Arth Ganga Project: District Bhadohi

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EXECUTIVE SUMMARY

Bhadohi, one of the centre of art and culture is located in the state of Uttar Pradesh. The city is traversed by rivers Ganga, Varuna, and Morva.

The total geographical area of the district is 1015 km^2. The primary sector showed an average annual growth rate from 2011-12 to 2018-19 is 7.74%. with share decreased from 17.13% to 15.63% in the same period. The share of the secondary sector decreased from 34.28% in 2011-12 to 32.97% in 2018-19. However, the sector grew with a significant average annual growth rate of 10.12%. The tertiary sector occupies, on average, 51.19% share in the district economy with a remarkable average annual growth rate of 8.74%, with its share increasing from 48.59% in 2011-12 to 51.4% in 2018-19. Overall, the district economy grew with an average annual growth rate of 8.44%.

In 2017-18, the net sown area and gross irrigated area represents 67773 ha and 87110 ha. The cropping intensity of the district is 144.91%. The total actual irrigated area is 57859 ha. Major crop types are wheat, rice, maize, barley, tide, millet, pulses like a variety of gram, black pulse, pigeon pea, lahi mustard, etc. along with sugarcane, potato, pea, etc. The total food grains along with pulses account for the production of 297334 MT. The livestock consists of cattle (indigenous and crossbred), buffalos (indigenous and crossbred), pigs (indigenous and crossbred), sheep; along with poultry and fisheries. Agriculture with the horticulture sector grew at a low average annual growth rate of 1.21% from 2011-12 to 2018-19 with its share decreased from 70.38% to 50.90% over the years.

The district's percentage of the net and gross irrigated areas have increased over the years with an average of 82.46% and 82.33%, respectively.The net sown area has increased over the years, from 64.54% in 2010-11 to 65.73% in 2017-18. The area for non-agricultural use increased slightly over the period from 17.24% to 18.42%. In 2017-18, The net sown area (NSA) has increased over the years, from 64.54% in 2010-11 to 65.73% in 2017-18. The area for non-agricultural use increased slightly over the period from 17.24% to 18.42%. The overall use of chemical fertilizers has decreased in the district from 269.08 kg/ ha GSA in 2010-11 to 146.48 kg/ ha GSA in 2017-18.

The share of livestock increased from 23.87% to 40.56% from 2011-12 to 2018-19 with a remarkable average annual growth rate of 17.78%. The fishery & aquaculture subsector share is around 5.05% in 2018-19, with a significant average annual growth rate of 147.78% from 2011-12 to 2018-19. Mines and quarrying recorded a remarkable average annual growth rate of 36.66% during the same period. The total forest cover of the district is 3.12 km^2. The percentage share of the forest area has decreased from 0.16% in 2010-11 to 0.07% in 2017-18. There is no major forest cover in the district. Out of total forest cover, the maximum area is covered by Open Forest (3.12 km^2). The district's forest cover in 2001 was 0 km^2.The share of area under trees and gardens decreased from 0.62% in 2010-11 to 0.53% in 2017-18. The share of forestry and logging in the total agriculture and allied sector is small, around 3.5% in 2018-19, but it grew remarkably well at an average annual growth rate of 55.19%.

Sant Ravindas Nagar is known for its spiritual significance and hosts fair and festivals. The district is well connected through roads and railway network. In the year 2019, the district received 41204 domestic tourists and 268 foreign tourists. In 2020, the number of Indian visitors increased yet number of foreign visitors fell. The district id destination to many temples like Sita Samahit Sthal (Sitamarhi), Baba Harihar Nath (Gyanpur), Baba Doodhnath (Gyanpur), Chakwa Mahaveer, etc.

In the district, 60.77% households use kerosene as the main source of lightning, followed by 37.88% using electricity and only 0.43% using solar. In the district, a Solar solar High Mast Lightning System was installed in 2018-2019. According to Pugazenthi et. al. 2016, total solar power potential available is 0.0703. Electricity consumption in agriculture has increased significantly from 130.98 KWH in 2014-15 to 279.18 KWH in 2019-20, a net increase of approximately 113.14%. 43% households use firewood and the other majority that is 40% households use firewood for cooking. Only 11% households in the district depend on LPG/PNG for cooking. It is a cause of concern, resulting in an increased burden on non-renewable resources and creating waste disposal problems. The percentage share of the agriculture sector in the total electricity is around 36.53%.The total number of wetlands existing in the district is 1130 consisting of both Man-made and Natural. Most of them are small or medium sized and tanks/lakes/ponds/ few raverine and waterlogged. The district's biodiversity data includes various crop production, livestock population, bird species, and forest cover with 311 bird species and 33 threatened/rare species of bird in the district. Biogas potential from animal waste and agricultural waste was calculated approximately as ninety-six lakh m^3/year and eleven crores m^3/year. No hydropower present or future plans exist.

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

1. DISTRICT OVERVIEW

1.1 INTRODUCTION

District Sant Ravi Das Nagar Bhadohi is located in south eastern part of Uttar Pradesh state. The district Sant Ravi Das Nagar (Bhadohi) was created on June 30, 1994 by dividing the western part of the district Varanasi. To provide efficient administration, the district is administratively divided into 03 tahsils namely Gyanpur, Bhadohi and Aurai(newly created after 2001 Census). There are 481 Gram Panchayats and 1217 Revenue villages with 1087 inhabited villages and 130 uninhabited villages in the district. In urban area there are 07 statutory Towns and 04 Census Town. Statutory Towns comprises of 02 Nagar Palika Parishad and 05 Nagar Panchayats.

Carpet weaving in Bhadohi-Mirzapur region dates back to the 16th century, during the reign of Mughal Emperor, Akbar and is believed to have established when centuries ago, some Iranian master weavers stopped at Madhosingh village, near Khamaria, in Bhadohi while travelling in India, and subsequently set up looms here.

The economy of the district is mainly based on agriculture. Most of the lands in the district are used for agricultural purposes. Some of its chief agricultural products are rice, wheat, barley, sugarcane, etc. The present day Bhadohi district is biggest carpet manufacturing centres in India, most known for its hand-knotted carpet. While the Mirzapur-Bhadohi region has the largest number of weavers involved in handmade carpet weaving cluster, engaging around 3.2 million people in the industry, Bhadohi alone employs 2.2 million rural artisans in its 100 percent export-oriented industry. Bhadohi based organisations account for about 75% of the Rs 44 billion of total carpet exports from India, The annual turnover of carpet exports from Bhadohi was Rs 25 billion (approx) in 2010.

The total population of the district is 1,578,213 in which 1,348,911 live in rural and rest 229,302 in urban areas. In the total population of the district of Sant Ravidas Nagar as much as 29.8 percent are workers and rest of 70.2 percent are non-worker. Among worker 18.18 percent are main workers and rest of 11.64 percent are marginal workers of total population. In the district among workers about 20.6 percent are cultivators and 44.44 percent other workers.

Sant Ravidas Nagar (Bhadohi) district is located in Uttar Pradesh state in northern India. The city of Gyanpur is the district headquarters

This district is situated in the plains of the Ganga River, which forms the southwestern border of the district. Ganga, Varuna and Morva are the main rivers. The district is surrounded by Jaunpur district to the north, Varanasi district to the east, Mirzapur district to the south, and Allahabad district to the west

There are some famous temples in Sant Ravidas Nagar: Sita Samahit Sthal (Sitamarhi), Baba Harihar Nath (Gyanpur), Baba Doodhnath (Gyanpur), Chakwa Mahaveer.

Figure 1 Map of the district

1.2 DEMOGRAPHIC PROFILE OF BHADOHI

Economy and Livelihoods

- Geographical Area: 1015 Sq. KM
- Administrative Divisions:[1]

  District Headquarters: Gyanpur

  No of Municipalities: 2

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

No of Tehsil: 3

No of Blocks: 6

No. Of Villages: 1217

- Demographic and socio-economic indicators:[2]

  Population: 15,78,213 (Census 2011)

  Population density (Total persons per sq. km): 1555

  Sex ratio: 955

  Literacy: 69.0%

- Occupation/ other Livelihood source: Carpet Industry
- Major Rivers: Ganges, Varuna and Morva
- Forest Area: 3.12 Sq. Km. (Least forest cover district)

1.3 ECONOMIC PROFILE OF BHADOHI

The District Economy

The primary sector has a significant impact on the district economy because it contributes, on average, 17.8% share in the district GDP. Moreover, this sector's average annual growth rate from 2011-12 to 2018-19 is 7.74%. However, its share decreased from 17.13% in 2011-12 to 15.63% in 2018-19 as the growth in other sectors is more than that in this sector. The share of the secondary sector decreased from 34.28% in 2011-12 to 32.97% in 2018-19. However, the sector grew with a significant average annual growth rate of 10.12%. The tertiary sector occupies, on average, 51.19% share in the district economy. Moreover, the sector grew with a remarkable average annual growth rate of 8.74%, with its share increasing from 48.59% in 2011-12 to 51.4% in 2018-19. Overall, the district economy grew with an average annual growth rate

[2] https://censusindia.gov.in/2011census/dchb/0967_PART_B_DCHB_SANT%20RAVIDAS%20NAGAR%20(BHADOHI).pdf

of 8.44%. Steps should be taken to 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 and the primary sector, which has a decent contribution to the district GDP. The secondary and tertiary sectors have performed well during the study period.

Table 1: Trends in Gross District Domestic product in Sant Ravidas 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	581.02	1162.63	1647.93	3391.58	-	-	-	-
	(17.13)	(34.28)	(48.59)	(100)				
2012-13	619.47	1095.52	1692.56	3407.55	6.62	-5.77	2.71	0.47
	(18.18)	(32.15)	(49.67)	(100)				
2013-14	663.68	1010.93	1870.97	3545.57	7.14	-7.72	10.54	4.05
	(18.72)	(28.51)	(52.77)	(100)				
2014-15	606.53	991.60	2034.22	3632.35	-8.61	-1.91	8.73	2.45
	(16.70)	(27.30)	(56.00)	(100)				
2015-16	793.34	1241.76	2286.24	4321.34	30.80	25.23	12.39	18.97
	(18.36)	(28.74)	(52.91)	(100)				
2016-17	903.21	1299.06	2463.84	4666.11	13.85	4.61	7.77	7.98
	(19.36)	(27.84)	(52.80)	(100)				
2017-18	1126.86	2225.54	2792.13	6144.53	24.76	71.32	13.32	31.68
	(18.34)	(36.22)	(45.44)	(100)				
2018-19	897.34	1893.49	2951.56	5742.39	-20.37	-14.92	5.71	-6.54
	(15.63)	(32.97)	(51.40)	(100)				
Average Growth Rate					7.74	10.12	8.74	8.44

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

We further break down the primary sector GDP to find which subsector is lagging and which is driving the primary sector growth. Table 2 shows that agriculture with the horticulture sector grew at a low average annual growth rate of 1.21% from 2011-12 to 2018-19. Moreover, its share decreased from 70.38% in 2011-12 to 50.90% in 2018-19. On the other hand, the share of the livestock subsector increased from 23.87% to 40.56% in the same period as it grew, with a remarkable average annual growth rate of 17.78%. It shows the importance of livestock in Sant Ravidas 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 3.5% in 2018-19, but it grew remarkably well at an average annual growth rate of 55.19%. The fishery & aquaculture subsector share is also small, around 5.05% in 2018-19, but it grew with a significant average annual growth rate of 147.78% from 2011-12 to 2018-19. Mines and quarrying also recorded a remarkable average annual growth rate of 36.66%. This high growth in this subsector can have serious environmental issues like deforestation, soil erosion, etc., with long-term effects on the health of local citizens. Overall, the Primary sector performed well during the period of the study. More work can

be done on improving the agriculture (including horticulture) sub-sector as it has the most significant impact on the primary sector.

Table 2: Gross District Domestic Product Trends from Agriculture and allied activities in Sant Ravidas 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	396.41	134.45	31.25	1.11	563.22	17.81	581.02
	(70.38)	(23.87)	(5.55)	(0.20)	(100)		
	-	-	-	-	-	-	-
2012-13	431.64	141.88	26.01	1.16	600.70	18.78	619.47
	(71.86)	(23.62)	(4.33)	(0.19)	(100)		
	[8.89]	[5.53]	[-16.78]	[4.49]	[6.65]	[5.45]	[6.62]
2013-14	432.81	157.50	52.82	1.20	644.34	19.34	663.68
	(67.17)	(24.44)	(8.20)	(0.19)	(100)		
	[0.27]	[11.01]	[103.10]	[3.59]	[7.26]	[3.01]	[7.14]
2014-15	382.84	165.66	39.94	1.29	589.72	16.81	606.53
	(64.92)	(28.09)	(6.77)	(0.22)	(100)		
	[-11.55]	[5.18]	[-24.39]	[6.94]	[-8.48]	[-13.09]	[-8.61]
2015-16	411.58	290.45	52.38	1.32	755.73	37.61	793.34
	(54.46)	(38.43)	(6.93)	(0.17)	(100)		
	[7.51]	[75.33]	[31.15]	[2.23]	[28.15]	[123.76]	[30.80]
2016-17	422.54	323.93	70.71	1.61	818.79	84.41	903.21
	(51.61)	(39.56)	(8.64)	(0.20)	(100)		
	[2.66]	[11.53]	[35.00]	[22.25]	[8.35]	[124.43]	[13.85]
2017-18	422.30	238.33	317.51	4.66	982.80	144.05	1126.86
	(42.97)	(24.25)	(32.31)	(0.47)	(100)		
	[-0.06]	[-26.43]	[349.01]	[189.83]	[20.03]	[70.66]	[24.76]
2018-19	425.58	339.19	29.24	42.19	836.20	61.14	897.34
	(50.90)	(40.56)	(3.50)	(5.05)	(100)		
	[0.78]	[42.32]	[-90.79]	[805.10]	[-14.92]	[-57.56]	[-20.37]
Average Growth rate	1.21	17.78	55.19	147.78	6.72	36.66	7.74

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 68.24% in 2018-19. The share has increased over the years as the average annual growth in this sector is 14.53%. The share of the

electricity, gas, and water supplies subsector has increased from 5.33% in 2011-12 to 6.25% in 2018-19. Moreover, this subsector grew with a remarkable average annual growth rate of 9.82%. The share of the construction sub-sector decreased from 30.12% to 25.51% in the same period, and the average annual growth rate is low (4.76%). It indicates that the secondary sector is heavily dependent on the Manufacturing and construction sub-sectors, and the electricity subsector is also growing at a faster rate. Within the tertiary sector, the Real estate made up the highest share (29.82%) in 2018-19, followed by the transport, storage, and communication (21.46%), Trade & Hotel (19.23%), and financial services (9.99%). Average annual growth is observed highest in transport, storage, and communication (15.6%), followed by Public Administration (11.59%), trade & hotel (10.23%), financial services (9.67%), and lowest in the real estate (4.75%). All the subsectors in the tertiary sector have performed well during the study period. More work needs to be done to improve Construction and real estate subsectors. Public Administration and Transport and Communication and Financial services sub-sectors are the major contributors to the Tertiary sector's growth.

Table 3: Trends in percentage share of non-agriculture sub-sectors in DGDP in Sant Ravidas 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	64.55	5.33	30.12	100	14.09	19.34	9.64	38.62	8.65	9.66	100
2012-13	61.72	6.06	32.22	100	15.70	17.55	11.17	40.24	4.95	10.39	100
2013-14	56.94	7.46	35.60	100	16.38	16.14	11.37	38.04	7.86	10.22	100
2014-15	53.38	7.97	38.64	100	18.85	15.00	11.59	36.76	7.25	10.55	100
2015-16	60.73	6.99	32.28	100	20.70	17.40	11.27	33.54	6.56	10.53	100
2016-17	61.33	7.64	31.03	100	21.14	18.22	10.77	31.98	6.91	10.97	100
2017-18	74.70	5.25	20.05	100	19.60	23.43	8.64	30.20	7.13	11.01	100
2018-19	68.24	6.25	25.51	100	21.46	19.23	9.99	29.82	7.72	11.78	100
Average Growth Rate	14.53	9.82	4.76	10.12	15.60	10.23	9.67	4.75	11.59	11.82	8.74

Source: Compiled from district statistical handbooks

2. Quantitative Data Analysis

2.1 Agriculture and Allied Activities

2.1.1 Trend in Land Use Pattern

The total declared area of the district is 1031.01 sq. km². The percentage share of the forest area has decreased from 0.16% in 2010-11 to 0.07% in 2017-18. The share of cultivable wasteland increased from 0.41% in 2010-11 to 0.76% in 2017-18, which is not a good development indicator. Barren and uncultivable land share decreased slightly from 2.09% in 2010-11 to 1.85% in 2017-18. The share of area under trees and gardens decreased from 0.62% in 2010-11 to 0.53% in 2017-18. The current and other fallow land has also decreased over the years, which is good for the district economy. The net sown area (NSA) has increased over the years, from 64.54% in 2010-11 to 65.73% in 2017-18. The area for non-agricultural use increased slightly over the period from 17.24% to 18.42% (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 Sant Ravidas (as % of total reported area)

Year	Total Reported Area (ha)	Area under forest	Cultivable wasteland	Current Fallow	Other Fallow	Barren and uncultivable land	Land other than agriculture	Pastureland	Area under trees and gardens	Net Sown Area
1	2	3	4	5	6	7	8	9	10	11
2010-11	103102	0.16	0.41	10.31	4.35	2.09	17.24	0.29	0.62	64.54
2011-12	103102	0.10	0.41	9.69	3.57	1.43	17.35	0.29	0.62	66.53
2012-13	103102	0.10	0.41	9.95	4.35	2.07	15.52	0.29	0.61	66.70
2013-14	103102	0.10	0.40	9.21	3.15	1.88	17.43	0.29	0.54	67.01
2014-15	103102	0.10	0.29	6.58	3.01	1.88	17.46	0.28	0.53	69.86
2015-16	103101	0.07	0.24	9.51	2.99	1.87	18.04	0.27	0.53	66.46
2016-17	103101	0.07	0.24	10.23	2.81	1.86	18.28	0.28	0.52	65.69
2017-18	103101	0.07	0.76	8.41	3.93	1.85	18.42	0.29	0.53	65.73

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

2.1.2 Trends in Operational Land Holdings

In Sant Ravidas district, the total number of operational farms decreased from 187 thousand in 2010-11 to 186 thousand in 2015-16, a net decrease of 0.53%. While in the state, their numbers increased from 23,325 thousand in 2010-11 to 23822 thousand in 2015-16, a net increase of 2.13%. Most land positions

in the district are marginal and small. These two size categories represented around 98.67% in the district in 2015-16, while the corresponding proportion in the state was 92.81% (Table 5). The two agricultural censuses of 2010-11 and 2015-16 report no significant change in the percentage share across the various categories of landholdings. Marginal land holdings increased in 2015-16.

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

	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.)
Sant Ravidas	2010-11	90.92	6.58	2.10	0.38	0.02	187
	2015-16	93.95	4.69	1.18	0.18	0.00	186
							[-0.53]
Uttar Pradesh	2010-11	79.45	13.01	5.72	1.71	0.11	23325
	2015-16	80.18	12.63	5.51	1.58	0.1	23822
							[2.13]

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

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

2.1.3.1 The Trend in Cropping Patterns

Rice and Wheat dominate the agriculture of the district. Table 6 shows the area under various crops over the last eight years. In 2017-18, Wheat made up the highest share of GCA (49.18%), followed by Rice (27.63%). These two crops constitute around 76.81% of the GCA. The area shared by the total cereals has increased slightly from 87.34% in 2010-11 to 87.88% in 2017-18. The main pulses produced are peas and Arhar, while the rest of the pulses are not significantly produced. The total pulse acreage has decreased from 6.54% in 2010-11 to 6.15% in 2017-18. Thus, the food grains cover a majority (average, 94.42%) of the GCA. Til is the only major oilseeds crop produced, and the total oilseed acreage has remained almost constant over the years. The cultivated area under Sugarcane and Potato is quite low, but it shows a marginal increase over the years. In general, there is no significant change in the cultivation pattern reported in the district during the study period, except that the net sown area has decreased over the years, from 68.26% in 2010-11 to 66.45% in 2017-18. The average cropping intensity in the district is 144.91.

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

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	27.70	27.55	27.76	28.32	27.55	28.41	28.20	27.63
Wheat	48.77	48.67	48.56	47.93	49.04	50.57	50.20	49.18
Bajara	8.72	8.71	8.64	8.75	8.82	9.09	9.03	8.84
Other Cereals	2.15	2.24	2.28	2.25	2.22	2.29	2.28	2.23
Total Cereals	87.34	87.17	87.23	87.25	87.64	90.36	89.71	87.88
Matar	1.03	1.02	1.01	1.00	0.91	0.94	0.93	0.91

Arhar	4.06	4.08	3.99	3.99	3.79	3.91	3.88	3.80
Other Pulses	1.44	1.37	1.39	1.56	1.43	1.48	1.47	1.44
Total Pulses	6.54	6.46	6.39	6.54	6.13	6.32	6.27	6.15
Total Foodgrains	93.88	93.63	93.63	93.79	93.76	96.68	95.98	94.03
Til (Net)	0.24	0.24	0.21	0.20	0.22	0.22	0.22	0.22
Other Oilseeds	0.16	0.16	0.14	0.14	0.18	0.19	0.19	0.19
Total Oilseeds	0.40	0.40	0.36	0.34	0.40	0.41	0.41	0.40
Sugarcane	0.97	0.96	0.96	1.04	1.07	1.10	1.09	1.07
Potato	1.14	1.30	1.40	1.16	1.20	1.24	1.23	1.20
Net Sown Area	68.26	70.13	70.21	69.93	70.43	69.08	67.79	66.45
Gross Sown Area (in 1000 Ha)	97.47	97.81	97.96	98.79	102.28	99.19	99.91	101.99
Cropping Intensity	146.49	142.59	142.44	143.00	141.99	144.75	147.51	150.49
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, it has increased in the latter years of the study. Wheat and Rice are the major crops in the district, and their per hectare yields (37.21 qtls and 31.74 qtls respectively, in 2017-18) are also high. Per hectare yield of total cereals has increased from 23.83 qtls in 2010-11 to 32.32 qtls in 2017-18. Similarly, per hectare yield of total pulses increased from 9.15 qtls in 2010-11 to 12.13 qtls in 2017-18. However, the yield of total oilseeds has decreased from 3.88 qtls in 2010-11 to 2.90 qtls in 2017-18. 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 average yield of Sugarcane is 631.76 qtls/ha. The yield of Potato is high, average, 270.16. 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 Sant Ravidas District (Qtls)

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	20.53	24.29	25.50	25.52	22.25	20.76	29.80	31.74
Wheat	28.75	32.05	27.85	25.37	15.43	21.65	31.12	37.21
Bajara	10.60	15.15	12.14	13.76	11.80	11.20	10.97	12.92
Total Cereal	23.83	27.37	25.10	23.91	17.07	20.00	28.19	32.32
Matar	10.40	10.76	11.14	9.84	9.22	12.42	12.64	11.25
Arhar	9.19	12.56	13.39	11.99	9.86	15.90	18.34	13.91
Total Pulses	9.15	11.41	12.21	10.94	9.32	13.20	15.04	12.13
Total Food Grains	22.81	26.27	24.22	23.00	16.56	19.56	27.33	31.00

Til (Net)	1.82	1.77	2.05	2.00	2.21	2.03	1.22	1.44
Total Oilseeds	3.88	3.33	3.35	5.29	3.65	2.92	6.72	2.90
Sugarcane	534.96	556.52	542.44	637.78	658.21	670.93	621.63	831.60
Potato	241.49	188.73	243.87	214.40	294.57	382.22	361.92	234.10
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 (89.43 thousand tons) and Wheat (186.64 thousand tons) formed a major part of the total cereal production (289.73 thousand tons). Among pulses, Peas and Arhar occupied the highest production. Peas had a production of 1.05 thousand tons, and Arhar had a production of 5.39 thousand tons in 2017-18. Although there has been a significant variation in the production of these pulses over the years, they still represent around 84% of the total pulse production. Pulses production in the district was quite low, indicating that pulses are not an important part of the district's agriculture. Til production was 0.03 thousand tons, which represented around 25% of the total oilseed production in 2017-18. Sugarcane production has been significant in the district (90.89 thousand tons in 2017-18). Potato production has also been significant (28.72 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 Sant Ravidas District (in 1000 Tons)

Crop/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Rice	55.42	65.44	69.36	71.42	62.70	58.50	83.96	89.43
Wheat	136.68	152.58	132.46	120.13	77.40	108.58	156.09	186.64
Bajara	9.01	12.91	10.27	11.89	10.64	10.10	9.89	11.65
Other Cereals	1.77	2.44	2.37	2.63	2.22	2.11	2.70	2.01
Total Cereals	202.87	233.37	214.46	206.06	152.96	179.30	252.65	289.73
Matar	1.05	1.07	1.11	0.97	0.86	1.15	1.17	1.05
Arhar	3.64	5.01	5.24	4.72	3.82	6.16	7.11	5.39
Other Pulses	1.14	1.13	1.30	1.38	1.16	0.96	1.14	1.17
Total Pulses	5.83	7.21	7.65	7.07	5.84	8.27	9.42	7.60
Total Foodgrains	208.70	240.58	222.11	213.13	158.80	187.57	262.07	297.33
Til (Net)	0.04	0.04	0.04	0.04	0.05	0.05	0.03	0.03
Other Oilseeds	0.11	0.09	0.08	0.14	0.10	0.08	0.25	0.09
Total Oilseeds	0.15	0.13	0.12	0.18	0.15	0.12	0.28	0.12

Sugarcane	50.50	52.26	51.04	65.76	71.94	73.33	67.94	90.89
Potato	26.88	24.08	33.34	24.59	36.14	46.90	44.41	28.72
Source: http://updes.up.nic.in/spiderreports/intialisePage.action								

2.1.3.4 Variability in the Area, Production, and Yield

To understand the variability across the years (Table 9), we calculated the mean, standard deviation (SD), and coefficient of variation (COV) of the area, production, and yield of the main crops. Among different crops, the lowest variability in the area is observed in Arhar (1.15%), followed by Rice (2.07%) and Wheat (2.90%), and the highest in Sugarcane (7.30%). The variability in the area under total pulses (1.14%) is less than the variability in the area under total cereals (2.54%). Since Rice and Wheat dominate the production, the variability in the area under total food grains is, therefore, also relatively low (2.33%).

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

	Area (1000 Ha)			Production (1000 Ha)			Yield (Qtl./Ha)		
Crop/Year	Average	SD	COV	Average	SD	COV	Average	SD	COV
Rice	27.73	0.57	2.07	69.53	11.90	17.12	25.05	4.05	16.18
Wheat	48.84	1.41	2.90	133.82	33.07	24.71	27.43	6.70	24.43
Bajara	8.78	0.27	3.02	10.80	1.26	11.71	12.32	1.55	12.59
Total Cereal	87.57	2.22	2.54	216.42	42.55	19.66	24.72	4.77	19.30
Matar	0.96	0.04	3.72	1.05	0.10	9.73	10.96	1.18	10.74
Arhar	3.91	0.04	1.15	5.14	1.14	22.29	13.14	3.01	22.89
Total Pulses	6.31	0.07	1.14	7.36	1.19	16.22	11.67	1.95	16.71
Total Food Grains	93.88	2.18	2.33	223.79	43.15	19.28	23.84	4.51	18.93
Til (Net)	0.22	0.01	4.73	0.04	0.01	17.81	1.82	0.34	18.46
Total Oilseeds	0.39	0.03	7.35	0.16	0.05	34.33	4.00	1.33	33.29
Sugarcane	1.03	0.08	7.30	65.46	13.95	21.32	631.76	96.60	15.29
Potato	1.23	0.08	6.27	33.13	8.78	26.49	270.16	69.82	25.84
Source: http://updes.up.nic.in/spiderreports/intialisePage.action									

The variability of production depends on the cultivated area's variability and the yield's variability. 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 Potato (26.49%), followed by Wheat (24.71%), Arhar (22.29%), Sugarcane (21.32%), and Til (17.81%). High variation in the production of pulses and oilseeds is partly due to variation in the land area under them and partly due to the high rate of seeds and non-availability of hybrid seeds. Improvement in crop insurance conditions and better market accessibility

can lower this variation. Variability is lowest in peas (9.73%), followed by Bajara (11.71%) and Rice (17.12%).

In the case of yield, the greatest variability is estimated in Potato (25.84%), Wheat (24.43%), and Arhar (22.89%). Yield variability in total cereals (19.30%) and total food grains (18.93%) is more as compared to that in total pulses (16.71%). Peas, Bajra, and Sugarcane are the most consistent crops over the years. Several factors, such as climate change, market prices, rainfall patterns, etc., influence the variability in agricultural production.

2.1.4 Trends in Value of production of major crops

Table 10 compares the share of the main crops in the total GCA and their share in the total value of agricultural output (VOP). It is significant to note that total cereals, total Foodgrains, and total oilseeds, on average, have a relatively larger share in GCA than their share in VOP. In contrast, Potato and sugarcane have, on average, a higher share in VOP than GCA. Sant Ravidas is mainly a food grain production district; therefore, food grains account for around 94.42% of the gross area of the crops. Similarly, total foodgrains account for nearly 86.49% of the total value of the agricultural product. Three crops - Wheat, Rice, and Potato together accounted for, on an average, around 78.24% of GCA and 79.96% of the total VOP. Overall, the total agricultural GCA has increased in the latter years of the study (average, 99.43 thousand hectares). The total value of the product has also increased significantly, that is, Rs.329.94 Cr. in 2010-11 to Rs.655.29 Cr. in 2017-18.

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

Crop	% Share in	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Wheat	GCA	48.77	48.67	48.56	47.93	49.04	50.57	50.20	49.18
	VOP	49.17	48.07	41.03	40.39	31.28	33.44	39.04	48.65
Paddy	GCA	27.70	27.55	27.76	28.32	27.55	28.41	28.20	27.63
	VOP	26.54	28.78	29.93	32.13	33.55	27.65	30.61	31.05
Total Cereals	GCA	87.34	87.17	87.23	87.25	87.64	90.36	89.71	87.88
	VOP	78.79	80.83	74.54	76.73	69.41	64.57	72.30	80.95
Total Pulses	GCA	6.54	6.46	6.39	6.54	6.13	6.32	6.27	6.15
	VOP	10.43	10.81	11.43	9.15	10.15	19.58	14.74	7.53
Total Food Grains	GCA	93.88	93.63	93.63	93.79	93.76	96.68	95.98	94.03
	VOP	89.22	91.64	85.97	85.88	79.57	84.14	87.04	88.48
Total Oil seeds	GCA	0.40	0.40	0.36	0.34	0.40	0.41	0.41	0.40
	VOP	0.18	0.16	0.15	0.20	0.21	0.16	0.14	0.09
Potato	GCA	1.14	1.30	1.40	1.16	1.20	1.24	1.23	1.20
	VOP	7.99	5.08	9.49	8.13	14.21	9.65	8.68	5.19
Sugarcane	GCA	0.97	0.96	0.96	1.04	1.07	1.10	1.09	1.07
	VOP	2.60	3.12	4.38	5.79	6.02	6.04	4.13	6.24
Paddy + wheat + potato	GCA	77.62	77.53	77.71	77.42	77.79	80.21	79.64	78.01

	VOP	83.70	81.93	80.44	80.65	79.04	70.74	78.33	84.88
Total Agriculture	GCA (1000 Ha)	97.47	97.81	97.96	98.79	102.28	99.19	99.91	101.99
	VOP (in Cr Rs)	329.94	376.76	401.64	426.15	358.76	546.49	690.49	655.29
Per Worker VOP (Rs.1000 at current prices) in **Sant Ravidas**		-	28.79	33.85	37.37	38.09	37.71	36.68	45.19
Per Worker VOP (Rs.1000 at current prices) in **UP**		-	40.66	48.69	52.50	52.11	56.48	61.97	69.69
Source: http://updes.up.nic.in/spiderreports/intialisePage.action And District-wise Indicator reports									

Table 10 shows that the total value of agricultural produce per agricultural worker in Sant Ravidas district increased from Rs.28.79 thousand in 2011-12 to Rs.45.19 thousand in 2017-18, a net increase of 56.96% at current prices, while in UP it increases from Rs. 40.66 thousand to Rs.69.69 thousand, a net increase of 71.40%. Thus, the per worker value of agricultural output is much higher in the state than in the district. The rate of growth per worker value of output in the district is less than in the state. The ratio of per worker value of the district's output to the state average has decreased from 0.7082 in 2011-12 to 0.6484 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 60.59% of the total fertilizers used, while the proportions of phosphorus and potassium were 30.35% and 9.07%, respectively. In 2017-18, however, the nitrogen share decreased to 58.82%, while the phosphorus share increased to 36.44%, and the potassium share decreased to 4.74%. The use of nitrogen and Phosphorous is more than the recommended ratio, while potassium is less than the recommended ratio. The table also shows that fertilizer consumption varies from year to year, which can be due to several factors, including rainfall patterns, cultivation patterns, etc. The overall use of chemical fertilizers has decreased in the district from 269.08 kg/ ha GSA in 2010-11 to 146.48 kg/ ha GSA in 2017-18, which is a good sign, and the authorities need to take steps to further reduce their consumption as the chemicalization of agriculture degrades soil and water resources, requiring the use of organic fertilizers and biofertilizers.

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

Fertilizer/Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Nitrogen	163.03	128.01	105.59	101.16	104.17	99.32	97.26	86.16
Phosphorous	81.65	62.44	43.90	26.01	30.08	37.23	38.13	53.38
Potassium	24.40	9.85	6.77	3.57	6.16	6.85	8.00	6.94
Total	269.08	200.29	156.25	130.75	140.41	143.40	143.39	146.48

Gross Sown Area (Ha)	97473	97812	97957	98790	102277	99190	99911	101991
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 (226 km) over the years. A number of ground-level pump sets have also remained constant (5) over the years. Government tube wells increased from 487 in 2010-11 to 526 in 2018-19. Shallow, medium, and deep tube wells increased by 0.15%, 66.66%, and 67.56%, 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 82.46% and 82.33%, 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)	226	226	226	226	226	226	226	226	226
No. of Govt. Tube wells	487	487	487	487	487	487	487	533	526
No. of Wells	65	65	65	65	65	65	65	65	65
No. of Ground-level Pump set	5	5	5	5	5	5	5	5	5
Shallow Tube well	8306	8319	8319	8319	8319	8319	8319	8319	8319
Medium Tube well	0	0	9	9	15	15	15	15	15
Deep Tube well	148	149	225	241	248	248	248	248	248
% Of NIA	80.26	80.29	80.40	80.29	82.33	85.61	85.15	85.37	-
% Of GIA	80.35	80.32	80.57	80.33	80.84	85.40	85.46	85.41	-
Source: http://updes.up.nic.in/spiderreports/intialisePage.action									

2.1.6.2 Source wise area under irrigation

Canals and groundwater (GW) are the main irrigation sources in the district. The canal's share in the NIA (average, 18.26%) has increased over the years, and the share of wells and tube wells in NIA (average, 81.68%) has decreased over the years. It shows the increased dependency of the district on the groundwater for irrigation purposes, and it can have serious environmental issues if such a pattern continues in the long run.

Table 13: Source-wise Area under Irrigation in Sant Ravidas (in %)								
Source/Year	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**
Canal (surface Irri.)	16.51	17.28	17.71	19.26	16.31	18.84	20.74	19.41
Wells And Tube-wells (GW Irri.)	83.49	82.72	82.29	80.74	83.69	81.16	78.76	80.59
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00
NIA (1000 ha)	53.41	55.08	55.29	55.47	59.30	58.66	57.68	57.86
Source: http://updes.up.nic.in/spiderreports/intialisePage.action								

2.1.6.3 Crop-wise irrigated area

Table 14 shows that a majority area under Rice (average, 100%), Wheat (average, 99.97%), Potato (average, 100%), and Sugarcane (average, 100%) is irrigated. Percentages of the irrigated area under pulses (average, 16.65%) and oilseeds (average, 30.76%) are relatively less.

Table 14: Trends in Crop-wise Irrigated Area in Sant Ravidas (as % of the cropped area)								
Crop/Year	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**
Rice	100	100	100	100	100	100	100	100
Wheat	99.92	99.91	100	99.91	100	100	100	100
Total Cereal	87.61	87.52	87.65	87.55	87.63	87.63	87.63	87.63
Total Pulses	16.46	16.38	16.75	16.14	16.86	16.86	16.86	16.86
Total Foodgrains	82.66	82.65	82.81	82.57	83.00	83.00	83.00	83.00
Total Oilseeds	30.23	30.49	28.69	25.29	32.85	32.85	32.85	32.85
Sugarcane	100	100	100	100	100	100	100	100
Potato	100	100	100	100	100	100	100	100
Source: http://updes.up.nic.in/spiderreports/intialisePage.action								

2.1.7 Electricity Consumption in Agriculture

Electricity is one of the main energy sources used in agriculture. Table 15 shows that per capita electricity consumption in agriculture has increased significantly from 130.98 KWH in 2014-15 to 279.18 KWH in 2019-20, a net increase of approximately 113.14%. It is a cause of concern, resulting in an increased burden on non-renewable resources and creating waste disposal problems. The percentage share of the agriculture sector (average, 36.53%) in the total electricity consumption in the district is quite significant. It indicates the heavy usage of electricity by agricultural farmers. Since electricity consumption has increased over the years, the authorities need to switch to more sustainable modes of electricity production, such as solar panels.

Table 15: Trends of Electricity consumption in Agriculture						
Division/ Year	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**
Per Capita electricity consumption (KWH)	130.98	135.67	242.63	259.64	276.93	279.18
% Of electricity consumed in Agriculture sector to total consumption	31.55	41.5	39.4	38.59	33.8	34.34
Source: District-wise Development Indicators file						

2.1.8 Status of Agriculture Market

Table 16 shows the marketing infrastructure in the district. It has one main market and two sub-markets. The number of regulated mandis per lakh hectare of Net area sown has decreased from 4.34 in 2013-14 to 1.46 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 Sant Ravidas							
Category/Year	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**
Main Markets (No.)	1	1	1	1	1	1	1
Submarkets (No.)	2	2	2	2	2	2	2
Total Markets (No.)	3	3	3	3	3	3	3
No. of Regulated mandis per lakh Ha. of net area sown	4.34	2.91	-	1.48	1.39	1.46	-
Source: District-wise Development Indicators file and District-wise Statistical Report							

2.1.9 Status of Organic Farming

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

The transition period for the full conversion from conventional to organic is considered three years. During this period, crop yield, on average, is expected to decline by 10—15 percent. However, after three years, it may reach its original level. Financial assistance received by the beneficiary farmers seems to be adequate to compensate for the yield losses and motivate them to do organic farming. There is a need to set up an integrated processing unit for organic products. Monitoring 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 two hundred thirty-five groups in three development blocks. The highest number of groups are in Deegh (174), followed by Aurai (60) and Abhauli (1). Significantly high variation can be seen in the number of farmers per group in the district. It is reported that the maximum limit of land under a cluster per farmer is 2.00 hectares. Hence, the majority of the beneficiary farmers are small and marginal. No organic cluster under the Namami Gange scheme is reported till date.

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

S. No.	Block	Scheme	No. of groups	No. of farmers in groups			
				Total	Average	Median	SD
1	Abhauli	PKVY	1	20	20	20	0
2	Aurai	PKVY	60	1414	23.56	23	4.89
3	Deegh	PKVY	174	4530	26.03	25	5.16
4	District Total	PKVY	235	5964	25.37	25	5.2
		Total	235	5964	25.37	25	5.2

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

Since per hectare use of chemical fertilizer is quite high in district agriculture, a gradual shift of farmers from conventional to the organic farming system is likely to positively impact water quality and soil health along with farming sustainability. However, being a knowledge-intensive 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 marketing problem is even more serious in the case of perishable vegetable crops. Contract farming companies and Farmer Producers' companies can be encouraged.
3. To get the scheme's benefit, farmers generally practice organic farming only on a small part of their land (less than one ha).
4. Although organic farming clusters are formed, the farmers allocated a part of their lands to organic farming and practiced conventional farming in the rest of the area, which may contaminate the organic produce and fail the purpose of the cluster approach in organic farming.
5. The knowledge and awareness level regarding practices under organic farming was inadequate among farmers.

2.1.10 Livestock Sector

2.1.10.1 Trends in Livestock Population

Livestock forms an integrated part of the rural economy. Table 18 shows that indigenous and exotic male cattle decreased considerably from 27294 in 1997 to 5287 in 2019 and from 20416 in 1997 to 1111 in 2019, respectively. However, on the other hand, the number of indigenous and exotic female cattle has increased considerably from 40628 in 1997 to 158368 in 2019 and from 21816 in 1997 to 47699 in 2019. Thus, the total number of cattle increased from 110154 in 1997 to 212465 in 2019, thus, a net increase of 92.87%.

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 106.87% 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 (42.20%) 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 52.23%. The total population of goats increased from 37765 in 1997 to 47738 in 2019, a net increase of 26.40%. The total pig population decreased considerably from 14463 in 1997 to 1064 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 30.35% share in the agriculture and allied activities sector and grew at a significant average annual growth rate of 17.78% from 2011-12 to 2018-19.

Table 18: Trends in Livestock population (in numbers) in Sant Ravidas						
	Category	1997	2003	2007	2012	2019
Indigenous Cattle	Total Male	27294	33932	37320	32762	5287
	Total Female	40628	50767	43741	85073	158368
	Total	67922	84699	81061	117835	163655
Exotic Cattle	Total Male	20416	5888	6525	5350	1111
	Total Female	21816	13673	12738	66734	47699
	Total	42232	19561	19263	92084	48810
Total Cattle		110154	104260	100324	209919	212465
Buffalo	Total Male	19324	23426	31737	36117	5332
	Total Female	56375	67790	77225	108461	151271
	Total	75699	91216	108962	144578	156603
Sheep	Total Indigenous Sheep	38284	29235	27795	27478	22125
	Total Exotic Sheep	8210	3745	601	10618	84
	Total Sheep	46494	32980	28396	38096	22209
Goat	Total	37765	33584	34072	74123	47738
Pig	Total Indigenous Pig	10019	7437	4070	5280	996
	Total Exotic Pig	4444	1027	904	1697	68
	Total Pig	14463	8464	4974	6977	1064
Total Livestock		285990	271877	277020	473754	-
Total Poultry		81796	79085	93029	99702	-
Source: http://updes.up.nic.in/spiderreports/intialisePage.action And http://dahd.nic.in/animal-husbandry-statistics						

2.1.10.2 Cattle Care Centre

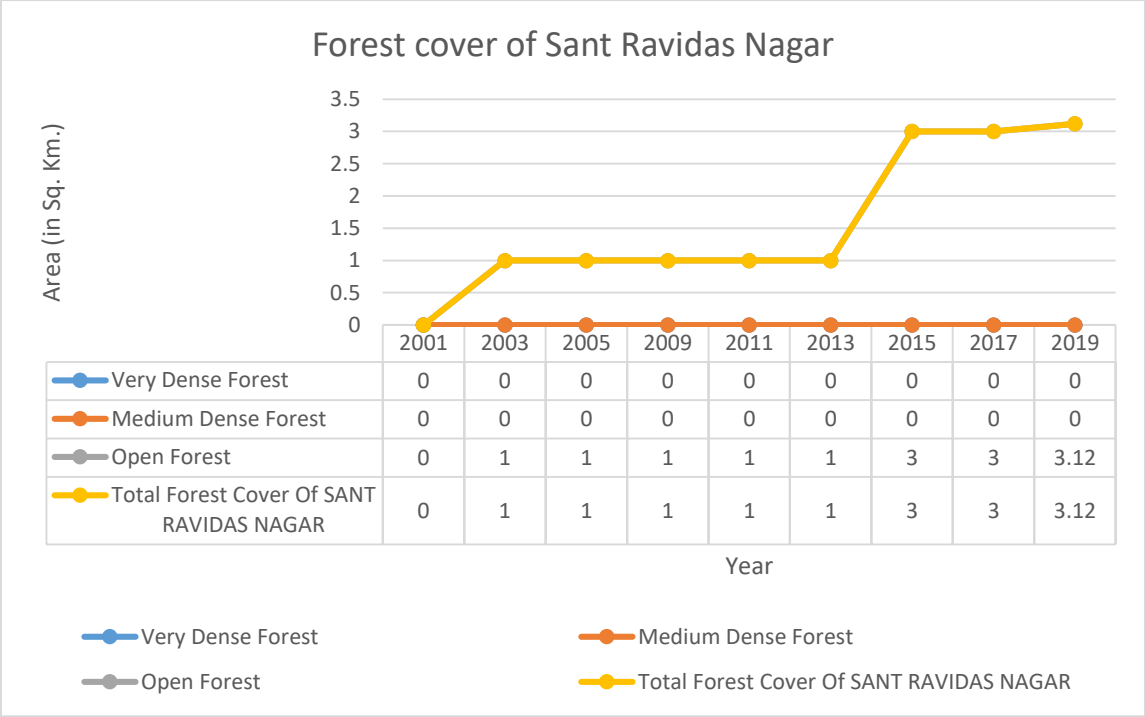
Table 19 shows the year-wise nuber of cattle hospital and development centres in the district. Cattle hospitals increased from 9 in 2010-11 to 13 in 2018-19, while cattle development increased from one in 2010-11 to two in 2018-19. Man-made Reproduction Centres also increased to 25 from 19 during the same period. The district also has 11 sheep development centres.

Table 19: Year-wise number of Cattle Hospitals and Development Centre									
Category	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19

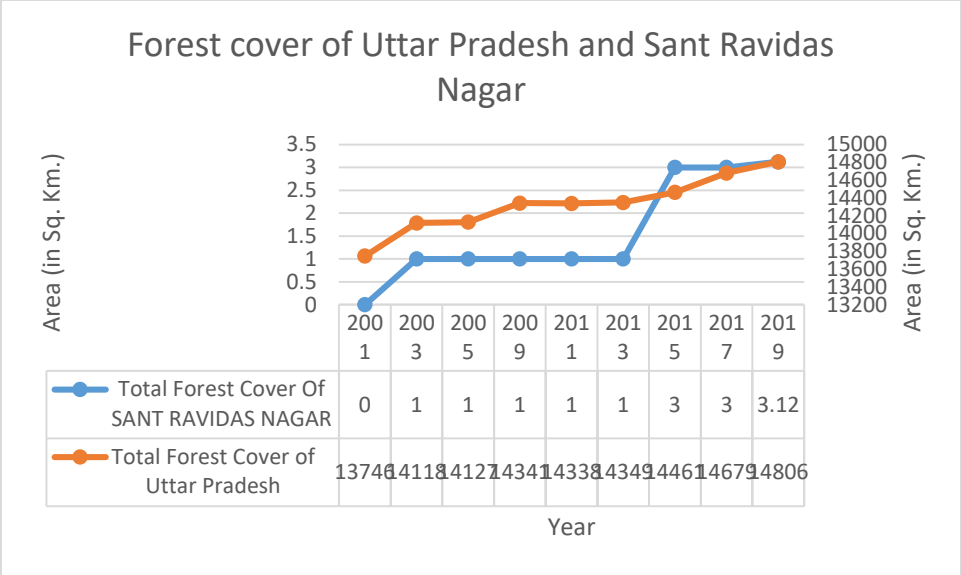
Cattle Hospital	9	9	9	9	9	9	9	14	13
D- category Cattle Dispensary	1	1	1	1	1	1	1	2	2
Cattle Development Centre	9	9	9	9	9	9	9	10	10
Man-Made Reproduction Centre	19	19	19	19	19	19	19	26	25
Sheep Development Center	9	9	9	9	9	9	7	11	11
Source: http://updes.up.nic.in/spiderreports/intialisePage.action									

2.2 FORESTRY

Baseline Data Analysis/ Quantitative Data Analysis



According to the ISFR, the forest cover of Sant Ravidas Nagar has increased. There are no major forest are found in the district, but from 2013, the forest cover has increased. Only open forest are found in the district.



The forest of the state Uttar Pradesh has increased over the years, and but in the case of Bhadohi, the district has the least forest cover.

2.2.1 Biodiversity

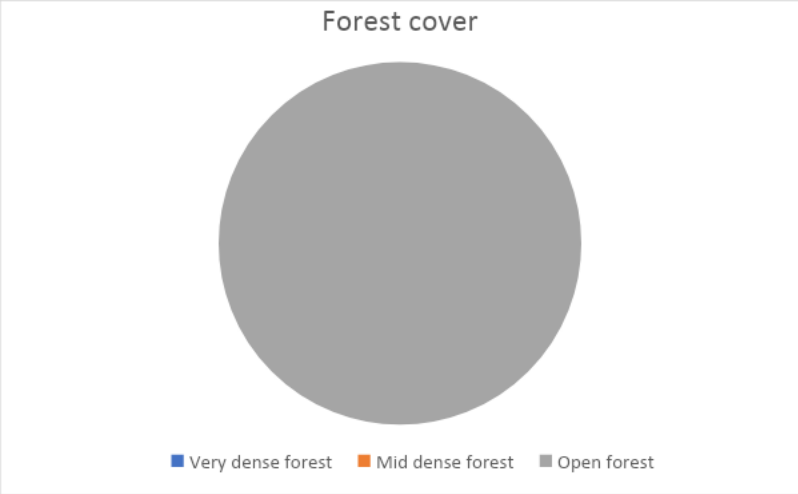
The district's biodiversity data includes various crop production, livestock population, bird species, and forest cover. The crop production trend shows an increase in crop production. Forest data shows that forest cover was decreased by 1.69 % in 2019. There are 414 bird species and thirty-three threatened/rare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

Table 1 Bird species recorded in the district.

Number of species	311
Number of rare/accidental species	33

Table 2 Forest cover in a square kilometer.

Geographical area	Very dense forest	Mid dense forest	Open forest	Total	% of Geographical area `	Change with respect to 2017 assessment	Scrub
1015	0	0	3.12	3.12	0.31	0.12	0.00



2.3 TOURISM

Baseline data/Quantitative Data
Total number of tourists visiting Mirzapur

Year	Domestic	International
2013	17324	188
2014	22500	195
2015	22721	197
2016	35800	201
2017	36251	212
2018	39191	220
2019	41204	268
2020	14271	66

Table-3; Source: Dept. of Tourism, Uttar Pradesh Government

- The above given table has been taken from the data present on the official site of Dept. of tourism Govt. of Uttar Pradesh. Table shows the number of domestic and international tourists from 2013 to 2020 in Sant Ravidas Nagar, Uttar Pradesh.
- From the above given data it is evident that the number of international tourists in insignificant in comparison to domestic tourists in the district.

1. Domestic and foreign visitors in different years in Uttar Pradesh

The Indian and Foreign Tourist visits in Uttar Pradesh from 2016 to 2020						
Year	Indian	Foreigner	Total	Percentage increase/ reduce in comparison to previous year		
				Indian (%)	Foreigner (%)	Total
2016	213544204	3156812	216701016	3.4	1.69	3.37
2017	233977619	3556204	237533823	9.56	12.65	9.61
2018	285079848	3780752	288860600	21.84	6.31	21.6
2019	535855162	4745181	540600343	87.96	25.5	87.14
2020	86122293	890931	87013224	-83.92	81.92	-83.9

Table-3; Source: Dept. of Tourism, Uttar Pradesh Government

a. The above-given graph shows the number of visitors who visited Uttar Pradesh from 2016 to 2020. In the year 2016 number of domestic tourists increased to 3.4% compared to 2015, and foreign tourists increased to 1.69%. In the year 2017, the growth rate increased to 9.56% in domestic tourists and 12.65% in foreign tourists.

b. Data shows that 2018 had been a fruitful year for Uttar Pradesh tourism. Uttar Pradesh encountered a 21.6% increase in tourist numbers from the previous year, a significant change in numbers. However, the patten is not similar in Kanpur

c. 2019 was a year when the global event Kumbh Mela 2019 was organized in Prayagraj (a District in Uttar Pradesh). The results are visible in the numbers (given in the data table above), 87.14% increase in the number of tourists compared to 2018. The data also shows foreign visitors increased to 25% in 2019. The enhanced response of tourists shows the consumer behaviour, which majorly depends on advertisements. A commodity that has been presented to be associate with the emotions of consumers has a high potential to sustain and perform better than its competitors.

d. The surge in the number of tourists in Kumbh Mela 2019 is attributed to expensive advertisements, extra-standard facilities, and a political campaign. All this together made the event a mega event. Security aspect in such organization is a significant factor which influences the success and failure. Kumbh Mela 2019 witnessed extra tight security and surveillance to prevent stampedes and violence in the Mela.

e. Such grand organization of events are also a factor on which the number of tourists to other districts (especially domestic tourists) and states (especially foreigner tourists) depend.

f. The scenario of foreign tourists is worse compared to state data. Even the mega event Kumbh mela could not increase the number of foreign tourists in Kanpur. This signifies the lack of transfer of information.

g. The district witnessed the increased growth in number of domestic tourists but not in foreign tourists. It is necessary to understand the shortfalls before working on upcoming policies and agendas.

2. Percentage change in visitors in different years

Year	Domestic tourists in Sant Ravidas Nagar	% Change compared to previous year
2013	17324	
2014	22500	29.88%
2015	22721	0.98%
2016	35800	57.56%
2017	36251	1.26%
2018	39191	8.11%
2019	41204	5.14%
2020	14271	-65.37%

Table-3; Source: Dept. of Tourism, Uttar Pradesh Government

- The above given table has been taken from the data present on the official site of Dept. of tourism Govt. of Uttar Pradesh. Table shows the number of domestic and international tourists from 2013 to 2020 in Sant Ravidas Nagar, Uttar Pradesh.

- From the data given above it is evident that the number of domestic tourists increased 29.88% in 2014 when compared to the data in 2013.
- In the year 2015 the district embraces a meagre increase in the number of tourists, 0.98% when compared to previous year data.
- In the year 2016, district witnesses 57.56% increase in the number of tourists, when compared to 2015 data.
- In the year 2017, district witnesses 1.26% increase in the number of tourists, when compared to 2016 data.
- In the year 2018, district witnesses 8.11% increase in the number of tourists, when compared to 2017 data.
- In the year 2019, district witnesses 5.14% increase in the number of tourists, when compared to 2018 data.
- In the year 2020, district witnesses -65.37% increase in the number of tourists, when compared to 2019 data. The negative growth in the number of tourists is attributed to lockdown due to the corona virus pandemic.

3. Budget allotted/ Expenditure in different years by tourism dept.

Budget -Department of Tourism, in Different Years		
Year	**Budget in Rupees**	**Percent increase or decrease**
2015-16	**2,245,098,000.00**	
2016-17	**1,992,912,000.00**	**-11.23%**
2017-18	**2,671,016,000.00**	**34.03%**
2018-19	**6,870,209,000.00**	**157.21%**
2019-20	**8,596,205,000.00**	**25.12%**
2020-21	**10,382,037,000.00**	**20.77%**
2021-22	**10,759,153,000.00**	**3.63%**

Table-4; Source: Dept. of Tourism, Uttar Pradesh Government

The above-given table shows the budget sanctioned for the Department of Tourism, Uttar Pradesh, from the Financial Year (FY) 2015-16 to 2021-22. In the initial FYs, which are 2015-16, 2016-17, 2017-18, the amount sanctioned to the department is significantly low. In the FY 2018-19 Department received a 157.21% increased budget. Which followed a 25% increase in the next FY-2019-20. A similar trend is visible in the number of tourists, skyrocketing of tourists is found in the same years. This directly implies that the money spent is directly proportional to the tourists in particular FY.

2.4 WETLANDS

The district has a vast number of small wetlands. Table 1 represents the number of wetlands and their area representation in the district.

Table 1: Wetland Data of Sant Ravidas Nagar District

	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	0	2	1	2	3	0	0	0	7
Ox-bow lakes/cut off meanders	0	1	1	0	0	0	0	0	0	0	0	0	0
High altitude Wetlands	0	0	0	0	0	0	0	0	0	0	0	0	0
Riverine Wetlands	0	1	1	0	0	0	0	0	0	0	0	0	0
Waterlogged	20	22	2	0	0	1	4	13	2	0	0	0	16
River/Stream	0	75	75	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	2	2	0	0	1	0	0	0	1	0	0	0	0
Waterlogged	8	8	0	0	0	0	2	2	4	0	0	0	8
Salt pans	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (1130)	38	117	79	1013	1	3	7	17	10	0	0	0	31

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, in the district Sant Ravidas Nagar, 60.77% households use kerosene as the main source of lightning, followed by 37.88% using electricity and only 0.43% using solar. (Fig. 1)

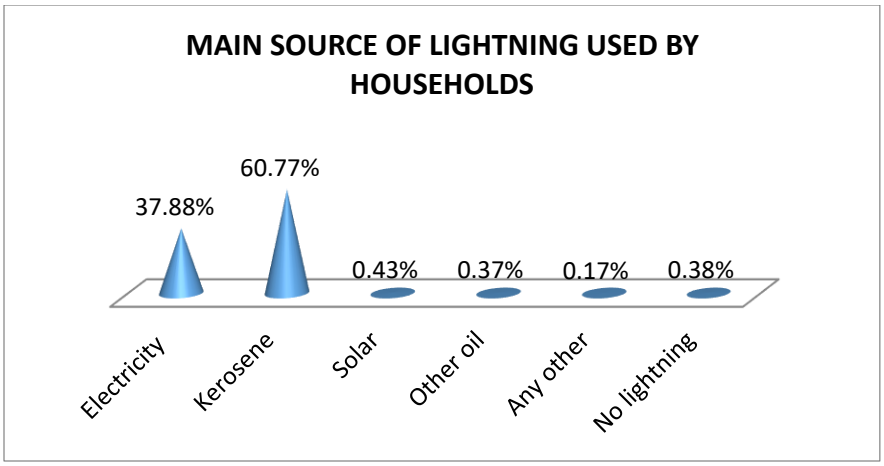


Fig. 1

In the district Sant Ravidas Nagar, a Solar solar HighMast Lightning System was installed in 2018-2019. Not much development has been done in the district in the solar energy sector, as nothing much has been recorded from the available resources.

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 43% households use firewood and the other majority that is 40% households use firewood for cooking. Only 11% households in the district depend on LPG/PNG for cooking, as depicted in Fig. 1.

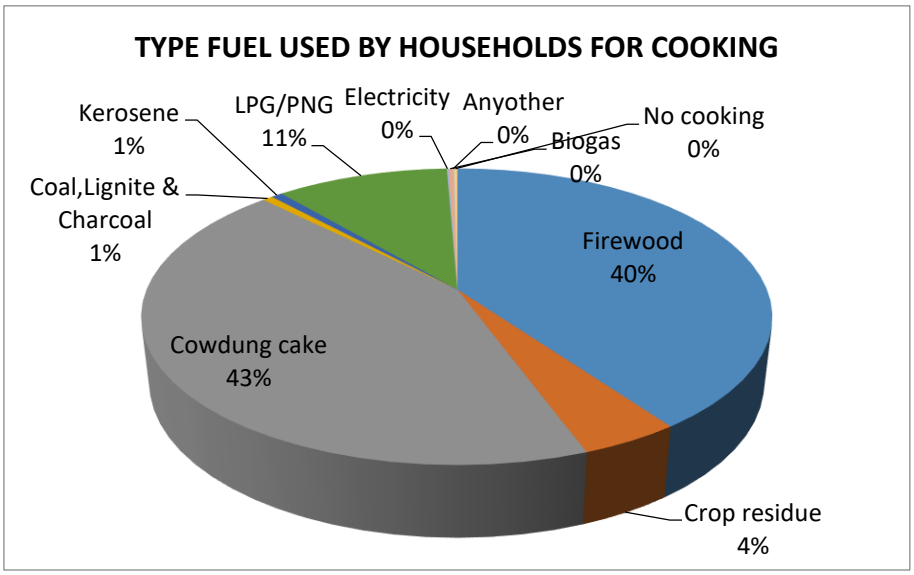


Fig. 1

Agriculture is the main source of income in the district. The major crops grown in the district are rice, pearl millet, pigeonpea, sorghum, wheat, pea, etc.
The net sown area of the district is 67533 ha with the cropping intensity of 142.5%. The cropping intensity of the district is quite good, as 28707 ha of the area in the district is grown more than once in the district. A total of 434ha of cultivable wasteland is there in the district, with 9643 ha of current fallows.
Table.1 gives an account of productivity of some of the major crops in the district. The productivity of the crops appears to be good consequently a good amount of crop residue would be produced.

CROP	PRODUCTIVITY (kg/ha)
Rice	1648
Pearl millet	959
Pigeon pea	894
Sorghum	944
Wheat	2094
Pea	1040

Table:1

The district produces 217 kT/yr of agricultural biomass and 13.7 kT/yr forest based biomass (Kumar et. el. 2017).

2.5.3. Biogas

Biogas data is not available for the district. Based on the livestock population and agricultural waste biogas potential calculated. Biogas potential from animal waste and agricultural waste was calculated approximately as ninety-six lakh m^3/year and eleven crores m^3/year. This amount of biogas generation can efficiently complete the energy demand of the district.

2.5.4. Hydro Power

No hydropower plant exists, nor the site has been identified in the district. The Ganges River lowlands, which define the district's southern boundary, are home to this district. The primary rivers are the Ganges, Varuna, and Morva. A survey or identification of the site must require for the construction of hydropower plants.

3 QUALITATIVE DATA ANALYSIS

3.1 FORESTRY

The use of timber in house construction, furniture and agricultural implements etc. is around 61.38 million cum. By using alternatives we can reduce this which in turn will result in reduction in tree felling. In the context of State of Uttar Pradesh 10.495 million people are using fuel wood from forests. Taking an average family size of 5 persons per family it can be concluded that 2.1 million families are directly dependent on forests for fuel wood. By giving them alternative sources of energy it will be possible to reduce Carbon dioxide to the tune of 2.1 million tonnes annually.[3]

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

Bhadohi is a one-stop shop for tourists looking to buy traditional handicraft goods. It is known for the majestic art of traditional weaving and carpet making. With several temples and mosques, the city also has a rich cultural past. The region, which is located along the riverfront, has a lush, fertile soil that is perfect for growing wheat and rice. In addition, crops like as chana, arhar, and urad are widely farmed in the area. The district, which is located within the Ganga plains, is made up of Khadar soils and alluvium. As a result, agriculture activities play a significant role in Bhadohi's economy. Forests and mango trees cover 30% of the district's total land area. The remainder is mostly devoid of vegetation. Apart from the Ganga, the area is traversed by the Varuna and Morwa rivers.

3.2. Energy:

As per the data of the year 2013, Bhadohi district energy consumption is around 275 TJ/year and 2.9 GJ/capita/year. GHG emission of 19,905 Ton CO_2 equivalent and 0.210 Ton CO_2 equivalent/capita has been evaluated for the district.

3.2.1. Solar

The district Bhadohi deals with the problem of power supply. This can be proved from a news article in a local daily, with the heading- ‘Somewhere the wires are hanging and somewhere the power supply with

[3] State Action on Climate Change, Uttar Pradesh
[4] https://pib.gov.in/newsite/PrintRelease.aspx?relid=148508

the help of bamboo sticks'. According to this article – "The government is trying to improve the electricity system by spending crores of rupees, while the condition of the electricity system in the city is such that electricity supply is being done in the villages with the help of bamboo balls. People's problems are also increasing due to hanging wires. Electric poles and wires have become dilapidated. Cables hanging in the lane leading to the old countryside, passing through the sub-station of the Electricity Corporation in Gyanpur, are giving a feast to the accident. There are many such villages in the district, where electricity is reaching with the help of bamboo balls. According to Pugazenthi et. al. 2016, total solar power potential available in the district Sant Ravidas Nagar is 0.0703.

3.2.2. Biomass

The district Sant Ravidas Nagar depends largely on agriculture for its income and also deals with the problem of stubble burning. This can be proved from an news article in a local daily with the heading-" Penalty for burning stubble, 2500 fined". According to this article The district administration has become strict on the farmers polluting the environment by burning stubble. Now the farmers have started falling. As the first incident, a fine of Rs 2500 has been imposed on farmer Omprakash, resident of Jagapur in Gyanpur tehsil area, found guilty of burning stubble. Another article reads- The Uttar Pradesh government has issued notices to District Magistrates of 26 districts where stubble burning has not been effectively checked. UP Chief Secretary R.K. Tiwari has asked the District Magistrates to explain why stubble burning has increased in their respective districts, despite orders to check it.
The notices have been issued to District Magistrates of Meerut, Bulandhshahr, Gautam Buddha Nagar, Baghpat, Hapur, Shamli, Ferozabad, Hathras, Agra, Sambhal, Moradabad, Badaun, Jyotiba Phule Nagar, Farukkhabad, Kanpur Dehat, Lalitpur, Banda, Jalaun, Kannauj, Amethi, Hamirpur, Bhadohi, Chitrakoot, Mahoba, among others.

3.2.3 Biogas:

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:

The State's national-level program runs for hydropower generation, such as the small hydropower project program. The implementation of small hydropower in the State is carried out by Uttar Pradesh New and Renewable Energy Development Agency. There is no information on the district's hydropower future.

3.3 TOURISM

Sita Samahit Sthal

The holy place of Sitamarhi is situated between Allahabad and Varanasi, near the national highway No.2 and also connected with Allahabad and Varanasi railway line with Jangiganj, the nearest railway station.

It is a well known Hindu pilgrim and a good tourist spot with a lot of tourist almost throughout the year.It is said that this temple is the place where mother Sita went into the earth when she willed it while she was living in the forest of Sitamarhi.Other one temple of Baba Hariharnath who is situated in gyanpur in Sant Ravidas Nagar

Sitamarhi temple is located in Sant Ravidas Nagar district. This temple is situated on the banks of Ganga river and 11 km from Jangiganj Bazar in the middle of Allahabad and Varanasi. It is believed that at this place Mother Sita had absorbed herself in the earth. Here is the 110 feet high statue of Hanuman ji, which has the distinction of being the world's greatest statue of the Hanuman ji.

Culture & Heritage

The art of painting reached of the country's carpets. The carpet weaving centers primarily located in the state are around Khamariya and Sant Ravidas Nagar. These carpets are popular export items today. Sant Ravidas Nagar is one of the old carpet centres of the Mughal days. It produces both the traditional as well as the new designs. The designs are of the Old Persian style.

There are 6 major manufacturers of carpet in the international market – Iran, China, India, Pakistan, Nepal, Turkey. 90 per cent of the exported northeast is from Iran, China, India and Nepal, in which Iran is 30 per cent, India 20 per cent and Nepal's share is 10 per cent. 95 percent of the carpet export goes to Europe and America.Germany alone imports 40 percent of the carpet. The amazing thing about the construction of Sant Ravidas Nagar carpets is that the raw material of this industry is not created here. Only the availability of skilled labor is the biggest weapon. On the strength of which Sant Ravidas Nagar has made its mark in the world market.

3.4. WELANDS:

The wetlands create a unique ecosystem that supports many species simultaneously like aquatic, terrestrial, and human beings. Local stakeholders directly or indirectly depend on the wetland for their income and small-scale business. The region is famous for its carpet and handicraft. The data collected and analyzed shows the region's production and possible product that can be derived from the raw product. The list of sources and the possible products are mentioned below:

- Rice, and wheat is produced as commercial crops in the district. Also, the production of pulses is reasonably high.
- This region is a belt of large varieties of oil production like mustard, linseed, and castor seeds.
- The region has a large production of dairy products.

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.[5]

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 –

- Tree plantation is done every year for environmental protection.
- Human resource and women development funded by good weave international runs awareness workshop on environment day in different village of Bhadohi.

4.2 Tourism

- **Ecotourism Projects**

Travelling to places where flora, wildlife, and cultural legacy are the main attractions is known as ecotourism. Ecotourism aims to provide visitors with a better understanding of how humans affect the environment and create a greater appreciation for our natural ecosystems. There is a huge opportunity to develop ecotourism projects in the Mirzapur district. The project will minimize the negative aspects of conventional tourism on the environment and enhance the cultural integrity of local people. Also, this project will boost the tourist inflow in the district. Lakes, Ponds, forests, and protected ranges can be protected to give Prayagraj a new face in tourism.

- **Sustainable Tourism**

It is a type of tourism in which all the needs and desires of a tourist/ and other stakeholders of the tourism industry is fulfilled without compromising the ability of the future generation to utilize the tourism. Several goals of Sustainable Developments Goals are also seen associated with sustainable tourism. Such as life below water and life on land are impacted by human activities if the tourism place is a water body of forest area; hence it is the duty of all of us to take care of sustainability aspect in the tourism. Sustainability for locals/natives can be provided by including them in trade and business activities.

There is a sense of responsibility of different stakeholders associated with tourism to develop sustainable tourism. In which each stakeholder takes care of other stakeholders and biotic and abiotic factors. For

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

example, reducing the Carbon footprint per visitor, using eco-friendly vehicles to roam around, supporting local businesses.

One example of sustainable tourism is promoting tourists to travel off-season. It will reduce the impact of seasonal unemployment on the marginal traders and other workers in the tourism sector.

Offering eco-friendly services is another example of sustainable tourism. Providing tourists with a cycle to roam around nearby places with help in reducing carbon footprint and it economical. It is aimed at the minimum negative impact on the environment created by tourism activities.

Projections and Monitoring matrix

Sector	Intervention	Strategy	Total cost	Expected Outcomes
Tourism	**Research**	• Based on various data and matrices, it is possible to predict the reason and motivation for tourism. Through extensive qualitative and quantitative research, it is also possible to determine the variables affecting tourism in Uttar Pradesh. • Research must be free from all the political pressures and influences. • The researchers must ensure that the field data and secondary data are correct		A well-researched document as a reference for other processes. Factors that affect tourism in Uttar Pradesh. Define the determinant of tourism activity.

		and not modified while entering the new records. • Need to involve unbiased researchers.		
	Planning	• Action plans can be developed for intervention based on the research and analysis of different data and reports. • Developing an Action plan is vital because results depend on how it is planned. • Planning must consider the social status of the State and the image in the tourists' minds. • No place should be given to non-practical projections. • Planning about when to organized Mahotsav/ festivals/ fairs		Planning to be based on research and previous lessons. Realistic planning for successful implementation. .

		to pump the local economy. • Separate planning for different demographics of tourists for comfort and leisure tours. For example, while planning the tour packages and tariffs, it is crucial to consider the demography of tourists. Foreign tourists ask much for hygiene while local tourists ask much for discounts. Hence these concerns must be included. • Need to develop the sites as per a set of standards to attract a wide range of tourists. • Brand Manufacturing to increase tourism activity. • Organizations of grand events.		

		• Use of allocated budget.		
	Implementations	• Various schemes can be developed, such as tourist packages, tariff plans etc., to attract more and more tourists. • Mahotsav and Fairs to be organized to rejuvenate the local economy and attract tourists. • Developing tourist circuits. • Developing eateries • Connecting tourism with local culture and food. • Extensive marketing for advertisement. • Famous face as brand ambassador. • Extensive branding and marketing. • Development of tourism spots		To attract a greater number of tourists and maximize the revenue from tourism. To improve the image of the State and not let the other social factor affect the revenue of tourism.

		and heritage sites. • Availability of information on government websites along with tour packages. • An extensive market research for the development of strategies		
	Impact Assessment of results	• Calculating what the touch points are. • The reason for failure • The reason for the success • Lesson for next planning		To learn the lesson and find out the root cause of success and failure, to be used further with modification

SWOT analysis of Tourism

S No.	Strength	Weakness	Opportunity	Threat
	• Located near Allahabad and Varanasi • Rich History • Carpet industry	• Limited number of tourist places. • Underdeveloped district. • No availability of ghats.	• Get benefitted with ecotourism spot near the district. • Can be benefitted from the events organised at Allahabad/Varanasi.	• Pollution • Overlooked district. • Far from the state capital. • Under funding to develop

	• Sitamarhi a religious location.			tourism in the district.

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

To overcome the interrupted power supply problem, the district should be diverted towards the renewable energy resources, especially solar energy. Agriculture and carpet industry are the two sectors which employ large number of people. Powering the two sectors with the solar would definitely help the district prosper. The carpet manufacturing units can be made well facilitated by powering them with solar energy, which would in turn attract more and more workers. The solar panels should be made available at low prices or the manufacturing unit owners should be provided with financial assistance in this regard.
Moreover the farmers should be made aware of the Kusum Yojana so that farmers could get more benefits similar to the Government of Maharashtra's Solar Agriculture Feeder Policy- Mukhyamantri Saur Krushi Vahini Yojana (Launched under PM KUSUM scheme).
Those places where infrastructure is not proper, off grid solar plants should be encouraged and the people should be provided with financial aid for these as well.

4.4.2. Biomass

The problem of stubble burning is very common in the district Sant Ravidas Nagar and hence to divert the farmers away from this, it becomes important to make them aware of the biomass energy**.** Since the district largely produces rice and wheat, hence rice husk based biomass power plants should be encouraged in the district among the new entrepreneurs. These can be developed on the lines of Husk Power Systems, Champaran, Bihar. Moreover the rice mill owners should be encouraged to set up their own biomass plants and if not possible then provisions should be made such that a group of them and own a single biomass plants. Community based biomass plants should be developed from the village panchayats.

A small district based survey for understanding the land availability would be of use in recognizing the apt lands for setting up the biomass plants.

Research is also required to develop technology which can not only produce energy from rice husk alone but also wastes from other crops can be used alongwith, such as wheat, etc.

4.4.3 Biogas:

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

4.4.4 Hydropower:

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

5 RECOMMENDATIONS

5.1 AGRICULTURE AND ALLIED SECTORS

1. The farmers should practice an improved variety of seeds and high-yield varieties (HYV).
2. Productivity of the major crops such as wheat and paddy are very low compared to the national average.
3. The district has scope for commercial cultivation of Mango, citrus, and guava under favorable climatic conditions.
4. Farmers should be trained for Integrated Pest Management (IPM) and post-harvesting management for major fruits.
5. Farmers should be encouraged for mushroom and beekeeping, especially for small landholders, including landless farmers.
6. Organic farming can be popularized in the district, mainly for vegetables under the PKVY organic farming scheme cluster.
7. Farmers should be encouraged for vermicomposting and biofertilizers, green manuring, and FYM application to boost soil health.
8. Dependency on groundwater for irrigation should be reduced, and conjunctive use of surface and groundwater should be promoted.
9. High water efficiency can be achieved by adopting micro-irrigation (sprinkler and drip) with efficient fertigation units.
10. Farmers should be trained to control the pest and diseases such as blast and brown spots in paddy, yellow rust, leaf blight, loose smut in wheat, etc.
11. Farmers can be encouraged for onion and potato cultivation, which will provide a good return to the farmers.

12. Low-cost farm mechanization can be promoted in the district.
13. Drought is a regular phenomenon in the district, and farmers should follow proper crop practices.
14. Short-duration pulses (Mung bean) and high-quality seeds should be introduced in the district.
15. Mulching, conservation tillage, SRI methods for paddy, etc. practiced, can be adopted by the farmers for proper resources management and utilization.
16. The district has a lot of scope for sheep, goats, and piggery for the poor farmers. Market access for poultry farming and egg production can be boosted under the corporative farming model.
17. Fish farming may be popularized in the district.

5.2 FORESTRY

Sant Ravidas Nagar located on the bank of river Ganges, Varuna and Morva. According to ISFR 2019, 3.12 Sq. Km. area of Sant Ravidas Nagar is covered with forest. As discussed above, the forest cover of Sant Ravidas Nagar has increased as compared to previous assessment of ISFR 2017. No major forest found in the district. There is a wide scope of Afforestation on waste land, trees outside forest (on the sides of the roads, banks of river etc.). Government can promote the afforestation, agroforestry activities by providing output based incentives.

5.3 Biodiversity

- Non-timber forest produce-based income-generating initiatives should be identified and promoted.
- Forest areas need to be protected, treated, and regenerated.
- Government should support/ promote local people to build communities and NGOs for afforestation programs.

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

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 introduce improved cultivars and production technologies for pulses and oilseeds.
- It is recommended to develop the outer periphery of the wetlands with wet gardens, flower gardens or medicinal plants. These wetlands can be turned into an eco-tourism site.
- Small-scale industries like boat making and net making should be promoted under the schemes by the Ministry of Micro, Small & Medium Enterprises.
- It is recommended to create awareness about the Fisheries and Aquaculture Infrastructure Development Fund (FIDF) scheme and Pradhan Mantri Matsya Sampada Yojana (PMMSY). The awareness will help the development of aquaculture of fish, crab and pearl.

5.5. ENERGY

5.5.1. Solar

- ❖ People should be made aware about the solar energy and the related schemes.
- ❖ Kusum Yojana should be popularized among the farmers in the district.
- ❖ The carpet industry should be powered with the solar energy.

5.5.2. Biomass

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

5.5.3. Biogas

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

5.5.4. Hydropower

- It is recommended to build Ganga canal and investigate hydropower potential near villages Sitamarhi, Dhantulsi, Konia, Katra.

5.5 TOURISM

ARTH GANGA PROJECT: DISTRICT BHADOHI

S. No.	Broad objectives / recommendations	Key activities / interventions to be planned			Monitoring & Evaluation	Impact
		2022	2023	2024		
	Encourage tourism related startups and ideas. Incubation centers to develop prototype and working model with the assistance of industry leaders (tourism industry). Training of skilled manpower to work in tourism sector (through earn while you learn programs). Upgradation of UP state tourism corporation policies, the hotels and integration of PPP. Connect with neighbouring bigger cities. Focus on international tourists.	Research to figure out the factors impacting the tourism in the district. Development of strategies to address the issues. Development of policies to protect the ecosystem. Adopting PPP (Public Private Partnership) model in the tourism sector to reduce the burden on government spendings Structural developments.	Implementation of strategies. Training and Incubation Centre support to innovative ideas Structural developments Supporting local carpet makers and artisans.	Sampling for analysis. Evaluation of interventions. Redesigning of strategies based on Impact analysis	Intervention impact-RCTs, regression analysis, propensity scores, econometrics, structural equation modelling, Contribution analysis, process tracing, Bradford Hill criteria. Through Participatory approaches and impact evaluations use the standard OECD-DAC criteria. Based on satisfaction of pre decided key questions.	Performance of interventions. Working model and scalability of ideas from incubation Centre. More tourist footfall. Trained youth to be a part of Tourism industry. Upgraded staff and facilities associated with UP State Tourism Corporation

6. Discussion during the Report Presentation

- The district largely produces rice and wheat.
- Bhadohi district has about 23 cow shelters and huge amount of crop residue from rice and wheat harvest (biomass).
- Sita Samahit Sthal and 110 feet high statue of Hanuman ji have high religious value.
- The IIML Report for Arth Ganga should be a regular Agenda item for next 6-8 DGC meetings.
- Hon'ble PM during the post-Budget webinar on Tourism had spoken about market potential of destination weddings. It was suggested that suitable Ashrams in Ganga Basin may be identified for such purpose to promote blissful experience, cost reduction, livelihood opportunities and better upkeep.
- Allocate separate space for Namami Gange Awareness and Jalaj Marketing kiosk in Melas/Congregatios/Fairs for providing better marketing opportunities to the Jalaj products.
- As Dilli Haat Centre – Namami Gange Awareness and Marketing Centre – is being launched soon, it was requested that every district to identify niche products with a creative story and link it with Jalaj in their area.
- To identify Arth Ganga Tourist Trails and organize Ganga Guide training
- Promotion of Natural Farming in Ganga Basin and training workshops should be organized on a regular basis. NMCG is supporting this initiative in coordination with MoA& FW and NCOF.
- Make plans for reuse of treated waste water for agriculture, industrial etc. purpose and also the sludge.
- Training of volunteers for Ganga awareness & Aarti workshops to promote regular aartis on Ghats.

6 REFERENCES

- *https://censusindia.gov.in/2011census/dchb/DCHB_A/09/0967_PART_A_DCHB_SANT%20RAVIDAS%20NAGAR%20(BHADOHI).pdf*
- *https://censusindia.gov.in/2011census/dchb/0967_PART_B_DCHB_SANT%20RAVIDAS%20NAGAR%20(BHADOHI).pdf*
- *https://agricoop.nic.in/sites/default/files/UP17-Sant%20Ravidas%20Nagar-27.09.2012.pdf*
- *https://www.indiastatdistricts.com/uttarpradesh/santravidasnagar-bhadohi-district*
- *http://www.aimspress.com/article/10.3934/energy.2016.2.222*
- *https://www.amarujala.com/uttar-pradesh/bhadohi/somewhere-the-wires-are-hanging-and-somewhere-the-power-supply-with-the-help-of-bamboo-sticks-bhadohi-news-vns6361632133*
- *https://www.researchgate.net/publication/314836204_Survey_on_Present_Scenario_of_Biomass_energy_and_its_future_prospect_in_Uttar_Pradesh_India*
- *https://agricoop.nic.in/sites/default/files/UP17-Sant%20Ravidas%20Nagar-27.09.2012.pdf*
- *https://censusindia.gov.in/2011census/dchb/DCHB_A/09/0967_PART_A_DCHB_SANT%20RAVIDAS%20NAGAR%20(BHADOHI).pdf*
- *https://censusindia.gov.in/2011census/dchb/0967_PART_B_DCHB_SANT%20RAVIDAS%20NAGAR%20(BHADOHI).pdf*
- *https://www.jagran.com/uttar-pradesh/bhadohi-stubble-burning-penaltyimposed-fine-19812414.html*
- *https://www.daijiworld.com/news/newsDisplay?newsID=649051*
  - ***http://uptourism.gov.in/***
  - ***https://bhadohi.nic.in/***

7 APPENDICES

7.1 AUXILLLARY DATA

Table 3 Biogas potential from animal waste in the district.

Livestock	Residue type	Total population as of 2012	Manure yield * (kg/day)	Total manure generation annually (kg)	Average collection (75%)	Dry manure after removing Moisture content	Manure required for biogas* (kg/m^3)	Biogas potential (m^3/yr)	m3/day	Dry matter per day
Cattle	Manure	209919	10	76,62,04,350	574653262.5	114930652.5	25	4597226.1	12595.14	314879
Buffalo	Manure	144578	15	79,15,64,550	593673412.5	118734682.5	25	4749387.3	13012.02	325301
Sheep	Manure	38096	1	1,39,05,040	10428780	2085756	25	83430.24	228.576	5714.4
Goat	Manure	74123	1	2,70,54,895	20291171.25	4058234.25	25	162329.37	444.738	11118
Pig	Manure	6977	2.5	63,66,513	4774884.375	954976.875	25	38199.075	104.655	2616.4
Poultry	manure	1,00,652	0.1	36,73,798	2755348.5	551069.7	25	22042.788	60.3912	1509.8
Total		**5,74,345**						**9652614.873**		

Table 4 Biogas potential from agricultural waste in the district.

Crop	residue type	Total crop producti	Residue production ratio	Residue amount (tons)	Average collection (70%)	Moisture content	Residue amount after removin	Biogas potential [m3/(to	Overall biogas potential (m3)

		on (tons) (2017-18)					**g moisture (tons)**	**ns of dry matter)]**	
Maize	straw	688	1.5	1032	722.4	15	614.04	800	491232
Wheat	straw	185620	1.5	278430	194901	30	136430.7	800	109144560
sugarcane	bagasse	82747	0.33	27306.51	19114.557	80	3822.9114	750	2867183.55
Total		**269055**							**112502975.6**