

Ganga Cultural Documentation 2021

SAHIBGANJ DISTRICT



National Mission for Clean Ganga



INTACH

Indian National Trust for Art and Cultural Heritage

71, Lodhi Estate, New Delhi – 110003

Website: www.intach.org

Email: intach@intach.org

Surveyed & Authored by: Hershwardhan Kumar

Team Headed By: Manu Bhatnagar [Principal Director [NHD] & Dr. Ritu Singh [Director, NHD]

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Front Cover: Ganga River as seen near Sahibganj town

Background: Ganga river floodplain near Udhwa Bird Sanctuary

Back cover: Moti Jharna waterfall in Sahibganj Distt.

Formatting and Design by: Sumesh Dudani



GANGA CULTURAL DOCUMENTATION

SAHIBGANJ DISTRICT

MARCH, 2021

Sponsored by :



National Mission for Clean Ganga

Authored By :



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1.0 Introduction

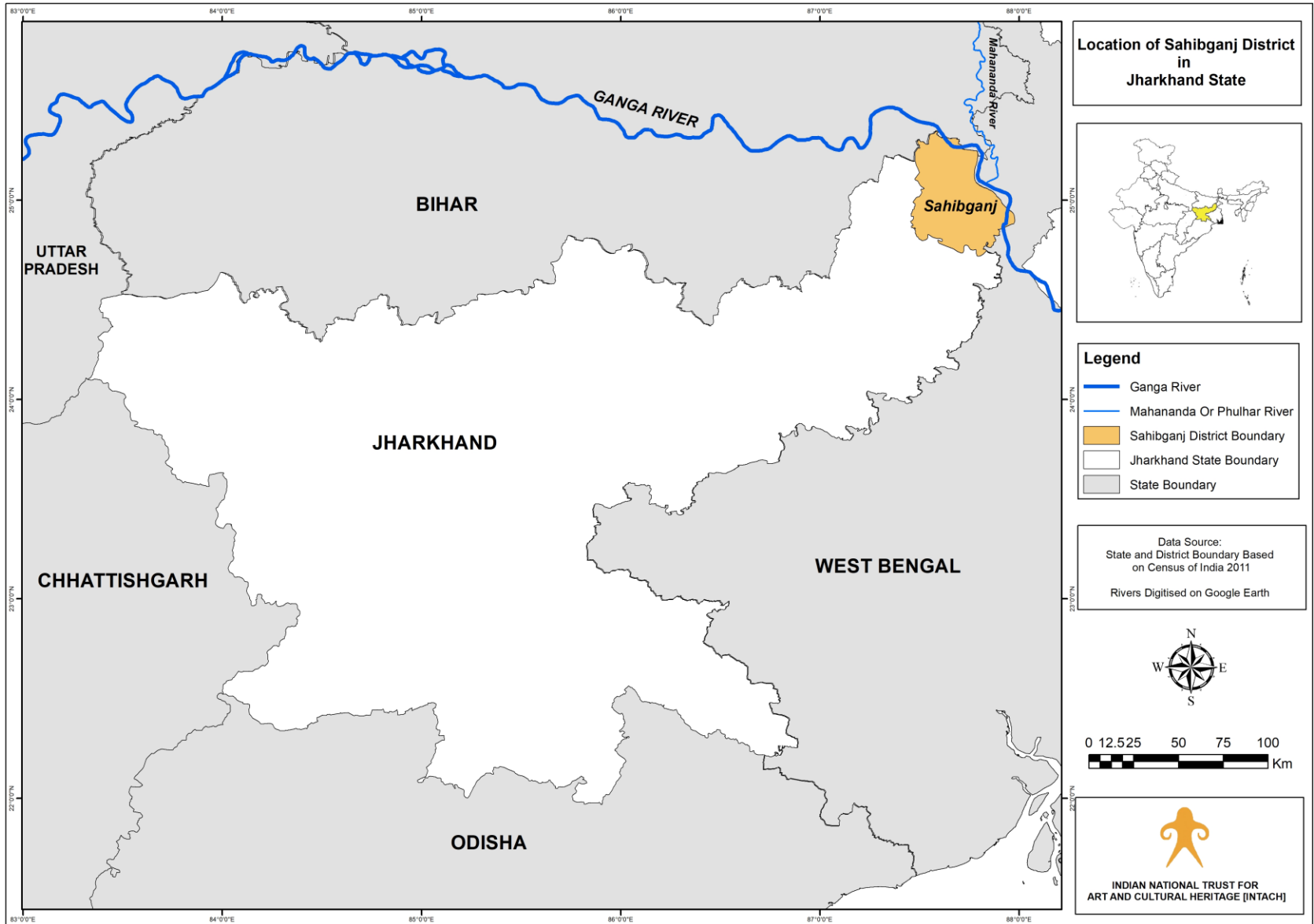
- 1.1 Sahibganj distt. is one of the twenty-four districts of the state of Jharkhand, situated between 24°42' North to 25°21' North latitude and 87°25' East to 87°54' East longitude. With a total area of 1702.10 sq. kms., the distt. is set in a lush green region with a predominantly tribal population. It is part of the Santhal Pargana division and lies at its eastern most tip [Map 1], as a result of the Rajmahal and Pakur subdivisions of old Santhal Pargana district to merge and pave the way for forming the state on 17 May 1983.
- 1.2 The distt. is divided into two subdivisions namely Sahibganj subdivision and Rajmahal subdivision, which are further sub-divided into 9 community development blocks. On its western periphery are Bhagalpur and Godda districts, Maldah and Murshidabad districts of West Bengal in the east, whilst the Ganga river and Katihar district flank the north. Sahebganj town is the administrative headquarters of this distt. Moti Jharna Waterfall, Shivgadi Temple, Udhwa Bird Sanctuary and National Fossil Park are some of the important historical sites of Sahibganj district.
- 1.3 The district may be divided into two natural divisions on the basis of its geographical location, topography, and cultivable land. The first region comprises of Borio, Mandro, Barhait, Pathna and Taljhari blocks and lies under the Damin-i-Koh area. The undulating hills and slopes are covered with forests, once dense but sparse at present. The valleys have cultivable lands, yielding mostly paddy. The inhabitants of this region are generally Paharias, Mal Paharias and Santhals. Those dwelling on the hill top cultivate Barbatti and maize using rainwater. The second region consists of Sahibganj, Rajmahal, Udhwa and Barharwa blocks. This plain region has an interesting mix of uplands, undulation along ridges, and depressions. The Ganges, Gumani and Bansloi rivers flow across this area, bestowing it with an abundance of fertile lands.
- 1.4 The history of Sahibganj district is rich and interesting. The area is believed to have been inhabited since time immemorial only by Malers (Mal Paharia), who were the early settlers of the territory of Rajmahal hills. They still reside in some areas of the same hills. Sahibganj has also been mentioned in the travelogue of Hiun Tsang during his trip to India in the 7th century AD. In the Chinese Buddhist text the town was mentioned as "Kajangla" literally translating to an old town. Historical records

also state that Bhaskaravarman, the King of Kamrupa proceeded and passed river Ganga with his army which included his warships, elephants, horses and infantry to meet King Harsha of the Gupta period in 642 AD.

- 1.5 One of the important natural highlights of this distt. is Moti Jharna [Image 1]. The name of the waterfall translates to “pearl” which is an apt name for this gem of a cascade. Symbolizing the beauty of a pearl, the running torrents of white, frothy waters are a great source of happiness and wonder from its visitors. Flowing from the Rajmahal Hills, it is also a celebrated picnic spot where tourists flock for entertainment and peace of mind. Eco tourism has been developed here and it is also an upcoming heritage site which needs to be conserved.



Image 1 : Moti Jharna In Sahibganj Distt.



Map 1 : Location Of Sahibganj Distt.

2.0 Ganga River In Sahibganj Distt.

2.1 The Ganges forms the northern boundary of the distt. and enters from its north western corner. From here, it meanders eastward up to Sakrigali where it takes a turn to the south and forms the southern boundary of the district up to a little beyond Radhanagar in the Rajmahal subdivision. The river has been drifting gradually to the north and Sahibganj town, which was once at the riverbank, has shifted about a mile away. The average width of the Ganges in the district is about four and half kilometers. It generally swells during the rainy season and inundates the lowlands lying east of the loop line. There is a ferry across the river between Maharajpur ghat in the Sahibganj district on one side and Manihari ghat in the Katihar district on the other side. Country boats and jetties plying in the river also connect Rajmahal and Malada in West Bengal.

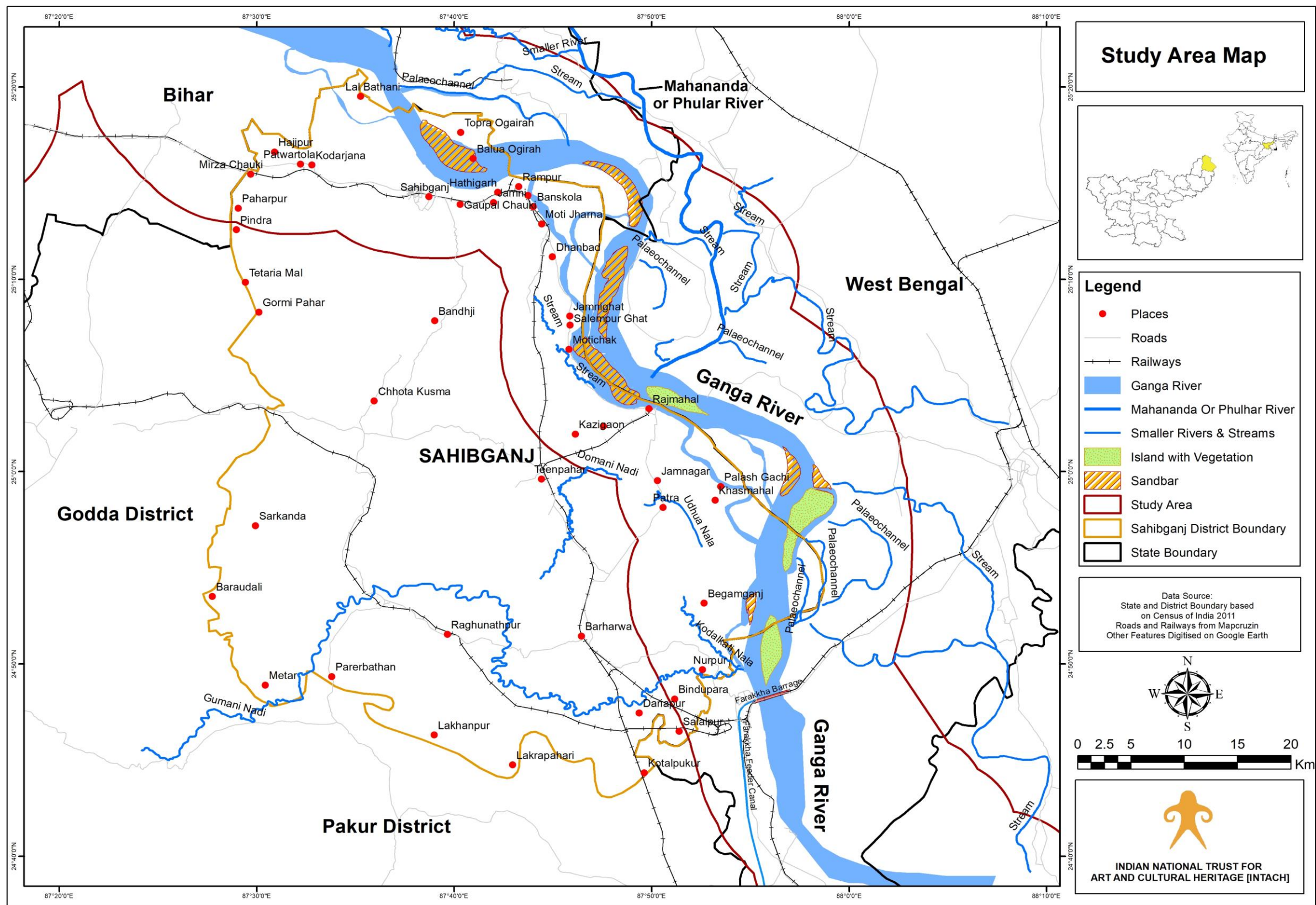


Image 2 :Ganga River As Seen Near Sahibganj Before Turning South In Rajmahal Subdivision

3.0 Methodology

- 3.1 The right bank of the Ganga is situated along the peripheral boundary of Sahibganj where the river continues for about 70 kms. Hence, for carrying out the ground survey a 7 km buffer zone on the right bank of Ganga River was selected [Map 02]. Based on the secondary information analyzed and the features noted on Google Earth 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 & *Diara* communities in the distt. for carrying out relevant interactions.

- 3.2 The field survey in Sahibganj Distt. was undertaken from 7th to 12th December, 2020 and 22nd to 30th December, 2020. During the survey, various field sites were visited where good quality pictures related to the study were collected using a DSLR camera. The GPS locations were also collected using Garmin hand-held GPS and videography at the study sites was done using 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 agriculture and cattle farmers, temple priests, village heads, fishermen, boatmen, etc. Besides this, the secondary data was also collected from District Forest Department and District Fisheries Department related to some parameters of this study.



Map 2 : Study Area In Sahibganj Distt.

4.0 Tributaries Of Ganga River

4.1 **Gumani River:** It rises in the northwestern slopes of Singarsi range and flows northward up to Simlong. Thereafter, it flows northeastward up to Berhait, and finally turns east from south of Borna Pahar and finds its way into the alluvial plains of the Ganga. The Gumani River Basin, Jharkhand ($24^{\circ} - 25^{\circ}15' N$, $87^{\circ}29' - 87^{\circ}45' E$), lies within the Rajmahal Volcanic Province (RVP), a Continental Flood Basalt Province (CFBP) of the early Cretaceous age (Bhattacharji, 2012). It merges with Ganga river at the southernmost boundary of Sahibganj distt. [Image 3]



Image 3 : Gumani-Ganga Confluence In Sahibganj Distt.

4.2 **Bansloi river:** The Bansloi River originates on Bans Hill in Sahibganj district of Jharkhand, flows through Pakur district of Jharkhand and Birbhum and Murshidabad districts of West Bengal before flowing into the Bhagirathi, north of Jangipur. Image 4 shows the flow of Bansloi river in study region as observed during the survey.

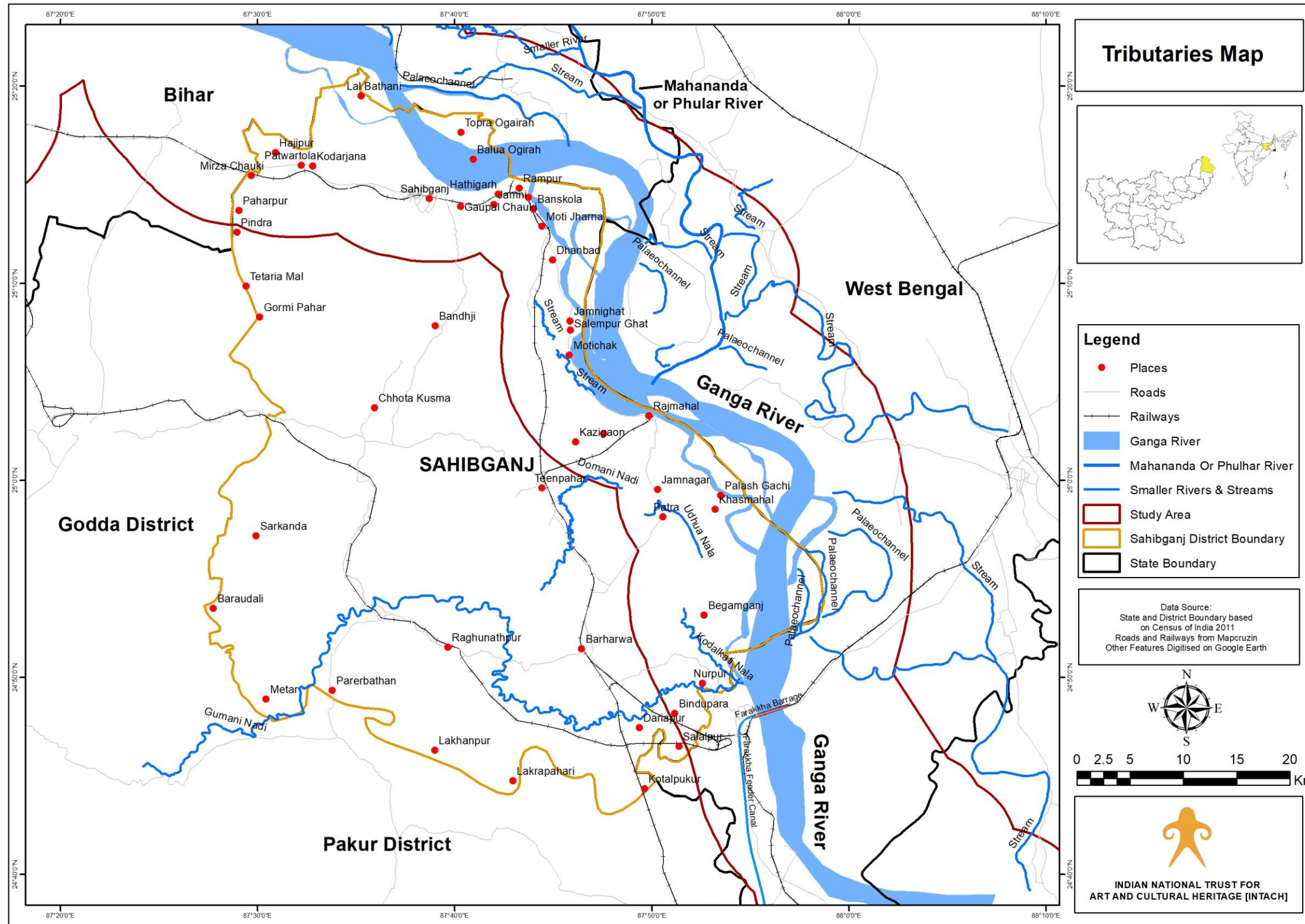


Image 4 : Bansloi River As Seen On 11th December 2020

4.3 **UdhwaNala:** Udhwa is named after saint Uddhava of Mahabharat fame, who was a friend of Lord Krishna and practitioner of Sankhya Yoga (Samkhya). It is believed that Udhwa was the birthplace of Saint Uddhava. Udhwa (also spelled as Udhua) is a village in the Uddhwa CD block in the Rajmahal subdivision of the Sahibganj district. This is the battlefield where the Battle of Udhwa nala between the Nawab of Bengal Mir Qasim, and the British (1763) took place. This nala serves as an important connecting link between the Udhwa Bird Sanctuary and Ganga river in the study region. Image 5 shows the flow of Udhwa Nala as seen during the survey.



Image 5 : Udhwa Nala Flow In The Study Region



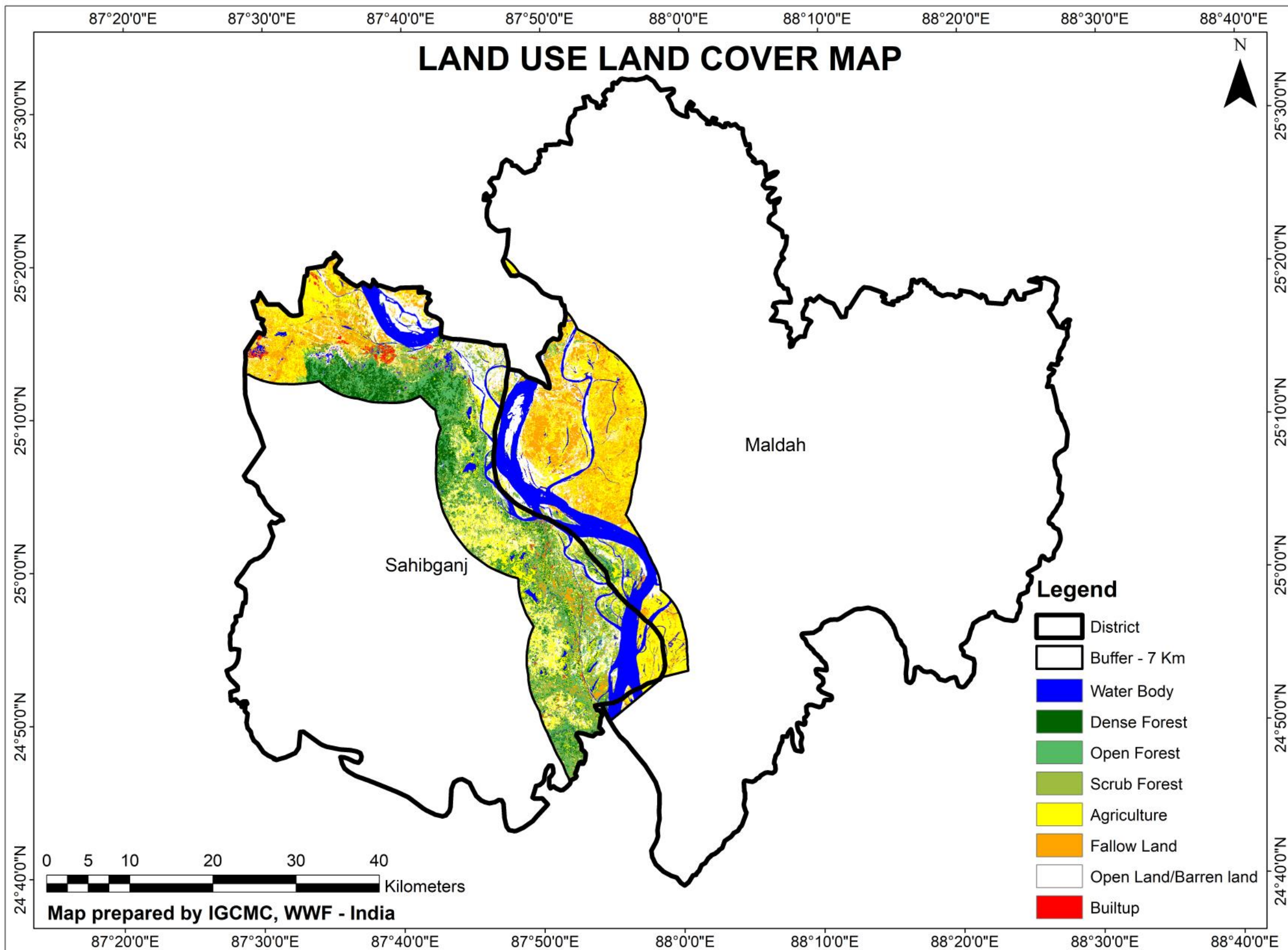
Map 3 : Major And Minor Tributaries Of Ganga River In The Study Region

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 bodies, dense forest, open forest, scrub forest, agriculture land, fallow land, open/barren land and built up area. Among these, the agriculture land along with fallow land occupied major portion of the land use type in Sahibganj distt. This was followed by forest land (including all three types of forest classifications), open land and water bodies. The built-up area in this distt. was just 0.755 % of the total area. The details of these classes in terms of area covered are presented in Table 1 and the land use of the Distt. is depicted in Map 4.

Table 1 : Land Use/Land Cover Details Of Study Region In Sahibganj Distt.

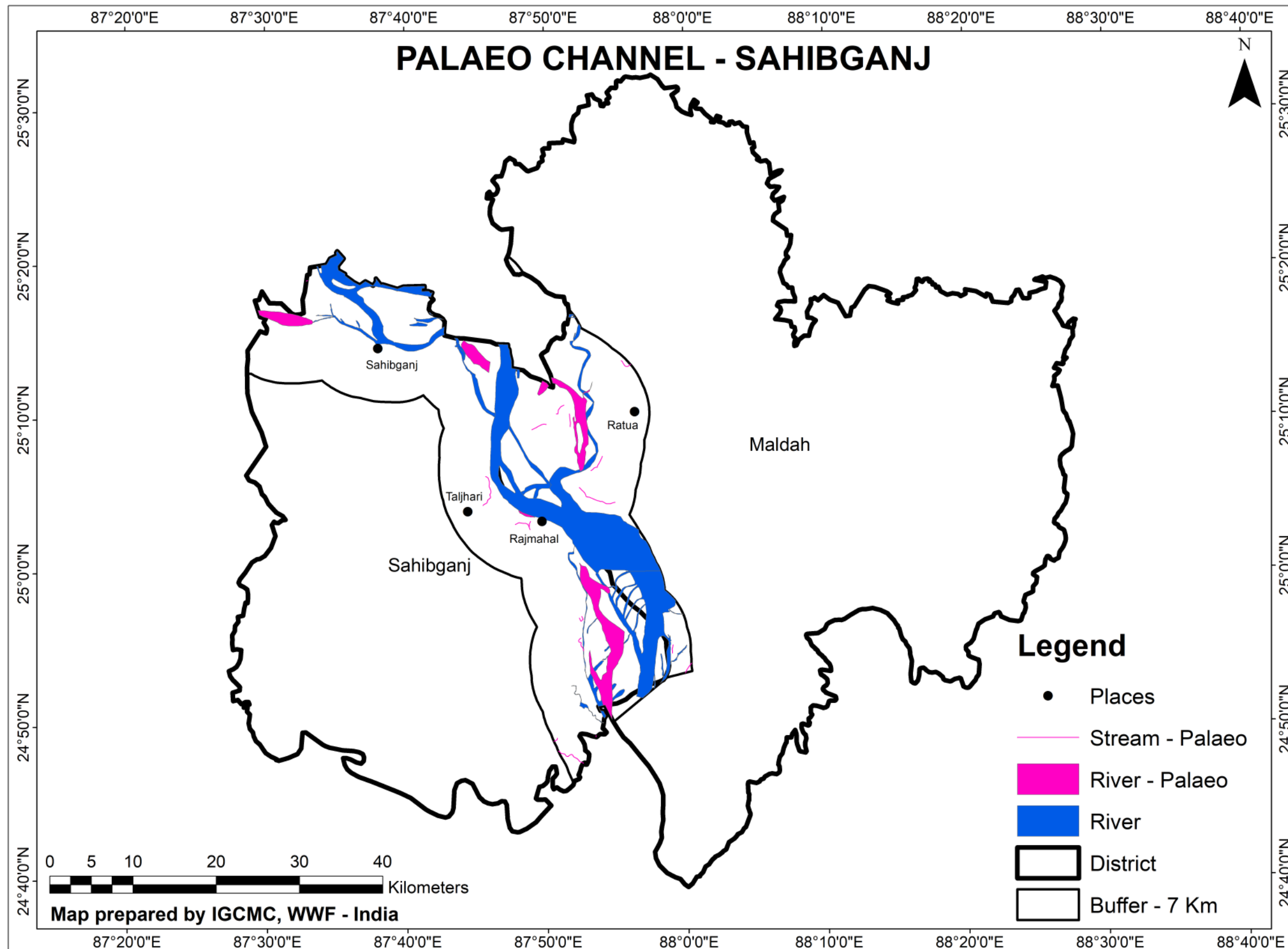
Sahibganj			
Class Name	Area (Ha)	Area (Sq. Km)	Area (%)
Water Body	18519.300	185.193	14.919
Dense Forest	8935.290	89.353	7.198
Open Forest	15851.400	158.514	12.770
Scrub Forest	5199.750	51.998	4.189
Agriculture Land	33572.400	335.724	27.045
Fallow Land	20668.700	206.687	16.650
Open Land/ Barren Land	20449.800	204.498	16.474
Built up	937.260	9.373	0.755
Total	124133.900	1241.339	100



Map 4 : Land Use/Land Cover Map Of Study Region In Sahibganj Distt.

6.0 Palaeochannels Of Ganga River In Sahibganj Distt.

- 6.1 Decline in natural flow of a river or stream decreases its sediment flushing ability and appears to be a be a pertinent reason behind the disappearing of river channels in the Ganga River basin. Besides, various other factors such as change in land use pattern, sand mining, agricultural practices and brick kilns have been responsible for dwindling streams and river channels in the region. These palaeochannels do not carry water during most of the year but may flow when flooding occurs. Such abandoned and silted palaeochannels of the past can be mapped using 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 Sahibganj Distt.



Map 5 :Palaeochannels In The Study Region

7.0 Floodplain of Ganga River In Sahibganj Distt.

- 7.1 The active floodplain of a river is defined as an area on either side of the river channel with regular flooding on a periodic basis. Maintaining an active flood plain of a river is critical for assuring equilibrium in the ecosystem. A river is akin to the nurturing element of the surrounding plains and become the genesis for harbouring rich biodiversity including riparian vegetation as well as many other groups of organisms, which help in maintaining the 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 of India, floodplains have been occupied by local farmers for carrying out their agricultural activities especially in the non-monsoon months. The Ganga River floodplain has been utilized in almost all the districts, where it passes through, for agricultural purposes, thereby rendering it as a great agrarian resource.
- 7.2 Sahibganj Distt. falls under the Central And North Eastern Plateau Zone according to NARP (National Agricultural Research Project) with the major soils being red lateritic soil, loam soil, fine loam soil and fine mixed loam soil. Parts of the distt. lying on the Ganga river bank are highly fertile and often richly cultivated by local residents. However, agriculture remains a more or less affected sector due to flooding. Lack of appropriate water storage in this hilly region results in water flowing away after the rainy season. The major crops grown in this distt. are paddy, maize, arhar, urad, moong, groundnut, soyabean, til, jowar, bajra, mahua, wheat, rai, tisi, maize, gram and sunflower. Some Ganga river floodplain areas in the study region are depicted in Images 6-7.



Image 6 : Floodplain Agriculture Near Udhwa Bird Sanctuary



Image 7 : Floodplains In Dihri Near Raksi Sthaan Temple

8.0 Wetlands In Sahibganj Distt.

8.1 Wetlands inadvertently become productive and unique ecosystems as they help in maintaining the food web and provide a conducive 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 555 wetlands are reported in Sahibganj Distt., which include lakes/ponds, oxbow lakes, riverine wetlands, waterlogged areas, rivers/streams, tanks or ponds and wetlands of smaller areas (<2.25 ha). Among these, the rivers and streams constitute about 70% of the total wetland area in the distt. followed by lakes and ponds, which cover about 17.75%. Table 2 provides the area estimates for wetlands in this distt. while Map 6 depicts the wetlands falling in our study region. Some notable wetlands are discussed in this section.

Table 2 : List Of Wetlands Recorded In The Study Region

S.No.	Name	Latitude	Longitude	Area [Acres]
1	1	24.8046	87.8625	70.06
2	2	25.1054	87.7306	60.81
3	3	25.1047	87.7337	31.43
4	4	25.0905	87.741	53.82
5	5	25.1022	87.7352	132
6	6	25.097	87.7381	51.99
7	7	25.1007	87.7406	26.51
8	8	25.082	87.7397	74.2
9	9	25.0848	87.7392	78.53
10	10	25.0864	87.7395	49.53
11	11	25.0904	87.7399	38.56
12	12	25.0877	87.7268	92.61
13	13	25.0482	87.8321	106.14
14	14	25.0512	87.8332	156.33
15	15	25.0523	87.8338	438.11
16	16	25.0528	87.8317	322.92
17	17	25.0515	87.8295	69.85
18	18	25.0495	87.8282	250.25
19	19	25.0488	87.8293	65.19
20	20	25.0477	87.8298	97.2
21	21	25.0526	87.8277	167.37

22	22	25.0534	87.8265	84.96
23	23	25.0521	87.8247	52.75
24	24	25.0507	87.825	54.67
25	25	25.0538	87.8252	118.77
26	26	25.0529	87.8195	730.95
27	27	25.0461	87.8121	2502.72
28	28	25.0482	87.8178	698.68
29	29	25.048	87.8215	695.05
30	30	24.7972	87.8767	63.01
31	31	24.7966	87.8696	18.15
32	32	24.7975	87.8687	60.29
33	33	24.796	87.8681	105.26
34	34	24.797	87.8658	38.46
35	35	24.7981	87.8674	218.72
36	36	24.7995	87.8655	161.93
37	37	24.7941	87.8655	24.77
38	38	24.7975	87.8617	29.06
39	39	24.7978	87.8609	31.21
40	40	24.7981	87.8603	70.06
41	41	24.7984	87.8596	43.07
42	42	24.7994	87.8597	81.13
43	43	24.8	87.86	18.43
44	44	24.8019	87.8586	87.39
45	45	24.8032	87.8652	95.78
46	46	24.8053	87.8656	119.49
47	47	24.8036	87.8635	21.15
48	48	24.8038	87.8628	40.29
49	49	24.8075	87.868	58.72
50	50	24.8054	87.867	19.85
51	51	24.8069	87.8664	31.96
52	52	24.8071	87.8642	40.92
53	53	24.8065	87.8639	32.07
54	54	24.8073	87.8655	32.27
55	55	24.8076	87.8672	45.75
56	56	24.8058	87.8614	22.69
57	57	24.8879	87.8554	42.9
58	58	24.8084	87.864	24.8
59	59	24.8086	87.8663	27.27
60	60	24.8102	87.8653	20.5
61	61	24.8022	87.8529	53.63
62	62	24.7992	87.8521	36.03

63	63	24.799	87.8494	77.87
64	64	24.8043	87.8521	101.24
65	65	24.8069	87.8496	241.22
66	66	24.8059	87.8508	50.34
67	67	24.804	87.8465	98.63
68	68	24.8056	87.8517	48.09
69	69	24.8034	87.85	77.98
70	70	24.8038	87.8476	51.32
71	71	24.801	87.8485	48.21
72	72	24.8029	87.8516	82.34
73	73	24.8053	87.8492	30.77
74	74	24.8055	87.8481	34.44
75	75	24.8048	87.8475	83.76
76	76	24.8045	87.8488	17.7
77	77	24.8058	87.8527	35.37
78	78	24.805	87.8527	86.19
79	79	24.8065	87.8511	85.51
80	80	24.8044	87.8514	20.35
81	81	24.8006	87.8498	25.95
82	82	24.888	87.8563	78.22
83	83	24.8872	87.8587	147.13
84	84	24.8837	87.8603	66.22
85	85	24.8831	87.8584	247.1
86	86	24.8824	87.8565	30.01
87	87	24.8833	87.8557	56.09
88	88	24.884	87.855	51.94
89	89	24.8847	87.8547	21.29
90	90	24.8862	87.8557	30.88
91	91	24.8871	87.8557	21.65
92	92	24.8874	87.8547	37.04
93	93	24.8887	87.8554	32.59
94	94	24.8882	87.8547	43.91
95	95	25.2603	87.5216	8870.63
96	96	25.2411	87.5691	31.69
97	97	25.2395	87.5751	37.77
98	98	25.2175	87.5731	662.28
99	99	25.2394	87.6378	861.54
100	100	25.2464	87.6446	203.93
101	101	25.2427	87.6425	21.38
102	102	25.2445	87.6485	635.1
103	103	25.2442	87.6525	39.21

104	104	25.2434	87.655	71.01
105	105	25.2353	87.65	70.81
106	106	25.2254	87.6478	286.45
107	107	25.2252	87.65	27.06
108	108	25.2316	87.662	123.71
109	109	25.2273	87.6782	116.36
110	110	25.2289	87.6812	77.79
111	111	25.2303	87.6825	104.23
112	112	25.2313	87.6864	87.82
113	113	25.2262	87.6915	116.49
114	114	25.2271	87.6935	28.61
115	115	25.2268	87.6927	17.95
116	116	25.2275	87.6964	99.72
117	117	25.2379	87.6885	50.85
118	118	25.2366	87.68	296.14
119	119	25.2408	87.6926	58.02
120	120	25.2395	87.6927	104.25
121	121	25.2433	87.6955	46.92
122	122	25.2484	87.7147	219.42
123	123	25.2037	87.7404	85.36
124	124	25.1956	87.748	112.27
125	125	25.1862	87.7509	519.42
126	126	25.1726	87.747	13993.54
127	127	25.1808	87.7517	110.26
128	128	25.1653	87.7403	71.03
129	129	25.1561	87.7528	18.16
130	130	25.1559	87.7542	385.69
131	131	25.1546	87.757	60.52
132	132	25.1503	87.7551	108.8
133	133	25.1506	87.7631	87.74
134	134	25.146	87.7648	263.61
135	135	25.1426	87.7655	13.24
136	136	25.1277	87.75	1968.72
137	137	25.1315	87.7574	2315.49
138	138	25.1332	87.7376	55.91
139	139	25.1372	87.7432	38.43
140	140	25.1361	87.7466	63.56
141	141	25.1364	87.7479	84.52
142	142	25.1353	87.7482	89.79
143	143	25.1368	87.7492	31.27
144	144	25.1378	87.7501	21.34

145	145	25.1383	87.751	19.1
146	146	25.1381	87.7523	79.49
147	147	25.1361	87.7567	157.75
148	148	25.1149	87.7481	24454.34
149	149	25.103	87.7552	557.41
150	150	25.101	87.7582	63.31
151	151	25.0994	87.7604	142.07
152	152	25.0981	87.765	70.21
153	153	25.095	87.7642	788.5
154	154	25.0974	87.7647	22.97
155	155	25.0966	87.7668	90.5
156	156	25.0932	87.7722	333.55
157	157	25.0925	87.7652	59.57
158	158	25.0794	87.773	242.09
159	159	25.0845	87.7738	127.05
160	160	25.084	87.7751	141.55
161	161	25.0822	87.776	42.98
162	162	25.0813	87.7756	20.74
163	163	25.0752	87.7781	171.5
164	164	25.0749	87.7807	892.17
165	165	25.0733	87.7797	86.94
166	166	25.0724	87.779	159.42
167	167	25.0706	87.7814	558.15
168	168	25.0733	87.7827	223.42
169	169	25.068	87.7812	66.07
170	170	25.0654	87.7839	503.98
171	171	25.0652	87.7812	64.06
172	172	25.0646	87.7824	52.1
173	173	25.0675	87.7795	22.3
174	174	25.0672	87.7805	15.01
175	175	25.0696	87.7837	29.62
176	176	25.0683	87.7834	16.39
177	177	25.0684	87.7844	27.24
178	178	25.0657	87.7872	95.74
179	179	25.0645	87.7879	69.56
180	180	25.064	87.7888	46.33
181	181	25.0626	87.7916	44.08
182	182	25.06	87.795	551.19
183	183	25.0588	87.7978	328.97
184	184	25.0597	87.7991	99.38
185	185	25.0573	87.7989	126.82

186	186	25.056	87.795	97.48
187	187	25.055	87.7961	32.14
188	188	25.0553	87.7972	66.98
189	189	25.0557	87.7981	40.19
190	190	25.0548	87.7987	17.15
191	191	25.0535	87.7995	32.67
192	192	25.0534	87.8017	16.99
193	193	25.0527	87.8025	15.08
194	194	25.0493	87.8055	57.93
195	195	25.0504	87.8078	56.53
196	196	25.048	87.8084	34.74
197	197	25.0407	87.8022	344.78
198	198	25.0409	87.8095	51.42
199	199	25.0384	87.8068	83.38
200	200	25.0398	87.8069	50.3
201	201	25.0375	87.8024	106.95
202	202	25.0392	87.8038	38.95
203	203	25.0396	87.8049	8.42
204	204	25.0334	87.8001	51.94
205	205	25.0342	87.8011	61.34
206	206	25.0349	87.8023	39.74
207	207	25.0356	87.8033	35.04
208	208	25.0364	87.8036	12.18
209	209	25.0354	87.8055	16.19
210	210	25.0343	87.8093	15.69
211	211	25.0318	87.8094	26.17
212	212	25.0309	87.8114	12.91
213	213	25.0303	87.815	24.34
214	214	25.034	87.8194	88.81
215	215	25.0296	87.8188	61.89
216	216	25.0297	87.8195	19.31
217	217	25.028	87.8182	42.29
218	218	25.0274	87.8179	25.78
219	219	25.0263	87.819	48.09
220	220	25.0246	87.818	100.94
221	221	25.0252	87.8191	31.86
222	222	25.0254	87.82	28.23
223	223	25.0259	87.8209	56.44
224	224	25.0239	87.82	47.11
225	225	25.027	87.8203	23.76
226	226	25.0265	87.8204	8.8

227	227	25.0271	87.8182	7.19
228	228	25.0278	87.821	8.59
229	229	25.0276	87.822	20.96
230	230	25.0258	87.8238	25.25
231	231	25.0309	87.8237	86.65
232	232	25.0308	87.8248	37.64
233	233	25.0337	87.8216	31.02
234	234	25.0343	87.823	32.19
235	235	25.0323	87.8239	41.55
236	236	25.0335	87.8238	25.6
237	237	25.034	87.8245	26.61
238	238	25.0353	87.8241	39.41
239	239	25.0297	87.8241	25.71
240	240	25.0284	87.8243	7.93
241	241	25.0273	87.8228	5.01
242	242	25.0262	87.8236	5.47
243	243	25.0255	87.8232	9.79
244	244	25.0187	87.8177	57.83
245	245	25.0194	87.8201	80.74
246	246	25.0171	87.816	48.29
247	247	25.0173	87.8151	25.47
248	248	25.0164	87.8157	45.85
249	249	25.0148	87.8163	19.95
250	250	25.014	87.8224	1040.03
251	251	25.0182	87.8242	238.29
252	BerailJhil	24.9961	87.8072	56126.8
253	253	25.0171	87.8096	6654.86
254	Patra Jhil	25.0151	87.7969	5699.73
255	255	24.9722	87.8208	21483.85
256	256	24.9204	87.8895	5545.46
257	257	24.9026	87.8909	9099.46
258	258	24.8962	87.8926	5328.05
259	259	24.8767	87.8946	6488.54
260	ChandshaharJhil	24.9021	87.8593	23487.65
261	Kanchan Jhil	24.9183	87.865	6668.76
262	GidhlaJhil	24.8914	87.8334	7697.76
263	263	24.8878	87.8497	1074.17
264	264	24.8846	87.848	16.32
265	265	24.8828	87.8474	27.34
266	266	24.8668	87.8637	53.19
267	267	24.8668	87.8623	83.11

268	268	24.864	87.8535	34.79
269	269	24.8633	87.854	13.24
270	270	24.862	87.8549	38.51
271	271	24.8616	87.8537	55.58
272	272	24.8603	87.8528	28.03
273	273	24.8609	87.8509	18.8
274	274	24.8594	87.8507	41.51
275	275	24.8608	87.8495	37.19
276	276	24.855	87.8703	177.59
277	277	24.8579	87.867	34.36
278	278	24.852	87.858	102.82
279	279	24.8568	87.8611	83.72
280	280	24.8558	87.8596	79.1
281	281	24.8566	87.8602	22.58
282	282	24.8529	87.8603	67.14
283	283	24.8509	87.8614	47.82
284	284	24.8509	87.8628	100.43
285	285	24.8519	87.8635	51.3
286	286	24.8494	87.8627	24.2
287	287	24.8492	87.8684	51.96
288	288	24.8477	87.8676	33.79
289	289	24.8464	87.8661	34.4
290	290	24.8451	87.868	85.89
291	291	24.8457	87.8644	61.53
292	292	24.8429	87.8674	229.11
293	293	24.8425	87.8705	23.07
294	294	24.8415	87.8699	84.3
295	295	24.84	87.8695	70.91
296	296	24.8402	87.8704	24.21
297	297	24.8386	87.8683	303.47
298	298	24.8389	87.8706	66.23
299	299	24.8368	87.8706	43.96
300	300	24.8378	87.873	66.24
301	301	24.8346	87.8686	71.69
302	302	24.8344	87.8666	52.27
303	303	24.8337	87.8668	17.02
304	304	24.8333	87.8682	24.91
305	305	24.8347	87.8658	24.88
306	306	24.8359	87.8678	22.35
307	307	24.8355	87.8686	17.24
308	308	24.8374	87.8763	65.81

309	309	24.8396	87.8763	116.93
310	310	24.8412	87.8775	26.51
311	311	24.8404	87.8772	33.21
312	312	24.8404	87.8784	42.32
313	313	24.8393	87.8789	24.21
314	314	24.8384	87.8777	45.69
315	315	24.8377	87.8775	52.99
316	316	24.8365	87.8747	30.28
317	317	24.8392	87.8841	159.69
318	318	24.8441	87.8813	328.51
319	319	24.8459	87.8795	130.81
320	320	24.8432	87.8776	130.16
321	321	24.844	87.8785	31.28
322	322	24.8452	87.8783	52.3
323	323	24.8329	87.874	46.22
324	324	24.8302	87.8739	35.49
325	325	24.8289	87.8742	84.87
326	326	24.8305	87.8749	49.47
327	327	24.8299	87.8718	19.27
328	328	24.8318	87.8738	11.84
329	329	24.8313	87.8735	7.87
330	330	24.8312	87.8923	74.09
331	331	24.8346	87.8927	54.63
332	332	24.8302	87.8881	32.83
333	333	24.8334	87.8872	66.43
334	334	24.8319	87.8866	33.06
335	335	24.8346	87.888	20.89
336	336	24.8375	87.8874	31.31
337	337	24.824	87.8858	31.44
338	338	24.8428	87.8649	65.4
339	339	24.844	87.8654	44.45
340	340	24.8421	87.8637	20.43
341	341	24.8434	87.8615	24.4
342	342	24.8473	87.8711	50.76
343	343	24.8494	87.8712	80.24
344	344	24.8477	87.8721	62.38
345	345	24.8468	87.8732	54.31
346	346	24.846	87.8743	26
347	347	24.8478	87.8741	20.36
348	348	24.8435	87.8758	15.83
349	349	24.8211	87.8632	40.55

350	350	24.8202	87.8645	12.91
351	351	24.8195	87.8591	233.91
352	352	24.8177	87.859	27.27
353	353	24.8171	87.8585	33.81
354	354	24.8164	87.8581	22.49
355	355	24.8149	87.8577	11.98
356	356	24.8184	87.8561	125.56
357	357	24.8199	87.8555	57.15
358	358	24.8203	87.8572	115.09
359	359	24.8242	87.8591	68.39
360	360	24.8285	87.8613	30.09
361	361	24.8319	87.8422	63.55
362	362	24.8301	87.8425	34.81
363	363	24.8344	87.8414	47.27
364	364	24.8331	87.8422	17.64
365	365	24.8346	87.8397	22.5
366	366	24.8339	87.839	30.91
367	367	24.8335	87.8383	18.92
368	368	24.8324	87.8388	11.11
369	369	24.837	87.8415	24.06
370	370	24.834	87.8528	45.08
371	371	24.8375	87.8534	45.29
372	372	24.8385	87.8496	46.79
373	373	24.8371	87.8492	16.7
374	374	24.843	87.8486	144.61
375	375	24.8435	87.8533	102.97
376	376	24.8464	87.8504	132.48
377	377	24.8448	87.8502	22.52
378	378	24.8449	87.8489	49.32
379	379	24.8451	87.8479	35.07
380	380	24.8497	87.8519	94.07
381	381	24.8517	87.8547	83.64
382	382	24.8463	87.8588	18.99
383	383	24.8527	87.8503	45
384	384	24.8549	87.8515	12.4
385	385	24.852	87.8502	27.99
386	386	24.8491	87.8476	38.38
387	387	24.8496	87.8445	93.07
388	388	24.8486	87.8461	51.64
389	389	24.8483	87.8416	86
390	390	24.8496	87.8389	44.46

391	391	24.8502	87.8413	31.32
392	392	24.8493	87.8418	34.87
393	393	24.849	87.8425	38.78
394	394	24.8433	87.8395	86.53
395	395	24.8424	87.8399	29.8
396	396	24.8423	87.8411	38.11
397	397	24.8415	87.8415	31.37
398	398	24.8417	87.8433	25.29
399	399	24.8417	87.845	39.81
400	400	24.8419	87.8441	33.99
401	401	24.8429	87.8443	76.78
402	402	24.8426	87.8433	47.32
403	403	24.8436	87.8435	54.92
404	404	24.8435	87.8426	49.87
405	405	24.8431	87.8416	27.49
406	406	24.8442	87.84	30.24
407	407	24.8442	87.8392	34.63
408	408	24.846	87.838	48.58
409	409	24.8416	87.8364	17.85
410	410	24.8431	87.8354	27.71
411	411	24.8416	87.8317	38.17
412	412	24.8432	87.8316	39.18
413	413	24.8417	87.8305	142.31
414	414	24.8439	87.8318	17.16
415	415	24.8481	87.8339	646.68
416	416	24.902	87.8223	122.25
417	417	24.9014	87.8206	136.75
418	418	24.9	87.8205	89.85
419	419	24.9011	87.8217	39.68
420	420	24.8983	87.8196	414.55
421	421	24.9086	87.824	344.16
422	422	24.9046	87.8272	47.56
423	423	24.9042	87.8256	166.31
424	424	24.9082	87.8216	72.58
425	425	24.9065	87.8243	246.98
426	426	24.9122	87.8174	39.79
427	427	24.9038	87.8189	28.27
428	428	24.9216	87.8521	426.27
429	429	24.9603	87.8457	705.49
430	430	24.9573	87.8441	251.99
431	431	24.9591	87.8382	118.9

432	432	24.9636	87.8373	103.34
433	433	25.0393	87.8257	81.95
434	434	25.0451	87.8237	159.28
435	435	25.0424	87.8199	56.95
436	436	25.0403	87.8188	37.39
437	437	25.0452	87.8219	144.85
438	438	25.046	87.8296	81.16
439	439	25.0469	87.831	61.74
440	440	25.0473	87.834	71.55
441	441	25.0499	87.8352	69.05
442	442	25.0459	87.7992	52.9
443	443	25.0477	87.8008	20.39
444	444	25.0494	87.7995	31.29
445	445	25.0438	87.798	48.37
446	446	25.0438	87.7987	28.11
447	447	25.0562	87.7778	68.51
448	448	25.0625	87.7843	28.5
449	449	25.0979	87.7285	244.12
450	450	25.1236	87.7297	128.93
451	451	25.1498	87.7198	239.94
452	452	25.1197	87.7371	39.64
453	453	25.1123	87.7319	56.88
454	454	25.1068	87.7277	37.8
455	455	25.096	87.7264	58.43
456	456	25.088	87.7138	667.86
457	457	25.0099	87.768	30.81
458	458	25.0089	87.7647	28.62
459	459	25.011	87.7644	52.78
460	460	25.0105	87.7618	36.16
461	461	25.0098	87.7637	53.05
462	462	25.0173	87.7602	101.36
463	463	25.0159	87.7609	29.2
464	464	25.0173	87.7639	20.42
465	465	25.0159	87.7649	19.9
466	466	25.0126	87.7685	34.19
467	467	25.0183	87.772	75.26
468	468	25.0173	87.7737	18.74
469	469	25.0189	87.776	35.95
470	470	25.017	87.7755	57.78
471	471	25.0219	87.7759	44.31
472	472	25.0244	87.7757	33.97

473	473	25.0311	87.7793	77.87
474	474	25.0265	87.7774	204.74
475	475	25.2093	87.6804	251.45
476	476	25.1204	87.7261	25.52
477	477	25.1118	87.7287	12.87
478	478	25.0602	87.7432	110.7
479	479	24.8946	87.8421	65.28
480	480	24.894	87.8436	135.59
481	481	24.896	87.8431	35.18
482	482	24.8952	87.8449	47.68
483	483	24.8933	87.8427	70.74
484	484	24.8922	87.8424	60.55
485	485	24.8925	87.8438	25.19
486	486	24.893	87.8449	107.79
487	487	24.8909	87.8442	18.35
488	488	24.8901	87.8429	31.63
489	489	24.8896	87.8433	20.45
490	490	24.8895	87.8444	43.02
491	491	24.89	87.8435	11.99
492	492	24.8887	87.8401	118.07
493	493	24.8695	87.8405	154.43
494	494	24.8669	87.8366	54.79
495	495	24.8732	87.8403	91.54
496	496	24.8919	87.8489	69.54
497	497	24.8956	87.8516	81.51
498	498	24.8946	87.8517	43.11
499	499	24.898	87.8534	56.13
500	500	24.9105	87.8376	108.78
501	501	24.9131	87.8354	104.55
502	502	24.9145	87.8366	111.17
503	503	24.9148	87.8332	63.7
504	504	24.9013	87.8353	92.72
505	505	24.9034	87.8305	45.49
506	506	24.9046	87.8309	50.36
507	507	24.9039	87.829	45.28
508	508	24.9035	87.8267	23.34
509	509	24.904	87.8274	14.13
510	510	24.8983	87.8325	16.67
511	511	24.8993	87.8295	20.52
512	512	25.2153	87.5083	563.21
513	513	25.2115	87.4983	350.38

514	514	25.22	87.6912	445.27
515	515	25.2061	87.7456	298.09
516	516	25.2035	87.746	52.13
517	517	25.2017	87.7477	38.06
518	518	25.1964	87.7495	472.73
519	519	24.8986	87.955	4164
520	520	24.8922	87.9702	4749.38
521	521	24.8765	87.9523	3340.84
522	522	24.8836	87.9585	394.15
523	523	24.8981	87.9506	2518.99
524	524	24.9143	87.9676	2954.48
525	525	24.9297	87.9595	649.38
526	526	25.2827	87.8626	38.95

8.2 **Udhwa Lake:** With its adjacent wetlands, Udhwa is an 8 sq. km area that includes a 5.65 sq. km notified bird sanctuary. This was done by the Bihar Govt. in 1991. The area also consists of reclaimed and seasonally cultivated tracts. It lies at the edge of the Chhotanagpur Plateau (Rajmahal Hills) in the floodplains of the Ganga River [Image 8]. Udhwa Bird Sanctuary has two large jheel or lakes, Berhale or Barhil (410 hectares) and Pataura or Patauda (155 hectares). There are a few other wetlands in adjacent areas. Together, these tracts of lakes and marshes form a large complex of wetlands that is home to a variety of birds. Berhale is primarily a marshy region with aquatic vegetation and open water areas occurring intermittently, while Pataura is a clear water body. Being at the edge of the Rajmahal Hills, Udhwa's physiography comprises of flat floodplains with low undulating tracts towards the west at an elevation of 35m msl. The Ganga river is connected to this wetland complex through the Udhwa nala. Over a period of time, this place has become a major tourist destination where bird watchers and nature lovers from all over the country converge to follow their passion. Some common bird species here include the bulbul, hill myna, sparrows, blue rock pigeon, lark, bee eaters, parakeets and drongo. Image 9 depicts Udhwa Bird Sanctuary as observed during the survey.

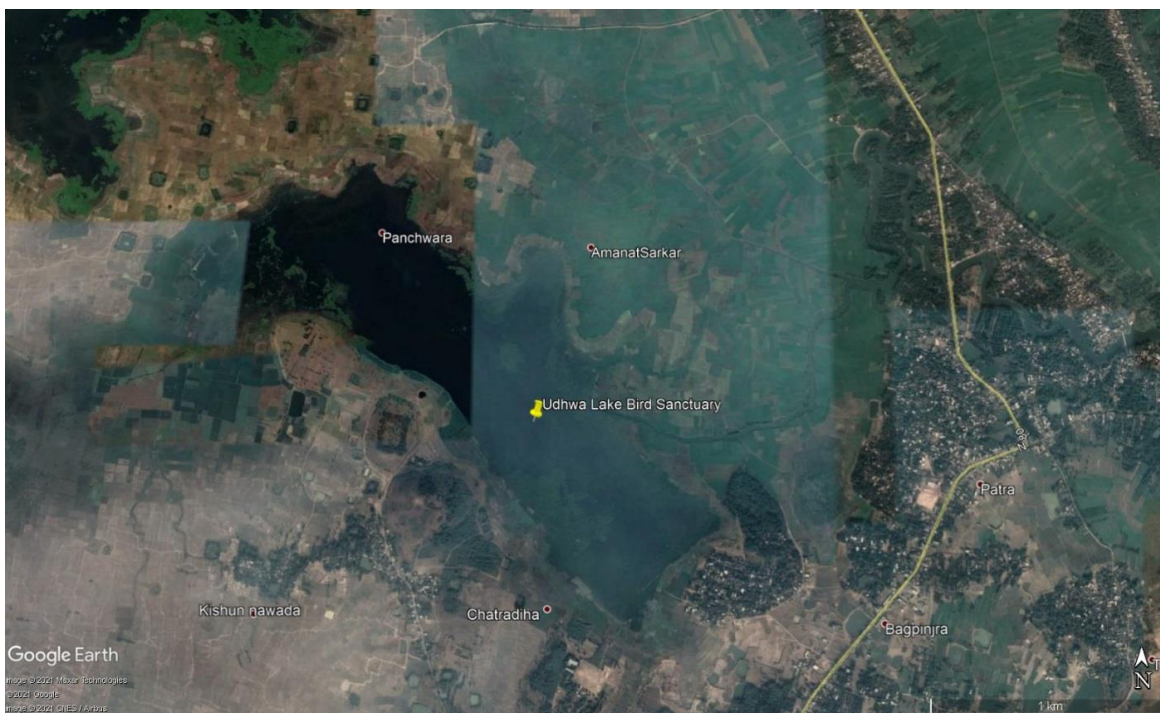


Image 8 : Location Of Udhwa Lake Bird Sanctuary



Image 9 : Udhwa Lake As Seen On 27-12-2020

8.3 **Waterbody associated with Baradari:** Situated in the Rajmahal block of Sahibganj distt., Baradari is an important architectural site having socio-cultural importance in the history of this region [Image 10]. Built on a high ground in roughly square shape, this place is believed to have hosted religious congregations, live performances and private concerts for the then rulers of this land. An irregularly shaped waterbody is associated with this site right on the banks of Ganga river. When the site was visited in December 2020, this waterbody was covered partly with floating aquatic vegetation [Image 11] and none of the locals were found to be using this water for any specific purpose.



Image 10 : Location Of Baradari And Its Associated Waterbody



Image 11 : Waterbody Associated With Baradari

- 8.4 **Chiriya Dahjhil wetland:** A roughly bean-shaped wetland is observed to be present near Chiriyadahjhil village [Image 12] which is connected with Ganga river through a small stream. It receives water mainly during the monsoon season, which is also used during remaining part of the year for irrigation in nearby agricultural fields.

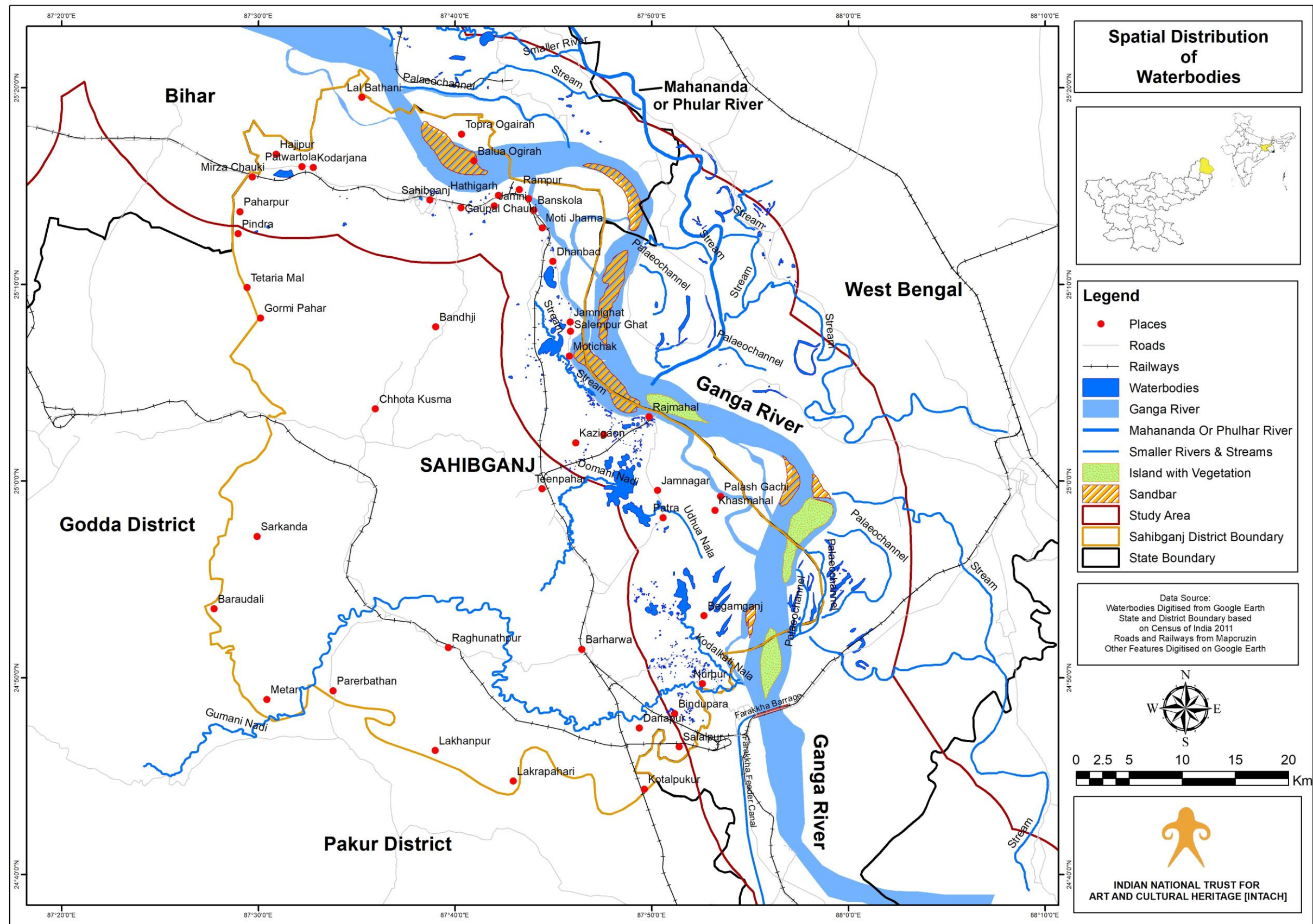


Image 12 : Location Of Chiriyadajhil

8.5 A group of big-sized and few smaller-sized wetlands can also be observed near Bistupur village in Sahibganj distt. [Image 13]. Most of these wetlands are depressions lying in the Ganga river floodplain region that dry up during summer season and receive water during monsoon floods.



Image 13 : A Group Of Wetlands Near Bistupur Village In Sahibganj Distt.



Map 6 : Spatial Distribution Of Water Bodies In Sahibganj Distt.

9.0 Forest Plant diversity in Sahibganj Distt.

9.1 The state of Jharkhand is rich in forest cover and well-known for its waterfalls, hills and forest landscapes. Sahibganj is one of the distts. Of Jharkhand bestowed with hills and rich forest cover. According to the India State of Forest Report of 2019, Sahibganj distt. has a total forest cover of 572.35 sq. km. which comprises of about 27.74% of the total geographical area of this distt. This forest is classified mainly into three different types – Very Dense Forest (17.96 sq. km.), Moderately Dense Forest (259.16 sq. km.) and open forest (295.23 sq. km.). According to the District Environmental Plan prepared for Sahibganj distt. in 2020, this distt. was once known for its thick and extensive forest cover which fell prey to unscrupulous felling resulting in only a small portion of its original jungle wealth. The most common forest tree found in this distt. is *Shorea robusta* (Sal) along with other tree species such as teak (*Tectona grandis*), semal (*Bombax ceiba*), jackfruit (*Artocarpus* sp.) and satsal (*Dalbergia latifolia*). Based on the information collected from district forest department, Table 3 provides a list of major tree species found here. Images 14-15 depict the forests present in the study region.

Table 3 : List Of Forest Trees Present In Sahibganj Distt.

Sr. No.	Botanical Name	Common Name
1.	<i>Acacia arabica</i>	Babul
2.	<i>Acacia catechu</i>	Khair
3.	<i>Adina cordifolia</i>	Karam
4.	<i>Aegle marmelos</i>	Bel
5.	<i>Ailanthus excelsa</i>	Ghotkaranj Ghorkaram
6.	<i>Alangium Lamarckii</i>	Dhela
7.	<i>Albizia lebeck</i>	Siris
8.	<i>Albizia odoratissima</i>	Jang Siris
9.	<i>Albizia procera</i>	Safed Siris
10.	<i>Alstonia scholaris</i>	Chatni
11.	<i>Anogeissus latifolia</i>	Dhautha
12.	<i>Antidesma ghaesembilla</i>	Bhabiranj
13.	<i>Artocarpus integrifolia</i>	Kathal
14.	<i>Artocarpus lakoocha</i>	Bachar
15.	<i>Azadirachta indica</i>	Neem
16.	<i>Bauhinia retusa</i>	Kathul

17.	<i>Bauhinia purpurea</i>	Koemar
18.	<i>Bauhinia racemosa</i>	Katmauli
19.	<i>Bauhinia variegata</i>	Kachnar
20.	<i>Bombax ceiba</i>	Semal
21.	<i>Boswellia serrata</i>	Salia
22.	<i>Bridelia retusa</i>	Kajhi
23.	<i>Buchanania lanzan</i>	Piar
24.	<i>Butea frondosa</i>	Palas
25.	<i>Careya arborea</i>	Kumbhi
26.	<i>Casearia tomentosa</i>	Beri
27.	<i>Cassia fistula</i>	Dhanraj/Amaltas
28.	<i>Chloroxylon swietenia</i>	Bharat
29.	<i>Cordia Macleodii</i>	Belwanjan
30.	<i>Cordia myxa</i>	Bahuar
31.	<i>Cochlospermum gossypium</i>	Galgal
32.	<i>Dalbergia lanceolaria</i>	Hardi
33.	<i>Dalbergia latifolia</i>	Kala Shisham
34.	<i>Dalbergia sissoo</i>	Shisham
35.	<i>Diospyros embryopteris</i>	Madartendu
36.	<i>Diospyros melanoxylon</i>	Tend/Kend/Tiril
37.	<i>Dillenia pentagyna</i>	Rai
38.	<i>Elaeodendron Mukorossi</i>	Ratangur
39.	<i>Emblica officinalis</i>	Amla
40.	<i>Eugenia heyneana</i>	Katjamun
41.	<i>Eugenia jamb</i>	Jamun
42.	<i>Eugenia operculata</i>	Paiman
43.	<i>Ficus benghalensis</i>	Bar
44.	<i>Ficus cunia</i>	Parho
45.	<i>Ficus hispida</i>	Dimar
46.	<i>Ficus religiosa</i>	Pipal
47.	<i>Ficus tomentosa</i>	Barun
48.	<i>Gardenia latifolia</i>	Papra
49.	<i>Gmelina arborea</i>	Gambar
50.	<i>Grewia hirsuta</i>	Gursukhi
51.	<i>Holarrhena antidysentrica</i>	Koreya
52.	<i>Holoptelea integrifolia</i>	Chilbil
53.	<i>Hymenodictyon excelsum</i>	Bhurkura
54.	<i>Ixora parviflora</i>	Lohajangin

55.	<i>Kydia calycina</i>	pula
56.	<i>Lagerstroemia parviflora</i>	Sidha
57.	<i>Madhuca latifolia</i>	Mahua
58.	<i>Mallotus philippinensis</i>	Rohan
59.	<i>Mangifera indica</i>	Mango
60.	<i>Melia azedarach</i>	Bakain
61.	<i>Michelia champaca</i>	Champa
62.	<i>Mitragyna parviflora</i>	Guri/Guri Karam
63.	<i>Morinda tinctoria</i>	Ach
64.	<i>Morus spp</i>	Tut
65.	<i>Murraya exotica</i>	Kamini/Otel
66.	<i>Oroxylum indicum</i>	Sonapatta
67.	<i>Eugenia ajanensis</i>	Sandam
68.	<i>Polyalthia cerasoides</i>	Kudmi
69.	<i>Pongamia glabra</i>	Karanj
70.	<i>Pterocarpus marsupium</i>	Bia/Paisar
71.	<i>Randia uliginosa</i>	Piurar
72.	<i>Rubia cordifolia</i>	Jotsingh
73.	<i>Saccopetalum tomentosum</i>	Kari
74.	<i>Sapindus Mukorossi</i>	Ritha
75.	<i>Schleichera oleosa</i>	Kusum
76.	<i>Schrebera swienoides</i>	Ghato
77.	<i>Semecarpus anacardium</i>	Bhelwa
78.	<i>Shorea robusta</i>	Sal/Sakhua
79.	<i>Soymida febrifuga</i>	Rohena
80.	<i>Spondias mangifera</i>	Amra
81.	<i>Sterculia urens</i>	Keonjhi
82.	<i>Tectona grandis</i>	Sagwan/Teak
83.	<i>Terminalia arjuna</i>	Arjun
84.	<i>Terminalia belerica</i>	Bahera
85.	<i>Terminalia chebula</i>	Harra
86.	<i>Terminalia tomentosa</i>	Asan
87.	<i>Toona ciliata</i>	Toon
88.	<i>Vangueria pubescens</i>	Katai
89.	<i>Wendlandia exserta</i>	Tilia/Tiril
90.	<i>Ziziphus mauritiana</i>	Ber
91.	<i>Ziziphus xylopyrus</i>	Kather



Image 14 : Google Imagery Showing Forest Area In Sahibganj Distt.



Image 15 : Forest On A Hilly Slope As Seen Near Sahibganj Town

10.0 Riparian Flora Along Ganga River In Sahibganj

- 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 a 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 Despite such a rich ecosystem of flora and fauna in the region there has been no systematic documentation or proper systematic sampling and no 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), Krishnamurti(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) that documents 475 riparian plant species from Rishikesh to Chinasura.
- 9.3 During the survey in Sahibganj distt., riparian vegetation was found to be having a mixed distribution with a higher growth in some sites and sparse growth in others. The trees along Ganga in the study region mainly included – *Acacia nilotica* (babool), *Azadirachta indica* (neem), *Ficus religiosa* (peepal), *Ficus benghalensis* (banyan) and *Phoenix dactylifera* (khajur). Among the ground flora, *Polygonum glabrum* and *Croton bonpladianus* were growing luxuriantly along Ganga river. The riparian grass – *Saccharum munja* was also present in patches along the river. The invasive plant species – *Parthenium hysterophorus* (congress grass) also found its presence among the riparian vegetation.



Image 16 : *Phoenix dactylifera* (Khajur) Growing Along Ganga River At Sakri Gali



Image 17 : Luxuriant Growth Of *Polygonum Glabrum* Along Ganga River At Riverine Islands Across Sahibganj Town

11.0 Faunal Diversity In Sahibganj Distt.

- 10.1 The Gangetic River Dolphin is exclusively aquatic and piscivorous, occasionally found in small groups. It is one of the three freshwater dolphin species in the world and is distributed in the Ganga–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 in the last 3-4 decades. According to a study (WII-GACMC, 2017), seven dolphins were recorded from a 34 kms Ganga river stretch between Sahibganj and Rajmahal. During the current field survey, scattered dolphin sightings were observed at sites such as near the confluence at Purani Sahibganj. Apart from this, the local residents also reiterated the presence of dolphins in study region.
- 10.2 The Ganga river stretch between Sahibganj and Rajmahal includes different habitats such as deep pools, sandbars and mid-river islands which also serve as potential habitats for fish, turtles and birds in this region. WII-GACMC (2017) recorded about 89 different fish species, 182 phytoplankton species and 40 zooplankton species from this region. One Smooth-Coated Otter (which is classified as ‘Vulnerable’ in IUCN Red List) was also sighted from this area. This stretch was also found to have abundant presence of Black-bellied terns (*Sterna acuticauda*, classified as ‘Endangered’ in IUCN Red List).
- 10.4 The mix forests covering hilly tracts that fall in our study region harbor a rich faunal diversity including different species of mammals, reptiles, lizards and insects. The details of major mammal diversity in the study region were obtained from the divisional forest office in Sahibganj and is presented in Table 4. The study region including Ganga river and its associated wetlands is also home to a rich avifaunal diversity. This includes both resident and migratory birds visiting here. The prominent birds from this area are mentioned in Table 5 and some birds are depicted in Images 18-19.

Table 4 : Mammal Diversity In The Forests Of Study Region (Source: Sahibganj District Forest Office)

Sr. No.	Scientific Name	Common Name
1.	<i>Tetraceros quadricornis</i>	Antelope, Four-horned
2.	<i>Mellivora capensis</i>	Badger, Honey or Ratel
3.	<i>Rousettus leschenaultia</i>	Bat, Fulvous Fruit
4.	<i>Pteropus giganteus</i>	Bat, Indian Flying Fox
5.	<i>Cynopterus sphinx</i>	Bat. Short-nosed Fruit
6.	<i>Melursus ursinus</i>	Bear. Sloth
7.	<i>Bos gaurus</i>	Bison, Indian or Gaur
8.	<i>Sus scrofa</i>	Boar, Indian Wild
9.	<i>Felis chaus</i>	Cat, Jungle
10.	<i>Paradoxurus herniaphroditus</i>	Civet, Common Palm
11.	<i>Viverricula indica</i>	Civet, Small India
12.	<i>Muntiacus muntjak</i>	Deer, Barking or Muntjac
13.	<i>Tragulus meminna</i>	Deer, Mouse or Indian Chevrotain
14.	<i>Axis axis</i>	Deer, Spotted or Chital
15.	<i>Cuon alpinus</i>	Dog, Indian Wild
16.	<i>Elephas maximus</i>	Elephant
17.	<i>Vulpes bengalensis</i>	Fox, Indian
18.	<i>Tatera indica</i>	Gerbilline, India
19.	<i>Lepus nigricollis</i>	Hare, Indian
20.	<i>Hyaena hyaena</i>	Hyena, Striped
21.	<i>Canis aureus</i>	Jackal
22.	<i>Presbytis entellus</i>	Langur, Common
23.	<i>Panthera pardus</i>	Leopard or Panther
24.	<i>Macaca mulatta</i>	Macaque, Rhesus
25.	<i>Herpestes edwardsi</i>	Mongoose, Common
26.	<i>Mus booduga</i>	Mouse, Indian Field
27.	<i>Vendeleuria oleracea</i>	Mouse, Long-tailed Tree
28.	<i>Boselaphus tragocamelus</i>	Nilgai or Blue Bull
29.	<i>Manis crassicaudata</i>	Pangolin, Indian

30.	<i>Hystrix indica</i>	Porcupine, Indian
31.	<i>Bandicota indica</i>	Rat, Bandicoot
32.	<i>Golunda ellioti</i>	Rat, Indian Bush
33.	<i>Cervus unicolor</i>	Sambhar
34.	<i>Suncus murinus</i>	Shrew, Grey Musk
35.	<i>Ratufa indica</i>	Squirrel, Indian Giant
36.	<i>Funambulus palmarum</i>	Squirrel. Three-striped Palm
37.	<i>Panthera tigris</i>	Tiger
38.	<i>Canis lupus</i>	Wolf

Table 5 : Prominent Birds Found In Sahibganj Distt.

Sr. No.	Scientific Name	Common Name
1.	<i>Turdoides caudatus</i>	Babbler. Common
2.	<i>Megalaima haemacephala</i>	Barbet, Crimson breasted or Coppersmith
3.	<i>Turdus merula</i>	Bird, Black
4.	<i>Orthotomus sutorius</i>	Bird, Tailor
5.	<i>Ixobrychus cinnamomeus</i>	Bitter, Chestnut
6.	<i>Pycnonotus cater</i>	Bulbul, Red-vented
7.	<i>Corvus Splenciens</i>	Crow, House
8.	<i>Corvus macrorhynchos</i>	Crow. Jungle
9.	<i>Numerius arquata</i>	Curlew
10.	<i>Streptopelia senegalensis</i>	Dove, Little Brown
11.	<i>Anas acuta</i>	Duck Pintail
12.	<i>Spilornis cheela</i>	Eagle, Crested Serpent
13.	<i>Circaetus gallicus</i>	Eagle, Short-toed
14.	<i>Aquila rapax</i>	Eagle, Tawny
15.	<i>Gallus gallus</i>	Fowl, Red Jungle
16.	<i>Ardea cinerea</i>	Heron, Grey
17.	<i>Upupa epops</i>	Hoopoe
18.	<i>Tockus birostris</i>	Hornbill, Common Grey
19.	<i>Anthracoceros coronatus</i>	Hornbill, Malabar Pied
20.	<i>Pseudibis papillosa</i>	Ibis, Black
21.	<i>Halcyon smyrnensis</i>	Kingfisher, White breasted
22.	<i>Haliastur indus</i>	Kite, Brahminy
23.	<i>Eudynamys scolopacea</i>	Koel
24.	<i>Vanellus indicus</i>	Lapwing, Redwattled
25.	<i>Vanellus malabaricus</i>	Lapwing. Yellow wattled
26.	<i>Mirafra erythroptera</i>	Lark, Red-winged Bush
27.	<i>Ammomanes phoenicurus</i>	Lark, Rufous-tailed Finch
28.	<i>Loriculus vernalis</i>	Lorikeet

29.	<i>Pericrocotus flammeus</i>	Minivet, Scarlet
30.	<i>Vanellus malabaricus</i>	Lapwing, Yellow wattled
31.	<i>Lonchura malacca</i>	Munia, Black-headed
32.	<i>Estrilda formosa</i>	Munia, Green
33.	<i>Estrilda amandava</i>	Munia, Red or Waxbill
34.	<i>Lonchura punctulata</i>	Munia, Spotted
35.	<i>Lonchura striata</i>	Munia, White-backed
36.	<i>Lonchura malabarica</i>	Munia, White-throated
37.	<i>Acridotheres ginginianus</i>	Myna Bank
38.	<i>Sturnus malabaricus</i>	Myna, Grey-headed
39.	<i>Acridotheres fuscus</i>	Myna, Jungle
40.	<i>Sturnus contra</i>	Myna, Pied
41.	<i>Sturnus pagodarum</i>	Myna, Brahminy or Black-headed
42.	<i>Caprimulgus asiaticus</i>	Nightjar. Common Indian
43.	<i>Sitta castanea</i>	Null hatch, Chestnut-bellied
44.	<i>Oriolus xanthornus</i>	Oriole, Black-headed
45.	<i>Oriolus oriolus</i>	Oriole, Golden
46.	<i>Tyto alba</i>	Owl, Barn or Screech
47.	<i>Bubo zeylonensis</i>	Owl, Brown Fish
48.	<i>Psittacula cyanocephala</i>	Parakeet, Blossom-headed
49.	<i>Psittacula krameri</i>	Parakeet, Roseringed
50.	<i>Francolinus pondicerianus</i>	Partridge, Grey
51.	<i>Pavo cristatus</i>	Peafowl. Common
52.	<i>Centropus siensis</i>	Pheasant, Crow or Coucal
53.	<i>Dendrocitta vagabunda</i>	Pie. Tree
54.	<i>Treron phoenicoptera</i>	Pigeon, Common Green
55.	<i>Pitta brachyura</i>	Pitta, Indian
56.	<i>Charadrius dubius</i>	Plover, Little Ringed
57.	<i>Coturnix Corornandelica</i>	Quail, Black breasted or Rain
58.	<i>Turnix suscitator</i>	Quail, Common or Blue legged Bustard
59.	<i>Coturnix coturnix</i>	Quail, Common or Grey
60.	<i>Perdica asiatica</i>	Quail, Jungle Bush
61.	<i>Saxicoloides fulicata</i>	Robin, Indian
62.	<i>Copsychus saularis</i>	Robin. Magpie
63.	<i>Coracias benghalensis</i>	Roller or Blue Jay
64.	<i>Pterocles exustus</i>	Sandgrouse. Common
65.	<i>Pterocles indicus</i>	Sandgrouse, Painted
66.	<i>Tringa hypoleucos</i>	Sandpiper. Common
67.	<i>Accipiter badius</i>	Shikra
68.	<i>Artamus fuscus</i>	Shrike. Ashy Swallow
69.	<i>Lanius vittatus</i>	Shrike. Baby-backed
70.	<i>Coracina melanoptera</i>	Shrike, Black-headed Cuckoo
71.	<i>Tephrodornis pondicerianus</i>	Shrike, Common Wood
72.	<i>Lanius schach</i>	Shrike, Rufous-backed
73.	<i>Alauda guagula</i>	Skylark, Indian Small

74.	<i>Passer domesticus</i>	Sparrow. House
75.	<i>Petronia xanthocollis</i>	Sparrow. Yellow-Throated
76.	<i>Galloperdix spadicea</i>	Spurfowl, Red
77.	<i>Calidris minutus</i>	Stint, Little
78.	<i>Ciconia episcopus</i>	Stork, White-necked
79.	<i>Ephippiorhynchus asiaticus</i>	Stork, Black-necked
80.	<i>Nectarinia asiatica</i>	Sunbird, Purple
81.	<i>Nectarinia zeylonica</i>	Sunbird, Purple-rumped
82.	<i>Hirundo rustica</i>	Swallow, Common
83.	<i>Hirundo smithii</i>	Swallow, Wire-tailed
84.	<i>Hemiprocne longipennis</i>	Swift. Crested Tree
85.	<i>Cypsiurus parvus</i>	Swift, Palm
86.	<i>Anas crecca</i>	Teal, Common



Image 18 : Open Billed Storks Observed Near Riverine Islands Near Sahibganj Town



Image 19 : Kingfisher Observed Near River Bank In Purani Sahibganj

11.0 Ganga Riverine Islands/Diaras In Sahibganj 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 such islands are existent in the Ganga River stretch that passes throughout the state of Bihar state. Colloquially, they are referred to as *diaras*. This term is derived from the word *diya* (which means an earthen oil lamp) and has been coined for a land where a *diya* is never lit [Udaset *al.*, 2018]. In local parlance in different parts of Bihar state, it symbolizes a village which is located outside the embankments of Ganga River floodplain, which means that its people lead a desolate and deprived existence beyond the naturally rich floodplains. Some of the major *diaras* surveyed in the study are described in this section.
- 11.2 The Ganga river stretch in Sahibganj distt. is intersected by numerous riverine islands among which the biggest group of islands lie near Sahibganj town and Rajmahal. The river makes a southward turn just ahead of Sahibganj town where these group of islands divide the main stem into two major parts – the smaller part which touches Sahibganj distt. and the larger part which touches Katihar distt. on the opposite bank [Image 20]. The territory of these islands gets divided among Jharkhand and Bihar states owing to the border which passes between Ganga river. Similarly another group of riverine islands lie a little downstream of Rajmahal town where the river makes a curve [Image 21]. Here, the islands are shared between Jharkhand and West Bengal states owing to the border intersecting across Ganga river. Both these groups of islands contain small human settlements on them. These islands are exploited greatly for agricultural purposes by the local residents owing to the fertile soil available throughout.



Image 20 : Group Of Riverine Islands Near Sahibganj Town



Image 21 : Group Of Riverine Islands Near Rajmahal

12.0 Fishing In Sahibganj 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. The 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). During the survey conducted in Sahibganj Distt., fishing from Ganga and other rivers was found to be an important source of food and income second to agriculture. Many local residents were involved in riverine fishing using small boats. The main fishing techniques used by them include feka jaal, tana jaal, nylon jaal, maha jaal and ghinna jaal. Some of these fishing techniques are depicted in Images 22-23. Major fish caught from this region included – rohu, katla and mrigal along with Chinese carps such as common carp, silver carp and grass carp. The list of fish caught from the study region is provided in Table 6 and some fish are depicted in Images 24-25. The extensive bed of the Ganges at Sahibganj offers one of the best fields in the state for collection of fish spawn and fisheries. The spawn of Rohu, Katla, Mirga, Catfish and Hilsa is collected from the Barhait valley and offers an important means of livelihood for the local populace.



Image 22 : Maha Jaal



Image 23 : Ghinna Jali

Table 6 : Riverine Fish Recorded In The Study Region

Sr. No.	Scientific Name	Common Name
1.	<i>Heteropneustes fossilis</i>	Singhi
2.	<i>Oreochromis niloticus</i>	Tilapia
3.	<i>Hypophthalmichthys molitrix</i>	Silver carp
4.	<i>Labeo catla</i>	Catla
5.	<i>Labeo rohita</i>	Rohu
6.	<i>Cyprinus carpio</i>	Common carp
7.	<i>Ctenopharyng odonidella</i>	Grass carp
8.	<i>Cirrhinus cirrhosus</i>	Mrigal carp



Image 24 : A Fish Seller In The Fish Market Of Sahibganj Town



Image 25 : Rohu Fish Caught From Ganga River

13.0 Groundwater In Sahibganj Distt.

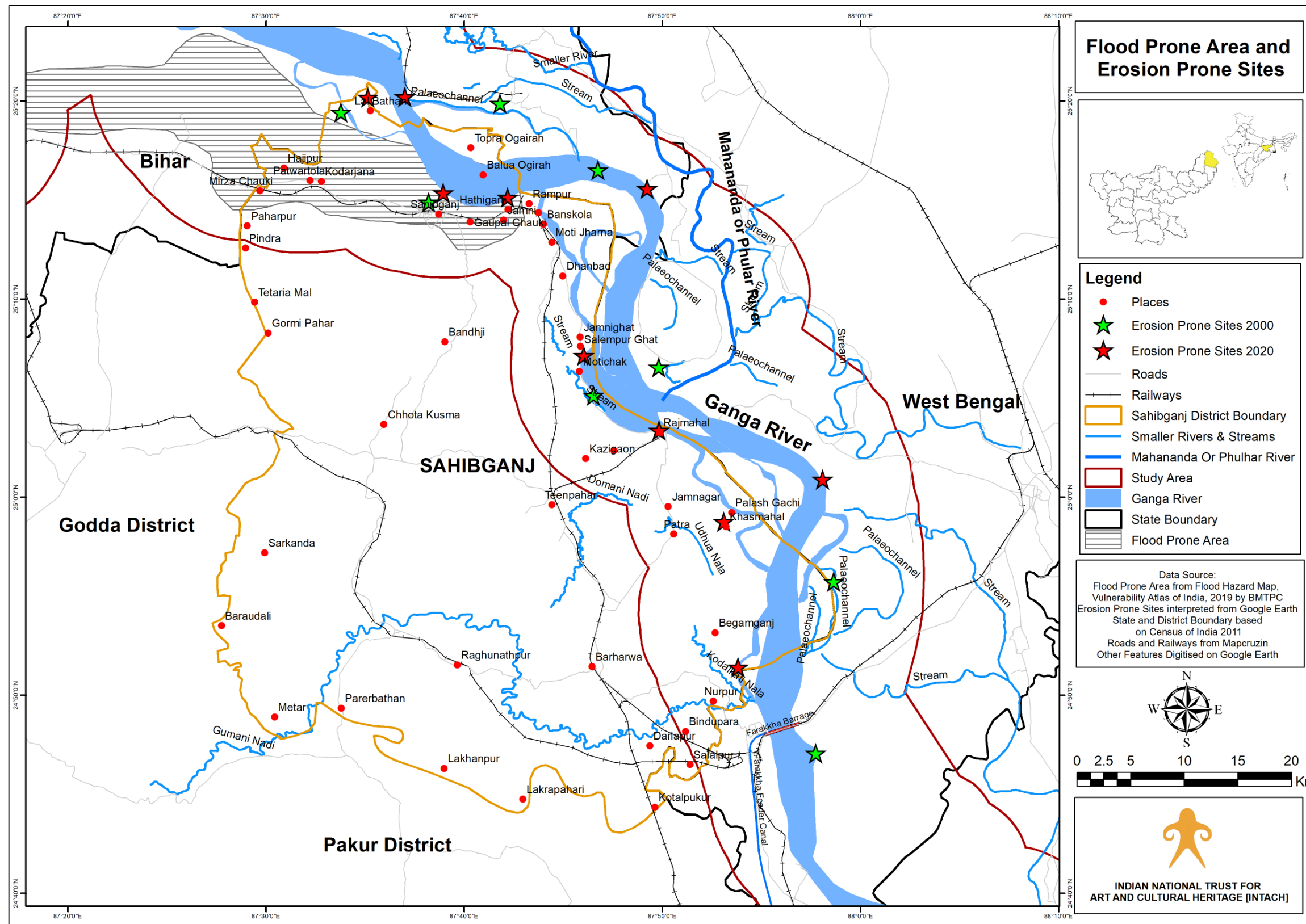
- 13.1 According to the Ground water information booklet prepared by CGWB (2013), the net ground water availability of the district is 11613.70 ham while the gross ground water draft for all uses of the district is 2606.09 ham. The average stage of ground water development in the district is 22.44 %. All blocks of the district are falling under “Safe” category. Dug wells and shallow to medium depth (upto 50 m) bore wells are the main ground water extraction structures in the area to meet the increasing demand of domestic water supply and irrigation. However in view of the increasing thrust on development of ground water resources, there is urgent need to augment the depleting ground water resources through natural recharge and artificial recharge. From hydrogeological point of view, rainwater conservation is needed to arrest decline in ground water levels and to improve ground water quality by dilution. The construction of water conservation structures, artificial recharge structures, depends on the topographic features, hydrological and hydrogeological conditions of the area. From this point of view, the Sahibganj distt. may be divided into two parts – 1) the hard rock area i.e. basaltic terrain is undulating topographic setting with hills is suitable for check dam, gabion structures, percolation tank, contour bunding and trenching 2) the alluvial area is suitable for recharge shaft and percolation tank.
- 13.2 The Arsenic concentration has been found more than permissible limits in some villages like Hazipur Bihta, Dihari, Bari Kudarjana, Nadhi Dera, Reza Nagar, Baluadiara and Chanan of Sahebganj block (CGWB, 2013). The element arsenic is introduced into soil and groundwater during weathering of rocks and minerals followed by subsequent leaching and runoff. It can also be introduced into soil and groundwater from anthropogenic sources. These sources are localized and therefore, important in some geologic settings like recent alluvium in Gangetic Basin. Sahibganj distt. falls in a region that is one of the most arsenic affected regions in the country (Rizvi & Hussain, 2014).

14.0 Ganga River Bank Erosion In Sahibganj Distt.

14.1 Weathering of soils by natural forces is both constructive and destructive. Erosion is the chief agent responsible for 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 (Singh et al., 2004). Soil erosion was an important issue in the study region with the major erosion prone sites being near Sahibganj town, near Rajmahal town and some other areas as demarcated in Map 7. Image 26 shows one such erosion prone site as observed on the Ganga river bank near Sahibganj town. The local residents in the study region were impacted by erosion and floods caused by Ganga river in terms of losses to their agricultural fields and settlements.



Image 26 : Erosion Prone Site Near Sahibganj Town



Map 7 :Flood And Erosion Prone Sites In The Study Region

15.0 Mining And Brick Kilns In Sahibganj Distt.

- 15.1 **Mining in Sahibganj:** According to the report prepared by DEIAA (2018), the different minerals found in Sahibganj distt. Include coal, china clay, bentonite, black stone, sand stone, silica sand, quartz, kaolin and flint stone. The Rajmahal hills in the study region are an important source of building and road stones. Most of the quarrying is done by the side of the loop line of the Eastern Railway. Kaolin is found near Mangal Hat in Rajmahal subdivision. Bentonite is also available in some places, used as “Multani Mitti” and has great scope of export to other parts of the state of Jharkhand.
- 15.2 During the survey stone quarries were observed in areas such as Mirza cheuki, Paharpur and Chota Bhageamari. These quarries generate employment in an impoverished terrain mostly comprising of social economically deprived indigenous tribal population. Considering that fishing and cultivational are seasonal activities, mining and brick kilns offer an alternate means of employment to the indigenous population, where men and women are both employed as casual day labour.
- 15.3 These quarries are also an important source of income to the state government while the need for building stone cannot be denied in the region that is rapidly industrializing and urbanizing. However, quarrying of Basalt in the cretaceous Rajmahal Trap Region has been increasing at an alarming pace. The quarries have created an extensive ugly landscape of pits and overburdened dumps. The stone workshops also continuously emit dust. Images 27-29 depict some stone quarries as observed during the survey.



Image 27 : Stone Quarry Near Mirza Cheuki



Image 28 : Stone Quarry Near Paharpur

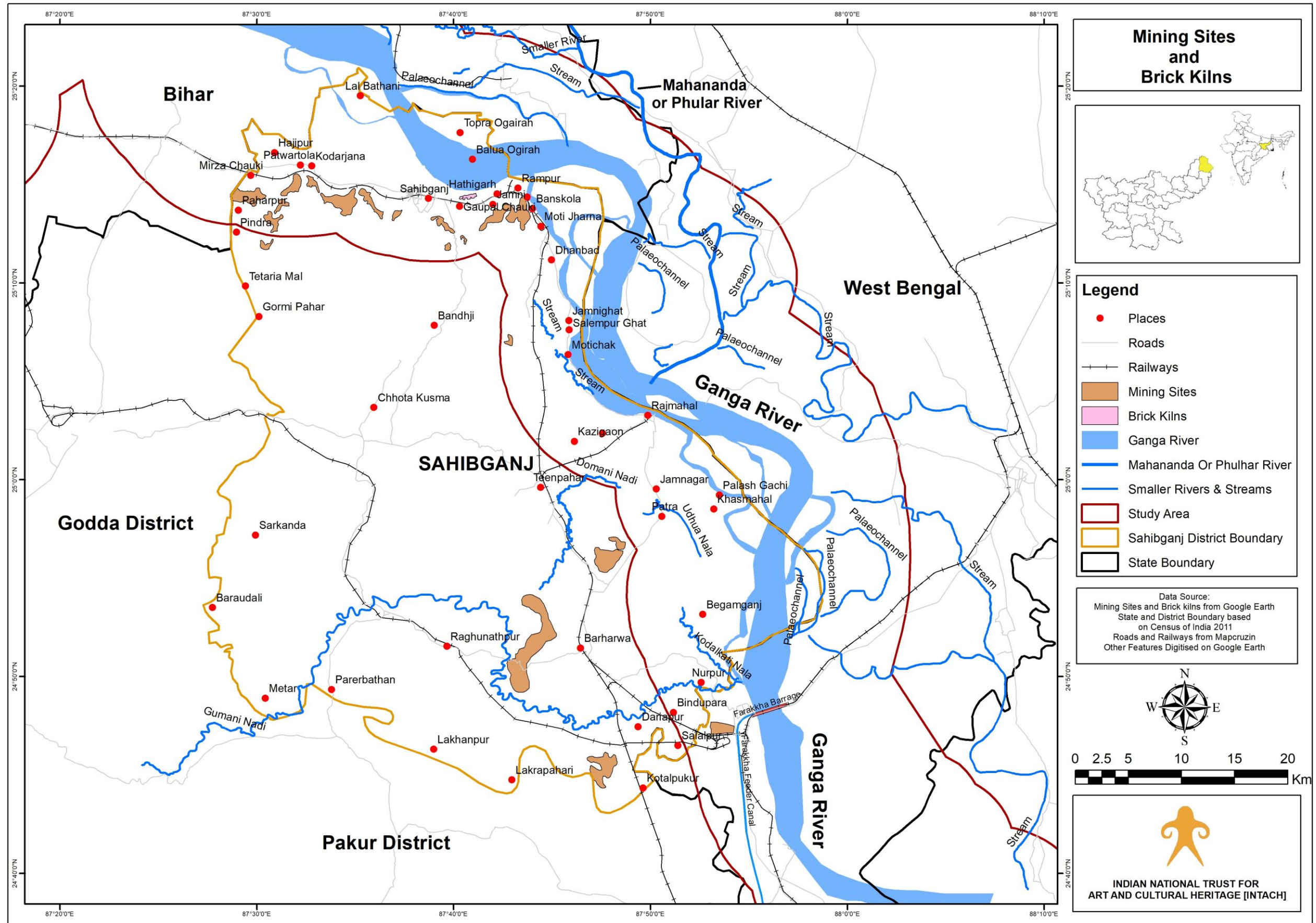


Image 29 : Stone Segregation Area Near Teliagarhi

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. Few brick kilns were observed to be present near the Ganga river as well as in its active floodplain region. Image 30 depicts one such brick kiln as seen during the survey. Map 8 depicts the mining sites and brick kilns distributed in the study region.



Image 30 : A Brick Kiln Observed From NH-33 Near Maskaliya



Map 8 : Mining And Brick Kiln Sites In The Study Region

16.0 Boatmaking In Sahibganj Distt.

16.1 Boats are the prime means of transport and livelihood for people residing in this region. The boats are mainly used for fishing, commuting and transporting goods. Types of boats used in region include dengi, wooden boat and steamer/jetty. Among these, the dengis are locally made, low cost and most basic version of a boat made of corrugated metal sheets. Dengi is used by single individuals for fishing and travelling between local riverine islands. Wooden boats /jetty / steamers are of different sizes and are used for travelling across the Ganga river to nearby towns and districts. They are also used for transportation of stone chips and other agricultural produce from farmlands to market places.



Image 31 : Boatmaking Observed Near Sakriguli



Image 32 : Locally Made Wooden Boats Used To Ferry People Between Mainlands And Islands



Image 33 : Jetties And Steamers Moving People And Goods Between Jharkhand, West Bengal And Bihar

17.0 Sacred Trees In Sahibganj Distt.

17.1 Some old and sacred trees recorded during the survey are depicted below:



Image 34 : Sacred Peepal Tree Observed At Baisi Kali Mandir In Sahibganj Town



Image 35 : Sacred Peepal Tree Observed Near Chaat Ghat In Purani Sahibganj

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