Ganga Cultural Documentation
2022

FARRUKHABAD & SHAHJAHANPUR DISTRICTS

NAMAMI GANGE

National Mission for Clean Ganga

Indian National Trust for Art and Cultural Heritage
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Azaadi Ke Rang Bharatiya Sanskriti Ke Sang

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Front Cover : Panchal Ghat in Farrukhabad

Background : Ramganga River as seen near Karakka Village

Back Cover : Vishrant Ghat in Farrukhabad

Formatting and Design by : Sumesh Dudani

GANGA CULTURAL DOCUMENTATION

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APRIL, 2022

Sponsored by :

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1.0 Introduction

1.1 Farrukhabad Distt. is situated in the western part of Uttar Pradesh state [Refer Map 1] between latitudes 26°46'00" and 27°43'00" N and longitudes 79°07'30" and 80°02'00" East. Its total geographical area currently is about 2181 sq.km. which has shrunken due to carving out of Kannauj Distt. from it in 1997. The maximum length from north to south is about 120 km. and the maximum breadth from east to west about 65 km. Owing to the action of the Ganga in shifting its bed from year to year the total area varies slightly but such changes are usually not very extensive. It is only in the northern portion of Kaimganj that the shifting of the river affects the district as a whole. The Distt. is bounded by Badaun and Shahjahanpur on the north, Hardoi Distt. on the east, Kannauj Distt. on the south, and Etah and Mainpuri Distt.s. on the west. The Distt. is divided into three tehsils – Kaimganj, Amritpur & Farrukhabad with its headquarters being at Farrukhabad-cum-Fatehgarh (Census of India, 2011).

1.2 Physiographically, the Distt. forms a part of southern Upper Ganga plain with the Ganga river forming boundary along its northern and eastern portions. Modern deposits of the Ganga and Ramganga rivers in the Distt. give rise to the low land and older form of deposits known as Bangar. It is a levelled plain covering four-fifths of the Distt. area and is traversed by small east bound rivers such as Bagar, Kali and Isan. On the basis of factors like geology, soils and topography, the Distt. has been divided into following four sub micro-regions: Ganga-Ramganga Khaddar (extending parallel to the Ganga river in a narrow strip, which is wider in north and tapers down towards south), Farrukhabad-Kaimganj plain (situated in the northern part of the Distt. covering parts of Kaimganj and Farrukhabad tahsils), Lower Kali plain (situated in central part of the Distt. covering southern part of Farrukhabad & northern parts of Chhibramau & Kannauj tahsils), and Isan plain (situated in southern part of the Distt. covering major portions of Chhibramau & Kannauj tahsils) (Census of India, 2011).

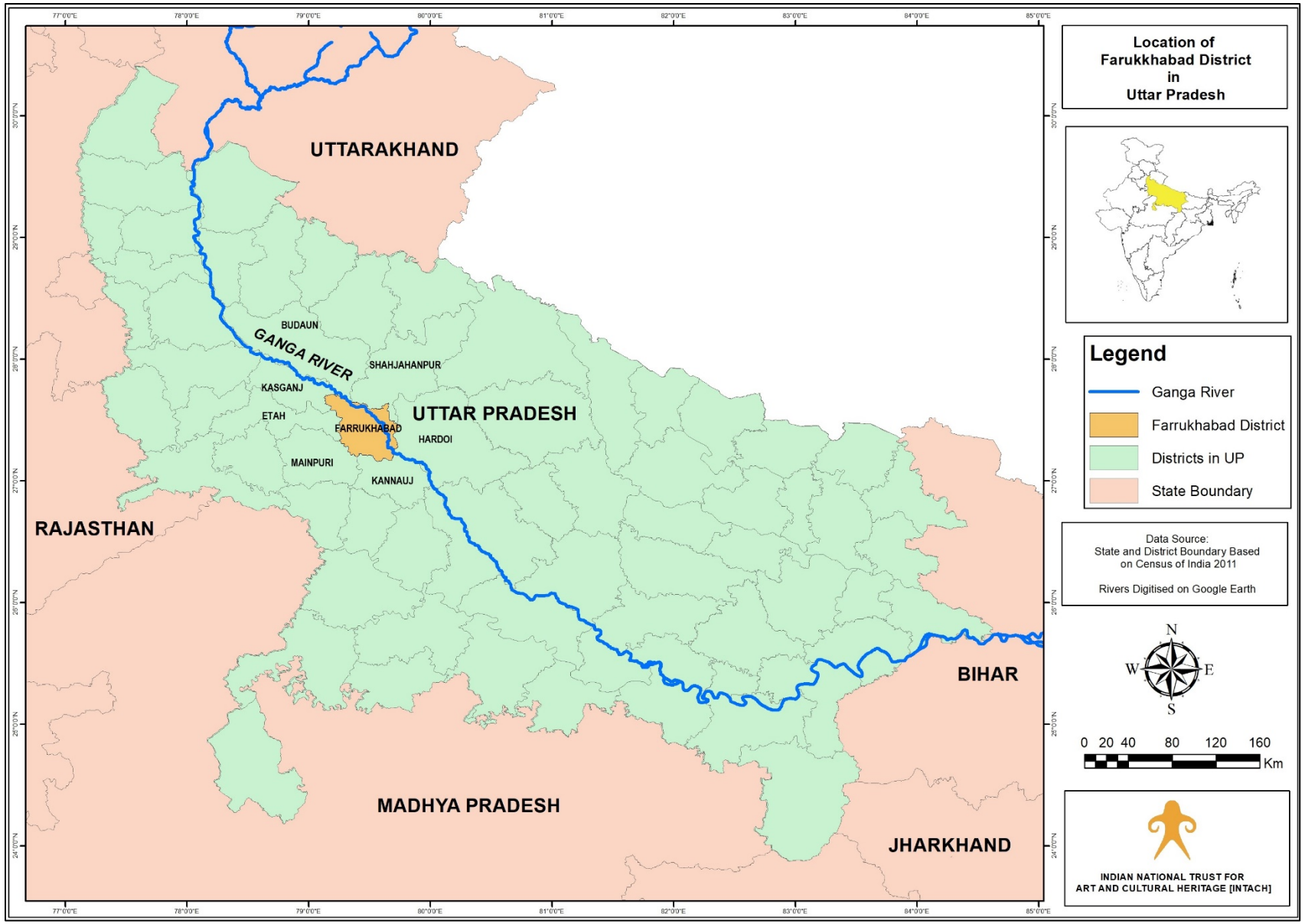
1.3 Farrukhabad was founded by Nawab Mohammad Khan Bangash, who named it after the reigning emperor Farrukhsiyar, in 1714, the district of Farrukhabad forms part of Kanpur division. The traditional history of the district from the earliest times till the end of Mahabharata war gleaned mainly from the 'Puranas' and the 'Mahabharata'. Also Panchal figures as the 'tenth' in the list of the sixteen premier states (Mahajanpada) in the time of Mahavira and Buddha and is said to have comprised the region of covered by the present district of Bareilly, Budaun and Farrukhabad. The finding of numerous prehistorical bronze weapons and tools indicates that the region must have been civilized

long ago in prehistoric times probably during the Bronze Age. A large number of small pieces of pottery have been found scattered all over the district out of which the pieces of pottery, known as grey and painted grey ware, have been found at Kampil which are similar to those found at Hastinapur and Atrangi Khera. The earliest known Aryan people who settled in the region were the Panchals and were close allies of the Kurus and their territory roughly corresponding to the present Bareilly, Budaun, Farrukhabad and adjoining districts of Uttar Pradesh.

1.4 Situated in the tehsil of Kaimganj the ancient town Kampil (also known as Kampilya) is believed to be synonymous with the capital of the south Panchala kingdom ruled by Drupada during Mahabharat period. Besides being a prosperous town, Kampilya is also the birthplace of the thirteenth Jain tirthankara Vimal Nath. Panchal Ghat (also known as Ghatiya Ghat) [Image 1] is situated on the bank of the Ganga river. Believed to be built by Panchal king Drupada, hundreds of temples line up the vicinity of this Ghat. In the month of Magh, a fair known as 'Ramnagriya' is held at this site where numerous pilgrims and visitors throng to bathe in Ganga River and pray at the temples.

Image 1 : Panchal Ghat As Observed In December, 2021

In 1665 was born at Mau-Rashidabad (a suburb of Kaimganj) Pathan child, who was named Mohammad Khan. When he was 20, Mohammad Khan joined the bands of Pathan freebooters. At the emperor Farruksiyar's invitation to join forces with him to suppress his cousin Jahandar Shah, he joined him. when Jahandar Shah was defeated Mohammad Khan was rewarded and received the title of Nawab. After having successfully commanded he obtained leave to return home where he founded the towns of Kaimganj and Mohammadabad. The first one was named after his son while the second one he named after himself. On a high mound called Kal-ka-khera, he built a fort, of which only the ruins now remain. It is said that Farrukhsiyar became angry when he heard that Mohammad Khan had founded a town in his own name. To abate his benefactor's wrath, the nawab announced his intention of founding another town which he would name after the emperor. Mohammad Khan asked for and obtained a grant of fifty-two Bamtela villages as the site of the new city which he named FARRUKHABAD after Farrukhsiyar, the foundations which were laid in 1714. (source: https://farrukhabad.nic.in/history/)

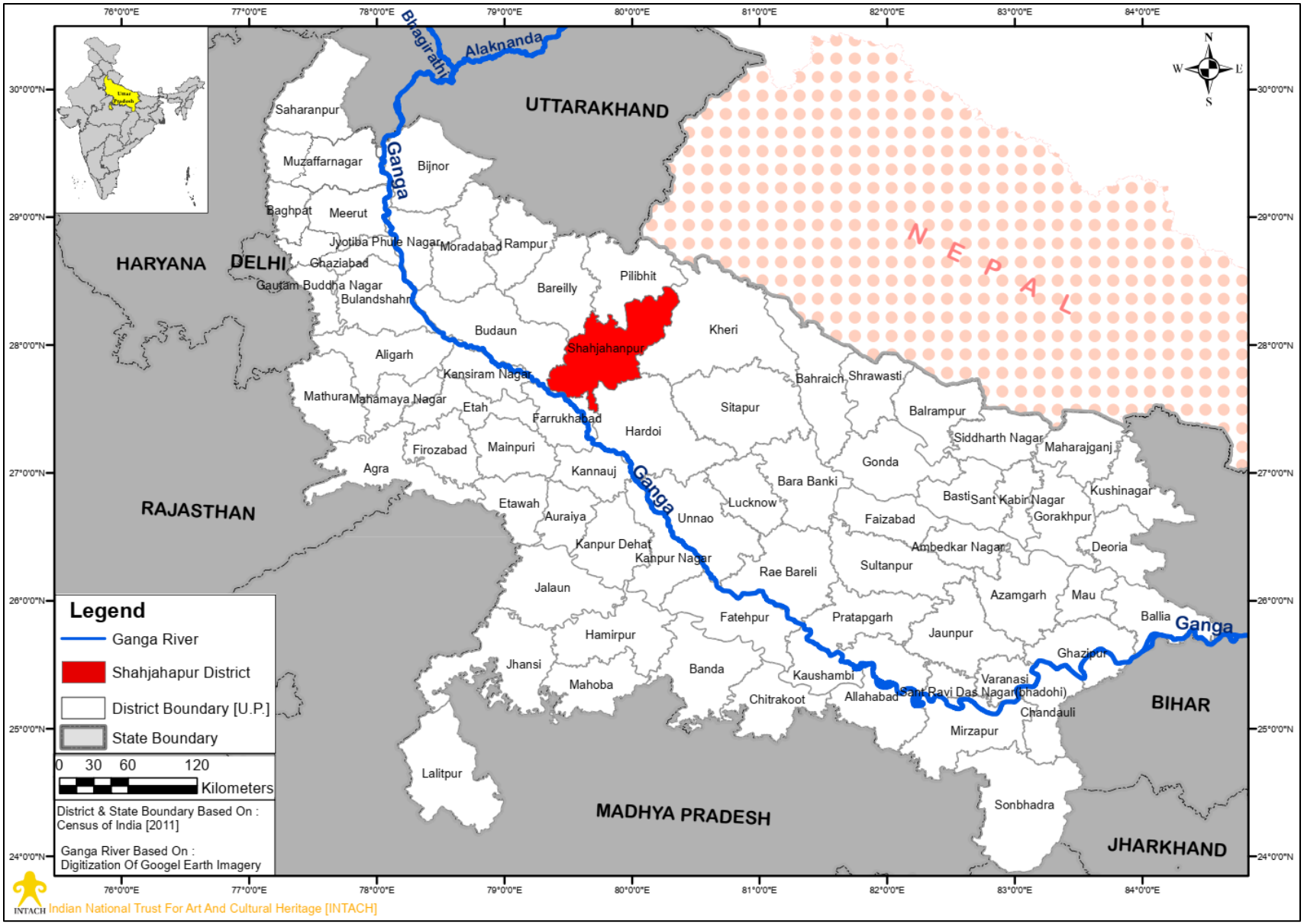


Map 1 : Location Of Farrukhabad Distt.

1.5 Situated in the west-central part of Uttar Pradesh [Refer Map 2], lying between latitudes 27°27'N and 28°28'N, and longitudes 79°19'E and 80°23'E, Shahjahanpur Distt. covers a total geographical area of 4575 sq.km. It was carved out as a separate Distt. from Bareilly Distt. in 1813 and is bounded in the northwest by Pilibhit Distt. and in the east and southeast by Kheri and Hardoi Distt.s. respectively. Towards its south lies Farrukhabad Distt. separated by river Ganga, and to the west, Bareilly and Budaun Distt.s. Administratively, the Distt. is divided into 4 tehsils and 15 developmental blocks while its urban sector is divided into 3 Nagar Palika Parishads and 7 town areas. The Ganga, Ramganga, Gomti and Garra are important rivers in this Distt.

1.6 This Distt. forms a part of the central Ganga plains in Upper Ganga basin and exhibits a monotonous flat topography intersected by numerous streams and water courses. The area of this Distt. can be divided into two broad geomorphic units: the Older Alluvium (Bangar surface) and the low land floodplain (Khaddar surface). The soils in this Distt. are deep and well-drained, with loamy surface. With hot and dry summers, humid monsoon season and dry winters, Shahjahanpur Distt. comes under sub-tropical sub-humid climate zone (Ranjan, 2013).

Shahjahanpur was founded in 1647 and named after the Mughal Emperor Shahjahan. is one of the historical districts of Uttar Pradesh in the republic of India. Shahjahanpur town is also known as 'Shaheedon Ki Nagari' or 'Shaheed Gadh'. On 9th August, 1925 the British treasury was robbed near Kakori Railway Station. On 26th December, 1925 forty persons were arrested in this Kakori conspiracy case from all over India. Freedom fighter Pandit Ram Prasad Bismil, Thakur Rosan Singh, Banarsi Lal, Lala Har Govind, Prem Krishna Khanna, Indu Bhushan Mitra, Ram Dutta Shukla, Madan Lal and Ram Ratan Shukla among them were from Shahjahanpur district. Murari Lal Gupta with a fake name of Murari Sharma had also actively participated in the train robbery; he went underground and could not trace out by the Police till the end of the case. His son Damodar Swaroop Gupta became a famous revolutionary poet with the pen name of 'Vidhrohi'. Shahjahanpur also known for its Kalin Udyog (Carpet Industry) as well as for Sarrafa Bazar (jewellery Market). It is also the place where Ganga Jamuni culture flourished for a long time. (Source – MSME, 2014)



Map 2 : Location Of Shahjahanpur Distt.

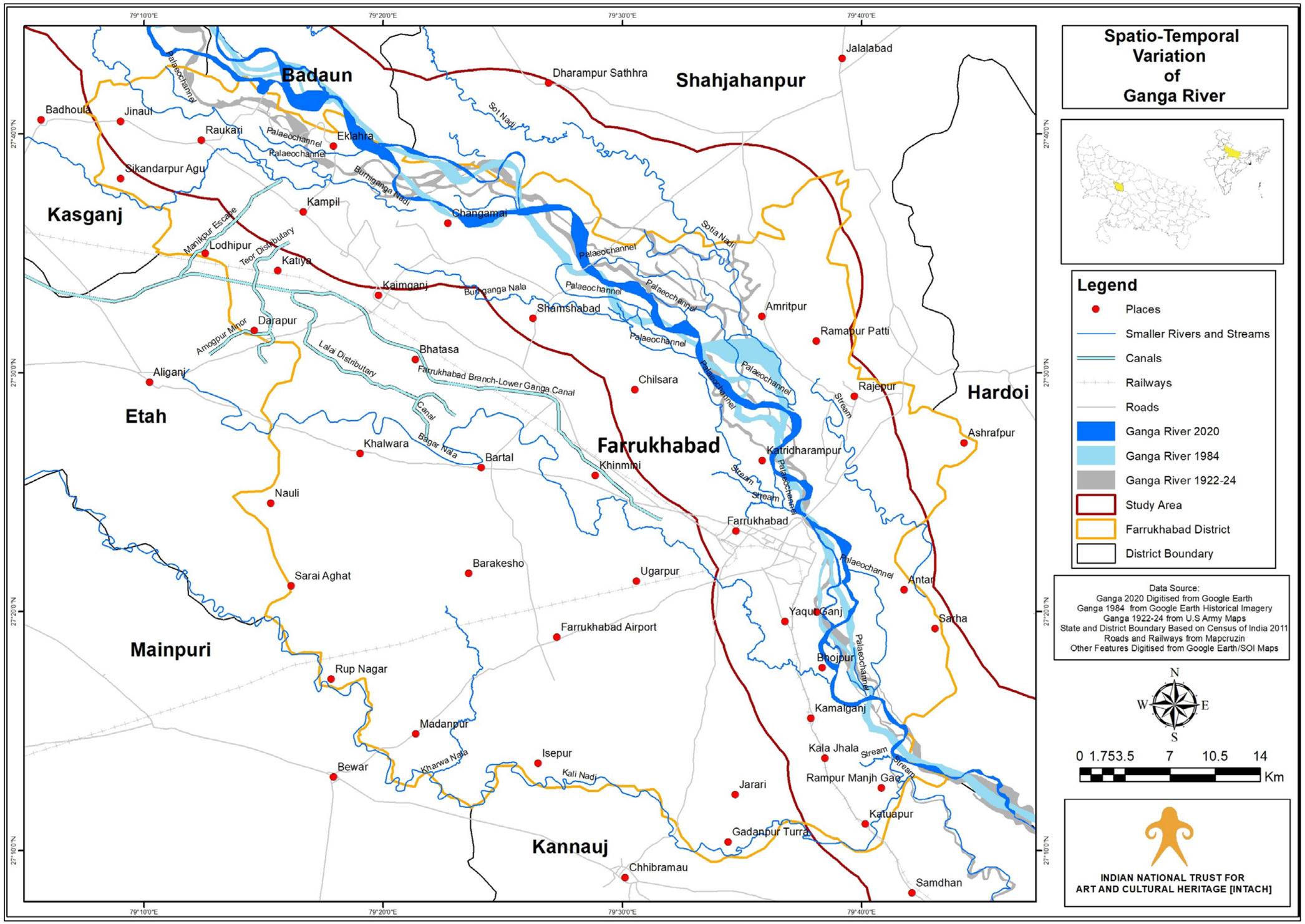
2.0 Ganga River In Farrukhabad & Shahjahanpur Distt.s.

2.1 Ganga River enters Farrukhabad Distt. just after crossing Ataina Ghat where it separates it from Budaun and Shahjahanpur Distt.s. After crossing the areas of Kampil, Kaimganj and Shamshabad, the river turns southwards throughout the Distt. until it reaches Singhirampur from where it turns south-eastwards exiting this Distt. and entering Kannauj Distt. Throughout its course in the Distt., Ganga River is braided due to presence of irregularly shaped riverine islands. Along its course lie important sites such as ancient and historic towns of Kampil, Shamshabad, Kaimganj, Farrukhabad & Fategarh. According to the Distt. Gazetteer, Ganga River constantly changed its course in this region with its movements being from side to side. During the current survey too, it could be observed that massive shifts in the river course had taken place [Refer Map 3] leaving some important sites behind. One such site is the Vishrant Ghat [Image 2] which used to be a landing site for goods and provided resting places for passengers and boatmen. The shift in Ganga river course has left this Ghat to be an isolated structure now exploited by some local residents for their personal uses. The Gazetteer also mentions that Ganga river was traversed by numerous ferries which were an important source of transporting cargo and passengers alike with Panchal Ghat being an important stop.

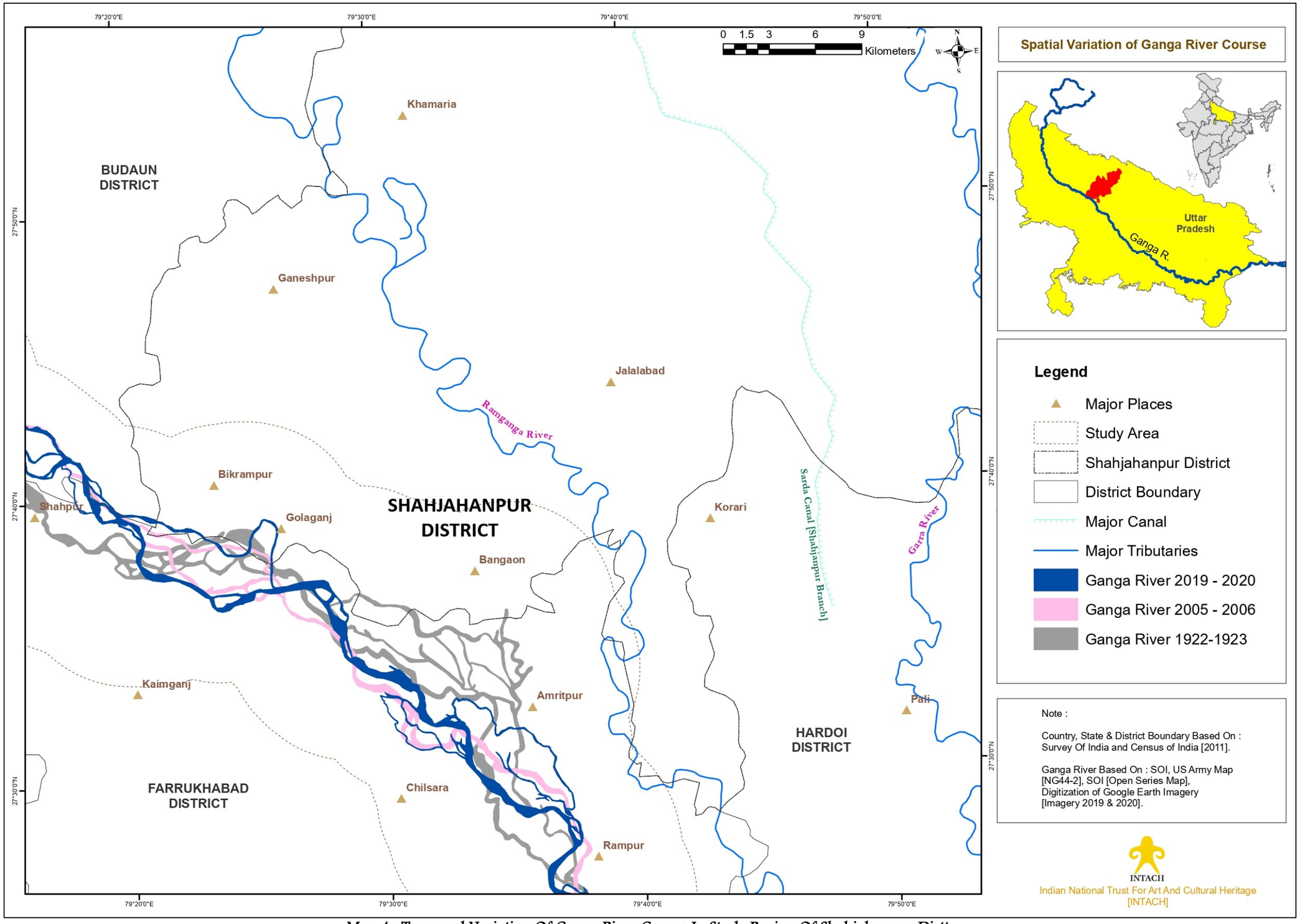
Image 2 : Vishrant Ghat In Farrukhabad Distt.

2.2 The Ganga river adjoins Shahjahanpur Distt. for a small stretch of about 9 kms. covering villages such as Chhidkuri, Sukhaniya and Naglabasola before exiting the Distt. near Dhai Ghat and entering Farrukhabad. Map 4 depicts the spatio-temporal variation of Ganga River in the study region of this Distt. while Image 3 depicts a stretch of Ganga river as observed during the field survey.

Image 3 : A Stretch Of Ganga River As Observed Near Naglabasola Village Of Shahjahanpur Distt. With Vertical Erosion Of Bank



Map 3 : Temporal Variation Of Ganga River Course In Study Region Of Farrukhabad Distt.

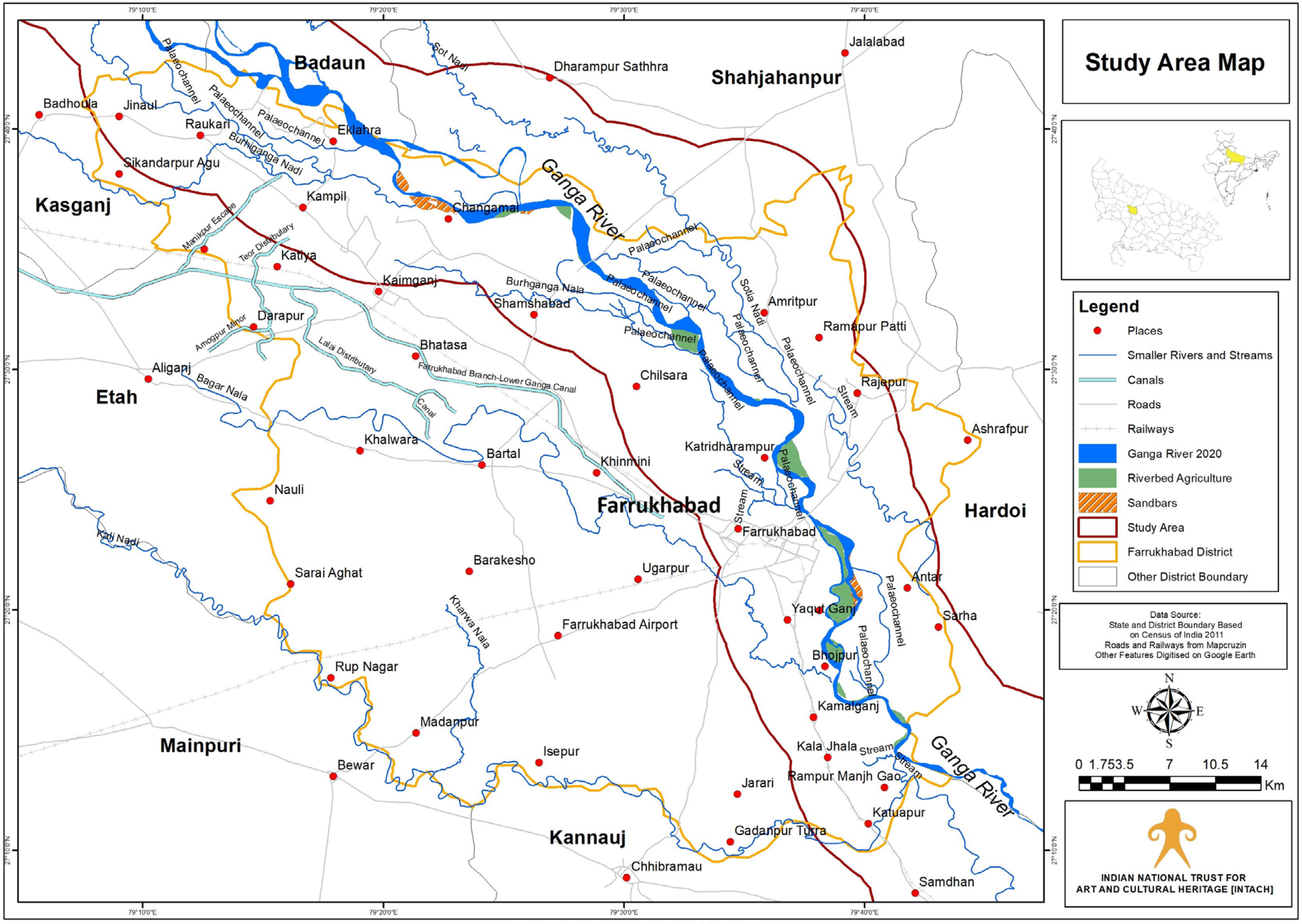


Map 4 : Temporal Variation Of Ganga River Course In Study Region Of Shahjahanpur Distt.

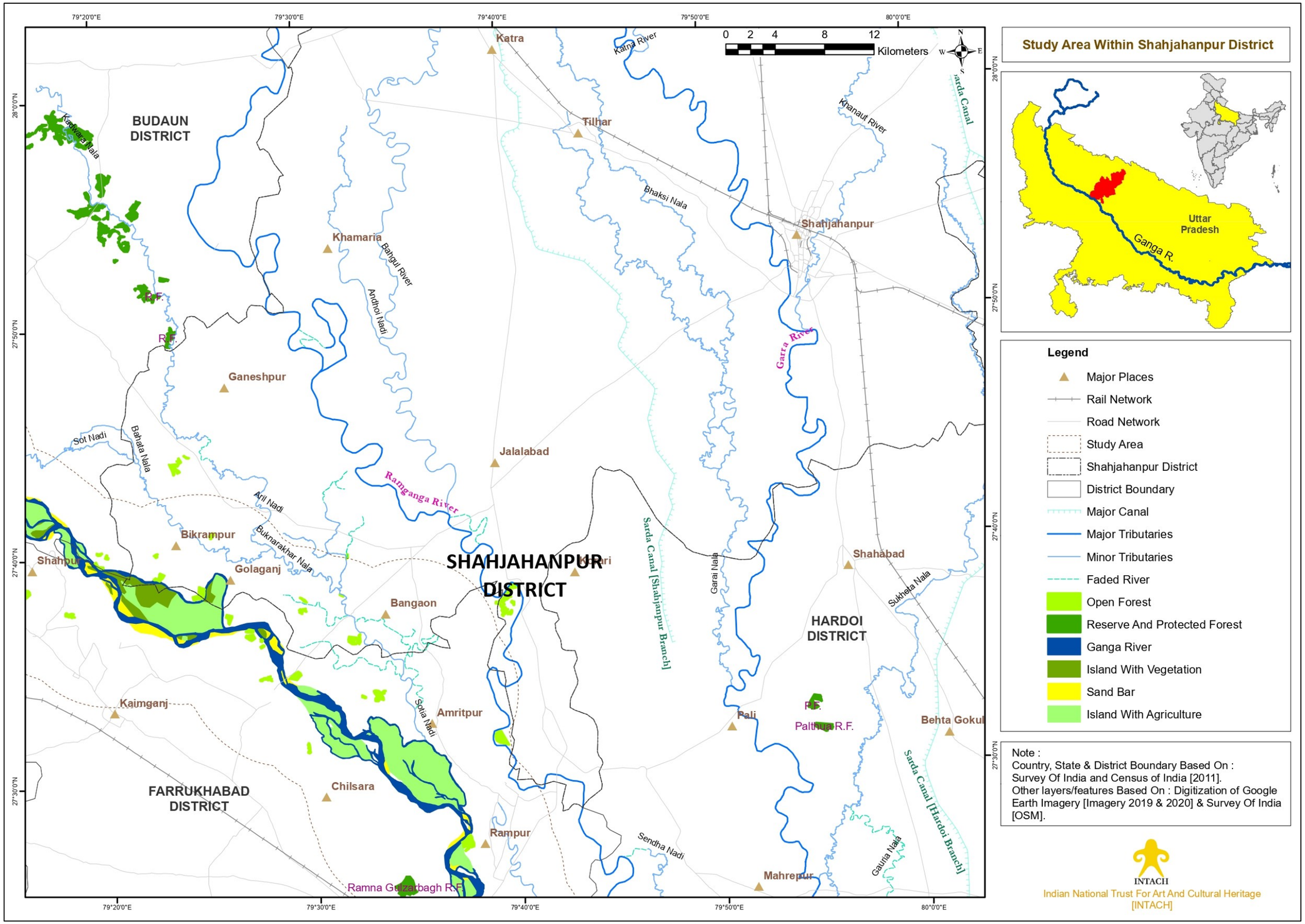
3.0 Methodology

3.1 Ganga River flows in Farrukhabad Distt. for approximately 84 kms adjoining it mainly on the right bank and in some parts on the left bank. Hence for carrying out the ground survey, a 7 km of buffer zone was selected on the both the banks of Ganga River in the Distt. [Refer Map 3]. In the case of Shahjahanpur Distt., Ganga river adjoins it mainly on the left bank for a small stretch of about 9 kms. 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 Farrukhabad and Shahjahanpur Distt.s. was carried out from 5-12 December, 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 5 : Study Area In Farrukhabad Distt.



Map 6 : Study Area In Shahjahanpur Distt.

4.0 Tributaries Of Ganga River

4.1 **Ramganga River :** Ramganga river is the first major tributary of Ganga joining on its left bank in Hardoi Distt. [Refer Map 4]. This river arises in lower Himalayas at an altitude of about 3110 m above the mean sea level near the village of Lohba in the Garhwal district of Uttarakhand. The total length of the river from the source to its outfall into the Ganga is 596 km and the entire length lies in the Uttarakhand and Uttar Pradesh. In the state of Uttar Pradesh, this river flows through the cities of Bijnor, Moradabad, Bareilly, Badaun, Shahjahanpur and Hardoi before its confluence with Ganga. All along its length, the river meets drinking water supply of large number of human habitations and meets irrigational demands of vast farming areas. According to the District Gazetteer (Nevill, 1904), Ramganga river made great changes in its course and brought rich alluvial deposit which didn't require any manuring for growing crops. It is also recorded that this river was navigable throughout its course during that time. However, currently negligible navigation is present in this river course in the study region.

4.2 Throughout its course in Farrukhabad Distt., it flows almost parallel to Ganga river forming a rough boundary separating this Distt. with Hardoi & Shahjahanpur Distt.s. During the field survey, a part of this river was observed near Karakka village [Image 4]. The water in the river was reduced exposing the river bed in many patches. Upon interaction, the interlocutors in this region reiterated that the river swelled up during monsoon season with the water often entering surrounding villages. However, during lean season it decreases significantly leading to an almost dry bed during summers. Some bird species such as duck species, cormorants and open billed storks were observed in places where water was present [Image 5]. The river is surrounded by dense agriculture and serves as a crucial source of irrigation for the local residents. Growth of riparian grass – *Saccharum* sps. was also observed along the banks of this river in the study region.

Image 4 : Part Of The Ramganga River As Observed Near Karakka Village On 8th December, 2021

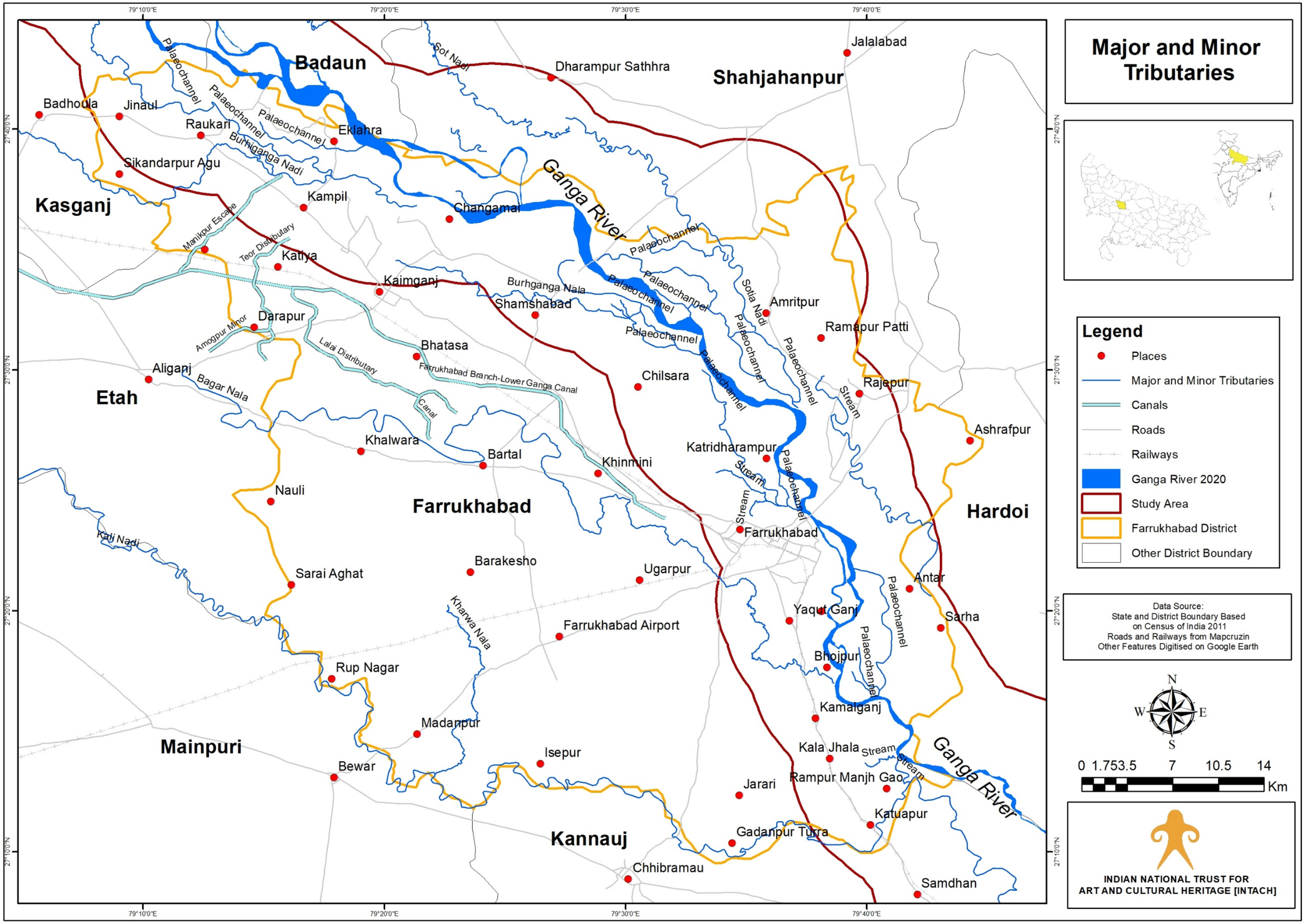
Image 5 : Migratory Ducks And Other Birds In Ramganga River

4.2 **East Kali River :** This is another major and an important tributary of Ganga River in the study region. It originates in Muzzafarnagar Distt. and traverses a distance of about 550 km passing through different Distt.s. of Uttar Pradesh state such as Meerut, Hapur, Khurja, Bulandshahar, Aligarh, Farrukhabad before entering Kannauj. It flows in the southern part of the Distt. forming a rough border separating it from Mainpuri Distt. It then starts bending east-southeastwards approaching Ganga river crossing Khudaganj and Sherpursarai before making another turn eastwards entering Kannauj Distt. where it confluences with Ganga. According to the Distt. Gazetteer (Neave, 1911), after serious floods in 1888, a cutting was made in Kali Nadi joining it with Ganga River near Sherpursarai which acted as an escape for its waters to prevent reoccurrence of any further calamity in the region. Image 6 depicts the East Kali River as observed during field survey in this Distt.

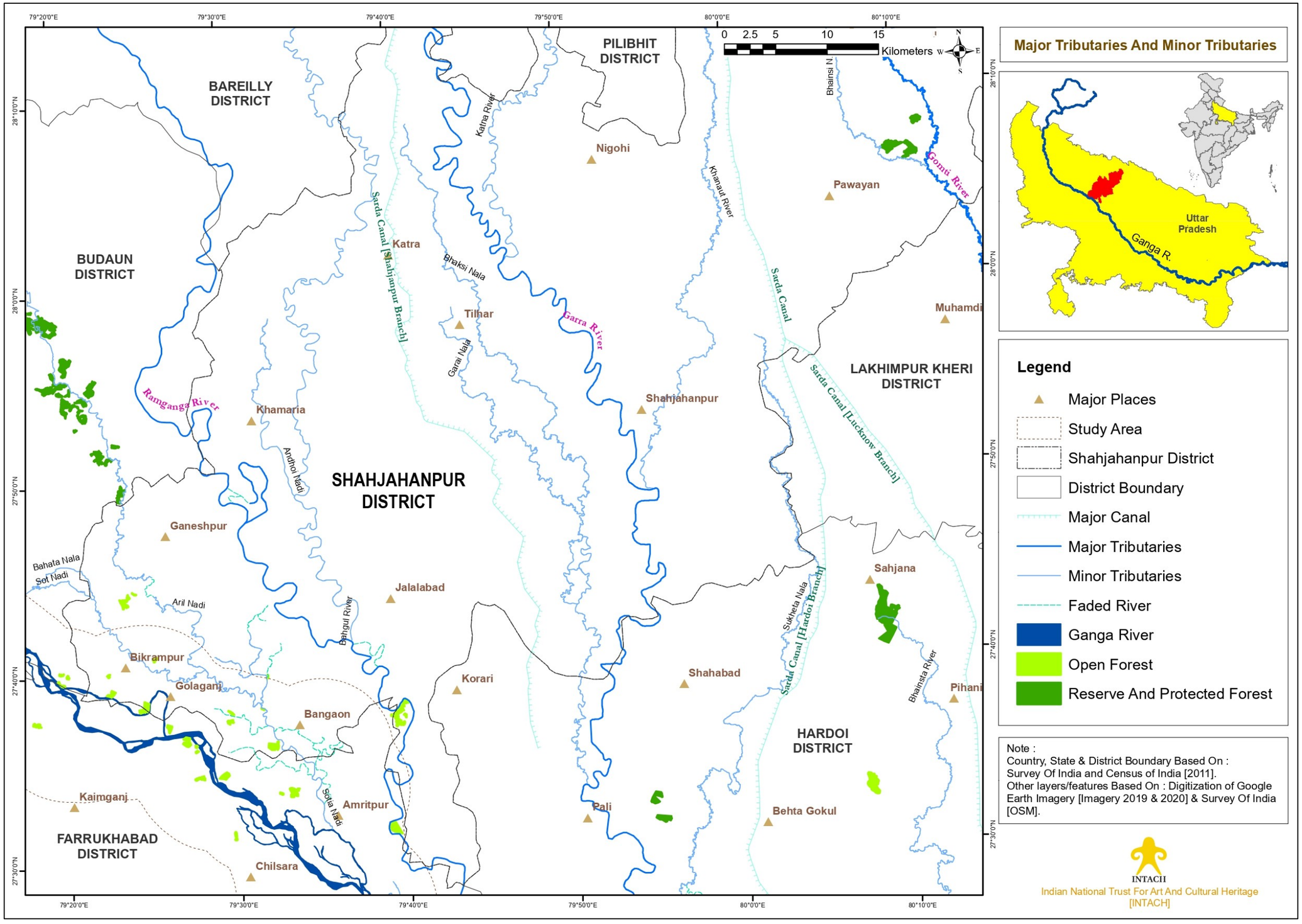
Image 6 : East Kali River As Observed On 10th December, 2021

4.3 **Burhi Ganga :** According to the District Gazetteer (Neave, 1911), Burhi Ganga is an intermittent stream which flows in old beds of Ganga River. Two such streams confluence close to Kampil and then flow as a single stream channel in northerly direction to confluence with Ganga River near Sinauli village. During the field work a part of this stream was observed near Kampil town where it was surrounded by dense agriculture on all sides. The interlocutors reiterated that it received water during monsoons and started drying up during non-monsoon period. The water from this stream was principally used for irrigating the surrounding fields. However, the expansion of agriculture has led to tremendous pressure on such streams which need to be immediately conserved before they are reduced to cultivable fields in the study region.

Image 7 : Part Of Burhi Ganga As Observed Near Kampil Town On 6th December, 2021



Map 7 : Major And Minor Tributaries Of Ganga River In Farrukhabad Distt.



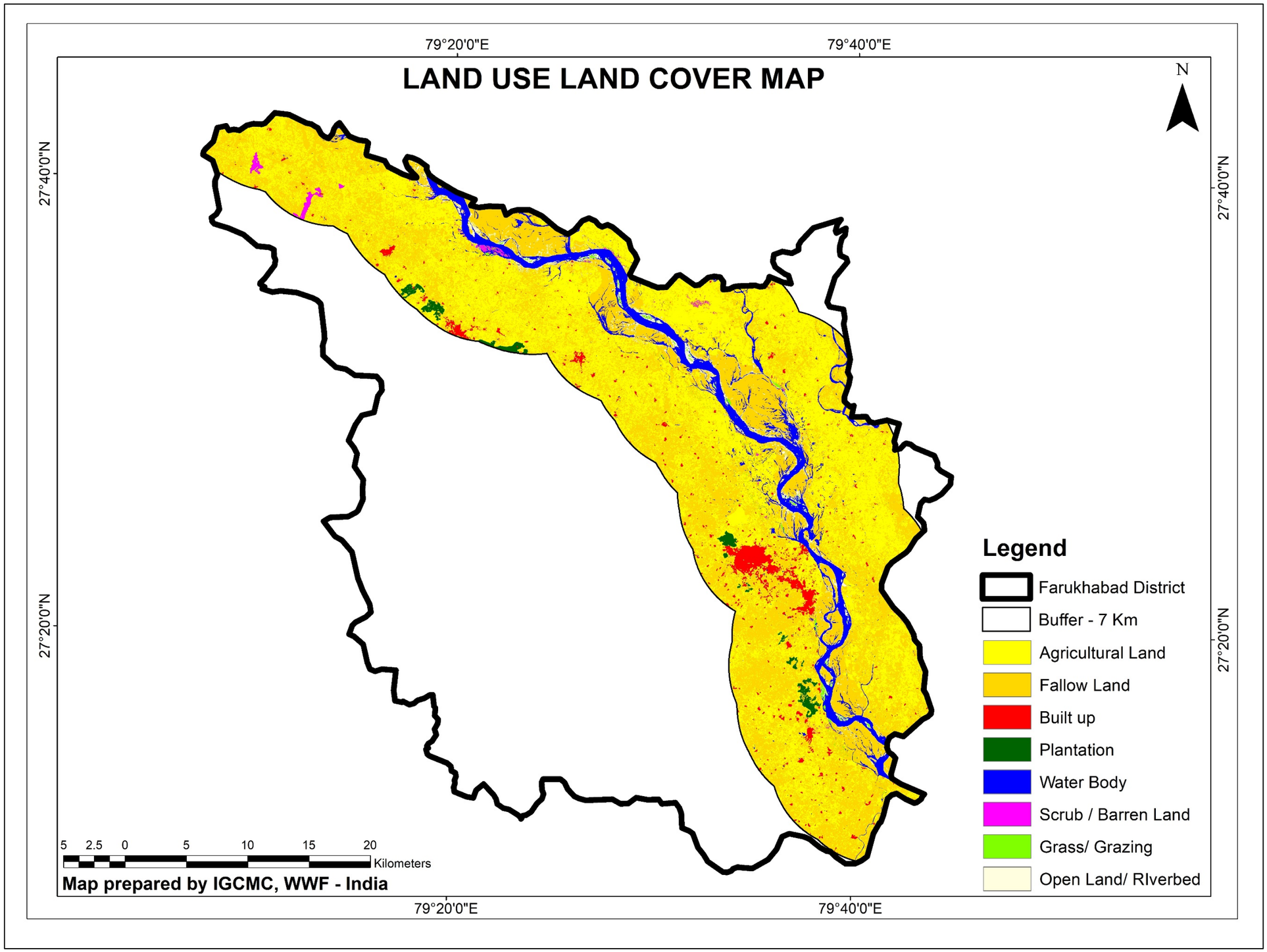
Map 8 : Major And Minor Tributaries Of Ganga River In Shahjahanpur Distt.

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, plantation, scrub/barren land, agriculture land, fallow land, open land/riverbed, grass/grazing and built up. Agriculture being a dominant source of income, the agriculture and fallow components occupy major part of the land use system in this Distt. (about 87% collectively). The water body component covering 6.704% of the total geographical area of this Distt. chiefly includes Ganga river, its tributaries and other wetlands. The built-up area includes Farrukhabad and Fatehgarh as the major towns along with other such as Kaimganj, Kampilya and Kamalganj spread along in the study region. Table 1 provides the statistics while Map 9 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 In Farrukhabad Distt.

FARRUKHABAD			
Class Name	**Area (Ha)**	**Area (Sq. Km)**	**Area (%)**
Water Body	7076.97	70.770	6.704
Plantation	836.310	8.363	0.792
Scrub/Barren land	433.140	4.331	0.410
Agriculture Land	42989.50	429.895	40.722
Fallow Land	48848.50	488.485	46.272
Open Land/ Riverbed	1821.89	18.219	1.726
Grass/Grazing	1153.620	11.536	1.093
Built up	2407.26	24.073	2.280
Total	**105567.19**	**1055.672**	**100**

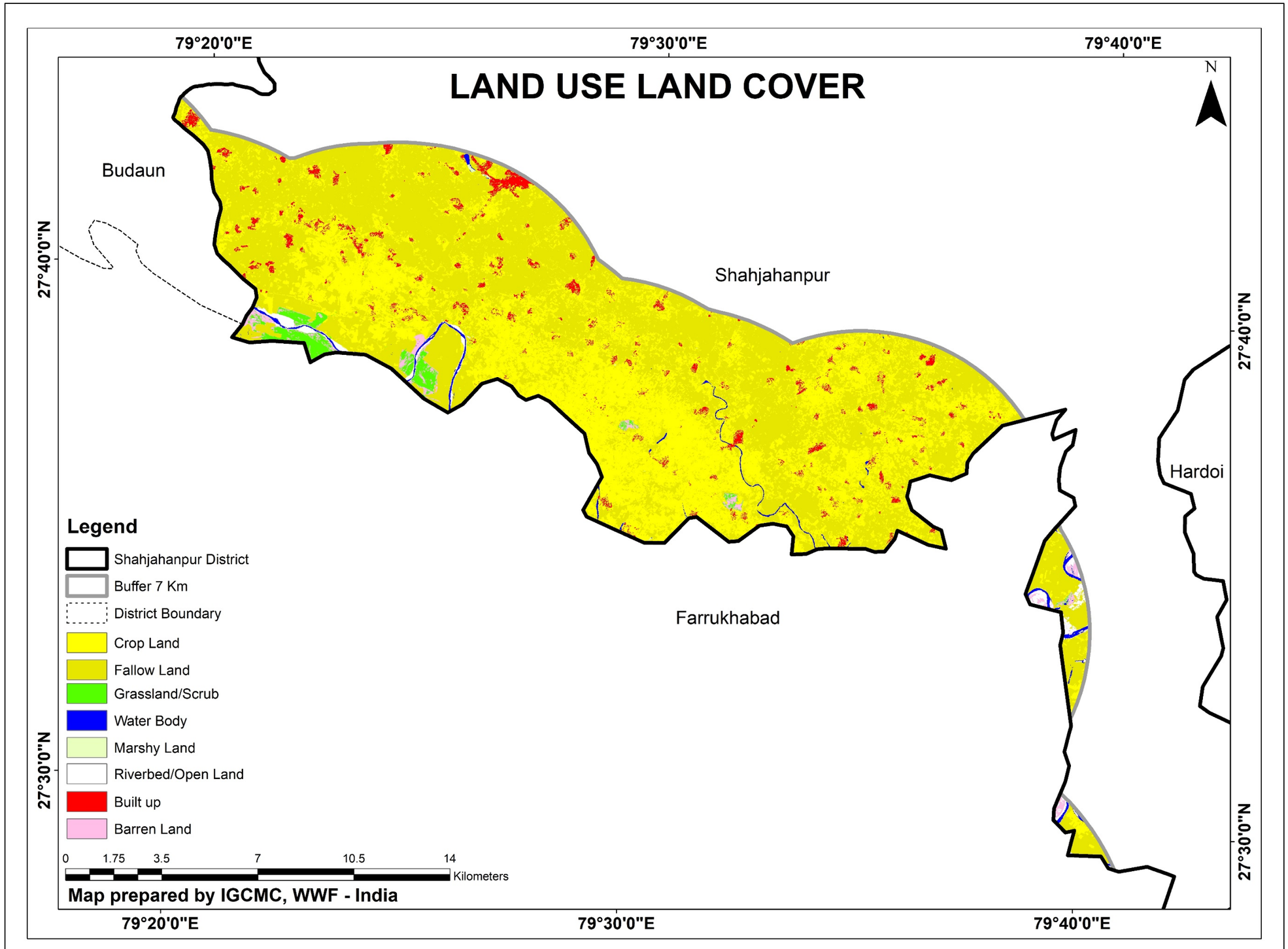


Map 9 : Land Use/Land Cover Map Of Study Region In Farrukhabad Distt.

5.2 In the case of Shahjahanpur Distt., 9 different classes of land-use have been identified namely – water body, plantation, barren land, crop land, fallow land, open land/riverbed, grassland/scrub, built up and marshy land. Similar to Farrukhabad, the study region in Shahjahanpur Distt. too is dominated by crop land and fallow land together comprising about 93.13% of the total area. The built up land use is the second most dominant category comprising about 2.8% of the total area and constitutes some small towns and villages. Table 2 provides the statistics while Map 10 depicts the various land use/land cover classes as analysed for the study region.

Table 2 : Land Use And Land Cover Details Of Study Region In Shahjahanpur Distt.

SHAHJAHANPUR			
Class Name	**Area (Ha)**	**Area (Sq. Km)**	**Area (%)**
Water Body	173.33	1.733	0.78
Plantation	0.3	0.003	0
Barren land	217.67	2.1767	0.97
Crop Land	8362.8	83.628	37.43
Fallow Land	12442.4	124.424	55.70
Open Land/ Riverbed	216.98	2.169	0.97
Grassland/Scrub	293.73	2.9373	1.31
Built up	624.66	6.2466	2.80
Marshy land	8.23	0.0823	0.04
Total	**22340.10**	**223.401**	**100**



Map 10 : Land Use/Land Cover Map Of Study Region In Shahjahanpur 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, Maps 11-12 were prepared which depict the various paleochannels in the study region of Farrukhabad and Shahjahanpur Distt.s. respectively.

6.2 A palaeochannel of Ganga River, locally referred as 'Sota or Kala Sota' was observed near Ballipatti ranigaon in Farrukhabad Distt. [Image 8]. Upon interaction, the interlocutors revealed that this used to be part of the main Ganga River channel till few decades ago but is reduced to a small stream owing to major course shifts in the region. Currently, this channel receives water only during monsoons and is connected on its both ends with the active Ganga river channel. These connections serve as the inlet and outlet for the flow of water as observed during the field survey [Image 9]. The water starts reducing and eventually dries up completely sometimes during the non-monsoon period. The local residents use this water chiefly for irrigation and fishing purposes. Major fish caught from this channel are similar to those of Ganga River namely baam, sidhari and tengara.

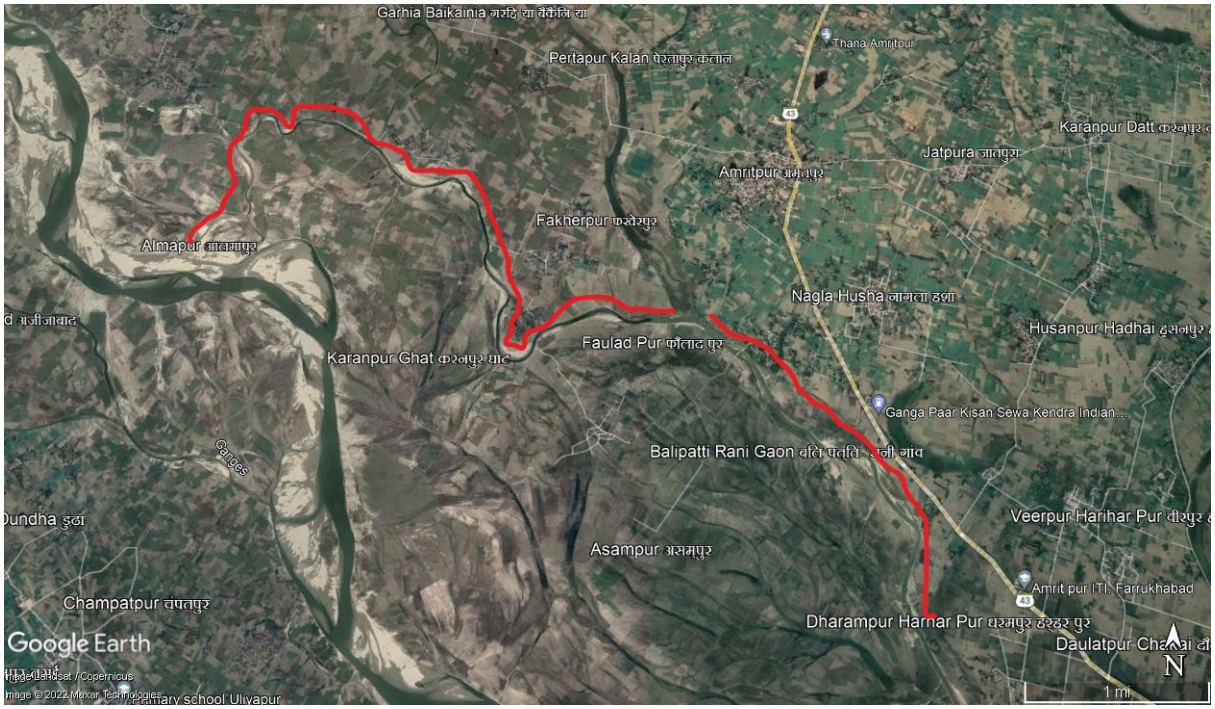
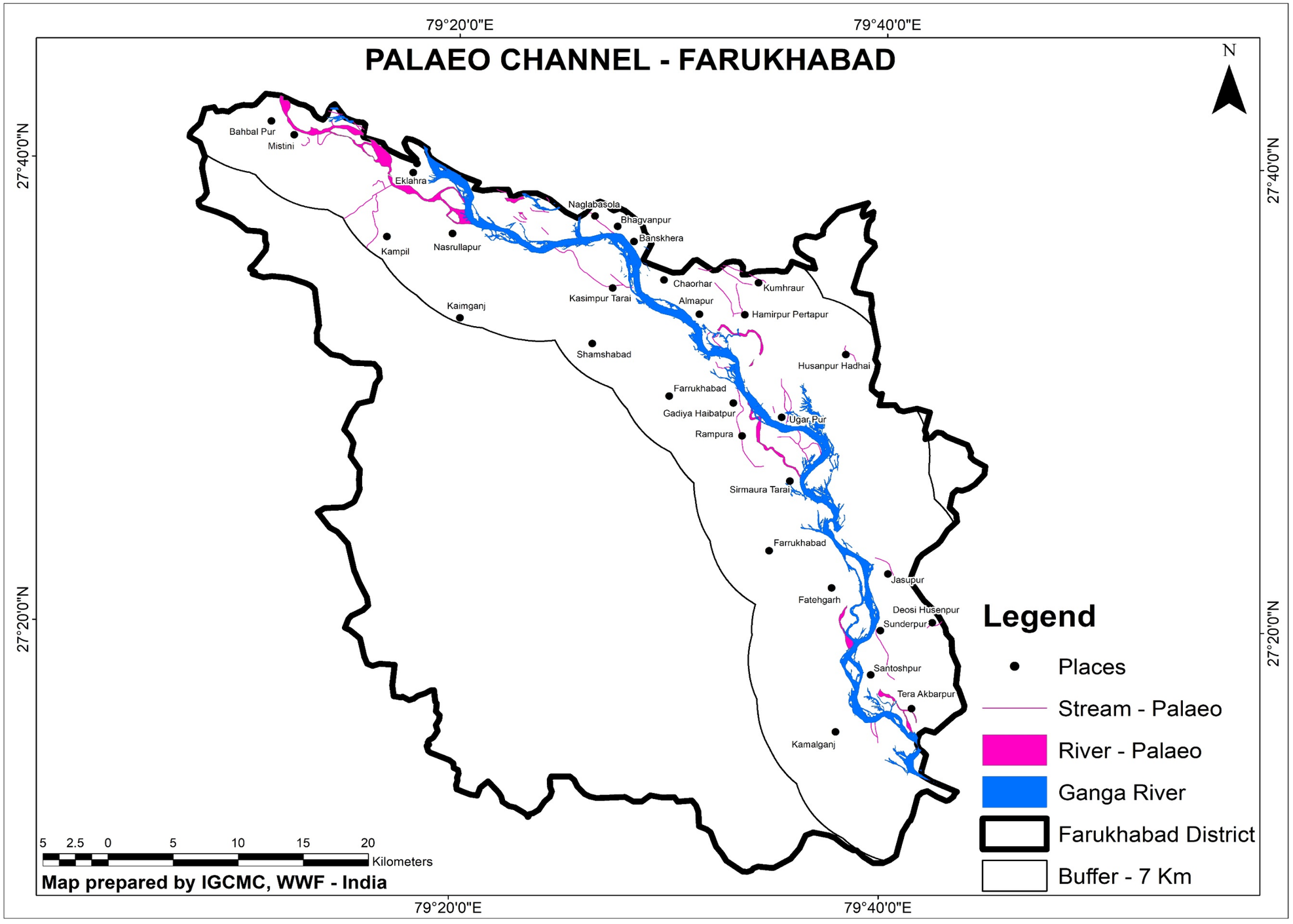
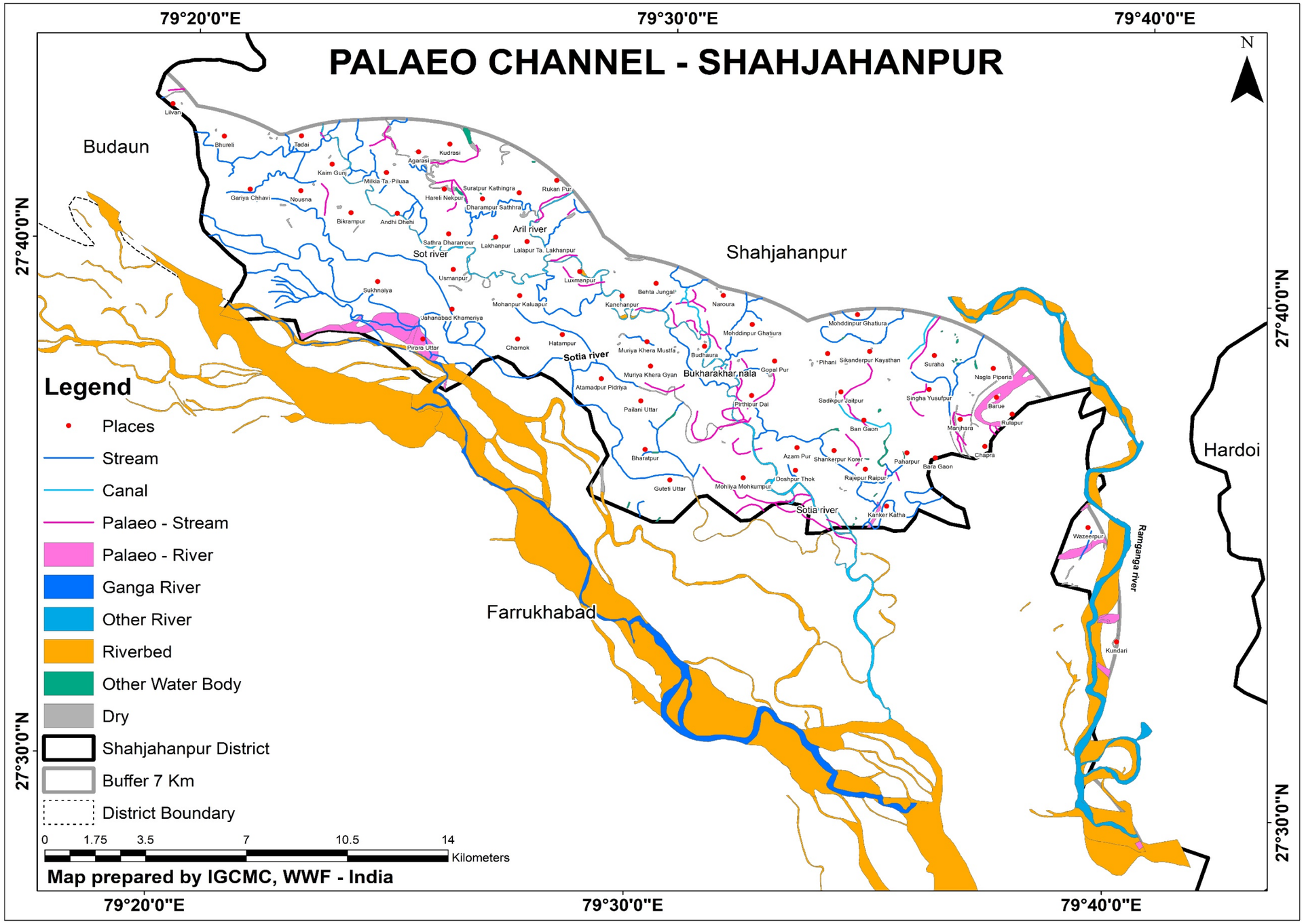


Image 8 : Location Of Sota Palaeochannel (Marked Red) In Farrukhabad Distt.

Image 9 : Part Of The Sota Palaeochannel As Observed Near Ballipatti Ranigaon In Farrukhabad Distt. On 9th December, 2021



Map 11 : Palaeochannel In Study Region Of Farrukhabad Distt.



Map 12 : Palaeochannels In Study Region Of Shahjahanpur Distt.

7.0 Floodplain Of River Ganga In Farrukhabad & Shahjahanpur

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 Farrukhabad Distt. falls in the UP-4 Central Plain agro-climatic zone (according to NARP) with the major soils being deep, loamy soils, deep stratified loamy soils, deep, fine soils and deep sandy soils (NICRA-ICAR, 2013). Agriculture is one of the major sources of income for the residents in the Distt. and it is benefitted by the fertile alluvium brought by Ganga River and its tributaries. Vast floodplain lands along Ganga, Burhi Ganga, Ramganga and Eat Kali rivers were observed to be under extensive crop cultivation during the field survey in this region. Major crops grown in the study region included – wheat, rice, maize, sugarcane and mustard along with other crops such as various lentils and vegetables (such as onion, tomato, brinjal and chillies). The details of some villages surveyed along with their floodplain agriculture produce are provided in Table 3 while Images 10-12 depict some floodplain agriculture fields as recorded during the survey.

7.3 Farrukhabad Distt. is one of the leading centers of potato cultivation in India. According to the Distt. Gazetteer (Neave, 1911) more than 9000 acres of land in this region was under potato cultivation followed by tobacco which was cultivated in about 1669 acres. In a study by Dahiya & Sharma (1994), it was recorded that a sample of potato growers in Farrukhabad Distt. consisted of 46% marginal farmers, 25% small farmers, 28% medium farmers and less than 1% large farmers. Even today several different varieties of potato are grown in the Distt. One of the traditional and most popular variety of potato recorded during the field survey in study region was known as 'Chipsona'. It is a small

to medium sized potato which is well known in the region for its taste which is slightly sweeter and better as compared to other high yielding varieties in the region.

7.4 Tobacco is considered to be a major *zaid* crop in this Distt. cultivated in several acres of floodplain fields as observed during the survey. The Distt. Gazetteer (Neave, 1911) mentions Farrukhabad as an important hub of tobacco plantation which followed the potato crop and ripened in the month of *Jeth* (May-June) giving it the name of '*jethi* tobacco'. The Gazetteer also mentions melons to be another important zaid crop in the Distt. which covered more than 4700 acres of cultivable land especially in the sandy soil areas along riverside and dried riverbeds. However, during the current survey, melon cultivation was not found to be of that extent in the study region.

Table 3 : Some Floodplain Villages And Their Agriculture Produce In Farrukhabad Distt.

Sr. No.	Village Name	Agricultural Produce
1.	Kaimganj	Potato, tobacco, rice, sugarcane
2.	Behtaballu	Potato, tobacco, mustard, arhar
3.	Katridharampur	Potato, mustard, wheat, sugarcane
4.	Ballipatti Rani Gaon	Rice, wheat, sugarcane, mustard
5.	Kasimpur tarai	Wheat, maize, sugarcane, mustard

Image 10 : Floodplain Potato Cultivation As Observed Near Kaimganj Town In Farrukhabad Distt.

Image 11 : Floodplain Sugarcane Cultivation As Observed Near Kasimpur Tarai Village In Farrukhabad Distt.

Image 12 : Floodplain Tobacco Cultivation As Observed Near Behtaballu In Farrukhabad Distt.

7.5 Shahjahanpur is principally an agrarian Distt. with large scale area under cultivation. It falls under the Mid-Western Plain agro-climatic zone according to NARP with the major soils being sandy loam, loam, clay loam and silt loam (NICRA-ICAR, 2013). The major crops grown in this Distt. are rice, wheat, sugarcane and potato. Other crops such as pulses and various vegetables are also grown in the Distt. A study by Bee & Rahman (2019) highlighted that the cropping pattern in this Distt. has moved towards commercial crops with an increase in cultivation of wheat and sugarcane in the last decade. During the survey, sugarcane cultivation was observed in floodplain fields along Ganga river in the study region of Shahjahanpur Distt. [Image 13].

Image 13 : Floodplain sugarcane fields near Naglabasola village in Shahjahanpur Distt. – Note Absence of Riparian Grasses and Resultant Vertical Bank Erosion

7.6 **Floodplain Horticulture :** Apart from diverse agriculture, several acres in the study region of Farrukhabad Distt. were found to be under cultivation of crops such as banana and different varieties of mango. Upon interaction with interlocutors, it was also recorded that in recent years cultivation of ornamental flowers such as gladiolus and some other varieties have picked up. Images 14-15 depict some examples of floodplain horticulture and floriculture in the study region of Farrukhabad Distt. Another interesting observation was the presence of nurseries which has increased significantly especially in Kaimganj and neighboring areas. Upon interaction, the interlocutors reiterated that the soil, climatic conditions and renewed interest in gardening and landscape has promoted the development of several nurseries in this region. These nurseries are known to provide several native and exotic ornamental plants along with other saplings which are distributed not only in this Distt. but throughout the state and neighboring states as well.

Image 14 : Floriculture And Banana Cultivation As Observed During The Survey

Image 15 : Mango Orchard Near Kaimganj Town

7.7 **Floodplain Grasses :** The chief floodplain grasses growing throughout study region of Farrukhabad and Shahjahanpur Distt.s. are – *S. spontaneum* (commonly known as *Kans*), *S. bengalense* (commonly known as *Munj/ Sarkanda*) and *Cynodon dactylon* (L.) Pers. (commonly known as Doob or Durva grass). Among these, the *Saccharum* grasses are dominant and luxuriant along the Ganga River banks [Images 16-17] 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 [Image 18]. 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 16 : Lush Growth Of *Saccharum* Grasses Along In Floodplain Region Near Eklahara in Farrukhabad Distt.

Image 17 : Lush Growth Of Saccharum Grasses On A *Diara* In Farrukhabad Distt.

Image 18 : Mud Houses Having Roofs Thatched With Dried *Saccharum* Grasses

8.0 Wetlands In Farrukhabad & Shahjahanpur Distt.s.

8.1 Wetlands are one of the most productive and unique ecosystems. They help in maintaining the food web and provide habitat for the aquatic biodiversity. They also help in controlling floods, recharging groundwater, nutrient recycling, climate stabilization and carbon sequestration. According to the report prepared by Tare et al. (2012) about 770 wetlands are reported in Farrukhabad Distt. which include – lakes/ponds, oxbow lakes/cut-off meanders, riverine wetlands, waterlogged areas, rivers/streams, reservoirs/barrages, tanks/ponds and wetlands of smaller areas (<2.25 ha). However, during the current study about 98 different wetlands are recorded from study region of Farrukhabad Distt. whose details are provided in Table 4. In the case of Shahjahanpur Distt., about 51 different wetlands have been recorded from the study region whose details are provided in Table 5. Maps 13 & 14 shows the spatial distribution of these wetlands in the study region of Farrukhabad and Shahjahanpur respectively. Some notable wetlands as observed during the field survey are discussed in this section.

Table 4 : List Of Wetlands In The Study Region Of Farrukhabad Distt.

Sr. No.	Wetland ID	Latitude	Longitude	Area (Acre)
1.	1	27.5944	79.2848	7.19
2.	2	27.5799	79.2807	1.28
3.	3	27.5801	79.2819	0.31
4.	4	27.5773	79.3049	1.88
5.	5	27.5786	79.3069	0.35
6.	6	27.5764	79.3076	0.43
7.	7	27.5641	79.3105	0.81
8.	8	27.5635	79.3101	0.19
9.	9	27.5634	79.3067	9.11
10.	10	27.577	79.4455	4.74
11.	11	27.5754	79.4511	13.96
12.	12	27.5808	79.4575	21.8
13.	13	27.5932	79.4612	7.22
14.	14	27.5319	79.4356	5.79
15.	15	27.3915	79.5684	3.14
16.	16	27.3862	79.5926	10.82
17.	17	27.3816	79.5949	3.71
18.	18	27.3785	79.5929	4.52
19.	19	27.3769	79.5947	1.61

20.	20	27.3666	79.5891	3.27
21.	21	27.3646	79.5901	1.41
22.	22	27.2938	79.6407	1.86
23.	23	27.2876	79.6443	11.22
24.	24	27.3554	79.706	74.06
25.	25	27.3861	79.6764	2.64
26.	26	27.3868	79.6796	1.18
27.	27	27.3908	79.6863	0.51
28.	28	27.3909	79.6878	0.58
29.	29	27.3818	79.6977	0.69
30.	30	27.3803	79.6976	0.38
31.	31	27.3989	79.7069	0.4
32.	32	27.3992	79.7062	0.15
33.	33	27.4079	79.7038	0.51
34.	34	27.4252	79.7003	1.37
35.	35	27.4246	79.6977	0.7
36.	36	27.4229	79.699	1.12
37.	37	27.4195	79.6831	0.93
38.	38	27.4216	79.6843	0.85
39.	39	27.4213	79.6818	0.34
40.	40	27.4209	79.6811	0.16
41.	41	27.4257	79.6722	1.92
42.	42	27.4271	79.6713	0.45
43.	43	27.4329	79.6573	3.74
44.	44	27.4297	79.6431	0.65
45.	45	27.4496	79.6382	0.49
46.	46	27.4498	79.6391	0.17
47.	47	27.4684	79.6406	0.98
48.	48	27.4684	79.642	0.69
49.	49	27.4835	79.6613	0.72
50.	50	27.4845	79.6601	0.61
51.	51	27.4819	79.6654	0.65
52.	52	27.489	79.6538	0.96
53.	53	27.4877	79.6518	1.94
54.	54	27.4904	79.6518	0.56
55.	55	27.4887	79.6441	0.66
56.	56	27.498	79.6522	2.73
57.	57	27.5001	79.6501	5.29

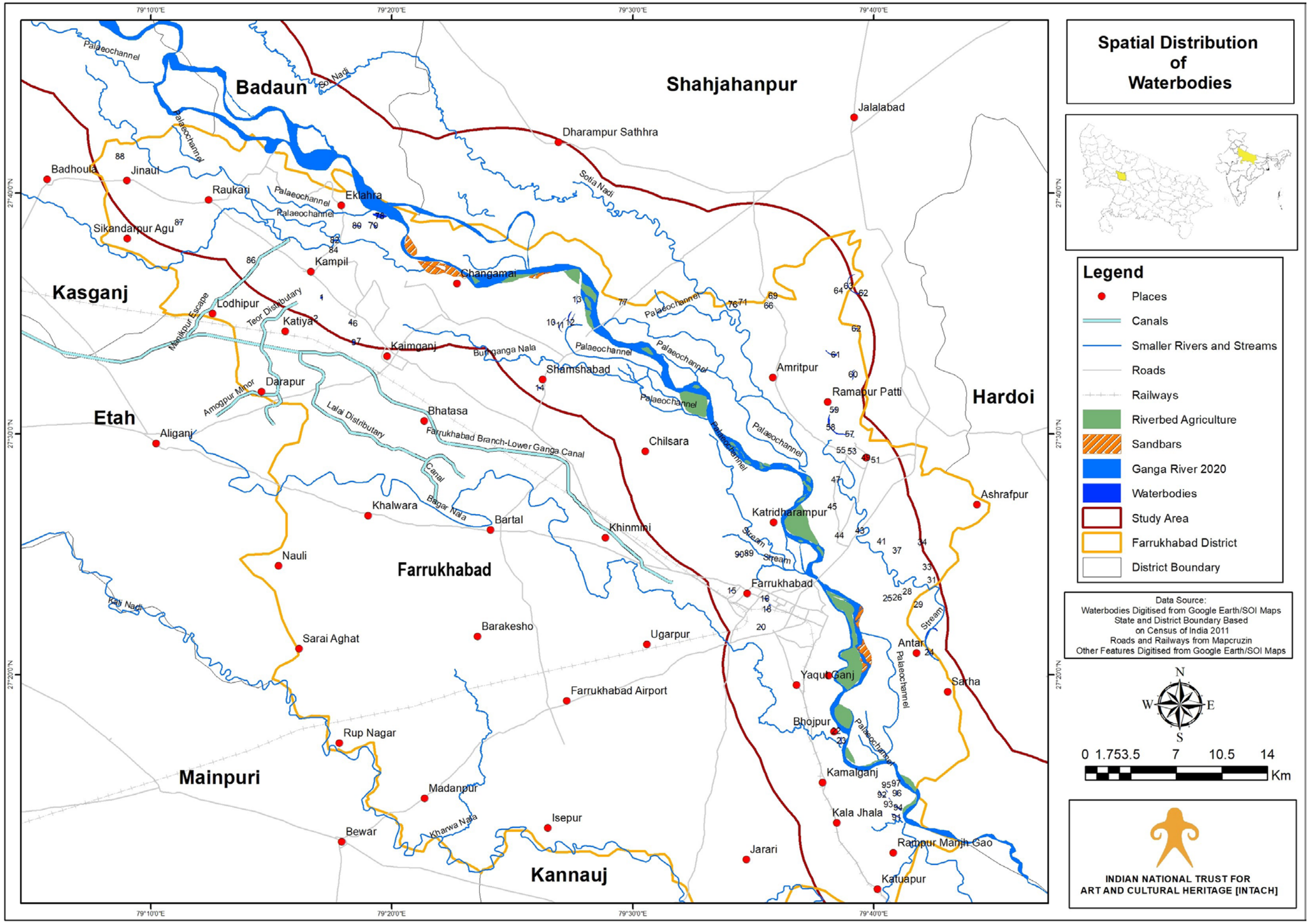
58.	58	27.5055	79.6407	53.39
59.	59	27.5166	79.6395	6.13
60.	60	27.541	79.6527	11.86
61.	61	27.5557	79.6377	19.06
62.	62	27.5729	79.6549	5
63.	61	27.5745	79.6575	1.27
64.	62	27.5974	79.6597	2.28
65.	63	27.6029	79.6526	31.04
66.	64	27.5992	79.6442	0.53
67.	65	27.5896	79.5928	0.81
68.	66	27.5886	79.594	2.09
69.	67	27.5903	79.5967	1.43
70.	68	27.5934	79.599	0.42
71.	69	27.5934	79.597	1.53
72.	70	27.5917	79.5962	0.35
73.	71	27.5913	79.5766	1.47
74.	72	27.592	79.5747	0.14
75.	73	27.5908	79.5734	1.44
76.	74	27.59	79.5731	0.5
77.	75	27.5887	79.5725	1.72
78.	76	27.5898	79.5691	7.33
79.	77	27.5912	79.4937	4.71
80.	78	27.651	79.3251	56.32
81.	79	27.6448	79.3203	12.7
82.	80	27.644	79.3092	10.29
83.	81	27.6339	79.2974	1.54
84.	82	27.6336	79.294	8.65
85.	83	27.6315	79.2958	0.43
86.	84	27.6286	79.293	0.64
87.	85	27.627	79.2909	0.5
88.	86	27.6202	79.236	0.74
89.	87	27.6465	79.1864	4.26
90.	88	27.6919	79.1454	1.88
91.	89	27.4175	79.5788	3.79
92.	90	27.4165	79.5737	7.34
93.	91	27.2356	79.6824	14
94.	92	27.251	79.6726	9.41
95.	93	27.2473	79.678	2.45

96.	94	27.2414	79.6834	15.23
97.	95	27.2533	79.6756	3.62
98.	96	27.2514	79.6829	4.78

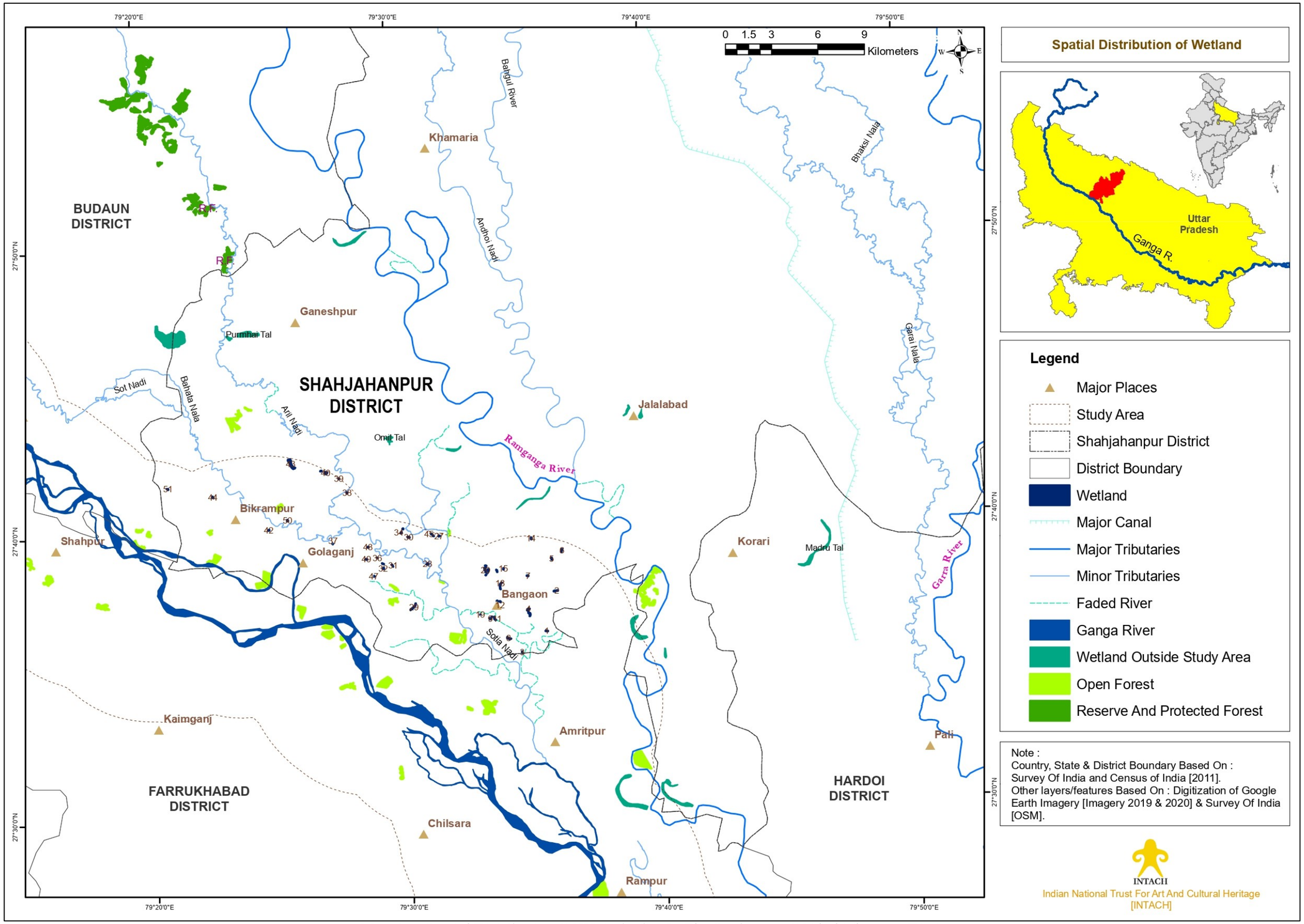
Table 5 : List Of Wetlands In The Study Region Of Shahjahanpur Distt.

Sr. No.	Wetland ID	Coordinates		Area [Hectares]
		Latitude	Longitude	
01	01	27°36'12.96"N	79°35'35.16"E	0.41
02	02	27°37'37.19"N	79°36'2.99"E	0.91
03	03	27°35'30.54"N	79°34'35.20"E	0.28
04	04	27°36'53.17"N	79°34'53.93"E	3.35
05	05	27°38'44.90"N	79°35'52.77"E	0.38
06	06	27°39'0.36"N	79°36'16.46"E	1.00
07	07	27°38'10.80"N	79°34'54.37"E	0.53
08	08	27°36'0.09"N	79°34'5.32"E	1.00
09	09	27°36'42.72"N	79°33'22.38"E	0.44
10	10	27°36'46.79"N	79°33'26.23"E	0.12
11	11	27°36'42.52"N	79°33'33.10"E	0.65
12	12	27°37'18.12"N	79°33'47.94"E	0.36
13	13	27°37'19.79"N	79°33'40.85"E	0.35
14	14	27°39'28.38"N	79°35'6.40"E	0.49
15	15	27°38'27.36"N	79°33'58.22"E	0.31
16	16	27°38'24.25"N	79°33'42.48"E	0.19
17	17	27°38'21.87"N	79°33'42.95"E	0.10
18	18	27°37'50.77"N	79°33'48.47"E	1.52
19	19	27°36'52.69"N	79°32'59.77"E	0.10
20	20	27°38'24.81"N	79°33'15.69"E	0.96
21	21	27°38'26.00"N	79°33'22.75"E	0.40
22	22	27°38'21.06"N	79°33'20.86"E	0.11
23	23	27°38'15.37"N	79°33'16.00"E	0.11
24	24	27°38'18.50"N	79°33'18.93"E	0.10
25	25	27°38'34.57"N	79°33'16.87"E	0.34

26	26	27°38'31.82"N	79°33'16.78"E	0.13
27	27	27°39'41.03"N	79°31'28.99"E	0.35
28	28	27°38'43.19"N	79°30'59.18"E	0.81
29	29	27°37'13.53"N	79°30'22.96"E	2.54
30	30	27°39'40.79"N	79°30'16.88"E	0.74
31	31	27°38'42.34"N	79°29'36.80"E	0.41
32	32	27°38'36.61"N	79°29'15.01"E	0.62
33	33	27°38'46.69"N	79°29'14.17"E	0.32
34	34	27°39'51.02"N	79°30'0.28"E	o.34
35	35	27°39'58.63"N	79°30'3.91"E	0.32
36	36	27°38'59.64"N	79°29'1.50"E	0.13
37	37	27°39'32.51"N	79°27'17.58"E	0.15
38	38	27°41'18.10"N	79°27'54.90"E	0.26
39	39	27°41'48.72"N	79°27'37.43"E	0.25
40	40	27°42'0.98"N	79°27'7.05"E	1.92
41	41	27°42'6.25"N	79°26'55.85"E	0.28
42	42	27°40'6.09"N	79°24'48.10"E	0.29
43	43	27°42'23.79"N	79°25'45.11"E	9.27
44	44	27°41'19.04"N	79°22'38.28"E	0.67
45	45	27°39'45.94"N	79°31'11.06"E	0.33
46	46	27°39'41.95"N	79°31'15.28"E	0.26
47	47	27°38'21.54"N	79°28'52.84"E	0.13
48	48	27°39'22.47"N	79°28'40.88"E	0.20
49	49	27°38'57.48"N	79°28'35.26"E	0.58
50	50	27°40'24.09"N	79°25'32.60"E	0.50
51	51	27°41'39.42"N	79°20'52.74"E	0.25
Total Area [Hectares]				**36.22**



Map 13 : Spatial Distribution Of Water Bodies Within Study Area Of Farrukhabad Distt.



Map 14 : Spatial Distribution Of Waterbodies In The Study Area Of Shahjahanpur Distt.

8.2 **Kuthla Jheel :** It is an oxbow shaped lake located between Ganga and Ramganga rivers close to Farrukhabad-Budaun highway in Nagla Husha village of Farrukhabad Distt. [Image 19]. Spread in area of about 5 ha, this is one of the important water bodies in study region which has taken up by Farrukhabad forest division for development. Upon interaction with interlocutors, it was recorded that this lake is an important site for numerous resident and migratory birds especially during winter season. During the field survey, this lake was found to be covered with water hyacinth and aquatic grasses in some parts and had tree saplings planted along its border [Image 20]. Despite its importance in the region, less is known about this jheel owing to scarcity of work done on it. Furthermore, the efforts of Forest Department for its conservation and development need to be supported by other stakeholders too in this region for achieving better results. This jheel has potential of becoming a bird sanctuary in the long run along with serving numerous ecosystem services.

Image 19 : Location Of Kuthla Jheel [27° 30' 56.83" N 79° 36' 34.63" E]

Image 20 : Part Of Kuthla Jheel As Observed On

8.3 **Chintamani Talab :** It is a small but significant pond just little outside the study area in Farrukhabad Distt. Popularly known as 'Chintamani Talab', this pond is situated in Naglanan village of this Distt. [Image 21] Based on the data available (Agnihotri & Chaturvedi, 2017) and upon interacting with interlocutors in the region, it is believed that this pond dates back to the Mahabharat Period. The Pandavas are believed to have spent some part of their exile here and used to worship Lord Shankar and Lord Hanuman along with taking bath in the water of this pond. According to legends, a king named Chintamani frequently took bath in this pond and got cured of his leprosy. Hence, he got this pond renovated and it came to be known as 'Chintamani talab'. The locals believe that by bathing in this water they can get cured of their illness and by praying in neighboring temples they can get their wishes fulfilled. Every year, fairs are organized at this site during auspicious occasions such as Karthik Purnima, Maghi Purnima and Jyeshta Dussehra. During the field survey, this pond was observed to be in wane condition [Image 22] needing urgent attention from concerned authorities.

Image 21 : Location Of Chintamani Talab [27° 28' 33.72" N 79° 29' 3.20" E]

Image 22 : Chintamani Talab As Observed On 9th December, 2021

8.4 **Unnamed wetland :** An unnamed wetland was observed on the border of Shahjahanpur and Farrukhabad Distt.s. near Gutaiti Dakhin village [Image 23]. Upon interactions, the interlocutors reiterated that this wetland was referred locally as talab and received water during monsoon especially from floods of Ganga River. During the survey, water was found to have retained in this wetland and served as an important habitat for birds [Image 24].

Image 23 : Location Of The Unnamed Wetland [27° 35' 28.29" N 79° 29' 37.04" E]

Image 24 : The Wetland As Observed On 9th December, 2021

9.0 Riparian Flora Along Ganga River In Farrukhabad & Shahjahanpur Distt.s.

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. Siddiqui (1991) gave an account of 40 riparian macrophytes from Narora-Kannauj region of which species of *Ammania*, *Eclipta*, *Polygonum*, *Ipomoea*, *Rumex*, *Saccharum*, *Scirpus* and *Tamarix* are amphibious in nature.

9.3 During the field survey the riparian vegetation along Ganga in study region of both these Distt.s. was found to be sparse in some sections and rich in some others [Images 25-26]. Overall, in some floodplain patches, extensive agriculture had proven to be detrimental to the riparian flora and its regeneration. The floodplain grass – *Saccharum* sps. was a dominant component of riparian vegetation throughout with its luxuriance overwhelming the other species at some sites. The detailed list of riparian plant species recorded is provided in Table 6 while Images 27-28 depict some species as observed in the field.

Table 6 : 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.	*Albizia lebbeck* (L.) Benth.	Fabaceae	Tree	Saras/Siris
4.	*Azadirachta indica* A.Juss.	Meliaceae	Tree	Neem
5.	*Borassus flabellifer* L.	Arecaceae	Tree	Taad
6.	*Dalbergia sissoo* Roxb. ex DC.	Fabaceae	Tree	Shisham
7.	*Ficus benghalensis*L.	Moraceae	Tree	Banyan
8.	*Ficus religiosa* L.	Moraceae	Tree	Peepal
9.	*Holoptelea integrifolia* (Roxb.) Planch	Ulmaceae	Tree	Chilbil
10.	*Mangifera indica* L.	Anacardiaceae	Tree	Mango
11.	*Calotropis gigantea* (L.) Dryand.	Apocynaceae	Shrub	Safed Aak
12.	*Calotropis procera* (Aiton) Dryand.	Apocynaceae	Shrub	Aak
13.	*Lippia alba* (Mill.) N.E. Br. ex Britton & P. Wilson	Verbenaceae	Shrub	Bushy Lippia
14.	*Polygonum sp.*	Polygonaceae	Shrub	
15.	*Ricinus communis* L.	Euphorbiaceae	Shrub	Wild Castor
16.	*Zizyphus* sp.	Rhamnaceae	Shrub	Wild Ber
17.	*Achyranthes aspera* L.	Amaranthaceae	Herb	Chirchira
18.	*Amaranthus spinosus* L.	Amaranthaceae	Herb	Prickly Amaranth
19.	*Croton bonplandianus* Baill.	Euphorbiaceae	Herb	Ban Tulsi
20.	*Rumex dentatus* L.	Polygonaceae	Herb	
21.	*Parthenium hysterophorus* L.	Asteraceae	Herb	Congress Grass
22.	*Tridax procumbens* L.	Asteraceae	Herb	
23.	*Xanthium strumarium* L.	Asteraceae	Herb	Chhotav dhatura
24.	*Saccharum munja* Roxb.	Poaceae	Grass	Munj
25.	*Cyperus* sp.	Cyperaceae	Grass	
26.	*Cynodondactylon* (L.) Pers.	Poaceae	Grass	Doob/Durva
27.	*Saccharum spontaneum* L.	Poaceae	Grass	Kans/Katha

Image 25 : Luxuriant Riparian Vegetation Along Ganga River Near Fatehgarh

Image 26 : Ganga River Bank Devoid Of Vegetation Due To Intensive Agriculture

Image 27 : *Albizia lebbeck*

Image 28 : *Tridax procumbens*

9.4 **Forestry along Ganga River in Farrukhabad :** The Farrukhabad Forest Division has taken up extensive plantations in different riparian patches along Ganga River in the Distt. According to the DFO – Mr. Pramod Kumar Updhyay, the aim of these plantations is to restore the riparian vegetation by employing native plants such as – Shisham, Jamun, Guler, Neem, Karanj, Ber and Bamboo species. During the field survey, some of these patches were visited and observed along with the forest officials [Images 29-31]. Along with these plantations, the local communities in these regions are trained and employed by the department for ensuring continued survival of the planted species till they attain certain age and are able to grow further naturally. The communities also get benefited in terms of grass and other wood resources from these plantations while protecting them from different threats. The success of these plantations will not only help restore the otherwise barren and exploited riparian regions but also serve as an important habitat for different faunal species in the long run.

Image 29 : Ganga NH Survey Team (Extreme Right) Along With The Forest Department Officials In Farrukhabad

Image 30 : Plantations By Forest Department Near Katridharampur Village

Image 31 : Plantations By Forest Department Near Gutaiti Dakhin Village

10.0 Faunal Diversity In Farrukhabad & Shahjahanpur Distt.s.

10.1 **Gangetic Dolphins:** The Gangetic River Dolphin is exclusively aquatic and piscivorus, occasionally found in small groups. The Ganges River Dolphin 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 in the last 3-4 decades. During the survey, only 1-2 dolphin sightings could be made in the Ganga river stretch close to Dhai Ghat in Farrukhabad Distt. The interlocutors reiterated occassional dolphin sightings in the Ganga River stretch between Farrukhabad and Shahjahanpur Distt.s. owing to the low population comprising of few individuals. Most sightings are during monsoon season as compared to remaining part of the year.

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). Total six species of turtles have been recorded in Bhagalpur Distt. with most of the sightings occurring in VGDS, as confirmed by the Bhagalpur Forest Department. Out of six species recorded in the district, three falls under "**Endangered**" category (**Indian Softshell Turtle**, **Indian Peacock Softshell Turtle** and **Indian Narrow-headed Softshell Turtle**) whereas two have "**Vulnerable**" status (**Indian Roofed Turtle** and **Indian Flapshell Turtle**) in IUCN's Red List of Threatened Species. However Indian Softshell Turtle and Indian Roofed Turtle are most frequently sighted species as reiterated by the local fishing community. The list of species recorded and their conservational status have been listed below:

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 Katridharampur, Sukhania, Behtaballu, Kasimpur Tarai and Katrinibal pur 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.**

10.5 Based on visual observations during field survey and interactions with the interlocutors some major fauna species recorded from study region in Farrukhabad & Shahjahanpur Distt.s. are presented in Table 8.

Table 7 : Other Important Fauna Recorded In The Study Region

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

10.8 **Avifauna Diversity:** Ganga River, with its mosaic of habitats, supports a rich diversity of avifauna which include both resident and migratory species. Some iconic and globally threatened birds such as the black-bellied tern (*Sterna acuticauda*), Indian skimmer (*Rynchops albicollis*), sarus crane (*Antigone antigone*) and riverlapwing (*Vanellus duvaucelii*) also breed on the islands, sandbars and banks of the Ganga River. During the survey in study region of Farrukhabad & Shahjahanpur Distt.s., a total of 95 different bird species were sighted, out of which 43 were wetland birds' species while remaining 52 species were of forest and grassland. Little Egret, Great Egret, Indian Pond Heron, White-breasted Waterhen, Common Moorhen, Little Cormorant, Asian Pied Starling, Indian Jungle Crow, House Crow, Common Pigeon, Common Myna, Red-wattled Lapwing and Eurasian Collared Dove were the most frequently sighted species. **Woolly-necked Stork**, **Oriental Darter**, **Eurasian Curlew**, **Ferruginous Duck**, **River Lapwing**, **Great Thick-knee** and **Alexandrine Parakeet** falls under "**Near Threatened**" category, **River Tern**, **Common Pochard** and **Sarus Crane** have "**Vulnerable**" status whereas **Black-bellied Tern, Palas's Fish Eagle** and **Egyptian Vulture** have been listed as "**Endangered"** in IUCN's Red List of Threatened Species. Total **18 Migratory** and **5 Local Migratory** species were identified among the recorded avian species. These migratory species are winter visitors to Indian Subcontinent can be seen from October to March. The details of all birds recorded is presented in Table 9 and some notable birds are depicted in Images 32-34.

Table 8 : List Of Birds Recorded In The Study Region

Sr. No.	Common Name	Scientific Name	Conservation Status
1.	White throated Kingfisher	*Halcyon smyrnensis*	Least Concern
2.	Pied Kingfisher	*Ceryle rudis*	Least Concern
3.	Cattle Egret	*Bubulcus ibis*	Least Concern
4.	Little Egret	*Egretta garzetta*	Least Concern
5.	Intermediate Egret	*Ardea intermedia*	Least Concern
6.	Great Egret	*Ardea alba*	Least Concern
7.	Indian Pond Heron	*Ardeola grayii*	Least Concern
8.	Grey Heron	*Ardea cinerea*	Least Concern
9.	Purple Heron	*Ardea purpurea*	Least Concern
10.	Sarus Crane	*Agus antigone*	Vulnerable
11.	Common Sandpiper	*Actitishypoleucos*	Least Concern
12.	Green Sandpiper	*Tringa ochropus*	Least Concern
13.	Asian Openbill	*Anastomus oscitans*	Least Concern
14.	Woolly-necked Stork	*Ciconia episcopus*	Near Threatened
15.	Little Cormorant	*Microcarbo niger*	Least Concern
16.	Indian Cormorant	*Phalacrocorax fuscicollis*	Least Concern

17.	Great Cormorant	*Phalacrocorax carbo*	Least Concern
18.	Oriental Darter	*Anhinga melanogaster*	Near Threatened
19.	Red-naped Ibis	*Pseudibis papillosa*	Least Concern
20.	Eurasian Curlew	*Numenius arquata*	Near Threatened
21.	White breasted - Waterhen	*Amaurornis phoenicurus*	Least Concern
22.	Common Moorhen	*Gallinula chloropus*	Least Concern
23.	Little Grebe	*Tachybaptus ruficollis*	Least Concern
24.	Common Teal	*Anas crecca*	Least Concern
25.	Gadwall	*Mareca strepera*	Least Concern
26.	Ferruginous Duck	*Aythya nyroca*	Near Threatened
27.	Common Pochard	*Aythya ferina*	Vulnerable
28.	Red-creasted Pochard	*Netta rufina*	Least Concern
29.	Ruddy Shelduck	*Tadorna ferruginea*	Least Concern
30.	Northern Pintail	*Anas Acuta*	Least Concern
31.	Knob-billed Duck (African Comb Duck)	*Sarkidiornis melanotos*	Least Concern
32.	Pallas's Gull	*Larus ichthyaetus*	Least Concern
33.	Brown-headed Gull	*Larus brunnicephalus*	Least Concern
34.	Black-headed Gull	*Larus ridibundus*	Least Concern
35.	Purple Swamphen	*Porphyrio porphyrio*	Least Concern
36.	Black-bellied Tern	*Sterna acuticauda*	Endangered
37.	River Tern	*Sterna aurantia*	Vulnerable
38.	Eurasian Coot	*Fulica atra*	Least Concern
39.	Common Greenshank	*Tringa nebularia*	Least Concern
40.	Common Redshank	*Tringa totanus*	Least Concern
41.	Black-winged Stilt	*Himantopus himantopus*	Least Concern
42.	Pied Avocet	*Recurvirostra avosetta*	Least Concern
43.	Bronze-winged Jacana	*Metopidius indicus*	Least Concern
44.	River Lapwing	*Vanellus duvaucelii*	Near Threatened
45.	Red-wattled Lapwing	*Vanellus indicus*	Least Concern
46.	Great Thick-knee	*Esacus recurvirostris*	Near Threatened
47.	Black Drongo	*Dicrurus macrocercus*	Least Concern
48.	Common Myna	*Acridotheres tristis*	Least Concern
49.	Bank Myna	*Acridotheres ginginianus*	Least Concern
50.	Asian Pied Starling	*Gracupica contra*	Least Concern
51.	Brahminy Starling	*Sturnia Pagodarum*	Least Concern
52.	Common Stonechat	*Saxicola torquatus*	Least Concern

53.	Pied Bushchat	*Saxicola caprata*	Least Concern
54.	Indian Bushlark	*Mirafra erythroptera*	Least Concern
55.	Sand lark	*Alaudala raytal*	Least Concern
56.	Common Babbler	*Argya caudata*	Least Concern
57.	Jungle Babbler	*Argya striata*	Least Concern
58.	Large Grey Babbler	*Argya malcolmi*	Least Concern
59.	Black-hooded Oriole	*Oriolus xanthornus*	Least Concern
60.	White Wagtail	*Motacilla alba*	Least Concern
61.	Grey Wagtail	*Motacilla cinerea*	Least Concern
62.	White-browed Wagtail	*Motacilla maderaspatensis*	Least Concern
63.	Indian Silverbill	*Euodice malabarica*	Least Concern
64.	Common Tailorbird	*Orthotomus sutorius*	Least Concern
65.	Alexandrine Parakeet	*Palaeornis eupatria*	Near Threatened
66.	Rose-ringed Parakeet	*Psittacula krameri*	Least Concern
67.	House Sparrow	*Passer domesticus*	Least Concern
68.	Indian Jungle Crow	*Corvus culminatus*	Least Concern
69.	House Crow	*Corvus splendens*	Least Concern
70.	Oriental Magpie Robin	*Copsychus saularis*	Least Concern
71.	Streak throated Swallow	*Petrochelidon fluvicola*	Least Concern
72.	Asian Plain Martin	*Riparia chinensis*	Least Concern
73.	Brown-headed Barbet	*Psilopogon zeylanicus*	Least Concern
74.	Ashy Prina	*Prinia socialis*	Least Concern
75.	Greater Coucal	*Centropus sinensis*	Least Concern
76.	Red-whiskered Bulbul	*Pycnonotus jocosus*	Least Concern
77.	Red-vented Bulul	*Pycnonotus cafer*	Least Concern
78.	Common Kaestral	*Falco tinnunculus*	Least Concern
79.	Black-winged kite	*Elanus caeruleus*	Least Concern
80.	Shikra	*Accipiter badius*	Least Concern
81.	Pallas's Fish Eagle	*Haliaeetus leucoryphus*	Endangered
82.	Egyptian Vulture	*Neophron percnopterus*	Endangered
83.	Green Bee-eater	*Merops orientalis*	Least Concern
84.	Scaly-breasted Munia	*Lonchura punctulata*	Least Concern
85.	Indian Peafowl	*Pavo cristatus*	Least Concern
86.	Spotted Owlet	*Athene brama*	Least Concern

87.	Common Pigeon	*Columba livia*	Least Concern
88.	Spotted Dove	*Spilopelia* chinesis	Least Concern
89.	Eurasian Collared Dove	*Streptopelia decaocto*	Least Concern
90.	Laughing Dove	*Spilopelia senegalensis*	Least concern
91.	Yellow-footed Green-pigeon	*Treron phoenicopterus*	Least concern
92.	Rufous Treepie	*Dendrocitta vagabunda*	Least concern
93.	Purple Sunbird	*Cinnyris asiaticus*	Least concern
94.	Indian Roller	*Coracias benghalensis*	Least concern
95.	Indian Grey Hornbill	*Ocyceros birostris*	Least Concern

Image 32 : Ruddy Shelduck

Image 33 : Sarus Crane

Image 34 : Asian Openbilled storks

11.0 Ganga Riverine Islands In Farrukhabad & Shahjahanpur 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 riverine islands are present in the Ganga river stretch of study region.

11.2 One of the biggest riverine island in the study region is an irregular shaped island between Farrukhabad & Shahjahanpur Distt.s [Image 35]. It measures about 10-11 kms in length and 2-3 kms wide and is mainly dominated by agricultural fields. During the field survey it was observed near Behtaballu where lush growth of Saccharum grasses was recorded [Image 36]. These grasses were collected widely by the local residents principally for thatching roofs of their huts. The interlocutors also reiterated that several wild boars resided on the island and posed threat to the potato cultivation in this region. The chief crops grown on the island included melon, potato, mustard and other seasonal vegetables.

Image 35 : Location Of Riverine Island Near Behtaballu

Image 36 : Part Of This Island As Seen on 8th December, 2021

11.3 A group of riverine islands of varying shapes and sizes were observed during boat survey close to Fatehgarh town in Farrukhabad Distt. [Image 37]. Most of these islands were devoid of agriculture and covered by dense vegetation with *Saccharum* grasses dominating as the chief component [Image 38]. Such undisturbed islands serve as crucial bird habitats in the study region along with supporting numerous other faunal groups.

Image 37 : Location Of Island Group Near Fatehgarh

Image 38 : Part Of Island Covered By *Saccharum* Grasses As Observed During Boat Survey In Study Region of Farrukhabad

12.0 Fishing In Farrukhabad & Shahjahanpur Distt.s.

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 was found to be in a complicated status during the field survey in study region of Farrukhabad Distt. Fish catching was supposedly a prohibited activity especially along sites such as Panchal Ghat, Ataina Ghat & Dhai Ghat owing to various religious activities, beliefs and practices. However, during boat survey between Panchal Ghat & Dhai Ghat, fishing was found to be rampant especially at secluded sites. While most people were village residents catching fish using locally made fishing rods and cast nets [Images 39-40], certain group of people were encountered who **claimed to have permits (*theka*) for catching fish on a large scale from Ganga river in that stretch**. They employed dragnets obtained from markets for this purpose [Image 41] which were nylon based having broad mesh size and brought from local markets. However, upon interactions with Farrukhabad Forest Division and other administrative officials in the study region, nobody was aware of such permits issued in the region.

12.3 Fish catching was also recorded from the palaeochannels in the study region which received water during monsoon season along with fish diversity similar to that of Ganga River. According to the interlocutors, major fish caught from the study region included – rohu, katla, tengara, baam and sidhari. They also reiterated that fish catching was carried out throughout the year with more catch during monsoon and low catch during summers as water depth decreased significantly during that season. The details of fish caught from the Ganga river stretch between Farrukhabad and Shahjahanpur Distt.s. is provided in Table 10.

Image 39 : Cast Net Fishing

Image 40 : Fish Catching Using Locally Made Fishing Rods

Image 41 : Dragnet Based Fishing

12.4 A crucial observation made during the field survey involving a boat-based survey from Panchal Ghat towards Sabalpur & Katri Dharampur highlighted numerous turtles mainly Brown Roofed Turtle species being caught in the dragnets used for fishing [Images 42-43] by a group of people who claimed to have fishing rights in this region. Ganga river ecosystem is home to numerous turtles which play a significant role in the river by scavenging dead organic material and deceased fish, controlling fish population as predators and controlling aquatic plants and weeds. However, such unchecked and rampant fishing activities pose a significant threat to these turtles which are often caught in the nets. Furthermore, during further interactions, **the fisherfolk claimed to sell some of these captured turtles in the market as they have a demand for ornamental purposes.** These captured endangered turtles are being sold for anywhere between Rs. 100-200 by these fishermen and it is further escalated to anywhere ranging from hundreds to thousands of rupees in the commercial markets of nearby towns and cities.

Image 42 : Brown Roofed Turtle Caught In The Fishing Net

Image 43 : Turtles Caught Are Sold In Markets To Be Used As Ornamentals In Ponds/Fish Tanks

Table 9 : 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 Farrukhabad & Shahjahanpur Distt.s.

13.1 Ground water characteristics of a particular area are subject to several natural factors like precipitation, drainage, topography, lithology and hydrogeological conditions of the region. Physiographically, Farrukhabad Distt. constitutes the central part of Indo Gangetic alluvial plain. Based on the geomorphological map prepared using remote sensing data, three different geomorphic units have been identified in the Distt. – Meander floodplain (confined mainly along river channels and comprising of coarse to fine sand, silt, clay and at places gravels); Newer Alluvial plains (flat to gently sloping & slightly undulating terrain formed by extensive deposition of alluvial sediments by Ganga river); and Older Alluvial Plain (covering about 80% of the total area in Distt. and sub-divided into four different sections by rivers Bagar, Kali and Isan) (Lal, 2013).

13.2 The area of this Distt. is underlain by quaternary sediments comprising mainly a sequence of clay, silty clay, fine to coarse sand occasionally mixed with *kankars* and gravels in varying proportions and grades. According to the Central Groundwater Board (Lal, 2013), four distinct groups of granular zones occur down to the depth of 450 mbgl separated by poorly permeable/semi-permeable horizons. Based on the borehole data, four types of aquifer systems exist in Farrukhabad Distt. – 1st aquifer (depth range 27-100 mbgl, composed of fine to medium sand and kankar with occasional gravels), 2nd aquifer (depth range 140-200 mbgl, composed of fine to medium sand), 3rd aquifer (depth range 240-310 mbgl, composed of fine grained sand and clay) and 4th aquifer (depth range 405-440 mbgl, composed of fine grained sand). The groundwater in this Distt. occurs under confined to semi-confined conditions. The groundwater levels as recorded during the field survey in different villages of study region in Farrukhabad Distt. are presented in Table 11.

13.3 Geomorphologically, Shahjahanpur Distt. forms part of Central Ganga Plains in the upper Ganga Basin, exhibiting monotonous flat topography, with master slope towards south and southeast. Northern part of the district merges imperceptibly into Terai, marked by thick forests and marshy lands. Ground elevation generally ranges from 148-172 masl. The area can be divided into two broad geomorphic units (Srivastava & Gairola, 1993), an upland – the Varanasi Older Alluvium (VOA) Plain (Bhanger surface) and the low land – the flood plain (Khadar surface). The geology of this Distt. is underlain by thick pile of Quaternary alluvial deposits deposited over Siwalik Supergroup, which in turn overlies Vindhyan Supergroup unconformably. According to the Central Groundwater Board (Ranjan, 2013), the lithological units in this Distt. are composed mainly of fine to medium and coarse sand, gravel, clay and kankar, with sand being the dominant component. The groundwater in shallow aquifer occurs under unconfined

condition and is tapped by dug wells and shallow borewells. The groundwater levels as recorded during the field survey in different villages of study region in Shahjahanpur Distt. are presented in Table 11.

Table 10 : Groundwater Levels In Different Villages As Recorded During The Survey

Place	Coordinates		Ground Water Table in Feet
	Lat.	Long.	
Farrukhabad			
Kampil (near Ganga Ghat)	27°37'54.89"N	79°20'3.17"E	5 ft.
Kayamganj	27°33'36.36"N	79°20'34.03"E	70 ft.
Ballu Behta	27°35'51.06"N	79°25'39.54"E	25 ft.
Shamsabad	27°32'20.98"N	79°25'55.92"E	40 ft.
Biriya Danda	27°33'13.80"N	79°26'56.31"E	50 ft.
Chintamani Tal (Mudav)	27°28'33.72"N	79°29'3.20"E	40 ft.
Gadiya Haibatpur	27°29'33.65"N	79°32'58.17"E	10 ft.
Panchal Ghat	27°23'59.95"N	79°37'43.99"E	15 ft.
Shahjahanpur			
Naglabasola	27°37'56.19"N	79°26'31.27"E	40 ft.
Sukhnaiya	27°39'14.83"N	79°25'6.91"E	30 ft.
Jahanabad Khameria	27°39'14.85"N	79°26'35.81"E	35 ft.
Chhidkuri	27°39'42.51"N	79°22'28.73"E	20 ft.

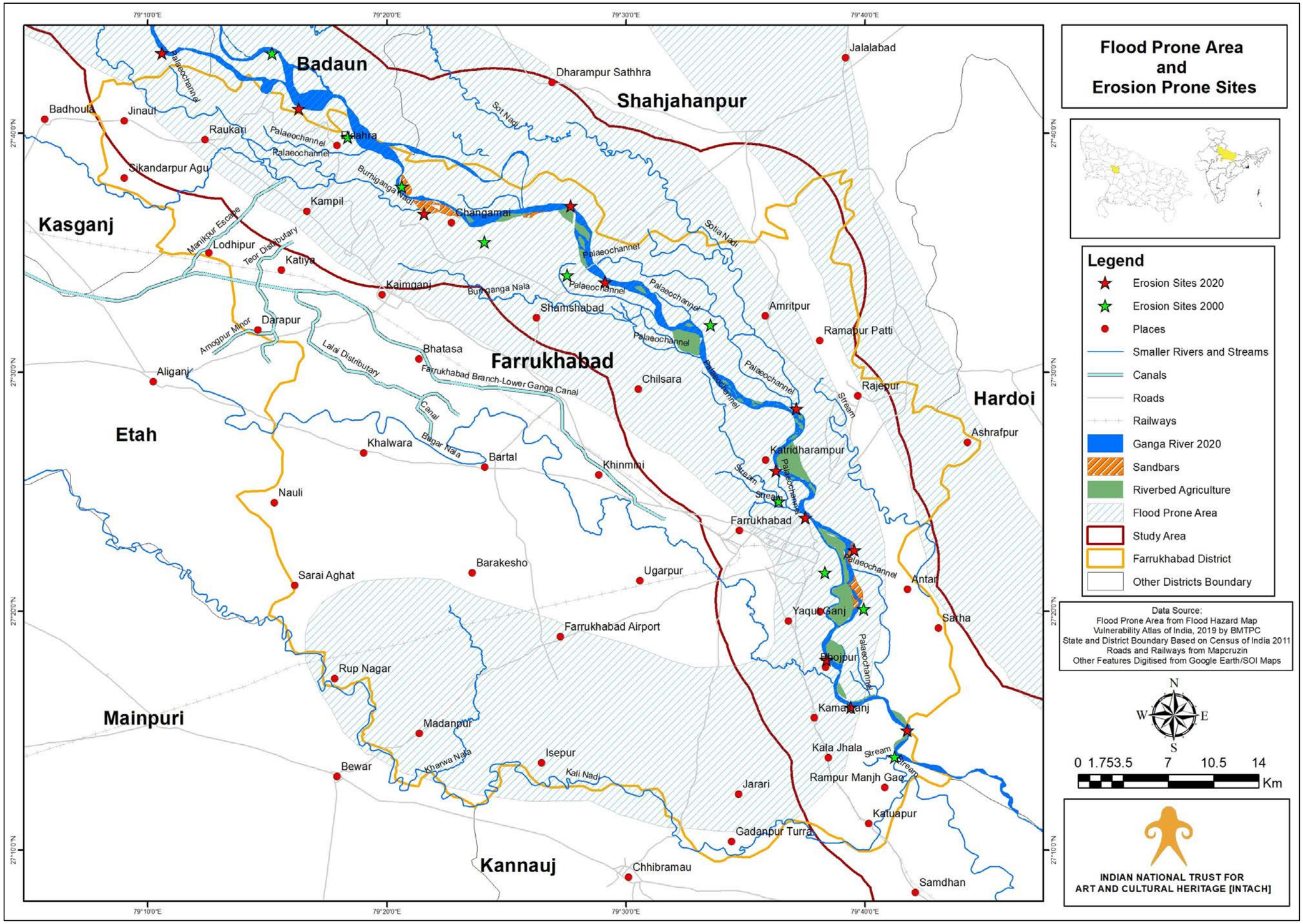
14.0 Ganga River Bank Erosion In Farrukhabad & Shahjahanpur Distt.s.

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 erosion prone banks of Ganga River were observed at sites such as Eklahara, Behtaballu, near Fatehgarh town, Katridharampur and Bhojpur in Farrukhabad Distt. and near Sukhania in Shahjahanpur Distt. Some images depicting erosion as observed in the field survey are presented in Images 44-46. 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. The spatial distribution of erosion prone sites in both these Distt.s. are presented in Maps 15-16.

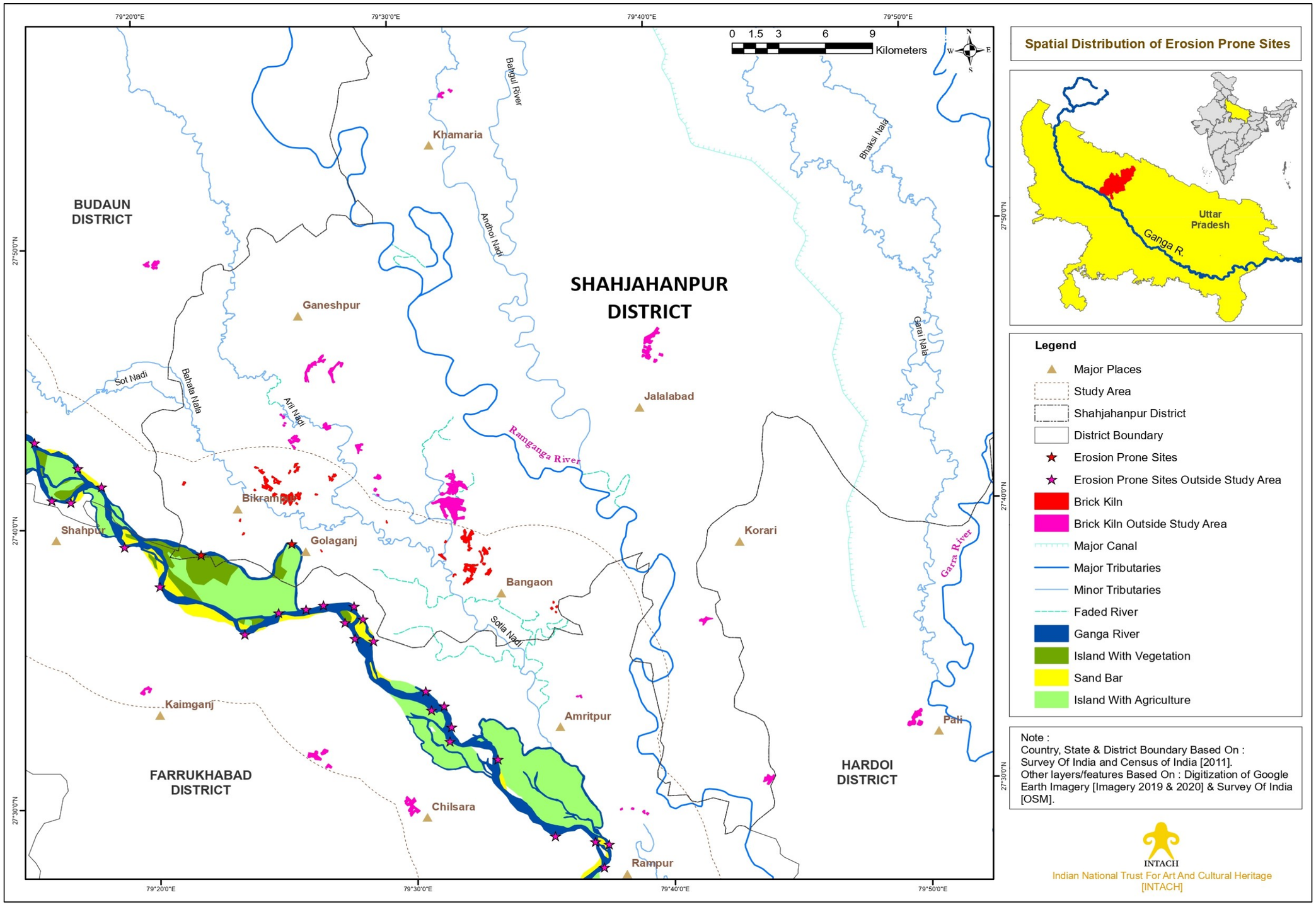
Image 44 : Lateral Bank Erosion Affecting A Heritage Site In Bhojpur Area Of Farrukhabad Distt.

Image 45 : Ganga River Bank Erosion As Observed Near Sukhania In Shahjahanpur Distt.

Image 46 : Ganga River Bank Erosion As Observed Near Katridharampur In Farrukhabad Distt.



Map 15 : Spatial Distribution Of Erosion Prone Sites In Farrukhabad Distt.

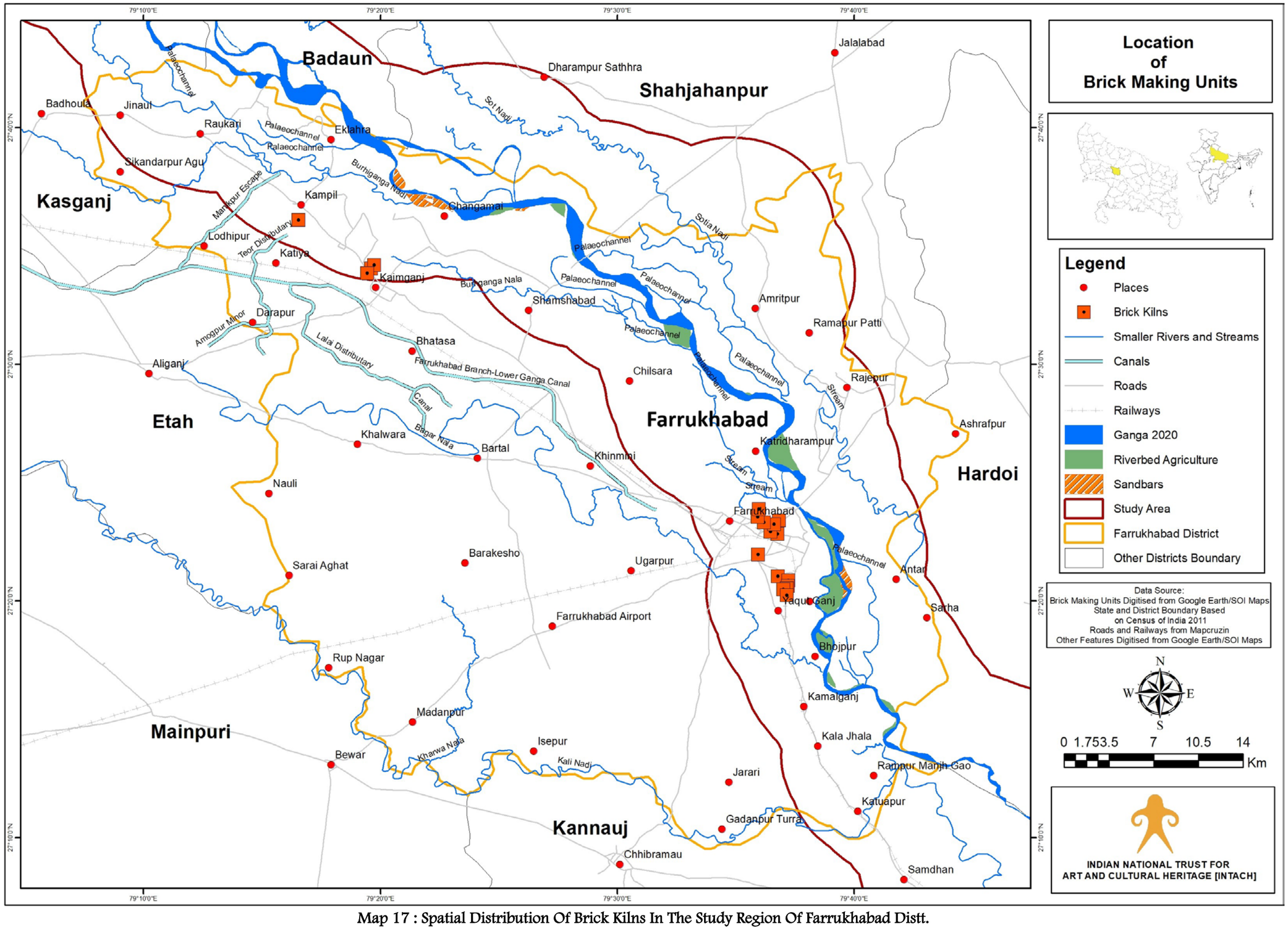


Map 16 : Spatial Distribution Of Erosion Prone Sites In Shahjahanpur Distt.

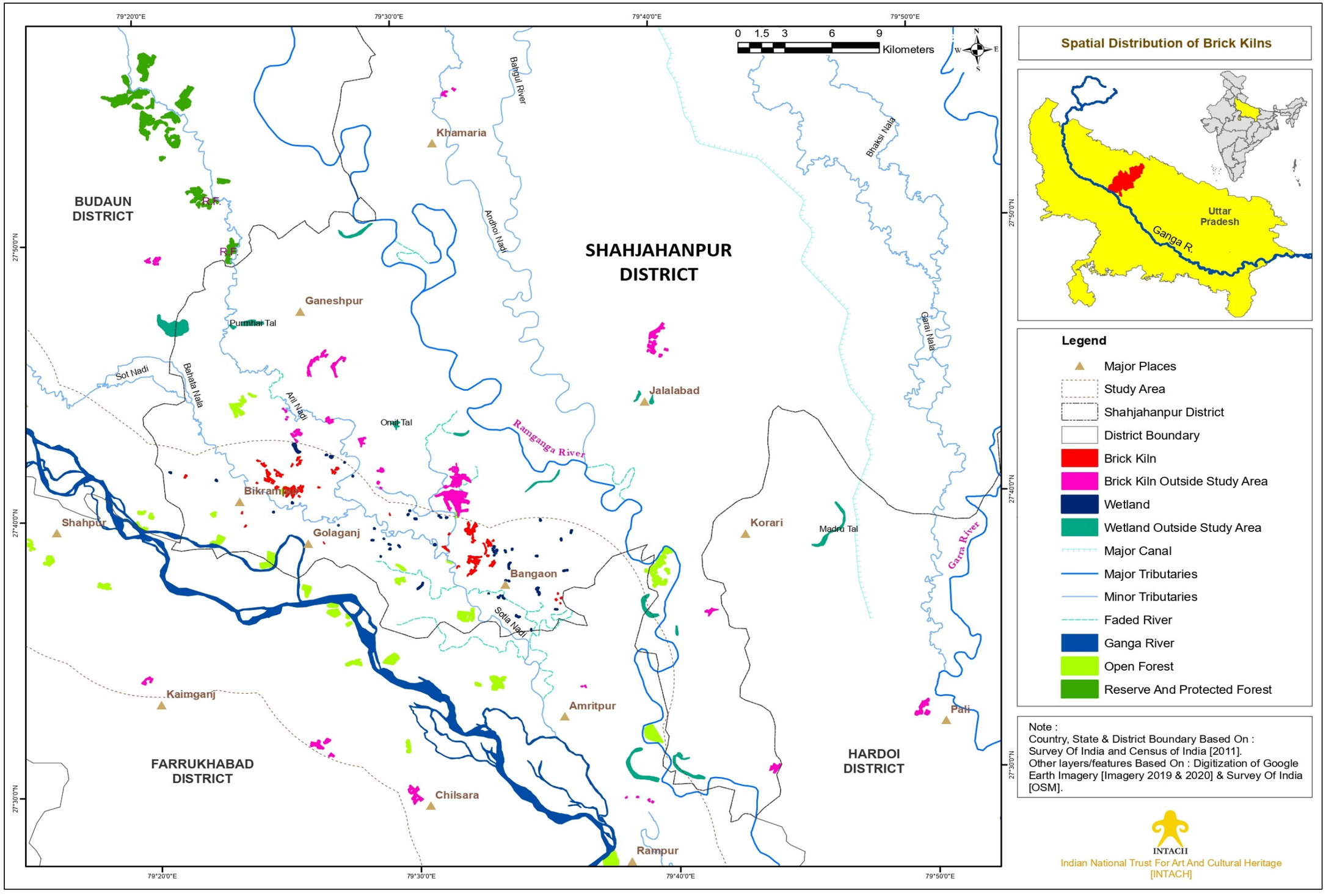
15.0 Mining And Brick Kilns In Farrukhabad & Shahjahanpur Distt.s.

15.1 Mining of sand along major rivers such as Ganga and Ramganga along with their tributaries such as Bagar and Kali contribute a major potentiality of sand mining in Farrukhabad Distt. Along these rivers, there are many potential areas for sand mining in different villages and river sand is also being collected for local use. Apart from that, mining of brick earth (soil/mitti/brick clay) is prevalent in the region with about 121 active brick kilns involved in that (MoEF & CC, 2016). During the current survey, brick kilns were found to be scattered in the study region with some congregation near Farrukhabad and Kaimganj towns. The spatial distribution of brick kilns for the study region of Farrukhabad is provided in Map 17.

15.2 In Shahjahanpur Distt., the minerals available are local sand, local clay and local bricks clay which are generally used in the civil construction works (MSME, 2014). The spatial distribution of brick kilns for the study region of Shahjahanpur is provided in Map 18.



Map 17 : Spatial Distribution Of Brick Kilns In The Study Region Of Farrukhabad Distt.



Map 18 : Spatial Distribution Of Brick Kilns In The Study Region Of Shahjahanpur Distt.S.

16.0 Boatmaking And Inland Navigation In Farrukhabad 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. In the study region of Farrukhabad, boatmaking activity was observed at and near Panchal Ghat which principally involved some local residents along with carpenters (*mistry*) from different places. The boats constructed were a mix of metal and wood [Image 47] which were mostly motorized and chiefly used for tourism purposes at this Ghat. The other boat type dominant in the region were smaller hand-rowed boats which were employed for fishing and for transportation from riverine islands to banks and back. The cost of boat construction ranged from anywhere between Rs. 50,000 to Rs. 1.5 lakhs depending upon various factors. While Sakhua wood was preferred for construction purposes, other alternates such as mango and babool wood were also sometimes employed.

Image 47 : Construction Of Motorized Boats Having Metal And Wood Near Panchal Ghat

Image 48 : Hand Rowed Boats Employed For Fishing In The Study Region

Image 49 : Hand Rowed Boats Used For Transportation Of *Saccharum* Grasses From Riverine Islands To The Banks

17.0 Sacred Sites & Trees In Farrukhabad Distt.

17.1 **Panchal Ghat :** This is an important site along Ganga River in Farrukhabad Distt. which is popular among tourists and pilgrims alike [Image 50]. According to a legend, Shringi Rishi from Garhmukteshwar got cursed due to which horns emerged from his head. To get rid of that, he migrated in this region along Ganga river to do penance and hence, that area came to be known after him. Later on, when he reached Panchal Ghat, his horns started decreasing due to which this Ghat also came to be known as 'Ghatiya Ghat'. However, the Distt. administration has referred to this site as Panchal Ghat in all official documents and promote the local residents to use this name. It is also believed that during the Mahabharat time, King Drupada along with his daughter Draupadi often used to visit this Ghat for offering prayers to Ganga River. Owing to its vast religious significance, one can even spot several ashrams and temples in its vicinity along Ganga River [Image 51].

Image 50 : Pilgrims And Tourists Visiting Panchal Ghat In Farrukhabad

Image 51 : An Ashram Along Ganga River Situated Close To Panchal Ghat

17.2 **Draupadi Kund :** It is another important sacred and historical site located in the heritage town of Kampil which was erstwhile capital city of King Drupada's kingdom – Panchala. This kund is believed to be the sacred site where Drupada organized a *Yagna* from whose fire Drishtyadumna and Draupadi were born. Both of them played pivotal roles in the Mahabharata war. Currently this kund is concretized and is being beautified by the local authorities in order to boost tourism in the region [Image 52].

Image 52 : Draupadi Kund As Observed During The Field Survey In Farrukhabad Distt.

17.3 **Swarna Sarovar :** A sacred water body was found to be present along with an ancient temple dedicated to Lord Shiva in Mudaul village of Farrukhabad Distt. [Image 53]. According to the interlocutors, this temple is believed to be more than 100 years old with the wetland being an important part of it. The worshippers used to take bath in the holy water here believing that it helped removed negativity and cure ailments. However, during the field survey the temple was being renovated by the local residents while the wetland was completely dry [Image 54]. The interlocutors also reiterated that it receives water during monsoon only which is used by some local residents for agriculture as well. During remaining months, this wetland remains dried up.

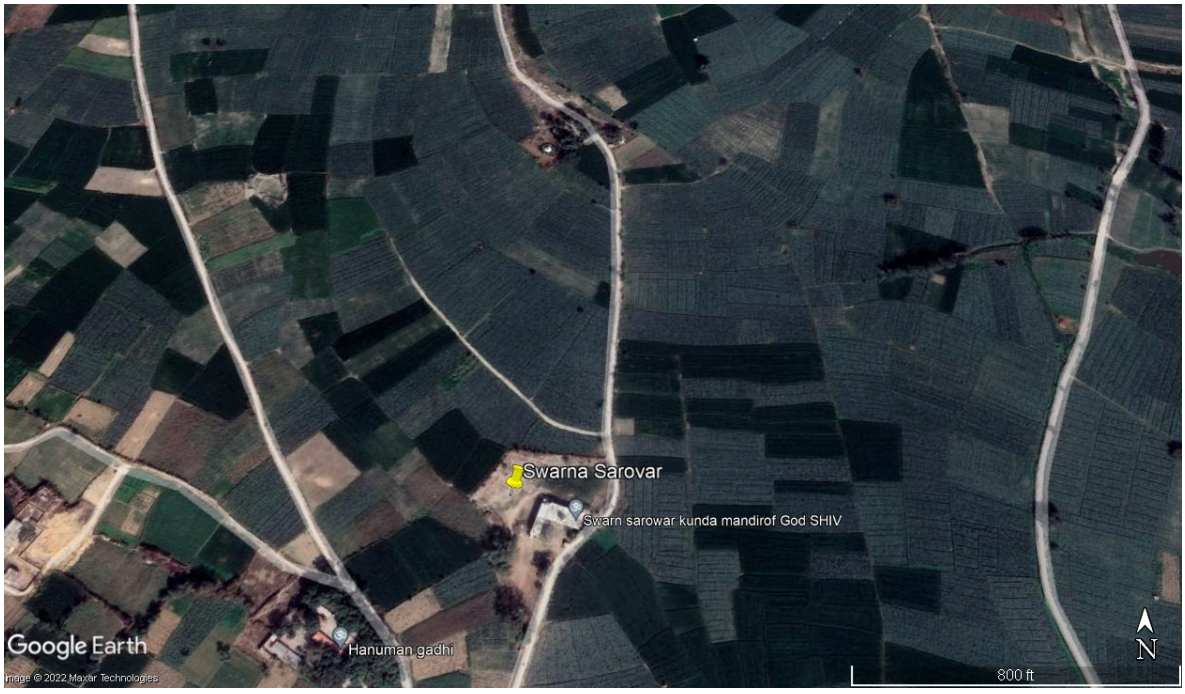


Image 53 : Location Of Swarna Sarovar In Farrukhabad Distt.

Image 54 : Swarna Sarovar As Observed During Field Survey

17.4 **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 55-56.

Image 55 : An Old And Sacred Banyan Tree Near Chintamani Pond In Naglanan Village

Image 56 : An Old And Sacred Peepal Tree Near Kuthla Jheel

18.0 Key Observations and Recommendations

18.1 One important Hindu ritual associated with Ganga river throughout India is cremation of dead bodies as it is widely believed that by immersing your burnt remains in the holy Ganga water, the person will attain 'Moksha'. The remains of these rites along with other substances such as pots, flowers, clothes, threads and so on are often dumped directly into the river thereby impacting the riparian and in stream biodiversity. Some such cremation sites were observed during the survey along Ganga River near Panchal Ghat and Dhai Ghat in this study region [Image 57]. 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 57 : Cremation Along Ganga River As Observed Near Panchal 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 waste influx into the river is also associated Ghats in the study region an example of which was observed during the field survey [Image 58]. This needs to be brought to immediate attention of the concerned authorities so as to develop appropriate waste management strategies for sites associated with Ganga River.

Image 58 : Waste Strewn Along Ganga River As Observed Near Singhirampur In Study Region

18.4 Evidences of 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 Fishing from Ganga River is an important source of livelihood for several people across the Ganga floodplain. However, in this region, lack of clarity on fishing activities and its associated regulations has led to rampant and unchecked fishing in secluded areas along Ganga River. These activities also pose immediate and serious threat to the rich turtle population in this region as they are illegally poached for ornamental purposes. This information should be used for keeping a strong vigil in the study region to prevent such harm to already endangered biodiversity.

18.7 The presence of Gangetic Dolphin in the study region of Farrukhabad and Shahjahanpur Distt.s highlights further significance of Ganga River in this section. It is imperative to create awareness and develop suitable strategies for preventing any kind of threat to this species.

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 59] 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 59 : Intensive Agriculture Along Ganga River In The Study Region Leaving Bald Banks Vulnerable to Erosion

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