95	97.25	96.85	96.94	96.94	96.94	96.94
Total Pulses	29.92	34.43	32.92	33.19	36.30	36.30	36.30	36.30
Total Foodgrains	95.65	95.14	95.45	94.98	95.28	95.28	95.28	95.28
Total Oilseeds	99.74	99.49	100	99.94	98.44	96.36	96.36	96.36
Sugarcane	100	100	100	100	100	100	100	100
Potato	100	100	100	100	100	100	100	100
Source: Compiled from Statistical Abstract, Uttar Pradesh								

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 276.72 KWH in 2014-15 to 527.23 KWH in 2019-20, a net increase of approximately 90.53%. 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, 46.37%) in the total electricity consumption in the district is quite significant. It indicates the heavy usage of electricity by agricultural farmers. Since

electricity consumption has increased over the years, the authorities need to switch to more sustainable modes of electricity production, such as solar energy.

Table 15: Trends of Electricity consumption in Agriculture in Amroha						
Division/ Year	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**
Per Capita electricity consumption (KWH)	276.72	230.33	453.47	532.91	511.5	527.23
% Of electricity consumed in Agriculture sector to total consumption	46.99	45.25	42.68	45.51	45.96	51.85
Source: District-wise Development Indicators file.						

2.1.8 Status of Agriculture Market

Table 16 shows the marketing infrastructure in the district. It has three main markets and three sub-markets. The number of regulated mandis per lakh hectare of NSA has decreased from 3.49 in 2013-14 to 3.43 in 2018-19, which is a cause of concern as it is very important to increase the number of regulated mandis so that farmers can sell their products efficiently.

Table 16: Status of Agriculture Markets in Amroha							
Category/Year	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**
Main Markets (No.)	3	3	3	3	3	3	3
Sub Markets (No.)	3	3	3	3	3	3	3
Total Markets (No.)	6	6	6	6	6	6	6
No. of Regulated mandis per lakh Ha. of net area sown	3.49	2.77	0	1.75	1.71	3.43	-
Source: Compiled from Statistical Abstract, Uttar Pradesh and District-wise Development Indicators file.							

2.1.9 Status of Organic Farming

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

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

However, the policy-related issue is what would be after the three years? Will the government protect their income? There may be a possibility that the beneficiary farmers may revert to conventional farming in the absence of the regulatory framework. In this context, two things need to be thought of—a well-designed regulatory and monitoring framework and introduction of payments for ecosystem services for the organic farmers after the transition period 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 three groups in two development blocks. The highest number of groups are in Hasanpur (2), followed by Gajrola (1). 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. It is very important for the authorities to incentivize the farmers to establish more organic farming groups in the district.

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

S. No.	Block	Scheme	No. of groups	No. of farmers in groups			
				Total	Average	Median	SD
1	Gajrola	PKVY	1	50	50	50	0
2	Hasanpur	PKVY	2	100	50	50	0
3	District Total	PKVY	3	150	50	50	0
		Total	3	150	50	50	0

Source: Compiled from https://pgsindia-ncof.gov.in/

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 system of farming, farmers need proper training to know the practical details of the integrated sustainable farming system. Since economies of scale in both production and marketing matter in organic farming, some institutional framework may be needed in the forms of SHGs/ farm cooperative/PFOs/contract farming, etc. Organic farming could be an economically viable option in the district if the government builds strong marketing networks linking farmers, processors, and distributors with the easy certification process and minimizes farmers' risk by protecting their farm income through payments of ecosystem services. A long-term system of incentive and regulation needs to be evolved to retain the existing farmers and motivate others to move towards the sustainable farming system in the district.

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

1. The major problem of the farmers was poor marketing of the organic products and not being able to fetch a premium.

2. Scaling up organic production is another problem. The problem of marketing is even more serious in the case of perishable vegetable crops. Contract farming companies and Farmer Producers' companies can be encouraged.
3. 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. According to the farmers, implementing policies initiated to promote organic farming in the area is not very efficient as the inspection is not conducted regularly, and the farmers did not receive subsidies in time under the scheme.
6. The knowledge and awareness level regarding practices under organic farming was inadequate among farmers.

2.1.10 Livestock Sector

2.1.10.1 Trends in Livestock Population

Livestock forms an integrated part of the rural economy. From Table 18, we can infer that indigenous male cattle decreased considerably from 86533 in 1997 to 20339 in 2019, but the exotic male cattle has increased from 5206 in 1997 to 15436 in 2019. On the other hand, indigenous and exotic female cattle increased considerably from 84026 in 1997 to 93113 in 2019 and 8711 in 1997 to 87761 in 2019. Thus, the total number of cattle increased from 184475 in 1997 to 216649 in 2019, thus, a net increase of 17.44%. 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 51.35% 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 (49.97%) 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 53.68%. The total population of goats increased from 71913 in 1997 to 75742 in 2019, a net increase of 5.32%. The total pig population decreased considerably from 15165 in 1997 to 1736 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 24.77% share in the agriculture and allied activities sector and grew at a significant average annual growth rate of 18.66% from 2011-12 to 2018-19.

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

	Category	1997	2003	2007	2012	2019
Indigenous Cattle	Total Male	86533	64888	49860	40204	20339
	Total Female	84026	32837	61588	52191	93113
	Total	170558	97725	111448	92395	113452

Exotic Cattle	Total Male	5206	7357	6295	19204	15436
	Total Female	8711	13319	12390	37904	87761
	Total	13917	20676	18685	57108	103197
Total Cattle		184475	118401	130133	149502	216649
Buffalo	Total Male	93459	135337	102942	203323	75752
	Total Female	246517	155593	268071	454622	438795
	Total	339976	290930	371013	657945	514547
Sheep	Total Indigenous Sheep	1951	2189	2249	1444	976
	Total Exotic Sheep	372	0	0	36	100
	Total Sheep	2323	2189	2249	1480	1076
Goat	Total	71913	58592	56222	74252	75742
Pig	Total Indigenous Pig	13849	9669	8934	6301	1479
	Total Exotic Pig	1316	1225	1038	417	257
	Total Pig	15165	10894	9972	6718	1736
Total Livestock		667025	484579	571738	891994	-
Total Poultry		117102	78865	77813	134227	-
Source: http://updes.up.nic.in/spiderreports/intialisePage.action And http://dahd.nic.in/animal-husbandry-statistics						

2.1.10.2 Cattle Care Centre

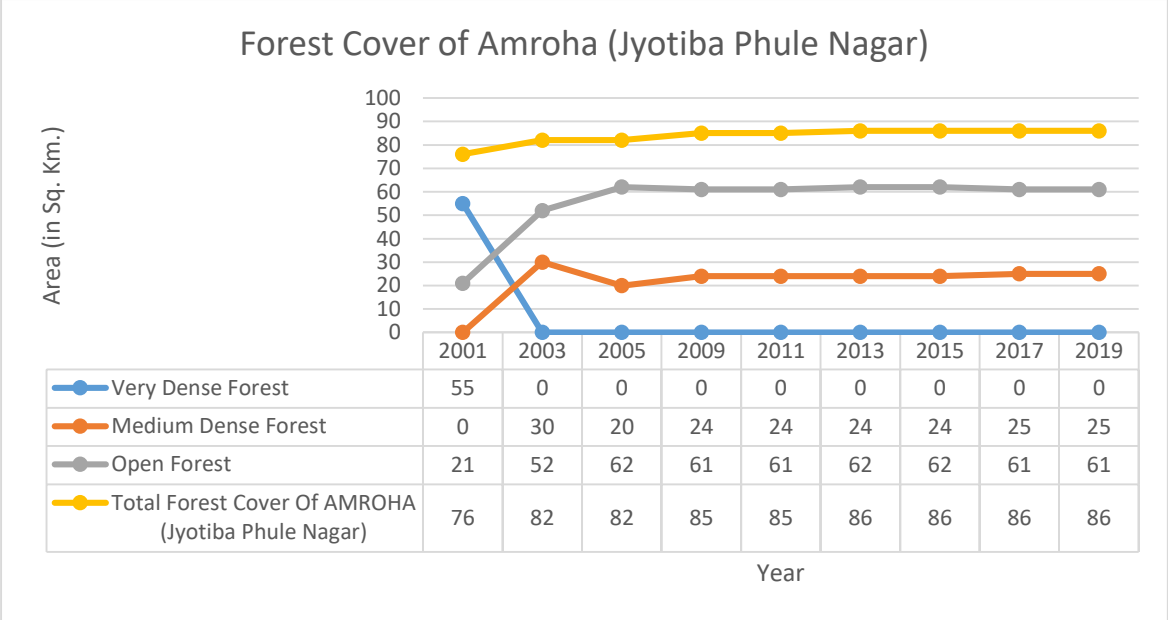
Table 19 shows that the Amroha district has an active network of cattle hospitals and development centres, which are necessary for the livestock sub-sector to grow. The number of cattle hospitals has increased from 20 in 2010-11 to 21 in 2018-19. The number of cattle development centres (40) has remained constant over the years. The number of man-made reproduction centres increased from 63 in 2010-11 to 65 in 2018-19. There are very few sheep (6) and pig (3) development centres which might be one reason 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	20	20	20	20	20	20	20	21	21
D- category Cattle Dispensary	3	3	3	3	3	3	3	3	3
Cattle Development Centre	40	40	40	40	40	40	40	40	40
Man-Made Reproduction Centre	63	63	63	63	63	63	63	64	65
Sheep Development Centre	6	6	6	6	6	6	6	6	6
Pig Development Centre	3	3	3	3	3	3	3	3	3
Source: http://updes.up.nic.in/spiderreports/intialisePage.action									

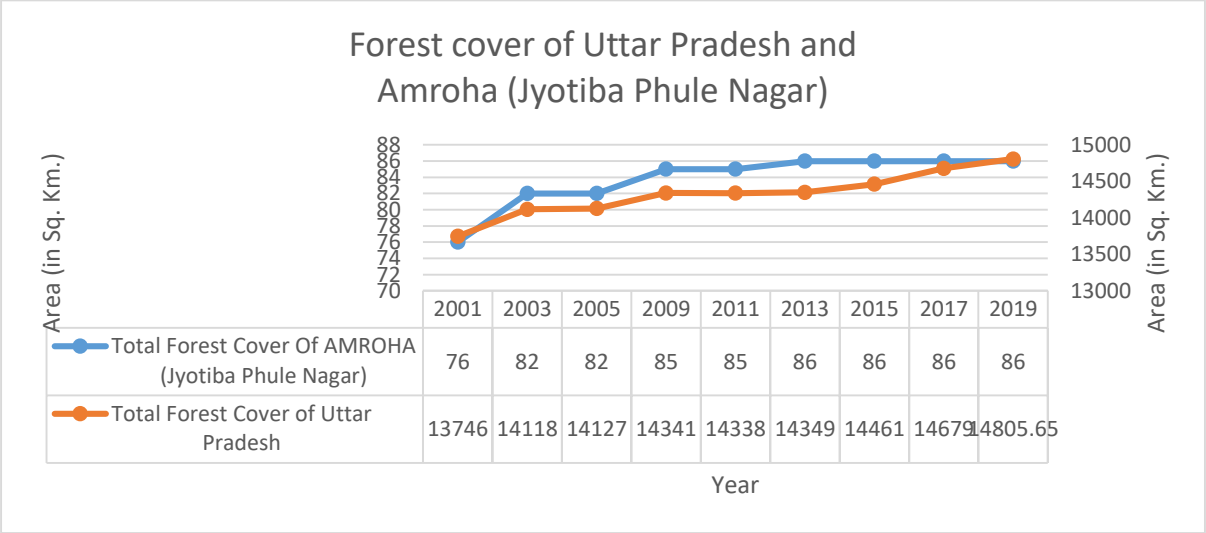
2.2 Forestry

Baseline Data Analysis/ Quantitative Data Analysis



	2001	2003	2005	2009	2011	2013	2015	2017	2019
Very Dense Forest	55	0	0	0	0	0	0	0	0
Medium Dense Forest	0	30	20	24	24	24	24	25	25
Open Forest	21	52	62	61	61	62	62	61	61
Total Forest Cover Of AMROHA (Jyotiba Phule Nagar)	76	82	82	85	85	86	86	86	86

According to FSI reports, over the years the forest cover of Amroha has increased, and as per the latest assessment, the forest cover is Amroha is 86 SQ. Km. Majorly. Open forest followed by medium dense forest are found in the district.



	2001	2003	2005	2009	2011	2013	2015	2017	2019
Total Forest Cover Of AMROHA (Jyotiba Phule Nagar)	76	82	82	85	85	86	86	86	86
Total Forest Cover of Uttar Pradesh	13746	14118	14127	14341	14338	14349	14461	14679	14805.65

According to the FSI assessment, the forest cover of the state Uttar Pradesh has increased significantly, but the forest cover of Amroha district has also increased, but at a slower pace.

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

motivate them to plant more trees, which would benefit the economy as well as the environment.[3]

in the district. There is a wide scope of Afforestation on waste land, trees outside forest (on the sides of the roads, banks of river etc.) and scrub area. Government can promote the afforestation, agroforestry activities by providing output based incentives.

2.2.1 Biodiversity

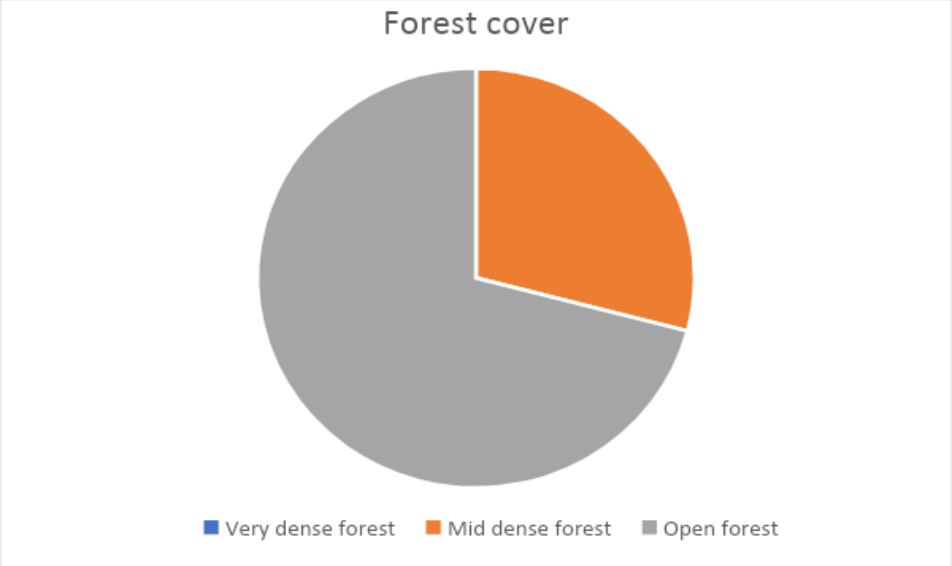
The district's biodiversity data includes various crop production, livestock population, bird species, and forest cover. The crop production trend shows an increase in crop production. Forest data shows that forest cover was not change in 2019. There are 401 bird species and forty-nine threatened/rare species of bird in the district.

Number of species	401
Number of rare/accidental species	49

Table 1 Bird species recorded in the district.

Geographical area	Very dense forest	Mid dense forest	Open forest	Total	% of Geographical area `	Change with respect to 2017 assessment	Scrub
2249	0	25	61	86	3.82	0	0

Table 2 Forest cover in a square kilometer.



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

2.3 TOURISM

Baseline data/Quantitative Data

Total number of tourists visiting Amroha -(2016-2020)

YEAR	INDIAN	FOREIGN	TOTAL
2016	765492	386	765878
2017	844091	408	844499
2018	925086	505	925591
2019	978753	600	979353
2020	274412	148	274560

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

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

b. In the year 2016 Amroha received total **765878** tourists. Number of Domestic travellers were 765492 and total international travellers were 386.

c. In the year 2017 Amroha received total **844499** tourists. Total number of Domestic travellers were 844091 and total international travellers were 408. The district experienced a total growth of 10.26% in total number of tourists compared to number in the previous year.

d. In the year 2018 Amroha received total **925591** tourists. Total number of Domestic travellers were 925086 and total international travellers were 505. The district experienced a total growth of 9.6% in total number of tourists compared to number in the previous year.

e. In the year 2019 Amroha received total **979353** tourists. Total number of Domestic travellers were 978753 and total international travellers were 600. The district experienced a total growth 5.4% in total number of tourists compared to number in the previous year.

f. In the year 2020 Amroha received total **274560**. Total number of Domestic travellers were 274412 and total international travellers were 148. The district experienced a total loss of -71.9% in total number of tourists compared to number in the previous year.

2.4 Wetlands

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

Table 1: Wetland Data of Jyotiba Phule Nagar 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	8	8	0	0	4	3	1	0	0	0	0	0	2

Ox-bow lakes/cut off meanders	9	12	3	0	1	6	1	1	0	0	0	0	5
High altitude Wetlands	0	0	0	0	0	0	0	0	0	0	0	0	0
Riverine Wetlands	4	5	1	0	0	0	1	2	1	0	0	0	4
Waterlogged	21	23	2	0	5	10	2	2	2	0	0	0	9
River/Stream	0	33	33	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	30	30	0	0	23	5	2	0	0	0	0	0	6
Waterlogged	6	6	0	0	2	2	0	1	1	0	0	0	2
Salt pans	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (542)	78	117	39	425	35	26	7	6	4	0	0	0	28

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.

According to the 2011 census, 61.13% households in the district depend on kerosene for the main sourceof lightning, followed by 36.82% using electricity and only 0.99% using solar.

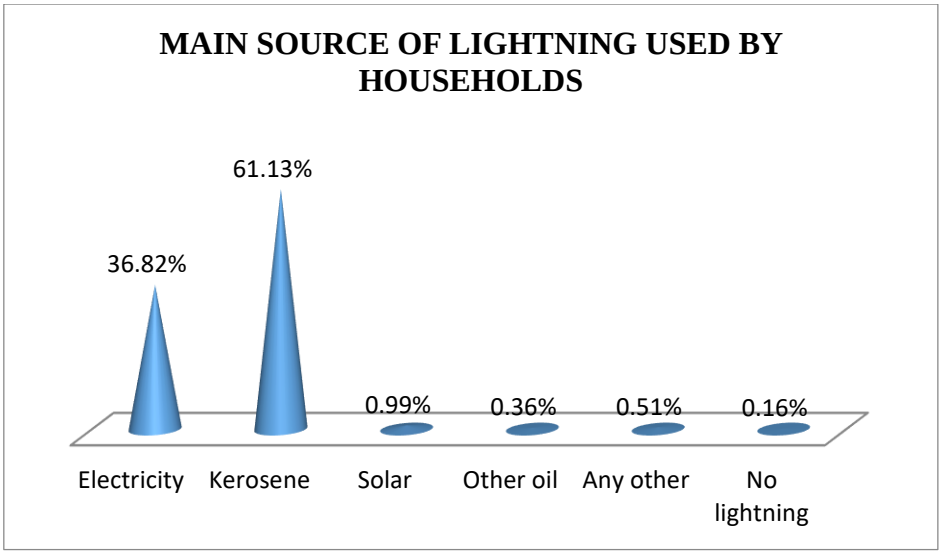


Fig. 1

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 (Fig. 1), 40.02% households use cowdung cake as the cooking fuel followed by 36.72% households using firewood and 17.60% depending on LPG/PNG. Majority of population in the district is mainly dependent on agriculture as their primary source of income. Rice, maize, sugarcane, mustard etc. are the main crops grown in are some of the major crops grown in the district.

The net sown area of the district is 172181 ha with the cropping intensity of 151.36%. The district has 21001 ha of forest land. A total of 904 ha of cultivable wasteland and 2818 ha of current fallow is there in the district. The district produces 854.1 KT/Yr of agricultural biomass and 1.5 Kt/Yr forest based biomass (Kumar et. al. 2017).

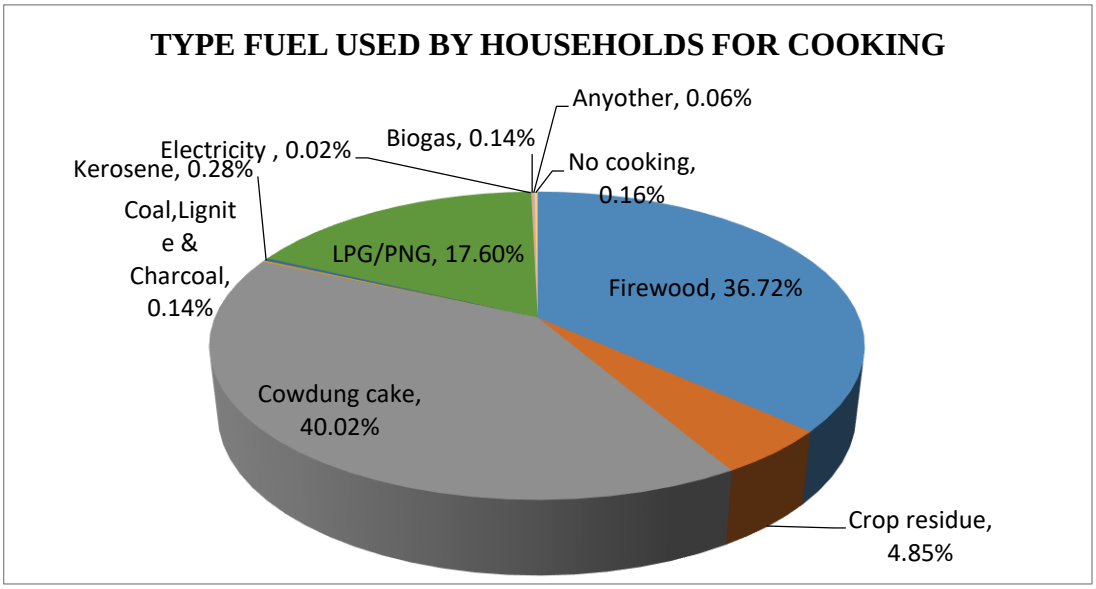


Fig. 1

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

CROPS	PRODUCTIVITY (kg/ha)
Rice	2029
Wheat	3155
Sugarcane	62420
Maize	909
Mustard	932
Pigeon pea	1052
Lentil	817
Toria	918

Table 1

According to the progress report of UPNEDA, a 2 MW biomass energy plant (Industrial waste) at Vam organic, Gajraula and a biomass gasifier at Insilco Limited, Gajaraula is installed in the district.

2.6.3. 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 m3/year and forty-one crores m3/year. This amount of biogas generation can efficiently complete the energy demand of the district.

2.6.4. Hydro Power

No hydropower plant exists, nor the site has been identified in the district. The district's main rivers are the Ganga, Baha, and Krishna. Hydropower sites should be identified in these district.

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).[4]

3.1.1 Biodiversity

Amroha lost 30ha of tree cover and 9.29kt of CO2 emissions between 2001 and 2021, a 13 percent decline in tree cover since 2000. Amroha acquired 9 hectares of tree cover from 2001 to 2012, accounting for 0.39 percent of all tree cover growth in Uttar Pradesh. Natural forest cover covered 0.1 percent in Amroha in 2000. The main fire season in Amroha usually starts in mid-December and lasts for around 25 weeks. Between the 14th of June 2021 and the 6th of June 2022, there were 1 VIIRS fire alarms reported, based on high confidence alerts alone. When compared to recent years, dating back to 2012, this is typical. So far in 2021, 60 hectares of land have burnt in Amroha. So far in 2021, 60 hectares of land have burnt in Amroha. This amount is typical when compared to other years' totals dating back to 2001. The year with the most fires was 2012, at 950ha. There were 333 VIIRS Alarms fire alerts in Amroha between the 10th of June 2019 and the 6th of June 2022.

3.2 Energy:

As per the data of the year 2013, Amroha's energy consumption is around 700 TJ/year and 3.5 GJ/capita/year. GHG emission of 48,354 Ton CO_2 equivalent and 0.244 Ton CO_2 equivalent/capita has been evaluated for the district.

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

3.2.1. Solar

The district Amroha has good solar energy potential, according to Pugazenthi et. al. 2016, total solar power potential available in the district is 0.2143. There have been a few installations of solar energy units in the district. One of the villages in the district is doing very well in the solar energy sector in the district as mentioned in an article in a national daily. According to the article, a village in Uttar Pradesh's Amroha district is presenting itself as a model for renewable energy usage with complete dependence on solar power for all its needs. The solar-powered village in Chakanwala Panchayat named 'Mandironwala Bhuddi' has no electricity poles but is completely lit up using solar power. Solar panels have been installed at every house in the village as part of government's scheme. A couple of villagers also talked about how solar power has helped to bring brightness into their area. They say that 'this is very beneficial to us as we can do our household chores easily in the solar light'. Others say that life has changed a lot after the solar power was brought to the village. The children of the village can be seen using the solar-powered lights to study in groups during night hours.

3.2.2. Biomass

The district has not achieved much in the biomass energy sector. The district also deals with problem of stubble burning. According to an article in India Today, The Uttar Pradesh government has sought answer from police chiefs of 26 districts of the state over incidents of stubble burning and absence of proper control over them. The districts whose police chiefs have been asked to reply are Jyotibhaphule Nagar, Shamli, Meerut, Bulandshahr, Gautam Buddh Nagar, Baghpat, Hapur, Agra, Firozabad, Hathras, Kashiram Nagar, Badaun, Moradabad, , Sambhal, Kanpur Dehat, Farrukhabad, Kannauj, Lalitpur, Banda, Hamirpur, Mahoba, Chitrakoot, Bhadohi, Amethi, Jalaun and Rampur.

Another recentr article in a local daily, Dainik Bhaskar, discusses the problem of power cut off in the district. According to the article, due to the ongoing undeclared power cut in Amroha district of UP, people are facing many problems. The people are hurt by the scorching heat, due to the unannounced power cuts during the afternoon and night, neither the employees are able to perform the work properly in the offices nor are the women and children living in the house able to sleep. Due to which the patience of the people has started responding.

3.2.3. Biogas:

Clean Effentech International private limited currently working on project with sugar mill waste in the district having capacity of 90 Ton per day. Livestock and agricultural data show a great potential of biogas in the district. However as per the authors knowledge, no data of biogas plant is given for Bhadohi district.

3.2.4. Hydropower:

No sites have been identified for micro hydel project in the district. The State's national-level program runs for hydropower generation, such as the small hydropower project program. The implementation of small hydropower in the State is carried out by Uttar Pradesh New and Renewable Energy Development Agency.

3.3 TOURISM

How to Reach Amroha-

Getting to Amroha by Plane

Amroha is not well connected by regular flights to the rest of the country's major cities. Pantnagar, 98 kilometres away, has the nearest airport. Airports: Pantnagar International Airport

Getting to Amroha by Train

There are no frequent trains to Amroha from the country's other main cities. The nearest railway station is Gajraula, which is 24 kilometres away. Gajraula Jn (Railway Station)

Cities Near Amroha –

This is a list of the largest cities in India that are nearest to Amroha. A huge city has a population of at least 200,000 people, and you can usually fly into one of the main airports. Find the nearest airport to Amroha, India if you need to book a flight. You can also check for places 4 hours (or 3 hours, 2 hours, or 1 hour) away from Amroha, India, or just search for cities near Amroha, India in general. Moradabad is 32 kilometres away, Hapur is 70 kilometres away, Meerut is 75 kilometres away, Ghaziabad is 104 kilometres away, Bareilly is 111 kilometres away, and Noida is 113 kilometres away.

Places to see in Amroha –

Dargah Bhure Shah

The Dargah Bhure Shah is situated on Joya Road Amroha and the distance between the Amroha City and Dargah Bhure Shah is 24 km. Syed Khwaja Sadruddin Shah arrived in Delhi from Amroha at the end of Jahangir's reign and resided on a mound in front of the ruins of an Afghan fort. When Shah Jahan decided the location for his Qila-e-Maula, he urged Pir to relocate. Regardless of the threat, the saint refused. It is reported that whenever troops arrive for eviction, he either disappears or tosses them under the mound with his supernatural powers. Bhure Shah, so-called because of his "brown" or light skin, was the son of another great saint, whose temple is located in Amroha. It is reported that when he saw his father, he told him to look for a settlement somewhere else in Amroha because Amroha was too young to keep them both. As a result, Bhure Shah travelled to Delhi. However, his father had to deal with another holy man in Amroha who cursed him with being burned with scorpions.

Bayen ka Kuan-

There is another specialty here which is now only recorded in the pages of history. Amroha was also known as the city of wells. With the passage of time, their existence went extinct. The most important in this was the well of the left, which was built in the 12th century by Amba Devi, sister of Prithviraj Chauhan.Amba Devi used to be the zamindar of Amroha during that time. The well of the historical heritage left is also losing its identity due to lack of proper maintenance. This terraced well is situated on Bijnor road in Amroha in north-west direction near spinning mill in village Razzakpur. Locally it is known as Baiyan Ka Kuan.

Majaar Shah Vilayat Sahib-

Majaar Shah Vilayat Sahib is a well-known living-miracle that still bears witness to Hazrat Sharafuddin Shah Wilayat's spiritual status as a change in the nature of an insect. On their way to the Holy Land. A scorpion's nature is to sting, as everyone knows. However, there is no scorpion sting on the premises of Hazrat Shah Vilayat's Dargah, regardless of whether it was used previously. People can take it for a set amount of time, and it will not be subtracted if they do not visit the temple during that time. The Dargah of Sharafuddin Shah Wilayat, also known as Dada Shahvilayat by Amroha inhabitants, is located in Amroha. Because the people of Amroha are ancestors of Shahvilat, there is a reason for this common address (p Dada 'Pitrabhakta'). The saint is well-known for his venomous black scorpions, which protect his temple and can kill with little attacks.

Khwaja Nasruddin Sahab-

Khwaja Nasruddin Sahab in Amroha, where animals do not spit, and it is the Buzurg farmaan that if a person's livestock is lost, he can come to the mazaar and, by God's grace, he will locate that animal here.

Vasudev Temple-

The history of the ancient Vasudev Tirtha temple of the city is 5000 years old. In this, the Vasudev temple has been a witness to the exile of the Pandavas, but this time the devotees stopped coming due to corona infection. Due to this the fair held in the month of Ashadh Magh was also canceled. Actually, a fair held in large numbers is very interesting.

Tigri

It is located on the bank of Ganga at about 62 Km. from Moradabad . Every year on Kartik Poornima, a famous Ganga Mela is held here and lakhs of devotees use to take holy dip.

Gajraula

It is situated on National Highway no. 24 and 53 Km. away from Moradabad & 100 Km. From Delhi. It has been developed as an important Industrial city. Many large & medium scale industries like Vam Organics, Chaddha Rubber, Shivalik Cellolose of Hindustan Lever etc are situated here.

Data analysis

- From the table-1 it is evident that the number of total tourists in Amroha increased from 2016 to 2019.
- The Amroha tourism encountered highest percentage change in tourists in the year 2017, which was 10% increase compared to previous year.
- The growth in the number of total tourists in Amroha is not constant in these years, although the range lies between -70-10%**.**

SWOT Analysis

S.No	Strength	Weakness	Opportunities	Threat
● 1.	● Geographically located next to Moradabad in Uttar Pradesh.	● Poor promotion of existing temples and monasteries.	● Proper maintenance of existing heritage sites to attract more	● Covid 19 can be a big threat with unpredictable arrival.

	• Religious tourist plans can be clubbed together to propose a spiritual travel plan. • The district has Dargah Bhure Shah is situated on Joya Road Amroha and the distance between the Amroha City and Dargah Bhure Shah is 24 km	• No maintenance of existing heritage sites in the district.	tourists both local and foreign. • By utilising cutting-edge technology, such as laser-induced for excavation of Ghositarama monastery. • Creating museums, artistic spaces and collaborative ventures to bring all useful collected heritage and art under one roof.	• Lack of good budget by the government can be a big barrier.

3.4 WETLANDS

The wetlands are the source of many ecosystems and habitats for various species. 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. These businesses can be a great opportunity to be turned into a large-scale production hub using the right approach. The region has a good amount of wheat, rice, and bajara. The region is known as the city of saints. The data collected and analysed shows the region's production and possible product derived from the raw product. The list of the possible products are mentioned below:

- Bajara and wheat production is recommended as commercial crops in the region, leading to products like flour and finished products.
- India Govt. has proposed a mission like India's Millet Mission, which creates an opportunity for the district to become a production hub. The district stats show a good amount of finger millet, pearl millet, in the region, which can be promoted in the scheme.
- Also, products like oil, finished pulses can be derived from the crops and millets grown in the region.
- Also, this region is a belt of large varieties of oil production like mustard seeds which can turn into a valuable market for oil production in the region.
- The region has a large production of dairy products, leading to increased animal husbandry. Wetlands can support the growth of fodder for animals.

4 ACTION PLAN DEVELOPMENT

4.1 FORESTRY

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

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.

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 - As an innovative environmental protection, food security, and livelihood effort, the Uttar Pradesh government is launching the 'Food Forest' project. The administration has designated 15 districts including Amroha with various agro-climatic zones for this purpose.

4.2 TOURISM

Travel Uttar Pradesh' plan- To provide visitors a better awareness of how humans affect the environment and to instil a greater respect for ecosystems it can be clubbed with a major city like Moradabad . In the Amroha district, there is a big chance to establish events around river ganga not only on religious grounds but also cultural grounds as well. The project will reduce the detrimental effects of traditional tourism on the environment while also enhancing local people's cultural integrity. This initiative will also increase visitor traffic in the area.

Sustainable tourism-

Many places in India have been transformed into significant holy sites due to spirituality. As a result, many travel aficionados have begun to flock to these hubs, in addition to the vast number of pilgrims who visit time and again with goals of sustainability in mind and its overall development. The impact of these religious locations is huge not only around the local surroundings but also among the travellers. To grow sustainably at various touch points like temples and monastery must be considered with respect to developing the local trade and involving the local folks. Different tourists share an equal sense of responsibility for the development of sustainable tourism. Every person is responsible for the factors including many elements.

Projections and Monitoring matrix

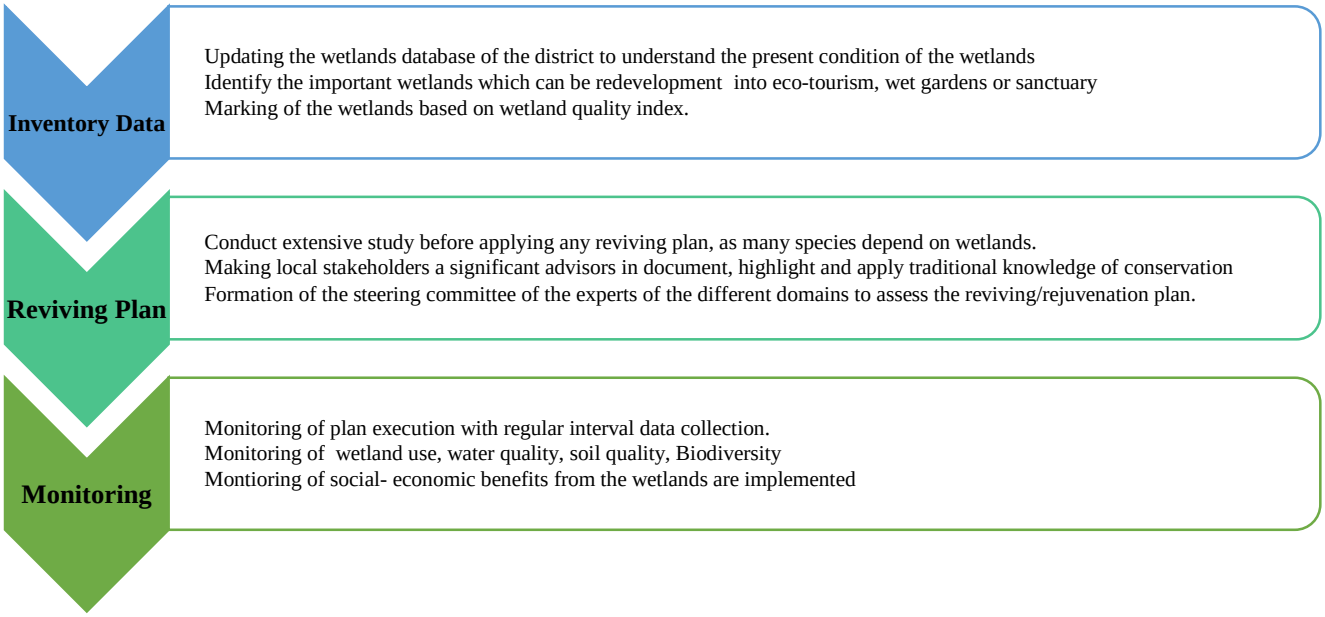
Sector	Intervention	Strategy	Total cost	Expected Outcomes
Tourism	**Research**	● The cause and motive for tourism can be predicted using various data and matrices which available on various government official websites. It is also feasible to discover the elements affecting tourism in Uttar Pradesh through significant qualitative and quantitative research. ● All political pressures and influences must be removed from research to bring as much transparency as one can. ● When adding new records, the researchers must ensure that the field data and secondary data are correct and unaltered. This would be specific prizes to the competition's winners. Hundreds of players competed in numerous international competitions.It is necessary to enlist the help of unbiased researchers.		As a reference for other processes, a well-researched document. Tourism in Uttar Pradesh is influenced by a number of factors. Understand multiple factors that influence tourism activity. To be able to understand and work upon all the listed factors and create a need for travel for people within and outside the country! Research and prior lessons will be used to inform the planning process. For a successful implementation, realistic planning is required.
	Planning	● Research and analysis of various data and reports can be used to generate action plans for intervention. ● Developing an active action plan is critical because the results are		

		dependent on how it is prepared and later implemented as well. ● Planning must take into account the state's social position as well as the impression that tourists have of the country. ● Non-practical forecasts should be avoided at all costs. ● Making plans for all major festivals and occasions like Ramnavmi. Finding out carious elements of the temples that can be utilized to weave stories in and around Amroha. ● Hindu temples can be commercialised. Other involved religions and religious places must be promoted in Amroha.. ● 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 Moradabad. • The development of tourist attractions and maintenance of temples in and around Amroha. • 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.		
	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, and rejuvenate the wetlands existing and extinct.



4.4 ENERGY

4.4.1. Solar

The district is mainly agricultural and hence if the solar energy aids in the agricultural activities then there would be a boost in the economy of the district. For this the people of the district should be made aware of the solar energy as there are not many solar installations witnessed in the district. This can be done by organizing awareness camps etc. at smaller levels so that people are able to get knowledge at personal levels. Also, the schemes of the government related to solar energy should be popularized. Farmers should be made acquainted with the Kusum Yojana. The DISCOMs should work towards developing infrastructure required for solar segregation. This would help the DISCOMs in providing uninterrupted power supply to the farmers at low costs without facing any losses. Attention should also be paid on encouraging more and more people for installing solar roof panels under the National Solar Mission, Phase II.

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

4.4.2. Biomass

The district first needs to be made aware of the renewable energy and more specifically the biomass energy. People should be made aware of the biomass energy and also should be educated about the harmful effects of stubble burning. The district cultivates sugarcane, rice and wheat mainly, so the best suited projects for the district can be husk based biomass gasifier and the bagasse based biomass plants. Ethanol production from sugarcane should be promoted in the district. The husk based biomass plants can be developed on the lines of the Husk Power Systems from Champaran, Bihar. Community based

biomass plants should be encouraged in the district, so that the investment is divided among the group of people.

A proper transportation system should be developed so that there is easy transportation of the biomass wastes to the plants. The authorities responsible should make an easy business environment in the district, so that more and more people are attracted to it.

4.4.3. Biodiversity

Amroha lost 30ha of tree cover and 9.29kt of CO2e emissions between 2001 and 2021, a 13 percent decline in tree cover since 2000. Amroha acquired 9 hectares of tree cover from 2001 to 2012, accounting for 0.39 percent of all tree cover growth in Uttar Pradesh. Natural forest cover covered 0.1 percent in Amroha in 2000. The main fire season in Amroha usually starts in mid-December and lasts for around 25 weeks. Between the 14th of June 2021 and the 6th of June 2022, there were 1 VIIRS fire alarms reported, based on high confidence alerts alone. When compared to recent years, dating back to 2012, this is typical. So far in 2021, 60 hectares of land have burnt in Amroha. So far in 2021, 60 hectares of land have burnt in Amroha. This amount is typical when compared to other years' totals dating back to 2001. The year with the most fires was 2012, at 950ha. There were 333 VIIRS Alarms fire alerts in Amroha between the 10th of June 2019 and the 6th of June 2022.

5 RECOMMENDATIONS

5.1 AGRICULTURE AND ALLIED SECTORS

- The possibility of evolving an economically viable model of convergence of MGNREGA activities with the concerned line departments would be explored to promote organic HVCs, including vegetables.
- The share of the livestock subsector increased substantially from 15.16% in 2010-11 to 32.79% in 2018-19, with average annual growth rate of 18.66%. The number of female cattle and buffaloes increased immensely during the study period. While the substantial decline in the number of male cattle and male buffaloes indicates the rising farm mechanization and declining relevance of animal power, mainly because of the high maintenance cost of livestock. Milk and other dairy products could be the key driver of rural economy if the government focus on improving the productivity and ensuring remunerative prices through promoting dairy cooperatives.
- Though the fishery & aquaculture has minuscule share in the primary sector GDP, it grew with a significant average annual growth rate of 94.25% during the study period. It has huge scope to raise GDP and local livelihood.
- Three crops - Wheat, Rice, and Sugarcane together accounted for, on average, around 73% of GCA and 94% of the total VOP of the district. These are the water guzzling crops and have high dependency on the groundwater for irrigation, which can have serious environmental issues if such a pattern continues in the long run. Therefore, two-fold strategy is required—fist incentivizing the farmers to shift to horticulture, oilseeds and pulses and second promotion of

organic farming in these three crops as economics are in favour of these crops. Agriculture R&D and extension services need to be reinvigorated and oriented toward sustainable agricultural practices in the case of HVCs, horticulture, livestock and agroforestry.

- There is a huge scope for the cultivation of aromatic and medicinal plants and other high revenue generation crops like capsicum, strawberry, the mushroom.

- Per capita electricity consumption in the district agriculture increased significantly from 276.72 KWH in 2014-15 to 527.23 KWH in 2019-20, a net increase of approximately 90.53%. Since electricity consumption has increased over the years, there is a need to promote the use of solar energy use in agriculture.

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

- 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 have positively impact water quality and soil health along with farming sustainability. However, being a knowledge-intensive system of farming, farmers need proper training to know the practical details of the integrated sustainable farming system. Since economies of scale in both production and marketing matter in organic farming, some institutional framework may be needed in the forms of SHGs/ farm cooperatives/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.

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

- Drip and Sprinkler irrigation should be introduced for higher water and crop yields.

5.2 FORESTRY

Amroha, located on the bank of river Ganga, Baha & Krishna. According to ISFR 2019, 86 sq. Km. area of Amroha is covered with forest. Majorly open and moderately dense forest are found in the district. There is a wide scope of Afforestation on waste land, trees outside forest

(on the sides of the roads, banks of river etc.) and scrub area. Government can promote the afforestation, agroforestry activities by providing output based incentives.

5.3 Biodiversity

- Organize contests and field trips for schoolchildren to wilderness places, such as wildlife parks and sanctuaries, to raise awareness about forest and animal conservation.
- Fragmentation of forest areas and protected areas (wildlife areas) must be avoided, and forests that have already been fragmented must be recreated, with the right corridor re-established.
- Non-timber forest produce-based income-generating initiatives should be identified and promoted.
- On-farm measures such as laser leveling, bench terracing, farm pond building, afforestation, crop diversification, and so on should be adopted.

5.4 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 rejuvenate and restore the wetlands under MNREGA schemes.
- It is recommended to diversify cropping culture by introducing vegetables, mushrooms, beekeeping, fruits, medicinal plants, dairy, poultry etc. for nutritional security
- It is recommended for the enhancement and conservation of green fodder for livestock.

5.5 ENERGY

4.5.1. Solar

- ❖ The people of the district should be made aware of the solar energy scheme of the government.
- ❖ Kusum Yojana should be popularized among the farmers of the district.
- ❖ Solar rooftop installations should be popularized under the National solar Mission- Phase II.
- ❖ The solar-powered village in Chakanwala Panchayat named ‘Mandironwala Bhuddi' can be a role model to other viallges in the district.

4.5.2. Biomass

It can be concluded that the district has made its way to get rid-off stubble burning which is quite appreciable. Attention should also be paid on Bagasse Based Co-Generation Project's in Sugar Mills as the district largely cultivates sugarcane. This can be done by making friendly environment for the entrepreneurs to set up biomass plants. All this will lead to development of the district’s economy and livelihood in a sustainable manner.

4.5.3. Biogas

- Large paper and pulp mills, as well as sugar mills, are in this region consumes lot of water. The waste from this industry can be utilised to produce biogas in a biogas plant.
- Promotion of household biogas plant and different incentive scheme should be spread through posters, or slogans. Tourist attraction places such as Hastinapur Jain temple or Shaheed Smarak should be targeted to conduct this activity.

4.5.4. Hydropower

- Jatowali, Shishowali, Bhudiwali, Thakowali are some of the villages constantly affected by flood therefore a canal should be made near these villages and hydropower potential should be identified for canal.
- It is recommended to identify new sites and build microhydel projects on the investigated sites in Amroha.

4.5.5 Tourism

Promoting Mango and Mango festivals- Amroha's oldest industries include utensil making, dholak production, and agriculture. People in this area are also active in Katholi, the production of wooden toys, and hand-loom weaving. Cotton industry, kaleen or carpet weaving industry, and bidi, a form of handcrafted cigarette industry, are examples of modern industries. The exceptional quality of Amroha's carpets is well renowned. It is in high demand not just in India, but also in many other countries throughout the world. Amroha, like most cities in Uttar Pradesh, has some sugar mills. In the nearby villages of Amroha, sugarcane is farmed in great numbers and processed into sugar for domestic and commercial usage in these sugar mills. Amroha is a market for agricultural products, with ceramics, hand-loom weaving, and sugar mills as its principal industries.

- **Jaun Elia poetry fest-** Famous Pakistani poet Jaun Elia was born in Amroha,Uttar Pradesh. History, philosophy, and religion were all subjects that Jaun Elia was passionate about. His personality and poetry took on a new dimension as a result of this. His poetry is notable for its ease of expression and directness of appeal. To be able to recreate his magic and attract poets, artists and students to Amroha.

Monitoring, Evaluation & Impact-

	Broad objectives / recommendations	Key activities / interventions to be planned			Monitoring & Evaluation	Impact
		2022	2023	2024		
1.	To market exceptional quality of Amroha's carpets across the country and globe.	To find ways to attract tourists to Amroha and promote its products like by products of sugar cane.	To keep a track of ongoing process and take constant tourist feedback.	Improve upon every touch and using technology as an important tool to maintain transparency.	Process tracing, Bradford Hill criteria. Environment Impact Assessment	More tourists visiting by the end of the year. Word of mouth spreading across the country and globe.
2.	To promote Amroha's oldest industries include utensil making, mangoes, dholak production, and agriculture.					

6. Discussion During the Report Presentation

- The DM, Amroha appreciated the presentation and assured that it will be used as a base for planning and discussion in next DGC meetings.
- The work of beautification of villages in the Ganga Basin is being taken up.
- The suggestions such as conversion of ashram into wedding venues and promoting local produce through Delhi Haat, INA will help in increasing the income of locals and hence, a plan will be laid down for the same.
- Amroha has good opportunities in the fisheries sector and hence, the interventions shared in the report will be studied further and the team will take up the related work.
- The IIML Report for Arth Ganga should be a regular Agenda item for next 6-8 DGC meetings.
- Hon'ble PM during the post-Budget webinar on Tourism had spoken about market potential of destination weddings. It was suggested that suitable Ashrams in Ganga Basin may be identified for such purpose to promote blissful experience, cost reduction, livelihood opportunities and better upkeep.
- Allocate separate space for Namami Gange Awareness and Jalaj Marketing kiosk in Melas/Congregatios/Fairs for providing better marketing opportunities to the Jalaj products.
- As Dilli Haat Centre – Namami Gange Awareness and Marketing Centre – is being launched soon, it was requested that every district to identify niche products with a creative story and link it with Jalaj in their area.
- To identify Arth Ganga Tourist Trails and organize Ganga Guide training
- Promotion of Natural Farming in Ganga Basin and training workshops should be organized on a regular basis. NMCG is supporting this initiative in coordination with MoA& FW and NCOF
- Make plans for reuse of treated waste water for agriculture, industrial etc. purpose and also the sludge.
- Training of volunteers for Ganga awareness & Aarti workshops to promote regular aartis on Ghats.

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6 APPENDICES

6.1 AUXILLLARY DATA

Table 1 Biogas potential from animal waste in the district.

Livestock	Residue type	Total population as of 2012	Manure yield * (kg/day)	Total manure generation annually (kg)	Average collection (75%)	Dry manure after removing Moisture content	Manure required for biogas* (kg/m³)	Biogas potential (m³/yr)	m³/day	Dry matter per day
Cattle	Manure	149502	10	54,56,82,300	40926172 5	81852345	25	3274093.8	8970.12	224253
Buffalo	Manure	657945	15	3,60,22,48,875	27016866 56	54033733 1.3	25	21613493.25	59215.05	1E+06
Sheep	Manure	1480	1	5,40,200	405150	81030	25	3241.2	8.88	222
Goat	Manure	74252	1	2,71,01,980	20326485	4065297	25	162611.88	445.512	11138
Pig	Manure	6718	2.5	61,30,175	4597631.25	919526.25	25	36781.05	100.77	2519.3
Poultry	manure	1,35,715	0.1	49,53,598	3715198.125	743039.625	25	29721.585	81.429	2035.7
Total		**10,25,612**						**25119942.77**		

Table 2 Biogas potential from agricultural waste in the district.

Crop	residue type	Total crop production (tons) (2017-18)	Residue production ratio	Residue amount (tons)	Average collection (70%)	Moisture content	Residue amount after removing moisture (tons)	Biogas potential [m³/(tons of dry matter)]	Overall biogas potential (m3)
Maize	straw	5038	1.5	7557	5289.9	15	4496.415	800	3597132
Wheat	straw	336604	1.5	504906	353434.2	30	247403.94	800	197923152
sugarcane	bagasse	6201537	0.33	2046507.21	1432555.047	80	286511.0094	750	214883257.1
Total		**6543179**							**416403541.1**