Arth Ganga Project: District Begusarai

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National Mission for Clean Ganga (NMCG)

Submitted by:

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

The administrative headquarter of Begusarai is an agrarian town of the Begusarai district. The economically backward town with not so impressive literacy is situated at the northern banks of River Ganges with a spatial extent of 25.042ºN and 86.013ºE.

Owing to the good rainfall and humid tropical climate the main source of economy is agriculture. The district lies in the agricultural category 1 by the physiological characteristics i.e., fine sandy loam soil making the highest percentage of land, the cultivable land accounts for approximately 159.5 ha. Of the agricultural land, the net sown area occupies 117.2 ha whereas the net irrigated area is 86.1 ha. The main crops grown in town are paddy, wheat, maize, gram, pulses, peas, mustard, and sunflower along with mango, litchi, turmeric, etc. A few cluster and small-scale industries are established in the districts.

There are many prominent tourist attractions in the Begusarai district such as they have many ghats, temples, etc. namely Kabar Jheel (Asia's largest oxbow lake), Jai Mangla temple, Simaria Ghat, Kanwar Lake bird sanctuary, Museum, etc. Measures are been taken to maintain and advertise well in order to get explored by tourists.

The forestry here does not paint a promising picture, as according to data, the percentage of forest cover is very less (4.27%). The district does not have a forest under the category of Very Dense Forest (VDF). Moderately dense forest (MDF) and open forest (OF) are the main forest types with open forest constituting nearly 65% of the forest cover. Miyawaki plantation, agro-horticulture, aromatic plants clusters, native forest maintenance, etc. should be adopted in order to achieve sustainable forestry.

With the presence of high agriculture and horticulture waste, the biomass potential of the district is expected to be more. There are developments in solar and hydro energy generations. The Kabartal wetland has been recognized as the first Ramsar site in Bihar. There are many trees, endangered, threatened and vulnerable bird species, thus emphasis should be imposed on promoting sustainable development of wetlands, various practices like eco-tourism, Agro-forestry, promoting renewable energy sectors, educating locals, and use of Integrated local knowledge, etc. for promoting a sustainable economy. Farm mechanization, mulching, intercropping, cultivation of high revenue crops, beekeeping, polyhouse, high-density plant production, etc., should also be practiced.

1 DISTRICT OVERVIEW

1.1 INTRODUCTION

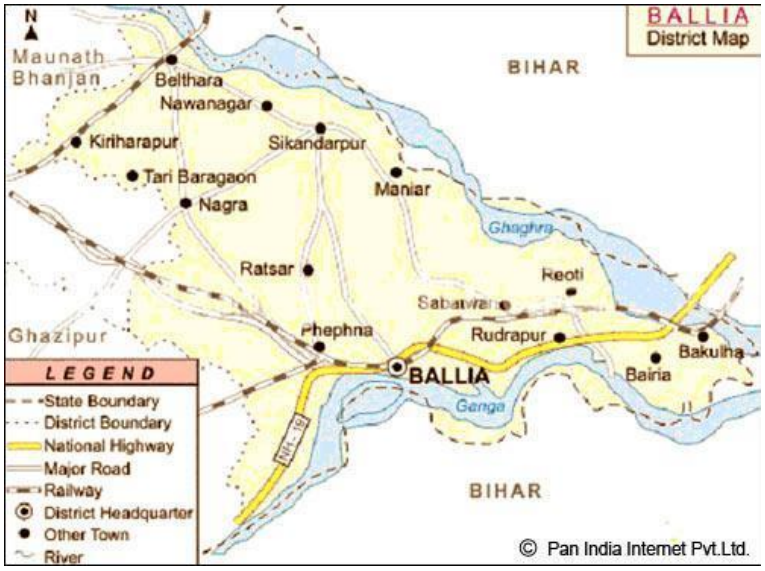


Figure 1 Map of the district

1.2 DEMOGRAPHIC PROFILE OF BEGUSARAI

Begusarai is the administrative headquarters of Begusarai district, which is one of the thirty-eight districts of the Indian state of Bihar. The district lies on the northern bank of river Ganga. Geographically, the district lies at 25.042'N latitudes, 86.013'E longitudes.

1. **District Overview:**

Geographic area: 1918 Km^2
Altitude: 41m
Rainfall: 687.6 mm (2018-19)
Forest area: 81.95 Km^2
Rivers: Ganga, Burhi Gandak, Chandrabhaga

Administrative Divisions:

District Headquarter	Begusarai
No. of subdivisions	5
No. of Blocks	18
No. of Villages	1229

Table 1 demographic overview

Demographic and Socio-economic Parameters:

Population	29,70,541
Population Density	1549 / Km^2
Sex Ratio	895
Literacy	63.87%
Occupation/Livelihood	Agriculture

The district receives funds from the Backward Regions Grant Fund Programme (BRGF) for the reason that in 2006 the Indian government named Begusarai as one of the backward region of India. The economy of the district is mainly based on agriculture. The prime agricultural crops of the district are paddy, wheat, maize, gram, pulses, peas, mustard and sunflower. In the year 2011-12, the gross domestic product of the district was Rs. 8,28,169 lakh at current price and Rs. 492,309 lakh at constant prices in the year 2004-2005. In the year 2011-12 the net domestic product in the district was Rs. 7,48,395 lakh at current price and Rs. 4,36,703 lakh at constant prices in the year 2004-2005 (IndiaStat).

1.3 ECONOMIC PROFILE OF BEGUSARAI

The District Economy

The primary sector significantly impacts the district economy because it contributes, on average, 24.67% to the district GDP. It grew at the average annual growth rate of 7.13% during 2007-08 to 2013-14. However, its share decreased from 29.19% in 2007-08 to 20.40% in 2013-14, as the growth in other sectors was greater than in the primary sector. The share of the secondary sector increased from 20.41% in 2007-08 to 25.80% during the same period. The sector grew with an impressive average annual growth rate of 18.03%. The tertiary sector occupies, on average, 52.02% share in the district economy. Moreover, the sector grew with a remarkable average annual growth rate of 14.58%, with its share increasing from 50.40% in 2007-08 to 53.80% in 2013-14, whereas the growth in the secondary sector outperformed other sectors. Overall, the district economy grew with an average annual growth rate of 13.39%. Although the District Administration's focus has been on the growth of all the three sectors simultaneously, the growth in the primary sector is less than in the other two sectors. Steps should be taken to increase the productivity of the primary sector so that it can grow at a higher rate. The secondary and tertiary sectors have performed well during the period.

Table 1: Trends in Gross District Domestic product in Begusarai at Constant Prices (base 2004-05), Millions in Rs.

Year	Sector-wise GDDP				Annual Growth Rates		
	PRIMARY SECTOR	SECONDARY SECTOR	TERTIARY SECTOR	TOTAL GDDP	PRIMARY SECTOR	SECONDARY SECTOR	TERTIARY SECTOR
2007 -08	8659	6054	14951	29664	-	-	-

	(29.19)	(20.41)	(50.40)	(100)			
	9115	6942	16979	33036	5.27	14.67	13.56
2008-09	(27.59)	(21.01)	(51.40)	(100)			
	8490	7582	19103	35175	-6.86	9.22	12.51
2009 -10	(24.14)	(21.56)	(54.31)	(100)			
	10262	9483	21692	41437	20.87	25.07	13.55
2010-11	(24.77)	(22.89)	(52.35)	(100)			
	11635	12146	24601	48382	13.38	28.08	13.41
2011 -12	(24.05)	(25.10)	(50.85)	(100)			
	12815	14467	29402	56683	10.14	19.11	19.52
2012 -13	(22.61)	(25.52)	(51.87)	(100)			
	12809	16203	33787	62800	-0.05	12.00	14.91
2013-14)	(20.40)	(25.80)	(53.80)	(100)			
Average Growth Rate					7.13	18.03	14.58

Source: http://data.icrisat.org/district-level-data/
Note: Figures in Parenthesis are percentage share of total GDDP

2 QUANTITATIVE DATA ANALYSIS

2.1 Agriculture and Allied Activities

2.3.1 Trend in Land Use Pattern

The total declared area of the district is 1878.2 sq. km². The share of Barren and uncultivable land has remained constant at 9.58% over the years. The fallow land has decreased over the years, from 4.05% in 2011-12 to 1.81% in 2019-20, which is good for the district economy. The net sown area has increased from 62.14% in 2011-12 to 64.70% in 2019-20. The area for non-agricultural use slightly decreased from 22.20% in 2011-12 to 21.83% in 2019-20 (Table 2). The area under trees and gardens has marginally increased from 1.97% in 2011-12 to 2.08% in 2019-20, which is good for the district to keep the sustainable development goals in mind. Overall, the land use pattern shows that the areas under fallow land and non-agricultural use have decreased while the net sown area and area under trees and gardens increased over the years.

Table2: Trends in land use pattern in Begusarai (as % of the total reported area)

YEAR	TOTAL REPORTED AREA (1000 Ha)	TOTAL FALLOW	BARREN AND UNCULTIVABLE LAND	LAND OTHER THAN AGRICULTURE	AREA UNDER TRESS AND GARDENS	NET SOWN AREA
1	2	3	4	5	6	7
2011-12	187.8	4.05	9.58	22.20	1.97	62.14
2012-13	187.8	4.05	9.58	22.26	1.97	62.14
2013-14	187.8	4.58	9.58	22.26	2.02	61.61
2014-15	187.8	13.74	9.58	22.31	2.02	52.34
2015-16	187.8	5.59	9.58	22.31	2.02	60.49
2016-17	187.8	5.86	9.58	22.31	2.02	60.22
2017-18	187.8	8.79	9.58	22.31	2.02	57.29
2018-19	187.8	5.70	9.58	22.10	2.08	60.49
2019-20	187.8	1.81	9.58	21.83	2.08	64.70
Source: http://dse.bihar.gov.in/ and http://data.icrisat.org/district-level-data/						

2.3.2 Trends in Operational Land Holdings

In Begusarai district, the total number of operational farms increased from 377 thousand in 2010-11 to 379 thousand in 2015-16, a net increase of 0.53%. While in the state, their numbers increased from 16191 thousand in 2010-11 to 16412 thousand in 2015-16, a net increase of 1.36%. Most land positions in the district are marginal and small. These two size categories represented around 98.05% in the district in 2015-16, while the corresponding proportion in the state was 96.96% (Table 3). The two agricultural censes of 2010-11 and 2015-16 report no significant change in the percentage share across the various categories of land holdings.

Table3: Distribution of Operational Holdings by Size-categories of farms (in %) in Begusarai

	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.)
Begusarai	2010-11	93.51	3.99	1.92	0.56	0.03	377

	2015-16	93.13	4.92	1.55	0.36	0.04	379
							[0.53]
Bihar	2010-11	91.06	5.86	2.56	0.5	0.02	16191
	2015-16	91.21	5.75	2.52	0.5	0.02	16412
							[1.36]
Source: Compiled from https://agcensus.nic.in/. Figures in [] are percentage increase/decrease in 2015-16 over 2010-11.							

2.3.3 Trends in Area, Production and Yield of Principal Crops

2.3.3.1 The Trend in Cropping Patterns

Wheat and Maize dominate the agriculture of the district. Table 4 shows the area devoted to various crops over the last seven years. In 2019-20, Maize made up the highest share of GCA (33.01%), followed by Wheat (32.75%) and rice (5.84). These two crops constitute around 65.76% of the GCA. The area shared by the total cereals has slightly increased from 82.31% in 2013-14 to 82.82% in 2018-19. The main pulses produced are Peas, Arhar, and Black gram (urad), while the other pulses have negligible area. The total pulse acreage has remained consistent throughout the study period (average, 2.72%). Thus, the food grains cover a majority (average, 82.30%) of the GCA. Mustard is the only major oilseeds crop produced, and the total oilseed acreage has remained consistent over the years (average, 4.01%). In general, there was no significant change in the cultivation pattern in the district during the study period. The average cropping intensity is 151.52.

Table 4: Trends in cropping pattern (as % GSA) and cropping intensity

Crop/Year	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Rice	17.28	14.47	10.92	11.46	11.86	9.04	5.84
Wheat	32.17	34.98	35.77	35.24	36.33	38.59	32.75
Maize	32.81	31.15	33.35	31.95	29.42	30.68	33.01
Other cereals	0.06	0.19	0.12	1.15	1.90	4.52	0.00
Total Cereals	82.31	80.79	80.17	79.80	79.52	82.82	71.60
Peas	0.76	0.78	0.89	0.81	0.95	0.85	0.64
Arhar	0.35	0.39	0.41	0.41	0.51	0.45	0.37

Black gram (urad)	0.53	0.58	0.53	0.48	0.63	0.45	0.21
Other Pulses	0.99	1.17	1.18	1.01	1.08	0.90	0.74
Total Pulses	2.63	2.92	3.01	2.72	3.17	2.66	1.96
Total Food Grains	84.94	83.71	83.18	82.51	82.69	85.48	73.57
Mustard	4.73	4.93	5.61	4.72	4.82	4.35	3.87
Other oilseeds	0.06	0.06	0.06	1.77	0.06	0.06	9.24
Total oilseeds	4.79	5.00	5.67	6.49	4.88	4.41	13.11
Sugarcane	0.82	1.69	1.53	1.46	1.33	1.19	2.12
Net Sown Area	67.54	63.79	67.06	67.00	68.23	64.18	64.49
Gross Sown Area (1000 Ha)	171.30	154.10	169.40	168.80	157.70	177.00	188.40
Cropping Intensity	148.06	156.77	149.12	149.25	146.56	155.81	155.06
Source: Compiled from http://dse.bihar.gov.in/ and http://data.icrisat.org/district-level-data/							

2.3.3.2 Trends in per hectare yield of principal crops

Table 5 shows that the per hectare yield of most crops varies from year to year. However, it has increased in the latter years of the study. Maize and Wheat are the major crops in the district, and their per hectare yield (45.50 qtls and 37.42 qtls respectively, in 2019-20) are high. The yield of total cereals has increased from 24.67 qtls in 2013-14 to 39.81 qtls in 2019-20. On the other hand, the yield of total pulses decreased from 11.11 qtls in 2013-14 to 10.00 qtls in 2019-20. The yield of total oilseeds has also decreased immensely from 21.10 qtls in 2013-14 to 7.64 qtls in 2019-20, which is a cause of concern. In summary, all crop yields show year-over-year fluctuations, with a sudden fall observed in the yield of pulses and oilseeds in the latter years of the study. The lack of homogeneity of yields makes farmers' income riskier and more unstable, requiring a solid insurance protection measure.

Table 5: Trends in yield of Principal Crops in Begusarai District (in Qty per Ha)							
Crop/Year	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**

Rice	11.05	16.82	15.89	17.37	27.49	17.19	21.09
Wheat	33.74	11.91	23.09	30.23	34.94	37.75	37.42
Maize	22.97	25.35	21.54	29.50	21.55	36.67	45.50
Total Cereals	24.67	17.95	21.45	27.77	28.22	33.46	39.81
Peas	10.77	10.83	11.33	10.98	11.33	10.67	10.83
Arhar	10.00	18.33	15.71	14.52	11.25	17.50	14.29
Black gram (urad)	8.89	8.89	8.89	8.98	9.00	8.75	10.00
Total Pulses	11.11	9.78	10.20	10.40	10.00	11.28	10.00
Total Food Grains	24.25	17.67	21.04	27.20	27.52	32.77	39.02
Mustard	21.23	14.74	12.95	13.97	10.00	11.82	12.88
Total oilseeds	21.10	14.68	12.92	12.27	10.00	11.79	7.64
Sugarcane	720.71	595.77	599.23	674.66	647.14	623.81	800.00
Source: http://dse.bihar.gov.in/ and http://data.icrisat.org/district-level-data/							

2.3.3.3 Trends in Production of Principal Crops

Table 6 shows the trends in the production of the main crops over the years. Maize and Wheat dominate the production. In 2019-20, Maize (283 thousand tonnes), Wheat (230.9 thousand tonnes) formed a major part of the total cereal production (537.1 thousand tonnes). Coming to pulses, Peas and Arhar occupied the highest production, with their productions being 1.3 thousand tons and 1.0 thousand tons, respectively, in 2019-20. Although these pulses show variation in the production across years, they still represent around 81% of the total pulse production. Mustard production was 9.4 thousand tons, representing about 41.4% of the total oilseed production in 2019-20. 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, fluctuated over the years, partly due to changes in nature and partly due to market conditions. Proper insurance arrangements are needed to get assured income so that the farmers may take more risks and diversify their production.

Table 6: Trends in Production of Principal Crops in Begusarai District (in 1000 Tons)							
Crop/Year	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**

Rice	32.7	37.5	29.4	33.62	51.4	27.5	23.2
Wheat	185.9	64.2	139.9	179.82	200.2	257.8	230.9
Maize	129.1	121.7	121.7	159.10	100	199.1	283
Other cereals	0.2	0.1	0.3	1.50	2.3	6.1	0
Total Cereals	347.9	223.5	291.3	374.03	353.9	490.5	537.1
Peas	1.4	1.3	1.7	1.50	1.7	1.6	1.3
Arhar	0.6	1.1	1.1	1.02	0.9	1.4	1
Black gram (urad)	0.8	0.8	0.8	0.73	0.9	0.7	0.4
Other Pulses	2.2	1.2	1.6	1.52	1.5	1.6	1
Total Pulses	5	4.4	5.2	4.77	5	5.3	3.7
Total Food Grains	352.9	227.9	296.5	378.80	358.9	495.8	540.8
Mustard	17.2	11.2	12.3	11.13	7.6	9.1	9.4
Other oilseeds	0.1	0.1	0.1	2.30	0.1	0.1	13.3
Total oilseeds	17.3	11.3	12.4	13.43	7.7	9.2	22.7
Sugarcane	100.9	154.9	155.8	166.42	135.9	131	320
Source: http://dse.bihar.gov.in/ and http://data.icrisat.org/district-level-data/							

2.3.3.4 Variability assessment in the area, production, and yield

To understand the variability across the years (Table 7), 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 Wheat (7.49%), followed by mustard (8.42%) and Maize (9.19%), and the highest in Sugarcane (29.84%). The variability in the area under total pulses (9.21%) is much higher than in the area under total cereals (5.42%). Since Maize and Wheat dominate the production, the variability in the area under total food grains is, therefore, relatively low (5.23%).

Table 7: Variability in Area, Production and Yield of Principal Crops (2013-14 to 2019-20)

Crop/Year	Area (1000 Ha)	Production (1000 Ha)	Yield (Qty/Ha)

	Average	SD	COV	Average	SD	COV	Average	SD	COV
Rice	19.35	5.29	27.34	33.62	9.09	27.04	18.13	5.08	28.01
Wheat	59.48	4.46	7.49	179.82	63.38	35.25	29.87	9.38	31.42
Maize	53.93	4.96	9.19	159.10	63.43	39.87	29.01	9.06	31.21
Total Cereals	134.70	7.30	5.42	374.03	108.59	29.03	27.62	7.34	26.58
Peas	1.37	0.13	9.31	1.50	0.17	11.55	10.96	0.27	2.45
Arhar	0.70	0.08	10.80	1.02	0.24	23.70	14.52	3.06	21.05
Black gram (urad)	0.82	0.18	22.12	0.73	0.16	21.80	9.06	0.42	4.68
Total Pulses	4.58	0.42	9.21	4.77	0.56	11.66	10.39	0.58	5.59
Total Food Grains	139.28	7.28	5.23	378.80	108.43	28.62	27.07	7.17	26.48
Mustard	7.97	0.67	8.42	11.13	3.10	27.88	13.94	3.56	25.53
Total oilseeds	10.95	5.73	52.29	13.43	5.12	38.11	12.91	4.24	32.86
Sugarcane	2.47	0.74	29.84	166.42	71.08	42.71	665.90	73.66	11.06

Source: http://dse.bihar.gov.in/ and http://data.icrisat.org/district-level-data/

The variability of production depends on the variability of the cultivated area and the variability of the yield. Therefore, the variability in the production of different crops is greater than in the cultivated area of all crops. The highest variability in production is observed in Sugarcane (42.71%), followed by Maize (39.87%), Wheat (35.25%), and mustard (27.88%). High variation in the production of oilseeds is partly due to variation in the land area under them and partly due to the non-availability of hybrid oilseeds. Improvement in crop insurance conditions and better market accessibility can lower this variation. Variability is lowest in Peas (11.55%) and total pulses (11.66%).

In the case of yield, the greatest variability is estimated in Wheat (31.42%), Maize (31.21%), and Rice (28.01%). Yield variability in total pulses (5.59%) is lower as compared to that in total cereals (26.58%) and total food grains (26.48%). Several factors, such as climate change, market prices, rainfall patterns, etc., influence the variability in agricultural production.

2.3.4 Consumption of Chemical Fertilizers

Table 8 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 2013-14, nitrogen represented 58.91% of the total fertilizers used, while the proportions of phosphorus and potassium were 26.86% and 14.21%, respectively. In 2019-20, however, the nitrogen share increased to 60.69%, while shares of phosphorus and potassium decreased to 26.46% and 12.83%, respectively. The use of nitrogen is more than the recommended ratio, while the Phosphorous and potassium ratio is less than the recommended ratio. The table also shows that fertilizer consumption varies yearly, which can be due to several factors such as rainfall patterns, cultivation patterns, etc. As the overall use of chemical fertilizers has increased in the district from 313.64 kg/ ha GSA in 2013-14 to 391.39 kg/ ha GSA in 2019-20, the authorities should take steps to reduce their consumption as chemicalization of agriculture degrades soils and water resources. There is a need to incentivize the farmers to use organic and bio fertilizers.

Table 8: Trends in Use of Chemical Fertilizers in Agriculture (Kgs/per ha GSA)

Fertilizer/Year	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Nitrogen	184.78	203.80	261.30	235.40	232.04	224.75	237.55
Phosphorous	84.27	79.91	98.39	120.87	100.55	96.64	103.59
Potassium	44.59	37.83	41.94	69.70	55.72	43.81	50.24
Total	313.64	321.54	401.64	425.97	388.30	365.21	391.39
GSA (1000 Ha)	171.3	154.1	169.4	168.8	157.7	177	188.4

Source: http://dse.bihar.gov.in/ and http://data.icrisat.org/district-level-data/

2.3.5.1 Irrigation Structure and Status

2.3.5.2 Source-wise area under irrigation

Groundwater (GW) is the main source of irrigation in the district. The share of wells and tube wells in NIA (average, 99.26%) has remained consistent over the years. Thus, the district is hugely dependent on groundwater for irrigation purposes. It can have a serious environmental issue if such a pattern continues in the long run. The district's percentage of the net and gross irrigated areas have increased over the years, averaging 79.94% and 67.27%, respectively.

Table 9: Source-wise Area under Irrigation in Begusarai (in % of NIA)

Source/Year	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Wells and Tube Wells (GW Irri.)	99.26	99.26	99.26	99.26	99.26	99.26	99.26	99.31	99.22
Other Sources	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.69	0.78
NET IRRIGATED AREA (1000 Ha)	82.31	71.33	83.93	81.06	98.77	96.84	93.35	100.80	103.00
GROSS IRRIGATED AREA (1000 Ha)	104.74	94.49	105.69	103.49	128.46	123.27	116.74	124.90	127.80
% of NIA	70.53	61.12	72.54	82.46	86.95	85.62	86.76	88.73	84.77
% of GIA	60.47	54.84	61.70	67.16	75.83	73.03	74.03	70.56	67.83

Source: http://dse.bihar.gov.in/ and http://data.icrisat.org/district-level-data/

2.3.6 Status of Organic Farming

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

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

However, the policy-related issue is what would be after the three years? In this context, two things need to be thought of—a well-designed regulatory and monitoring framework and the introduction of payments for ecosystem services for the organic farmers after the transition period so that they may carry on the activity on a sustainable basis. Organic/natural/zero budget farming provides ecological services in terms of soil health, human and animal health, saving of water, protection of biodiversity, 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 a need to create an assured market for these products so that farmers may get premium prices. Certification and quality check, and monitoring mechanisms should be set up.

Table 10 shows the details of establishing organic clusters under the Paramparagat Krishi Vikas Yojana and Namami Gange schemes in the district. The district has 90 groups in eight development blocks. The highest number of groups are in Matihani (29), Sahebpur Kamal (25), and Samho Akha Kurha (25). 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. More groups need to be added in other development blocks as well.

Table 10: Status of Organic Farming PGS Groups under PKVY and Namami Gange Schemes in Begusarai (as on May 20, 2022)

S. No.	Block	Scheme	No. of groups	No. of farmers in groups			
				Total	Average	Median	SD
1	Bachhwara	PKVY	2	61	30.5	30.5	2.12
2	Bakhri	PKVY	2	46	23	23	0
3	Barauni	PKVY	4	122	30.5	30	6.6
4	Gadhpura	PKVY	1	28	28	28	0
5	Matihani	PKVY	4	108	27	27	2.94

		Namami Gange	25	516	20.64	21	2.36
6	Nawkothi	PKVY	2	52	26	26	1.41
7	Sahebpur kamal	Namami Gange	25	421	16.84	20	7.71
8	Samho Akha Kurha	Namami Gange	25	472	18.88	20	4.25
9	District total (Begusarai)	PKVY	15	417	27.8	28	4.32
		Namami Gange	75	1409	18.78	20	5.42
		Total	90	1826	20.28	20	6.23
Source: Compiled from https://pgsindia-ncof.gov.in/							

Since per hectare use of chemical fertilizer is quite high, a gradual shift of farmers from conventional to organic farming systems is likely to positively impact water quality, soil health, and farm sustainability. However, being a knowledge-intensive farming system, farmers need proper training to know the practical details of the integrated sustainable farming system. Since economies of scale in both production and marketing matter in organic farming, there is a need for some institutional framework in the forms of SHGs/ farm cooperatives/PFOs/contract farming, etc. Organic farming could be an economically viable option in the district if the government builds strong marketing networks linking farmers, processors, and distributors with the easy certification process and minimizes farmers' risk by protecting their farm income through payments of ecosystem services. A long-term system of incentives and regulation needs to evolve to retain the existing farmers and motivate others to move toward a 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 the inability to fetch a premium.
2. Scaling up organic production is another problem. The problem of marketing is even more serious in the case of perishable vegetable crops. Contract farming companies and Farmer Producers' companies can be encouraged.
3. Farmers practice organic farming only on a small part of their land (less than one ha) to get the scheme's benefit.
4. Although organic farming clusters are formed, the farmers allocated a part of their lands to organic farming and practiced conventional farming in the rest of the area, which may contaminate the organic produce and fail the purpose of the cluster approach in organic farming.

5. The knowledge and awareness level regarding practices under organic farming was inadequate among farmers.

2.3.7 Trends in Livestock Sector

The total number of cattle has increased in the district from 277 thousand in 2003 to 457 thousand in 2019, a net increase of 65.21%. However, the number of adult male cattle has decreased from 12 thousand to 2 thousand during the same period. The increase in total cattle has been due to an increase in adult female cattle (from 138 thousand to 241 thousand) and young cattle (from 126 thousand to 213 thousand) in the same period. Cattles represent around 79.65% of the total large ruminant. However, total buffaloes have decreased from 101 thousand in 2003 to 86 thousand in 2019, a net decrease of 14.85%. This decrease has been largely driven by a decrease in adult female buffaloes from 54 thousand in 2003 to 43 thousand in 2019 and a decrease in young buffaloes from 46 thousand in 2003 to 42 thousand in 2019. Buffaloes represent around 20.34% of the total large ruminant. However, total sheep have decreased from 1 thousand in 2003 to 0.2 thousand in 2019, a net decrease of 82.4%. Total goats have increased from 148 thousand in 2003 to 213 thousand in 2019, a net increase of 4.08%. Total pigs have decreased from 4 thousand in 2003 to 2 thousand in 2019, a net decrease of 54.6%. The total livestock population has increased in the district from 530 thousand in 2003 to 759 thousand in 2019, a net increase of 43.2%.

Notably, the number of female cattle has increased, indicating growth in 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.

Table 11: Trends in Livestock population (in 1000 numbers) in Begusarai

Category	2003	2007	2012	2019
Cattle total	276.9	340.45	362.73	456.98
Cattle adult male	12.18	7.47	9.44	2.43
Cattle adult female	138.39	181.43	209.39	241.48
Cattle young total	126.33	151.54	143.91	213.07
Cattle share in large ruminant (percent)	73.35	82.67	78.49	84.1
Buffalo total	100.61	71.36	99.42	86.41
Buffalo adult male	1.17	0.28	1.93	0.78
Buffalo adult female	53.57	39.5	54.22	43.47
Buffalo young total	45.87	31.58	43.27	42.16

Buffalo share in large ruminant (percent)	26.65	17.33	21.51	15.9
Sheep total	1.25	0.09	0.07	0.22
Sheep share in small ruminant (percent)	0.84	0.07	0.03	0.1
Goats total	147.91	125.92	231.04	213.32
Goats share in small ruminant (percent)	99.16	99.93	99.97	99.9
Pigs total	3.79	2.06	3.63	1.72
Livestock total	530.47	541.24	701.18	758.63
Source: http://dse.bihar.gov.in/ and http://data.icrisat.org/district-level-data/				

2.3.8 Trends in Fishery Production

Table 12 shows the trends in Fish Production in Begusarai compared to the total fish production in Bihar. Fish Production was 12 thousand tons in 2011-12 in Begusarai, which increased to 24.1 thousand tons in 2017-18. Begusarai represented around 3.5% of the total fish production in Bihar in 2011-12. However, its share increased to 4% in 2017-18.

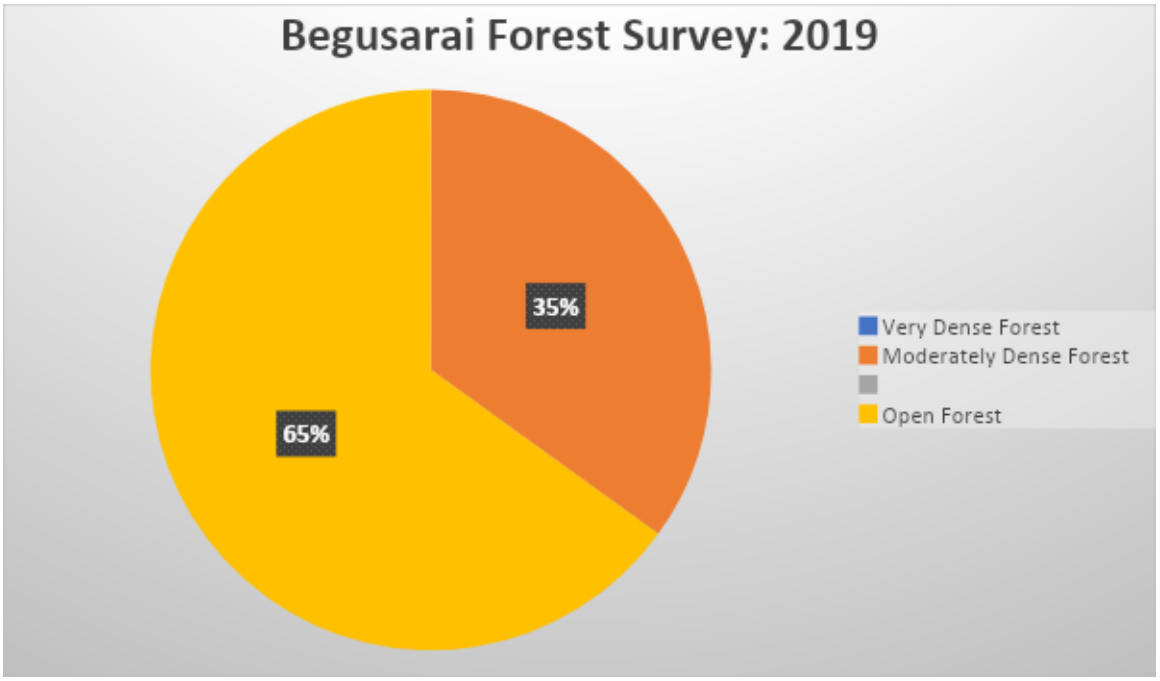
Table12: Trends in fish production (1000 tons) in Begusarai

District/Year	2011-12	2013-14	2015-16	2017-18
Begusarai	12.05	18.38	21.76	24.1
Patna	344.47	432.29	506.88	587.85
Source: http://dse.bihar.gov.in/				

2.3 Forestry

District of Begusarai has 1918 Km^2 total geographic area. Forest cover area as per 2019 forest survey assessment is 81.95 Km^2. This is 4.27% to the total area which makes the district forest deficient area. The state has a total 7305.99 Km^2 forest area which is 7.75% of the total geographical area of the state.

Begusarai district does not have forest under the category of Very Dense Forest (VDF), 28.64 Km^2 of area comes under the category of Moderately Dense Forest (MDF) and 53.31 Km^2 is open forest (OF) as per 2019 assessment.



Forest Survey of India 2019 Bihar State vs Begusarai Comparative Assessment						
Area	Geographical Area	Very Dense Forest	Moderately Dense Forest	Open Forest	Total	%of Geographical Area
Begusarai	1918	0	28.64	53.31	81.95	4.27
Bihar	94163	333.13	3280.32	3692.54	7305.99	7.76

2.4 Tourism

★ **Bihar: Year Wise Tourist Arrivals (2001 to 2020)**

Tourism is one of the latest growing industries in the state of Bihar. The tourism influx is very irregular in terms of Domestic as well as of Foreign in the Bihar. In one year region witnessed a very huge tourist influx and in very next year number of tourists decreased suddenly owing to prediction of heavy flood, Crime and poor infrastructure facilities. Tourism has been worst hit in **2020 covid Pandamic** ravaged Bihar, caused a steep fall of **-83.03%** in tourist traffic.

★ Table: 2 Bihar: Year Wise Tourists Arrivals (2001 to 2020)

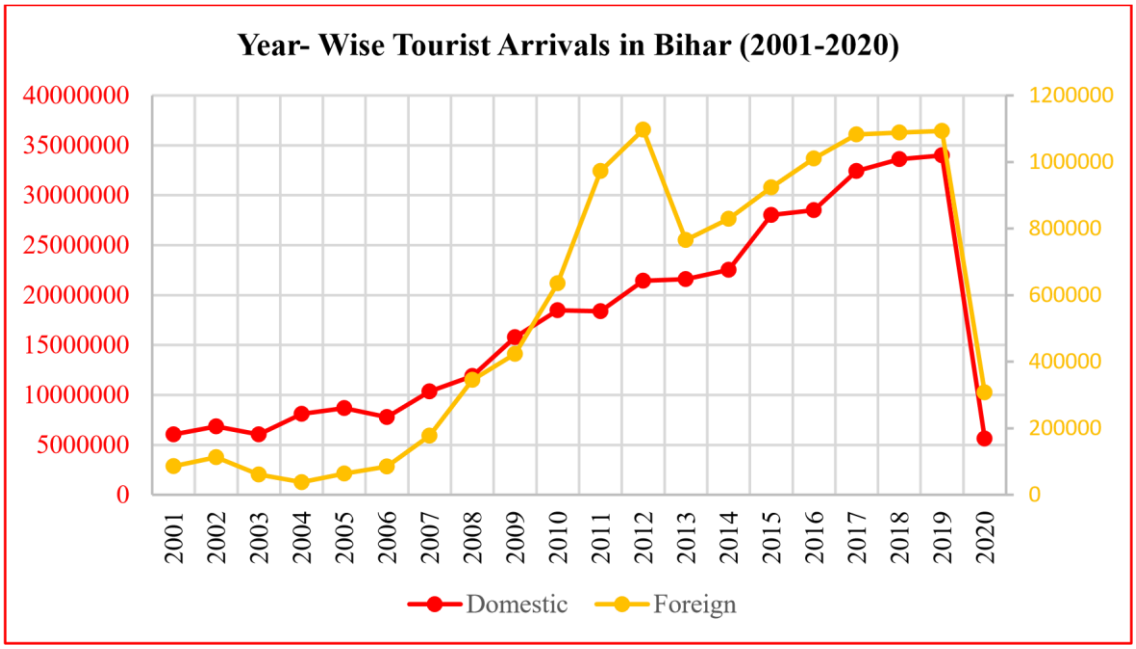
Year	Domestic	Growth	Foreign	Growth	Total	Overall Growth
2001	6061168	0.00%	85673	0.00%	6146841	0.00%
2002	6860207	13.18%	112873	31.75%	6973080	13.44%

2003	6044710	-11.89%	60820	-46.12%	6105530	-12.44%
2004	8097456	33.96%	38118	-37.33%	8135574	33.25%
2005	8687220	7.28%	63321	66.12%	8750541	7.56%
2006	7774732	-10.50%	84942	34.15%	7859674	-10.18%
2007	10352887	33.16%	177362	108.80%	10530249	33.98%
2008	11889611	14.84%	345572	94.84%	12235183	16.19%
2009	15784679	32.76%	423042	22.42%	16207721	32.47%
2010	18491804	17.15%	635722	50.27%	19127526	18.01%
2011	18397490	-0.51%	972487	52.97%	19369977	1.27%
2012	21447099	16.58%	1096933	12.80%	22544032	16.39%
2013	21588306	0.66%	765835	-30.18%	22354141	-0.84%
2014	22544377	4.43%	829508	8.31%	23373885	4.56%
2015	28029118	24.33%	923737	11.36%	28952855	23.87%
2016	28516127	1.74%	1010531	9.40%	29526658	1.98%
2017	32414063	13.67%	1082705	7.14%	33496768	13.45%
2018	33621613	3.73%	1087971	0.49%	34709584	3.62%
2019	33990038	1.10%	1093141	0.48%	35083179	1.08%
2020	5644524	-83.39%	308080	-71.82%	5952604	-83.03%

★ *Source: Data Compiled from dse.bihar.gov.in*

In Bihar there was an increase of **33.96% of Domestic Tourists in 2004**. This growth sharply declined in **2006** and accounts **-10.50%.** However, it again increases up to **33.16%** in **2007**. Talking about Foreign tourist arrival in Bihar, **Foreign Tourists** increase up to **31.75%** in **2002** and **108.80%** in **2007.** However, we witnessed a very huge decreased in the number of foreign tourist suddenly owing to prediction of natural catastrophe, poor infrastructure and experieces of tourists. Like in the year **2013 and 2020** Foreign Tourist decline **-30.18% and -71.82** respectively.

★ Figure: 1 Bihar: Year Wise Tourists Arrivals (2001 to 2020)



★ Figure: 2 Bihar: Year Wise Domestic Tourists Arrivals (2001 to 2020)

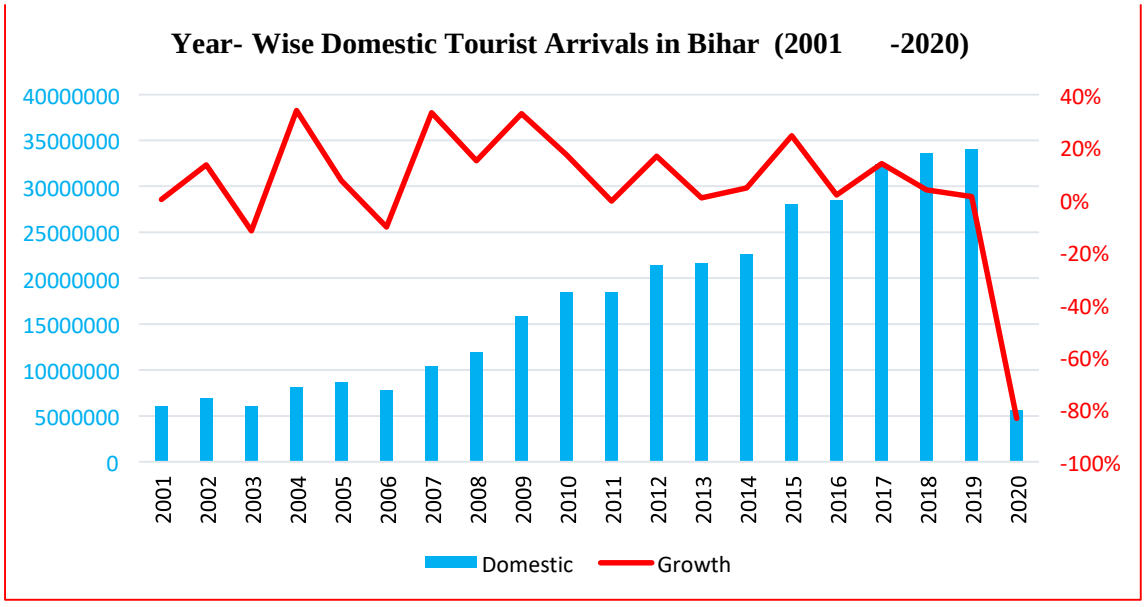


Figure: 3 Bihar: Year Wise Foreign Tourists Arrivals in Bihar (2001 to 2020)

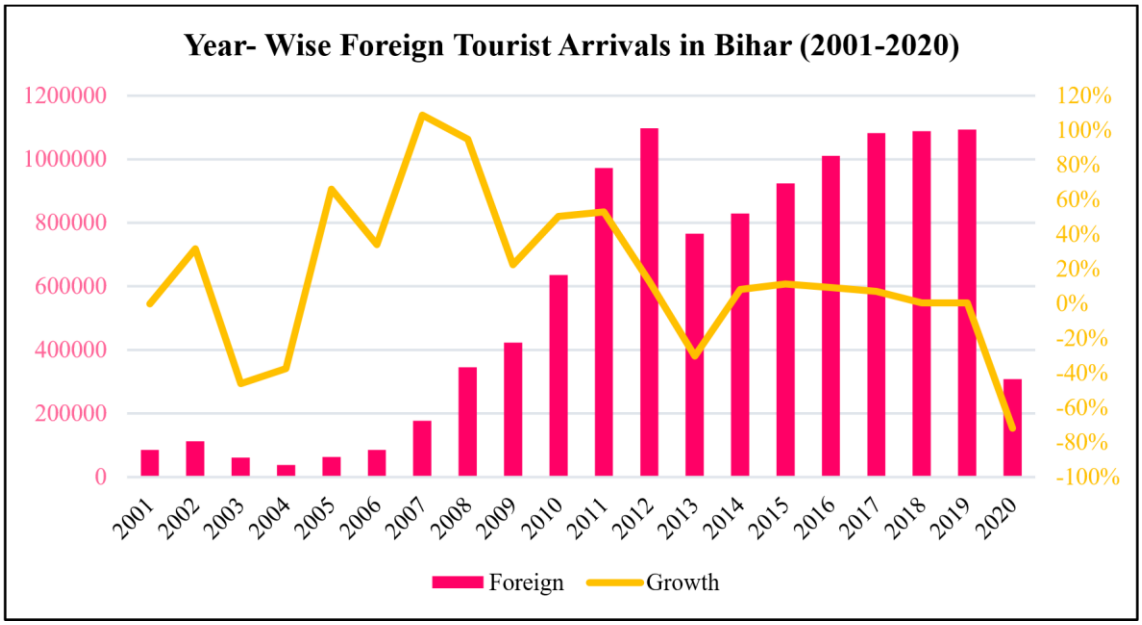
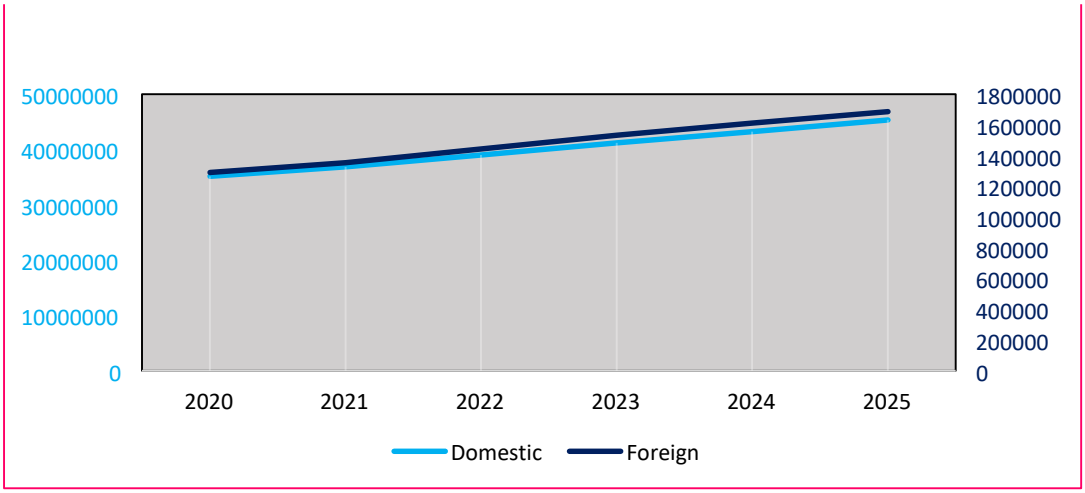


Table: 3 Bihar: Year Wise Tourists Arrivals (2020 to 2025) Forecast

Year	Domestic	Foreign	Total
2020	35185067	1291658	36476724
2021	36910980	1355501	38266481
2022	39061662	1444141	40505803
2023	41247899	1533826	42781725
2024	43268513	1614654	44883168
2025	45375097	1688413	47063510

Source: Data Compiled from Tourism Department of Bihar

Figure: 4 Bihar: Year Wise Tourists Arrivals (2020 to 2025) Forecast



Tourist Arrivals in Bihar (FORECAST)

Bihar: Sectoral Contribution to GSDP (1999-2000 to 2006-2007)

Bihar is one of the fastest growing economies in India. It is largely service based, with a significant share of agricultural and industrial sectors. The sectoral contribution to the state GDP, the contribution of tertiary sector accounts **(53.88%)** in **1999-2000** increases to **(56.65%)** in **2003-2004**. The contribution of Primary sector is accounts between **(33.69%)** in **1999-2000** to **(36.80%)** in **2002-2003** and again decrease to **(30.77%)** in **2006-2007**. Meanwhile, contribution of Secondary sector is **(12.43%)** in **1999-2000** to **(16.31%)** in **2006-2007**. Moreover, the contribution of Trade, repair, hotel, and restaurant to tertiary Sector accounts **(27.89%)** in **1999-2000** while crossed **(40.62%)** in **2006-07**. Therefore, Bihar has great potential to contribute to the economy, Tourism and Hospitality sector in the state can further be promoted to harness its growth through providing world class infrastructure facilities, establishing tourism centres across the state, adopting disaster management policy, Law and Order.

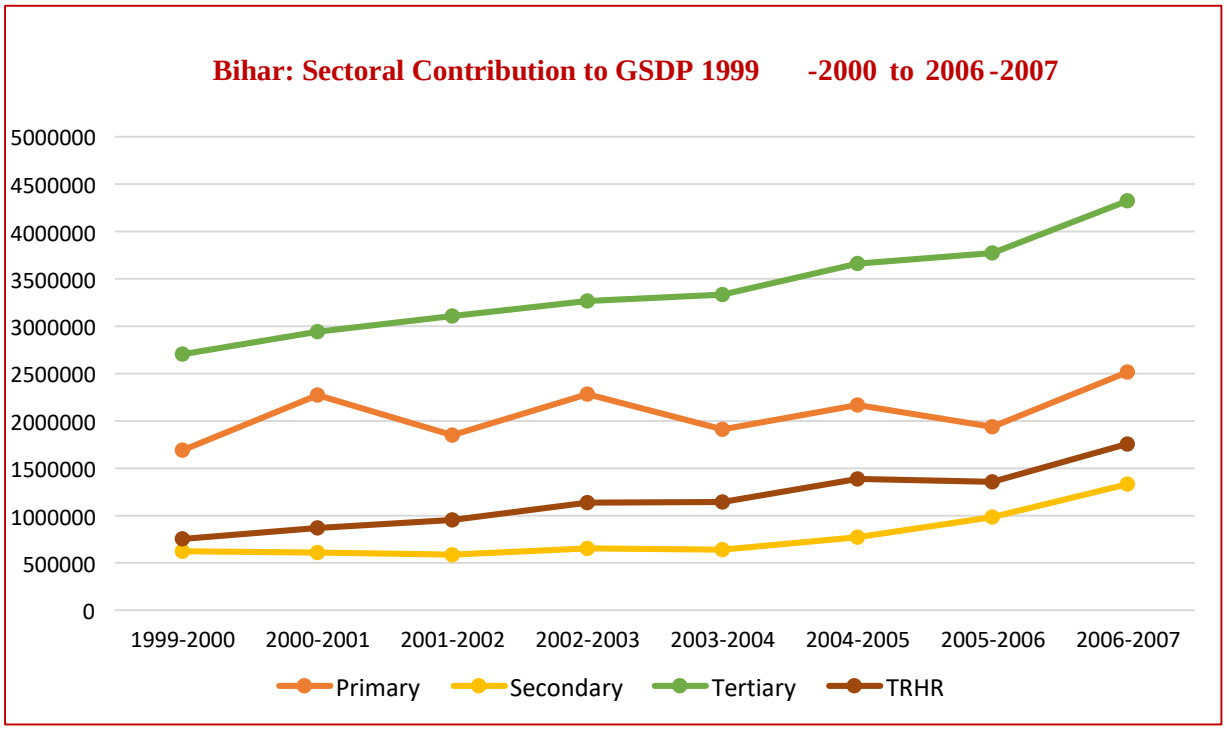
Table: 4 Sectoral Contribution to GSDP Bihar 1999-2000 to 2006-2007

Year	Primary	Secondary	Tertiary	TRHR as % of Tertiary
1999-2000	1690440 (33.69%)	623589 (12.43%)	2703347 (53.88%)	754097 (27.89%)
2000-2001	2272675 (39.03%)	609252 (10.46%)	2940338 (50.50%)	870083 (29.59%)
2001-2002	1850242 (33.36%)	587654 (10.59%)	3108764 (56.05%)	952986 (30.65%)
2002-2003	2282622 (36.80%)	654300 (10.55%)	3265587 (52.65%)	1135730 (34.78%)
2003-2004	1911225 (32.49%)	639591 (10.87%)	3332491 (56.64%)	1142426 (34.28%)
2004-2005	2167878 (32.85%)	770771 (11.68%)	3660900 (55.47%)	1388261 (37.92%)
2005-2006	1937233 (28.92%)	986505 (14.73%)	3774182 (56.35%)	1356901 (35.95%)

2006-2007	2514504 (30.77%)	1332672 (16.31%)	4324459 (52.92%)	1756746 (40.62%)

★ *Source: Data Compiled from dse.bihar.gov.in*

Figure: 5 Sectoral Contribution to GSDP Bihar 1999-2000 to 2006-2007



Begusarai: Sectoral Contribution to GSDP (1999-2000 to 2006-2007)

Like Bihar as a state, the District of Begusarai has potential for Archeological, Historical, Religious, Spritual, Culture, Ghat and Ecotourism etc. and has scope to develop niche markets. Comparing the sectoral contribution to the state GDP, the contribution of tertiary sector in **Begusarai** is **(50.50%)**, whereas for the state it is **(53.88%)** in **1999-2000** while it exceeds to **(61.75%)** and **(56.05%)** in **2001-2002** respectively. Moreover, the contribution of Trade, repair, hotel, and restaurant **(7.91%)** outperforms in comparison to the state counterpart **(27.89%)** in **1999-2000**, however this gap strengthen during **2006-2007** were Begusarai accounts **(53.49%)** that of state

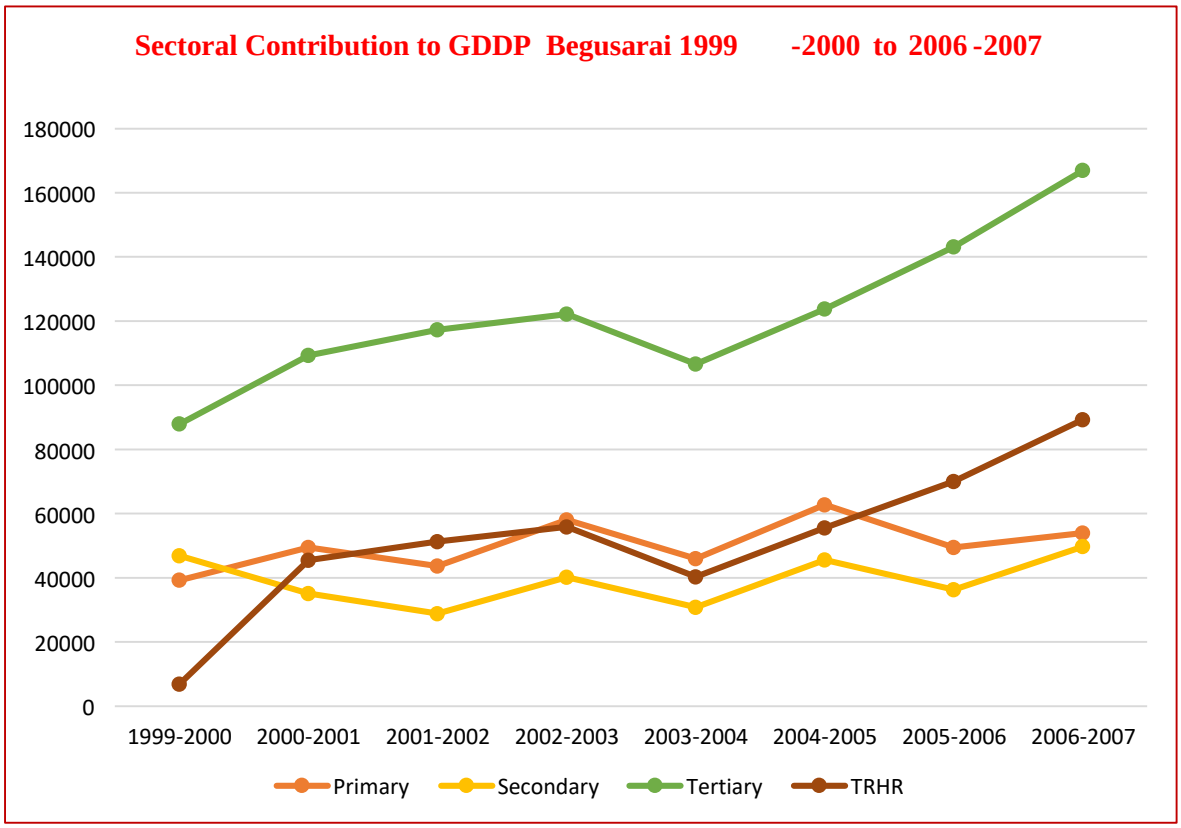
(**40.62%**). Thus, the contribution of Begusarai's Tertiary sector is increase faster than the state. Similarly, trade, repair, hotel, and restaurant also contribute faster than state of Bihar.

★ Table: 5 Sectoral Contribution to GDDP Begusarai 1999-2000 to 2006-2007

Year	Primary	Secondary	Tertiary	TRHR as % of Tertiary
1999-2000	39333 (22.57%)	46933 (26.93%)	88001 (50.50%)	6962 (7.91%)
2000-2001	49484 (25.50%)	35178 (18.13%)	109377 (56.37%)	45563 (41.66%)
2001-2002	43766 (23.04%)	28903 (15.21%)	117322 (61.75%)	51297 (43.72%)
2002-2003	58106 (26.34%)	40209 (18.23%)	122277 (55.43%)	55918 (45.73%)
2003-2004	46056 (25.09%)	30872 (16.82%)	106644 (58.09%)	40373 (37.86%)
2004-2005	62823 (27.04%)	45592 (19.63%)	123877 (53.33%)	55627 (44.91%)
2005-2006	49557 (21.62%)	36382 (15.87%)	143254 (62.50%)	70037 (48.89%)
2006-2007	54066 (19.96%)	49799 (18.38%)	167003 (61.65%)	89338 (53.49%)

Source: Data Compiled from dse.bihar.gov.in

★ Figure: 6 Sectoral Contribution to GDDP Begusarai:1999-2000 to 2006-2007



Begusarai has great potential to contribute to the economy. Hence, tourism and hospitality sector in the district can further be promoted to harness its growth and benefits to the district economy. However, promoting tourism sector by considering its economic contribution may lead to bad policy decisions without noting the natural disaster as well as tourism infrastructure and crime and implementation policy. Taking a time series data set on tourism foot falls with disasters, Crime & Security, and infrastructure etc. their correlation may be conjectured. Moreover, development of projects and strong research is mandatory to know the detailed information on disaster, Crime, tourism infrastructure, tourist foot fall etc.

Bihar: GSDP Growth Rate at Constant Price (1999-2000 to 2006-2007)

The impact of the Disaster, High Crime rate, Poor Infrastructure, Under-investments, Poor Economic Policy, and Poor Political Vision etc. has been reflected in terms of reducing the annual growth rate of the state from (**16.04%)** in **2000-2001 to (-4.73%)** in **2001-2002**. While the state annual growth was again rise to **(11.82%)** in **2002-2003** affected during **2003-2004 (-5.15%)** which is the lowest growth rate during a 5-year period; the effect of the disaster and economic policy has negatively affected the district annual GDP growth rate for subsequent years. However, we can see a huge growth during **2006-2007** when GDDP accounts 8171635 i.e. **22.00%** of growth. This states that disaster and economic policy largely has a micro regional impact, hence disaster and development related policies must be made be made considering micro regional contexts and be site specific.

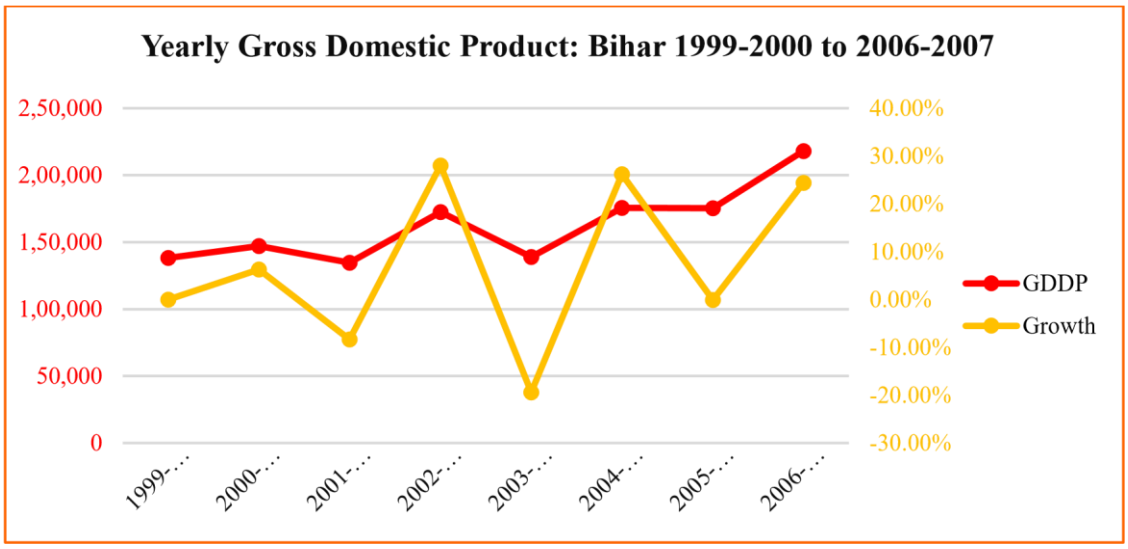
★ Table: 6 GSDP Growth Rate at Constant Price: Bihar 1999-2000 to 2006-2007

Year	GDDP	Growth

1999-2000	5017376	0
2000-2001	5822265	16.04%
2001-2002	5546660	-4.73%
2002-2003	6202509	11.82%
2003-2004	5883306	-5.15%
2004-2005	6599549	12.17%
2005-2006	6697921	1.49%
2006-2007	8171635	22.00%

Source: Data Compiled from dse.bihar.gov.in

★ Figure: 7 GSDP Growth Rate at Constant Price: Bihar 1999-2000 to 2006-2007



★ **13. Begusarai: GDDP Growth Rate at Constant Price (1999-2000 to 20062007)**

The impact of the Disaster, High Crime rate, Poor Infrastructure, Under-investments, Poor Economic Policy and Poor Political Vision etc. has been reflected in terms of reducing the annual growth rate of the district from **(11.35%)** in **2000-2001 to (-2.09%)** in **2001-2002**. The district annual growth was again rise up to **(16.11%)** in **2002-2003** but didn't maintain its positive growth and thus decrease to **(-16.78%) in 2003-2004.** This states that impact of the Disaster, High Crime rate, Poor Infrastructure, Underinvestments, Poor Economic Policy and Poor Political Vision etc. largely has severe regional impacts in reducing the annual growth rate of the district, hence disaster and development related policies must be made be made taking into account micro regional contexts and be site specific.

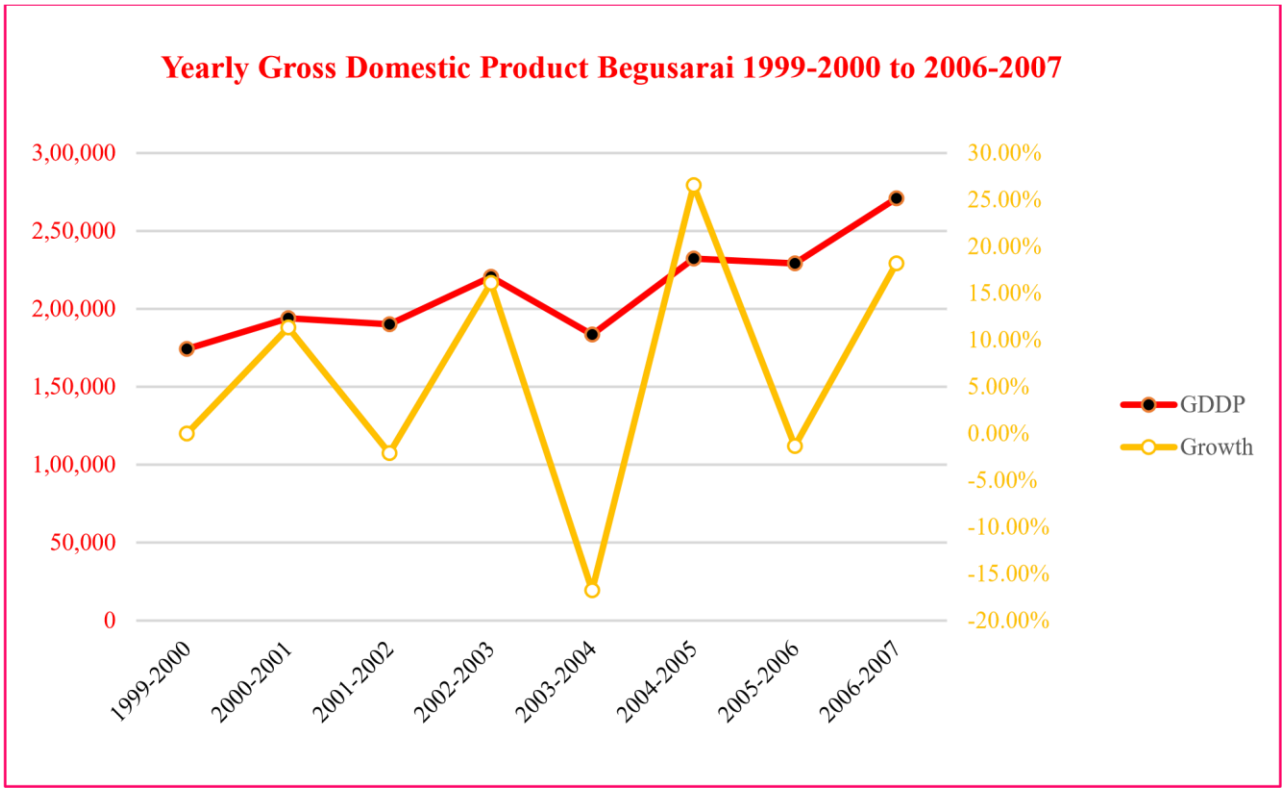
However, during **2002-2003** Begusarai accounts **16.11%** as compare with state growth rate **11.82%**. Similarly, during **2006-2007** is **18.18%** while state accounts **22.00%**. This is because of the difference in Socio-economic and geographical difference that exists across Begusarai districts in the state of Bihar. Hence, district specific plans must be developed rather than state specific.

★ Table: 7 GDDP Growth Rate at Constant Price: Begusarai 1999-2000 to 2006-2007

Year	GDDP	Growth
1999-2000	174267	0.00%
2000-2001	194039	11.35%
2001-2002	189991	-2.09%
2002-2003	220591	16.11%
2003-2004	183572	-16.78%
2004-2005	232292	26.54%
2005-2006	229193	-1.33%
2006-2007	270867	18.18%

★ *Source: Data Compiled from dse.bihar.gov.in*

Figure: 8 GDDP Growth Rate at Constant Price: Begusarai 1999-2000 to 2006-2007



Source: Data Compiled from dse.bihar.gov.in

Begusarai: Contribution of TRHR to the GDDP at Constant Price (1999 to 2025)

Table: 8 Contribution of TRHR to the GDDP at Constant Price Begusarai (1999 to 2025)

Year	Trade, Repair, Hotels and Restaurants	Tertiary	TRHR as % of Tertiary	DGDP	% of TRHR to DGDP
1999	6962	88001	7.91%	174267	4.00%
2000	45563	109377	41.66%	194039	23.48%
2001	51297	117322	43.72%	189991	27.00%
2002	55918	122277	45.73%	220591	25.35%
2003	40373	106644	37.86%	183572	21.99%
2004	55627	123877	44.91%	232292	23.95%
2005	70037	143254	48.89%	229193	30.56%
2006	89338	167003	53.49%	270867	32.98%
2007	89199	161135	59.32%	262308	34.01%

2008	91808	168372	57.07%	274113	33.49%
2009	100697	179027	60.25%	289449	34.79%
2010	111124	191524	64.09%	302429	36.74%
2011	123121	205430	68.81%	322170	38.22%
2012	129650	213285	71.11%	329793	39.31%
2013	136025	220638	73.75%	343776	39.57%
2014	142804	229008	76.33%	353199	40.43%
2015	152795	241755	79.19%	369940	41.30%
2016	162004	252136	83.10%	383173	42.28%
2017	169934	261654	86.04%	395707	42.94%
2018	177484	270762	88.80%	408300	43.47%
2019	185114	280035	91.54%	420440	44.03%
2020	193734	290419	94.70%	434357	44.60%
2021	202353	300809	97.81%	447427	45.23%
2022	210693	310754	100.91%	460822	45.72%
2023	218517	320072	103.88%	473174	46.18%
2024	226548	329843	106.74%	486151	46.60%
2025	234841	339816	109.78%	499281	47.04%

★ *Source: Data Compiled from dse.bihar.gov.in*

Figure: 9 Contribution of TRHR to the GDDP at Constant Price Begusarai (1999 to 2025)

2.5 Wetlands

2.6 Energy

3 QUALITATIVE DATA ANALYSIS

3.1 AGRICULTURE, ALLIED ACTIVITIES,

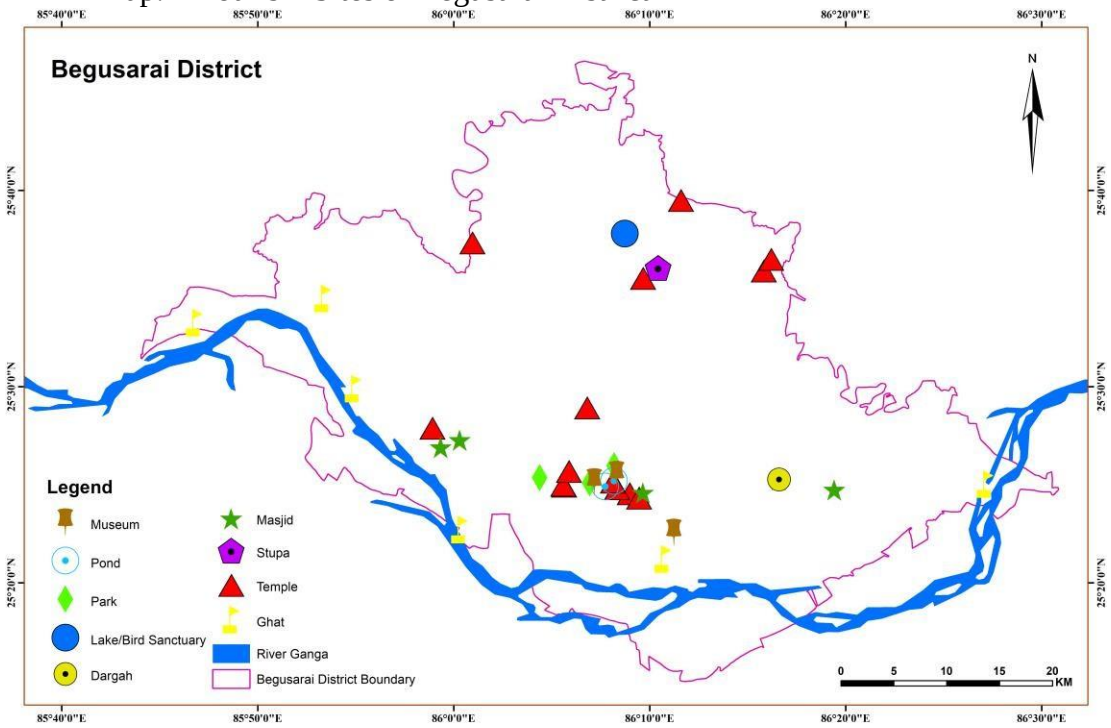
3.2 ENERGY

3.3 TOURISM

Begusarai is a beautiful district in the eastern Indian state of Bihar, which is also known as the *'Industrial Capital'* of the state. The name of the district is made up of two words, one 'Begum' and the other 'Sarai', Sarai meaning a place to stay or rest. Evidence related to history suggests that the queen of Bhagalpur used to come here to perform rituals on the banks of the Ganges and that is how the district got its name. Begusarai is the part of historic Mithila or Mithilanchal region. Begusarai is also famous for its high-quality milk, sweets and dairy products. Sometimes begusarai is also referred as milk belt of Bihar. It majorly depends on agriculture now, but also has industries for energy production, refinery and fertilizers. It was the centre of Indigo production and marketing under British Rule.

The district is known for its historical, religious importance, apart from this we can also see many spectacular natural sites here. The important tourist places of visit includes: Jai Mangla Temple, Naulakha Temple, Radheshyam Mandir, Basaha Asthan, Bari Balia Masjid and Dargah, Garhpura Temple, Thakurbari, Begusarai Museum, Harigiri Dham, Chandika Asthan, Harsai Stupa, Ankuri Nath Temple, Panch Mandir, Masuriya Dih, Simaria Ghat and Kabar Lake etc.

★ Map: 2 Tourism Sites of Begusarai District



Source: Prepared by Author

3. ARCHAEOLOGICAL & HISTORICAL TOURISM

★ **Harsai stupa (Herson):** It is situated about 20 Kms North from Begusarai district headquarters, near Jaimangla Garh. It consists of four stupas having the largest in the centre and there equidistant smaller in three directions, one each in the west, north and south. The main stupa has been cut almost to half. It is explored recently by archaeologists. Preliminary studies indicate these stupas date back to the post-Gupta period and belong to Hinayana sect of Buddhism.The completely clay-built stupa use to have a hard outer most surface built by bricks-dust. Only one smaller Stupa of southern part seems to be intact due to thick vegetation cover.

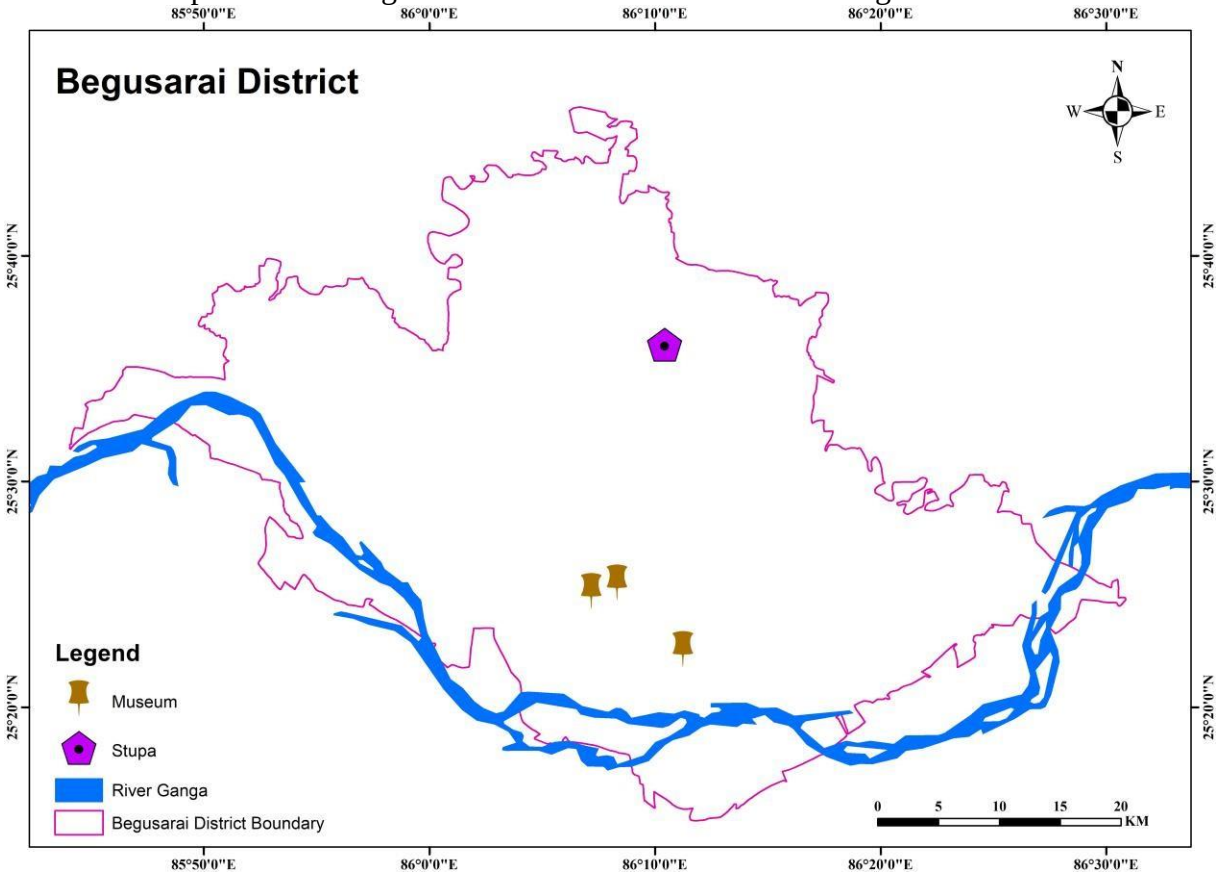
★ **Begusarai Museum:** The Begusarai Museum established in the year 1981, this government museum houses physical evidences that witnessed the rich cultural history of Begusarai. Stone sculptures of Lord Buddha, Lord Ganesh, Sun God and Lord Vishnu etc. can be seen here. Coins, ranging from the period of Pal rule, Mauryan Rule to the end of British Era in India are treasured in the museum. Other attractions include manuscripts, terracotta and pottery specimens. Art objects are collected from all around the town, though the centuries.

★ **Viplavi Library:** It is located in village Godargawan. It is registered as a Society (NGO). Its parent Organaisation is Paul Foundation. Library has a collection of 15000 books. Various cultural programmes are being organised by the libray. A legal awareness camp was organised by the library. Library has a collection of some precious ancient material of archeological value and it has proposed to make a museum in future at the same place.

★ **The KP Jayaswal Radha Krishna Chaudhary Memorial Archaeological Museum:** It is situated on the local G D College premises. It has on display many statues and artifacts found during various archaeological excavations.

★ **Kankaul:** It is located 2 KM towards North from District head quarters Begusarai. It is situated around the Kola chaur. Kankuaul have important archaeological sites. Here is a newly built small temple called Brama Asthan. The remarkable feature of this site is the Black stone intact Four Handed Vishnu (29 cm x 70 cm) sculptures of Pala Period being placed here and being offered regular worship.

Map: 3 Archaeological & Historical Tourism Sites of Begusarai District



Source: Prepared by Author

4. RELIGIOUS & SPIRITUAL TOURISM

★ **Jai Mangla Temple:** This historical site is located in the village of Manjhaul. Jai Mangla Temple is one of the most visited tourist places in Begusarai. It is located at Jaimangalgarh which lies on southern flake of Kanwar Lake and devoted to Goddess Jai Mangla who is the presiding deity of this temple. This temple is also famous as Shaktipeeth among locals and devotees come to offer their prayers and get blessings of deity from distant places. The temple belongs to the Pali era and houses an idol of Lord Vishnu as well. Allegedly Tantra i.e. black magic was practiced here in olden times. Buddhist relevance also had been found during archaeological work. The village also has a big market place and is an important place for commercial activities and education.

★ **Naulakha Temple:** It is located in the heart of the town in Bishnupur. It is believed that the temple was built in the 17th century by Mahanth Deer Das. In the year 1952, Mahanth Mahavir Das undertook the task of restoring and renovating the temple. This age-old temple is adorned with beautiful paintings and carvings on its walls. Nine Lakhs is the exorbitant cost of restoring and renovating of the temple so called Nauo Lakha Temple. The present temple is famous for its glittering look due to use of Makrana and Italian tiles. The temple is constructed in a large campus bearing area of 150m x 100m.

★ **Radhe Shyam Temple:** It is situated 6 km west of Begusarai town on National Highway 31 at a place called Ulao Temple It is made by Shyam kumara of Ulao estate in 1857. The temple is a superb piece of Indo- Western architecture. The main temple is based on the platform of 1m height. An open ground of 34 m x 27 m is in the middle of the entrance and the main temple. It is embellished with exquisite murals of rich Rajasthan Shekhawati Art of painting. The theme of the paintings is based on the Ramayana, the Mahabharata and other Hindu epics.

★ **Baidyanath Shiv Temple:** Shiva temple is built during the late Pratihara dynasty.

★ **Kali Sthan Mandir:** This is most famous temple of Begusarai hence there after that the chowk is named after it. There is a Shiv Mandir behind this temple.

★ **Ankuri Nath Temple:** Ankuri Nath Mahadev Panch Mandir is about 4 K.M. west from Begusarai H.Q. It is about 1.5 K.M. south from NH-31. At present this temple bears the Panchayatan style of architecture. The original temple made of stone is in the centre. The central temple bearing a broken Shivling seems to be made during late Rajputana Period. The rectangular plan of this central architecture is important over a platform of 5m x 2.60m x about 10m high. Four temples in each corner has been constructed somewhere in the 20th century. Formerly it was known as Ankuri Nath Simaria Mahadev.

★ **Gopal Mandir:** It is located about 5 km west from Begusarai district headquarters in Sanghaul Village. Mandir lies on the Mound 50 x 40 x 15m. It is made by Manager Ram Karan Upadhyaya on behalf of the Zamindar Mrs Jayanti Kurmi of Ulao estate in year 1902. A Sanskrit school is running in the southern western Part since 1906. A goshala in the southern eastern, Dharamsala in the northern east and the temple in the central part were made. The temple is still in use. The three storied building is in advance stage of decay. An old pond is in the western side of the building. There is a secret stairway from the top floor to the eastern end of the tank. The temple used to have 31 acres of land campus but now the sign of encroachment can be seen. A black Asthadhatu sculpture of Krishna of 20th century is placed in the Garbhagriha of the temple and being offered regular worship.

★ **Chitragupta Temple:** It is situated about 1/2 KM South from Begusarai Railway Station.near Bari pokhar, Kachahari road. A black stone Four Handed Sculpture of size 37 cm x 65 cm of Late Pala period is enshrined, which Left hand upper position has a Book and Lower position hand has a Ink Pot similarly Right hand upper position has a Katar and Lower position hand has a Pen.

★ **Ram Janaki Temple:** It is an old temple almost 50 m from Bahura Mama temple. Almost 15 – 16 m high 'Shikara' adds to its glory. An astadhatu sculpture of RamJanaki is placed in the Garbhagriha. The temple is said to be 350 years old.

★ **Shiv Temple:** It is situated almost 50 m west to Ram Janaki temple. The old Shiv temple seams to be built during the medieval period. The architecture is planned over a 4 m x 5m. platform.

★ **Shiv Temple Bihat Bazar:** This is newer of the temples present here. The platform follows almost square plan of 4m x 4m with a raised height of almost 80 cm. The height of the shikhar is about 10 m. The temple seems to be around 100 years old. The temple enshrine Black Stone Basaha 15 cm x 13 cm x 7 cm. A blackstone sculpture completely defaced is also placed in the Garbhagriha.

★ **Hari Giri Dham**

★ **Dalarua Dham**

★ **Rampur Dham**

★ **Sun Temple Birpur:** It is situated about 14 KM North from Begusarai district headquarters. A temple enshrine a black stone Sculpture of size 77cm x 143cm of Pala period. Pointed stele, sparsely decorated having three figures-two of flying ganadherves on both sides on the top and the face of a tiger in middle of those celestial being, two hands holding two stalk of full flown lotus. Sun is standing on a big lotus throne bearing the relief of seven horses of the Devine chariot. The sparse decoration and the pointed

★ **Vishhar Asthan Baraipura:** It is small temple said to be built almost 100 years ago. Here is a black stone Raivant Sculpture of Pala period of size 50 cm wide and 1 m high. Riding over highly caparisoned horse, Raivant is shown booted. Right hand of the deity is slightly raised and probably holding a cup. An attendant has been depicted holding a very big shaft of a parasol lifted over the head of Raivant. A dog is running under the belly of the horse. Upper limbs is Partially destroyed.

★ **Bahura Godhin Shaktipeeth:** Bahura Godhin is the famous character of the local folk tradition of Bakhari and its surroundings. There are a number of stories associated to her power and glory. The old belief that the famous Godhin used to perform her magical activities is still in custom. There is an old vast 'Pakar' tree on this Shaktipeeth. Three 'pindis' namely Bahura, Durga and Kamala measuring 16 cm, 20 cm and 6 cm diameters can be seen on the incircling platform. Devotees and aspirants of magical powers used to come here and fulfill there wishes.

★ **Chamunda Asthan Baraipura:** It is situated 14 Kms North from Begusarai district headquarters. Temple is said to be built almost 125-150 years ago. The old temple is made of bricks jointed by surkhi lime. A black Stone of Pala Period Chamunda Devi 52cm x 1m is in the Garbha griha 4m x 4 x 8m. Two hands of the eight handed Devi are holding an elephant, Damru, vessel, dagger in three right hands which on left hand touches the lips and two other holding 'Danda' and ' Munda.' Sculpture is intact.

★ **Bhairav Asthan Birpur:** A fine piece of Pala sculpture of Black Stone Tara 25cm x 50cm is put in the newly built Temple and being offered prayer by the villagers as "Bhairav – Baba". 'Pancha Dayani', Buddha decorated in the crown. The superb piece of antiquity is intact.

★ **Jageshwar Baba Temple Bihat:** This is one o the oldest temple of Bihat. The temple with its dome shaped top is remarkable and said to be around 350 years old. The platform follows the square plan of 5m x 5mx 10 m and its height is about 10 m. The temple enshrine Black Stone Shivlinga 23 cm high and 28cm circumferance. There are two sculpture. One is completely defaced made of Black stone sculpture and other is Black stone Broken stele of 49 cm x 18 cm x 15 cm.

★ **Suza Math:** This is said to be one of the 14th Century Math running in this region. Mahanth Krishna Das Payohari ji Maharaj is said to be the founder. The Naokothi estate denoted ample land to it and offered its descendent to the service of the above mentioned prist as the boy was supposed to be the blessing of this math. Later Saha Suja granted a copper plate to Mahanth Naga Baba Parshu Ram ji Maharaj. According to the villagers there used to be some Astadhatu sculpture in this Thakurbari but at present nothing remarkable except the rich tradition can be seen here.

★ **Masjid and Dargha Shah Alauddin Bukhari Bari Balia:** It was constructed more than 500 years ago. Abandoned but the place is used as Mazar. Only a part of sanctuary wall can be seen in its mined position, a Mazar has been made just before the old structure. Use of red stone and decorated bricks can be seen in the remaining wall. It is believed to be the copy of famous Nizamuddin Aulia Dargah Masjid. A new masjid has been constructed in the campus. This is said to be one of the oldest masjid in this region. One of the most important Sufi saint visiting eastern region of India Ishah Alauddin Bukhari (1451-1526) is believed to come here in 1493 AD. Every year 'Ursa' is being celebrated here. Mahatma Gandhi had visited the Dargah in 1915.

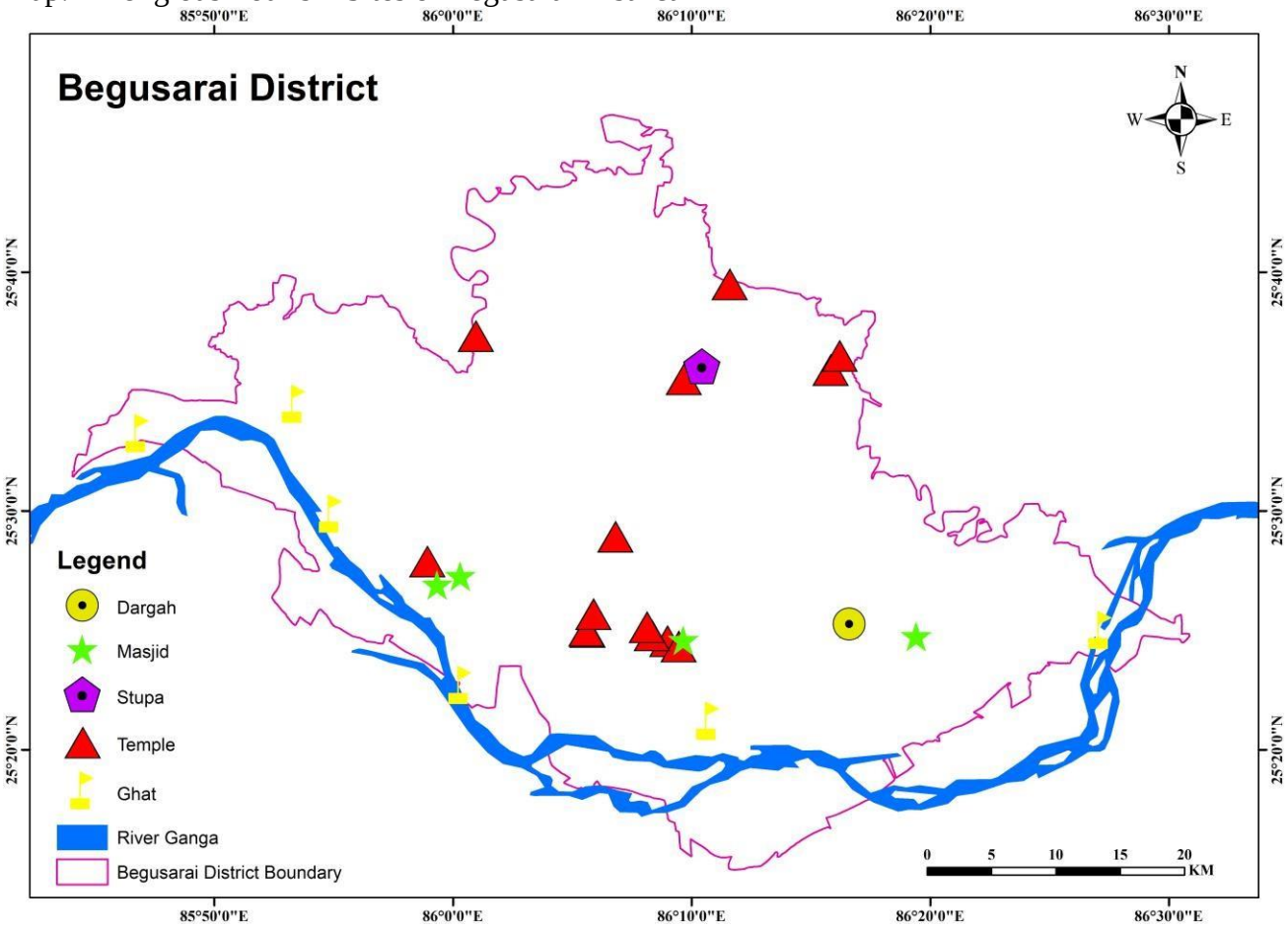
★ **Masjide Sultaniya Lakhminiya:** It is situated about 18 Km East from Begusarai district headquarter. The present mosque is said to be built almost 300 years ago.Minars of this mosque represent the eight edged Firoz minar (Gaur) architecture while the top of the minar in round – edged Madarsa (Bidar) type. It is made of Bricks and stone. This mosque is said to be built according to the wishes of Sheikh Sultan who settled here coming from an unknown place. As, he was a Wali (disciple) of Hazrat Sheikh Ahmad Sarhindi, the Sufi tradition entered this region. At the time of the construction of the mosque, Aurangzeb is said to be the Shahanshah of India. Since then, the mosque has been a center of regular prayer for the followers.

★ **Thakurichack Masjid**

★ **Khatopur Masjid**

★ **Shahi Masjid Naipur, Sarai Noorpur**

Map: 4 Religious Tourism Sites of Begusarai District



Source: Prepared by Author

5. ADVENTURE, NATURE & ECO TOURISM

★ **Kabar Taal Lake and Bird Sanctuary:** Kabar Jheel or Kabar Taal Lake is Asia's largest freshwater oxbow lake. It lies in Manjhaul sub-division of Begusarai district. Kabar Lake is natural shelter of hundreds of species of endangered and rare domestic and migrant birds. It covers an area of approx. 67.5 sq km. Some of the birds which can be seen in this region are of critically endangered species such as Oriental White-backed Vulture and Long-billed Vulture, many other come in category of near threatened like Darter Anhinga, Painted Stork and Black-bellied Tern and few other come in group of vulnerable species including Greater Spotted Eagle, Greater Adjutant, Lesser Kestrel and Sarus Crane. Migratory birds from Central Asia, specifically from Siberia and Himalayan region come a long way to Kabar Lake during winter season. Besides, this place becomes much beautiful during spring and winter season due to presence of a variety of aquatic plants. For nature lovers and bird watchers, Kanwar Lake Bird Sanctuary is the perfect place to visit in Begusarai. (*Begusarai Tourism*, n.d.)

★ **Veer Kunwar Singh Park:** Kunwar Singh was a leader during the Indian Rebellion of 1857. He belonged to a family of the Ujjainiya clan of the Parmar Rajputs of Jagdispur, currently a part of Bhojpur district, Bihar, India. At the age of 80, he led a selected band of armed soldiers against the troops under the command of the British East India Company. He was the chief organiser of the fight against the British in Bihar. He is popularly known as Veer Kunwar Singh. (*Tourist Places in Begusarai*, n.d.)

★ **Eocological Park:** Situated 8 km west of Begusarai town near the Barauni Refinery. The park has been developed by the Barauni Refinery. The green cover given to a wide area is a major ecological relief in this industrial belt. The park is also the winter destination of a large number of migratory birds.

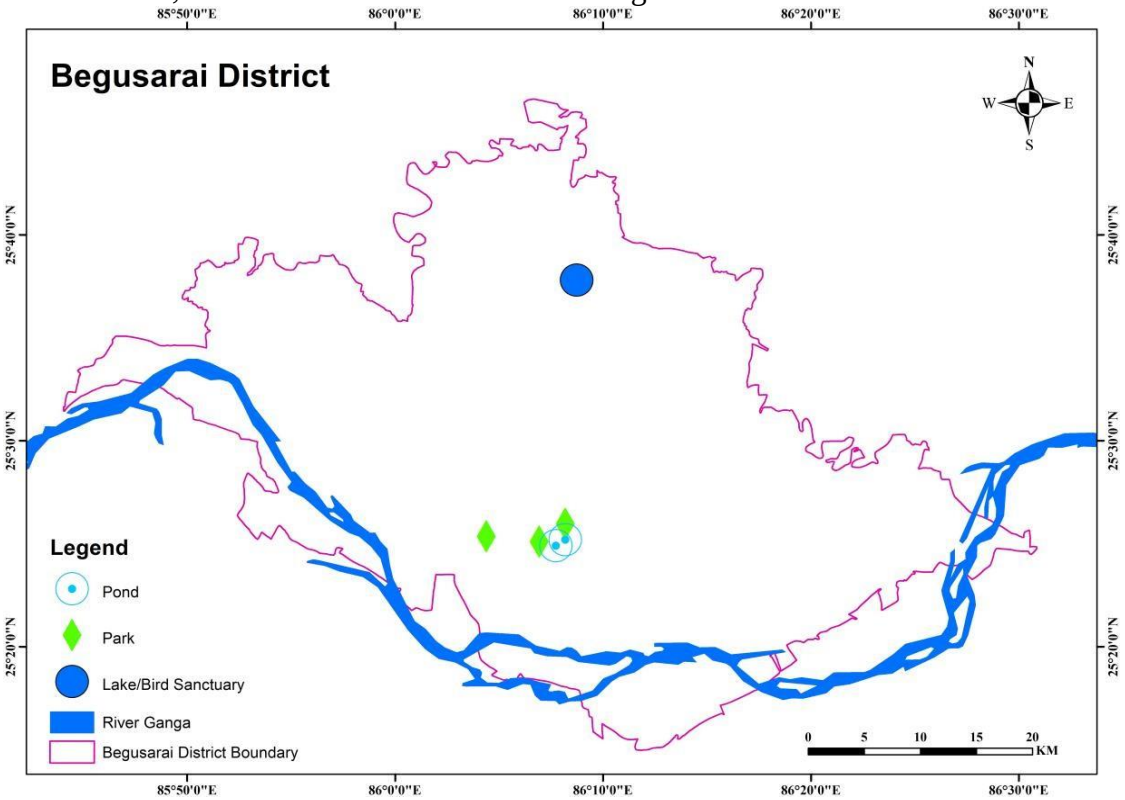
★ **Teliya Pokhar**

★ **Badi Pokhar**

★ **Refinery Township**

★ **Rajendra Setu:** Also known as Rajendra Pul and Simaria Pul is a bridge across the river Ganga that was the first bridge to link the northern and southern portions of the state of Bihar. The location of the bridge was based on the work of M. Visvesvaraya, who was more than 90 years old at the time. The double track road-cum-single track rail bridge near Hathidah in Patna district was inaugurated in 1959 by Jawaharlal Nehru, Prime.

Map: 5 Adventure, Nature & Eco Tourism Sites of Begusarai District



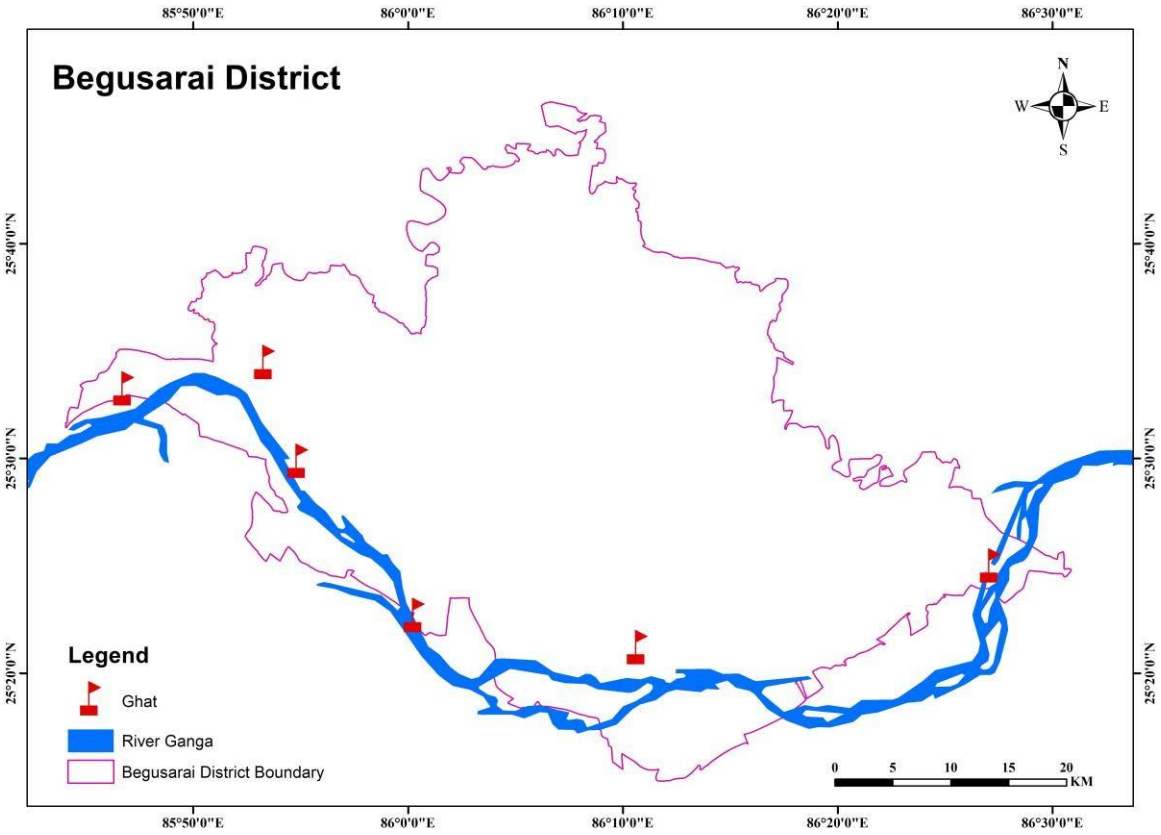
Source: Prepared by Autho

6. GHAT TOURISM

Begusarai is one of the most beautiful districts in the state of Bihar. The name of the town is divided to two parts, 'Begum' and 'Sarai', which mean queen and inn respectively. The Queen of Bhagalpur used to come on the banks of the river Ganga for a pilgrimage, which influenced the name of the district. Every city has some specialty that is engraved in the heart of it. A visit to Begusarai cannot be complete without a visit to the ghats running along River Ganges. The ghats have been a source of inspiration for artists, film-makers, photographers, writers and musicians for centuries. As a dip in Ganga is considered holy in the Hindu religion, most of the ghats are dedicated to religious rituals. One of the more visually spectacular ghats is the Simaria Ghat, Ayodhya Ghat Teghra, Jhamtiya Ghat and Chamtha Ghat etc. Ghats in Begusarai are riverfront steps leading to the banks of the river Ganges. Most of the ghats are bathing, Puja ceremony ghats and cremation site. Earlier Morning boat ride on the Ganges across the ghats is a popular visitor's attraction.

- **Simaria Ghat:** It is situated northern bank of River Ganges opposite of Mokameh. It is about 20 Kms from Begusarai. Huge number of devotees assemble here for bathing in the on the Kartik and Maghi Purnima.Simaria village is also the birthplace of famous Hindi poet Ramdhari Singh Dinkar. The month-long Simaria Mela, organised on the bank of river Ganga at Simaria Ghat during October-November every year. The devotees stay in thatched houses and take a dip in the river as there's belief that a dip in the Ganga during the period washes all sins. The atmosphere becomes supremely religious during the period, and the festivities end with Chhath festiva. The sanctity of the Ganges is unquestionable whereever it passes through but few holy- places beside it have earned more sacred identity. Simariya is one of them. The Kartika Mela here has been recognized as State- Fair. Pilgrims from all over the Mithilanchal, West Bengal, Orissa and even from the downs of Nepal use to come here in the month long Kalpavas on the bank of Ganges. It seems that the bank of the Ganges cited in the poems of Vidyapati might be Simariya. The continuous flow of devotees from heart of Mithila to Simariya supports this assumption. (*Begusarai District*, n.d.-b)
- **Jhamtia Ghat:** It is situated 2 km west of Bachhwara on bank of Ganga.Devotees of Lord Shiva, who offer of the Ganges water in the Shiva Temple at Vidyapati Dham, collect the sacred water here. A large fair is held on this occasion.
- **Ayodhya Ghat Teghra**
- **Chhitraur Ghat**
- **Raghunathpur Barari Ghat**
- **Chamtha Ghat**

Map: 6 Ghat Tourism Sites of Begusarai District



Source: Prepared by Author

7. CULTURE & ARTS TOURISM

The culture of Begusarai defines the cultural heritage of Mithilanchal. **Begusha** is a famous Mithila painting made by the people of Begusarai. Begusarai is also famous for **Simaria fair**, which is a fair of devotional significance every year during the month of Kartik according to the Indian Panchang (usually during November). Men and women in Begusarai are very religious and dress according to festivals as well. The costumes of Begusarai represent the rich traditional culture of Mithila. Panjabi kurta and dhoti with a red Bengali gamchha covering their head are common clothing among men. He wears a "Gold ring" in his nose and "Balla" in his wrist.In the Ancient time there was no Colour option was found in Begusarai so that was the time when women of Begusarai worn White and Yellow Saree with red Border by Calling it Laal-Paara,but now in Current days they have a lot of Verity and Colour option.In present time they wearing "LaalPaara" (the traditional Maithili Saree)on some special Occasion. And the women of Begusarai also wear "Shakha-Pola" with lahthi in their hand. In Mithila culture, it means new beginnings, passion and prosperity. Red also represents the Hindu goddess Durga, a symbol of new beginnings and feminine power. During Chhaith, the women of Begusarai wear pure cotton dhoti without stitching which reflects the Pure traditional culture of Mithilanchal.Usually crafted

from pure cotton for daily use and from pure silk for more glamorous occasions, traditional attire for the women of Begusarai includes Jamdani, Banorisi and Bhagalpuri and many more. Many festivals are celebrated throughout the year in Begusarai.Chhath and Durga Puja is celebrated as perhaps the most important of all the celebrations of Begusarai.

★ 8. TOURISM POTENTIAL OF BEGUSARAI DISTRICT

Begusarai has good potential for the development of tourism in the district. In the flood prone and minimum opportunities for other industries, tourism could be the best way for economic growth and employment generation in the district. There is a need to minimize the hurdles and threats by developing good governance. Many destinations in the district are still unexplored and reason behind is infrastructure problem. Lack of adequate infrastructure deprives them from fulfilling their desire of leisure and rest. This has adversely affected the perception of the district as a tourist destination. It is expected that if the infrastructure is improved and the introduction of more activities at the site and to the excursion point can increase the duration of stay and lure more tourists. For many places of interest accessibility is a huge problem whereas for others condition of roads needs to be vastly improved.

The history of Begusarai indicates a rich heritage inherited from various dynasties & great personalities. The district has an abundance of Historical places, Archeological Sites, Religious Places, and Eco Tourism which can be suitably renovated and opened up for tourism. The archeological & historical value of this heritage still remains to be explored & recognized in the international scenario although there is an inflow of foreign tourists in the present situation. The Bird Sanctuary hold vast potential for nature-based eco-tourism. The river Ganga, all along its stretch offers potential for water-based sports & riverfront activities. These features have a great potential in Begusarai as they will introduce a variety of recreational facilities to tourists and will lead to water-based tourism (water-parks, riverfront development, water transport etc.). These features if properly developed will definitely attract a lot of tourists to the state. But, the tourism potential of the Begusarai for generating much needed income & employment remains under utilized. Though the district has high tourism potential, owning to lack of infrastructure facilities such as, transport, communication facilities, accommodation and other tourism supported facilities, most part of it remains unexplored by the tourist.

- ✞ **Historical and Archaeological Tourism:** Begusarai has several archaeological sites, monuments that have historic value. There are number of temples, Mosques, sculptures and Museum. Historical sites here dated back to the Pala Period, Harsai Stupa and Jai Mangla Temple. Moreover, there are several Medieval Mosque and Dargah which is known for its spiritual and architectural looks like Masjid and Dargah Shah Alauddin Bukhari of Bari Balia, Masjid Lakhminia etc.

- **Religious Tourism:** Begusarai is among the most popular destination for people who are on Pilgramage. Begusarai is one of the most sacred places of various religions like Hinduism, Islam and others. Begusarai is dotted with ancient temples of Hindu religions, centuries-old Islamic 'Dargah' and Masjids. Some religious attractions are: Jai Mangla Temple, Naulakha Temple, Radheshyam Mandir, Kali Asthan, Bari Balia Masjid and Dargah, Garhpura Temple, Thakurbari, Harigiri Dham, Chandika Asthan, Harsai Stupa, Ankuri Nath Temple, Panch Mandir etc.
- **Adventure and Eco Tourism:** Begusarai is well known for Asia's largest freshwater oxbow lake (Kabar Taal Lake) which is known for natural shelter of hundreds of species of endangered and rare domestic and migrant birds. For nature lovers and bird watchers, Kanwar Lake Bird Sanctuary is the perfect place to developed as Eco tourism spot for the tourist.
- **Nature and Adventure Tourism:** Begusarai has great potential to developed adventure and nature tourism. The district has number of Wetlands, Parks and Lakes. Teliya Pokhar, Badi Pokhar, Ecological Park, Veer Kuwar Singh Park etc. These places are well known for its natural beauty. This is towards the development of ecotourism and providing opportunities for tourists to indulge in the activities. These ponds and parks are home for several medicinal plants and migratory bird.
- **Waterfront Tourism:** The river 'Ganges' offers potential for development of waterbased sports & activities along its stretch. Riverfront development has to be undertaken in the Begusarai district to promote tourism.
- **Fairs & Festivals:** Begusarai is also famous for Simaria fair, which is a fair of devotional significance every year during the month of Kartik according to the Indian Panchang (usually during November). Chhath and Durga Puja is celebrated as perhaps the most important of all the celebrations of Begusarai.
- **Art and Craft Tourism:** Begusha is a famous Mithila painting made by the people of Begusarai. The costumes of Begusarai represent the rich traditional culture of Mithila. Panjabi kurta and dhoti with a red Bengali gamchha covering their head are common clothing among men. "Laal-Paara" (the traditional Maithili Saree)on some special Occasion. And the women of Begusarai also wear "Shakha-Pola" with lahthi in their hand. During Chhaith, the women of Begusarai wear pure cotton dhoti without stitching which reflects the Pure traditional culture of Mithilanchal.Usually crafted from pure cotton for daily use and from pure silk for more glamorous occasions, traditional attire for the women of Begusarai includes Jamdani, Banorisi and Bhagalpuri and many more.
- **Ghat Tourism:** The Begusarai Ganga ghats has great potential of been a source of inspiration for artists, film-makers, photographers, writers and musicians for centuries.

The Morning boat ride on the Ganges across the ghats is a popular visitor's attraction. One of the more visually spectacular ghats is the Simaria Ghat, Ayodhya Ghat Teghra, Jhamtiya Ghat and Chamtha Ghat etc. The month-long Simaria Mela, organised on the bank of river Ganga at Simaria Ghat during October-November every year.

Table: 1 Tourism Potential Destinations of Begusarai District

Historical & Archaeological Tourism	★ Harsai Stupa ★ Begusarai Museum ★ Viplavi Library ★ K P Jaisawal Achaeological Museum ★ Kankaul
Religious & Spiritual Tourism	★ Naulakha Mandir ★ Jaimangla Garh Temple ★ Radheshyam Mandir Temple ★ Baidyanath Shiv Temple ★ Bishanpur Kali Mata Mandir ★ Ankurinath Temple ★ Gopal Mandir Sanghaul ★ Sri Chitragupta Mandir ★ Ram Janki Mandir ★ Shiv Temple Bakhri ★ Surya Mandir Baghangama ★ Hari Giri Dham ★ Dularua Dham ★ Rampur Dham ★ Bari Ballia Masjid ★ Jama Masjid Baro ★ Masjid Sultania Lakhminia
	★ Thakurichack Masjid ★ Khatopur Masjid ★ Dargah Shah Alauddin Bukhari

Adventure & Eco Tourism	★ Kabar Taal Lake & Bird Sanctuary ★ Teliya Pokhar ★ Badi Pokhar ★ Ecological Park ★ Veer Kunwar Park ★ Refinery Township ★ Rajendra Setu
Ghat Tourism	★ Ayodhya Ghat Teghra ★ Chhitraur Ghat ★ Jhamtiya Ghat ★ Raghunathpur Barari Ghat ★ Chamtha Ghat ★ Simaria Ghat

3.4. FORESTRY

Forest Survey 2019 assessment reported a variety of native trees in rural and urban areas across the state. These common species are Mangifera indica, Bombax ceiba, Psidium guyava, Dalbergia sissoo (FSI, 2019). Currently, the State government forest department runs 'Krishi Vaniki Yojana', a scheme which primarily focuses on motivating farmers to plant trees and other crops on a large scale along with traditional crops on their land. This scheme is aimed to improve the income of farmers in the event of crop loss and to contribute towards agricultural produce by growing popular trees such as Heesham, Guava, Gambhar, Amla, Mahogany, Teak, Peepal, Jamun, Kachnar, Gulmohar, Mango, Eucalyptus, Neem, Kadam, Bahera, Palas, etc. Farmers are provided seedlings of the trees in government nursery at the rate of Rs 10 / seedling. If farmers maintain 50 percent of the plants purchased from the forest department in their lands for 3 years, then for this, the farmers will be given an incentive of Rs 60 per plant. Moreover, the Rs 10 they spent for purchasing the seedling is also given back to the farmers (Krishi Yojana).

Kabar Lake or Kabar Taal Lake in Manjhaul sub-division of Begusarai is the Asia's largest freshwater oxbow lake. Kanwar Lake bird sanctuary of the district covers an area of approx. 67.5 Km.

3.5. WETLAND

4 ACTION PLAN DEVELOPMENT

4.1 FORESTRY

District of Begusarai is extremely deficient in forest area. The major occupation in the district is agriculture. That is why the Government of Bihar had drafted Agroforestry policy in 2018. The district lies under the agriculture category I. This categorisation had been developed on the basis of climatic condition, geography of the region, soil condition and water availability. Major crops in the district are Rice, Wheat, Lentils, and Gram pulse. The study has suggested a variety of trees in this zone. Eucalyptus, Arjun, Jamun, Kadam, Semal etc are the suggested tree species in the flood prone zone; whereas Shisham, Gamhar, Melia, Teak etc for the non-flood zone. Litchi, Mango, Jamun, Kathal, Guava can be most profitable, yielding trees as part of agro-horticulture. Medicinal plants like Kalmegh, Aswagandha, Sarpgandh, Satawar, Lemon grass, Safedmusli etc are the viable options in agroforestry (Govt of Bihar, 2018).

Below are the important species which can be included under agroforestry:

Fruits	Vegetables	Spices	Flowers	Aromatic Plants
Mango, Guava, Litchi, Banana, Pineapple	Solanaceous, Cucurbits, Onion, Okra, Beans	Turmeric, Ginger, Garlic, Coriander	Marigold, Rose, Tuberose, Gladiolus, Jasmin	Japanese Mint, Lemongrass, Pamaroja, Citronella

Afforestation on the riverbanks and open public spaces is another option that suits Begusarai district. Miyawaki afforestation method has been adopted by many urban authorities in the world. This technique helps to build dense, native forests. This method ensures that plant growth is 10 times faster and the resulting plantation is 30 times denser than usual. It involves planting native

species in the available area and becomes maintenance-free after the first three years. The most important aspect of this method is it requires as minimum as 20 square feet area. This can enable the native citizens of Begusarai to grow the profitable fruit plants in the community. The combination of small forest and home garden is known as homestead forest. With the combination of Miyawaki method of afforestation and trading platform for these products, this combination can be beneficial for the local economy (Miyawaki Afforestation, 2019). Some of the major Indian cities like Mumbai, Chennai have also adopted this technique for the afforestation (Indian Express, 2021). Compensation to the local people for protection and revenue sharing from the fruits and tree products with the forest department can help locals to add income.

Before & After Miyawaki Afforestation Method: For the open spaces, homestead forests and riverfronts

4.2 TOURISM

★ **SWOT ANALYSIS**

STRENGTHS

★ Presences of natural features (Rivers, Wetlands and Lakes dominate the landscape) and unique ecosystems are valuable scenic and recreational resources and can contribute to environmental services.

★ Presence of Archaeological, religious and historical structures.

- ★ Presence of committed NGOs and CBOs.
- ★ Residents who are passionate and involved.
- ★ Engaged leadership.
- ★ Cohesive Community.
- ★ Financial institutions / willingness to invest in the district.

WEAKNESS

- ★ Inadequate infrastructure facilities for tourist.
- ★ Poor maintenance of heritage structures and lack of awareness among local population about their heritage value.
- ★ Poor maintenance of religious heritage and lack of awareness among local population about their heritage value.
- ★ Lack of desire of skilled work force to stay in the district, lack of accountability of service delivery, Lack of Leaders and Entrepreneurs in the community and Lack of developable land in and around the district.
- ★ No maintenance of natural heritage leading to loss of valuable recreational space that can act as tourist destinations.
- ★ No maintenance of Natural heritage leading to loss of valuable recreational space that can act as tourist destinations.

OPPORTUNITIES

- ★ Ongoing, committed and proposed development projects.
- ★ Potential for growth in Archaeological, Religious, Eco Tourim and Culture Tourism.
- ★ Reuse of vacant lands into economically productive use.
- ★ Obtaining grants for provision of infrastructure and housing.
- ★ Encourage Public – Private partnership for provision of infrastructure services.

THREATS

- ★ Tourism industry is underdeveloped. At present Tourism has very little contribution towards economic generation of the district.
- ★ Lack of tourism infrastructure and tourist information centers.

- The district is prone to different kinds of disasters, which include floods and earthquakes etc. Incorporating disaster mitigation measures within the infrastructure planning process.
- Across the district the rise of crime including, robbery, snatching, drugs, and murder etc.
- Political stability, Naxalism and Corruption, the district is surrounded by Naxal affected areas.
- Lack of governmental response towards tourism infrastructure such as tourism centre, tourism promotion and tourism accommodation.
- Poor Infrastructure facilities for tourists in Begusarai.
- Too much dependence on single economic sector.
- Lack of desire of skilled work force to stay in the district.

PROJECTS DEVELOPMENT

- Project on development of tourist information centres at all important places of Begusarai district.
- In order to maximize the use of the Ganga and Gandak River flowing through the district, Ganga riverfront development would be a great potential for Boating, Public Promenades, Religious Facilities, Cruise etc, making it the vibrant heart of the urban fabric.
- Landscaping and flood protection along Ganga River front through Meditaion park and Millenium Park.
- Developing Tourism circuits through the Integration of Archaeological, Religious, Eco tourism and Ghat by development of capacity building, engagements with local stakeholders.
- Development of Parks and playgrounds, development of Recreational Facilities of higher order Strengthen the existing Tourism spots and infrastructure, Create the new tourism attraction points and recreational centers.
- Development of combined projects involving Tourism department/ Ministry, Disaster management department and Environment, forest, and climate change section/Ministry. Stakeholder consultation & Participatory management and involvement of Municipality, and local communities from Ganga villages and

tour operators to build ecotourism options and choosing adventure and religious tourism sites.

- ★ Tourism carrying capacity at individual sites and caping the number tourists must be estimated through specific research and development projects.
- ★ Project on fixing users fees / fee for ecosystem charges/ Payment for recreational/cultural ecosystem services (PES) must be developed and examined thoroughly in the line of putting price per nature's view even at the Sanctuaries, parks and monuments. The different methods (command and control; economic incentive; behavioural and others) may be explored in detail for controlling the tourist's behaviour and managing wastes at each site, ensuring economic, ecological and cultural sustainability.
- ★ Tourist's satisfaction and perception analysis can be undertaken to ensure quality tourism experiences and promoting sustainable tourism.
- ★ Adequate guidelines and rules for hoteliers, tour operators, paying guests and homestays towards waste management.

4.3 WETLANDS

4.4 ENERGY

5. RECOMMENDATIONS

5.1. AGRICULTURE AND ALLIED SECTORS

Recommendation to Developed Agriculture Activities and Allied Activities

- The district needs to establish some mandis to procure surplus grains and vegetables.
- The district has a large scope for the promotion of farm mechanization and resource conservation technologies.

- There is a need to construct some deep tube wells and borewells (>60 m), in the major arsenic-contaminate blocks (Teghra, Bachwara, Sahebpur Kamal) with the help of the government's assistance.
- To promote organic farming, more bio-fertilizer distribution, government subsidies, and training are required.
- Establishment of a Jaivik corridor and certification needs to promote local farmers for organic farming in the district.
- More areas should be brought under drip and sprinkler irrigation for vegetable and fruits cultivation.
- Mulching, Relay Cropping, Intercropping, Seed production, off-season vegetable cultivation should be encouraged among the farmers.
- The district has huge potential for banana, mango, guava, litchi, and papaya cultivation, which should be encouraged among the farmers.
- The farmers should be encouraged to cultivate high-revenue crops like capsicum, dragon fruits, strawberry besides mushroom and sugarcane cultivation.
- Small scale food processing units like tomato Sauce & Ketchup, Chili Sauce (ODOP), Vegetable pickles have a huge scope for the district.
- More farmers need to be encouraged for beekeeping by providing training.
- Cold storage needs to develop mainly for potatoes and onions.
- More farmers should be encouraged for the fishery and poultry farming by providing training and subsidies, which have huge potential in the district.
- There is a need for awareness and to bring more farmers under the district's Gramin Krishi Mausam Sewa (GKMS), Common Service point, and WhatsApp Group for acquiring weather information.
- Poly houses and net houses need to develop for the high revenue crops and nursery.
- High-density planting (HDP), use of tissue culture planting material, Multi Story cropping should be encouraged among the farmers for fruit orchards.

5.2. FORESTRY

Begusarai being an agriculture-based economy with a very arid climate; Agroforestry and homestead forest are the suitable options for increasing forest cover. District holds only 4.27% forest cover. This way the citizens can earn extra income through these forest products such as fruits, flowers, and beekeeping. Agroforestry information centers and forest product processing clusters can be established. The government scheme 'Krishi Kalyan Yojana' should not be only limited to the farmers but to the citizens who can grow mini forests in their space. Being a Historic place, Begusarai district can have Miyawaki Forests with native plants at every open space possible and these forests can be utilized as heritage and ecotourism places. These forests can be tourist attractions. Native Fruit bearing trees can be planted in these forests and the processing can be done on a public private partnership basis. This can provide aesthetics to the geography and income to the locals.

5.3. WETLAND

5.4. TOURISM

- Establish Tourist Information Centre in the District Headquarters. Tourist information centres will be equipped with the modern information and communication technology devices.
- Developing Tourism circuits through the Integration of Archaeological, Religious, Eco tourism and Ghat by development of capacity building, engagements with local stakeholders.
- Protection, maintenance and beautification of Archaeological and Historical monuments and sites.
- Must look at the tourism carrying capacity of the district at different site-specific destinations of the district.
- Provide adequate Park and Open Spaces/ Recreational Facilities, Eco Park, Water Park, Water Sport and Riverfront development etc. around the tourism sites and along Ganga ghats to attract all type of tourism.
- Development of tourist facilities and overall improvement of infrastructure facilities for tourists in places of tourist attractions.
- To strengthen the tourism and attract large number of tourists, Tourism Product Diversification/Improvement is needed like, Promotion and packaging of tourist resources, Upgradation of identified tourist spots, Quality accommodations, Tourist Information Centre, Road and public transportation and Road furniture and signages etc.

- Maintenance of law and order, deploying tourist police force, disposing grievances, enacting suitable rules, regulation and laws for tourism development and Standardizing quality of tourism product and services.

- Empowering and Sensitizing Ganga Ghats (Cleaning of garbage and waste management at each Ghats sites) to make tourism compatible, environment friendly and sustainable. For example: Development of boating and cruise facility in existing Ghats.

- Stakeholder consultation & Participatory management and involvement of Municipality, Disaster management authority and local communities from Ganga villages and tour operators to build ecotourism options and choosing adventure and religious tourism sites.

CHALLENGES AND THREATS

- Crime and social amenities (including, robbery, snatching, drugs, and murder etc.) being one of the biggest challenges in the district tourist development, have been neglected.

- Lack of tourism infrastructure and tourist information centers.

- The district is prone to different kinds of disasters, which include floods and earthquakes etc. Incorporating disaster mitigation measures within the infrastructure planning process.

- Lack of proper communication and the inaccessibility of the place by road has hampered the development of Begusarai district.

- The water bodies and open spaces are used as the dumping areas in the district.

- There are chances of epidemic due to lack of sewage and solid waste disposal system for the core city area particularly in slums. These increase losses during disasters. Thus, a disaster mitigation plan should be prepared for the city and whole district.

- Tourism industry is underdeveloped. At present Tourism has very little contribution towards economic generation of the district.

- The problems being faced by pilgrims while taking dip during the ongoing festivals like: Chath Puja is a matter for serious concern.

- Inadequate and inappropriately located facilities for garbage collection, inadequate fire services due to congested lanes, storm water, and sewerage connections has led to overall deterioration of the urban fabric.

- Strategies for Social Infrastructure, Environment & Tourism Encroachments, inadequate municipal services and insensitive building control mechanisms are leading to the chaos in the urban landscape in the Begusarai.

- Too much dependence on single economic sector and Competing cities for external investments in the vicinity.

5.5. ENERGY

6. Discussion during the Report Presentation

- The Kanwar Taal, located in Begusarai, is Asia's largest freshwater oxbow lake (Ramsar Wetland).
- The Natural Farming trainings will be planned with Namami Gange.
- The scope for tourism is limited but the Jalal model could be explored more for increasing local livelihood.
- 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

7 APPENDICES