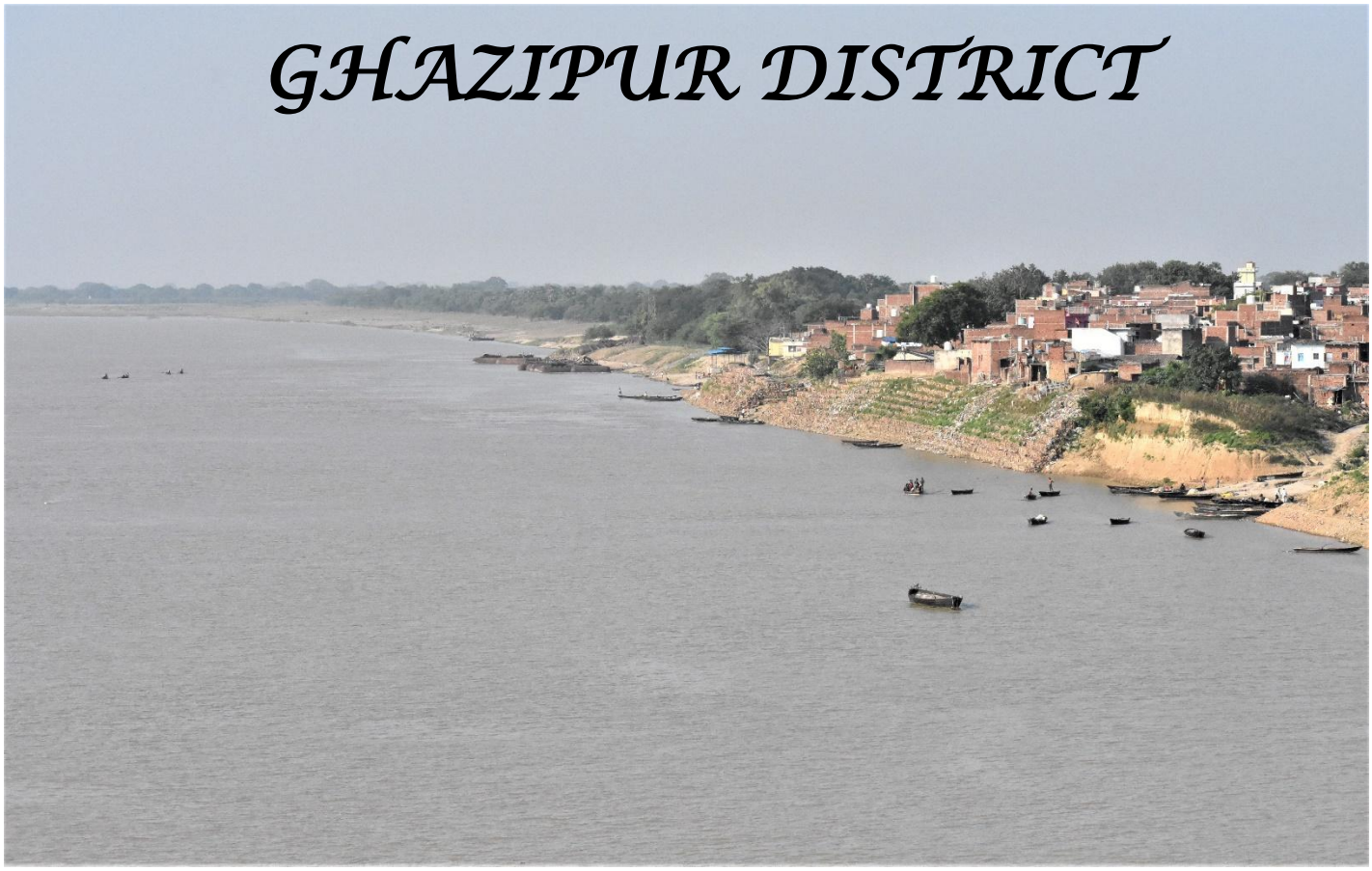
Ganga Cultural Documentation
2021

GHAZIPUR DISTRICT



National Mission for Clean Ganga

Indian National Trust for Art and Cultural Heritage

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Azaadi Ke Rang Bharatiya Sanskriti Ke Sang

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Front Cover : Ganga River from Zamania Ganga Bridge

Background : Ganga River Bank near Birpur

Back Cover : Sunset over Ganga River near Phulwari Khurd

Formatting and Design by : Sumesh Dudani

GANGA CULTURAL DOCUMENTATION

GHAZIPUR DISTRICT

October, 2021

Sponsored by :

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1.0 Introduction

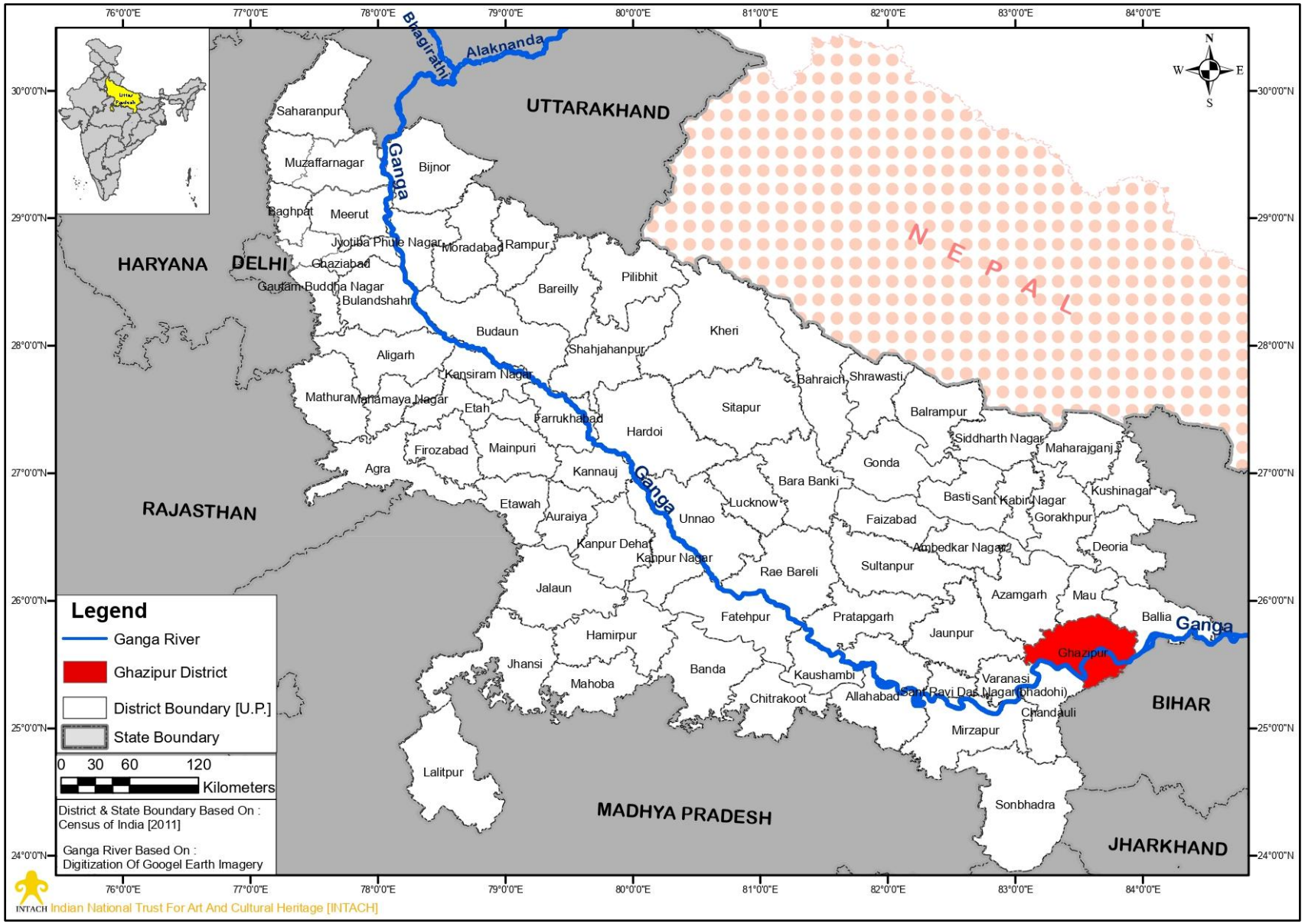
1.1 Ghazipur Distt. forms the eastern part of Varanasi Division situated between the parallels of 25°19′ and 25°54′N latitude and 83°4′ and 83°58′E longitude. It is located 67.5 m above sea level with the length of 90 km from east to west and 64 km from north to south. It encompasses a total geographical area of about 3384 sq. km. and forms a part of Mid Gangetic Plain. The Distt. is bounded by Ballia and Bihar State in east, Jaunpur, Varansi and Azamgarh in west, Mau and Ballia in north and the Chandauli in south. It is divided into 7 Tehsils which are further sub-divided into 16 blocks (https://ghazipur.nic.in/demography/).

1.2 The topography of Ghazipur Distt. ranges from a flat to gentle undulation. Physiographically, the Distt. is divided into two regions –(a) The Ghazipur Plain: this region covers the northern part of the Distt. beyond Ganga River encompassing some areas of Saidpur, Ghazipur and Muhammadabad tehsils;(b) Gomti–Ganga Flood Plain: this region is situated along the Gomti and Ganga rivers in an east-west direction encompassing entire Zamania town and parts of Saidpur, Ghazipur and Muhammadabad tehsils. The climate of this Distt. is warm and temperate with an average temperature of 26.1°C. Annual precipitation varies from 800 to 1034 mm in the Distt., major part of which is received from June-September. Major soil types in the Distt. are – clay loam, sandy loam, *diara* soil and black soil.

1.3 Ghazipur was covered with dense forest in Vedic era and it was a place for Ashrams of Saints during that period. This place is related to the Ramayana period where Maharshi Yamdagni, father of Maharishi Parsuram resided here. The famous Rishis Gautam and Chyavan were given teaching and sermons here in ancient period. Lord Buddha gave the first sermon in Sarnath, Varanasi which is not very far from here. The Aunrihar area of Ghazipur district became the main center for teaching of Lord Buddha. Many *stupas* and pillars are the main evidence of that period. Chinese traveler *Hiuen Tsang* had visited this area and described this place as Chanchu or "The Land of Battle Fields". This region was the main center during Mughal period when Babur took over the charge of Ghazipur and Muhammad Khan Nuhani became its administrator. In the reign of Akbar, the Afghan, Ali Kuli Khan, took over the charge of Ghazipur and developed the town Zamania. After the death of Aurangzeb, this area was taken by Zamindar Mansa Ram. Thereafter, Ghazipur came under the suzerainty of the Banaras state and Raja Balwant Singh, the Son of Mansa Ram became the King of Ghazipur. After the attack of Warren Hastings, the then Governor General of the British rule, this

area was ruled over by various British rulers. Lord Cornwallis came to visit this place and accidentally died here subsequently commemorated by an elegant tomb.

1.4 In 1764 AD Britishers won Buxar and Ghazipur which was therafter ruled by the East India Company. Company posted Mr. Richardson as a judge and Mr. Robert Warlo was made the first Collector for this district. The Britishers used this place for cultivation of indigo, opium, kewra and roses. They established Opium Factory which is of its kind. It is presently working and providing revenue to govt. of India by producing opium alkaloids. During British rule Opium manufactured in this factory was carried to China on boats through the Bay of Bengal.



Map 1 : Location Of Ghazipur Distt.

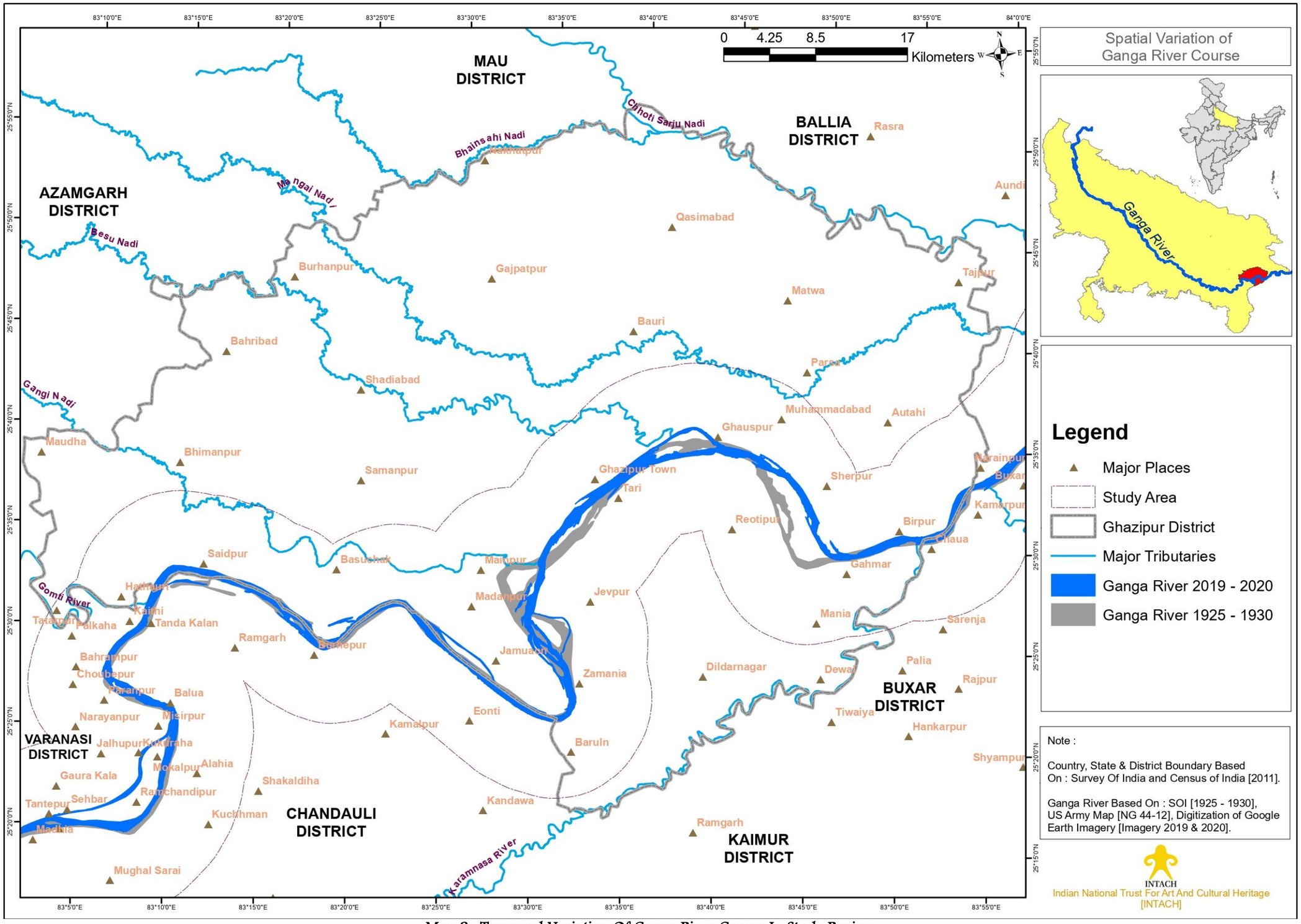
2.0 Ganga River In Ghazipur Distt.

2.1 Soon after its confluence with Gomti, Ganga River enters Ghazipur Distt. near Kaithi and for several kilometers, forms a separating boundary between Ghazipur and Chandauli Distt.s. Soon after entering the Distt., Ganga River changes direction near Aunrihar bending south-eastwards and maintains this course until Diyara Bad where it turns north-eastwards for some distance. Near Nari Pachdewara, the river channel returns towards northern bank and makes a sharp bend south-eastwards flowing past Chochakpur. In the extreme south towards Dharammarpur, the river makes another great bend turning northwards to the Zamania town and then northwestwards as far as Mainpur and the confluence with the Gangi Nadi. From Mainpur, Ganga River sweeps north-eastwards flowing close under the high *Kankar* ridge on which stands the city of Ghazipur (Nevill, 1909).

2.2 At a short distance from Ghazipur, the river makes another turn south-eastwards near Gauspur village and flows past Narainpur, Jamalpur, Prithvipur and Birpur villages before exiting the Distt. and entering Ballia Distt. On the opposite bank of Birpur Ghat, Karamnasa River confluences with Ganga which forms a separating boundary between Ghazipur and Buxar Distt.s. The total reach of Ganga River in the study region of Ghazipur Distt. is about 113 kms. Throughout its course, the river alters its flow from one bank to the other which has also been mentioned in the Distt. Gazetteer (Nevill, 1909). The river swells during monsoon season resulting in inundation of floodplain areas in some parts of the study region whereas during summers, it shrinks to the lowest possible width. Map 2 depicts the temporal variation in Ganga River course in different periods as analyzed from GIS study while Images 1-2 depict Ganga River as seen during the field survey.

Image 1 : Ganga River Near Birpur Ghat In Ghazipur Distt.

Image 2 : Ganga River From Zamania Ganga Bridge

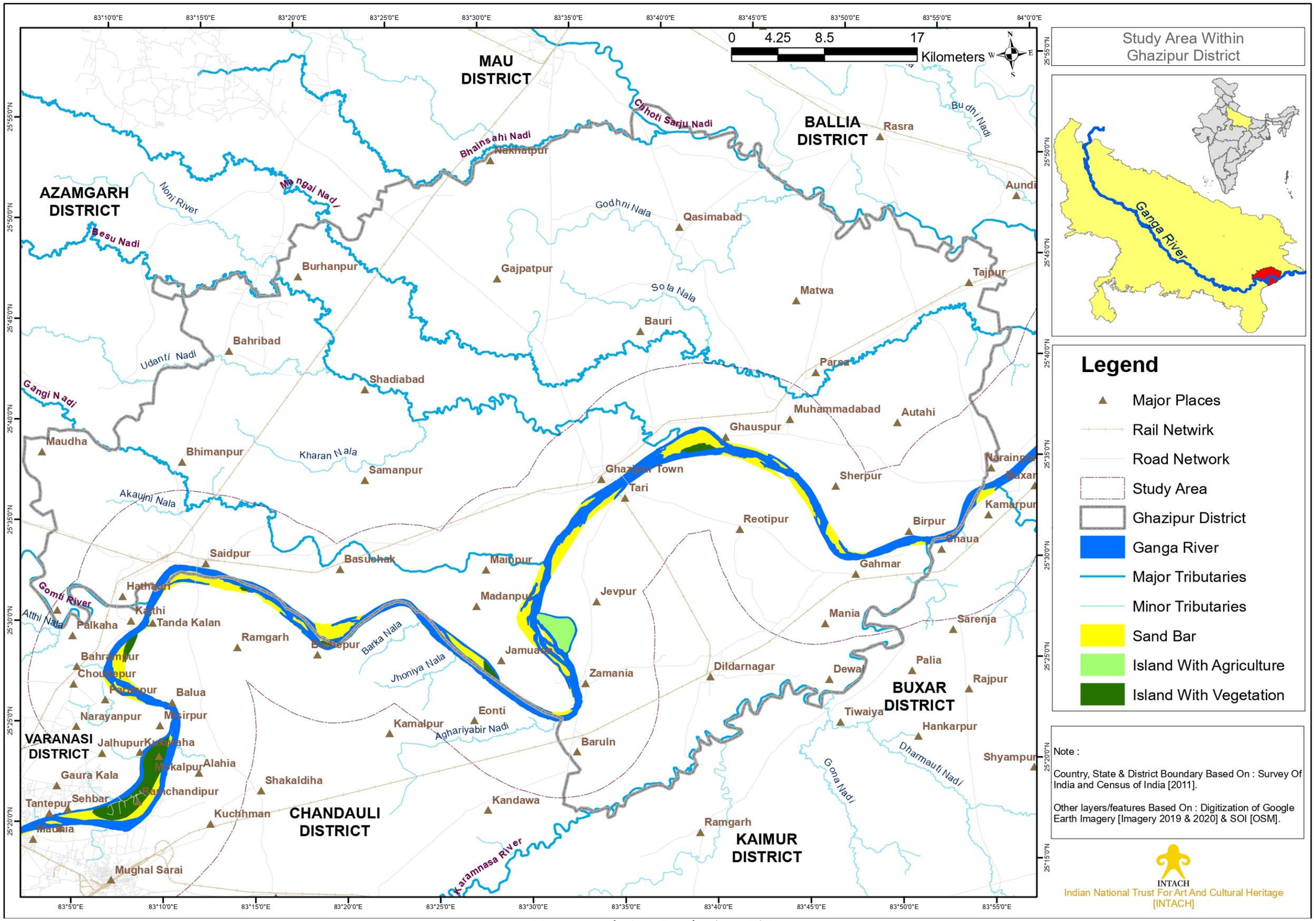


Map 2 : Temporal Variation Of Ganga River Course In Study Region

3.0 Methodology

3.1 Ganga River flows in Ghazipur Distt. for approximately 113 kms adjoining it mainly on the left bank and some part on the right bank. Hence for carrying out the ground survey, a 7 km of buffer zone was selected on the both the banks of Ganga River in the Distt. [Refer Map 3]. Based on the secondary information analyzed and the features noted from Google Earth satellite imagery, plan for the fieldwork was constituted to cover different elements of natural heritage in these grids. Special focus was laid on denoting the sites important for riparian biodiversity, riverine fishing, boat making communities, river and stream confluences, important water bodies and oxbow lakes. Furthermore, contacts were developed with various stakeholders including riparian and *Diara* communities in the Distt. for carrying out relevant interactions.

3.2 The field survey for Natural Heritage documentation in the study region of Ghazipur Distt. was carried out from 25-29 October, 2021. The high-quality pictures related to the study were recorded using Nikon D3400 DSLR camera. The GPS locations were also recorded using Garmin hand-held GPS and videography at the study sites was carried out using Sony Handycam. The plants observed in the survey were identified based on available handbooks and online databases while the birds observed in the survey were identified using Grimmett *et al.* (2011). The information on current status of Ganga River and changes from the past was obtained from detailed interactions with different stakeholders such as agriculturists and dairy farmers, temple priests, village heads, fishermen, boatmen and general public.



Map 3 : Study Area In Ghazipur Distt.

4.0 Tributaries Of Ganga River

4.1 **Gomti River:** Gomti is an alluvial river of the Ganga Plain and one of the important tributaries of Ganga, originating near Mainkot from a lake 'Fulhar Jheel' in Madhotanda, about 30 km. east of the Pilibhit town in Uttar Pradesh at an elevation of 185 m. It flows through an incised valley southwards through the Distt.s of Sitapur, Lucknow, Barabanki, Sultanpur and Jaunpur before meeting Ganga river at Kaithi in Ghazipur Distt. bordering Varanasi [Refer Map 4]. Majority of the surface area of Gomti Basin is generally flat, sloping towards South and South East with altitude varying from 200 m. to 62 m. above mean sea level. The river is perennial having a sluggish flow through most part of the year barring monsoon season when heavy rainfall causes manifold increase in the runoff (Ref: http://117.252.14.242/Gangakosh/tributaries/gomati.htm).During the field survey, this river was observed from a bridge on the Ghazipur-Varanasi highway [Image 3] and at its confluence with Ganga near Ganga-Gomti Sangam Ghat in Kaithi [Image 4]. Fishing was found to be the common activity at the confluence zone with fishermen either using locally made fishing rods along the river bank or employing use of small boats with fishing nets. Agriculture along Gomti River bank in the study region is also a prominent activity with major crops grown being Rice, Wheat, Chana and Mustard.

Image 3 : Gomti River From Ghazipur-Varanasi Highway Bridge On 25th October, 2021

Image 4 : Ganga-Gomti Confluence Observed On 25th October, 2021

4.2 **Karamnasa River:** It is a tributary of Ganga River which originates in Kaimur Distt. of Bihar and flows through the states of UP and Bihar. Along the boundary between Uttar Pradesh and Bihar it has the Districts of Sonbhadra, Chandauli, Varanasi and Ghazipur on its left bank [west] (Uttar Pradesh side); and the Districts of Kaimur and Buxar on its right bank (Bihar side) [Refer Map 4]. The river was observed near from Karamnasa Bridge on State Highway 99 [Image 5] where it forms the border between the states of Bihar and Uttar Pradesh and also confluences with Ganga River. Upon interaction, it was noted that agriculture was being practiced in the villages neighboring this river using its water for irrigation purpose. The river swells up during monsoon whereas the water flow and extent decrease significantly during remaining part of the year. Fishing was also found to be practiced at its confluence with Ganga River though it was practiced only on a small scale mainly for local consumption. There was scanty riparian flora along the river as extensive agriculture dominated the land use in this region with crops being grown up to the active channel of the river in most places.

4.3 According to a popular Hindu legend: '*King Trisanku was anxious to ascend to heaven in his human form and hence, approached Sage Vasishta who told him that he was forbidden to offer such an indignity to the Gods. However, King Trisanku became desperate and sought help from Sage Vishwamitra who agreed to his petition and sent*

him to heaven through his powers. This enraged the Gods who cast his head upside down and threw him back to the ground but was stopped by Vishwamitra midair. Hence, it is believed that while hanging upside down, saliva started dropping from his mouth on the ground and became the source of this river.' This river was used to be considered by Hindus in utmost abhorrence and thus this river came to be known as Karamnasa meaning 'destroyer of good deeds'. Today the residents of this region no longer hold these beliefs and make use of river water for many different purposes.

Image 5 : Karamnasa River As Observed On 25th October, 2021

4.4 **Other Tributaries:** Other important tributaries in the Ghazipur Distt. are – Mangai Nadi, Besu Nadi and Gaangi Nadi.

4.4.1 Mangai Nadi enters Ghazipur Distt. north of Shadiabad Pargana and traverses across to enter Ballia Distt. where it confluences with Tamsa River just before its confluence with Ganga (Ref: https://ghazipur.nic.in/river/). This river was observed near Jakrauli village during the field survey [Image 6]. Fishing from this river was a prominent activity with huge fishing nets being set up in the river. Bhakur (*Labeo catla*) was the major fish caught from Mangai Nadi [Image 7].

Image 6 : Mangai River As Observed On 26th October, 2021

Image 7 : Bhakur (Labeo catla) Being Caught From Mangai Nadi In Ghazipur

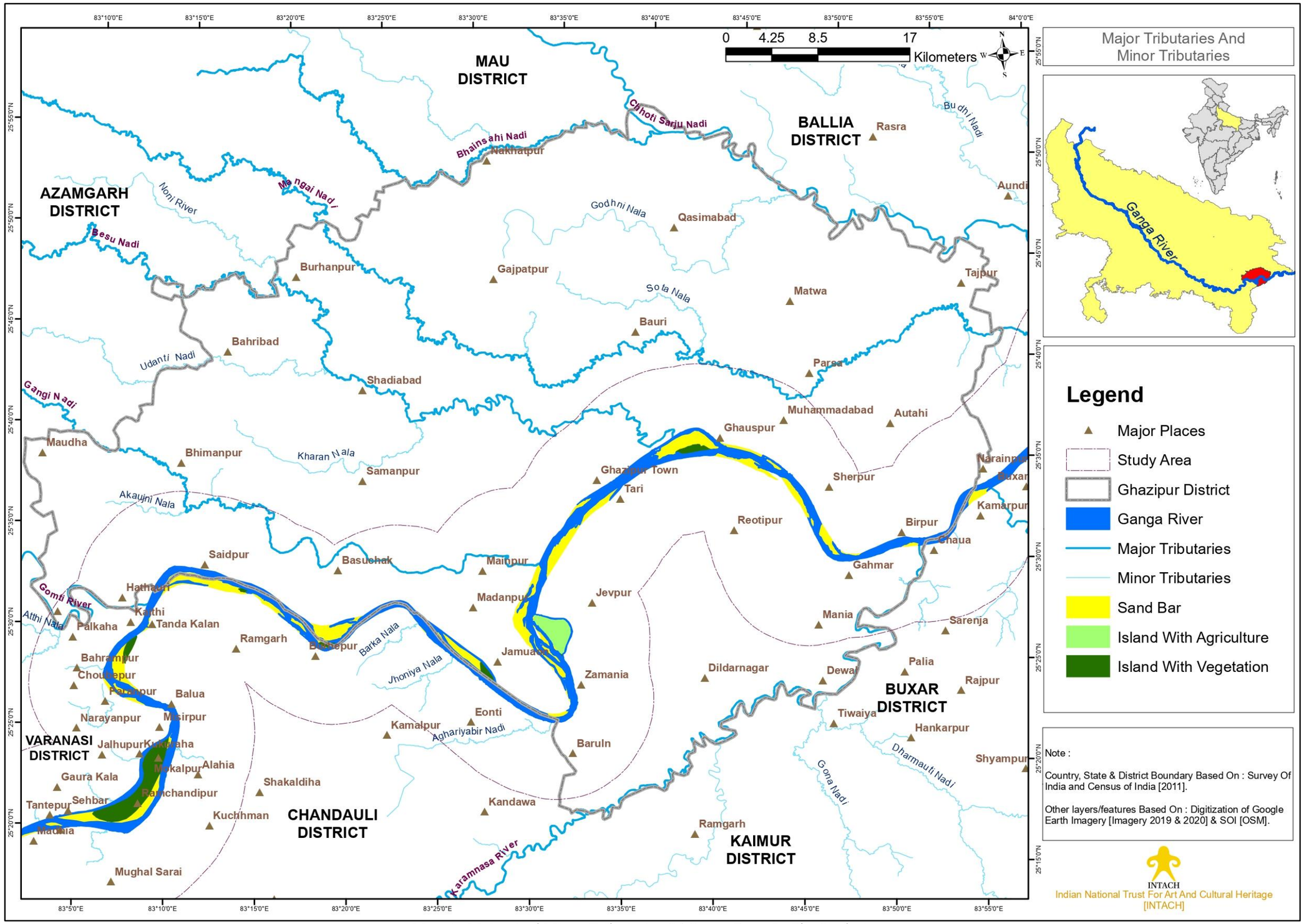
4.4.2 Besu River originates from a series of swamps in Deogaon Tehsil of Azamgarh and enters Ghazipur Distt. from the north-western part. It then flows eastwards traversing across the Distt. before its confluence with Ganga River near Nagwa Urf Nawapura. During the field survey, this river was observed near Chaurahi village in Ghazipur [Image 8]. Agriculture and fishing were the chief activities along this river in the study region.

Image 8 : Besu River As Observed On 26th October, 2021

4.4.3 Gangi Nadi rises near Jaunpur and flows alongside the borders of Jaunpur and Azamgarh before entering Ghazipur Distt. It confluences with Ganga River near Mainpur in this Distt. [Refer Map 4]. During the field survey, this river was observed from Parameth bridge on Ghazipur-Chochakpur road [Image 9]. Extensive agriculture was being practised on both the banks of this stream and fishing nets were also placed for catching fish [Image 10]. The interlocutors reiterated that fish such as Bhakur, Sidhari and Tengara were caught from this stream during monsoons.

Image 9 : Gangi Nadi As Seen On 27th October, 2021

Image 10 : Fishing Nets Set Up In Gangi Nadi



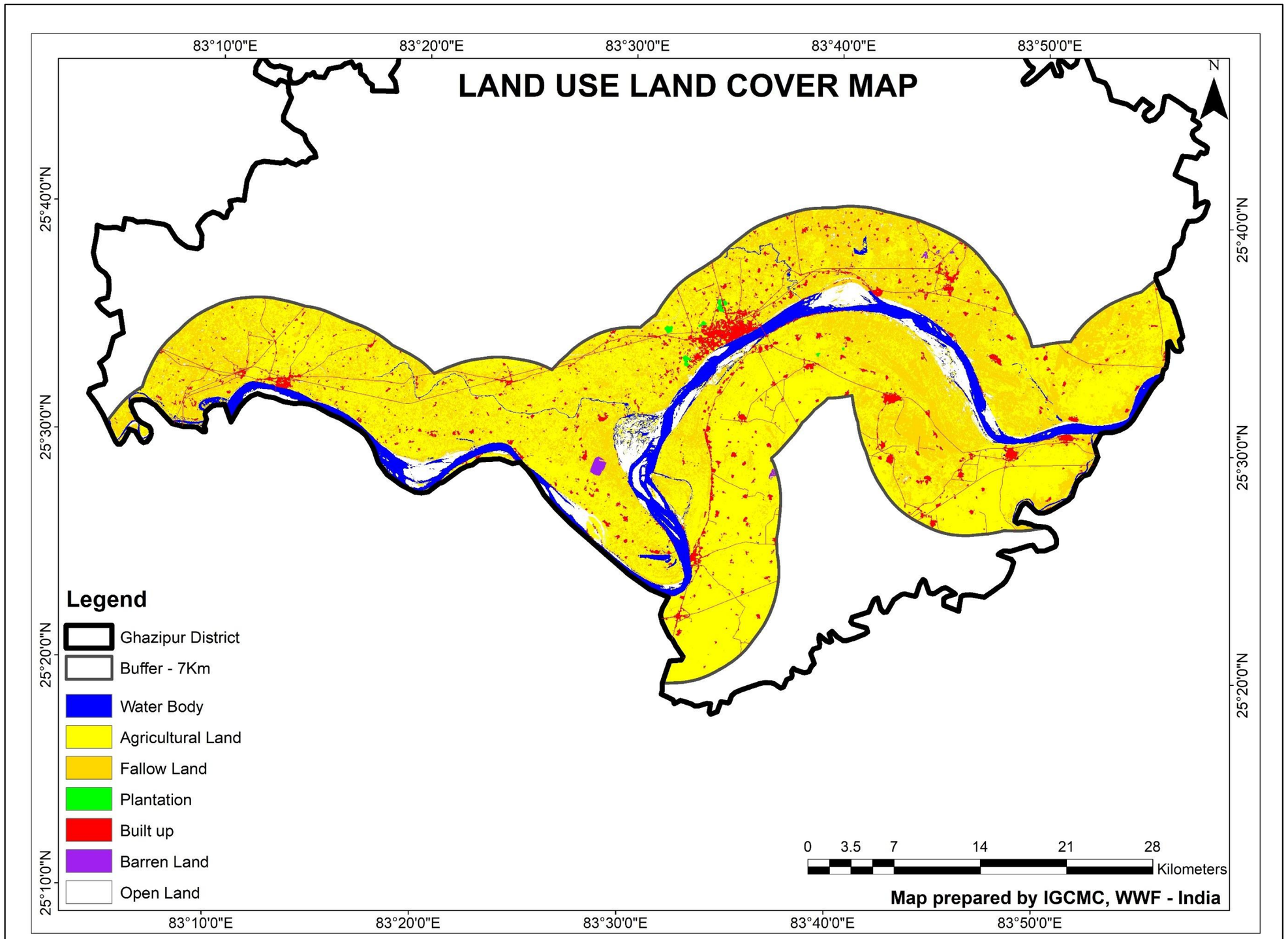
Map 4 : Major And Minor Tributaries Of Ganga River In The Study Area

5.0 Land Use/Land Cover

5.1 Land Use Land Cover (LULC) Map of the study corridor has been prepared from Landsat imagery. Using supervised classification system,7 different classes were generated – water body, agricultural land, fallow land, plantation, built up, barren land and open land. Agriculture being a dominant source of income, occupies major part of the land use system in this Distt. The water body component covering 7.385% of the total geographical area of this Distt. chiefly includes Ganga river, its tributaries and other wetlands. The built up area includes Ghazipur as the major city along with other towns and villages spread along in the study region. Table 1 provides the statistics while Map 5 depicts the various land use/land cover classes as analysed for the study region.

Table 1 : Land Use And Land Cover Details Of Study Region

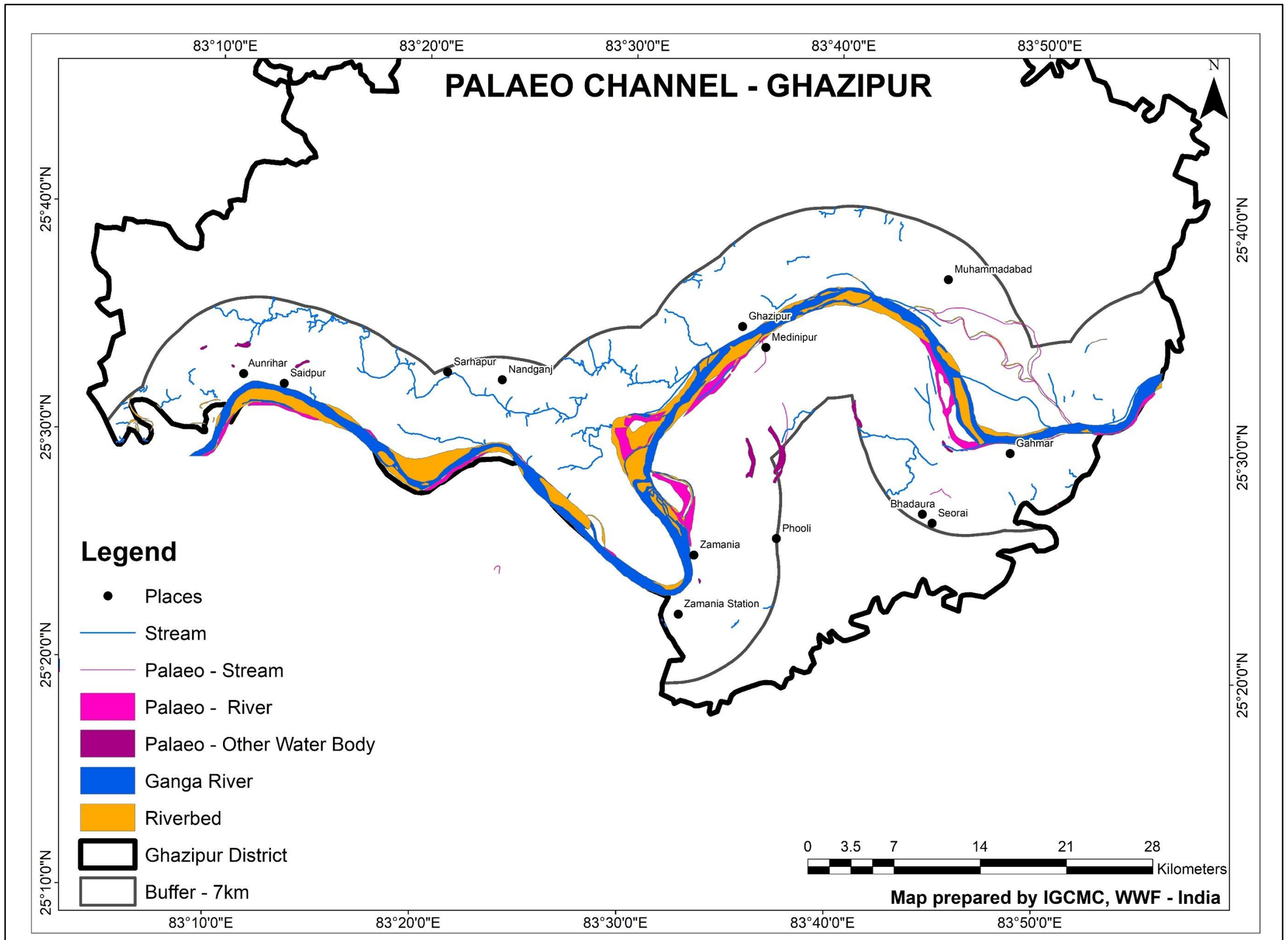
Ghazipur Distt.		
Class	**Area (Ha)**	**Area (%)**
Water Body	9619.130	7.385
Agricultural Land	70198.500	53.891
Fallow Land	39444.100	30.281
Plantation	139.129	0.107
Built up	5061.720	3.886
Barren Land	186.105	0.143
Open Land	5612.120	4.308
Total	**130260.804**	**100**



Map 5 : Land Use/Land Cover Map Of Study Region In Ghazipur Distt.

6.0 Palaeochannels Of Ganga River

6.1 Decline in natural flow of a River or stream decreases the sediment flushing ability of the Rivers. It may be a reason behind the disappearing of River channels in the Ganga River basin. Apart from that various other factors such as change in land use pattern, sand mining, agricultural practices and brick kilns may also lead to disappearance of streams and river channels in the region. These paleochannels do not carry water during most of the year but may flow during flood events. Such abandoned and silted paleochannels of the past can be mapped using the remote sensing techniques. Hence, based on the available satellite data and subsequent remote sensing analysis, Map 5 was prepared which depicts the various paleochannels in the study region of Ghazipur Distt.



Map 6 : Paleochannels In The Study Region

7.0 Floodplain Of River Ganga In Ghazipur

7.1 The active flood plain of a river is defined as an area on either side of the river channel with regular flooding on a periodic basis. Maintaining active flood plain of a river is critical for assuring equilibrium in ecosystem. The floodplains harbour rich biodiversity including riparian vegetation as well as many other groups of organisms which help in maintaining fertility of this region. Along with this, the floodplains have been of great cultural and economic importance with many early civilizations having risen in these fertile lands. As the rivers naturally meander through the landscape over a period of time, they deposit sand, silt and other soil forming materials in the floodplain region which make them ideal for agricultural production. Throughout history, people have learned to cultivate in the fertile floodplains and use their rich resources for sustaining livelihoods. Even today, in most of the riverine regions, especially in India, the floodplains have been occupied by local farmers for carrying out their agricultural activities especially in the non-monsoon season. Ganga River floodplain is one such important floodplain in India which has been extensively utilized in almost all the districts, where it passes through, for agricultural purposes.

7.2 GhazipurDistt. falls in the Eastern Plain Zone/Middle Gangetic Plain Zone with the major soils being loam, silty clay loam, clay loam and sandy loam (NICRA-ICAR, 2013). Agriculture is one of the major sources of income for the residents of the Distt. and it is benefitted by the fertile alluvium brought by Ganga river and its tributaries. Vast floodplain lands along Ganga, Gomti, Karamnasa, Magai, Besu and Gangi Rivers were observed to be under extensive crop cultivation during the field survey in study region. Rice is the chief Kharif crop while Wheat is the chief Rabi crop grown in the Distt. Other major crops grown here include maize, mustard, chana, various pulses and vegetables such as potato, onion, chillies, green peas and tomato. The details of some villages surveyed along with their floodplain agriculture produce are provided in Table 2 while Images11-13 depict some floodplain agriculture fields as recorded during the survey.

Table 2 : Some Floodplain Villages And Their Agriculture Produce In Ghazipur Distt.

Sr. No.	Village Name	Agricultural Produce
1.	Loharpur	Rice, wheat, mustard, chana, potato
2.	Birpur	Rice, wheat, arhar, bajra, onion
3.	Semara	Rice, wheat, chana, maize, chillies
4.	Bandipatti	Rice, wheat, maize, mustard, brinjal
5.	Chakeri Upraw	Rice, wheat, chana, mustard, maize
6.	Phulwari Khurd	Rice, wheat, bajra, maize, potato
7.	Kharona	Rice, wheat, maize, mustard, chana

Image 11 : Floodplain Bajra Fields Near Birpur Village In Study Region

Image 12 : Floodplain Rice Fields Near Loharpur Village In Study Region

Image 13 : Floodplain Brinjal Fields Near Bandipatti Village In Study Region

7.3 Floodplain grasses: The chief floodplain grasses growing throughout study region are – *S. spontaneum* (commonly known as *Kans*),*S. bengalense* (commonly known as *Munj/ Sarkanda*)and *Cynodon dactylon* (L.) Pers. (commonly known as Doob or Durva grass). Among these, the *Saccharum* grasses are dominant and luxuriant along the Ganga River banks [Images 14-16] and on the *diaras*. They are tall, perennial wild grasses growing upto 2-3 m height. They form extensive root networks that bind the soil/pebbles and form tall thick clumps with high biomass tufts. The dried *Saccharum* grasses are widely used throughout the Distt. for roof thatching in villages. Along with this some local residents also use these grasses in construction of temporary huts to monitor their agricultural fields. The abundance of this grass and availability throughout the year makes it an excellent resource for the residents in this region.

Image 14 : Lush Growth Of *Saccharum* Grasses Along Ganga River Near Pallia Ghat In Ghazipur Distt.

Image 15 : Lush Growth Of *Saccharum* Grasses Along Ganga River Near Chochakpur

Image 16 : Lush Growth Of Saccharum Grasses Along Ganga River Near Prithvipur

8.0 Wetlands In Ghazipur Distt.

8.1 Wetlands are one of the most productive and unique ecosystems. They help in maintaining the food web and provide habitat for the aquatic biodiversity. They also help in controlling floods, recharging groundwater, nutrient recycling, climate stabilization and carbon sequestration. According to the report prepared by Tare et al. (2012) about 2645 wetlands are reported in Ghazipur Distt. which include – lakes/ponds, oxbow lakes, riverine wetlands, waterlogged areas, rivers/streams, reservoirs/barrages, tanks/ponds and wetlands of smaller areas (<2.25 ha). However, during the current study about 500 different wetlands are recorded whose details are provided in Table 3. Map 7 shows the spatial distribution of these wetlands in the study region. Some notable wetlands as observed during the field survey are discussed in this section.

Table 3 : List Of Wetlands In The Study Region

Sr. No.	Wetland	Coordinates		Area (Ha)
		Latitude	Longitude	
1.	Oxbow Lake	25°31'23.76"N	83° 9'41.67"E	40.6
2.	02	25°31'2.35"N	83° 7'59.41"E	1.47
3.	03	25°31'31.68"N	83° 7'15.56"E	0.91
4.	04	25°30'19.19"N	83° 5'14.92"E	0.43
5.	05	25°32'10.99"N	83° 7'39.29"E	0.42
6.	06	25°31'58.58"N	83° 8'49.03"E	0.40
7.	07	25°32'5.66"N	83°10'19.32"E	0.32
8.	08	25°32'22.66"N	83° 9'6.96"E	0.27
9.	09	25°32'43.58"N	83° 7'11.91"E	0.45
10.	10	25°32'40.11"N	83° 6'51.55"E	0.39
11.	11	25°33'22.13"N	83° 7'12.85"E	4.44
12.	12	25°32'42.01"N	83° 7'34.80"E	0.43
13.	13	25°32'52.26"N	83° 7'26.41"E	0.42
14.	14	25°32'47.53"N	83° 7'53.03"E	5.21
15.	15	25°33'2.10"N	83° 8'7.69"E	0.88
16.	16	25°32'47.36"N	83° 9'18.72"E	1.00

17.	17	25°32'24.09"N	83° 9'41.99"E	0.28
18.	18	25°32'26.88"N	83°10'6.49"E	0.34
19.	19	25°32'16.00"N	83°10'35.06"E	0.60
20.	20	25°32'13.94"N	83°10'42.62"E	0.22
21.	21	25°32'58.63"N	83° 9'10.85"E	0.56
22.	22	25°33'22.10"N	83° 9'2.92"E	0.58
23.	23	25°33'13.78"N	83° 8'32.51"E	0.85
24.	24	25°33'9.27"N	83° 8'11.71"E	0.71
25.	25	25°33'56.91"N	83° 8'0.58"E	0.83
26.	26	25°33'38.17"N	83° 8'56.25"E	1.18
27.	27	25°33'25.33"N	83° 9'53.99"E	0.57
28.	28	25°33'25.09"N	83°10'34.83"E	0.90
29.	29	25°33'18.64"N	83°11'35.30"E	0.78
30.	30	25°33'30.10"N	83°12'23.83"E	1.79
31.	31	25°33'34.38"N	83°11'58.06"E	0.51
32.	32	25°33'36.61"N	83°12'7.71"E	1.10
33.	33	25°33'47.32"N	83°11'53.35"E	6.0
34.	34	25°33'38.08"N	83°11'10.26"E	0.92
35.	35	25°34'1.76"N	83° 8'55.48"E	0.61
36.	36	25°34'34.55"N	83° 9'0.72"E	0.85
37.	37	25°34'33.61"N	83° 9'31.30"E	1.21
38.	38	25°34'38.42"N	83°10'4.46"E	0.73
39.	39	25°34'28.75"N	83°10'10.12"E	0.65
40.	40	25°34'9.80"N	83°12'27.53"E	0.75
41.	41	25°33'56.48"N	83°12'34.37"E	0.86
42.	42	25°33'54.10"N	83°12'52.11"E	0.97
43.	43	25°33'54.82"N	83°13'4.97"E	0.77
44.	44	25°33'46.77"N	83°13'12.47"E	0.83
45.	45	25°33'39.34"N	83°13'48.78"E	2.86
46.	46	25°33'52.00"N	83°13'45.40"E	0.66
47.	47	25°34'3.84"N	83°13'49.02"E	1.82
48.	48	25°34'40.04"N	83°13'37.19"E	0.26
49.	49	25°35'19.15"N	83°12'51.24"E	0.90

50.	50	25°35'48.12"N	83°12'25.77"E	0.29
51.	51	25°34'23.70"N	83°14'52.46"E	0.85
52.	52	25°33'26.30"N	83°13'56.32"E	0.63
53.	53	25°32'14.95"N	83°13'31.24"E	0.30
54.	54	25°34'17.39"N	83°14'58.45"E	0.31
55.	55	25°34'43.97"N	83°16'10.64"E	0.15
56.	56	25°34'11.20"N	83°15'43.85"E	0.56
57.	57	25°34'15.02"N	83°15'36.35"E	1.10
58.	58	25°33'11.39"N	83°15'43.42"E	0.57
59.	59	25°33'24.44"N	83°15'41.62"E	0.88
60.	60	25°34'2.97"N	83°16'4.10"E	0.33
61.	61	25°33'28.48"N	83°16'3.57"E	1.57
62.	62	25°33'8.66"N	83°16'18.99"E	1.00
63.	63	25°32'0.44"N	83°15'12.92"E	0.47
64.	64	25°31'58.38"N	83°15'54.43"E	0.36
65.	65	25°32'54.94"N	83°16'9.57"E	0.26
66.	66	25°31'59.32"N	83°17'22.24"E	1.18
67.	67	25°31'59.59"N	83°18'12.34"E	0.32
68.	68	25°30'41.35"N	83°18'12.94"E	0.57
69.	69	25°30'25.98"N	83°19'12.40"E	0.67
70.	70	25°32'22.49"N	83°20'53.37"E	0.53
71.	71	25°31'19.43"N	83°20'14.26"E	0.45
72.	72	25°30'48.99"N	83°19'41.81"E	1.98
73.	73	25°30'13.87"N	83°19'16.37"E	0.60
74.	74	25°30'32.47"N	83°19'53.71"E	0.25
75.	75	25°31'28.08"N	83°20'37.01"E	1.00
76.	76	25°31'34.97"N	83°20'36.95"E	0.17
77.	77	25°31'44.39"N	83°20'49.36"E	1.11
78.	78	25°31'58.88"N	83°20'58.61"E	1.00
79.	79	25°33'11.54"N	83°21'33.69"E	0.45
80.	80	25°31'40.81"N	83°21'18.17"E	0.38
81.	81	25°31'18.40"N	83°20'50.83"E	0.56
82.	82	25°30'25.30"N	83°20'34.25"E	0.26

83.	83	25°30'20.29"N	83°20'39.82"E	0.57
84.	84	25°31'15.08"N	83°21'40.96"E	0.83
85.	85	25°31'40.73"N	83°21'43.85"E	0.54
86.	86	25°33'13.34"N	83°22'52.24"E	0.35
87.	87	25°33'9.33"N	83°22'54.81"E	0.27
88.	88	25°33'7.67"N	83°23'4.56"E	0.25
89.	89	25°33'7.51"N	83°23'16.51"E	0.38
90.	90	25°31'40.42"N	83°22'44.76"E	0.34
91.	91	25°31'35.24"N	83°22'51.70"E	0.32
92.	92	25°32'52.23"N	83°23'23.02"E	1.24
93.	93	25°33'10.26"N	83°23'39.79"E	0.43
94.	94	25°33'2.72"N	83°23'53.04"E	0.23
95.	95	25°32'6.03"N	83°23'49.67"E	1.18
96.	96	25°30'43.22"N	83°24'8.15"E	0.85
97.	97	25°29'53.84"N	83°24'16.15"E	0.23
98.	98	25°32'14.21"N	83°25'0.71"E	0.31
99.	99	25°32'10.98"N	83°25'17.75"E	0.91
100.	100	25°31'43.14"N	83°25'19.57"E	0.47
101.	101	25°29'54.01"N	83°24'47.96"E	0.15
102.	102	25°31'0.27"N	83°25'23.04"E	0.74
103.	103	25°30'30.49"N	83°24'43.73"E	1.43
104.	104	25°32'31.63"N	83°26'6.98"E	0.17
105.	105	25°32'18.74"N	83°26'3.01"E	0.63
106.	106	25°30'14.34"N	83°25'4.83"E	0.66
107.	107	25°29'21.48"N	83°25'20.97"E	0.67
108.	108	25°30'38.04"N	83°25'49.79"E	0.71
109.	109	25°30'56.70"N	83°26'3.94"E	1.14
110.	110	25°31'41.03"N	83°27'0.06"E	0.91
111.	111	25°31'35.28"N	83°26'53.33"E	1.24
112.	112	25°29'24.49"N	83°25'58.12"E	0.67
113.	113	25°29'21.39"N	83°26'42.85"E	0.52
114.	114	25°32'32.70"N	83°27'45.60"E	0.93
115.	115	25°33'58.40"N	83°28'2.06"E	0.32

116.	116	25°34'26.65"N	83°28'36.30"E	1.55
117.	117	25°27'46.96"N	83°27'15.90"E	0.30
118.	118	25°27'51.44"N	83°27'22.70"E	0.19
119.	119	25°29'20.02"N	83°27'45.26"E	0.69
120.	120	25°31'0.04"N	83°28'2.79"E	0.50
121.	121	25°31'25.57"N	83°28'14.87"E	0.87
122.	122	25°31'20.15"N	83°28'29.77"E	0.71
123.	123	25°31'8.59"N	83°29'0.29"E	0.72
124.	124	25°31'7.69"N	83°28'42.71"E	0.41
125.	125	25°31'20.12"N	83°28'43.57"E	0.64
126.	126	25°32'27.20"N	83°29'17.54"E	0.62
127.	127	25°33'15.51"N	83°29'34.00"E	0.43
128.	128	25°32'34.18"N	83°29'43.73"E	1.20
129.	129	25°32'24.39"N	83°29'51.05"E	0.12
130.	130	25°31'31.97"N	83°29'29.14"E	1.0
131.	131	25°28'16.96"N	83°28'22.20"E	0.41
132.	132	25°27'51.30"N	83°28'37.46"E	0.38
133.	133	25°27'33.38"N	83°28'19.26"E	0.65
134.	134	25°27'42.95"N	83°28'18.39"E	0.26
135.	135	25°25'49.82"N	83°29'35.61"E	0.60
136.	136	25°31'45.93"N	83°30'31.36"E	6.22
137.	137	25°32'31.61"N	83°30'58.27"E	0.68
138.	138	25°34'46.36"N	83°30'44.43"E	1.77
139.	139	25°35'7.53"N	83°31'21.79"E	0.41
140.	140	25°35'42.68"N	83°31'16.18"E	1.68
141.	141	25°36'0.58"N	83°31'36.56"E	0.39
142.	142	25°35'43.84"N	83°31'35.49"E	2.12
143.	143	25°35'35.00"N	83°31'38.85"E	5.88
144.	144	25°35'44.27"N	83°31'50.15"E	0.18
145.	145	25°34'27.05"N	83°31'36.96"E	0.53
146.	146	25°26'12.73"N	83°30'0.63"E	0.33
147.	147	25°25'38.93"N	83°30'0.99"E	0.42
148.	148	25°32'46.46"N	83°32'5.03"E	0.39

149.	149	25°32'52.06"N	83°32'9.37"E	0.24
150.	150	25°33'14.48"N	83°32'12.90"E	5.50
151.	151	25°33'46.61"N	83°32'23.10"E	0.42
152.	152	25°33'54.00"N	83°31'56.39"E	0.35
153.	153	25°33'56.76"N	83°32'23.95"E	0.48
154.	154	25°34'35.81"N	83°32'11.65"E	1.49
155.	155	25°35'54.60"N	83°32'17.96"E	0.96
156.	156	25°36'37.88"N	83°33'11.13"E	1.57
157.	157	25°35'48.49"N	83°33'25.69"E	0.63
158.	158	25°34'39.63"N	83°32'49.20"E	1.10
159.	159	25°21'40.00"N	83°32'57.29"E	0.84
160.	160	25°21'50.62"N	83°32'38.10"E	0.50
161.	161	25°21'47.23"N	83°33'9.14"E	2.85
162.	162	25°24'45.45"N	83°33'24.46"E	0.85
163.	163	25°24'50.92"N	83°33'33.13"E	0.28
164.	164	25°25'3.46"N	83°33'23.46"E	0.56
165.	165	25°25'6.60"N	83°33'26.46"E	0.31
166.	166	25°25'8.61"N	83°33'32.35"E	0.69
167.	167	25°27'4.43"N	83°33'52.01"E	0.23
168.	168	25°29'51.83"N	83°34'6.08"E	0.36
169.	169	25°29'57.11"N	83°33'56.58"E	0.23
170.	170	25°30'26.63"N	83°33'42.67"E	0.55
171.	171	25°30'38.11"N	83°34'5.96"E	1.79
172.	172	25°33'57.48"N	83°33'25.81"E	1.32
173.	173	25°34'39.59"N	83°33'56.05"E	1.00
174.	174	25°35'1.57"N	83°33'54.50"E	1.54
175.	175	25°35'3.65"N	83°34'19.83"E	3.00
176.	176	25°35'8.44"N	83°34'21.60"E	1.28
177.	177	25°35'15.82"N	83°33'51.28"E	1.10
178.	178	25°35'29.89"N	83°34'0.09"E	0.42
179.	179	25°35'51.61"N	83°34'10.52"E	0.57
180.	180	25°36'9.29"N	83°33'47.23"E	0.37
181.	181	25°36'52.40"N	83°33'57.55"E	0.30

182.	182	25°37'9.74"N	83°33'58.41"E	0.61
183.	183	25°37'53.82"N	83°35'11.77"E	1.10
184.	184	25°37'2.13"N	83°34'23.13"E	2.90
185.	185	25°37'9.10"N	83°34'42.34"E	0.74
186.	186	25°36'21.79"N	83°35'14.39"E	0.70
187.	187	25°35'45.61"N	83°34'40.66"E	0.87
188.	188	25°35'36.12"N	83°34'23.30"E	1.84
189.	189	25°35'16.42"N	83°34'49.55"E	0.97
190.	190	25°34'59.70"N	83°34'50.18"E	1.97
191.	Pahar Kha ka Pokhara	25°34'50.09"N	83°34'26.16"E	1.66
192.	192	25°34'39.16"N	83°34'21.73"E	1.14
193.	193	25°34'51.04"N	83°34'55.17"E	0.55
194.	194	25°31'1.63"N	83°35'0.81"E	0.56
195.	195	25°30'54.86"N	83°35'7.77"E	1.12
196.	196	25°31'1.37"N	83°35'11.71"E	1.00
197.	197	25°29'11.00"N	83°34'29.86"E	0.87
198.	198	25°29'11.33"N	83°34'21.72"E	0.75
199.	199	25°29'17.71"N	83°34'33.90"E	0.46
200.	200	25°28'58.63"N	83°34'14.64"E	0.37
201.	201	25°27'9.15"N	83°34'27.34"E	0.80
202.	202	25°25'21.01"N	83°34'15.04"E	1.17
203.	203	25°24'54.95"N	83°34'59.55"E	0.41
204.	204	25°24'51.32"N	83°34'58.41"E	0.48
205.	205	25°20'59.40"N	83°34'55.34"E	0.49
206.	206	25°21'14.42"N	83°34'28.44"E	0.51
207.	207	25°20'12.64"N	83°34'0.85"E	0.70
208.	208	25°21'16.52"N	83°35'43.16"E	0.61
209.	209	25°23'7.98"N	83°35'57.98"E	1.28
210.	210	25°23'45.46"N	83°35'44.66"E	0.41
211.	211	25°24'17.38"N	83°35'46.39"E	0.46
212.	212	25°24'55.72"N	83°35'57.25"E	0.66
213.	213	25°25'26.82"N	83°35'45.91"E	0.81
214.	214	25°26'1.45"N	83°36'7.62"E	0.84

215.	215	25°26'31.93"N	83°36'21.66"E	0.44
216.	216	25°26'36.51"N	83°36'2.34"E	0.47
217.	217	25°27'44.47"N	83°35'53.42"E	3.1
218.	218	25°28'34.99"N	83°36'7.89"E	2.64
219.	219	25°29'3.92"N	83°35'54.39"E	0.68
220.	220	25°30'56.03"N	83°35'27.43"E	2.27
221.	221	25°31'19.63"N	83°35'51.85"E	1.00
222.	222	25°31'23.65"N	83°35'44.07"E	1.69
223.	223	25°31'25.78"N	83°35'15.23"E	1.55
224.	224	25°31'26.53"N	83°35'26.06"E	1.87
225.	225	25°32'14.88"N	83°36'19.83"E	0.56
226.	226	25°32'51.64"N	83°36'2.36"E	0.71
227.	227	25°35'24.93"N	83°35'44.83"E	0.62
228.	228	25°35'37.03"N	83°35'51.77"E	1.18
229.	229	25°35'52.38"N	83°35'29.48"E	0.65
230.	230	25°35'49.68"N	83°35'38.43"E	0.62
231.	231	25°35'52.41"N	83°35'39.25"E	0.88
232.	293	25°36'18.63"N	83°36'15.12"E	1.18
233.	294	25°36'35.77"N	83°36'0.80"E	1.00
234.	295	25°36'33.52"N	83°36'6.95"E	0.77
235.	296	25°36'35.40"N	83°36'16.92"E	0.60
236.	293	25°37'12.37"N	83°35'26.39"E	0.65
237.	294	25°38'6.94"N	83°36'19.60"E	0.45
238.	295	25°39'28.20"N	83°35'52.82"E	0.61
239.	296	25°39'45.09"N	83°36'47.12"E	1.60
240.	293	25°39'58.49"N	83°37'27.18"E	0.43
241.	294	25°38'3.51"N	83°36'25.55"E	0.41
242.	295	25°38'2.83"N	83°36'29.10"E	0.80
243.	296	25°37'59.02"N	83°36'46.93"E	0.78
244.	293	25°37'29.94"N	83°36'40.90"E	0.63
245.	294	25°36'38.34"N	83°36'48.24"E	0.62
246.	295	25°36'33.70"N	83°37'18.16"E	0.80
247.	296	25°36'33.79"N	83°37'34.84"E	0.88

248.	293	25°34'23.98"N	83°37'13.39"E	0.47
249.	294	25°33'47.16"N	83°36'55.18"E	1.47
250.	295	25°33'9.81"N	83°37'32.24"E	2.46
251.	296	25°33'4.20"N	83°37'17.42"E	0.87
252.	293	25°32'54.73"N	83°37'9.58"E	0.42
253.	294	25°32'33.82"N	83°37'1.23"E	1.27
254.	295	25°27'53.56"N	83°36'54.17"E	0.41
255.	296	25°27'38.79"N	83°36'59.29"E	0.51
256.	293	25°27'27.89"N	83°36'41.57"E	0.53
257.	294	25°25'52.16"N	83°37'9.85"E	0.31
258.	295	25°26'0.34"N	83°37'16.56"E	1.45
259.	296	25°25'10.09"N	83°37'21.83"E	0.54
260.	260	25°24'5.72"N	83°37'1.94"E	2.82
261.	261	25°24'17.48"N	83°36'42.72"E	0.44
262.	262	25°24'13.83"N	83°36'45.51"E	0.27
263.	263	25°24'10.29"N	83°36'45.18"E	0.25
264.	264	25°24'6.51"N	83°36'45.93"E	0.49
265.	265	25°23'48.24"N	83°37'14.56"E	0.77
266.	266	25°22'39.13"N	83°36'36.20"E	1.42
267.	267	25°22'33.47"N	83°36'38.24"E	0.14
268.	268	25°22'23.67"N	83°36'33.55"E	0.34
269.	269	25°39'45.05"N	83°37'51.32"E	0.96
270.	270	25°39'22.07"N	83°38'28.10"E	1.40
271.	271	25°38'54.43"N	83°37'43.02"E	1.27
272.	272	25°37'56.25"N	83°38'41.97"E	1.13
273.	273	25°37'13.27"N	83°38'19.45"E	0.44
274.	274	25°37'21.25"N	83°38'25.85"E	0.87
275.	275	25°33'32.09"N	83°38'41.11"E	0.42
276.	276	25°33'11.07"N	83°38'29.15"E	1.20
277.	277	25°31'46.14"N	83°38'7.42"E	0.42
278.	278	25°31'7.08"N	83°38'5.15"E	0.54
279.	279	25°34'53.83"N	83°39'11.85"E	0.25
280.	280	25°35'1.82"N	83°39'4.55"E	0.23

281.	281	25°37'41.77"N	83°39'7.25"E	0.65
282.	282	25°37'54.58"N	83°39'4.30"E	1.47
283.	283	25°37'44.37"N	83°40'3.30"E	0.31
284.	284	25°37'44.68"N	83°39'58.16"E	0.47
285.	285	25°37'51.90"N	83°39'55.31"E	0.52
286.	286	25°37'54.47"N	83°39'55.15"E	0.48
287.	287	25°39'41.12"N	83°39'13.02"E	0.58
288.	288	25°39'20.09"N	83°40'2.82"E	0.36
289.	289	25°39'20.05"N	83°39'16.41"E	0.37
290.	290	25°39'20.32"N	83°39'16.00"E	0.36
291.	291	25°39'34.29"N	83°39'22.44"E	0.36
292.	292	25°39'28.54"N	83°39'33.22"E	0.17
293.	293	25°39'39.57"N	83°39'30.45"E	0.36
294.	294	25°39'38.86"N	83°39'45.23"E	0.41
295.	295	25°39'36.06"N	83°39'50.19"E	0.30
296.	296	25°40'2.08"N	83°39'32.54"E	0.53
297.	297	25°40'3.71"N	83°40'14.13"E	0.37
298.	298	25°39'58.98"N	83°40'13.42"E	0.36
299.	299	25°40'34.83"N	83°40'9.76"E	0.49
300.	300	25°40'32.77"N	83°40'26.84"E	1.39
301.	301	25°39'51.44"N	83°41'24.57"E	0.50
302.	302	25°39'28.50"N	83°41'48.11"E	0.34
303.	303	25°39'0.63"N	83°40'28.70"E	0.63
304.	304	25°38'54.35"N	83°40'30.16"E	0.27
305.	305	25°39'2.01"N	83°40'43.67"E	0.37
306.	306	25°38'28.23"N	83°41'46.39"E	0.67
307.	307	25°38'51.69"N	83°41'21.32"E	1.00
308.	308	25°37'7.34"N	83°41'36.97"E	0.92
309.	309	25°32'32.79"N	83°40'25.86"E	0.24
310.	310	25°30'9.56"N	83°41'33.75"E	0.69
311.	311	25°28'58.88"N	83°41'56.75"E	0.91
312.	312	25°28'55.15"N	83°42'43.97"E	1.55
313.	313	25°29'3.63"N	83°42'41.28"E	0.81

314.	314	25°29'9.82"N	83°41'55.48"E	0.63
315.	315	25°29'14.93"N	83°41'55.68"E	0.75
316.	316	25°29'26.64"N	83°42'28.71"E	0.71
317.	317	25°29'25.78"N	83°42'37.15"E	0.45
318.	318	25°29'14.17"N	83°42'58.47"E	0.67
319.	319	25°29'30.32"N	83°42'54.60"E	0.68
320.	320	25°29'35.14"N	83°42'32.55"E	1.00
321.	321	25°29'40.95"N	83°42'10.06"E	0.50
322.	322	25°29'44.66"N	83°42'14.86"E	0.28
323.	323	25°29'51.05"N	83°42'53.30"E	1.22
324.	324	25°29'58.19"N	83°42'7.83"E	0.72
325.	325	25°30'6.60"N	83°42'25.12"E	0.47
326.	326	25°31'42.75"N	83°42'18.73"E	0.36
327.	327	25°32'10.10"N	83°43'4.43"E	4.69
328.	328	25°32'15.60"N	83°43'2.95"E	0.46
329.	329	25°32'14.55"N	83°43'12.76"E	1.00
330.	330	25°32'19.94"N	83°43'9.43"E	0.95
331.	331	25°32'23.50"N	83°42'57.29"E	0.61
332.	332	25°32'23.50"N	83°42'39.64"E	1.99
333.	333	25°32'31.61"N	83°42'45.43"E	3.44
334.	334	25°32'29.16"N	83°42'40.83"E	0.33
335.	335	25°33'24.33"N	83°41'52.51"E	0.65
336.	336	25°36'56.57"N	83°41'56.49"E	1.10
337.	337	25°37'4.47"N	83°41'58.59"E	0.81
338.	338	25°37'8.36"N	83°43'9.46"E	0.45
339.	339	25°37'6.00"N	83°43'22.05"E	0.66
340.	340	25°37'27.88"N	83°42'22.35"E	0.75
341.	241	25°37'19.93"N	83°42'51.79"E	0.41
342.	242	25°37'23.46"N	83°42'22.37"E	0.65
343.	343	25°38'11.68"N	83°42'34.42"E	0.37
344.	344	25°38'7.85"N	83°42'45.12"E	0.45
345.	345	25°38'5.04"N	83°42'57.31"E	0.23
346.	346	25°38'4.87"N	83°43'3.85"E	0.30

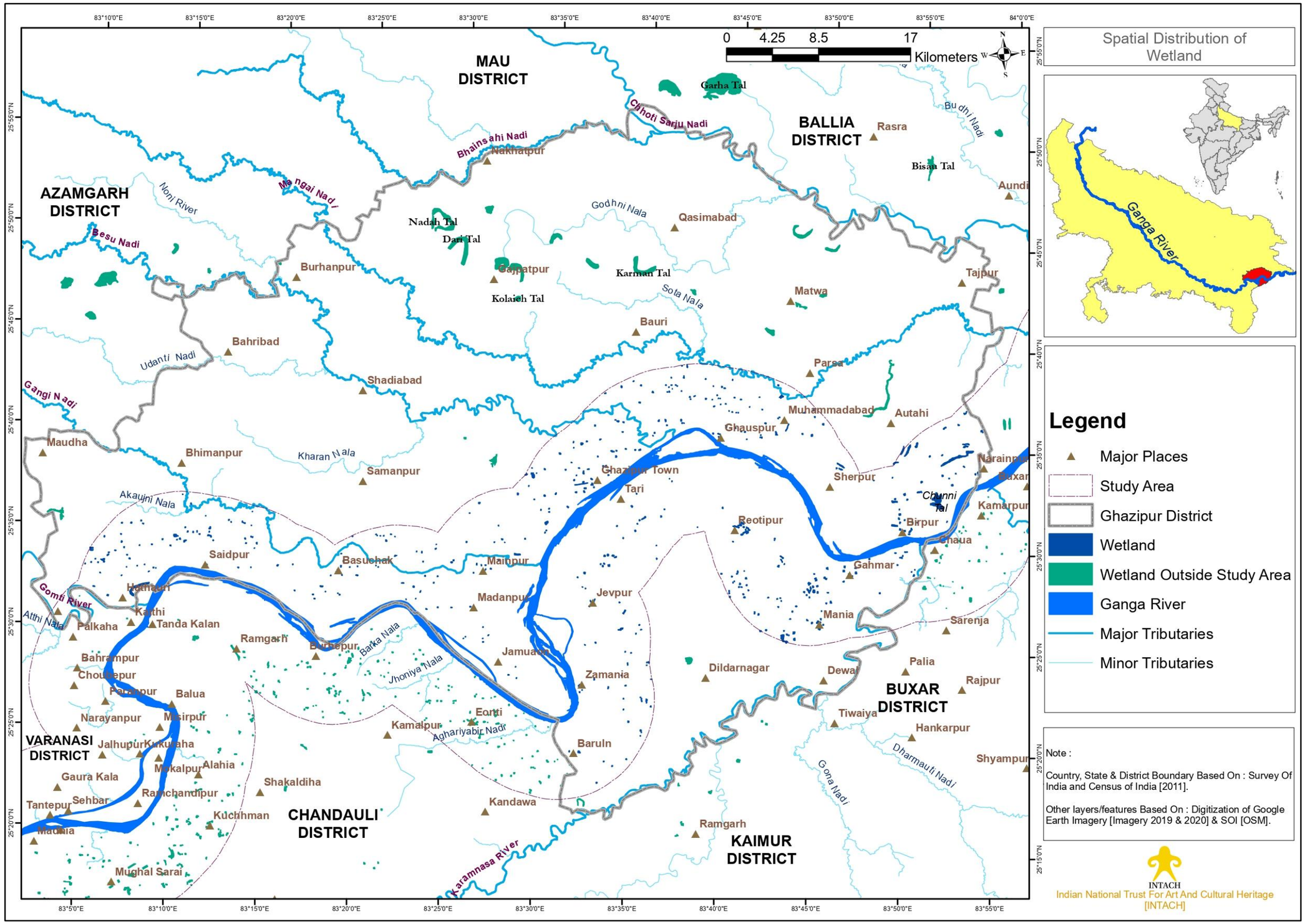
347.	347	25°38'32.66"N	83°42'8.49"E	0.31
348.	348	25°38'33.68"N	83°42'24.61"E	0.48
349.	349	25°38'42.82"N	83°43'15.62"E	0.68
350.	350	25°38'49.54"N	83°42'54.49"E	0.57
351.	351	25°38'50.64"N	83°42'7.82"E	0.34
352.	352	25°38'50.97"N	83°42'1.84"E	0.21
353.	353	25°38'48.76"N	83°41'42.00"E	0.31
354.	354	25°39'0.92"N	83°41'58.66"E	0.40
355.	355	25°39'20.57"N	83°42'24.26"E	0.87
356.	356	25°39'23.97"N	83°42'16.66"E	0.86
357.	357	25°39'43.06"N	83°42'52.94"E	0.43
358.	358	25°38'46.69"N	83°44'17.08"E	0.29
359.	359	25°38'19.84"N	83°43'42.69"E	0.38
360.	360	25°38'9.15"N	83°44'23.21"E	0.45
361.	361	25°37'27.89"N	83°44'30.62"E	0.92
362.	362	25°36'44.42"N	83°43'25.86"E	0.35
363.	363	25°36'46.75"N	83°44'10.59"E	0.30
364.	364	25°36'45.76"N	83°44'15.28"E	0.43
365.	365	25°36'53.47"N	83°44'12.87"E	0.31
366.	366	25°28'49.77"N	83°44'1.63"E	0.60
367.	367	25°28'7.19"N	83°43'13.95"E	0.94
368.	368	25°28'0.84"N	83°43'26.51"E	1.27
369.	369	25°27'13.29"N	25°28'0.84"N	1.00
370.	370	25°27'11.22"N	83°43'29.42"E	1.21
371.	371	25°26'37.16"N	83°44'43.09"E	12.3
372.	372	25°26'55.76"N	83°44'54.67"E	0.94
373.	373	25°26'53.25"N	83°45'1.60"E	0.40
374.	374	25°26'39.16"N	83°45'18.37"E	1.98
375.	375	25°26'58.73"N	83°45'18.31"E	2.90
376.	376	25°27'7.39"N	83°44'45.97"E	0.60
377.	377	25°27'41.75"N	83°45'8.83"E	0.50
378.	378	25°28'2.76"N	83°45'17.94"E	0.85
379.	379	25°28'19.17"N	83°44'32.61"E	0.69

380.	380	25°28'18.01"N	83°45'31.65"E	0.90
381.	381	25°28'36.79"N	83°44'43.45"E	0.41
382.	382	25°28'43.29"N	83°44'31.73"E	0.35
383.	383	25°28'45.21"N	83°44'41.84"E	0.26
384.	384	25°30'21.32"N	83°44'42.18"E	1.65
385.	385	25°30'25.52"N	83°45'1.74"E	0.83
386.	386	25°30'33.56"N	83°44'55.01"E	0.45
387.	387	25°30'43.86"N	83°44'57.70"E	1.50
388.	388	25°31'43.16"N	83°44'35.83"E	0.76
389.	389	25°36'54.63"N	83°45'3.87"E	3.00
390.	390	25°37'9.09"N	83°45'41.02"E	2.59
391.	391	25°37'40.02"N	83°45'13.38"E	0.36
392.	392	25°37'42.95"N	83°45'17.82"E	0.40
393.	393	25°38'43.52"N	83°45'28.09"E	4.76
394.	394	25°39'17.82"N	83°45'20.85"E	1.10
395.	395	25°37'51.37"N	83°46'43.18"E	0.53
396.	396	25°37'51.02"N	83°46'38.86"E	0.17
397.	397	25°36'48.74"N	83°46'29.52"E	0.80
398.	398	25°29'24.15"N	83°46'17.80"E	2.67
399.	399	25°28'58.89"N	83°46'0.50"E	1.10
400.	400	25°28'41.57"N	83°46'16.67"E	0.73
401.	401	25°28'48.58"N	83°46'8.34"E	0.54
402.	402	25°29'5.00"N	83°46'12.09"E	2.25
403.	403	25°29'7.12"N	83°46'22.73"E	1.64
404.	404	25°28'58.74"N	83°46'32.20"E	4.66
405.	405	25°29'11.60"N	83°46'30.84"E	1.81
406.	406	25°29'13.58"N	83°46'44.68"E	1.28
407.	407	25°37'36.80"N	83°47'13.96"E	0.88
408.	408	25°37'57.00"N	83°47'12.36"E	1.19
409.	409	25°37'13.23"N	83°47'39.74"E	1.79
410.	410	25°36'42.95"N	83°47'0.16"E	2.43
411.	411	25°30'4.46"N	83°47'20.97"E	2.00
412.	412	25°29'33.91"N	83°47'16.22"E	2.73

413.	413	25°29'50.14"N	83°46'37.08"E	0.46
414.	414	25°29'37.04"N	83°46'39.97"E	1.18
415.	415	25°29'31.51"N	83°46'42.20"E	1.15
416.	416	25°28'20.73"N	83°47'10.79"E	0.70
417.	417	25°28'23.61"N	83°47'25.77"E	1.70
418.	418	25°27'58.90"N	83°46'53.30"E	0.37
419.	419	25°27'33.90"N	83°46'4.84"E	1.10
420.	420	25°27'25.32"N	83°46'19.20"E	1.49
421.	421	25°27'5.98"N	83°46'42.10"E	1.63
422.	422	25°27'9.21"N	83°46'45.90"E	1.92
423.	423	25°27'13.86"N	83°46'48.81"E	0.68
424.	424	25°27'17.02"N	83°46'56.01"E	0.63
425.	425	25°27'24.72"N	83°46'35.55"E	0.46
426.	426	25°27'28.81"N	83°46'40.10"E	0.78
427.	427	25°27'24.67"N	83°46'47.64"E	0.42
428.	428	25°27'34.05"N	83°46'49.02"E	0.70
429.	429	25°28'55.81"N	83°46'44.77"E	1.29
430.	430	25°28'51.49"N	83°47'17.89"E	0.65
431.	431	25°35'7.23"N	83°48'29.18"E	0.58
432.	432	25°34'54.92"N	83°48'29.01"E	1.29
433.	433	25°35'5.32"N	83°48'31.30"E	3.23
434.	434	25°29'53.51"N	83°48'14.62"E	1.99
435.	435	25°30'4.27"N	83°48'17.88"E	1.61
436.	436	25°29'45.14"N	83°48'54.02"E	2.00
437.	437	25°29'41.72"N	83°48'31.68"E	0.92
438.	438	25°29'35.94"N	83°48'40.77"E	0.79
439.	439	25°29'59.70"N	83°48'54.36"E	1.79
440.	440	25°29'21.81"N	83°48'12.62"E	0.72
441.	441	25°30'23.43"N	83°49'40.90"E	1.00
442.	442	25°28'40.48"N	83°50'7.97"E	0.90
443.	443	25°34'16.83"N	83°50'12.93"E	0.32
444.	444	25°30'0.81"N	83°51'12.08"E	0.77
445.	445	25°30'36.40"N	83°51'8.19"E	0.62

446.	Wetland in Birpur	25°31'58.59"N	83°51'10.93"E	5.39
447.	Purana Pokhara	25°33'8.83"N	83°51'15.63"E	5.19
448.	Sacred wetland	25°33'16.36"N	83°51'18.93"E	1.17
449.	449	25°35'4.88"N	83°51'27.73"E	2.59
450.	450	25°29'26.22"N	83°52'3.27"E	1.22
451.	451	25°29'37.51"N	83°51'56.11"E	0.32
452.	452	25°29'42.52"N	83°52'7.26"E	0.25
453.	453	25°30'20.45"N	83°51'28.34"E	0.57
454.	454	25°30'26.39"N	83°51'31.34"E	0.55
455.	455	25°30'21.84"N	83°51'23.06"E	0.83
456.	456	25°30'37.61"N	83°51'45.77"E	0.41
457.	457	25°30'37.55"N	83°51'39.29"E	0.47
458.	458	25°31'45.68"N	83°51'28.30"E	1.48
459.	459	25°31'40.16"N	83°51'42.81"E	1.30
460.	460	25°31'36.01"N	83°51'33.22"E	1.24
461.	461	25°31'30.25"N	83°51'55.64"E	0.95
462.	462	25°31'35.43"N	83°51'57.60"E	0.48
463.	463	25°31'38.91"N	83°52'1.11"E	0.85
464.	464	25°31'43.40"N	83°52'5.38"E	1.22
465.	465	25°32'4.21"N	83°52'9.59"E	0.89
466.	466	25°32'5.86"N	83°51'29.39"E	0.89
467.	467	25°32'18.03"N	83°51'26.99"E	1.25
468.	468	25°32'12.52"N	83°51'44.82"E	0.65
469.	469	25°32'29.84"N	83°51'30.35"E	2.14
470.	470	25°32'2.00"N	83°52'26.94"E	0.71
471.	471	25°32'44.73"N	83°51'30.56"E	0.45
472.	472	25°33'12.28"N	83°51'57.99"E	1.00
473.	473	25°33'27.80"N	83°51'51.13"E	1.85
474.	474	25°34'20.36"N	83°51'14.93"E	0.40
475.	475	25°34'1.82"N	83°52'48.44"E	1.54
476.	476	25°33'31.58"N	83°52'40.96"E	3.41
477.	Pallia Pond	25°32'53.41"N	83°53'38.20"E	76.9
478.	478	25°31'59.96"N	83°54'3.75"E	0.50

479.	479	25°33'46.63"N	83°54'28.44"E	1.93
480.	480	25°34'6.58"N	83°54'20.37"E	0.52
481.	481	25°34'16.68"N	83°53'59.40"E	1.39
482.	482	25°35'4.68"N	83°54'36.29"E	45.0
483.	483	25°35'16.98"N	83°53'21.81"E	0.75
484.	484	25°35'17.90"N	83°54'2.86"E	0.52
485.	485	25°36'37.69"N	83°54'16.87"E	1.37
486.	586	25°36'44.07"N	83°55'2.52"E	0.73
487.	487	25°35'40.01"N	83°55'21.58"E	2.55
488.	488	25°35'45.72"N	83°55'26.67"E	2.20
489.	489	25°34'39.54"N	83°55'10.98"E	0.59
490.	490	25°34'20.44"N	83°54'43.09"E	0.47
491.	491	25°37'16.47"N	83°55'27.62"E	1.44
492.	492	25°36'20.71"N	83°56'18.11"E	2.17
493.	493	25°34'14.50"N	83°55'46.60"E	0.86
494.	494	25°34'12.59"N	83°55'57.78"E	1.15
495.	495	25°34'18.36"N	83°55'55.41"E	0.62
496.	496	25°35'36.63"N	83°51'53.44"E	5.94
497.	497	25°35'35.63"N	83°52'9.81"E	11.0
498.	498	25°35'50.76"N	83°52'40.09"E	4.90
499.	499	25°30'11.64"N	83°42'27.71"E	0.71
500.	500	25°30'13.00"N	83°42'48.97"E	0.22
Total Area (Ha)				**663.32**



Map 6 : Spatial Distribution Of Water Bodies Within Study Area

8.2 **Oxbow Lake :** An oxbow lake spread in an area of about 40.6 ha was present near Kharona village in Ghazipur Distt. [Refer Map 7; Image 17]. This lake is very close to Ganga-Gomti confluence at the borders of Ghazipur and Varanasi Distt.s. Locally known as 'Suta/Sota', this oxbow lake was formed few decades ago due to the shift in course of Gomti River as reiterated by the local interlocutors. This lake is completely surrounded by agricultural fields which are used for growing crops such as rice, bajra, mustard, urad, arhar and various vegetables. Some residents of nearby villages are also involved in fishing from this lake with the common fish caught being chinese carp and catfish. Sparse growth of trees such as *Acacia nilotica* (Babool), *Azadirachta indica* (Neem), *Syzigium cumini* (Jamun), *Dalbergia sisoo* (Shisham) and *Ficus* spp. were observed along the lake [Image 18]. This lake receives water mainly during monsoon season and remains filled throughout the year thereby, being an important water source for surrounding villages.

Image 17 : Location Of Oxbow Lake [25°31'23.76"N; 83° 9'41.67"E]

Image 18 : Oxbow Lake As Observed On 29th October, 2021

8.3 **Pallia Pond :** This is the largest wetland in study region located close to Pallia Ghat in the easternmost part of Ghazipur Distt. just short of its border with Ballia Distt. [Refer Map 7, Image 19]. Spread in an area of about 76.9 ha, this irregularly shaped wetland is surrounded by extensive agricultural fields mainly growing rice, wheat, mustard and bajra crops. During the field survey, this wetland was observed closer to Loharpur village and was found to be in marshy condition with dense growth of water hyacinth along with other aquatic plants and grasses. This wetland also supports birds such as Purple Heron, purple swamp hen and cattle egret as observed during the survey [Image 20]. The interlocutors claimed that many other birds visited this site during winter season. Despite this being an important wetland for the study region, it is under immense pressure from the continuously expanding agriculture in its surroundings. The interlocutors opined their interests in expanding their fields further into the wetland as they felt that it served no specific purpose for them. **Hence, it is a matter of urgent concern to safeguard this wetland in conjunction with the local authorities concerned and local residents.**

Image 19 : Location Of Pallia Pond [25°32'53.41"N; 83°53'38.20"E]

Image 20 : Pallia Pond As Observed On 26th October, 2021

8.4 **Pahar Kha ka Pokhara :** This is an old pond believed to have been built during the Mughal period. It is located in the heart of Ghazipur town [Refer Map 7; Image 21] and was a popular spot for the local residents and tourists alike. However, with the passage of time this pond lies in neglected state having influx of liquid and solid waste owing to which the water gives foul odor. There is a Hanuman temple along the main road situated on the edge of this water body. The interlocutor revealed that pilgrims used to visit this pond for bathing on festivals and auspicious occasions till few years back. But as the condition of this pond deteriorated, people have ceased to visit here. Urgent attention is required to safeguard this water body which has immense potential as a tourist attraction.

Image 21 : Location Of Pahar Kha Ka Pokhara [25°34'50.09"N 83°34'26.16"E]

8.5 **Wetlands in Taraon :** Two irregular shaped wetlands were observed in Taraon village of Ghazipur Distt. situated close to each other [Refer Map 7; Image 22]. The larger among these two wetlands was the village pond also known locally as 'Purana Pokhara' [Image 23] spread in an area of about 5.19 ha and whose water was chiefly used for domestic purposes. According to interlocutors, it was also given on lease for rearing fish such as rohu, bhakur and tengara. The other smaller pond was spread in an area of about 1.17 ha and is believed to be sacred and very old water body having a Shiva temple along its bank [Image 24]. However, the temple was in a dilapidated condition indicating that no care of any kind was being taken by the local residents.

Image 22 : Location Of The Wetlands In Taraon Village
[25°33'8.83"N; 83°51'15.63"E& 25° 33' 16.36" N; 83°51'18.93"E]

Image 23 : Purana Pokhara In Taraon Village As Observed On 26th October, 2021

Image 24 : Sacred Pond In Taraon Village As Observed On 26th October, 2021

8.6 **Wetland in Birpur :** A roughly rectangular shaped wetland was observed in Birpur village of study region [Refer Map 7; Images 25-26] spread in an area of about 5.39 ha. Upon interaction, the interlocutors reiterated that this wetland receives water during monsoon season but almost dries up during remaining part of the year. Fish catching was earlier prevalent from this wetland but has now decreased considerably. The water is generally used only for domestic purposes such as bathing cattle, washing clothes and utensils.

Image 25 : Location Of Wetland In Birpur Village [25° 31' 58.59" N; 83°51'10.93"E]

Image 26 : Birpur Wetland As Observed On 26th October, 2021

9.0 Riparian Flora Along Ganga River In Ghazipur Distt.

9.1 The riparian areas, lying between the aquatic and the terrestrial habitats, serve as functional interfaces within the landscapes, mediating energy and matter between these two ecosystems. With dynamic environmental conditions and ecological processes, these areas tend to harbor rich biodiversity. A major component of this biodiversity is the plant communities growing along the river bank which are interacting with both terrestrial and aquatic ecosystems. The riparian vegetation is significant in the overall ecology and environmental aspects of the region owing to its important roles in soil conservation, harboring faunal diversity and providing livelihood resources [Groffman *et al.*, 1990; Castelle *et al.,* 1994].

9.2 Till some time ago, no proper systematic sampling had been undertaken or record had been maintained for the riparian plant diversity all along Ganga river. There are however, some scattered but significant works of Pallis [1934], Auden [1941], Sahai [1953], Gupta [1960], Bhattacharyya and Goel [1982], Groffman *et al.* [1990], Krishanmurti [1991], Castelle *et al.* [1994], Shyam [2008], Gangwar and Joshi [2006] and Gangwar and Gangwar [2011] which have explored the biodiversity of Ganga river basin. Also, a detailed study published in the form of a book titled – "The Ganga – A Scientific Study" edited by Krishnamurti [1991] documents 475 riparian plant species from Rishikesh to Chinasura. Earlier workers have reported from Buxar to Barh, the presence of 7 shrubs, 41 herbs, 6 grasses and 2 sedges, besides these a number of tree species along the banks of river during 1987-88 (Kumar, 2001).

9.3 During the field survey the riparian vegetation was found to have patchy distribution with it being dense in few places and sparse in most [Images 27-28]. This could be attributed to the fact that agriculture is dominant in the landscape of study region especially along Ganga River and its tributaries. Shrubs and herbs were dominant in terms of growth and extent of distribution as compared to the trees. The common tree species in study region included – Mango, Peepal, Banyan, Neem and Bel Patra among which Peepal and Banyan were also found associated with various religious sites. Acacia nilotica (Babool tree)[Image 29] was abundant in the riparian regions along Ganga River. The common shrubs and herbs in the study region included – *Croton bonplandianus, Parthenium hysterophorus, Polygonum sp.* [Image 30] and *Zizyphus* sp. The floodplain grass – *Saccharum* sps. was a major component of riparian vegetation throughout with its luxuriance dominating the other flora at some sites. Some notable riparian flora are presented in Table 3.

Table 4 : Riparian Plant Species Recorded In The Study Area

Sr. No.	Botanical Name	Family	Habit	Common Name
1.	*Acacia nilotic*a (L.) Delile	Fabaceae	Tree	Babool
2.	*Aegle marmelos* (L.) Correa	Rutaceae	Tree	Bel Patra
3.	*Azadirachta indica* A.Juss.	Meliaceae	Tree	Neem
4.	*Borassus flabellifer* L.	Arecaceae	Tree	Taad
5.	*Dalbergia sissoo* Roxb. ex DC.	Fabaceae	Tree	Shisham
6.	*Ficus benghalensis*L.	Moraceae	Tree	Banyan
7.	*Ficus religiosa* L.	Moraceae	Tree	Peepal
8.	*Mangifera indica* L.	Anacardiaceae	Tree	Mango
9.	*Calotropis gigantea* (L.) Dryand.	Apocynaceae	Shrub	Safed Aak
10.	*Calotropis procera* (Aiton) Dryand.	Apocynaceae	Shrub	Aak
11.	*Lippia alba* (Mill.) N.E. Br. ex Britton & P. Wilson	Verbenaceae	Shrub	Bushy Lippia
12.	*Polygonum sp.*	Polygonaceae	Shrub	
13.	*Ricinus communis* L.	Euphorbiaceae	Shrub	Wild Castor
14.	*Zizyphus* sp.	Rhamnaceae	Shrub	Wild Ber
15.	*Achyranthes aspera* L.	Amaranthaceae	Herb	Chirchira
16.	*Amaranthus spinosus* L.	Amaranthaceae	Herb	Prickly Amaranth
17.	*Blumealacera*(Burm.f.) DC.	Asteraceae	Herb	Kakronda
18.	*Croton bonplandianus*Baill.	Euphorbiaceae	Herb	Ban Tulsi
19.	*Rumex dentatus* L.	Polygonaceae	Herb	
20.	*Parthenium hysterophorus* L.	Asteraceae	Herb	Congress Grass
21.	*Xanthium strumarium* L.	Asteraceae	Herb	Chhotav dhatura
22.	*Saccharum munja* Roxb.	Poaceae	Grass	Munj
23.	*Cyperus* sp.	Cyperaceae	Grass	
24.	*Cynodondactylon* (L.) Pers.	Poaceae	Grass	Doob/Durva
25.	*Saccharum spontaneum* L.	Poaceae	Grass	Kans/Katha
26.	*Saccharum bengalense* Retz.	Poaceae	Grass	Munj

Image 27 : Riparian Vegetation As Observed Along Ganga River Near Narainpur Village

Image 28 : Riparian Vegetation Along Ganga River As Observed Near Gahmar Village

Image 29 : *Acacia nilotica*

Image 30 : *Polygonum sp.*

10.0 Faunal Diversity In Ghazipur Distt.

10.1 **Gangetic Dolphins:** The Gangetic River Dolphin is exclusively aquatic and piscivorus, occasionally found in small groups. It is one of the three freshwater dolphin species in the world and is distributed in the Ganges–Brahmaputra–Meghna and Sangu–Karnaphuli River systems in India, Nepal, and Bangladesh (Sinha & Kannan, 2014). It has been declared as the National Aquatic Animal by Govt. of India (Sinha & Kannan, 2014) and is classified as 'Endangered' in the IUCN Red List owing to the decrease in its population during last 3-4 decades. During the field survey, maximum dolphins were sighted at Birpur ghat (short distance after Karamnasa-Ganga confluence) [Image 31] and at Ganga-Gomti Sangam Ghat. Apart from these, the presence of dolphins throughout Ganga river stretch in study region was reiterated by the interlocutors along with scattered sightings at various places.

Image 31 : Gangetic Dolphin Sighted Near Birpur Ghat

10.2 **Turtles:** Turtles form an important component of Ganga riverine biodiversity and play a critical ecological role by controlling aquatic vegetation, serve as scavengers and help maintain rivers (WII-GACMC, 2017). **During the field survey, interactions with local fishermen revealed a significant decrease (almost 80-90%) in the turtle population during last couple of decades.** According to them, turtles would be seen earlier on the sandy river banks and exposed *diaras*. However, especially since last two decades there have been negligible sightings of turtles in the study region.

10.3 **Nilgai:** The Nilgai antelope – *Boselaphus tragocamelus* is widely distributed throughout the country. However, due to prolonged breeding activity and lack of potential predators, the numbers of Nilgai have increased considerably and become locally overabundant in states of Gujarat, Bihar, Uttar Pradesh, Haryana, Punjab, Rajasthan, Madhya Pradesh and Delhi (Meena, 2017). In the due course of time, this species has been successful in adjusting to the human-altered landscapes and in many places have become serious pests of agricultural crops. The farmers in this region often complained about the large-scale damage to agricultural produce caused by nilgai but despite this they never retaliated violently towards it. The villagers often enclosed their fields with mesh nets or wires or thorny plants to prevent intrusion of nilgai and used to drive them away with the help of sticks and stones. Image 32 depicts the nilgai as spotted during the survey in study region.

Image 32 : Nilgai As Spotted In Floodplain Fields Near Mainpur Village

10.4 **Wild boar:** The Indian wild boar (*Sus scrofa* L.) also known as the wild pig is one of the widespread animals throughout the world. In recent times, wild boar has become a regular menace for farmers as it generally causes damage right from planting till the maturity of the crop (Vasudeva Rao et al., 2015).The floodplain farmers in villages such as Gauspur, Gahmar, Chitawan Patti, Loharpur, Chochakpur and Kaithi complained about the menace caused by wild boars especially to crops such as potato and onion.

They claimed that the boars destroyed entire fields sometimes resulting in huge losses and even attacked small children or some local residents who tried to drive them away. Hence, in some cases the local villagers had to resort to killing these boars in order to safeguard themselves and their agriculture produce.

10.5 Based on visual observations during field survey and interactions with the interlocutors some major fauna species recorded from study region in Ghazipur Distt. are presented in Table 5.

Table 5 : Other Important Fauna Recorded In The Study Region

Sr. No.	Common Name	Scientific Name	Conservation Status
1	Golden Jackal	*Canis aureus*	Least Concern
2	Rhesus Monkey	*Macaca mulatta*	Least Concern
3	Indian Grey Mongoose	*Herpestes edwardsii*	Least Cocern
4	**Bengal Monitor**	***Varanus bengalensis***	**Near Threatened**
5	Danaid Eggfly (Butterfly)	*Hypolimnas misippus*	Least Concern
6	Grey Pansy (Butterfly)	*Junonia atlites*	Least Concern
7	Peacock Pansy (Butterfly)	*Junonia almana*	Least Concern
8	Blue Jay (Butterfly)	*Graphium doson*	Least Concern
9	Common Mime (Butterfly)	*Papilio clytia*	Least Concern
10	Common Grass Yellow (Butterfly)	*Eurema brigitta*	Least Concern

10.8 **Avifauna Diversity:** Ganga River, with its mosaic of habitats, supports a rich diversity of avifauna which include both resident and migratory species. Some iconic and globally threatened birds such as the black-bellied tern (*Sterna acuticauda*), Indian skimmer (*Rynchops albicollis*), sarus crane (*Antigone antigone*) and riverlapwing (*Vanellus duvaucelii*) also breed on the islands, sandbars and banks of the Ganga River. During the survey in study region of Ghazipur Distt., a total of 55 different bird species were sighted, out of which 19 were wetland birds' species while remaining 36 species were of forest and grassland including some common species like House Sparrow, Indian

Jungle Crow, House Crow, Common Pigeon, Common Myna and Eurasian Collared Dove. **River Lapwing comes under Near Threatened Category and River Tern has Vulnerable status of IUCN Red List of Threatened Species.** The details of all birds recorded is presented in Table 6 and some notable birds are depicted in Images 33-35.

Table 6 : List Of Birds Recorded In The Study Region

Sr. No	Common Name	Scientific Name	Conservation Status
1.	White throated Kingfisher	*Halcyon smyrnensis*	Least Concern
2.	Pied Kingfisher	*Ceryle rudis*	Least Concern
3.	Cattle Egret	*Bubulcus ibis*	Least Concern
4.	Little Egret	*Egretta garzetta*	Least Concern
5.	Intermediate Egret	*Ardea intermedia*	Least Concern
6.	Great Egret	*Ardea alba*	Least Concern
7.	Indian Pond Heron	*Ardeola grayii*	Least Concern
8.	Grey Heron	*Ardea cinerea*	Least Concern
9.	Purple Heron	*Ardea purpurea*	Least Concern
10.	Common Greenshank	*Tringa nebularia*	Least Concern
11.	Common Sandpiper	*Actitis hypoleucos*	Least Concern
12.	Little Cormorant	*Microcarbo niger*	Least Concern
13.	Little Ringed Plover	*Charadrius dubius*	Least Concern
14.	White breasted -Waterhen	*Amaurornis phoenicurus*	Least Concern
15.	Common Moorhen	*Gallinula chloropus*	Least Concern
16.	**River Tern**	***Sterna aurantia***	**Vulnerable**
17.	Red-naped Ibis	*Pseudibis papillosa*	Least Concern
18.	Black-winged Stilt	*Himantopus himantopus*	Least Concern
19.	**River Lapwing**	***Vanellus duvaucelii***	**Near Threatened**
20.	Red-wattled Lapwing	*Vanellus indicus*	Least Concern
21.	Black Drongo	*Dicrurus macrocercus*	Least Concern
22.	Common Myna	*Acridotheres tristis*	Least Concern
23.	Bank Myna	*Acridotheres ginginianus*	Least Concern
24.	Common Stonechat	*Saxicola torquatus*	Least Concern
25.	Jungle Babbler	*Turdoides striata*	Least Concern
26.	Common Babbler	*Argya caudata*	Least Concern
27.	White Wagtail	*Motacilla alba*	Least Concern
28.	White-browed Wagtail	*Motacilla maderaspatensis*	Least Concern
29.	Asian Plain Martin	*Riparia chinensis*	Least Concern
30.	Streak-throated Swallow	*Petrochelidon fluvicola*	Least Concern
31.	Barn Swallow	*Hirundo rustica*	Least Concern
32.	House Sparrow	*Passer domesticus*	Least Concern
33.	Indian Jungle Crow	*Corvus culminatus*	Least Concern

34.	House Crow	*Corvus splendens*	Least Concern
35.	Oriental Magpie Robin	*Copsychus saularis*	Least Concern
36.	Common Pigeon	*Columba livia*	Least Concern
37.	Ashy Prinia	*Prinia socialis*	Least Concern
38.	Asian Koel	*Eudynamys scolopaceus*	Least Concern
39.	Greater Coucal	*Centropus sinensis*	Least Concern
40.	Red-whiskered Bulbul	*Pycnonotus jocosus*	Least Concern
41.	Red-vented Bulbul	*Pycnonotus cafer*	Least Concern
42.	Common Kaestral	*Falco tinnunculus*	Least Concern
43.	Black-winged kite	*Elanus caeruleus*	Least Concern
44.	Black Kite	*Milvus migrans*	Least Concern
45.	Spotted Dove	*Spilopelia* chinesis	Least Concern
46.	Eurasian Collared Dove	*Streptopelia decaocto*	Least Concern
47.	Laughing Dove	*Spilopelia senegalensis*	Least concern
48.	Red Turtle Dove	*Streptopelia tranquebarica*	Least concern
49.	Baya Weaver	*Ploceus philippinus*	Least Concern
50.	Purple Sunbird	*Cinnyris asiaticus*	Least Concern
51.	Common Hoopoe	*Upupa epops*	Least Concern
52.	Black Redstart	*Phoenicurus ochruros*	Least Concern
53.	Indian Roller	*Coracias benghalensis*	Least Concern
54.	Crested Lark	*Galerida cristata*	Least Concern
55.	Common Buttonquail	*Turnix sylvaticus*	Least Concern

Image 33 : A Flock Of Streak-Throated Swallows

Image 34 : Red-Wattled Lapwing

Image 35 : Common Greenshank

11.0 Ganga Riverine Islands/ *Diaras* In Ghazipur Distt.

11.1 The riverine fluvial islands are present in many major rivers and are defined as 'land masses within a river channel that are separated from the floodplain by water on all sides and exhibiting some kind of stability' [Osterkamp, 1998]. Such islands may not be permanent on the geologic time scale owing to the river meandering, climate change, etc. but can remain in place over decadal or century time scales and hence exhibit stability [Wyrick & Klingeman, 2011].Many irregularly shaped sand bars and few riverine islands are present in the Ganga river stretch of study region.

11.2 The biggest and most significant riverine island in the study region is roughly semi-circular [Refer Map 3; Image 36] measuring roughly about 2-4 kms long and 1-2 kms wide located close to Zamania town. The vegetation on this island mainly comprises of *Acacia nilotica* (Babool) trees and *Saccharum* sps. grasses. The grass resources on this island also form an important source of fodder for cattle from surrounding villages [Image 37]. Residents from nearby villages practice agriculture on this island with crops such as mustard, chana and various vegetables being grown here.

Image 36 : The Biggest Riverine Island In Study Region Of Ghazipur Distt.

Image 37 : Part Of This Riverine Island As Seen From Near Chitawan Patti Village on 27th October, 2021

11.3 The other riverine island observed during the survey is roughly lens shaped measuring about 3-3.5 kms long and 1-1.75 kms wide located near Gauspur village [Refer Map 3; Image 38]. Similar to the other island, the vegetation here also comprises mainly of *Acacia nilotica* trees and *Saccharum* sps. grasses. It was observed that residents from nearby villages made use of small boats to access this island for cultivating different crops. Part of this island was observed during the field near Gauspur town [Image 39].

Image 38 : A Roughly Lens Shaped Island Near Gauspur Town In Ghazipur Distt.

Image 39 : Part Of This Diara As Observed On 27th October, 2021

12.0 Fishing InGhazipur Distt.

12.1 Fish resources of Ganga River have been an important source of livelihood and food security for millions of people residing along its banks. Ganga river supports a diverse fish fauna with about 260 species reported for Indian waters (Sinha and Khan, 2001) among which about 35 species have been identified as having highest commercial value including carps (Cyprinidae), snakeheads (Channidae) and catfish (Siluriformes) (Islam *et al.*, 2006). However, today these rich fish resources are threatened by various anthropogenic activities and resulting water pollution, accumulation of heavy metals, eutrophication, damming, alteration of hydrology and introduction of exotic species (Tripathi *et al.*, 2017).

12.2 Fishing from Ganga River and its tributaries (Gangi, Mangai, Besu, Gomti & Karamnasa in this region) is an important source of livelihood and food for local residents which is done almost throughout the year. Apart from the regular fishing nets and rod & line method, an interesting method of fish catching from Ganga River was documented during the survey. Known locally as 'Manbisra Jaal', this technique involves use of a plastic based fishing nets bounded to two large bamboo sticks in a particular manner as depicted in Image 40. This set-up is lowered into the waters with the help of boats and brought up after sometime so as to strain out any fish in that particular region. This technique was common throughout along with others such as dragnets, fishing rods and conical nets deployed in the water. The fine-sized fishing nets are chiefly employed for catching smaller fish while nets having slightly bigger mesh sizes [Image 41] are employed for catching bigger fish species. The nets are generally available from local market at rates varying from Rs. 50-100 per meter depending upon material, quality, mesh size and various other parameters.

12.4 The boats used for fishing are small sized and hand-rowed made chiefly from 'Sakhua/Sal' wood (*Shorea robusta*) which is available from the market. These boats were earlier mainly constructed using the raw materials available in the villages by local Mallah community members. However, currently only some natives construct these boats by themselves while majority are dependent upon 'Mistry' (carpenters) from other villages for this. The cost of constructing these boats can go upto Rs. 3 lakhs depending upon various factors.

Image 40 : Manbisra Jaal In Ghazipur Distt.

Image 41 : Fishermen Using Rope Based Big Mesh Sized Fishing Nets In Ghazipur

12.4 The major fish caught from these rivers include - Rohu (*Labeo rohita*), Catla (*Labeo catla*), Tengara (M*ystus tengara*), Buari/Barari (*Wallago attu*) and Sidhari (*Puntius* sp.). These fish, especially Rohu and Catla, are found in plenty during monsoons while Tengara is found more during the summer months. Some of the important fish species caught from the region are represented in Table 7. The fish caught are generally sold in Ghazipur town or local markets of nearby villages. The interlocutors also reiterated the increase of exotic fish – common carp/Chinese carp (*Cyprinus carpio*) in the region which is found in more quantity especially during pre-monsoon season. The interlocutors also highlighted that fish availability from a particular stretch of Ganga River was deciphered from the presence of dolphin population. According to them, the more the dolphin sightings, the more chances of getting good fish catch from that area.

12.5 The fishermen in this region unanimously reiterated their concerns over decreasing fish catch and yield during the last few decades. Various important factors such as overexploitation of fisheries, water pollution, and variations in river flow and depth along with changes in climatic conditions such as uncertain monsoons and higher temperatures during summers were believed to be chief reasons for this decrease. Besides this, the increase in population of exotic carps also proved to be a tough competition for survival of Indian major carps in Ganga River. This had significantly impacted the livelihoods of fishermen in the region who are forced to look for alternate modes of earning income for family. **The respondents also reiterated that Hilsa fish, which was once available in the Ganga river stretch of Ghazipur Distt. was no longer seen since the last few decades. Similarly Ganga River Prawns have also decreased considerably in the study region and are almost negligible in the fish catch from this river stretch.**

Table 7 : Major Fish Caught From Rivers In The Study Region

Sr. No.	Scientific Name	Common Name
1.	*Labeo rohita*	Rohu
2.	*Labeo catla*	Catla/Bhakur
3.	*Wallago attu*	Buari/Barari
4.	*Mystus tengara*	Tengara
5.	*Puntius sp.*	Sidhari
6.	*Cyprinus carpio*	Common/Chinese carp
7.	*Channa punctata*	Garai

8.	*Eutropiichthys vacha*	Bachwa
9.	*Anguilla bengalensis*	Baam
10.	*Cirrhinus mrigala*	Naini
11.	*Mastacembelus armatus*	Gaichi
12.	*Cabdio morar*	Chepua
13.	*Oreochromis* sp.	Tilapia

13.0 Groundwater In Ghazipur Distt.

13.1 Ground water characteristics of a particular area are subject to several natural factors like precipitation, drainage, topography, lithology and hydrogeological conditions of the region. The surface geology of this Distt. is dominated by alluvium sediments commonly referred to as Gangetic–Karamnasa alluvium. The Middle Ganga regions are primarily composed of flood plains and piedmont plains. The Holocene alluvial Central Gangetic Plain slopes from north to south, smooth on a regional scale, but is interrupted locally by sandy ridges and basins. Ground waters in aquifers of Holocene sandy sediments, which are unconfined or semi-confined, are mainly used in this Distt. (Kumar et al., 2010).

13.2 The ground water levels as recorded from different sites during the field survey based on information from the interlocutors is presented in Table 8. The water depth varied from 55-120 ft. in the study region and it kept on increasing as the distance from Ganga River increased. The use of hand pumps was prevalent throughout the Distt. for drawing out ground water while the wells had diminished.

13.3 A study by Kumar et al. (2010) highlighted that groundwater with high geogenic arsenic (As) is extensively present in the Holocene alluvial aquifers of Ghazipur Distt. in the middle Gangetic Plain, India. A shift in the climatic conditions, weathering of carbonate and silicate minerals, surface water interactions, ion exchange, redox processes, and anthropogenic activities such as extensive agriculture are responsible for high concentrations of cations, anions and As in the groundwater of this region. The heterogeneous distribution of As in aquifers around the Ghazipur Distt. showed higher As concentrations in areas such as Devbaranpur, Ghazipur City, Rajapur, Gahmar and Bara.

Table 8 : Groundwater Levels Recorded From Different Villages In Study Region

Place	Coordinates		Ground Water Table in Feet
	Lat.	Long.	
Loharpur	25°32'59.06"N	83°54'34.53"E	85
Gamhar Ghat	25°30'20.91"N	83°48'34.51"E	90
Gamhar Village	25°29'54.74"N	83°48'34.98"E	75
Collector Ghat	25°34'39.46"N	83°35'3.52"E	65
Ghazipur Ghat	25°35'39.48"N	83°36'51.51"E	55
Saidpur	25°33'6.52"N	83°11´0.19"E	80
Malhipur	25°33'17.80"N	83°12'29.92"E	100
Kurtha Village	25°32'42.72"N	83°31'59.14"E	120
Dadri Ghat	25°34'30.82"N	83°34'45.01"E	70

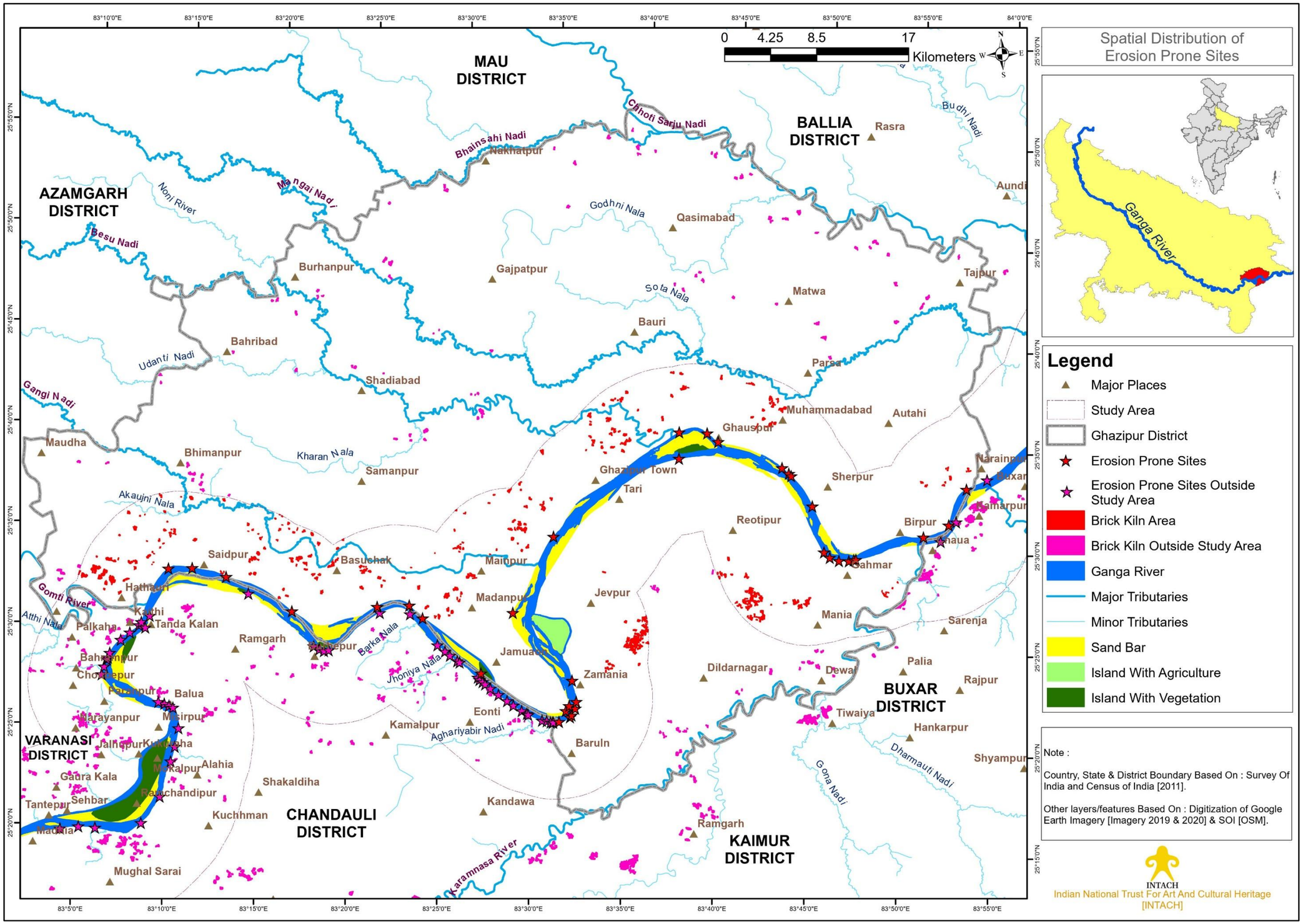
14.0 Ganga River Bank Erosion In Ghazipur Distt.

14.1 Weathering of soils by natural forces is both constructive and destructive. Erosion is the chief agent responsible for the natural topographic cycles as it wears down higher elevations, banks (lateral erosion) and deposits sediments in the plains. However, erosion gets aggravated due to human interventions through change in land use, excessive grazing, extensive farming, cultivation without taking proper conservation measures, destruction of forest and riparian vegetation. It is well known that exposed soil may erode rapidly. During the field survey lateral erosion was observed along Ganga river bank at different sites such as close to Birpur Ghat, Gahmar village, close to Zamania, Saidpur & Gauspur towns and close to Ganga-Gomti Sangam. Some images depicting lateral erosion as observed in the field survey are presented in Images 42-44. The interlocutors reiterated that severe erosion led to losses in agricultural lands and even village settlements at some places which in turn affected their livelihoods. Steps to control erosion such as use of stones were observed at some sites during the survey.

Image 42 : Ganga River Bank Erosion As Observed Near Hathikhana Village In Ghazipur

Image 43 : Ganga River Bank Erosion As Observed Near Gahmar Village In Ghazipur

Image 44 : Erosion Control With Gabions Along Ganga Bank Near Narainpur



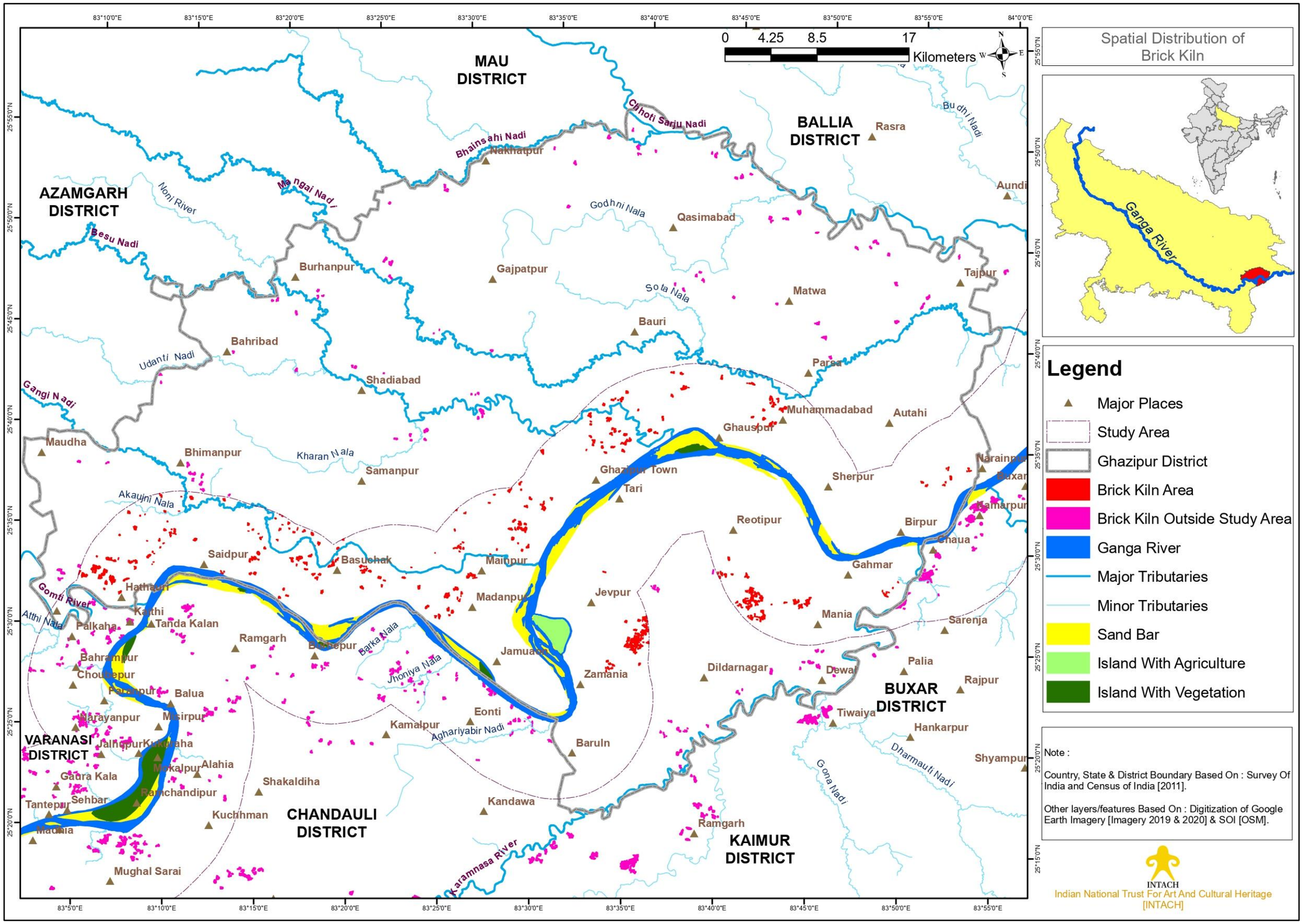
Map 7 : Spatial Distribution Of Erosion Prone Sites In Ghazipur Distt.

15.0 Mining And Brick Kilns In Ghazipur

15.1 Sand is the chief mineral of Ghazipur Distt. which is mainly obtained from Ganga River and its tributaries mainly for construction purposes (Directorate of Geology & Mining, 2016). During the field survey sand mining was not observed from any site in the study region.

15.2 **Brick Kilns:** An important economic activity in the Distt. is production of bricks in the brick kilns. With rapid urbanization, bricks have become an important building material for construction activities. Brick kilns in the study area provide livelihood opportunity to the local community. However, this industry has posed current and potential future threats to the soil, air, biota and water system of the region. Several brick kilns are distributed in the study region with some of them situated close to Ganga River and its floodplain. The spatial distribution of brick kilns in the study region is depicted in Map 9 and one such brick kiln is depicted in Image 45 as observed during the field survey.

Image 45 : A Brick Kiln As Seen During The Field Survey



Map 8 : Spatial Distribution Of Brick Kilns In The Study Region

16.0 Boatmaking And Inland Navigation In Ghazipur Distt.

16.1 Boats play a crucial role in the livelihood and day-to-day activities of riparian communities in the study region. Different types of boats ply on the Ganga River and its tributaries depending upon its purpose. The smaller wooden boats are hand-rowed and generally made of Sekhua/Sal wood (*Shorea robusta*) which is purchased from the markets. These boats are principally employed for fishing activities in the study region [Image 46]. Slightly bigger sized wooden boats are either hand-rowed or motor based and are principally employed for transportation of people, their vehicles such as bike or bicycle and other goods from one bank to the other or from the bank to *diaras*[Image 47]. Upon interaction, the interlocutors reiterated that these boats are constructed with the help of 'Mistry' (carpenters) which are called from nearby towns and cities. The cost of constructing these boats range from Rs. 2-3 lakhs for smaller boats and from Rs. 5-7 lakhs for bigger boats depending upon various factors. The boats ferrying passengers generally charge Rs. 15-30 per passenger depending upon different factors such as luggage, distance to be traveled and so on. Boats were found to be an important mode of transportation especially for traveling from left to right bank and vice-versa on Ganga River at different sites such as Birpur, Gahmar, Zamania and Narainpur villages.

Image 46 : Smaller Hand-Rowed Wooden Boats Employed For Fishing In The Study Region

Image 47 : Medium Sized Motorized Wooden Boats Ferrying Passengers From Birpur Ghat To Opposite Bank Of Ganga River

17.0 Sacred Trees In Ghazipur Distt.

17.1 **Sacred Trees:** Various sacred trees were observed during the field survey in study region. Peepal (*Ficus religiosa*) is the major tree species often found associated with temples and other religious sites throughout. The worship of this tree is usually done by the female residents in that region by tying threads around it and offering water along with sindoor, coconuts or incense sticks. Another tree species that is also found commonly associated with sacred sites is *Ficus benghalensis* (Banyan tree). Owing to their protection these sacred trees often develop trunks with huge girths and a luxuriant canopy. Some such examples of sacred trees as observed during field survey are depicted in Images 48-52.

Image 48 : An Old And Sacred Banyan Tree Near Ghazipur Town

Image 49 : Sacred Peepal Tree Associated With A Goddess Temple At Birpur Ghat

Image 50 : A Sacred Neem Tree Associated With A Goddess Temple Near Phulwari Khurd Ram Ghat in Ghazipur

Image 51 : A Sacred Peepal Tree Along Ganga River Bank Near Chochakpur

Image 52 : A Sacred Peepal Tree Associated With A Goddess Temple Near Kharona Village

18.0 Key Observations and Recommendations

18.1 One important Hindu ritual associated with Ganga river throughout India is cremation of dead bodies as it is widely believed that by immersing your burnt remains in the holy Ganga water, the person will attain 'Moksha'. The remains of these rites along with other substances such as pots, flowers, clothes, threads and so on are often dumped directly into the river thereby impacting the riparian and in stream biodiversity. Some such cremation sites were observed during the survey along Ganga River in this study region [Image 53]. Hence, it is strongly suggested through this study to take cognizance of this matter and develop suitable cremation facilities while ensuring that water pollution and ecosystem damage is prevented in this region

Image 53 : Remains From A Cremation Along Ganga River As Observed Near Chochakpur Village

18.2 One important concern often raised during the survey was crop destruction caused by nilgai and wild boar especially in the floodplain agricultural fields. Though the farmers never retaliated violently towards the nilgai, they did admit to killing wild boars as they are equally dangerous to local residents in this region. Nonetheless, both these animals are known to cause huge losses to the farmers who claimed to receive no compensation or help of any kind from the authorities. Hence, this important issue in the study region needs to be mitigated by creating awareness among the local people, ensuring sufficient compensation for their losses and incorporating non-violent techniques to keep these animals away from the fields.

18.3 Many settlements along Ganga River often lead to escalated solid and liquid waste dumping directly into the water which turns out extremely hazardous by degrading the water quality and negatively impacting the aquatic biodiversity. Such examples were observed in the study region during the field survey [Image 54] which need to be brought to immediate attention. Hence, it is suggested in this study to develop appropriate waste management strategies for the local communities directly linked to Ganga River.

Image 54 : Solid And Liquid Waste Entering Ganga River As Observed Near Bara Village

18.4 Evidences of severe bank erosion can be observed on the map throughout the study region which usually results in losses of human settlements and agricultural fields. Hence, it is recommended to carry out detailed studies in the Distt. to identify erosion prone and impacted sites along with developing suitable remedies for its control such as extensive plantation of trees, shrubs and grasses having strong root system to bind the soil.

18.5 The wetlands observed in the study serve as crucial resources for livelihoods and day to day needs of local residents associated with them. However, no effort has been made to ensure conservation and maintenance of these resources which has resulted in issues like sewage influx and dominance of invasive species. These wetlands if conserved properly have the potential to not only provide good fish resources, but also harbor other flora and fauna diversity, provide aesthetic benefits and clean water for various uses. Hence, it is strongly recommended to pay immediate attention for maintenance of these water bodies especially in conjunction with local stakeholders.

18.6 The fishermen in study region strongly reiterated their concerns regarding sharp decline in the fish availability, catch and yield which could be attributed to reasons such as changes in river flow and depth, climatic alterations and dominance of invasive exotic species such as Chinese/Common carps. Along with this the influx of pollution in Ganga River from various sources was also to blame for the changes in fisheries. Hence, it is imperative to carry out awareness cum survey programs involving fishermen in the region to understand these changes and address the necessary issues. Along with that alternate livelihoods could to be developed for fishermen communities such as promoting them for building different boats and involving in eco-tourism activities.

18.7 The Ganga river stretch of Ballia Distt. is also an important habitat for IUCN Red Listed and Schedule-I (Wildlife Protection Act, 1972) species – Gangetic dolphin. It is recommended to carry out more surveys for identifying their tentative population and presence status in this region. The local Forest department should also carry out awareness activities for sensitizing people directly associated with Ganga River.

18.8 The riparian ecosystems are of high conservation priority owing to the rich biodiversity they support and the large-scale ecosystem services they provide. However, intensive agricultural practices including expansion of fields up to the current flow of Ganga River in many parts of this Distt. [Image 55] has already negatively impacted the riparian vegetation communities which is evident from the sparse growth and low species diversity of riparian plants recorded during this survey. This in turn impacts the

associated faunal diversity as well as bank stability often leading to severe erosion during flood situation. Hence, it is recommended through this study to take up measures for checking the limit ofagriculture in riparian areas of Ganga River in order to allow the natural biota to flourish.

Image 55 : Intensive Agriculture Along Ganga River In The Study Region Leaving Bald Banks Vulnerable to Erosion

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