Ganga Cultural Documentation
2021

CHANDAULI 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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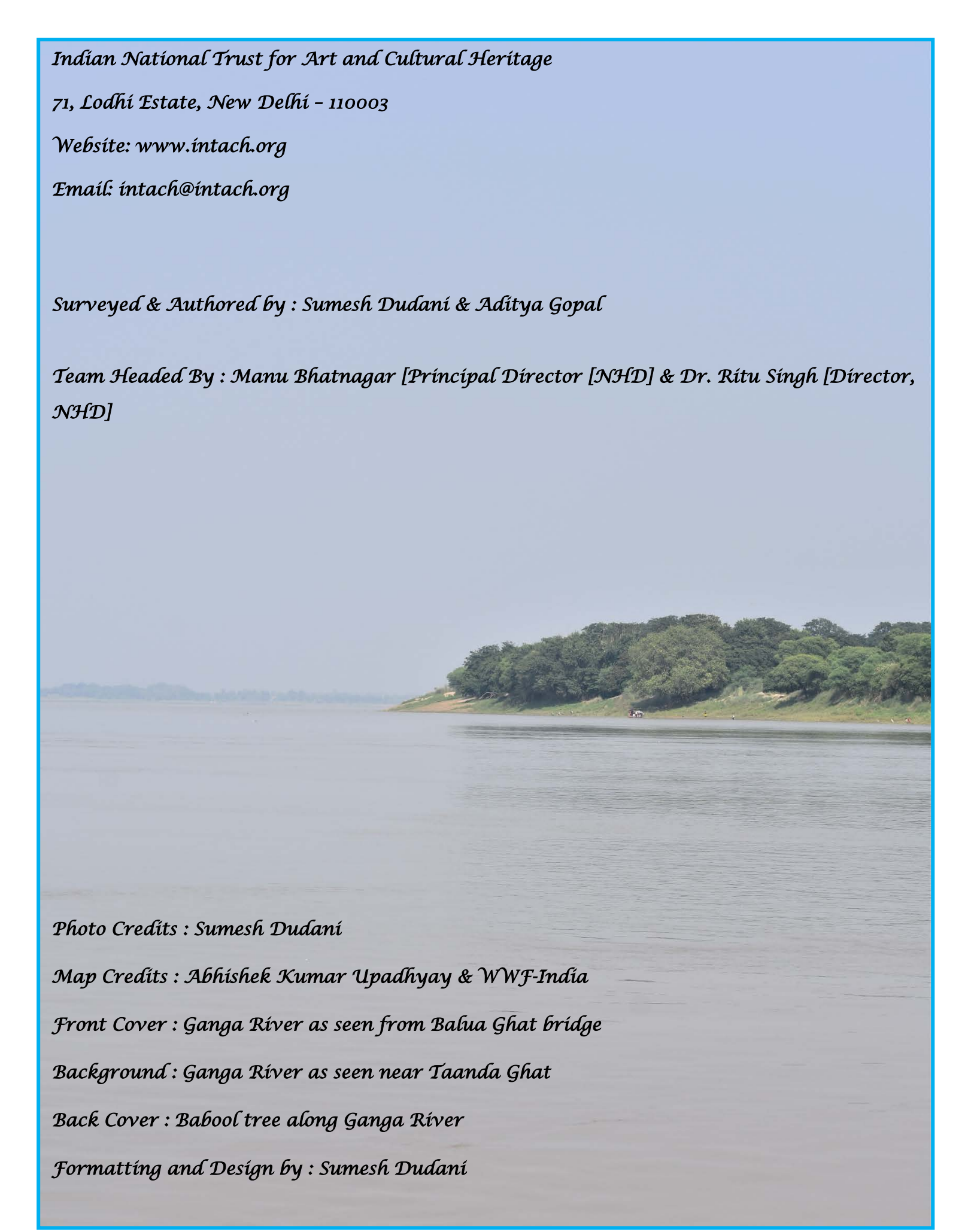

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Front Cover : Ganga River as seen from Balua Ghat bridge

Background : Ganga River as seen near Taanda Ghat

Back Cover : Babool tree along Ganga River

Formatting and Design by : Sumesh Dudani

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1.0 Introduction

1.1 Chandauli Distt. was carved out from Varanasi Distt. in 1997 and is located between 24°56' to 25°35'N longitudes and 81°14' to 84°24' E latitudes at a distance of about 30 km south east of Varanasi. The Distt. lies at an elevation of 70m above MSL covering a total geographic area of about 2541 sq. km. It is bounded on east by Rohtas Ditt. Of Bihar State, on the north and north east by Ghazipur Distt., on the South by Sonebhadra Distt., on the South-West by Mirzapur and on the North- West by Varanasi Distt. River Ganga separates this Distt. from the Distt.s of Varanasi and Ghazipur. Chandauli town is the Distt. headquarters while Mughal Sarai city in this Distt. has the busiest railway station on the North Eastern Railways. The Distt. is divided into 5 tehsils viz., Sadar, Sakaldiha, Chakia, Mughalsarai and Naugarh which are further subdivided into 9 administrative blocks.

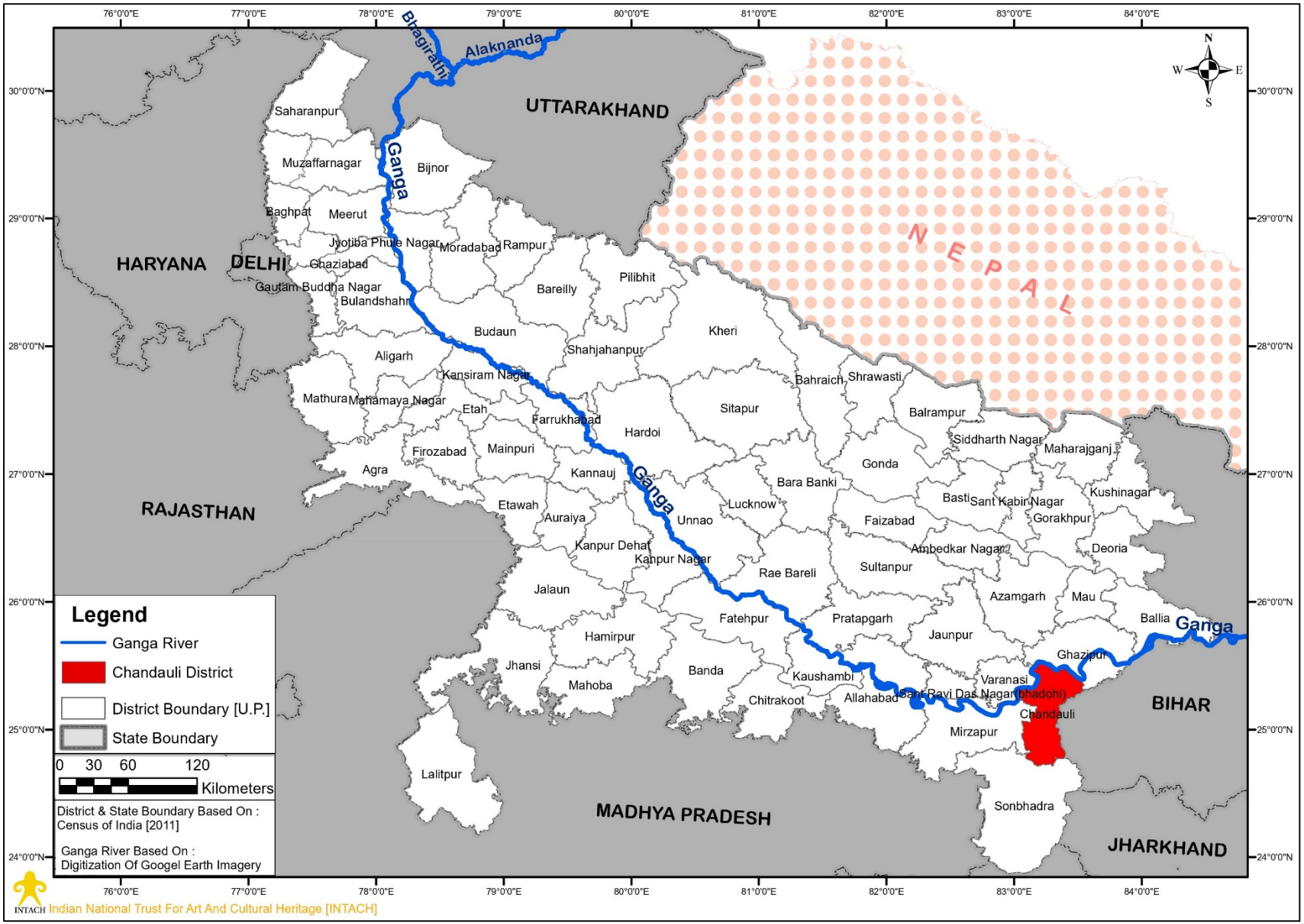
1.2 On the basis of geology, soils, topology, climate and natural vegetation, Chandauli Distt. is divided into three different regions – Chakia plateau, Chandauli plains and Ganga Khaddar. The Chakia plateau region comprises of the southern part of Chakia tehsil. The 100 meter contour separates this region from Chandauli plains. Geologically this region belongs to the upper Proterozoic Period and is a hilly tract with dissected surface. The Chandauli Plains region comprises of parts of the Chandauli, Sakaldiha and Chakia Tehsils. The major part of this region is devoid of streams. Geologically this region is composed of alluvium and dun gravels. The third region of Ganga Khaddar is a narrow belt along the Ganga River extending from one end of the district to the other end. The surface in this region is low lying and subject to inundation during floods. Ganga is the main river which flows in the northern and western part (https://chandauli.nic.in/geography/).

1.3 The region covered by the present Chandauli Distt. was part of the ancient kingdom of Kashi. Thus, the history of the Chandauli Distt. is the same as that of Kashi Kingdom and of Varanasi Distt. Before the birth of Lord Buddha, in 6th century B.C., Bharatvarsha was divided into sixteen Mahajanpadas, Kashi was one of them and its capital was Varanasi. Modern Banaras with its surroundings region was called as Kashi Mahajanpad. The name of Kashi came to be known after name of king Kashi the seventh king of this dynasty. Kashi kingdom was, however, dominated by Brahmadutta dynasty of Magadh during the century preceding the Mahabharata war but post Mahabharata period saw the rise of Brahmadutta dynasty. About hundred kings of this generation are said to have had their supremacy over this region and some of these rulers become Chakravarty

Samrats. King Manoj of Kashi brought the kingdom of Kaushala, Anga and Magadh in his control and annexed their territories. In the Jain scriptures, a king of Kashi named Ashwasewa was the father of 23rd Tirthankar Parshvanath. In 1775 Kashi Kingdom had come under the influence of British Empire.

The history of this Distt. for the most part is unknown. There are some deserted sites, tanks and kunds seen in tahsils of the district and they carry vague legends. One of the ancient site of the district, "Baluwa" is situated about 21 km. to the southern part of tahsil Sakaldiha at the banks of river Ganga where Ganga flows from east to west direction. A religious fair for Hindus takes place every year in the month of magha(January) which is known as "Pachchim vahini Mela" it is said that the Ganga flows east to west direction only at two places - first in Prayagraj and second one at Baluwa. Village Ramgarh of tahsil Sakaldiha, known as birth place of great Aghoreshwari saint Shri Kinaram Baba is just 6 km. away from Chahniya.

In one of the ancient sites in the village Hetampur of the district, there is a fort which is known as "Fort of Hetam" which is situated about 22 km. to the north east from the district headquarters. The ruins of this fort are spread over on 22 bighas in area. It is said that this fort was designed and constructed between 14th to 15th centuries by Todar Mal Khatri who was the construction supervisor in the kingdom of Sher Shah Sur. After Mughal period, Hetam Khan, Talukedar and Jagirdar captured this fort. There are five famous ruined Kots, known as Bhulaini Kot, Bhitari Kot, Bichali Kot, Uttrai Kot and Dakchhani Kot, which attract the visitors. (https://chandauli.nic.in/history/)

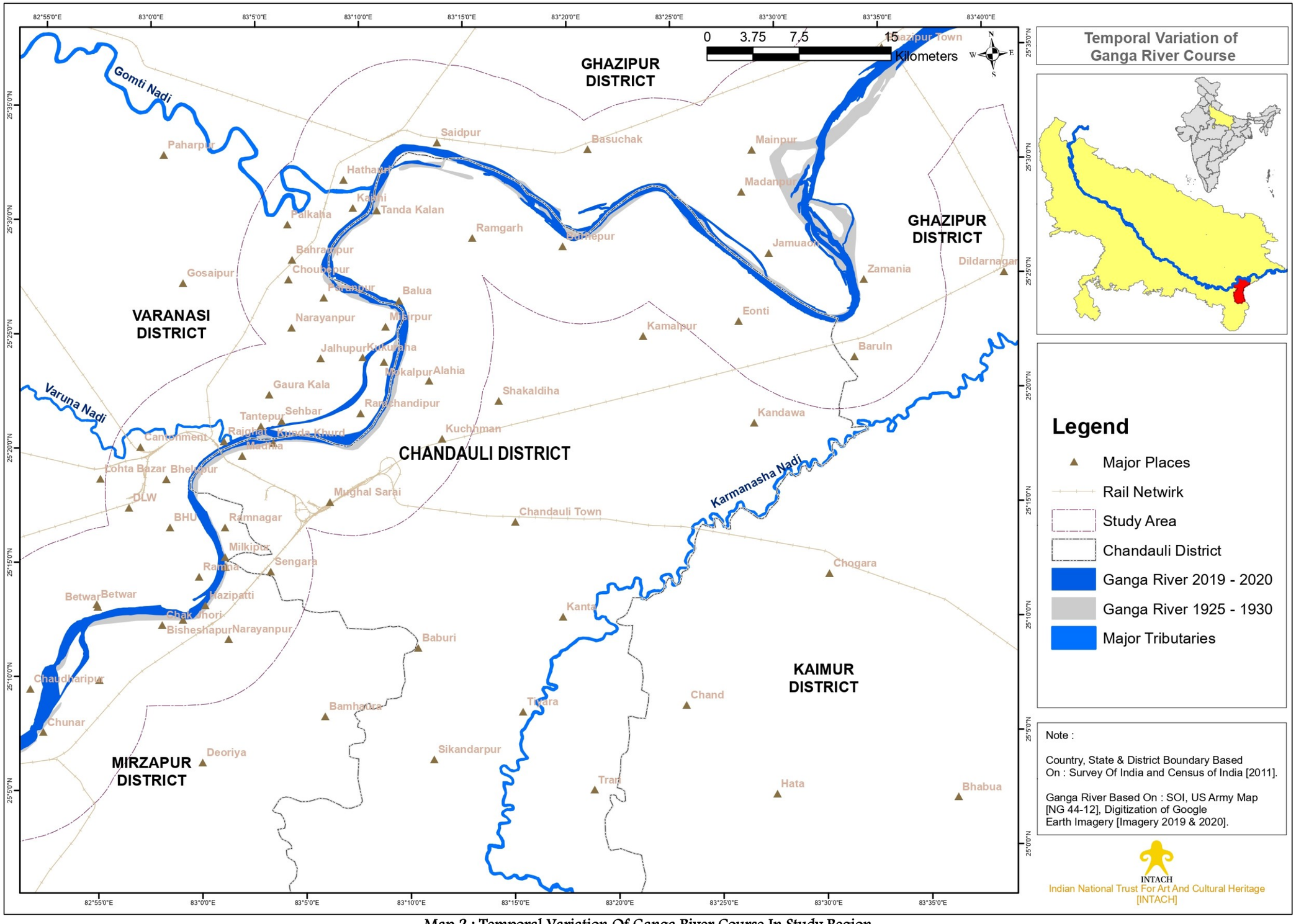


Map 1 : Location Of Chandauli Distt.

2.0 Ganga River In Chandauli Distt.

2.1 Shortly after crossing Ramnagar, Ganga River enters part of Chandauli Distt. which is intermixed with parts of Varanasi Distt. on the opposite bank of Assi Ghat in Varanasi City. At this point, the river curves south-eastwards for a short distance after which it bifurcates into two branches due to presence of the riverine island. After re-joining near Mahuriya, the Ganga River curves north-eastwards crossing Baluwa Ghat [Image 1], Taanda Ghat and upto Jamalpur in Chandauli Distt. Thereafter, it again curves south-eastwards crossing Saifpur, Dhanapur and Guraini upto Zamania town where it enters Ghazipur Distt. The river flows for a distance of about 84 kms adjoining Chandauli Distt. on the right bank throughout its course.

Image 1 : Ganga River From Balua Ghat Bridge

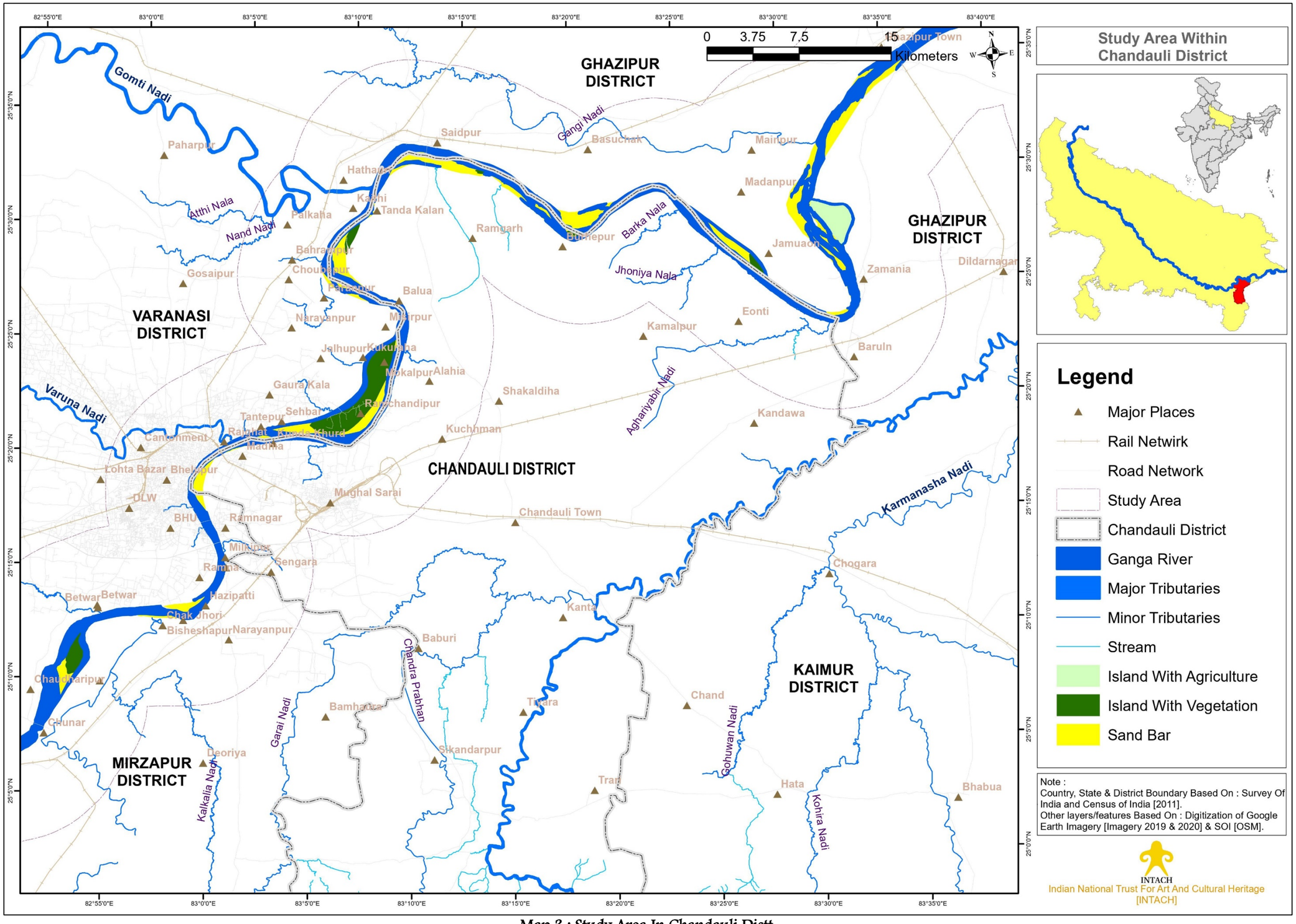


Map 2 : Temporal Variation Of Ganga River Course In Study Region

3.0 Methodology

3.1 Ganga River flows in Chandauli Distt. for approximately 84 kms adjoining it mainly on the right bank. Hence for carrying out the ground survey, a 7 km of buffer zone was selected on the right bank 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 Chandauli Distt. was carried out from 30th October to 2nd November, 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 Chandauli Distt.

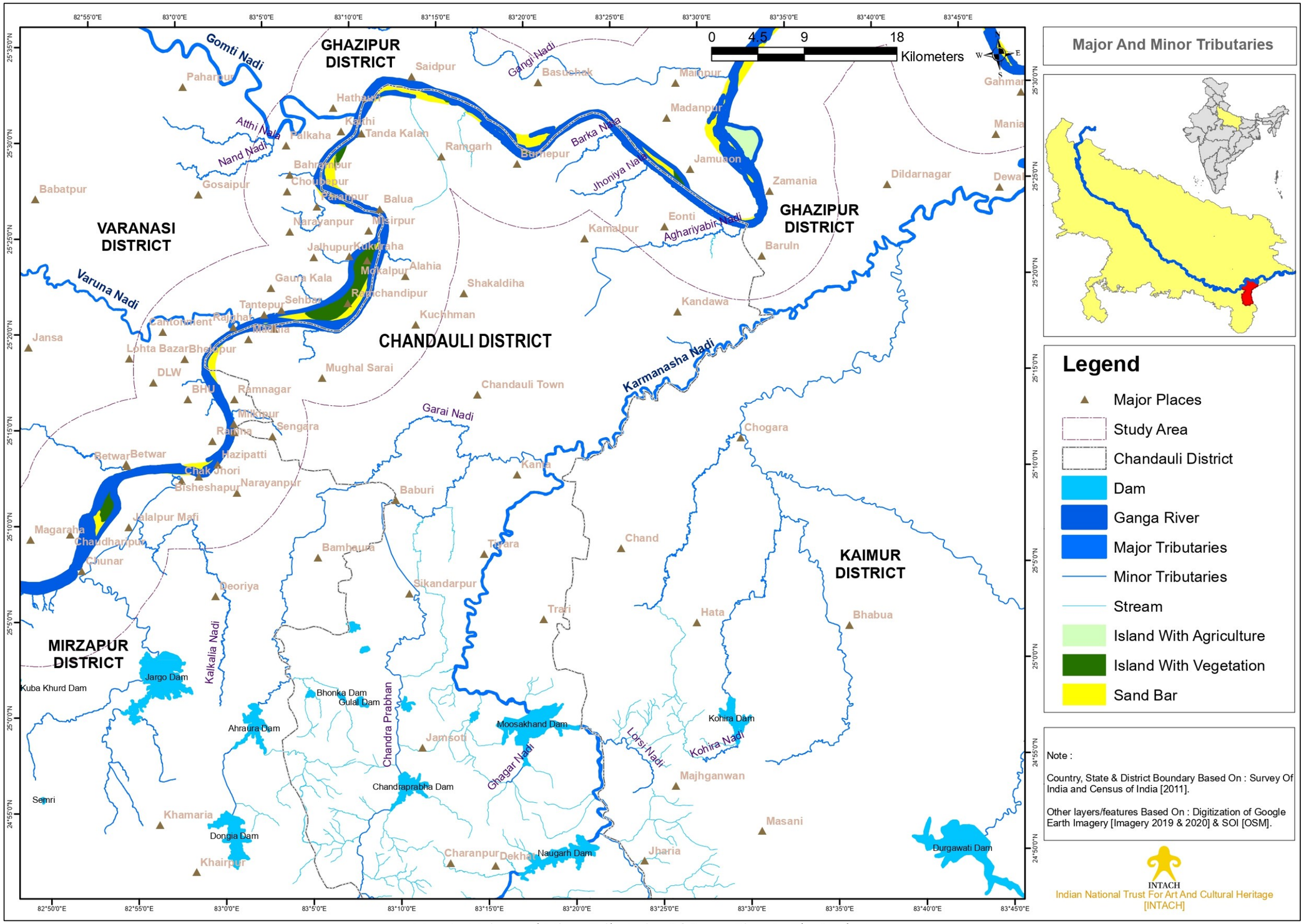
4.0 Tributaries Of Ganga River

4.1 Barring few streams or 'nalas' in the study region of Chandauli Distt. [Refer Map 4], no major tributary of Ganga River is present in the study region. Most of these streams receive water only during monsoon season and remain dry during the rest of the year or mainly carry sewage from nearby villages and towns. Some such streams were observed during the field survey and are depicted in Images 2-4. The interlocutors in study region refer to these streams commonly as 'Nala' due to the lack of any specific name.

Image 2 : A Nala Observed Near Jigana Village On 30th October, 2021

Image 3 : A Nala At Confluence With Ganga Near Guraini Ghat Observed On 30/10/2021

Image 4 : Another Nala At Confluence With Ganga Near Taanda Ghat Observed On 31/10/21



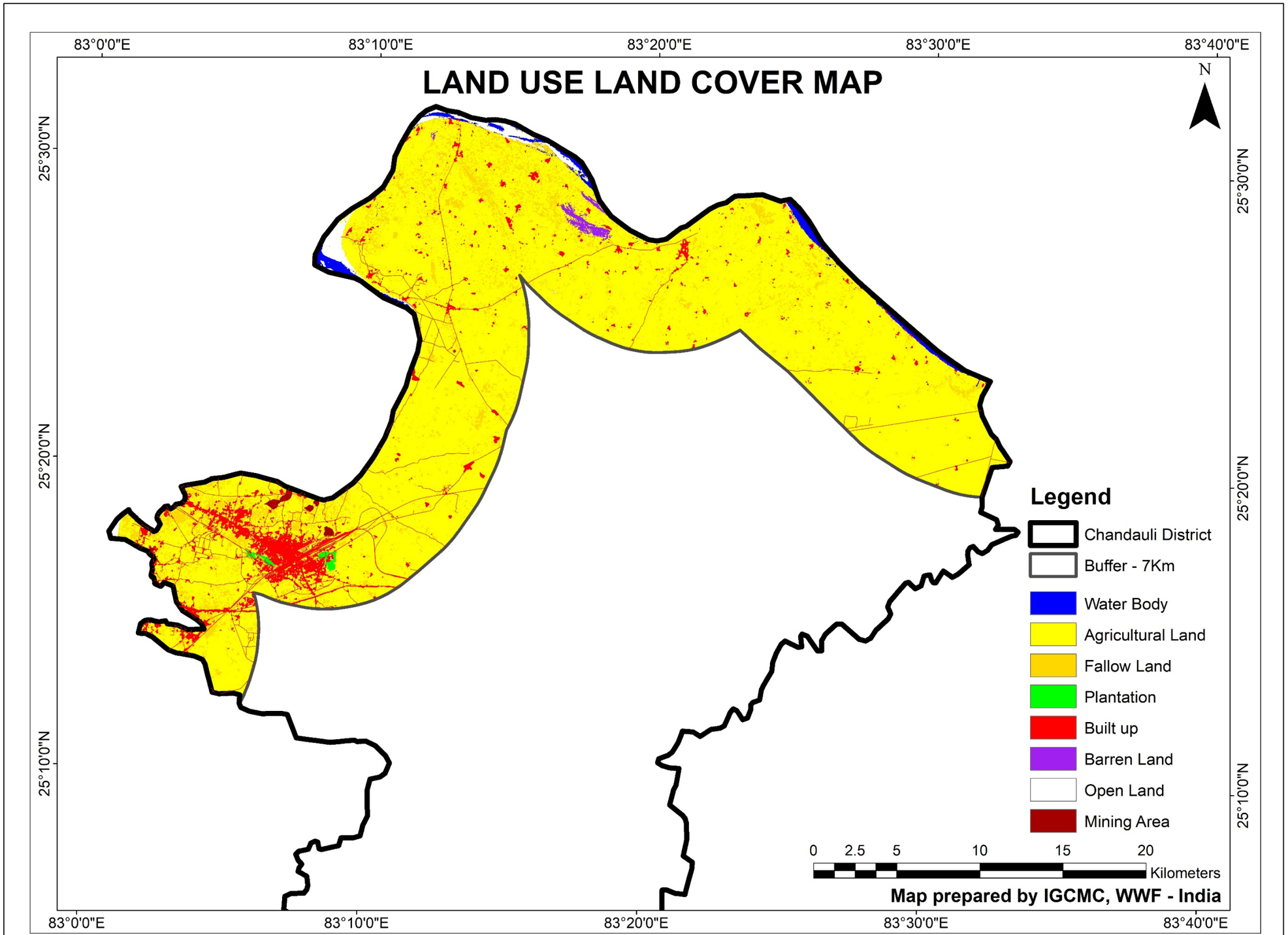
Map 4 : Major And Minor Tributaries Of Ganga River In The Study Area

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, 8 different classes were generated – water body, agricultural land, fallow land, plantation, built up, barren land, open land and mining area. Agriculture being a dominant source of income, occupies major part of the land use system in this Distt. The water body component covering 1.742% of the total geographical area of this Distt. chiefly includes Ganga River and other wetlands. The built up area mainly includes Mughal Sarai city as the major settlement 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

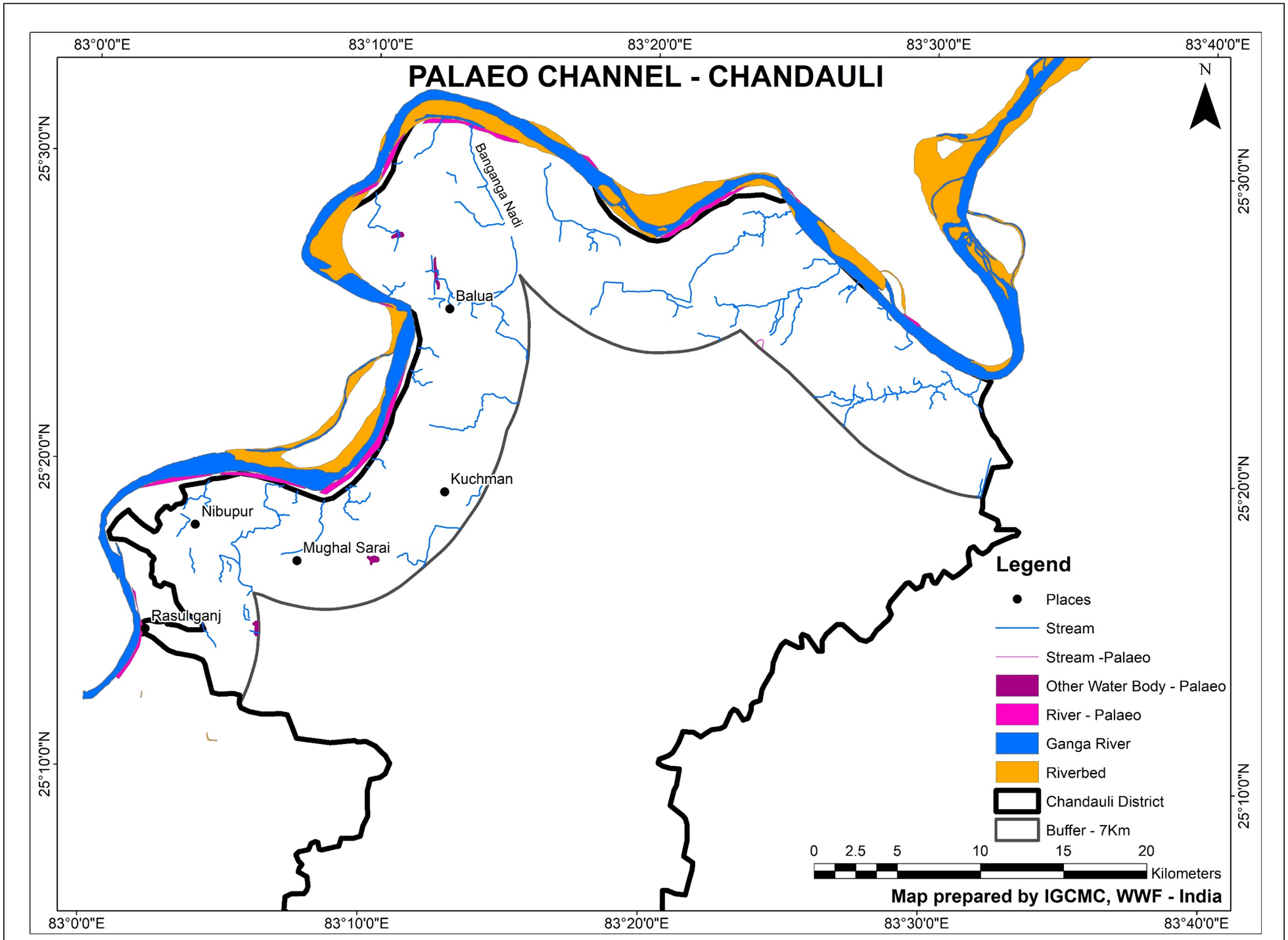
Chandauli Distt.		
Class	**Area (Ha)**	**Area (%)**
Water Body	1004.860	1.742
Agricultural Land	46608.500	80.805
Fallow Land	6093.400	10.564
Plantation	102.412	0.178
Built up	2666.480	4.623
Barren Land	231.011	0.401
Open Land	838.461	1.454
Mining area	135.259	0.234
Total	**57680.383**	**100**



Map 5 : Land Use/Land Cover Map Of Study Region In Chandauli 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 6 was prepared which depicts the various paleochannels in the study region of Chandauli Distt.



Map 6 : Paleochannels In The Study Region

7.0 Floodplain Of River Ganga In Chandauli

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 Chandauli Distt. falls in Middle Gangetic Plain Region with the major soils being loam soil, clay loam soil, clay soil, sandy loam soil, sandy soil and rocky track (NICRA-ICAR, 2012). 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 River 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 arhar, chana, sarso, bajra and sugarcane along with vegetables such as potato, brinjal, tomato and chillies. The details of some villages surveyed along with their floodplain agriculture produce are provided in Table 2 while Images 5-6 depict some floodplain agriculture fields as recorded during the survey.

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

Sr. No.	Village Name	Agricultural Produce
1.	Jigana	Rice, wheat, mustard, chana
2.	Guraini	Rice, sugarcane, mustard, tomato, bajra
3.	Taanda	Rice, brinjal, chillies, chana
4.	Bissupur	Rice, arhar, chana, mustard
5.	Saifpur	Rice, wheat, mustard, potato, chillies

Image 5 : Floodplain Rice Fields Near Jigana Village In Study Region

Image 6 : Floodplain Arhar Fields Near Bissupur 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/ Patel*) 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 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 7 : Lush Growth Of *Saccharum* Grasses Along Ganga River Near Taanda Ghat

Image 8 : Lush Growth Of *Saccharum* Grasses Along Ganga River Near Naughara Village

8.0 Wetlands In Chandauli 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. During the current study about 293 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.	01	25°21'10.14"N	83°32'36.69"E	0.25
2.	02	25°20'45.33"N	83°32'26.77"E	0.26
3.	03	25°20'16.76"N	83°32'9.38"E	0.39
4.	04	25°20'10.48"N	83°32'3.11"E	0.53
5.	05	25°20'40.98"N	83°31'26.26"E	1.36
6.	06	25°21'28.99"N	83°31'58.15"E	0.19
7.	07	25°21'23.32"N	83°31'48.25"E	0.21
8.	08	25°23'7.49"N	83°31'34.20"E	0.20
9.	09	25°21'26.12"N	83°31'24.70"E	1.22
10.	10	25°20'23.20"N	25°21'26.12"N	1.70
11.	11	25°20'1.73"N	83°30'24.45"E	1.59
12.	12	25°19'55.66"N	83°30'20.59"E	1.14
13.	13	25°21'9.82"N	83°30'37.28"E	0.49
14.	14	25°21'7.47"N	83°30'42.08"E	0.26
15.	15	25°21'10.21"N	83°30'30.90"E	0.60
16.	16	25°21'43.25"N	83°30'36.94"E	0.84
17.	17	25°21'57.79"N	83°30'55.24"E	0.80
18.	18	25°23'12.56"N	83°30'52.55"E	0.86
19.	19	25°22'48.32"N	83°30'21.90"E	0.80
20.	20	25°21'39.46"N	83°30'2.61"E	0.35
21.	21	25°20'56.59"N	83°29'33.72"E	1.14

22.	22	25°20'48.93"N	83°29'23.13"E	0.91
23.	23	25°20'39.26"N	83°28'32.37"E	1.38
24.	24	25°20'50.80"N	25°20'39.26"N	1.18
25.	25	25°22'18.46"N	83°28'48.73"E	1.41
26.	26	25°22'24.59"N	83°29'7.47"E	0.85
27.	27	25°22'42.74"N	83°28'59.23"E	0.35
28.	28	25°22'33.90"N	83°29'38.48"E	0.32
29.	29	25°23'21.13"N	83°29'13.41"E	0.52
30.	30	25°23'46.59"N	25°23'21.13"N	0.73
31.	31	25°23'52.89"N	83°30'17.80"E	0.26
32.	32	25°24'20.34"N	83°29'30.54"E	1.10
33.	33	25°24'2.20"N	83°28'44.37"E	2.68
34.	34	25°23'50.08"N	83°28'43.59"E	2.30
35.	35	25°23'27.83"N	83°28'49.74"E	2.54
36.	36	25°22'31.40"N	83°28'11.39"E	1.00
37.	37	25°21'31.08"N	83°28'18.16"E	0.74
38.	38	25°21'17.09"N	25°21'31.08"N	0.39
39.	39	25°21'27.75"N	83°27'18.15"E	0.56
40.	40	25°22'48.42"N	83°27'47.04"E	3.84
41.	41	25°23'29.54"N	25°22'48.42"N	2.89
42.	42	25°23'31.76"N	83°27'40.55"E	3.55
43.	43	25°23'34.96"N	83°28'7.04"E	1.39
44.	44	25°23'32.65"N	83°28'17.52"E	0.23
45.	45	25°23'55.03"N	83°28'21.87"E	0.50
46.	46	25°24'45.29"N	83°28'6.83"E	0.69
47.	47	25°24'44.91"N	83°28'34.03"E	0.27
48.	48	25°24'47.72"N	83°28'46.92"E	0.47
49.	49	25°25'51.13"N	83°27'45.80"E	0.56
50.	50	25°24'53.61"N	83°27'41.67"E	0.84
51.	51	25°24'58.07"N	83°27'46.37"E	0.47
52.	52	25°24'6.18"N	83°27'22.22"E	1.33
53.	53	25°23'40.89"N	83°27'0.62"E	0.74
54.	54	25°23'40.65"N	83°27'23.45"E	2.24

55.	55	25°23'43.34"N	83°27'32.83"E	0.40
56.	56	25°23'46.54"N	83°27'38.20"E	0.34
57.	57	25°23'28.63"N	83°27'19.99"E	0.89
58.	58	25°23'30.74"N	83°25'43.95"E	2.00
59.	59	25°23'43.30"N	83°26'15.28"E	0.70
60.	60	25°24'45.30"N	83°25'36.42"E	0.92
61.	61	25°24'43.91"N	83°25'49.68"E	1.22
62.	62	25°24'36.66"N	83°26'30.26"E	0.49
63.	63	25°24'42.58"N	83°26'29.86"E	0.27
64.	64	25°24'43.67"N	83°26'37.89"E	0.25
65.	65	25°24'43.49"N	83°26'33.82"E	0.26
66.	66	25°25'15.99"N	83°26'16.80"E	0.69
67.	67	25°25'28.45"N	83°26'18.40"E	0.73
68.	68	25°25'24.19"N	25°25'28.45"N	0.39
69.	69	25°25'50.70"N	83°25'44.92"E	0.51
70.	70	25°25'29.05"N	83°25'36.05"E	0.70
71.	71	25°25'24.15"N	83°25'43.45"E	0.33
72.	72	25°24'48.15"N	83°25'12.73"E	1.17
73.	73	25°24'44.90"N	83°25'4.31"E	1.41
74.	74	25°24'40.84"N	83°25'11.86"E	0.49
75.	75	25°23'56.97"N	83°24'58.15"E	0.48
76.	76	25°23'51.30"N	83°24'52.49"E	0.24
77.	77	25°23'41.60"N	83°24'34.50"E	0.70
78.	78	25°23'38.62"N	83°24'57.24"E	0.30
79.	79	25°25'11.88"N	83°24'37.48"E	0.82
80.	80	25°26'38.12"N	83°24'55.30"E	1.51
81.	81	25°27'6.14"N	83°25'0.95"E	0.75
82.	82	25°27'19.33"N	83°24'50.79"E	1.00
83.	83	25°26'54.65"N	83°24'37.07"E	1.90
84.	84	25°27'9.83"N	83°24'30.30"E	0.32
85.	85	25°25'6.80"N	83°23'21.72"E	0.97
86.	86	25°24'39.25"N	83°22'41.85"E	0.29
87.	87	25°26'12.14"N	83°22'38.28"E	0.25

88.	88	25°26'6.75"N	83°22'48.35"E	0.25
89.	89	25°26'9.40"N	83°22'48.12"E	0.13
90.	90	25°26'18.32"N	83°23'2.18"E	0.29
91.	91	25°26'57.60"N	83°22'51.96"E	0.45
92.	92	25°26'47.44"N	83°23'7.54"E	0.44
93.	93	25°27'18.78"N	83°23'20.73"E	1.24
94.	94	25°28'6.47"N	83°23'41.64"E	0.94
95.	95	25°27'54.54"N	83°22'12.55"E	0.52
96.	96	25°27'44.93"N	83°22'23.05"E	1.19
97.	97	25°26'54.58"N	83°22'32.66"E	1.53
98.	98	25°26'27.91"N	83°21'58.27"E	0.93
99.	99	25°26'20.13"N	83°22'1.79"E	1.43
100.	100	25°26'17.25"N	83°21'46.88"E	0.48
101.	Village Pond in Kharan	25°25'19.72"N	83°21'37.97"E	4.62
102.	102	25°25'19.97"N	83°21'56.05"E	1.49
103.	103	25°25'2.30"N	83°21'34.21"E	0.99
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105.	105	25°24'22.10"N	83°21'23.07"E	0.55
106.	106	25°24'7.71"N	83°20'44.00"E	0.24
107.	107	25°28'31.76"N	83°22'17.51"E	0.91
108.	108	25°27'37.45"N	83°21'29.86"E	1.57
109.	109	25°27'21.77"N	83°21'7.65"E	0.89
110.	110	25°27'15.34"N	83°21'9.06"E	1.15
111.	111	25°26'51.07"N	83°21'33.21"E	1.18
112.	112	25°27'6.02"N	83°21'34.68"E	0.38
113.	113	25°27'1.61"N	83°20'56.68"E	8.62
114.	114	25°26'41.83"N	83°20'42.30"E	0.58
115.	115	25°26'48.19"N	83°20'46.06"E	0.24
116.	116	25°25'0.13"N	83°20'16.86"E	1.15
117.	117	25°25'2.97"N	83°20'43.34"E	1.00
118.	118	25°24'25.54"N	83°20'30.89"E	2.36
119.	119	25°24'35.24"N	83°19'19.71"E	0.57

120.	120	25°24'18.85"N	83°19'18.67"E	0.37
121.	121	25°25'22.24"N	83°20'16.43"E	1.38
122.	122	25°25'19.47"N	83°20'3.68"E	1.26
123.	123	25°25'26.49"N	83°20'8.00"E	1.31
124.	124	25°25'19.47"N	83°20'3.83"E	1.37
125.	125	25°25'32.33"N	83°19'44.92"E	1.31
126.	126	25°25'44.16"N	83°19'43.80"E	0.43
127.	127	25°25'43.20"N	83°19'47.72"E	0.64
128.	128	25°25'43.01"N	83°19'53.30"E	0.24
129.	129	25°25'50.11"N	83°20'0.15"E	0.62
130.	130	25°26'24.15"N	83°20'5.83"E	1.95
131.	131	25°27'20.96"N	83°20'27.78"E	1.53
132.	132	25°27'28.39"N	83°20'49.62"E	0.38
133.	133	25°27'29.38"N	83°20'58.08"E	0.80
134.	134	25°24'49.67"N	83°18'31.69"E	2.12
135.	135	25°24'45.47"N	83°18'20.44"E	0.78
136.	136	25°24'54.27"N	83°18'50.23"E	0.30
137.	137	25°24'55.65"N	83°19'0.17"E	0.35
138.	138	25°25'45.56"N	83°18'35.53"E	0.73
139.	139	25°26'28.08"N	83°19'33.53"E	0.89
140.	140	25°27'3.14"N	83°18'40.83"E	1.64
141.	141	25°26'51.48"N	83°18'40.92"E	0.87
142.	142	25°26'51.32"N	83°18'48.92"E	1.41
143.	143	25°26'58.66"N	83°18'8.39"E	1.14
144.	144	25°27'8.71"N	83°18'21.48"E	0.47
145.	145	25°26'47.37"N	83°17'27.08"E	1.14
146.	146	25°26'14.80"N	83°17'1.61"E	1.36
147.	147	25°25'39.05"N	83°16'44.26"E	3.75
148.	148	25°25'28.76"N	83°16'49.18"E	1.30
149.	149	25°25'48.14"N	83°15'46.95"E	2.80
150.	150	25°25'42.97"N	83°15'58.42"E	0.49
151.	151	25°26'3.63"N	83°16'9.20"E	0.66
152.	152	25°26'21.82"N	83°15'49.20"E	0.77

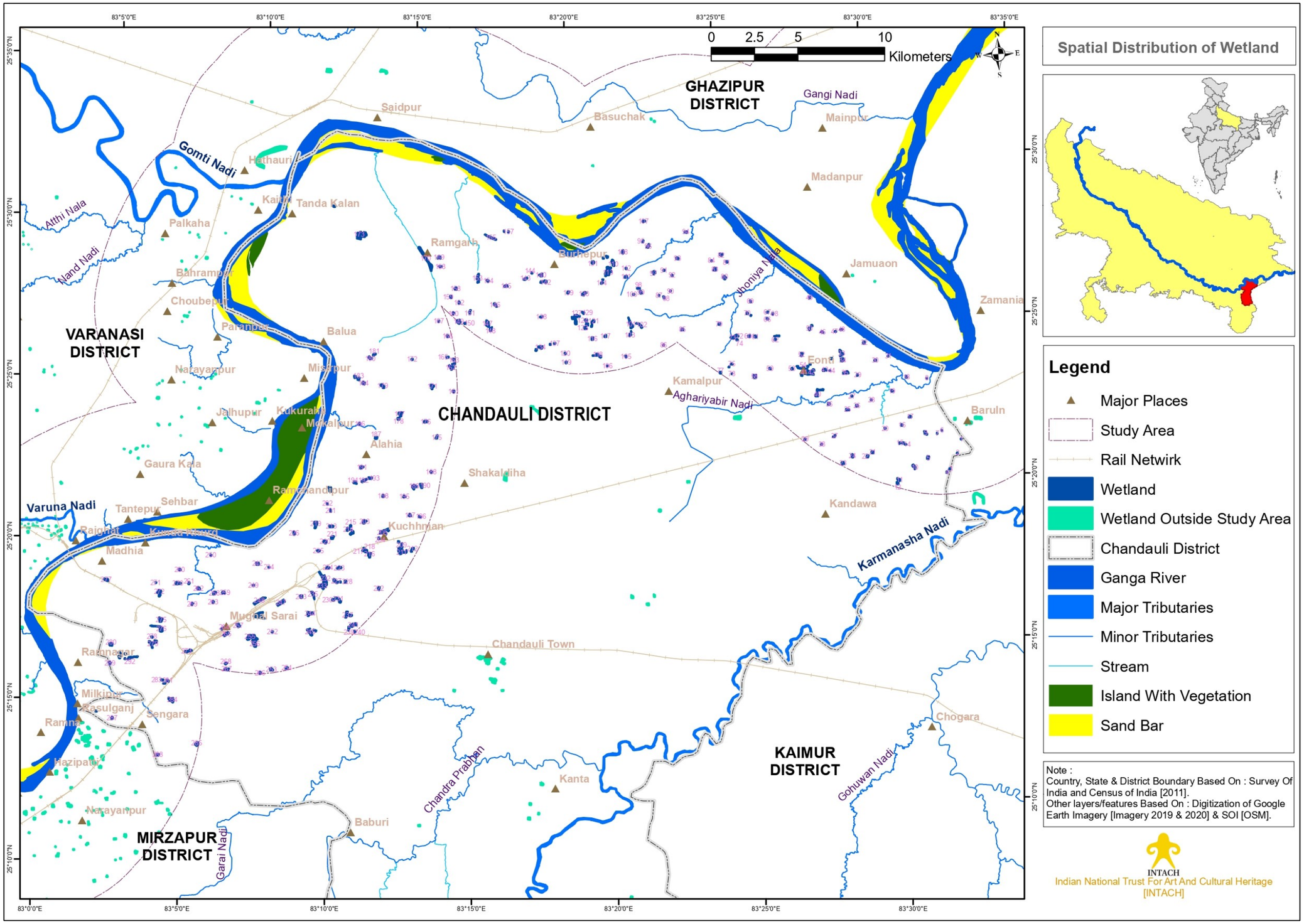
153.	153	25°27'5.96"N	83°16'30.51"E	3.13
154.	154	25°26'58.60"N	83°16'50.80"E	0.59
155.	155	25°28'19.41"N	83°17'2.39"E	2.44
156.	156	25°28'29.07"N	83°17'30.74"E	029
157.	157	25°28'28.24"N	83°17'38.86"E	0.32
158.	158	25°26'33.67"N	83°15'33.11"E	0.90
159.	159	25°26'33.83"N	83°15'33.21"E	0.75
160.	160	25°26'2.45"N	83°15'36.19"E	0.80
161.	161	25°23'37.93"N	83°15'27.13"E	0.85
162.	162	25°24'19.55"N	83°15'25.05"E	2.39
163.	163	25°24'28.50"N	83°15'30.18"E	1.10
164.	164	25°24'37.56"N	83°15'31.01"E	0.67
165.	165	25°24'41.78"N	83°15'18.83"E	0.72
166.	166	25°25'20.96"N	83°15'21.22"E	0.67
167.	167	25°25'50.05"N	83°15'5.09"E	0.36
168.	168	25°27'31.25"N	83°15'15.30"E	0.68
169.	169	25°27'47.92"N	83°15'14.56"E	1.99
170.	Oxbow lake near Kinaram Ashram	25°27'44.52"N	83°14'49.43"E	14.1
171.	171	25°23'49.59"N	83°14'44.40"E	2.37
172.	172	25°24'42.34"N	83°14'6.25"E	0.42
173.	173	25°28'38.62"N	83°12'32.92"E	11.5
174.	174	25°29'35.33"N	83°11'46.46"E	0.77
175.	175	25°22'15.90"N	83°14'46.12"E	1.23
176.	176	25°22'45.49"N	83°14'27.55"E	1.54
177.	177	25°23'0.84"N	83°13'34.70"E	2.78
178.	178	25°22'53.12"N	83°13'30.99"E	0.95
179.	179	25°23'56.60"N	83°13'1.81"E	1.95
180.	180	25°24'48.91"N	83°12'39.11"E	1.41
181.	181	25°24'56.32"N	83°12'50.04"E	1.10
182.	182	25°24'15.85"N	83°12'7.27"E	0.91
183.	183	25°24'12.04"N	83°12'14.22"E	1.40

184.	184	25°24'3.00"N	83°12'23.50"E	1.65
185.	185	25°22'48.01"N	83°12'10.51"E	0.89
186.	186	25°22'20.58"N	83°12'42.82"E	1.60
187.	187	25°21'10.77"N	83°14'31.12"E	0.73
188.	188	25°20'46.20"N	83°13'54.69"E	3.40
189.	189	25°20'45.73"N	83°14'9.05"E	2.19
190.	190	25°21'27.96"N	83°12'8.46"E	1.55
191.	191	25°21'1.21"N	83°11'53.23"E	1.72
192.	192	25°21'2.57"N	83°12'11.55"E	1.50
193.	193	25°21'7.12"N	83°12'25.52"E	1.68
194.	194	25°20'28.56"N	83°13'32.39"E	0.87
195.	195	25°19'48.68"N	83°14'2.75"E	0.68
196.	196	25°19'53.84"N	83°13'41.99"E	1.15
197.	197	25°20'31.83"N	83°12'49.67"E	1.13
198.	198	25°20'47.70"N	83°11'3.22"E	1.69
199.	199	25°20'53.63"N	83°11'1.89"E	0.87
200.	200	25°20'10.86"N	83°11'0.54"E	0.66
201.	201	25°20'23.81"N	83°10'55.00"E	0.45
202.	202	25°19'46.16"N	83°12'8.44"E	2.00
203.	203	25°19'14.45"N	83°12'35.32"E	0.69
204.	204	25°19'23.79"N	83°12'44.98"E	3.54
205.	205	25°19'29.03"N	83°12'55.32"E	1.12
206.	206	25°19'4.94"N	83°13'15.49"E	0.48
207.	207	25°19'1.53"N	83°13'21.61"E	0.22
208.	208	25°18'56.66"N	83°13'20.64"E	0.88
209.	209	25°18'50.44"N	83°13'20.91"E	0.64
210.	210	25°18'45.43"N	83°13'19.22"E	4.86
211.	211	25°18'51.09"N	83°13'43.63"E	1.46
212.	212	25°19'42.20"N	83°10'59.96"E	2.14
213.	213	25°19'34.67"N	83°11'34.21"E	2.53
214.	214	25°19'40.26"N	83°11'39.36"E	0.70
215.	215	25°18'45.83"N	83°12'13.82"E	2.55
216.	216	25°18'51.42"N	83°12'8.28"E	2.1

217.	217	25°18'56.56"N	83°12'4.21"E	0.78
218.	218	25°19'46.48"N	83°10'28.90"E	3.70
219.	219	25°19'13.91"N	83°10'45.60"E	2.00
220.	220	25°19'20.14"N	83°11'0.56"E	1.66
221.	221	25°17'41.24"N	83°12'29.27"E	0.92
222.	222	25°18'24.13"N	83°11'12.17"E	1.38
223.	223	25°18'25.26"N	83°10'47.89"E	1.13
224.	224	25°18'57.95"N	83°10'30.31"E	0.80
225.	225	25°19'31.16"N	83° 9'43.25"E	1.24
226.	226	25°18'0.28"N	83°10'59.79"E	2.19
227.	227	25°17'57.35"N	83°11'21.83"E	1.00
228.	228	25°17'57.27"N	83°11'11.44"E	0.45
229.	229	25°17'25.65"N	83°10'54.29"E	1.00
230.	230	25°17'20.02"N	83°11'8.42"E	1.89
231.	231	25°17'58.45"N	83°10'42.59"E	4.10
232.	232	25°17'54.35"N	83°10'38.69"E	11.4
233.	233	25°18'32.16"N	83° 8'47.87"E	0.35
234.	234	25°17'38.58"N	83°10'13.67"E	1.49
235.	235	25°16'59.79"N	83°11'20.65"E	0.87
236.	236	25°16'54.80"N	83°11'24.59"E	2.1
237.	237	25°16'51.46"N	83°11'18.08"E	0.26
238.	238	25°16'31.39"N	83°11'23.48"E	1.15
239.	239	25°16'23.42"N	83°11'34.69"E	0.30
240.	240	25°16'36.73"N	83°11'32.75"E	2.48
241.	241	25°18'41.39"N	83° 8'24.53"E	1.82
242.	242	25°17'35.16"N	83° 9'49.68"E	1.67
243.	243	25°17'2.16"N	25°17'35.16"N	4.17
244.	244	25°16'27.58"N	25°17'2.16"N	4.40
245.	245	25°16'30.13"N	83°10'13.58"E	0.83
246.	246	25°17'25.67"N	83° 9'8.15"E	6.23
247.	247	25°17'31.62"N	83° 8'22.06"E	6.71
248.	248	25°18'0.48"N	25°17'31.62"N	0.60
249.	249	25°19'2.39"N	25°18'0.48"N	0.30

250.	250	25°17'2.93"N	83° 8'16.49"E	8.81
251.	251	25°16'31.37"N	83° 8'46.06"E	0.46
252.	252	25°15'22.51"N	83° 8'39.66"E	1.78
253.	253	25°15'24.21"N	83° 9'11.25"E	1.0
254.	254	25°16'26.21"N	83° 8'0.79"E	5.80
255.	255	25°16'9.95"N	25°16'31.37"N	6.31
256.	256	25°16'49.30"N	83° 7'36.95"E	2.56
257.	257	25°17'50.03"N	83° 6'52.51"E	1.60
258.	258	25°17'51.30"N	83° 7'12.18"E	1.35
259.	259	25°18'38.82"N	83° 5'44.34"E	0.73
260.	260	25°18'12.01"N	83° 6'2.33"E	0.68
261.	261	25°18'1.63"N	83° 6'20.96"E	1.62
262.	262	25°17'34.50"N	83° 6'48.99"E	0.91
263.	263	25°16'45.59"N	83° 7'8.35"E	1.85
264.	264	25°16'33.37"N	83° 7'11.38"E	3.13
265.	265	25°15'18.36"N	83° 8'16.30"E	0.93
266.	266	25°15'28.16"N	83° 7'9.55"E	1.51
267.	267	25°15'39.32"N	83° 7'7.59"E	0.75
268.	268	25°17'32.97"N	83° 6'6.20"E	0.80
269.	269	25°18'13.30"N	83° 5'37.94"E	2.20
270.	270	25°18'17.29"N	83° 4'54.03"E	0.25
271.	271	25°17'53.73"N	83° 5'1.52"E	2.63
272.	272	25°16'6.22"N	83° 5'48.59"E	1.13
273.	273	25°16'7.44"N	83° 5'57.80"E	0.67
274.	274	25°17'7.27"N	83° 5'0.53"E	3.25
275.	275	25°16'50.03"N	83° 4'59.78"E	5.00
276.	276	25°18'28.36"N	25°16'50.03"N	1.73
277.	277	25°16'36.61"N	83° 4'40.09"E	0.56
278.	278	25°16'27.93"N	83° 4'34.72"E	4.29
279.	279	25°16'28.06"N	83° 3'15.30"E	2.46
280.	280	25°15'14.61"N	83° 5'6.65"E	0.91
281.	281	25°15'9.82"N	83° 4'59.38"E	0.63
282.	282	25°15'15.99"N	83° 4'55.30"E	0.66

283.	283	25°14'35.52"N	83° 5'14.16"E	3.70
284.	284	25°13'13.95"N	83° 5'57.22"E	1.80
285.	285	25°14'26.14"N	83° 2'36.87"E	0.51
286.	286	25°14'10.51"N	83° 3'9.09"E	0.83
287.	287	25°12'57.84"N	83° 4'37.18"E	1.10
288.	288	25°15'53.47"N	83° 3'10.99"E	1.00
289.	289	25°16'2.96"N	83° 3'31.53"E	1.24
290.	290	25°15'59.57"N	83° 3'42.32"E	0.28
291.	291	25°16'0.82"N	83° 3'52.35"E	2.23
292.	292	25°16'8.24"N	83° 3'44.40"E	0.54
293.	293	25°16'10.31"N	83° 3'32.19"E	0.93
Total Area				**447.74 Ha**



Map 6 : Spatial Distribution Of Water Bodies Within Study Area

8.2 **Sacred water body associated with Kinaram Baba** : An oxbow lake was found associated with Baba Kinaram in Ramgarh area of Chandauli Distt. [Image 9] which is spread in an area of about 14.1 Ha. According to local people and religious practitioners, Aghoracharya Baba Kinaram was believed to have born in the 16th century at Ramgarh village where his ashram is situated currently. Believed to be an incarnation of Lord Shiva, he wandered throughout the country on his religious journey for the welfare of humanity. He is believed to have performed penance in the mountains of Girnar in Gujarat where he was guided and initiated by Lord Dattatreya. After this, he visited Mata Hinglaj Devi's Shaktipeeth (Goddess of Aghoris) in Balochistan and received her blessings through penance. His Ashram in Ramgarh comprises of a small worshipping place constructed besides a Banyan tree which is where Baba Kinaram did penance. Besides the temple there are graves of different sadhus who practiced the Aghor culture and attained Samadhi in this place. In the backyard of this temple lies the water body [Image 10] referred by the locals as "Baan Ganga" who associate this with the Mahabharata. As this water body is considered sacred, no activities such as bathing, washing, fish catching are permitted making it suitable habitat for the native biodiversity. However, some extended parts of this oxbow lake away from Ashram boundary are exploited for their water resource mainly to irrigate the surrounding agricultural fields.

Image 9 : Location Of Oxbow Lake [25° 27' 44.52" N; 83° 14' 49.43" E]

Image 10 : Part Of This Oxbow Lake As Seen On 1st November, 2021

8.3 **Village pond in Kharan :** A village pond spread in an area of about 4.62 ha was observed near Kharan village in Chandauli Distt. [Image 11]. According to interlocutors in this region, the water from this pond was mainly used for residential purposes along with being an important site during auspicious occasions and festivities. Fish rearing used to be practiced in this pond earlier, but has now declined significantly. The pond was relatively maintained and looked after by the local residents with plant species such as Ipomoea sp. along with other trees growing alongside its bank [Image 12]. Water hyacinth was observed in a small part of this pond which was relatively unused [Image 13].

Image 11 : Location Of Village Pond In Kharan, Chandauli Distt.
[25° 25' 19.72" N; 83° 21' 37.97" E]

Image 12 : The Village Pond In Kharan As Observed On 31st October, 2021

Image 13 : The Smaller Part Of Village Pond In Kharan

8.4 **Wetlands in Mughal Sarai town :** Numerous irregular shaped and varied sized ponds are located in Mughalsarai town [Image 14] especially around the railway junction. While some of these ponds serve as an important source of water for Indian Railways, others are either used by the local residents for various purposes including recreation and many lie in neglected state wanting urgent conservation efforts. One such wetland observed during the survey is depicted in Image 15.

Image 14 : Various Wetlands In Mughalsarai Town

Image 15 : A Tank Near Mughalsarai Railway Station

9.0 Riparian Flora Along Ganga River In Chandauli 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 [Image 16]. This could be attributed to the fact that agriculture is dominant in the landscape of study region especially along Ganga River. 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 17] 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 while some common species in study region are depicted in Images 18-19.

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.	*Blumea lacera* (Burm.f.) DC.	Asteraceae	Herb	Kakronda
18.	*Commelina benghalensis* L.	Commelinaceae	Herb	
19.	*Croton bonplandianus* Baill.	Euphorbiaceae	Herb	Ban Tulsi
20.	*Rumex dentatus* L.	Polygonaceae	Herb	
21.	*Parthenium hysterophorus* L.	Asteraceae	Herb	Congress Grass
22.	*Xanthium strumarium* L.	Asteraceae	Herb	Chhotav dhatura
23.	*Saccharum munja* Roxb.	Poaceae	Grass	Munj
24.	*Cyperus* sp.	Cyperaceae	Grass	
25.	*Bambusa bambos* (L.) Voss.	Poaceae	Grass	Bamboo
26.	*Cynodon dactylon* (L.) Pers.	Poaceae	Grass	Doob/Durva
27.	*Saccharum spontaneum* L.	Poaceae	Grass	Kans/Katha
28.	*Saccharum bengalense* Retz.	Poaceae	Grass	Munj

Image 16 : Riparian Vegetation Along Ganga River Near Taanda Ghat

Image 17 : Riparian Vegetation Dominated By Babool Trees And Parthenium Near Nidhaura Village In Chandauli Distt.

Image 18 : *Bambusa bambos* (Indian Thorny Bamboo)

Image 19 : *Lippia alba*

10.0 Faunal Diversity In Chandauli 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 between Taanda Ghat and Ganga-Gomti Sangam. 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.

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.

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 **Golden Jackal :** The golden jackal (*Canis aureus*) is a wolf-like canid that is native to Southeast Europe, Southwest Asia, South Asia, and regions of Southeast Asia. It is listed as of Least Concern in the IUCN Red List with their population trend increasing in the last couple of years owing to their widespread distribution, availability of shelter and food in good quantity and they being generalist foragers. Its presence in the study region was recorded based on information of local residents along with a direct sighting near Bissupur village amidst agricultural fields along Ganga River [Image 20].

Image 20 : A Pair Of Golden Jackal Spotted Near Bissupur Village In Chandauli Distt.

10.5 Based on visual observations during field survey and interactions with the interlocutors some major fauna species recorded from study region in Chandauli 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	**Indian Roofed Turtle**	***Pangshura tecta***	**Vulnerable**
3	Rhesus Monkey	*Macaca mulatta*	Least Concern
4	Indian Grey Mongoose	*Herpestes edwardsii*	Least Cocern
5	Blue Jay (Butterfly)	*Graphium doson*	Least Concern
6	Common Mime (Butterfly)	*Papilio clytia*	Least Concern
7	Common Grass Yellow (Butterfly)	*Eurema brigitta*	Least Concern
8	Blue Jay (Butterfly)	*Graphium doson*	Least Concern
9	Common Mime (Butterfly)	*Papilio clytia*	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 Chandauli Distt., a total of 60 different bird species were sighted, out of which 20 were wetland birds' species while remaining 40 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 was the sighted species which comes under Near Threatened Category, River Tern has Vulnerable status while Pallas's Fish Eagle comes under Endangered category 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 21-22.

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.	Common Greenshank	*Tringa nebularia*	Least Concern
10.	Common Sandpiper	*Actitishypoleucos*	Least Concern
11.	Asian Openbill	*Anastomus oscitans*	Least Concern
12.	Little Cormorant	*Microcarbo niger*	Least Concern
13.	Painted Stork	*Mycteria leucocephala*	Least Concern
14.	Indian Cormorant	*Phalacrocorax fuscicollis*	Least Concern
15.	White breasted - Waterhen	*Amaurornis phoenicurus*	Least Concern
16.	Common Moorhen	*Gallinula chloropus*	Least Concern
17.	**River Tern**	***Sterna aurantia***	**Vulnerable**
18.	Red-naped Ibis	*Pseudibis papillosa*	Least Concern
19.	Black-winged Stilt	*Himantopus himantopus*	Least Concern
20.	**River Lapwing**	***Vanellus duvaucelii***	**Near Threatened**
21.	Red-wattled Lapwing	*Vanellus indicus*	Least Concern
22.	Black Drongo	*Dicrurus macrocercus*	Least Concern
23.	Ashy Drongo	*Dicrurus leucophaeus*	Least Concern
24.	Common Myna	*Acridotheres tristis*	Least Concern
25.	Bank Myna	*Acridotheres ginginianus*	Least Concern
26.	Common Stonechat	*Saxicola torquatus*	Least Concern
27.	Jungle Babbler	*Turdoides striata*	Least Concern
28.	Common Babbler	*Argya caudata*	Least Concern
29.	White Wagtail	*Motacilla alba*	Least Concern
30.	White-browed Wagtail	*Motacilla maderaspatensis*	Least Concern
31.	Asian Plain Martin	*Riparia chinensis*	Least Concern
32.	Streak-throated Swallow	*Petrochelidon fluvicola*	Least Concern
33.	Barn Swallow	*Hirundo rustica*	Least Concern
34.	Common Tailorbird	*Orthotomus sutorius*	Least Concern
35.	Rose-ringed Parakeet	*Psittacula krameri*	Least Concern
36.	House Sparrow	*Passer domesticus*	Least Concern
37.	Indian Jungle Crow	*Corvus culminatus*	Least Concern

38.	House Crow	*Corvus splendens*	Least Concern
39.	Oriental Magpie Robin	*Copsychus saularis*	Least Concern
40.	Common Pigeon	*Columba livia*	Least Concern
41.	Ashy Prinia	*Prinia socialis*	Least Concern
42.	Asian Koel	*Eudynamys scolopaceus*	Least Concern
43.	Greater Coucal	*Centropus sinensis*	Least Concern
44.	Red-whiskered Bulbul	*Pycnonotus jocosus*	Least Concern
45.	Red-vented Bulbul	*Pycnonotus cafer*	Least Concern
46.	Common Kaestral	*Falco tinnunculus*	Least Concern
47.	Black-winged kite	*Elanus caeruleus*	Least Concern
48.	Black Kite	*Milvus migrans*	Least Concern
49.	**Pallas's Fish Eagle**	***Haliaeetus leucoryphus***	**Endangered**
50.	Spotted Dove	*Spilopelia* chinesis	Least Concern
51.	Eurasian Collared Dove	*Streptopelia decaocto*	Least Concern
52.	Laughing Dove	*Spilopelia senegalensis*	Least concern
53.	Red Turtle Dove	*Streptopelia tranquebarica*	Least concern
54.	Baya Weaver	*Ploceus philippinus*	Least Concern
55.	Common Hoopoe	*Upupa epops*	Least Concern
56.	Black Redstart	*Phoenicurus ochruros*	Least Concern
57.	Indian Peafowl	*Pavo cristatus*	Least Concern
58.	Indian Roller	*Coracias benghalensis*	Least Concern
59.	Crested Lark	*Galerida cristata*	Least Concern
60.	Asian Pied Starling	*Gracupica contra*	Least Concern

Image 21 : Common Hoopoe

Image 22 : White Wagtail

11.0 Ganga Riverine Islands/*Diaras* In Chandauli 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 only big and most significant diara that falls in the Ganga river stretch between Chandauli and Varanasi Distt.s is semi-circular shaped [Image 23] measuring about 10 kms long and 1-1.6 km wide. The island is inhabited with main villages being Mokulpur, Gobrha and Ramchandipur which can be accessed by the Ramchandipur Bridge situated near Chhittauna village in Varanasi. The island divides Ganga into two braids – the narrower channel [left bank/northern branch] is known locally as 'Sota' River, implying that it dries up during the lean season, and the wider channel, locally referred to as Ganga, which has a perennial flow. The island area is extensively under agriculture which is practiced by residents from Chandauli Distt. who have lost their original lands due to shift in the river course and hence, have migrated here. The riparian flora on this island comprised of dispersed trees with most of them being *Acacia nilotica* (Babool) along with *Azadirachta indica* (Neem), *Ficus religiosa* (Peepal), *Dalbergia sisoo* (Shisham) and *Aegle marmelos* (Bel patra). The ground flora in the riparian zones of the island was dominated by *Parthenium hysterophorus* (Congress grass) and *Leucas aspera*. The riparian grass – *Saccharum munja* was also luxuriantly growing throughout the island and was being used for roof thatching by the villagers.

11.3 Apart from this island, few sand bars are also present in the Ganga river stretch of study region in Chandauli Distt. Some of these are depicted in Images 25-26.

Image 23 : Riverine Island Between Chandauli And Varanasi Distt.s

Image 24 : Part Of This Riverine Island As Seen From Near Ramchandipur Bridge

Image 25 : A Sandbar As Seen From Saidpur Ganga Bridge

Image 26 : A Sandbar As Seen Near Naughara Village

12.0 Fishing In Chandauli 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 is an important source of livelihood and food for local residents which is done almost throughout the year. Commonly used fishing techniques in the study region include dragnets, cast net, fine and medium meshed plastic nets and locally made fishing rods [Images 27-28]. 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.

12.3 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 local markets of nearby villages and are also consumed locally. 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.

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.

Image 27 : A Small Boat Along With Fishing Gear As Observed Near Jigana Village

Image 28 : Medium Meshed Fishing Net Ready To Be Set Up In Ganga River Near Guraini Ghat

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 Chandauli Distt.

13.1 The geomorphology of a region plays an important role on the ground water regime. The relief, slope, depth of soil types and assemblage of different land forms hold significantly on the occurrence and movement of ground water. The soils of Chandauli Distt. are broadly classified into two groups – alluvial and residual representing the different stages of soil development resulting from a sub-humid to a humid climate and the physical and chemical weathering of the soils. The Distt. is underlain by Gangetic alluvium in the northern part which consists of interbeded layers of sand, silt and clay which are associated at places with *kankar*. The Vindhyan rocks which occur in the southern part of the district consist of Quartzite and Sandstones belonging to the Dhandraul and Scarp-Sandstone stages. The groundwater in this Distt. occurs in both the Kaimur sandstones and unconsolidated alluvial sediments of the Distt. In the Kaimur sandstone, the occurrence and movement of ground water are controlled by size, depth, spacing and degree of Joints, Bedding, Fractures and Fissures whereas in the unconsolidated alluvial sediments, groundwater occurs in the pore spaces in zone of saturation (Bhargava, 2012).

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 60-120 ft. in the study region and it kept on increasing as the distance from Ganga River increased. Though the use of hand pumps was prevalent throughout this Distt. for drawing out ground water, the use of wells was also observed in some villages. One such old well used for drawing groundwater was recorded near [Image 29]. According to a study conducted by Singh et al. (2015), the major ion chemistry data for groundwater in parts of Chandauli-Varanasi region revealed that the ground water in this area is slightly hard to very hard and fresh to brackish in nature. The water quality index calculated exhibited poor quality in less percentage indicating the effective ion leaching, overexploitation and anthropogenic activities including discharge of effluents from agricultural and domestic uses in both the seasons.

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

Place	Coordinates		Ground Water Table in Feet
	Lat.	Long.	
Kawar	25°22'27.46"N	83°11'3.59"E	110
Mugalsarai	25°16'55.71"N	83° 5'21.19"E	70
Sadhguru Ashram	25°23'33.52"N	83°25'32.80"E	70
Ramnagar	25°16'35.11"N	83° 2'9.87"E	80
Ramgarh	25°13'2.81"N	83°15'4.44"E	60
Dighwat	25°11'43.29"N	83°10'55.65"E	90
Chandauli Town	25°15'37.13"N	83°15'50.07"E	60
Jamalpur	25° 9'12.53"N	83° 4'51.26"E	120

Image 29 : An Old Dug Well Observed Near Bissupur Village

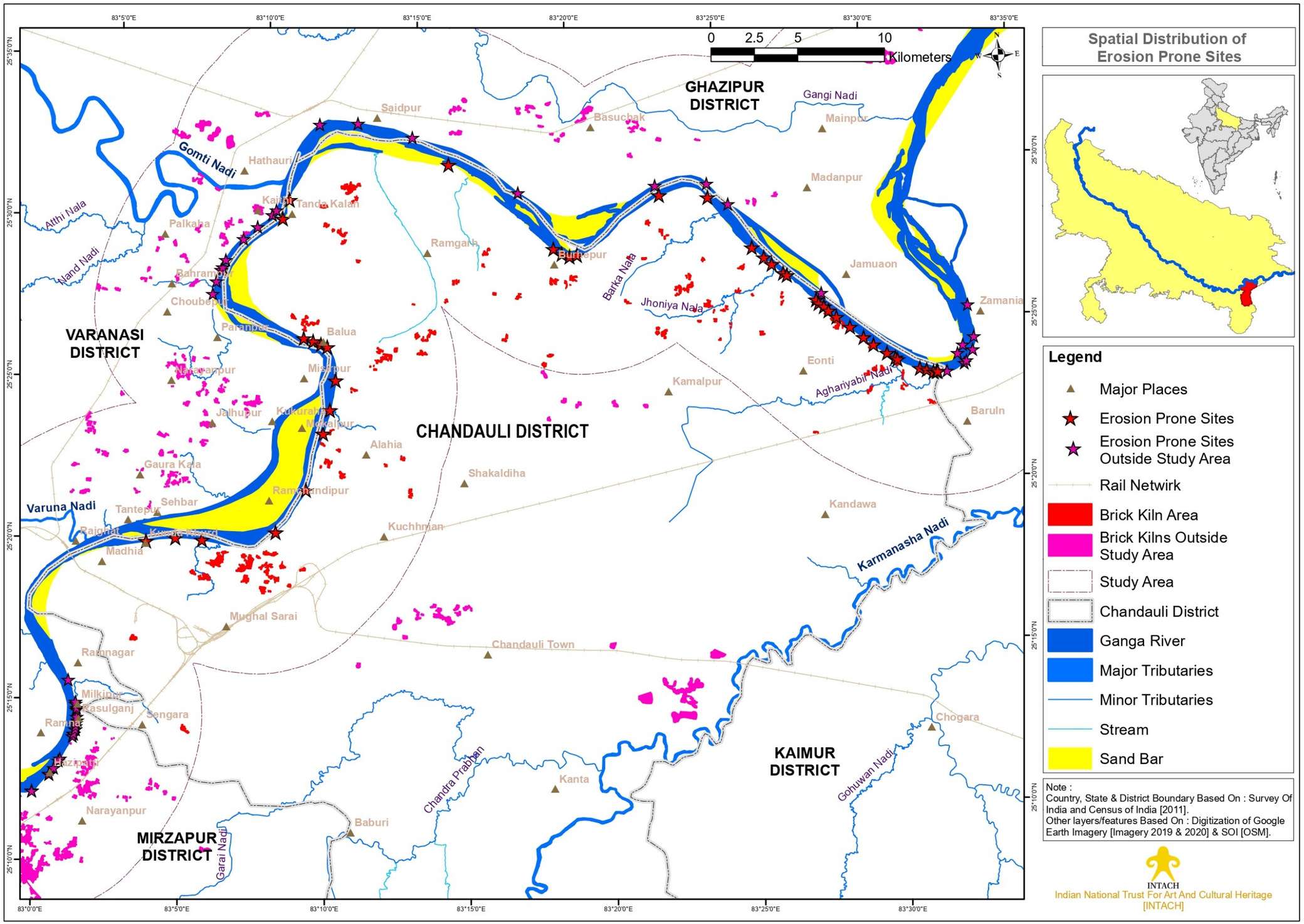
14.0 Ganga River Bank Erosion In Chandauli Distt.

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 several different sites such as near Mahuji village, Guraini Ghat, Dhanapur, Naughara, Balua Ghat, Saidpur near Taanda Ghat and near Kunda Khurd. Some images depicting lateral erosion as observed in the field survey are presented in Images 30-32. 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. This also led to migration of residents towards further south in the Distt. and some residents towards Varanasi.

Image 30 : Ganga River Bank Erosion Near Saidpur In Chandauli Distt.

Image 31 : Ganga River Bank Erosion Near Balua Ghat In Chandauli Distt.

Image 32 : Ganga River Bank Erosion Near Taanda Ghat In Chandauli Distt.



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

15.0 Mining And Brick Kilns In Chandauli

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 8 and one such brick kiln is depicted in Image 33 as observed during the field survey.

Image 33 : A Brick Kiln As Seen During The Field Survey

16.0 Boatmaking And Inland Navigation In Chandauli 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. Boatmaking was observed at different sites such as near Guraini Ghat and Taanda Ghat [Images 34-35] during field survey in Chandauli Distt. Two major types of boats are made – the smaller wooden boats which are generally hand-rowed and used for fishing and the medium-big sized boats mainly used for ferrying passengers and for tourists [Image 36]. Sekhua/Sal wood (*Shorea robusta*) is the principal choice of wood for construction of boats and is obtained from the local markets. 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 the boats ranges from Rs. 50,000 to Rs. 3 lakhs depending upon various factors such as type of wood, size of boat, use of metal, motorized or hand-rowed and so on. 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.

Image 34 : Boatmaking Near Guraini Ghat

Image 35 : Boatmaking Near Taanda Ghat

Image 36 : Inland Navigation As Observed Between Dhanapur In Chandauli And Chochakpur In Ghazipur Distt.S

17.0 Sacred Trees In Chandauli 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 37-39.

Image 37 : A Stand Of Sacred Peepal Trees Associated With A Goddess Temple Near Bissupur Village

Image 38 : A Stand Of Sacred Trees Associated With A Devi Temple Near Kawar Village

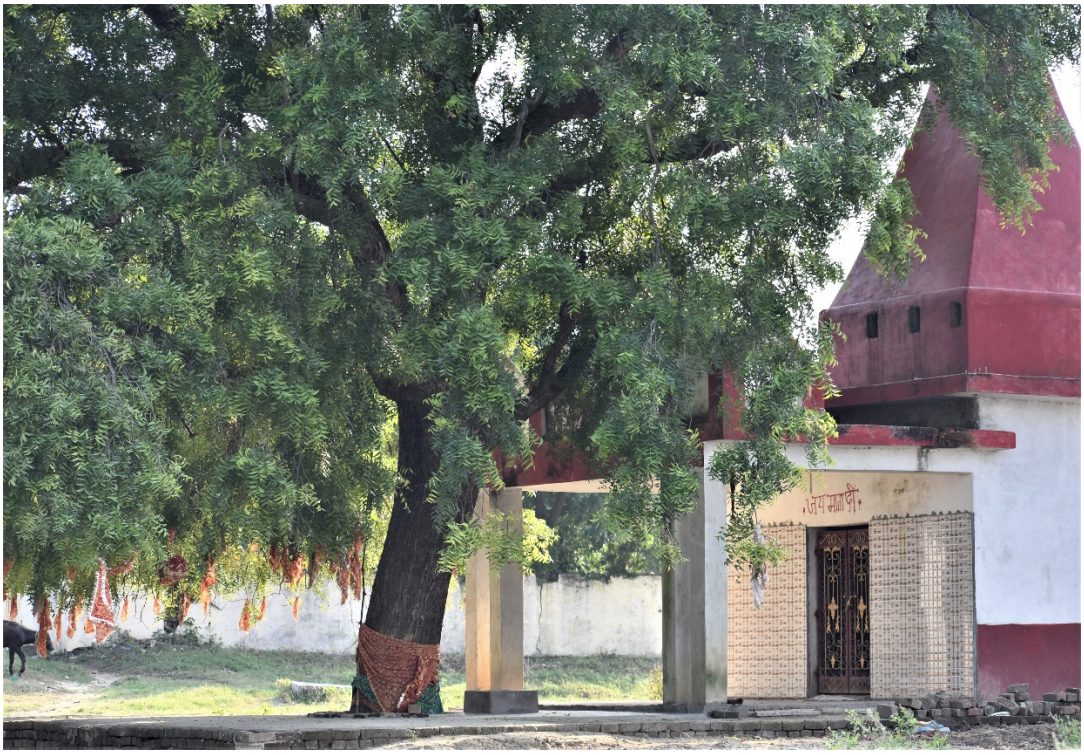


Image 39 : A Sacred Neem Tree Associated With A Goddess Temple Near Ramchandipur Village

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 instream biodiversity. One such important cremation site is situated at Balua Ghat in the study region [Image 40]. Despite there being dedicated places to perform last rites, people still undertook that activity right on the river bank leading to the partially burnt remains directly entering the water. 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 40 : Cremation Along Ganga River At Balua Ghat

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 41] 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 41 : Solid And Liquid Waste Entering Ganga River As Observed Near Taanda Ghat

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 Chandauli 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 42] 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 of agriculture in riparian areas of Ganga River in order to allow the natural biota to flourish.

Image 42 : Intensive Agriculture Along Ganga River In The Study Region Leaving Bald Banks Vulnerable to Erosion

17.0 References:

1. Ali S. (2002), The Book of Indian Birds (13th revised edition). Oxford University Press, New Delhi, 326 pp.
2. Auden J.B. (1941), An excursion to Gangotri. *Himalayan Journal*, 7: 96-102
3. Bhattacharyya U.C. and Goel A.K. (1982), Studies on the vegetation of Tehri dam and some rare plants in Garhwal Himalayas. Published by B.S.I. Howrah. pp. 1-38.
4. Bhargava A.K. (2012), Groundwater brochure of Chandauli District, U.P. http://cgwb.gov.in/District_Profile/UP/Chandauli.pdf
5. Castelle A.J., Johnson A.W. and Conolly C. (1994). Wetland and stream buffer size requirements: A review. *Journal of Environmental Quality,* 23:878-882.
6. Gangwar R.S. and Gangwar K.K. (2011). Taxonomic and economic classification of riparian floral diversity along river Ganga in Garhwal Himalayan region of India. *Researcher*, 3(4):5-14.
7. Gangwar R.S. and Joshi B.D. (2006). Some Medicinal flora in the riparian zone of river Ganga at Saptrishi, Haridwar, Uttaranchal. *Himalayan Journal of Environment and Zoology*, 20(2): 237-241.
8. Grimmett R., Inskipp C. and Inskipp T. (2016), Birds of the Indian Sub-continent: India, Pakistan, Sri Lanka, Nepal, Bhutan, Bangladesh and the Maldives. Bloomsburry Publishing, India.
9. Groffman P.M., Gold A.J., Husband T.P., Simmons R.C. and Eddleman W.R. (1990). *An investigation into multiple uses of vegetated buffer strips*. RI: University of Rhode Island, Kingston.
10. Gupta R.K. (1960), On a botanical trip to the source of the river Ganga in Tehri Garhwal Himalayas. *Indian Forester*, 86: 547-552
11. Islam Md.S., Rahman M.M., Halder C.G. and Tanaka M. (2006), Fish assemblage of a traditional fishery and seasonal variation in diet of its most abundant species *Wallago attu* (Siluriformes: Siluridae) from a tropical floodplain. *Aquatic Ecology*, 40: 263-272.
12. Joshi K.D., Jha D.N., Alam A., Srivastava S.K., Kumar V. and Sharma A.P. (2014), Enironmental flow requirements of river Sone: impacts of low discharge on fisheries. Current Science, 107(3): 478-488.
13. Joshi E.B. (1965), Uttar Pradesh District Gazetteers – Varanasi. Printed by Govt. Press, Allahabad, U.P.
14. Kumar S. (2001), Plant diversity along river Ganga, BSI, Sai Publisher Dehradun.
15. Meena M. (2017), Agriculture crop damage by antelope (*Boselaphus tragocamelus*) and management strategies: Challenges in India. International Journal of Zoology Studies, 2(6): 157-160.
16. Nawab A., R.K. Sinha P.M. Thompson and S. Sharma (2016), Ecosystem services and conservation assessment of freshwater biodiversity. In: L. Bharati, B.R. Sharma, and V.

Smakhtin (eds.), The Ganges River Basin: Status and Challenges in Water, Environment and Livelihoods. Routledge, Taylor and Francis Group, London, UK.

17. Osterkamp W.R. (1998), Processes of fluvial island formation with examples from Plum Creek, Colorado and Snake River, Idaho. *Wetlands*, 18(4): 530-545.
18. NEERI (2018), Assessment of water quality and sediment to understand the special properties of River Ganga. Report submitted to NMCG.
19. NICRA-ICAR (2012), Agriculture Contingency Plan for District: Chandauli. http://www.nicra-icar.in/nicrarevised/images/statewiseplans/Uttar%20Pradesh/UP18-Chandauli-27.09.2012.pdf
20. Pallis M. (1934), Gangotri und Leo Pangal. *Himalayan Journal*, 7(6): 106-126.
21. Prasad R., Pruthi V. and Saini R.K. (2012), Riparian floral diversity of Ganga river. Report prepared by Indian Institutes of Technology.
22. Sahai (1953), Trek to Gangotri (Source of the Ganga). *Indian Forester*, pp. 147-151
23. Shyam R. (2008), A study on riparian floral biodiversity of river Ganga between Haridwar and Gangotri. Thesis submitted to Gurukul Kangri Unversity, Haridwar, India.
24. Singh S., Raju N.J. and Ramakrishna Ch. (2015), Evaluation of Groundwater Quality and Its Suitability for Domestic and Irrigation Use in Parts of the Chandauli-Varanasi Region, Uttar Pradesh, India. *Journal of Water Resource and Protection*, 07(07): 482-497.
25. Sinha M. and Khan M.A. (2001) Impact of environmental aberrations on fisheries of the Ganga (Ganges) River. *Aquatic Ecosystem Health and Management Society*, 4: 493-504.
26. Sinha R.K. and Kannan K. (2014), Ganges River Dolphin: An overview of Biology, Ecology and Conservation status in India. Ambio, DOI 10.1007/s13280-014-0534-7.
27. Tare et al. (2012), Wetland Report for Ganga River Basin Environment Management Plan. Report published by Indian Institutes of Technology.
28. Tripathi S., Gopesh A. and Swivedi A.C. (2017), Fish and fisheries in the Ganga river: Current assessment of the fish community, threats and restoration. Journal of Experimental Zoology India, 20(2): 907-912.
29. Udas P.B., Prakash A. and Goodrich C.G. (2018), Gendered vulnerabilities in Diaras: Struggling with floods in the Gandak River Basin. *Review of Women's Studies*, LIII(17): 46-54.
30. WII-GACMC (2017), Aquatic Fauna of Ganga River: Status and Conservation. Ganga Aqualife Conservation Monitoring Centre, Wildlife Institute of India, Dehradun.
31. Wyrick J.R. and Klingeman P.C. (2011), Proposed fluvial island classification scheme and its use for river restoration. *River Resources and Applications*, 27: 814-825.

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