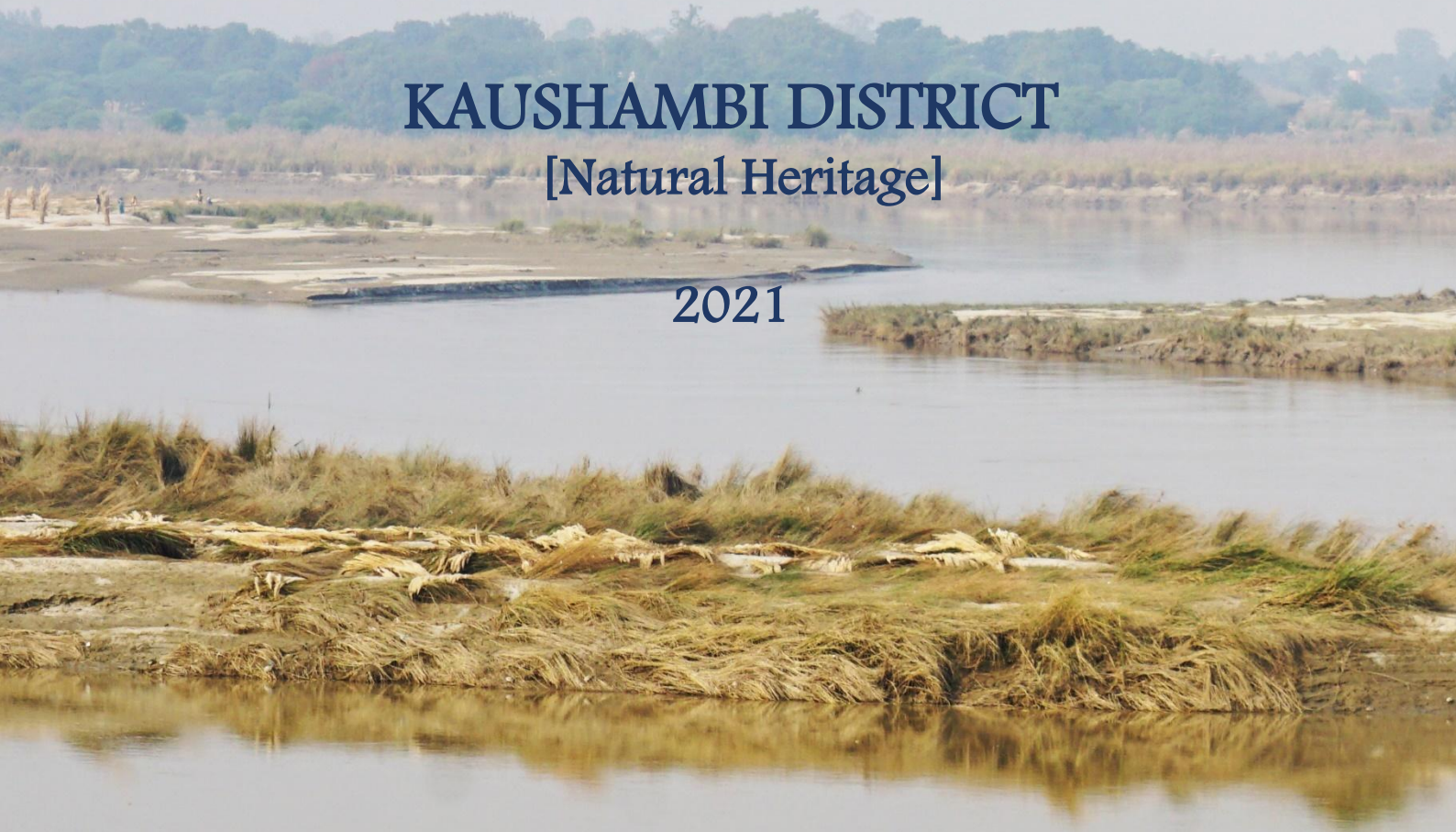
GANGA CULTURAL DOCUMENTATION



KAUSHAMBI DISTRICT

[Natural Heritage]

2021

National Mission for Clean Ganga

Indian National Trust for Art and Cultural Heritage

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Front Cover : Ganga River As Seen From Bhueya Baba Temple, Kanthua Village, Kaushambi

Background : Ganga River As Seen From Jaychand Fort

Back Cover : Riparian Vegetation Along Ganga River

Formatting And Design By : Abhishek Kumar Upadhyay

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DECEMBER, 2021

Sponsored By :

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1.0 Introduction

1.1 District Kaushambi was formed on 4th April 1997, earlier was part of Prayagraj District. Falling under Prayagraj Division, the district has 3 tehsils namely, Chail, Manjhanpur and Sirathu, 8 blocks, 10 Nagar Panchayats and 451 Gram Panchayats, Manjhanpur is the District Headquarter. Out of eight blocks, four blocks namely – Kara, Sirathu, Chail and Muratganj lie in the study area. The total area of the Distt. is 1903.17 sq. Km. having a population of 1,599,556, with population density of 840/sq.km. The Distt. is surrounded by Pratapgarh District from the north, Prayagraj District from the east, Chitrakoot District from the south and Fatehpur District from the west.

1.2 The Distt. lies between 25° 31' 26" N and 81° 23' 41" E at an elevation of 104 meters from MSL. Ganga and Yamuna are the two major rivers flows through the north and the south direction of the district respectively. The physiography of the Distt. is divided into two units namely the Trans Ganga and the Yamuna Doab[1]. The major part of the district lies between the *Doab* region of these rivers. Trans Ganga is a small portion lies to the north of Ganga. The major soil type of the Distt. is older alluvium mainly consisting sandy, clay and loam. The Distt. has a forest cover of just 47 hectares.

1.3 The Distt. has sub humid climate type, where the annual rainfall is 854 mm. The maximum temperature reaches up to 44.80° C in the summers while it iss at 10°-12° C in the winters. The relative humidity reaches up to 80%-85% in the monsoons[2].

1.4 Kaushambi is known for its ancient historical background, capital of *Chedi-Vasta Mahajanpada*, one of the prominent *janpadas* into which the Indo-Aryans were divided. Kaushambi has also been mentioned in the epic tales of Mahabharata and Ramayana. According to the *Puranas*, *Nicaksu*, descendent of *Parikshit*, transferred his capital from *Hastinapura* to Kaushambi, as *Hastinapura* was almost destroyed due to flood events, invasion of locusts and upheavals in the *Kuru* family itself. Ruin of ancient city of Kaushambi is situated at distance of 51.2 km south-west to Prayagraj on the left bank of River Yamuna[3].

[1] Ground Water Brochure of Kaushambi District, Uttar Pradesh [2012-2013] http://cgwb.gov.in/District_Profile/UP/Kaushambi.pdf

[2] District Survey Report Kaushambi District [Accessed dated 20.12.2021] https://cdn.s3waas.gov.in/s369adc1e107f7f7d035d7baf04342e1ca/uploads/2018/02/2018021711.pdf

[3] Kaushambi District Profile [Accessed dated 20.12.2021] https://kaushambi.nic.in/

There are different stories how Kaushambi got its name. According to the *Paramatthajyotika*, Sage Kaushamba used to reside in the region after whom the place was named as Kaushambi. However, according to the records of Buddhaghosa, during the time when Kaushambi was being founded a large number of Kusamba were uprooted, on which the place was entitled.

During the period of Budhha, Kaushambi was one of the six prominent cities of India. Kaushambi was an important centre for communication in ancient India as it was situated at intersection of major routes of that time. It was a terminus of river traffic and an important emporium of *Madhyadesa*. Chinese travellers Fa-Hien and Yuvan-Chwang also visited the place. Kaushambi remained as one of the prominent cities till sixth century.

Image 1 : Lush Green Vegetation Covering The Jaychand Fort At Vrindavan Ghat

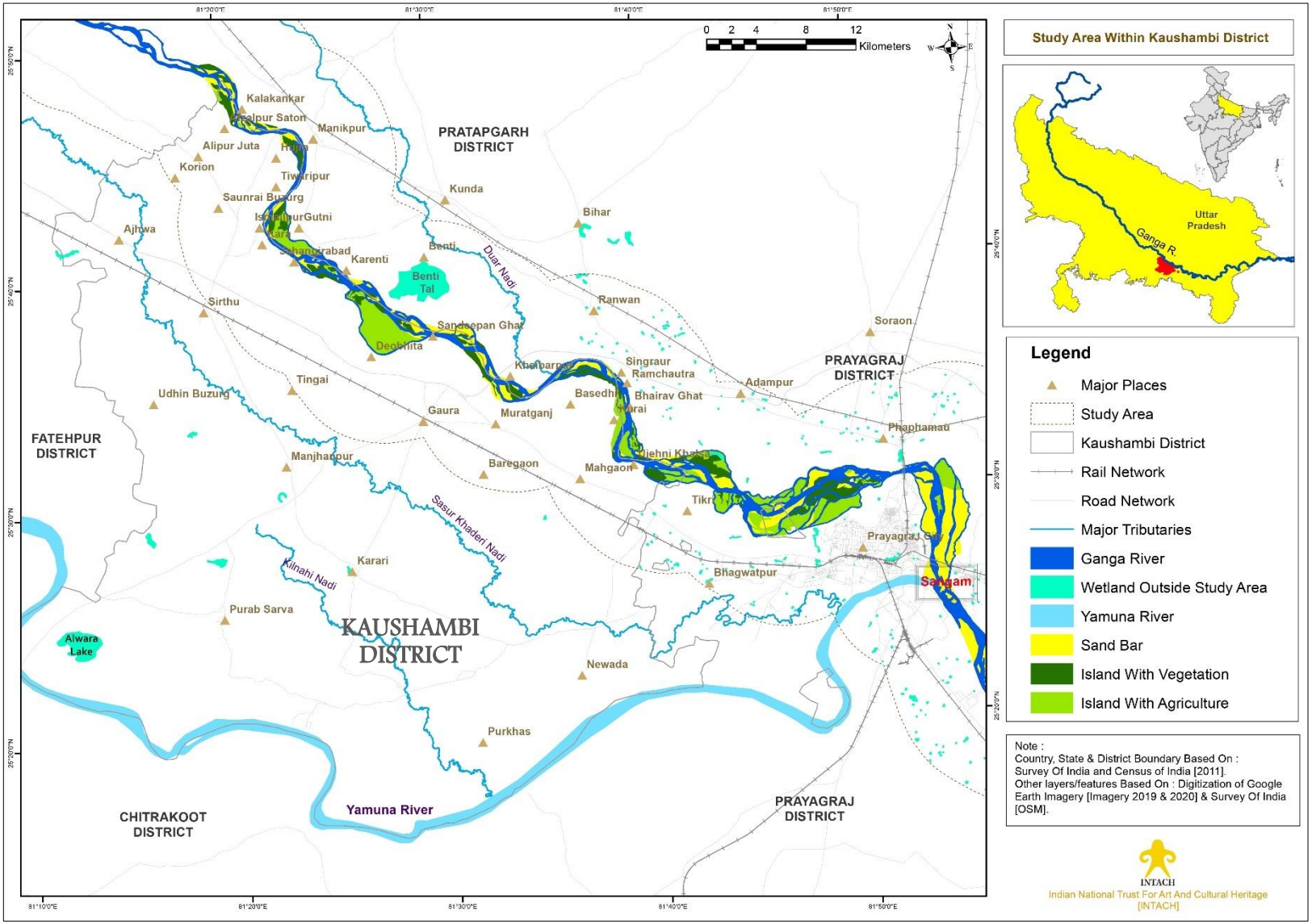
Map 1 : Location Of Kaushambi Distt. On Right Bank of Ganga River

2.0 Ganga River in Kaushambi District

2.1 Ganga River enters Kaushambi Distt. at Latitude 25°48'34.64"N and Longitude 81°20'16.85"E near Afzalpur Saton Village after crossing Fatehpur District [Right Bank] and Rai Bareli Distt. [Left Bank] [Refer Map No. 1 & 2]. Length of Ganga River in Kaushambi Distt. is approximately 62 km, while its width varies between 0.3 Km [near village Badanpur] to 3.75 km [near Deobhita]. The active floodplain of Ganga River in Kaushambi Distt. is under cultivation [mainly *rabi and zaid*] while some areas, especially the riverine island, are intact having riparian grasses upto 2 metres high.

2.2 The river enters the Distt. and flows over a wide bed, within the limits of which it continuously shifting its channel between Afzalpur Saton and Sangeti (Sandeepan Ghat) [30 Km stretch]. In this stretch of 30 Km.s the river forms several riverine islands of which some are under cultivation. The slope of some places is terraced in two -three stages. Flowing northward, the river turns twice between Sandeepan Ghat and Ujehni Ghat [Ujehni Khalsa Village] and enters Prayagraj Distt. near Fatehpur village at Latitude 25°30'13.05"N and Longitude 81°41'10.04"E. Within this stretch the river channel has nearly dried between Badanpur and Kurai Village and is navigable only in monsoon. Approximately 7.5 Km downward from Fatehpur Village, the river again enters the Kaushambi Distt. and flows for a distance of 2.10 Km. after which the river flows into Prayagraj Distt. and is joined by one of its major tributaries, namely Yamuna at *Triveni Sangam* [25°25'16.55"N, 81°53'36.15"E].

Image 2 : View of Ganga River Near Kanthua Village, Kaushambi Distt.



Map 2 : Study Area In Kaushambi Distt.

3.0 Methodology

3.1 For carrying out surveys, a 7 km buffer [study area] of Ganga River in Kaushambi Distt. was marked having a total area of 445.11 sq. km. [Right bank]. The study area was divided into grids of 5 × 5 km for field survey. Before carrying out surveys, the study area was analysed with the help of secondary literature, mythological records, available maps [Google Earth historical satellite data, SOI old toposheets, SOI-OSM sheets]. Based on that, key features were marked in Google Earth Pro and Kml files were generated. The Kml files were further transported to mobile based QGIS field survey application. Key features were marked taking consideration of Natural Heritage documentation format.

3.2 The field survey in Kaushambi Distt. was carried out in November, 2021. Various sites were visited within the study area wherein field data was collected along with interactions with stakeholders. The co-ordinates of all localities were taken by Garmin handheld GPS eTrex30 and the representative images of various parameters were taken with the help of Sony Digital Camera Cyber-shot DSC-HX300 with 50X optical zoom. Pre-marked Google Earth's Kml files and Google Maps were used for navigation. Scanned maps of the topographic map series of Army Map Services, U.S. Army [Map NG44-11], Survey of India [SOI] Open Series Maps [OSM] and Google Earth Historical Imagery were obtained and analysed for preparation of Maps.

3.3 Field guides were used for flora and fauna identification. The diversity of avian species was recorded using binoculars and identified using field guides [Salim Ali, 2012; Grimmett et al., 2016]. The conservation status of the species was listed by using IUCN Red Data List. Information regarding groundwater, agriculture, forest and wetland were obtained through informal/formal interviews and discussion with Govt. officials of Forest Department, and farmers, fishermen, boatmen and other stakeholders.

4.0 Tributaries of Ganga River

4.1 Yamuna and its tributary Sasur Khaderi and Kilnahi Nadi are major rivers within Kaushambi Distt.. Yamuna River originates from Yamunotri glacier (60 km. away from Kedarnath) in Uttrakhand state and joins Ganga River in Prayagraj Distt. The river enters Kaushambi Distt. from its southern side at 25°27'5.83"N, 81°11'37.22"E and forms southern and eastern boundary of Kaushambi district with Chitrakoot and Prayagraj Distt. respectively. In its journey of 1376 Km, the river drains approximately 78.5 km within Kaushambi Dist. and empties to Ganga River at *Triveni Sangam* near Allahabad Fort in Prayagraj Distt. [Refer Image No. 3]. The Allahabad Gazetteer of 1911[4] describes the flow of Yamuna River [also called Jamuna] as:

"The Jamuna has a more rapid stream and a greater slope than the Ganges. Its water contains much less silt and are consequently cleaner than those of the Ganges, the blue water of the Jamuna contrasting shapely with the yellow stream of the larger river for some distance below the confluence"

Image 3 : Yamuna River As Viewed From New Yamuna Bridge [Near Triveni Sangam]

[4] Allahabad - A Gazetteer, District Gazetteers of the United Provinces of Agra and Audh, Volume XXIII, Printed by Govt. Press, United Provinces, 1911.

4.2 Sasur Khaderi Nadi is a tributary of river Yamuna, originates from Jagannath Jhil[5] of Fatehpur Distt., and enters the Sirathu Tehsil of Kaushambi Distt. at latitude 25°44'50.30"N and longitude 81°14'39.92"E. The river drains almost parallel to Ganga River and joins Yamuna from its left bank near village Bakshi Mohda at latitude 25°24'14.41"N and longitude 81°48'27.80"E. In its journey the river drains 145 Km in Kaushambi Distt. Sasur Khaderi Nadi forms a central drainage channel of the Duab region [Region between Ganga-Yamuna] and is joined by Chhoti Kilnahi Nadi from its left bank near Fazlabad at latitude 25°26'0.64"N and longitude 81°31'33.83"E. During the rains the river carries large discharge and dries in summer. In recent years river bed has been encroached and flattened in some areas for agricultural and construction purpose[6].

4.3 Kilnahi Nadi, a tributary of river Yamuna originates from a wetland at latitude 25°29'27.95"N and longitude 81°19'41.85"E near Village Sukhdeopur. Currently, the wetland has dried and a small wetland has been constructed at the same place. The river flows parallel to Sasur Khaderi Nadi and joins Yamuna River from its left bank near Shyampur village at latitude 25°17'6.67"N and longitude 81°31'33.25"E. Total length of the river is 53.5 Km [Refer Image No. 4 & 5].

4.4 There are eighteen minor streams identified within the study area which drains to river Ganga. Out of 18 streams, six streams are completely faded and two are partially faded. Details of flowing minor streams are provided in Table No.1 and faded streams in Table No. 3 of section 6. The lengths of identified streams range between 2 Km. to 13.5 Km. Documentation of these small streams is important because these streams serve as breeding ground to fishes. Dense riparian vegetation is still present along their banks and is continuously shrinking due to increasing anthropogenic activities.

[5] One India Hindi, Article dated 25 November 2012 [Accessed in December 2021] https://hindi.oneindia.com/news/2012/11/25/uttar-pradesh-bundelkhand-sasur-khaderi-river-going-to-die-224186.html

[6] Dainik Jagran Hindi Newspaper, Article dated 24 November 2018 [Accessed in December 2021] https://www.jagran.com/uttar-pradesh/allahabad-city-sasur-khaderi-river-will-be-life-line-of-kaushambi-18676636.html

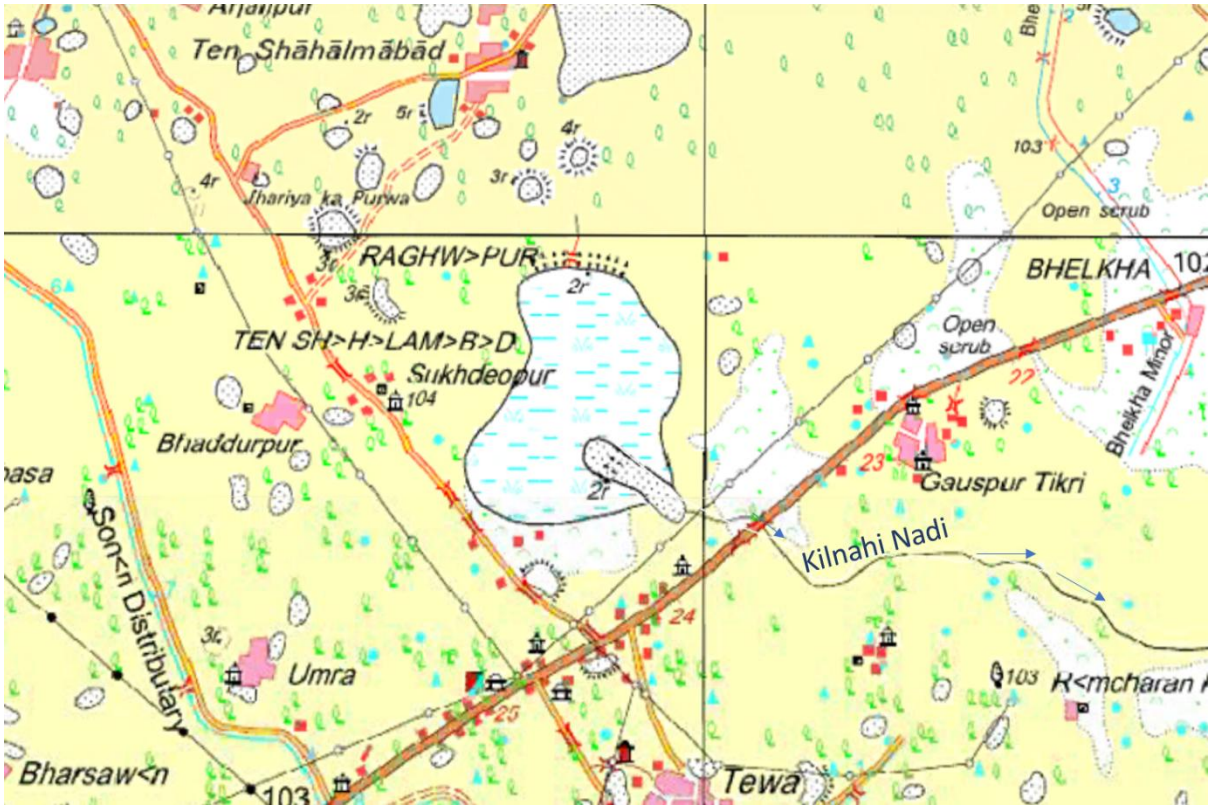


Image 4 : SOI-OSM Sheet Showing Wetland Near Sukhdeopur - The Orign of Kilnahi Nadi
[Scale 1:50,000]

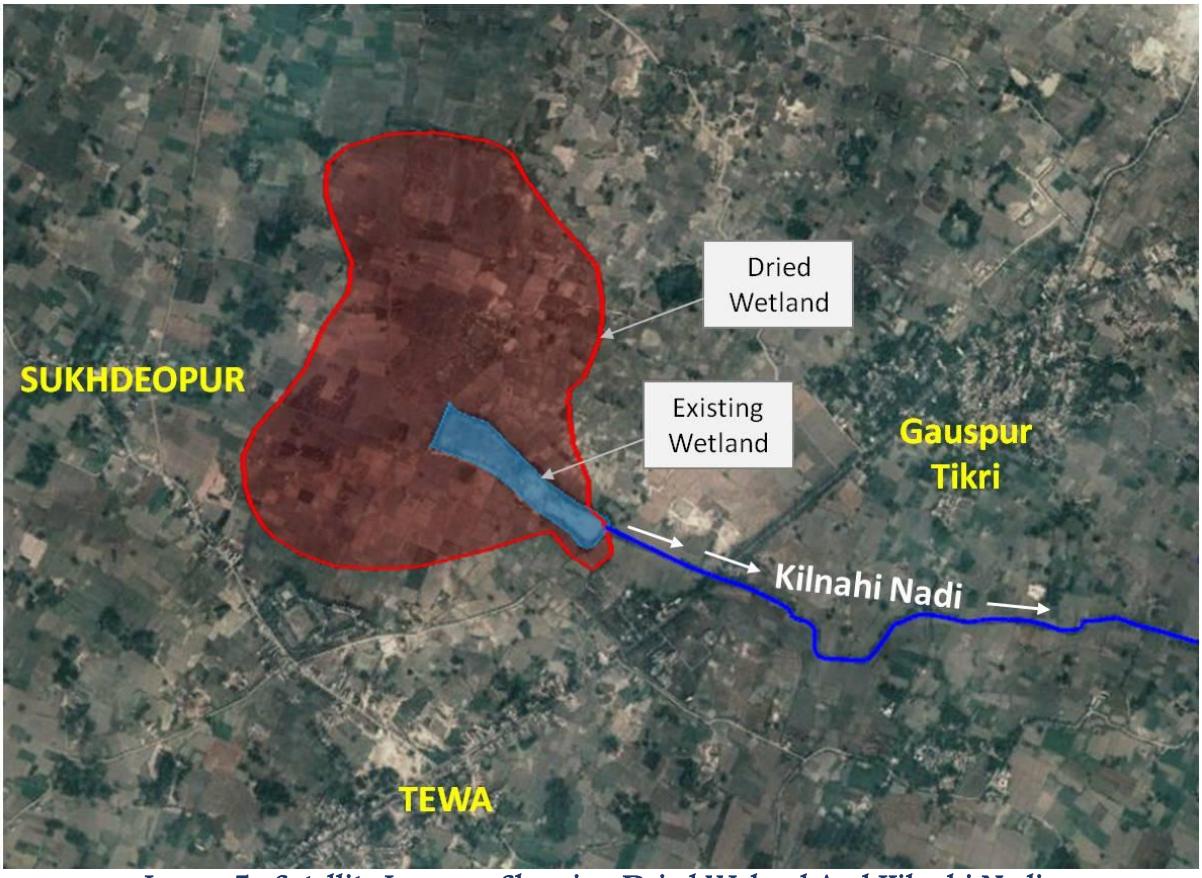


Image 5 : Satellite Imagery Showing Dried Weland And Kilnahi Nadi
[Source : Google Earth Imagery, November 2021]

Table 1 : Streams Within The Study Area

Stream	Origin	Confluence	Length and Potential Threat
Nara/ Nala	Near Afzalpur Saton [25°46'40.70"N, 81°20'55.21"E]	Near Gadarian Ka Purwa [25°46'0.51"N, 81°20'48.49"E]	Stream Length approximately 2.0 Km. Potential Threat : Extensive Agricultural Practices, construction activities
Lehdri Ka Nar	Near Bhueya Baba Temple, Kanthua [25°46'19.06"N, 81°22'3.60"E]	Near Nizam Ka Purwa [25°45'42.85"N, 81°21'32.38"E]	Stream Length approximately 2.7 Km Potential Threat : Extensive Agricultural Practices [Refer Image No. 6]
Nara/ Nala	At 25°42'50.99"N, 81°22'2.53"E	Near Girdharpur Garhi [25°43'30.15"N, 81°21'19.66"E]	Stream Length approximately 3.0 Km Potential Threat : Extensive Agricultural Practices
Chamrupur Nara	Stream 1 Near Chamrupur [25°41'5.87"N, 81°21'22.51"E] Stream 2 Near Shadipur [25°40'47.74"N, 81°21'43.40"E] Stream 3 Near Hafizpur [25°40'46.09"N, 81°22'16.21"E]	Near Kara [25°41'30.65"N, 81°22'26.72"E]	Stream Length approximately 12 Km Three streams- 1 originates near Chak Chamrupur, 2 originates near Shadipur, 3 originates near Hafizpur Potential Threat : Extensive Agricultural Practices and Loss of riparian vegetation [Refer Image No.7]
Nara/ Nala	Near Lower Ganga Canal [25°37'49.81"N, 81°21'49.30"E]	Near Shahzadpur [25°39'12.60"N, 81°25'47.19"E]	Stream Length approximately 12 Km Potential Threat : Extensive Agricultural Practices and dumping of solid waste
Nara/ Nala	Near Farhimpur Kalesharmau [25°42'29.97"N, 81°22'1.71"E]	Near Chak Zafarpur [25°41'51.30"N, 81°20'34.30"E]	Stream Length approximately 4.0 Km. Potential Threat : Extensive Agricultural Practices & Loss

			of riparian vegetation
Nara/ Nala	Near Mathiya [25°36'44.14"N, 81°26'57.10"E]	Near Matakrezma [25°36'13.77"N, 81°25'52.95"E]	Stream Length approximately 3.0 Km Potential Threat : Extensive Agricultural Practices and loss of vegetation
Sakra Nala	Near Sainta Village [25°32'44.72"N, 81°31'2.60"E]	Near Sihori Village [25°35'8.90"N, 81°32'40.35"E] [Refer Image No. 8]	Stream Length approximately 8.0 Km. Potential Threat : Extensive Agricultural Practices, constructed embankment and loss of vegetation **Nala is faded between Sihori and confluence due to constructed embankment**
Nara/ Nala	Near Bikrampur [25°32'25.42"N, 81°33'6.30"E]	Near Pathana [25°34'12.96"N, 81°33'14.30"E]	Stream Length approximately 5.0 Km Potential Threat : Extensive Agricultural Practices and loss of vegetation
Nara/ Nala	Near Barai Salempur [25°33'42.21"N, 81°33'56.89"E]	Near Patti Narwa [25°34'25.37"N, 81°34'33.93"E]	Stream Length approximately 3.5 Km Potential Threat : Extensive Agricultural Practices and loss of vegetation
Sitkhia Nala	Originates from a wetland at 25°32'58.63"N 81°34'10.18"E	Near Kurai Village [25°33'18.49"N, 81°38'34.81"E]	Stream Length approximately 13.5 Km Potential Threat : Extensive Agricultural Practices and loss of vegetation
Sadhua Nala	Near Charai [25°30'21.60"N, 81°34'53.25"E]	Near Gauspur [25°31'24.49"N, 81°38'19.44"E] [Refer Image No. 9]	Stream Length approximately 3.0 Km Potential Threat : Extensive Agricultural Practices and loss of vegetation **Nala is faded due to**

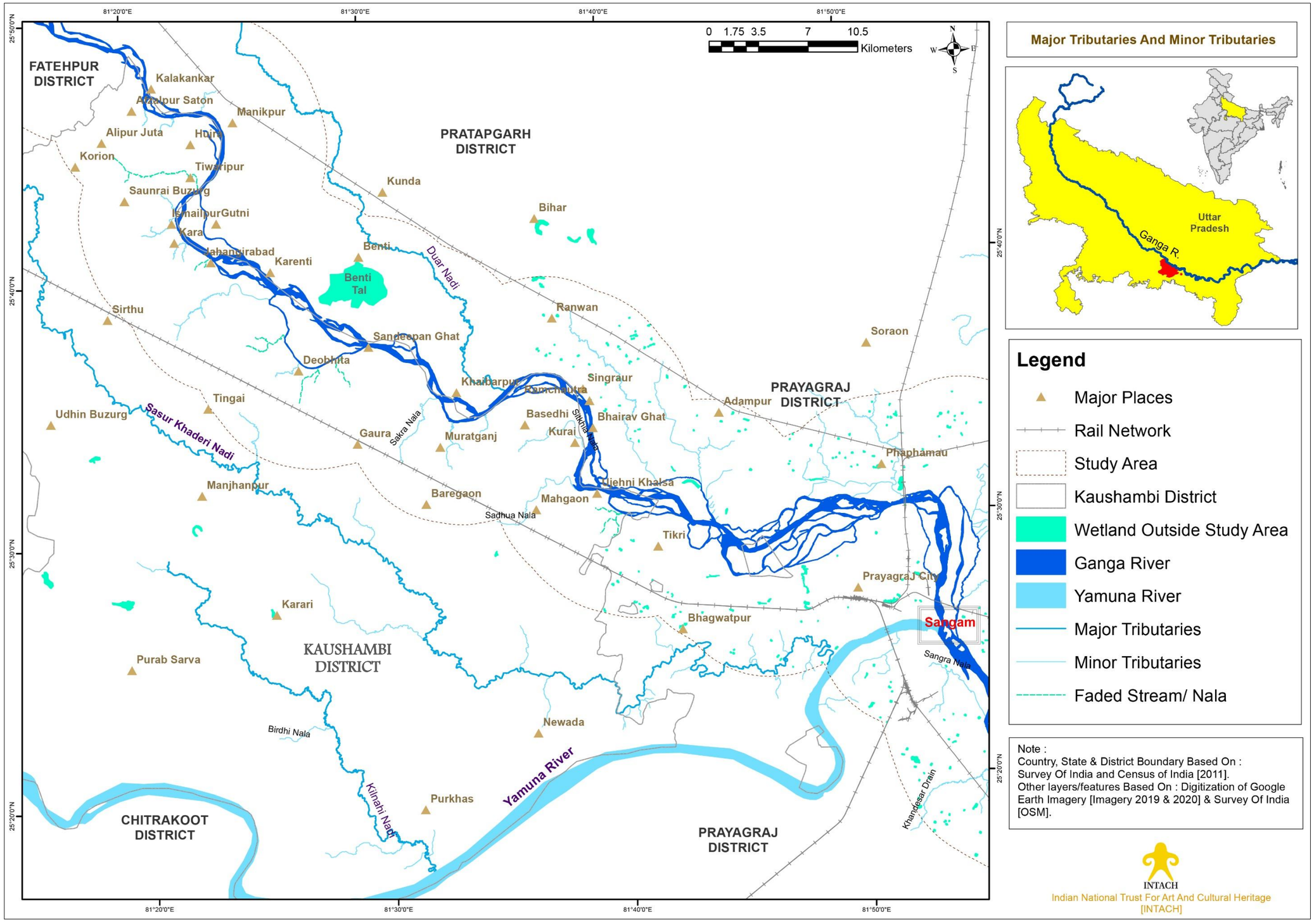
			encroachment for agricultural activities

Image 6 : Lehdi Ka Nar At Confluence [Showing riparian vegetation along bank of Nara]

Image 7 : Chamarpur Nala

Image 8 : Image Showing Altered Bed Of Sakra Nala

Image 9 : Image Showing Sadhua Nala



Map 3 : Major and Minor Tributaries In Study Area

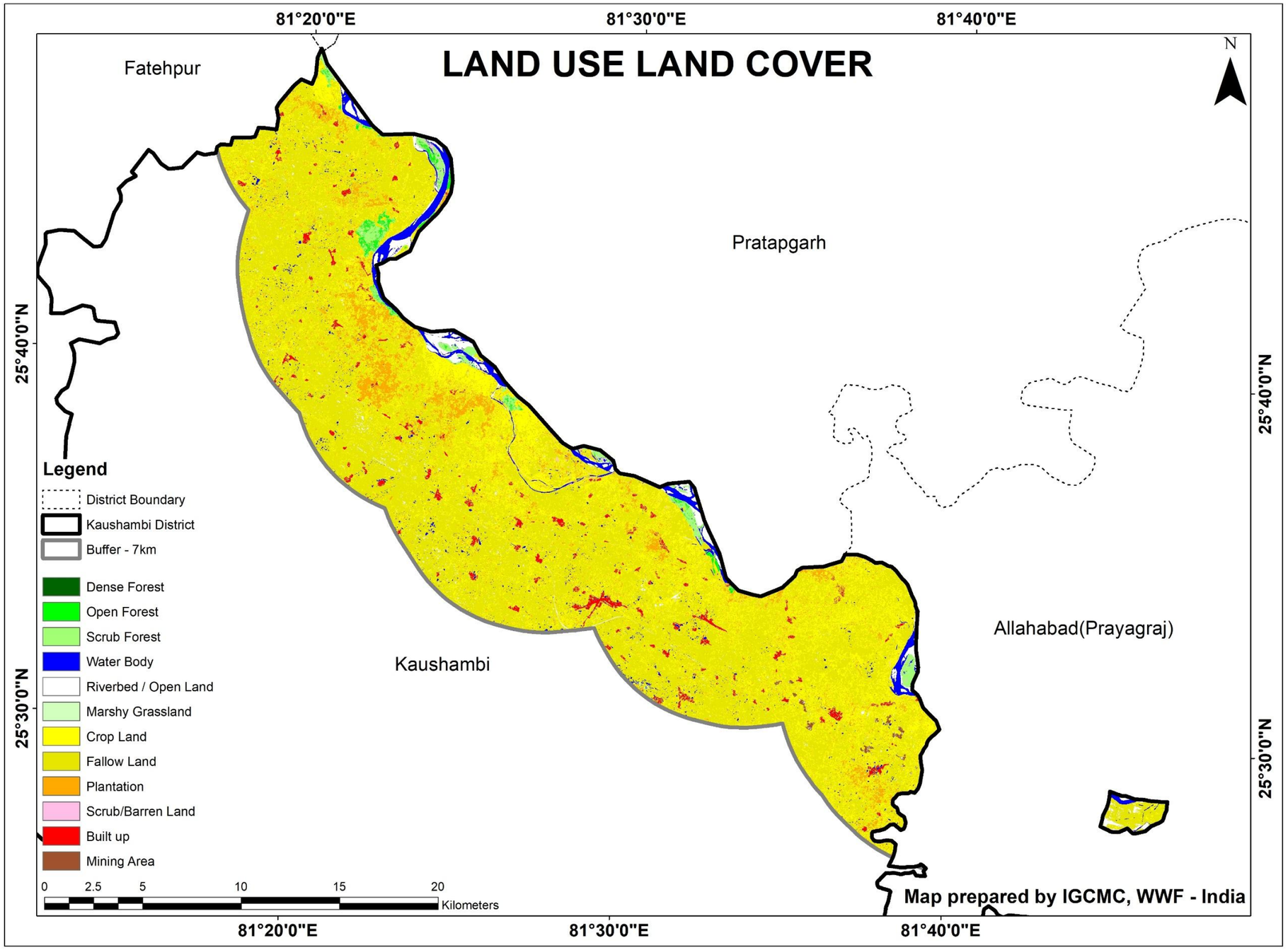
5.0 Land Use Land Cover [LULC]

5.1 Land Use Land Cover [LULC] map of the study area has been prepared from Landsat imagery for the year 2020 [Refer Table No. 2 & Map No. 4]. Using supervised classification system, 12 different classes were generated – Dense Forest, Open Forest, Scrub Forest, Water Body, Riverbed / Open Land, Marshy Grassland, Crop Land, Fallow Land, Plantation, Scrub/Barren Land, Built-up and Mining Area [Refer Map No. 4]. Study area constitutes 445.11 sq.km. covering right bank of River Ganga for which the following observations were drawn based on this classification:

- Forest area constitutes 1.94% of the study area and is classified into Dense Forest, Open Forest and Scrub Forest. Forest area is found in patches along Ganga River. Fallow land has a distribution of 29.13%, which also includes agricultural fallow land.
- Water body [3.11%] and marshy grassland [0.19%] constitutes 3.31% of the study area. It covers lentic and lotic system of the study area.
- The built-up land constitutes 1.63% of the total study area. This class covers the urbanised area and settlements.
- Mining Area covers the brick kiln sites.

Table 2 : Land Use Land Cover of Study Area In Kaushambi Distt. [2020]

Class	Area (Ha)	Area (%)
Dense Forest	0.38	0.0009
Open Forest	207.79	0.4668
Scrub Forest	657.45	1.4770
Water Body	1387.79	3.1179
Riverbed / Open Land	1064.32	2.3911
Marshy Grassland	88.11	0.1980
Crop Land	11459.8	25.7459
Fallow Land	25644.2	57.6131
Plantation	3039.59	6.8288
Scrub/Barren Land	171.54	0.3854
Built up	726.86	1.6330
Mining Area	63.26	0.1421
Total	44511.09	100



Map 4 : Land Use Land Cover Map of The Study Area [Kaushambi District]

6.0 Palaeochannels Within Study Area

6.1 Palaeochannels are the remnants or old channels of once active rivers or streams, some of which are lie buried under the cover of younger sediments. They are formed when the river or stream migrate their courses and form new ones. Paleochannels are important to understand geology, old river routes, sediment deposition and are considered suitable areas for ground water recharge. In Kaushambi Distt. factors such as encroachment, extensive agricultural practices, brick kilns and loss of vegetation act as a catalyst for the fading of river channels and wetlands. Within these factors, loss of vegetation and extensive agricultural activities are the main reason behind the shrinking and loss of wetlands in the study area. Loss of vegetation allows the soil to erode easily, which finally ends up in filling of the wetlands and accelerate the rate of migration of river.

6.2 In order to identify paleo-channels and threatened river channels in the study region, Survey of India (SOI) toposheets from 1925-1931 to 2005-2006 and Google Imagery upto November 2021 were analysed [Refer Map 5 & 6]. Further, ground truthing carried out in November 2021. Based on that, it has been found that :

- River channel of Ganga in Kaushambi Distt. has migrated between 1925-1931 to 2005 - 2006 [Ref. Map No. 5].

- Major migration was recorded near Deobhita [25°36'36.31"N, 81°26'54.98"E (Right bank), Basedhi [25°34'12.31"N, 81°36'38.70"E (Right Bank)], between Sringverpur and Bhairav Ghat [Sitakund, (Left Bank)].

- Between 2005-2006 and 2019-2020, the river has migrated towards Bhairav Ghat [Left Bank] i.e. away from Kurai Village Ghat [Right Bank]. This may be due to lack of inflow and increasing sediment load due to increased number of brick kilns along left bank.

- In recent years it has been observed that channel of Ganga River has dried between Badanpur and Gauspur [Right bank] and between Sangeti and Sihori. Dried channels are showing in image no. 10 & 11.

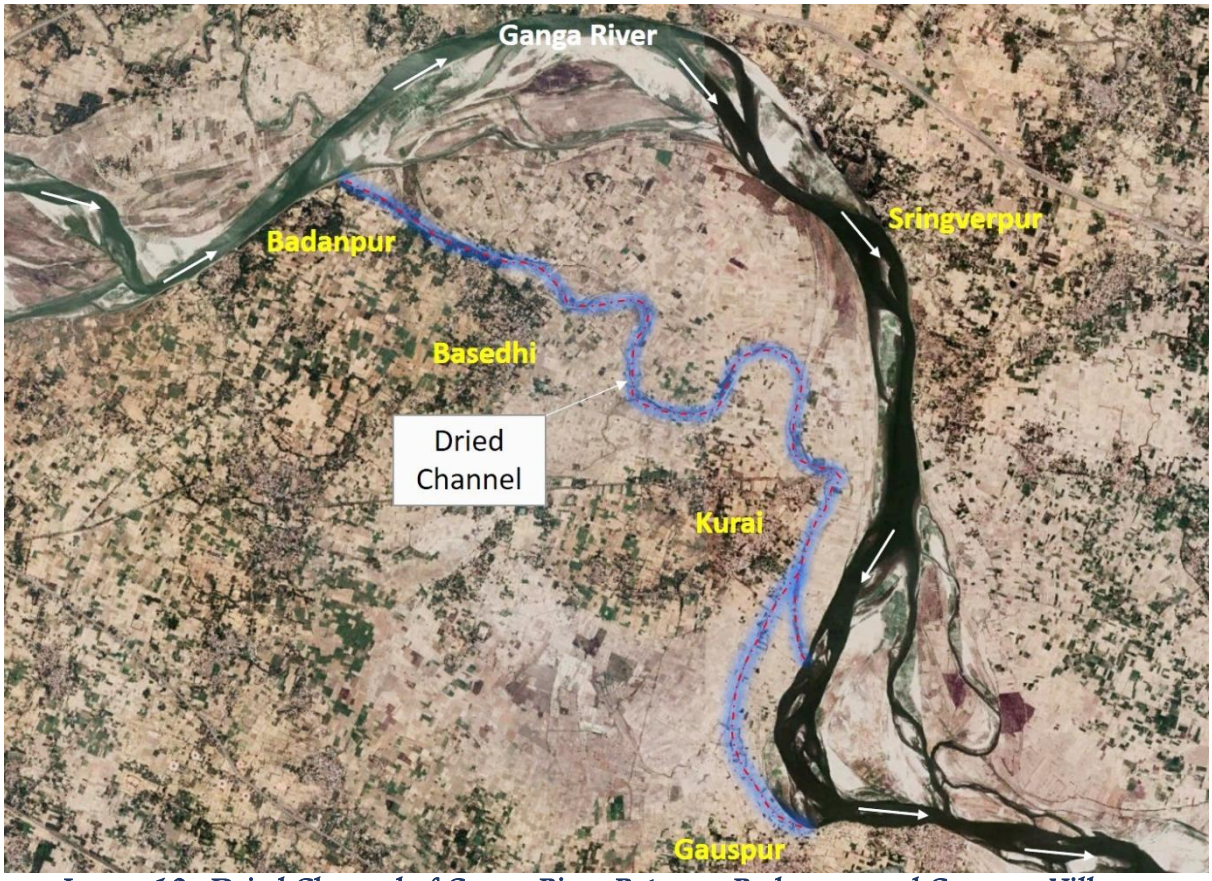


Image 10 : Dried Channel of Ganga River Between Badanpur and Gauspur Village
[Source : Google Earth Pro, Imagery Dated, April 2021]

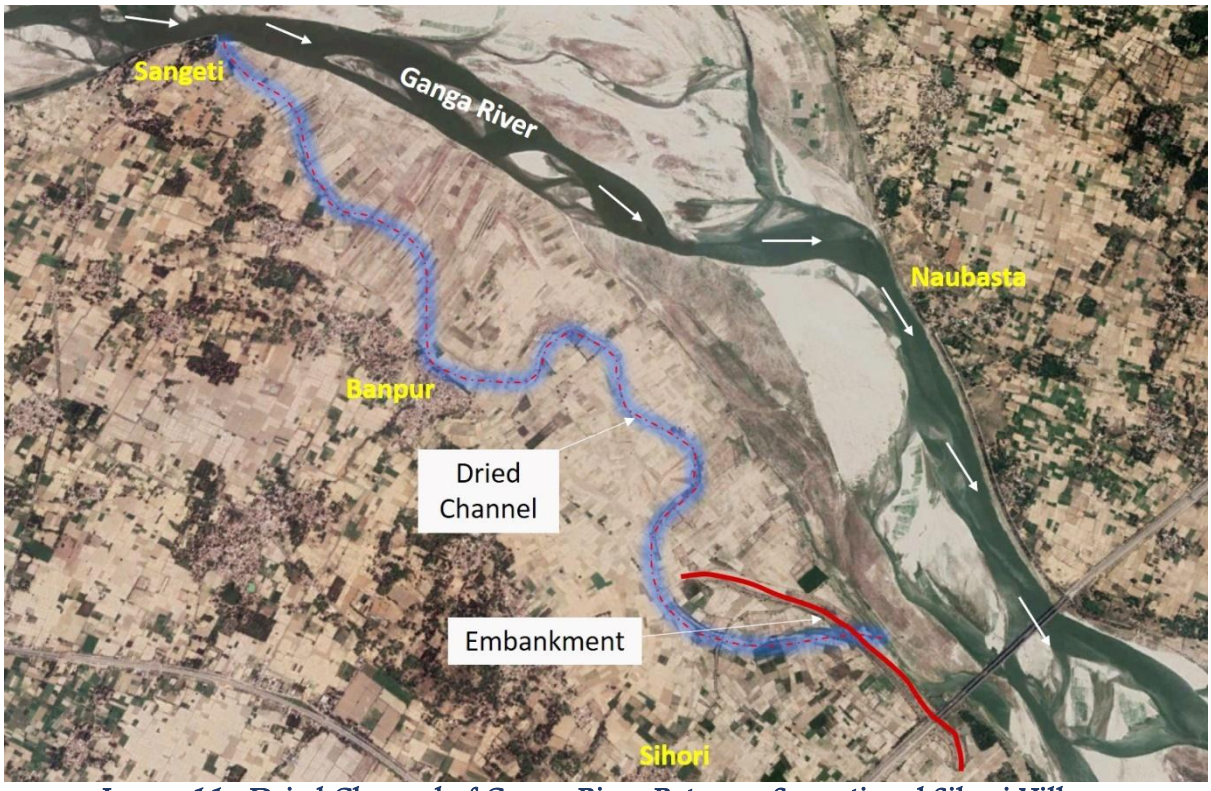


Image 11 : Dried Channel of Ganga River Between Sangeti and Sihori Village
[Source : Google Earth Pro, Imagery Dated, April 2021]

❖ The study of SOI map series, Google Imagery (in time series) and ground survey highlighted there are six small streams whose courses have faded or disappeared altogether. The disappearing channels are small and seasonal but are equally important because they directly drain to River Ganga. Streams have faded maybe due to extensive agricultural practices, encroachment, loss of vegetation and high silt load. Details of faded streams provided in table No. 3 and images 12-15.

Table 3 : Faded Streams Within The Study Area

Stream	Origin	Confluence	Reason for the fading of the stream
Manyarwa Nala	Near Village Daryapur Jatta [25°44'56.93"N, 81°19'29.46"E]	Near Village Tiwaripur [25°43'31.05"N, 81°23'1.11"E]	Extensive Agricultural Practices, encroachment, removal of riparian vegetation and high silt load.
Nara	Near Sipaha [25°40'27.63"N, 81°22'43.20"E]	Near Asadpur [25°40'54.16"N, 81°23'23.02"E]	Extensive Agricultural Practices and removal of riparian vegetation
Sukhu Nala	Near Andawan [25°37'31.00"N, 81°24'43.81"E]	Near Sukhu Ka Purwa [25°37'43.41"N, 81°26'21.27"E]	Extensive Agricultural Practices, brick kiln and removal of riparian vegetation
Nara	Near Bidanpur [25°35'8.18"N, 81°26'47.79"E]	At 25°36'32.45"N, 81°27'42.32"E	Extensive Agricultural Practices, removal of riparian vegetation and high silt load
Nara	Near Naudiha [25°35'43.72"N, 81°28'59.68"E]	Near Sailab [25°36'57.00"N, 81°28'41.17"E]	Extensive Agricultural Practices and removal of riparian vegetation
Nara	Three channels two originates near Grand Trunk Road one near Ujehni village [25°29'42.18"N, 81°39'12.35"E]	Near Mirapur [25°30'26.05"N, 81°40'10.67"E]	Extensive Agricultural Practices and removal of riparian vegetation

Image 12 : Manyarwa Nala Near Confluence
[Image Showing Extensive Agricultural Activities, Nara bank Lacking Riparian Vegetation]

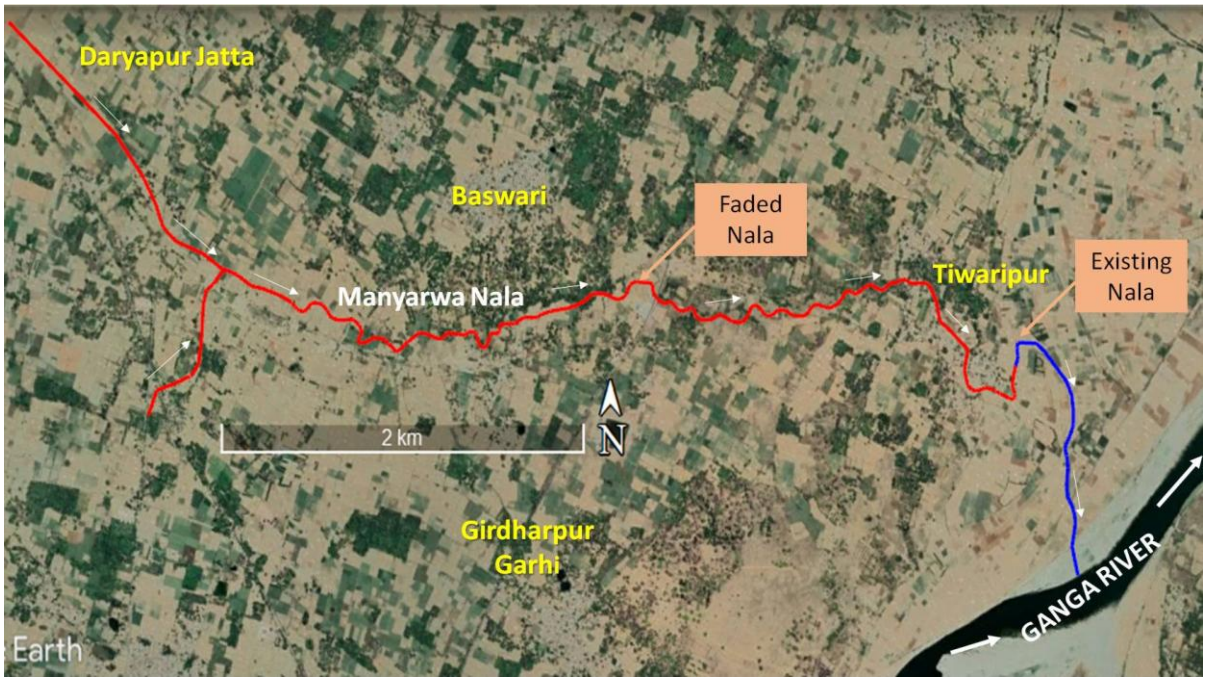


Image 13 : Faded and Existing Part of Manyarwa Nala
[Source : Google Earth Pro, Imagery Dated, April 2021]

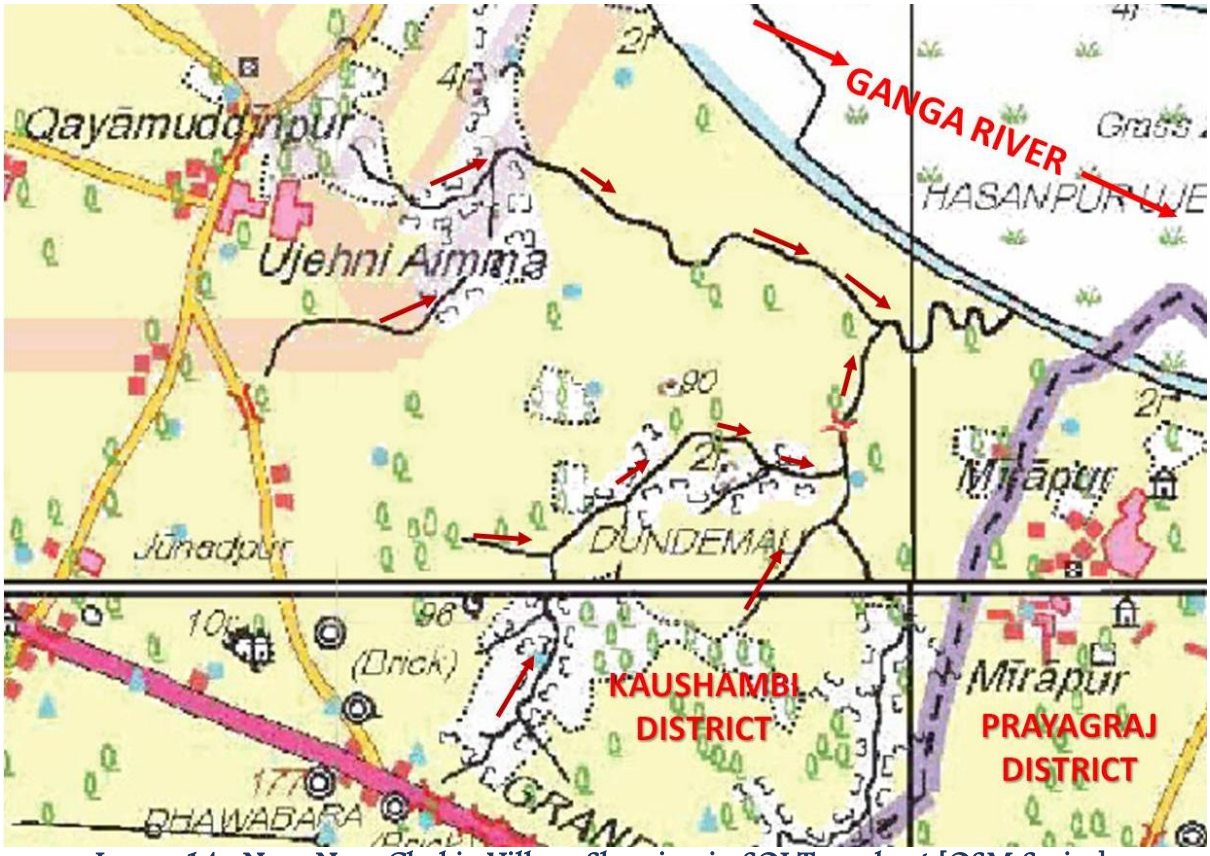


Image 14 : Nara Near Chakia Village Showing in SOI Toposheet [OSM Series]
[Scale 1:50,000]

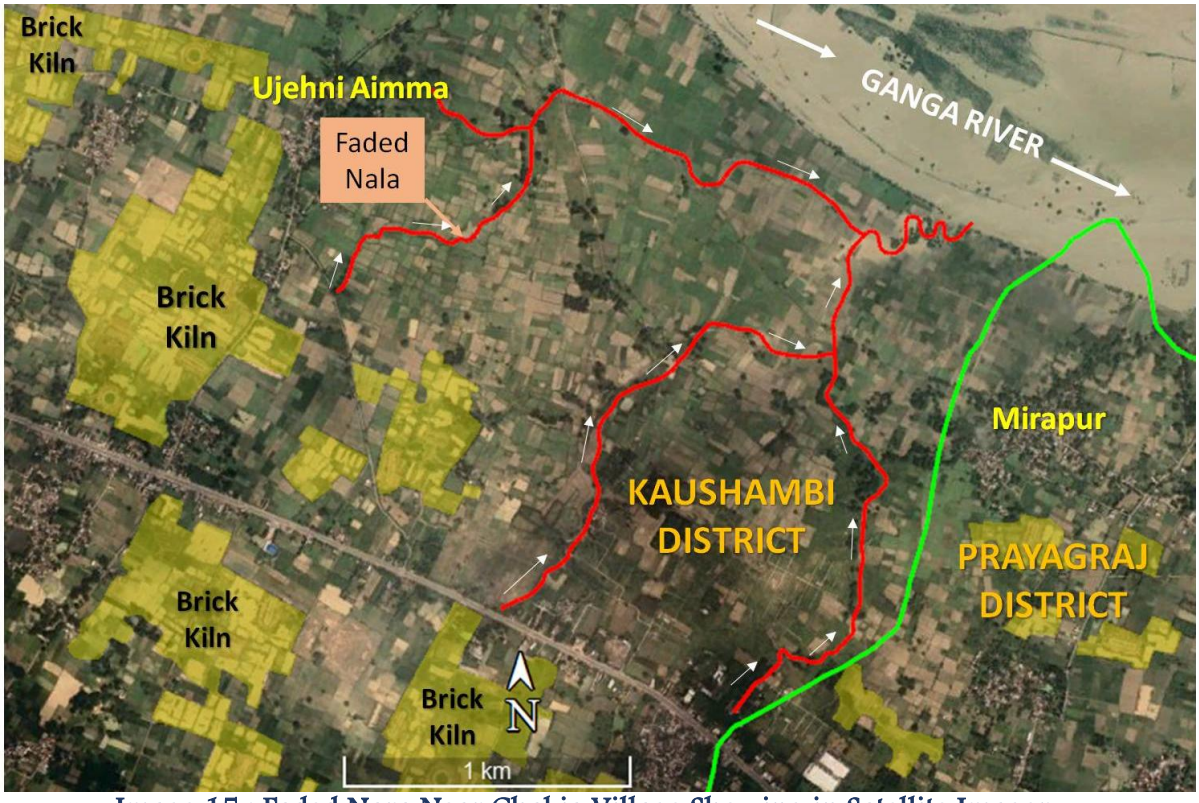
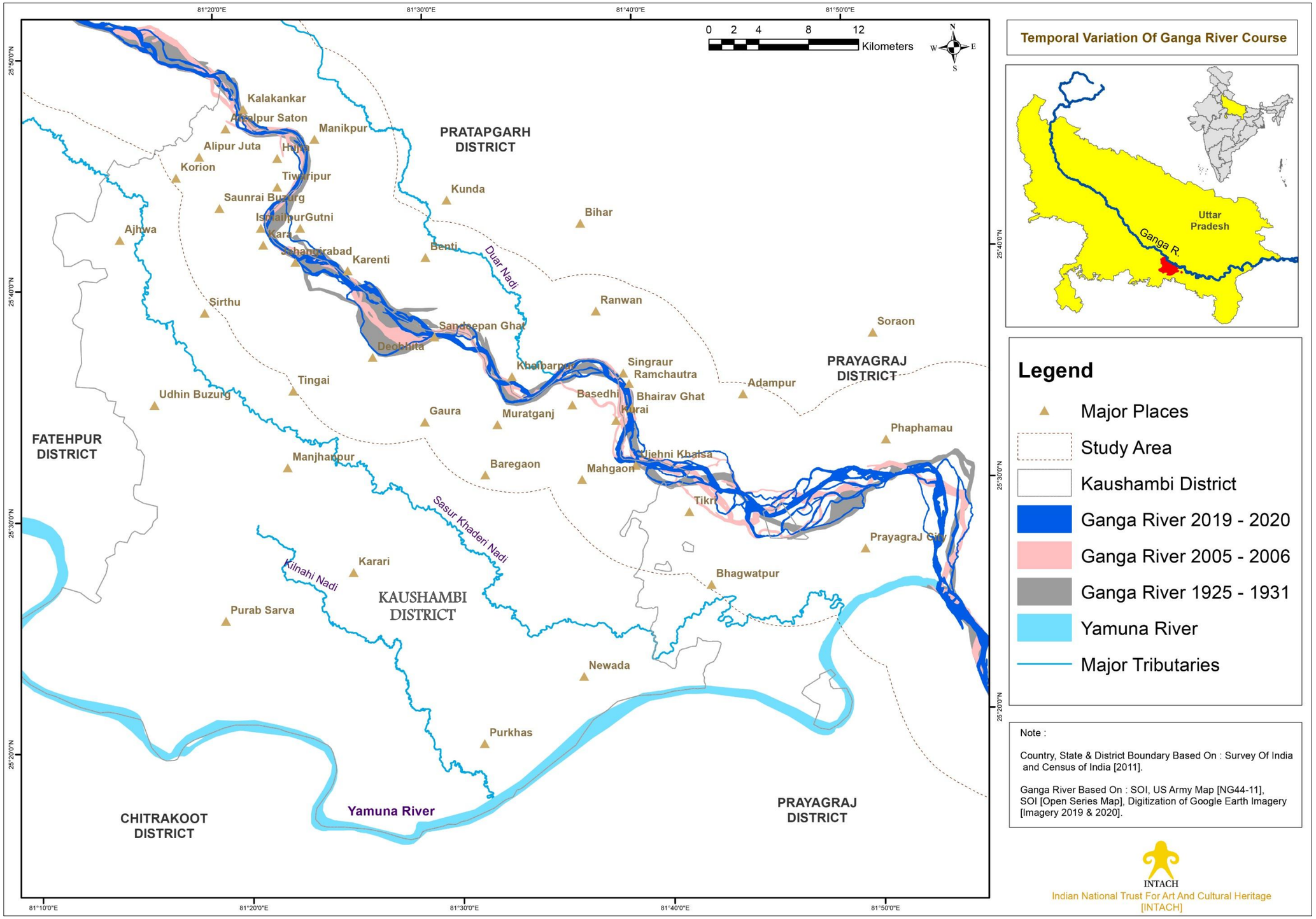
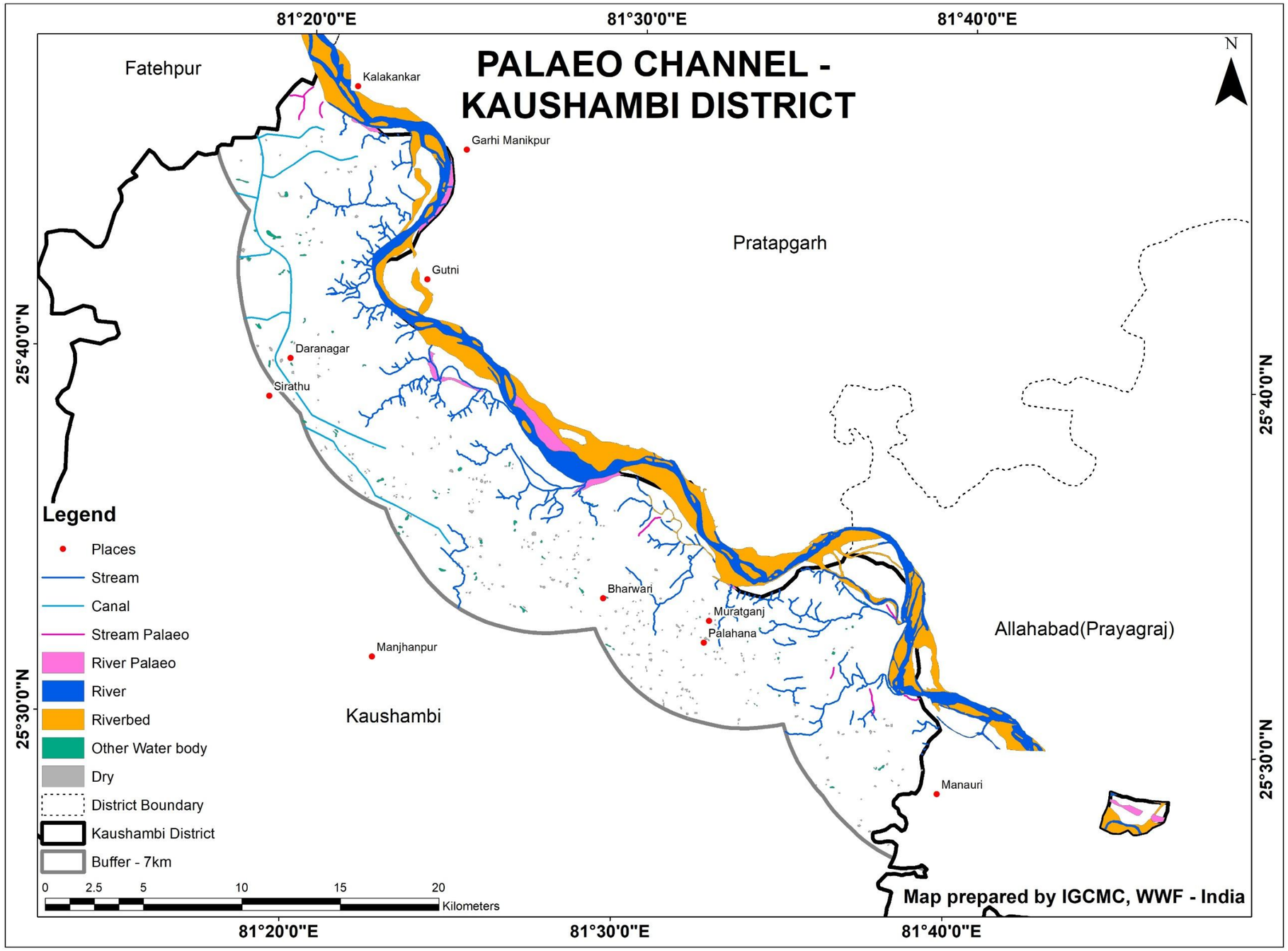


Image 15 : Faded Nara Near Chakia Village Showing in Satellite Imagery
[Source : Google Earth Pro, Imagery Dated, April 2021]



Map 5 : Temporal Variation Map of Ganga River Course [Kaushambi Distt.]



Map 6 : Paleochannels Within Study Area [Kaushambi Distt.]

7.0 Floodplain Of Ganga River In Kaushambi District

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 floodplain 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, 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 Distt.s, where it passes through, for agricultural purposes.

7.2 The fertile floodplain zone in the Distt. is used for agricultural practices. The study area is predominantly agrarian and agriculture is a main source of livelihood. *Rabi* and *Zaid* crops are mainly cultivated within active floodplain areas. During the survey, the floodplain region was dominated by crops such as Mustard, Wheat, Paddy, Bajra, Jowar and pulses like Chana and Arhar. Some of the vegetables planted in the study area were Potato, Brinjal, Green Chilli, Turnip and Green Peas. Singhara [*Trapa natans*] cultivation was also seen in the study region. Sugar Cane plantation found as cash crop within the study area. This is because the sandy loam soil deposited by the river provides appropriate physiographic conditions for the crop.

Table 4 : Floodplain Agricultural Produce Of Villages In Kaushambi Distt.

Village name	Flood Plain Produce
Afzapur Saton and Kanthua Village	Sugar Cane, Mustard, Wheat, Paddy, Bajra, Potato, Brinjal, Green Chilli
Lehdri Village	Sugar Cane, Chana, Arhar, Mustard, Wheat, Bajra

Shahzadpur	Wheat, Paddy, Potato, Green Peas, Potato, Mustard
Sangeti Village	Trapa, Turnip, Green Chilli, Mustard, Wheat

Image 16 : Potato Cultivation In Shahzadpur Village

Image 17 : Singhara [*Trapa Natans*] Cultivation In Akbarpur Village

8.0 Wetlands Within Study Area In Kaushambi District

As per the Wetlands (Conservation and Management) Rules, 2017 - "Wetland means an area of marsh, fen, peatland or water; whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters, but does not include river channels, paddy fields, human-made water bodies/ tanks Specifically constructed tor drinking water purposes and structures specifically constructed for aquaculture, salt production, recreation and irrigation purposes.''

8.1 Wetlands are highly productive ecosystems and help in maintaining ecological balance by providing food and habitat to large number of living organisms. They also help in controlling floods, recharging groundwater, nutrient recycling, climate stabilization and carbon sequestration. According to National Wetland Atlas [Uttar Pradesh], Wetlands constitute 5.16% geographic area of the Uttar Pradesh state and 4.9% area of the Kaushambi district. The majority [74%] area within the wetlands covered by the lotic system i.e., River/stream. The remaining 26% area is covered by lakes, ponds, oxbow lakes/ cut-off meanders, riverine wetlands, tanks, reservoir/barrages and waterlogged area.

8.2 In the current exercise, 164 wetlands have been mapped in the study area with the help of Google Earth satellite imagery and SOI-OSM available maps. Total area of the mapped wetlands is 199.02 ha i.e. 0.45% of the study area. The area of identified wetlands ranges between 0.28 ha to 9.29 ha. Out of 164 wetlands, the area of 95 wetlands is less than 1 ha, 55 wetlands have area between 1 ha and 2.5 ha and 14 wetlands have area greater than 2.5 ha. Area of the five largest wetlands constitutes 13.91% of the total study area. The list of identified wetlands is provided in Table No. 5 and their spatial distribution is shown in Map No. 7.

Table 5 : Wetland Within The Study Area

Sr. NO.	Wetland Name/ Wetland NO.	Coordinates		Area [Hectare]
		Latitude	Longitude	
1	1	25°28'12.54"N	81°39'32.55"E	0.52
2	2	25°27'7.88"N	81°38'38.98"E	1.70
3	3	25°27'14.32"N	81°38'30.30"E	0.74

4	4	25°27'14.98"N	81°38'16.75"E	0.57
5	5	25°28'28.28"N	81°38'48.50"E	1.39
6	6	25°27'36.83"N	81°37'41.95"E	1.19
7	7	25°29'18.84"N	81°37'55.70"E	3.67
8	8	25°29'28.22"N	81°38'8.64"E	0.63
9	9	25°29'50.44"N	81°38'10.88"E	0.77
10	10	25°29'57.53"N	81°38'34.63"E	0.44
11	11	25°29'20.61"N	81°37'48.97"E	1.59
12	12	25°29'13.57"N	81°37'36.27"E	0.84
13	13	25°28'57.68"N	81°37'39.45"E	1.27
14	14	25°28'36.80"N	81°36'44.73"E	0.57
15	15	25°28'45.45"N	81°36'31.36"E	2.64
16	16	25°28'57.59"N	81°36'22.83"E	1.74
17	17	25°30'0.05"N	81°35'45.88"E	0.56
18	18	25°30'55.05"N	81°36'15.91"E	0.46
19	19	25°30'56.53"N	81°34'44.23"E	0.45
20	20	25°30'30.08"N	81°33'38.05"E	1.14
21	21	25°32'26.83"N	81°36'23.74"E	2.12
22	22	25°33'7.66"N	81°36'38.78"E	0.87
23	23	25°33'7.44"N	81°36'45.56"E	0.68
24	24	25°30'58.05"N	81°34'5.46"E	0.96
25	25	25°31'4.57"N	81°33'52.67"E	1.81
26	26	25°32'14.28"N	81°34'44.61"E	0.89
27	27	25°32'26.00"N	81°34'46.37"E	0.67
28	28	25°32'30.89"N	81°34'25.19"E	0.40
29	29	25°32'7.29"N	81°33'42.27"E	0.50
30	30	25°32'12.59"N	81°33'42.14"E	0.62
31	31	25°31'45.64"N	81°33'31.17"E	1.61
32	32	25°31'3.16"N	81°32'13.89"E	1.94
33	33	25°30'56.24"N	81°32'20.47"E	0.52
34	34	25°30'46.36"N	81°31'53.66"E	0.93
35	35	25°30'49.35"N	81°31'21.15"E	0.86
36	36	25°30'56.02"N	81°31'20.52"E	0.50

37	37	25°33'3.33"N	81°34'9.66"E	1.42
38	38	25°32'17.45"N	81°33'39.20"E	0.40
39	39	25°32'4.09"N	81°33'9.63"E	0.46
40	40	25°31'16.40"N	81°32'1.65"E	4.24
41	41	25°31'7.49"N	81°31'51.93"E	0.69
42	42	25°31'5.31"N	81°31'45.77"E	0.72
43	43	25°30'59.09"N	81°31'8.23"E	0.47
44	44	25°31'3.46"N	81°31'5.59"E	0.62
45	45	25°31'38.99"N	81°31'12.63"E	1.75
46	46	25°32'31.96"N	81°32'28.90"E	0.64
47	47	25°32'42.99"N	81°32'33.60"E	2.19
48	48	25°33'35.37"N	81°33'49.15"E	0.51
49	49	25°32'49.45"N	81°32'6.37"E	1.33
50	50	25°32'18.34"N	81°31'27.68"E	0.50
51	51	25°32'20.11"N	81°31'17.73"E	0.46
52	52	25°32'13.84"N	81°30'53.77"E	0.57
53	53	25°33'40.81"N	81°32'37.63"E	0.57
54	54	25°33'23.54"N	81°32'37.38"E	0.50
55	55	25°32'58.57"N	81°32'12.48"E	0.58
56	56	25°33'1.71"N	81°31'50.19"E	1.23
57	57	25°33'1.15"N	81°31'41.63"E	2.10
58	58	25°32'53.42"N	81°31'45.31"E	1.00
59	59	25°31'54.20"N	81°30'12.18"E	0.72
60	60	25°31'58.04"N	81°30'2.57"E	0.55
61	61	25°32'10.22"N	81°30'3.14"E	1.00
62	62	25°32'15.60"N	81°29'30.75"E	0.55
63	63	25°32'20.30"N	81°29'45.09"E	0.86
64	64	25°32'26.84"N	81°29'37.02"E	1.77
65	65	25°33'32.44"N	81°32'0.67"E	0.68
66	66	25°33'43.18"N	81°32'8.18"E	0.54
67	67	25°33'45.94"N	81°32'24.97"E	1.47
68	68	25°33'45.33"N	81°31'9.35"E	0.55
69	69	25°33'11.07"N	81°30'26.22"E	0.52
70	70	25°33'19.02"N	81°30'29.83"E	0.62

71	71	25°33'35.87"N	81°30'20.91"E	1.20
72	72	25°33'40.42"N	81°30'28.98"E	0.73
73	73	25°33'53.26"N	81°28'47.51"E	4.34
74	74	25°33'48.34"N	81°28'52.31"E	0.42
75	75	25°32'47.38"N	81°28'13.05"E	0.80
76	76	25°33'17.84"N	81°28'44.26"E	0.98
77	77	25°33'43.69"N	81°29'29.21"E	2.23
78	78	25°34'33.10"N	81°30'57.36"E	1.26
79	79	25°32'44.79"N	81°27'44.80"E	1.86
80	80	25°32'50.17"N	81°27'52.56"E	1.40
81	81	25°33'44.07"N	81°28'24.30"E	0.96
82	82	25°35'23.00"N	81°30'10.75"E	1.16
83	83	25°33'16.72"N	81°26'55.34"E	5.45
84	84	25°34'8.64"N	81°27'48.71"E	1.00
85	85	25°34'53.49"N	81°29'9.00"E	0.73
86	86	25°35'39.94"N	81°29'17.25"E	0.59
87	87	25°34'53.76"N	81°28'29.89"E	1.10
88	88	25°34'5.68"N	81°26'3.30"E	0.53
89	89	25°34'28.38"N	81°26'49.50"E	0.66
90	90	25°35'44.41"N	81°28'34.42"E	0.56
91	91	25°36'16.74"N	81°28'49.55"E	0.48
92	92	25°36'40.82"N	81°29'24.66"E	1.24
93	93	25°34'30.39"N	81°26'13.17"E	0.87
94	94	25°34'7.05"N	81°25'31.37"E	4.28
95	95	25°33'59.61"N	81°24'23.97"E	1.10
96	96	25°34'17.57"N	81°24'34.80"E	1.11
97	97	25°35'2.72"N	81°25'37.58"E	4.33
98	98	25°35'40.30"N	81°26'40.04"E	1.38
99	99	25°35'56.49"N	81°25'17.97"E	1.60
100	100	25°35'8.28"N	81°23'8.31"E	0.57
101	101	25°35'14.70"N	81°23'4.56"E	1.67
102	102	25°35'15.78"N	81°23'13.94"E	0.72
103	103	25°35'22.51"N	81°23'14.57"E	1.65
104	104	25°35'18.48"N	81°24'12.24"E	0.86
105	105	25°37'12.36"N	81°26'22.08"E	2.86

106	106	25°36'45.73"N	81°25'39.24"E	0.58
107	107	25°36'48.17"N	81°23'56.72"E	0.46
108	108	25°36'10.11"N	81°22'10.88"E	0.60
109	109	25°36'29.12"N	81°22'18.01"E	0.71
110	110	25°36'40.82"N	81°22'38.06"E	4.26
111	111	25°36'33.60"N	81°22'40.89"E	0.76
112	112	25°36'44.34"N	81°22'55.08"E	0.43
113	113	25°37'18.01"N	81°23'38.53"E	0.77
114	114	25°37'44.03"N	81°24'13.85"E	2.10
115	115	25°37'27.46"N	81°23'28.13"E	0.59
116	116	25°36'49.83"N	81°22'3.74"E	0.53
117	117	25°36'36.44"N	81°21'39.43"E	0.66
118	118	25°37'3.78"N	81°22'1.56"E	0.31
119	119	25°37'40.77"N	81°22'33.13"E	0.30
120	120	25°37'51.09"N	81°23'6.81"E	0.58
121	121	25°38'3.03"N	81°23'26.47"E	0.46
122	122	25°38'26.12"N	81°23'34.80"E	1.36
123	123	25°37'37.69"N	81°20'34.79"E	1.89
124	124	25°37'50.13"N	81°21'6.93"E	1.24
125	125	25°38'48.70"N	81°21'19.43"E	0.61
126	126	25°39'11.89"N	81°21'24.24"E	1.79
127	127	25°39'20.83"N	81°20'12.84"E	0.76
128	128	25°38'57.70"N	81°19'37.53"E	0.87
129	129	25°38'59.23"N	81°19'53.64"E	0.65
130	130	25°39'48.30"N	81°21'52.17"E	1.12
131	131	25°39'46.98"N	81°20'30.91"E	0.83
132	132	25°39'52.41"N	81°20'59.26"E	0.40
133	Mahua Talab	25°40'38.94"N	81°20'48.65"E	1.45
134	134	25°40'38.38"N	81°20'53.20"E	0.68
135	135	25°39'43.94"N	81°19'38.98"E	1.41
136	136	25°39'13.55"N	81°19'22.34"E	0.58
137	137	25°39'42.01"N	81°19'0.43"E	1.82
138	138	25°40'17.33"N	81°19'44.19"E	1.14
139	139	25°42'25.36"N	81°19'8.02"E	1.16
140	140	25°42'35.48"N	81°18'17.79"E	2.64

141	141	25°42'45.03"N	81°19'54.82"E	3.97
142	Ramsagar	25°43'5.86"N	81°19'48.01"E	2.25
143	143	25°43'13.53"N	81°19'8.53"E	1.28
144	144	25°43'18.94"N	81°19'48.71"E	1.64
145	145	25°43'30.15"N	81°21'19.25"E	0.75
146	146	25°43'53.79"N	81°21'28.56"E	3.35
147	147	25°44'1.31"N	81°18'27.01"E	0.76
148	148	25°44'40.82"N	81°18'2.28"E	9.29
149	149	25°45'5.98"N	81°21'11.52"E	2.90
150	150	25°45'9.12"N	81°21'23.40"E	0.85
151	151	25°45'9.15"N	81°22'2.22"E	0.72
152	152	25°45'28.64"N	81°19'3.29"E	0.92
153	153	25°45'13.74"N	81°18'54.05"E	1.00
154	154	25°45'5.29"N	81°17'23.15"E	1.25
155	155	25°45'36.96"N	81°19'4.94"E	1.48
156	156	25°45'45.34"N	81°18'52.42"E	0.71
157	157	25°45'57.38"N	81°20'18.43"E	0.64
158	158	25°46'8.60"N	81°19'31.48"E	1.17
159	159	25°45'41.47"N	81°17'44.90"E	0.48
160	160	25°45'50.26"N	81°18'38.56"E	1.50
161	161	25°45'54.23"N	81°17'38.86"E	0.28
162	162	25°46'25.71"N	81°18'59.19"E	0.76
163	163	25°46'37.91"N	81°19'9.42"E	0.35
164	164	25°47'20.67"N	81°19'47.30"E	0.34
Total Area [Hectares]				199.02

8.3 Among identified wetlands, the Ramsagar Talab, Dargah Talab, Tadahar Talab and Mahua Talab were selected for sample survey. Ramsagar Talab and Mahua Talab is village ponds while Dargah Talab is a sacred pond and Tadahar Talab is a man made pond constructed because of brick kiln activities. The details of wetlands surveyed in Kaushambi Distt. are provided below :

8.3.1 **Ramsagar Talab :** It is a village pond located near Saunrai Buzurg and Naudiha Saunrai Buzurg at latitude 25°43'5.86"N and longitude 81°19'48.01"E [Refer Map 7 & Table No. 5 (Wetland No. 142)]. The wetland gets its water from rainfall and runoff from the surrounding areas and sewage from the nearby villages [Refer Image No. 19]. Maximum depth of the wetland found as 12-15 feet. Trees, mainly Mahua [*Madhuca longifolia*], *Peepal* [*Ficus religiosa*] *and Banyan* [*Ficus benghalensis*] are found along the wetland provide bank protection [Refer Image No 19].

Currently, wetland is on lease and used for the fish farming. Fish species found in the wetland includes – Rohu [*Labeo rohita]*, Catla [*Labeo catla]*, Brigid, Silver carp, Sawri, Padhina, Bhakur and Tengra [*Mystus tengara].*

Image 18 : Ramsagar Talab

Image 19 : Showing Sewage Discharge And Solid Waste Dumping In Ramsagar

8.3.2 **Dargah Talab :** It is located near Hishampur Pershakhi Uparhar at latitude 25°38'41.41"N and longitude 81°25'14.29"E. It is a sacred wetland having area of approximately 1 hectare, is associated with Hazrat Sayyed Salar Hans Dargah. A village pond separates Dargah from the wetland. The wetland gets its water from rainfall and runoff from the surrounding areas. Maximum depth of the wetland found to be 10-12 feet only. Currently, wetland is on lease and used for the fish farming. Fish species found in the wetland includes – Rohu [*Labeo rohita]*, Catla [*Labeo catla]*, Brigid, and Tengra [*Mystus tengara].* Trees Mainly Mahua [*Madhuca longifolia*]*, Peepal* [*Ficus religiosa*] and Khajur [*Phoenix sylvestris*] found along the wetland serve as nesting site for the avian species [Refer Image No. 20].

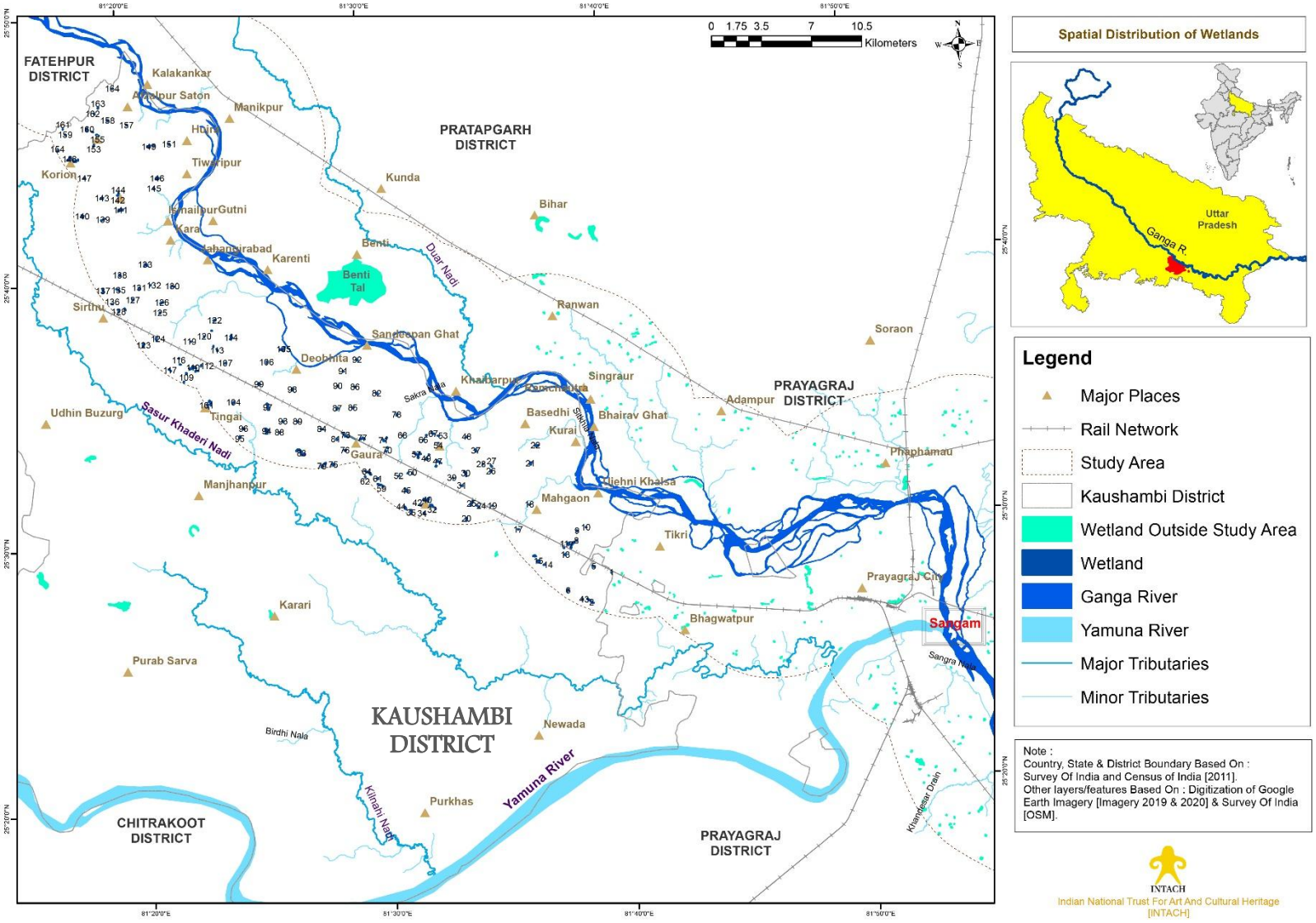
Image 20 : Talab Associated With Hazrat Sayyed Salar Hans Dargah

8.3.2 **Tadahar Talab :** It is located in Tadahar Village at latitude 25°37'18.11"N and longitude 81°25'13.33"E [Refer Image No. 21]. It is formed because of the brick kiln activities carried out for years within the bed of a Nara/Nala. Nara which once empties to River Ganga is now completely faded. The wetland gets its water from rainfall and runoff from the surrounding areas. Water spread area of the wetland is around 3.1 hectares and its depth is 4-5 m. Water of the wetland is used in brick making processes.

8.3.4 **Mahua Talab :** Mahua Talab is a village pond located in Gauspur Village at latitude 25°40'39.12"N and longitude 81°20'48.93"E [Refer Map 7 & Table No. 5 (Wetland No. 133)]. The wetland gets its water from rainfall and runoff from the surrounding areas and sewage from the Gauspur Village. Water spread area of the wetland is 1.45 hectares and its maximum depth is approximately 10 feet. Wetland got its name from the Mahua trees [*Madhuca longifolia*], *which* found at its bank. Currently, wetland is in eutrophic condition and is facing threat due to sewage discharge, dumping of solid waste and encroachment of wetland area for construction activities [Refer Image No. 22].

Image 21 : Tadahar Talab

Image 22 : Eutrophic Condition of Mahua Talab



Map 7 : Spatial Distribution Of Wetlands In The Study Area [Kaushambi Distt.]

9.0 Riparian Flora Along Ganga River In Kaushambi Distt.

9.1 The riparian areas, lying between the aquatic and the terrestrial habitats, serve as functional interfaces within the landscapes, mediating energy and matter between these two ecosystems. With dynamic environmental conditions and ecological processes, these areas tend to harbour 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, harbouring faunal diversity and providing livelihood resources [Groffman et al., 1990; Castelle 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 Auden [1941], Gupta [1960], Bhattacharyya and Goel [1982], Groffman et al. [1990], Krishanmurti [1991], Castelle al. [1994], Shyam [2008], Gangwar and Joshi [2006] and Gangwar and Gangwar [2011] which have explored the biodiversity of Ganga River basin. In addition, 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 [Bengal].

9.3 The pattern of riparian vegetation in Kaushambi distt. is similar to the adjoining districts – Fatehpur, Pratapgarh and Prayagraj. Major riparian sites are found between Afzalpur Saton, Kanthua and Lehdri Village, Girdharpur Garhi, between Akbarpur and Jahangirabad and along Nara in Shahzadpur Village. During the survey, total 42 species of 20 families were recorded. Dominated by grasses - *Saccharum spontaneum* L, *Saccharum munja* Roxb. and *Cynodon dactylon* along the river bank. The most common shrubs and herbs in the study region were *Croton bonplandianus, Parthenium hysterophorus* and *Ipomia sp.* The most common tree species that were present in the study area were Babool [*Acacia nilotica*], Neem [*Azadirachta indica*], Semal [*Bombax ceiba*], Shisham [*Dalbergia sissoo*], Banyan [*Ficus benghalensis*] and Peepal [*Ficus religiosa*].

9.4 Some riparian grasses are economically valuable in the district. *Saccharum spontaneum* and Saccharum *munja* are used for making huts, basket and ropes. Ropes [locally called

Juda] made of Saccharum *spontaneum* are more durable. A bundle of rope of nearly 1.5 Kg weight costs around 30 rupees and is sold at local market.

Table 6 : Recorded Riparian Plant Species Within Study Area

Sr. No.	Botanical Name	Family	Common Name
01	*Acacia nilotica* (L.) Delile	Fabaceae	Babool
02	*Aegle marmelos* (L.) Corrêa	Rutaceae	Bel Patra
03	*Azadirachta indica* A. Juss.	Meliaceae	Neem
04	*Bombax ceiba* L.	Bombacaceae	Semal
05	*Dalbergia sissoo* DC.	Fabaceae	Shisham
06	*Delonix regia (Hook.)* Raf.	Fabaceae	Gulmohar
07	*Ficus benghalensis* L.	Moraceae	Banyan
08	*Ficus religiosa* L.	Moraceae	Peepal
09	*Ficus virens* Aiton	Moraceae	Pakad
10	*Holoptelea integrifolia* Planch.	Ulmaceae	Chilbil
11	*Madhuca longifolia* var. latifolia (Roxb.) A.Chev.	Sapotaceae	Mahua
12	*Peltophorum pterocarpum* (DC.) K.Heyne	Fabaceae	Peela Gulmohar
13	*Polyalthia longifolia* (Sonn.) Thwaites	Annonaceae	False Ashok
14	*Tectona grandis* L.f.	Lamiaceae	Teak
15	*Calotropis gigantea* (L.) Dryand.	Apocynaceae	Safed Aak
16	*Calotropis procera* (Aiton) Dryand.	Apocynaceae	Aak
17	*Lantana camara* L.	Verbenaceae	~~~~~
18	*Lippia alba* (Mill.) N.E.Br. ex Britton &P.Wilson	Verbenaceae	~~~~~
19	*Malvastrum coromandelianum* (L.) Garcke	Malvaceae	False Mallow
20	*Ocimum tenuiflorum* L.	Lamiaceae	Tulsi

21	*Polygonum glabrum* Wild.	Polygonaceae	Common marsh buckwheat
22	*Ricinus communis* L.	Euphorbiaceae	Arandi
23	*Ziziphus nummularia* (Burm.f.) Wight &Arn.	Rhamnaceae	Wild Ber
24	*Achyranthes aspera* L.	Amaranthaceae	Chirchira
25	*Amaranthus spinosus* L.	Amaranthaceae	Prickly Amaranth
26	*Ammania baccifera* L.	Lythraceae	~~~~~~
27	*Croton bonplandianus* Baill.	Euphoriaceae	Ban Tulsi
28	*Justicia* sp.	Acanthaceae	~~~~~~
29	*Leucas aspera* (Willd.) Link	Lamiaceae	~~~~~~
30	*Parthenium hysterophorus* L.	Asteraceae	Congress grass
31	*Rumex dentatus* L.	Polygonaceae	Jungli Palak
32	*Solanum xanthocarpum* Schrad. & H. Wendl.	Solanaceae	Kateli
33	*Tephrosia purpurea* (L.) Pers.	Fabaceae	Sharpunkha
34	*Tridax procumbens* (L.) L.	Asteraceae	~~~~~
35	*Xanthium strumarium* L.	Asteraceae	Chhota Dhatura
36	*Cyperus difformis* L.	Cyperaceae	~~~~~
37	*Cyperus rotundus* L.	Cyperaceae	Nut grass
38	*Dicanthium annulatum*	Poaceae	~~~~~
39	*Saccharum spontaneum* L.	Poaceae	Kaans
40	*Saccharum munja* Roxb.	Poaceae	Munj
41	*Cynodon dactylon*	Poaceae	Dhoob/Durva grass
42	*Ipomea aquatica Forsk.*	Convolvulaceae	Water Morning Glory

Image 23 : Tree Line At Afzalpur Saton Ghat
[Ficus benghalensis, Ficus religiosa and *Mangifera Indica* covering the canopy, Herbage cover dominated by monoculture and *Saccharum spp.*]

Image 24 : Riparian Vegetation Dominated By *Saccharum spontaneum*
[*Madhuca longifolia* and *Mangifera Indica* covering the canopy]

10.0 Faunal Diversity Along Ganga River In Kaushambi Distt.

10.1 According to India State of Forest Report [2019], 1.56% geographical area of the district is under forest cover. In which moderately dense forest and open forest cover 5 Sq. Km and 22.83 Sq. Km areas respectively. Very dense forest in not present in the district[7]. Patches of riparian vegetation falls under open forest or shrub area and are spatially distributed along Ganga River and minor tributaries in the district. Riparian patches provides the habitat to Fox [*Vulpes bengalensis*], Hare [*Lepus ruficaudatus*], Indian Porcupine [Hystrix leucura], Golden Jackal [*Canis aureus*], Nilgai [*Boselaphus tragocamelus],* Indian wild boar [*Sus scrofa*], Indian mole rat [*Bandicota bengalensis],* Common mongoose [*Herpestes edwardsii*], *Rhesus macaque* [*Macaca mulatta*] and Langur [*Semnopithecus spp.*].

Image 25 : Rhesus macaque Sighted In Riparian Patch Near Afzalpur Saton

10.2 Details of faunal species sighted within the study corridor are provided below :

[7] India State of Forest Report [Uttar Pradesh], 2019
https://fsi.nic.in/isfr19/vol2/isfr-2019-vol-ii-uttar-pradesh.pdf

10.2.1 Turtles: River Ganga is home to 13 freshwater turtle species of total 24 species found in the freshwaters of India. Turtles are unique reptilian creatures having distinct ecological niche, adapted to specialized environmental conditions, slight alteration in the habitat can make the species extinct from the region. Poaching, habitat loss, pollution and over fishing are major threats to the turtles. During the survey **Indian Roofed Turtles** [*Pangshura tecta*] (approximately 50 numbers) which is listed in "**vulnerable**" category of IUCN's Red List of Threatened Species was sighted. According to the locals, the **Brown Roofed Turtle** [*Pangshura smithi*] which falls under "**Near Threatened**" Category and **Indian Soft-shell Turtle** [*Nilssonia gangetica]* under **"Endangered"** by IUCN are randomly sighted species in the region.

Image 26 : Indian Roofed Turtles [*Pangshura tecta*] At Riverine Island Near Kanthua

10.2.2 Gangetic Dolphin: Declared as National declared as the National Aquatic Animal by the Govt. of India in 2010, the Gangetic Dolphin [*Platanista gangetica*] is one of the three fresh water dolphins found in the world. Found in Ganga-Brahmaputra- Meghna and Sangu–Karnaphuli river systems in India, Nepal, and Bangladesh. The Gangetic Dolphin falls under "Endangered" category of IUCN's Red Data List, the population of these species has been decreased since the last century due to habitat loss, habitat fragmentation, diversion of water, over fishing and hunting (Sinha & Kannan, 2014; Abdul Wakid, 2005). During the survey, we did not have any direct sighting of the mammalian creature. Upon interaction with the mallah community, it is found that there is a sparse population of dolphin present in the stretch. Major sighting area

includes - Prayagraj-Kaushambi boarder area and confluences of streams like Manyarwa Nala, Sadhua Nala and Sakra Nala.

10.2.3 Nilgai: Nilgai [*Boselaphus tragocamelus*] or Blue bull has become one of the major threats in crop production, leading to human-wildlife conflict in various regions of the country. Usually prefer open grasslands, open scrublands, woodlands and agricultural fields as habitat. The population of Nilgai has increased drastically over the years due to prolonged breeding activity and lack of potential predators and has become locally overabundant in states of Gujarat, Bihar, Uttar Pradesh, Haryana, Punjab, Rajasthan, Madhya Pradesh and Delhi (Meena, 2017). The entire Gangetic plain is prone to crop raiding by the animal creating human-wildlife conflict across the region. During the survey, significant population was spotted across the district [Refer Image No. 27].

Image 27 : Group of Nilgai [*Boselaphus tragocamelus*] Sighted In Agricultural Field In Sangeti Village

10.2.4 Wild Boar: Wild Boars [*Sus scrofa* L.] are one of the most widely distributed species in the world. Their highly adaptive behaviour and wide range of habitat have led the species' population to flourish. In recent years, wild boar has become a regular menace for farmers, causes crop damage right from planting till the maturity of the crop [Vasudeva Rao et. al., 2015]. Famous for attacks on human, the wild boars are usually nocturnal species. During the survey, the locals stated that the boars are responsible for destroying the crops, potatoes and other vegetables. The tall riparian grasses serve as

habitat for them, during the night the wild boars use to come out and feed on the crops and vegetables.

10.2.5 Other fauna: During field survey and interactions with the locals some major faunal species recorded from study region in the district are in the table below:

Table 7 : Sighted Species Within Study Corridor

Common Name	*Scientific Name*	*Conservation Status*
Golden Jackal	*Canis aureus*	Least Concern
Indian Grey Mongoose	*Herpestes edwardsii*	Least Cocern
Bengal Monitor	***Varanus bengalensis***	**Near Threatened**
Danaid Eggfly (Butterfly)	*Hypolimnas misippus*	Least Concern
Peacock Pansy (Butterfly)	*Junonia almana*	Least Concern
Blue Jay (Butterfly)	*Graphium doson*	Least Concern
Common Mime (Butterfly)	*Papilio clytia*	Least Concern
Common Grass Yellow (Butterfly)	*Eurema brigitta*	Least Concern
Common Bush Brown (Butterfly)	*Mycalesis janardana*	Least Concern

Image 28 : Golden jackal [Canis aureus] Sighted Near Shahzadpur Village

Image 29 : Peacock Pansy [*Junonia almana*]

Image 30 : Common Bush Brown *[Mycalesis janardana*]

10.3 Avian Diversity: Kaushambi District has a rich diversity of avian species yet is relatively understudied. The avian diversity survey was conducted in November 2021. The diversity was recorded using binoculars and identified using field guides (Salim Ali, 2012; Grimmett et al., 2016). The conservation status of the species was listed by using IUCN Red Data List. Based on the survey following observations were made :

- Total 77 avian species were sighted during the survey of Kaushambi District. Out of which 23 were wetland species and 54 species were of forest and grassland.
- Little Egret, Cattle Egret, Indian Pond Heron, White-breasted Waterhen, Asian Pied Starling' House Sparrow, Indian Jungle Crow, House Crow, Common Pigeon, Common Myna, Red-wattled Lapwing and Eurasian Collared Dove were the most frequently sighted species.
- **River Tern** has the "**Vulnerable"** status, **River Lapwing** and **Alexandrine Parakeet** falls under "**Near Threatened"** category and **Palas's Fish Eagle** has been listed as "**Endangered"** in IUCN's Red List of Threatened Species. (IUCN Red Data List).
- **Black-headed Gull**, **Brown-headed Gull**, **Whiskered Tern**, **White Wagtail**, **Common Greenshank**, **Black Redstart**, **White Wagtail**, **Grey Wagtail**, **Yellow Wagtail, Common Sandpiper** and **Common Stonechat** are the winter visitors, migrate from the north-western areas of the Indian Sub-Continent and Northern Himalayas, sighted along the river in the district. **Indian Cormorant** and **Barn Swallow** are local migrant, migrates to the Gangetic Plains in the winters. (Birds of Indian Subcontinent: Richard Grimmett, Carol Inskipp and Tim Inskipp).

Table 8 : List Of Recorded Avian Species Within Kaushambi District

Sr. No.	Common Name	Scientific Name	Conservation Status
1.	White throated Kingfisher	*Halcyon smyrnensis*	Least Concern
2.	Pied Kingfisher	*Ceryle rudis*	Least Concern
3.	Cattle Egret	*Bubulcus ibis*	Least Concern
4.	Little Egret	*Egretta garzetta*	Least Concern
5.	Intermediate Egret	*Ardea intermedia*	Least Concern
6.	Great Egret	*Ardea alba*	Least Concern
7.	Indian Pond Heron	*Ardeola grayii*	Least Concern
8.	Grey Heron	*Ardea cinerea*	Least Concern
9.	Purple Heron	*Ardea purpurea*	Least Concern
10.	Common Sandpiper	*Actitishypoleucos*	Least Concern

11.	Asian Openbill	*Anastomus oscitans*	Least Concern
12.	Little Cormorant	*Microcarbo niger*	Least Concern
13.	Indian Cormorant	*Phalacrocorax fuscicollis*	Least Concern
14.	Great Cormorant	*Phalacrocorax carbo*	Least Concern
15.	White breasted - Waterhen	*Amaurornis phoenicurus*	Least Concern
16.	Black-headed Gull	*Larus ridibundus*	Least Concern
17.	Brown-headed Gull	*Larus brunnicephalus*	Least Concern
18.	Purple Swamphen	*Porphyrio porphyrio*	Least Concern
19.	**River Tern**	***Sterna aurantia***	**Vulnerable**
20.	Whiskered Tern	*Chlidonias hybrida*	Least Concern
21.	Common Greenshank	*Tringa nebularia*	Least Concern
22.	Black-winged Stilt	*Himantopus himantopus*	Least Concern
23.	Bronze-winged Jacana	*Metopidius indicus*	Least Concern
24.	**River Lapwing**	***Vanellus duvaucelii***	**Near Threatened**
25.	Red-wattled Lapwing	*Vanellus indicus*	Least Concern
26.	Black Drongo	*Dicrurus macrocercus*	Least Concern
27.	Common Myna	*Acridotheres tristis*	Least Concern
28.	Bank Myna	*Acridotheres ginginianus*	Least Concern
29.	Asian Pied Starling	*Gracupica contra*	Least Concern
30.	Brahminy Starling	*Sturnia Pagodarum*	Least Concern
31.	Paddyfield Pipit	*Anthus rufulus*	Least Concern
32.	Common Stonechat	*Saxicola torquatus*	Least Concern
33.	Pied Bushchat	*Saxicola caprata*	Least Concern
34.	Oriental Skylark	*Alauda gulgula*	Least Concern
35.	Common Babbler	*Argya caudata*	Least Concern
36.	Jungle Babbler	*Argya striata*	Least Concern
37.	Large Grey Babbler	*Argya malcolmi*	Least Concern
38.	White Wagtail	*Motacilla alba*	Least Concern
39.	White-browed Wagtail	*Motacilla maderaspatensis*	Least Concern
40.	Indian Silverbill	*Euodice malabarica*	Least Concern

41.	Common Tailorbird	*Orthotomus sutorius*	Least Concern
42.	**Alexandrine Parakeet**	***Palaeornis eupatria***	**Near Threatened**
43.	Rose-ringed Parakeet	*Psittacula krameri*	Least Concern
44.	House Sparrow	*Passer domesticus*	Least Concern
45.	Indian Jungle Crow	*Corvus culminatus*	Least Concern
46.	Oriental Magpie Robin	*Copsychus saularis*	Least Concern
47.	Indian Robin	*Saxicoloides fulicatus*	Least Concern
48.	Common Pigeon	*Columba livia*	Least Concern
49.	Barn Swallow	*Hirundo rustica*	Least Concern
50.	Asian Plain Martin	*Riparia chinensis*	Least Concern
51.	Brown-headed Barbet	*Psilopogon zeylanicus*	Least Concern
52.	Coppersmith Barbet	*Psilopogon haemacephalus*	Least Concern
53.	Ashy Prina	*Prinia socialis*	Least Concern
54.	Plain Prinia	*Prinia inornata*	Least Concern
55.	Asian Koel	*Eudynamys scolopaceus*	Least Concern
56.	Greater Coucal	*Centropus sinensis*	Least Concern
57.	Red-whiskered Bulbul	*Pycnonotus jocosus*	Least Concern
58.	Red-vented Bulul	*Pycnonotus cafer*	Least Concern
59.	Shikra	*Accipiter badius*	Least Concern
60.	Common Kaestral	*Falco tinnunculus*	Least Concern
61.	Black-winged kite	*Elanus caeruleus*	Least Concern
62.	Green Bee-eater	*Merops orientalis*	Least Concern
63.	**Pallas's Fish Eagle**	***Haliaeetus leucoryphus***	**Endangered**
64.	Scaly-breasted Munia	*Lonchura punctulata*	Least Concern
65.	Indian Peafowl	*Pavo cristatus*	Least Concern
66.	Spotted Dove	*Spilopelia* chinesis	Least Concern
67.	Eurasian Collared Dove	*Streptopelia decaocto*	Least Concern

68.	Laughing Dove	*Spilopelia senegalensis*	Least concern
69.	Red Collared Dove	*Streptopelia tranquebarica*	Least concern
70.	Yellow-crowned Woodpecker	*Leiopicus mahrattensis*	Least concern
71.	Black Redstart	*Phoenicurus ochruros*	Least concern
72.	Grey Fancolin	*Ortygornis pondicerianus*	Least concern
73.	Yellow-footed Green-pigeon	*Treron phoenicopterus*	Least concern
74.	Rufous Treepie	*Dendrocitta vagabunda*	Least concern
75.	Purple Sunbird	*Cinnyris asiaticus*	Least concern
76.	Indian Roller	*Coracias benghalensis*	Least concern
77.	Indian Grey Hornbill	*Ocyceros birostris*	Least Concern

Image 31 : Flock of Brown-headed Gulls [*Larus brunnicephalus*]

Image 32 : River Lapwing [*Sterna aurantia*], Vulnerable Sighted At Ganga River Bank

Image 33 : Indian Cormorant [*Phalacrocorax fuscicollis*]

11.0 Ganga Riverine Islands In Kaushambi Distt.

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]. 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].

11.1 Riverine Island is present throughout the stretch of River Ganga Within Kaushambi Distt.. There are five major islands identified and documented within the district. Jurisdiction of the riverine islands lies in Kaushambi-Pratapgarh and Kaushambi-Prayagraj Distt.. The species – *Saccharum spontaneum*, Saccharum munja and Ziziphus spp. dominates the riparian flora of the island. Details of the riverine island are provided in Table No. 10.

Table 9 : Details Of The Riverine Island Within Kaushambi District

Sr. No.	Nearest Settlement	Coordinates		Status
		Latitude	Longitude	
1	Kanthua [Right Bank] [Refer Image No. 35 & 36]	25°46'35.95"N	81°21'37.11"E	Area approx. 1.40 Sq. Km. Jurisdiction : Kaushabi and Pratapgarh Distt. Land Use : Agriculture Vegetation: Mainly *Saccharum spontaneum*, Saccharum munja
2	Lehdri [Right Bank] [Refer Image No. 37]	25°45'17.36"N	81°23'54.62"E	Area approx. 1.93 Sq. Km. Jurisdiction : Kaushabi and Pratapgarh Distt. Land Use : Agriculture has recently started. Vegetation : Mainly *Saccharum spontaneum*, Saccharum munja
3	Jahangirabad [Right Bank]	25°40'25.93"N	81°24'44.83"E	Area approx. 1.68 Sq. Km. A bridge is under construction

	[Refer Image No. 38]			at eastern end of the island Jurisdiction : Kaushabi and Pratapgarh Distt. Land Use : Agriculture Vegetation : Mainly *Saccharum spontaneum*, Saccharum munja
4	Tarsora & Sangeti [Right Bank] [Refer Image No. 39]	25°37'32.55"N	81°27'30.61"E	Area approx. 12.7 Sq. Km. Jurisdiction : Kaushabi and Pratapgarh Distt. Land Use : Most of the area is utilized for agricultural activities, Cremation and Burial ground Vegetation : Riparian vegetation is shrinking and is mainly *Saccharum spontaneum*, Saccharum munja
5	Ujehni Khalsa [Right Bank] [Refer Image No. 39 & 40]	25°31'44.68"N	81°38'47.86"E	Area approx. 2.75 Sq. Km. Jurisdiction : Kaushabi and Prayagraj Distt. Land Use : Agricultural activities in parts of the island Vegetation : Mainly *Saccharum spontaneum*, Saccharum munja

11.2 Apart from the identified islands there are several sand bars and emerging islands present within the district [Refer Image No. 34]. These islands are not stable and changes continuously. Area of most of the sand bar is under cultivation for *Zaid crops* and vegetables and wheat [in few areas]. Sand bar located near Kanthua village and Jahangirabad village is found as major turtle habitat within the district. Some sand bar located near settlements is utilized as burial grounds.

Image 34 : Image Showing Emerging Island

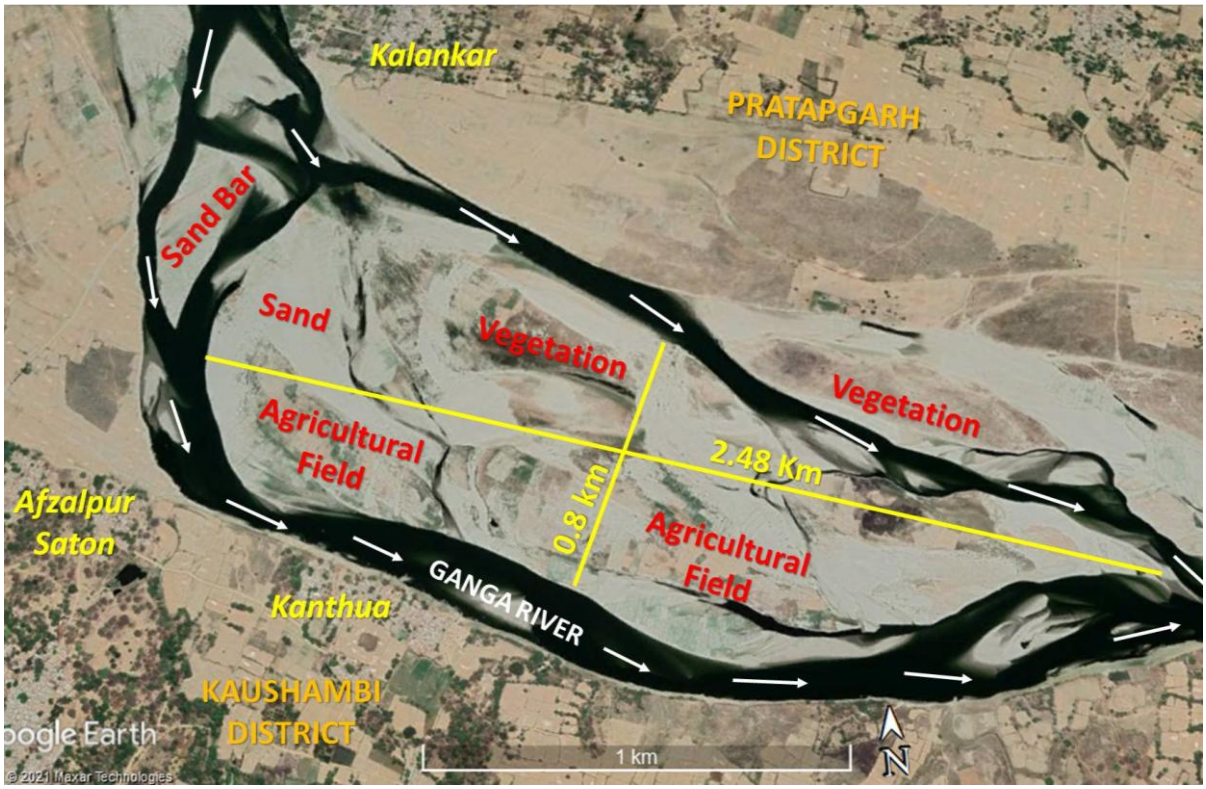


Image 35 : Satellite Imagery Showing Riverine Island Near Kanthua Village

[Source : Google Earth Imagery, May 2021]

Image 36 : Riverine Island Near Kanthua Village

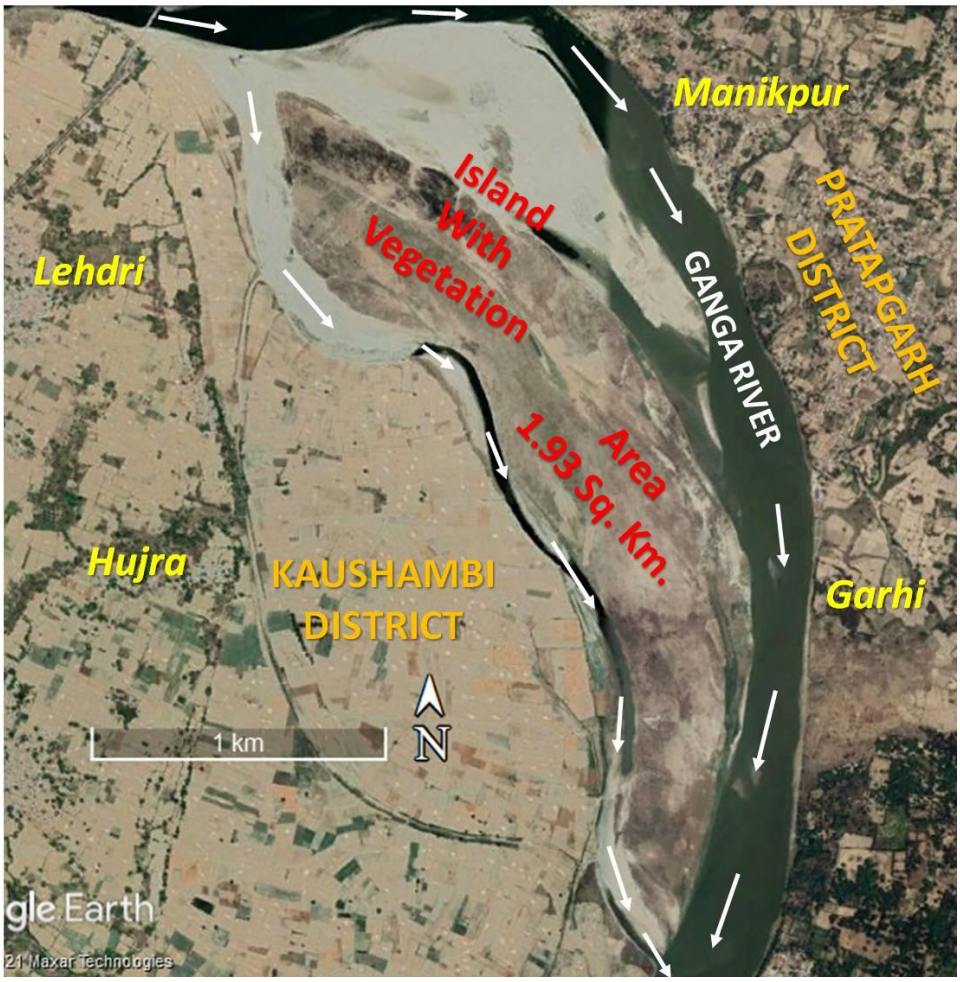


Image 37 : Riverine Islands Near Lehdri Village And Hujra Village

[Source : Google Earth Imagery, May 2021]

Image 38 : Satellite Imagery Showing Riverine Island Near Jahangirabad

[Source : Google Earth Imagery, November 2021]

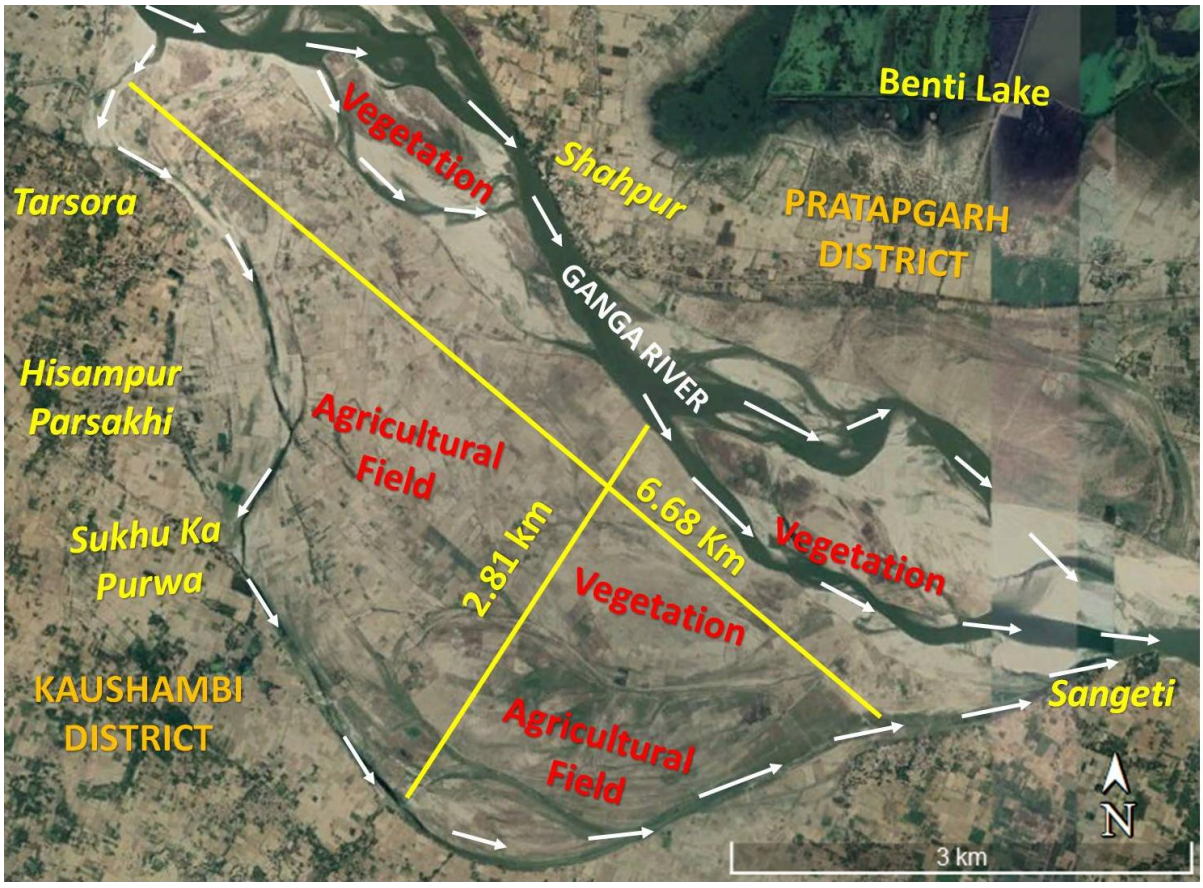


Image 39 : Satellite Imagery Showing Riverine Island Near Tarsora And Sangeti

[Source : Google Earth Imagery, November 2021]

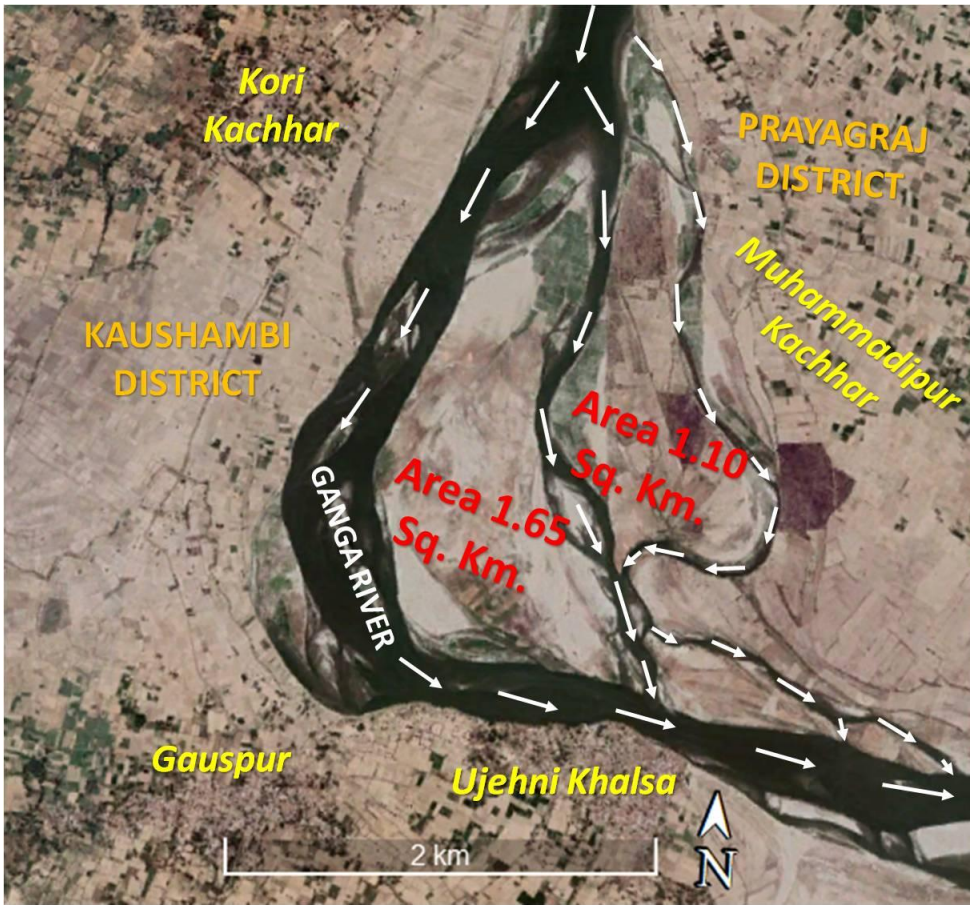


Image 40 : Satellite Imagery Showing Sand Bar Located at 25°13'2.73"N, 82°20'45.71"E

[Source : Google Earth Imagery, May 2021]

Image 41 : Riverine Island Near Ujehni Khalsa Village

12.0 Fishing In Kaushambi Distt.

12.1 Fish resources of Ganga River have been an important source of livelihood and food security for millions of people residing along its banks. Ganga river supports a diverse fish fauna with about 260 species reported for Indian waters (Sinha and Khan, 2001) among which about 35 species have been identified as having highest commercial value including carps (Cyprinidae), snakeheads (Channidae) and catfish (Siluriformes) (Islam et al., 2006). In recent years, the diversity and population of the fish resources have declined due to various anthropogenic factors. The factors are – deterioration of water quality, damming, introduction of exotic species, alternation in migratory routes of fishes and use of small mesh sizes of fishing nets.

12.2 The boats used for fishing are small sized and hand-rowed made usually from 'Sakhua/Sal' wood [*Shorea robusta*] and sometimes from 'Jamun' wood [*Syzygium cumini*] as well. These boats were earlier mainly constructed using the raw materials available in the villages by local Mallah community members. However, currently only some natives construct these boats by themselves while majority are dependent upon 'Mistry' [carpenters] from other villages for this.

12.3 In the district, the Mallah community is mainly involved in the fishing activity throughout the Ganga stretch [Refer Image No. 43 & 44]. The hook and line, drag net and cast net is common fishing gears among fishermen in the district. According to fishermen community they get a good catch in post- monsoon season. During that period, gill nets and seine nets were kept overnight in waters and removed early in the morning.

12.4 As stated by the local fishermen, the fish population in the district has decreased drastically in the last 15-20 years by 60% to 70%. This significant decrease in fish population has adversely affected the livelihood of the Mallah community forcing them to seek alternate source of income. During the survey total 12 species of fishes were recorded which are listed below. Singhi [*Heteropneustes fossilis*], Common/Chinese carp [*Cyprinus carpio*] and Rohu [*Labeo rohita*] were the most common caught species by the fishermen.

Table 10 : List of Fish Species Recorded In Ganga Stretch In Kaushambi District

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.	*Cyprinus carpio*	Common/Chinese carp
6.	*Channa punctata*	Garai
7.	*Eutropiichthys vacha*	Bachwa
8.	*Anguilla bengalensis*	Baam
9.	*Cirrhinus mrigala*	Naini
10.	*Mastacembelus armatus*	Gaichi
11.	*Cabdio morar*	Chepua
12.	*Heteropneustes fossilis*	Singhi
13.	*Bagarius yarrelli*	Goonch
14	*Puntius chola*	Pothiya
15.	*Sperata seenghala*	Singhara

Image 42 : Common Carp [Cyprinus carpio]

Image 43 : Fishing In Ganga River Near Sandeepan Ghat

Image 44 : Fishing In Ganga River Near Shahzadpur

13.0 Groundwater Conditions In Kaushambi District

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. It is also influenced by human induced factors like groundwater withdrawal and changes in land use pattern. Kaushambi Distt. lies in doab region of Ganga and Yamuna river system and is characterized by five geomorphic units - the Floodplain, Younger Alluvial plain, Older alluvial plain, Alluvial plain with salt encrustation and Ravenous land. The Geological setup of the Distt. comprises of rocks of Vindhyan super group [Kaimur group of rocks consisting of shale and sandstone] and Quaternary sediments, which further classified into older and newer Alluvial[8]. Older alluvial soil consists broadly - Bhur or sandy, Matiyar or clay rich and Domat or loam soil.

13.2 Groundwater occurs in thick zone of saturation of unconsolidated sediments which comprises Two-tier aquifer system - Tier I [Ground level to 120 meter, Phreatic] and Tier II [150m to basement, Confined]. According to Groundwater brochure of Kaushambi District, (2012-2013) approximately 70% area of the district shows depth to water level between 10 to 15 mbgl while 30% area shows depth to water level between 15 to 20 mbgl. The ten years trend (2003-2013) of pre-monsoon and post-monsoon shows a decline trend. The range of decline at Lehdri village in Kara block is 14 cm/year during pre-monsoon and 0.009 cm/year in post-monsoon respectively. Based on groundwater resource utilization, Central Ground Water Board (CGWB) has assessed the block wise ground water resource throughout the country. The assessment for year 2009, 2011, 2013, 2017, and 2020 for the blocks of Kaushambi district, which lies within study area is provided in the table below.

Table 11 : Block Wise Groundwater Resource Assessment [Study Area Only]

Block Within Study Area	2009 Assessment[9]	2011 Assessment[10]	2013 Assessment[11]	2017 Assessment[12]	2020 Assessment[13]
Kara	Critical	Over-	Critical	Semi-Critical	Semi-Critical

[8] Ground Water Brochure of Kaushambi District, Uttar Pradesh [2012-2013] http://cgwb.gov.in/District_Profile/UP/Kaushambi.pdf
[9] Dynamic Ground Water Resources of India, CGWB (As on 31 March 2009).
[10] Dynamic Ground Water Resources of India, CGWB (As on 31 March 2011).
[11] Dynamic Ground Water Resources of India, CGWB (As on 31 March 2013).
[12] Dynamic Ground Water Resources of India, CGWB (As on 31 March 2017).
[13] Dynamic Ground Water Resources of India, CGWB (As on 31 March 2020).

		Exploited			
Sirathu	Over-Exploited	Over-Exploited	Over-Exploited	Semi-Critical	Semi-Critical
Muratganj	Critical	Over-Exploited	Over-Exploited	Over-Exploited	Over-Exploited
Chail	Over-Exploited	Over-Exploited	Over-Exploited	Over-Exploited	Over-Exploited

13.3 During field visits, the survey team has interacted with local communities throughout the study corridor. In almost every village dug well is still in use. It has been also observed that groundwater of the study area is declining. This situation is similar to the ground water conditions of study area within adjoining districts [Pratapgarh, Fatehpur and Prayagraj Distt.]. It has been observed that the use of dug well is declined in last 15-20 years. One major cause of this decline is drying of dug wells in summer season and lack of maintenance and increase in number of hand pumps. The abandoned dug wells should be restored and may be used for groundwater recharge.

13.4 Major interaction sites for groundwater observations are – Afzalpur Saton, Kanthua Village, Ujehni Khalsa, Saunrai Buzurg, Tiwaripur Village, Vrindavan Ghat [Near Jaichand Fort], Kara [Kada Dham], Chaturmukh Ghat, Akbarpur Village, and Shahzadpur. The groundwater observations were noted and are presented in Table No. 10.

Table 12 : Water Levels In Dug Wells (Based on interactions with local communities)

Sr. No.	Location	Coordinates	GW Level (in feet)	
			Post-Monsoon	Pre-Monsoon
1	Afzalpur Saton	25°46'42.19"N, 81°20'20.56"E	75-80	85
2	Kanthua Village	25°46'25.24"N, 81°20'46.52"E	75-80	85
3	Ujehni Khalsa	25°31'17.34"N, 81°39'14.64"E	100-110	120
4	Saunrai Buzurg	25°43'4.90"N, 81°19'56.84"E	80-85	90
5	Tiwaripur Village	25°44'2.37"N, 81°22'43.96"E	80	~~~~

6	Vrindavan Ghat [Near Jaichand Fort]	25°42'2.49"N, 81°22'4.65"E	120-125	~~~~
7	Kara [Kada Dham]	25°41'41.93"N, 81°21'50.91"E	90-100	120-140
8	Akbarpur Village	25°41'4.20"N, 81°22'53.30"E	100	~~~~
9	Shahzadpur	25°39'21.08"N, 81°24'51.36"E	120-130	~~~~
10	Deobhita	25°36'27.15"N, 81°26'51.32"E	55-60	70-80

Image 45 : An Old Well In Deobhita Village [25°36'27.15"N, 81°26'51.32"E]

14.0 Ganga River Bank In Kaushambi Distt.

14.1 Ganga River bank in Kaushambi district may be classified on the basis of land use and land cover. The possible classes could be – Built-up area [Settlements, Temple Complexes, cremation sites and burial ground], Vegetation [Plantation and riparian vegetation patches] and agricultural fields. Out of three classes, the vegetation area especially the riparian vegetation area along the River Ganga and streams/ Nara are decreasing day by day due to conversion of riparian zone into the agricultural fields and cutting of trees and shrubs for cremation. During interaction with the local communities, it has been observed that the river bank area which has riparian vegetation is now provided by the local administration to the farmers on lease [locally called *patta*] for agricultural activities. The newly developed agricultural fields can be easily seen along Ganga River in Afzalpur Saton and Kanthua Village [Near Bhueya Baba Temple]. River bank area, which has recently converted into agricultural fields, is prone to lateral erosion [Refer Image No. 46 & 47]. Rills and gullies may also develop in such areas.

Image 46 : Satellite Imagery Of Year 2010 - Showing Riparian Vegetation and Agricultural Fields along Ganga River In Kaushambi Distt.

[Source : Google Earth Imagery, February 2010]

Image 47 : Satellite Imagery Of Year 2020 - Showing Riparian Vegetation and Agricultural Fields along Ganga River

[Source : Google Earth Imagery, February 2020]

14.2 Riparian vegetation on the upland tracts in the Kaushambi, Pratapgarh, Prayagraj, Mirzapur and Bhadohi Distt. are site of penance and meditation for generations. Several sacred caves of sages are found within these riparian patches. Within Kaushambi district, approximately 50-60 years old sacred cave associated with Mauni Baba is located within Bhueya Baba temple complex at latitude 25°46'19.30"N and longitude 81°21'55.70"E. The mouth of the cave opens towards Ganga River [Refer Image No. 48 & 49]. Strong local beliefs and rituals act as catalyst for the protection of riparian patches in some areas. Apart from the riparian patches, there are several temple complexes and sacred ghats [like Bhueya Baba temple complex, Sandeepan Ghat and Kurai Ghat] along the river bank which play a vital role in the bank stability as there are several trees found to be associated with these temples [Refer Image No. 50].

Image 48 : Mouth of Sacred Cave Of Mauni Baba [Opens Towards Ganga River]

Image 49 : Sacred Cave of Mauni Baba
[**A.** Mauni Baba Cave, **B.** Entrance of Mauni Baba Cave]

Image 50 : Stable Bank of River Ganga Near Bhueya Baba Temple Area [Right Bank]

14.3 Cremation Ground Along Ganga River Bank In Kaushambi District

14.2.1 Ganga River Banks are used for cremation and burial ground for generations. There are nine major cremation sites identified within distt. along the river. Out of that, five are cremation sites, three are cremation and burial sites and one is burial ground. Burial in Hindu religion is common in Kaushambi District [Major site near Afzalpur Saton], Pratapgarh District, Prayagraj District, [Major site at Sringverpur] and Bhadohi District. During field visits it has been observed that burial ground is not restricted to particular site and can been done at any sand bar of the Ganga River [Refer Image No. 51]. This is because Ganga River and its active floodplain is considered as sacred and burial within the region is equivalent to the cremation.

14.2.2 For cremation of a body requires approximately 250-300 kg wood depending on the body weight. The wood of mango *[Mangifera indica]* is preferred for the cremation. During unavailability of mango wood use of *acacia nilotica, prosopis juliflora, Saccharum munja Saccharum spontaneum, Desmostachya bipinnata* and cow dung cake is common. Depending upon the availability, other riparian grasses are also used to cremate. The cost of the wood ranges Rs. 300-400 per quintal. The overall cost

of each cremation goes upto 1500-2000 rupee. The cost of cremation maybe higher for the poor families belongs to local communities. Thus, some of them prefer to go for burial rather than cremation. Burials are also done to the dead bodies of kids, teens and sages. Burials are usually done at Ganga River sand at a depth of 5-6 feet.

Image 51 : Burial Ground At Sand Bar In Shahzadpur Village

Table 13 : Cremation And Burial Sites In The Study Area

Site	Location		Burial Site/ Cremation Site
	Latitude	Longitude	
Afzalpur Saton	25°47'8.47"N	81°20'52.44"E	Burial and Cremation Site
Lehdri [Ganga Bridge Ghat]	81°22'54.89"E	81°22'54.89"E	Burial and Cremation Site
Hanuman Ghat [Kara Dham]	25°42'9.46"N	82°23'21.56"E	Cremation site
Akbarpur	25°41'20.78"N	81°22'41.11"E	Cremation Site
Shahzadpur	25°39'48.62"N	81°25'18.47"E	Burial Ground
Shahzadpur	25°39'25.90"N	81°24'48.71"E	Cremation Site
Sangeti [Sandeepan Ghat]	25°37'14.41"N	81°29'55.63"E	Cremation Site
Badanpur Ghat	25°34'53.02"N	81°35'19.67"E	Cremation Site
Tajpur Ghat	81°38'11.24"E	25°31'54.47"N	Cremation and Burial Site

Image 52 : Cremation Site At The Edge of River Ganga Near Lehdri [Ganga Bridge Ghat]
[Site Lacking Cremation Infrastructure]

Image 53 : Abandoned Cremation Infrastructure At Shahzadpur Village

14.4 Ganga Bank Erosion In Kaushambi Distt.

14.4.1 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 land use change, excessive grazing and farming, removal of riparian vegetation and construction brick kilns in flood plain area. It is well known that exposed soil may erode rapidly (Singh et al., 2004).

14.4.2 Depending on the intensity and severity of erosion, the study area [7km Buffer] maybe grouped under slight erosion category. However, increasing number of brick kilns, decrease in riparian vegetation and extensive agricultural activities may increase the rate of erosion. The lateral erosion of the banks occurs under intense rainfall accompanied by torrential flow in rivulets generating vast quantities of sediment transported downstream.

14.4.3 There are 37 lateral erosion sites marked within the study area with the help of satellite imagery [2020-2021] and is provided in Table 15. Few selected erosion prone sites were assessed during field visit. Major eroded sites are found near village – Afzalpur Saton, Kanthua, Kara, Akbarpur, Jahangirabad, Gansari, Basedhi, Mohanapur, Fardipur Chak Tejpur and Ujehni Khalsa. Area between Afzalpur Saton and Kanthua village is susceptible to lateral erosion because of conversion of riparian vegetation area into agricultural fields [Refer Image No. 54].

Table 14 : Erosion Prone Sites

Sr. No.	Latitude [N]	Longitude [E]	Nearest Settlement
1	25°48'17.16"N	81°20'29.31"E	Near Afzalpur Saton and Kanthua Village [Right Bank]
2	25°47'53.71"N	81°20'40.40"E	
3	25°47'1.42"N	81°20'52.81"E	
4	81°20'53.98"E	25°46'48.12"N	
5	25°46'43.26"N	81°20'55.97"E	
6	25°46'21.87"N	81°22'29.70"E	Near Lehdri Village [Right Bank]
7	25°43'13.74"N	81°22'22.73"E	Near Girdharpur Garhi [Right Bank]
8	25°42'3.90"N	81°22'4.95"E	Near Kara (Kada Dham) [Right Bank]
9	25°41'55.64"N	81°22'9.43"E	
10	25°41'27.78"N	81°22'31.12"E	Near Akbarpur Village

11	25°41'3.56"N	81°23'8.60"E	[Right Bank]
12	25°40'18.69"N	81°23'48.38"E	Near Jahangirabad Village [Right Bank]
13	25°40'13.27"N	81°24'0.47"E	
14	25°40'6.35"N	81°24'14.79"E	
15	25°39'39.56"N	81°25'46.00"E	Between Shahzpur and Tarsora Village [Right Bank]
16	25°39'22.11"N	81°26'18.41"E	
17	25°39'1.37"N	81°26'43.54"E	
18	25°36'30.44"N	81°27'26.55"E	Near Deobhita Village [Right Bank]
19	25°37'34.92"N	81°28'20.81"E	
20	25°37'0.58"N	81°30'33.60"E	Near Sangeti [Right Bank]
21	25°34'10.70"N	81°33'24.15"E	Between Pathana and Gansari Village [Right Bank]
22	25°34'12.18"N	81°33'43.14"E	
23	25°34'17.05"N	81°34'16.74"E	
24	25°35'5.45"N	81°36'3.94"E	Between Badanpur and Muhiudinpur Gaus [Right Bank]
25	25°35'8.81"N	81°36'42.57"E	
26	25°35'10.12"N	25°35'8.81"N	
27	25°35'2.82"N	81°38'2.75"E	
28	25°34'53.83"N	81°38'17.57"E	
29	25°34'43.09"N	81°38'32.04"E	
30	25°32'32.09"N	81°38'30.97"E	Between Mohnapur Village and Ujehni Khalsa Village [Right Bank]
31	25°32'14.22"N	81°38'21.76"E	
32	25°31'59.44"N	81°38'14.36"E	
33	25°31'27.83"N	81°38'15.82"E	
34	25°31'21.28"N	81°38'29.19"E	
35	25°31'23.00"N	81°38'41.30"E	
36	25°31'21.42"N	81°39'4.74"E	
37	25°31'20.02"N	81°39'17.22"E	

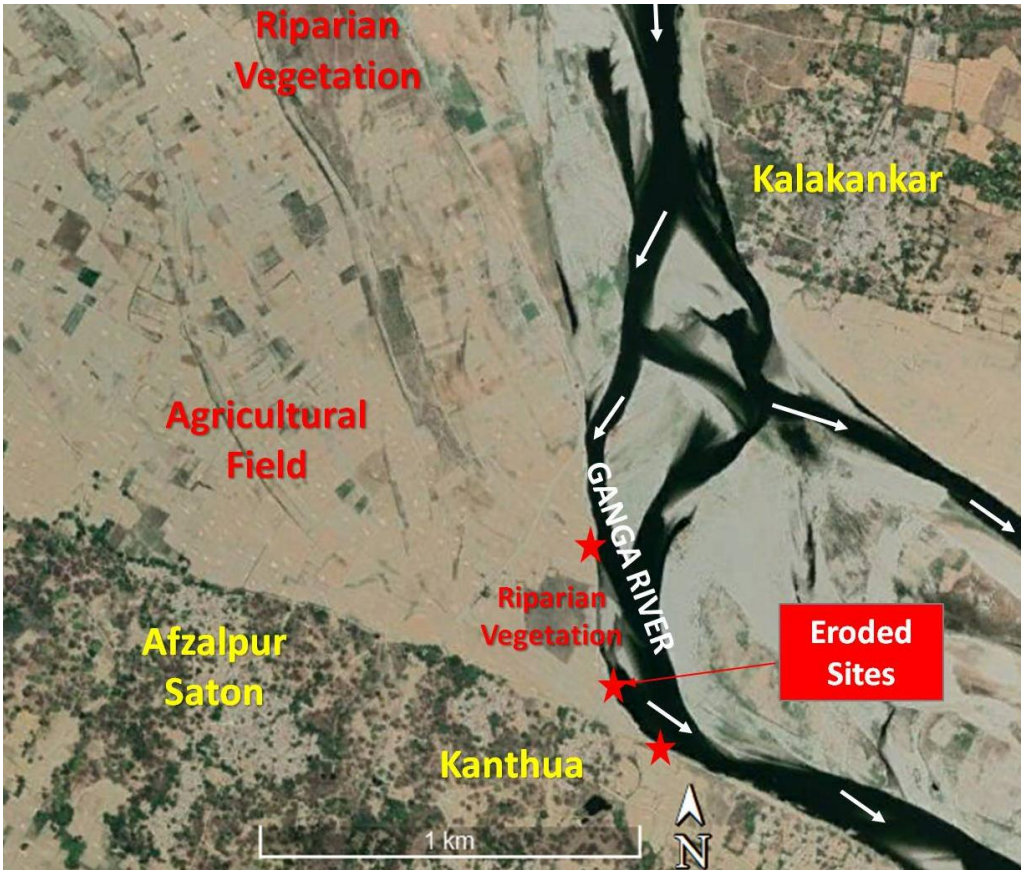


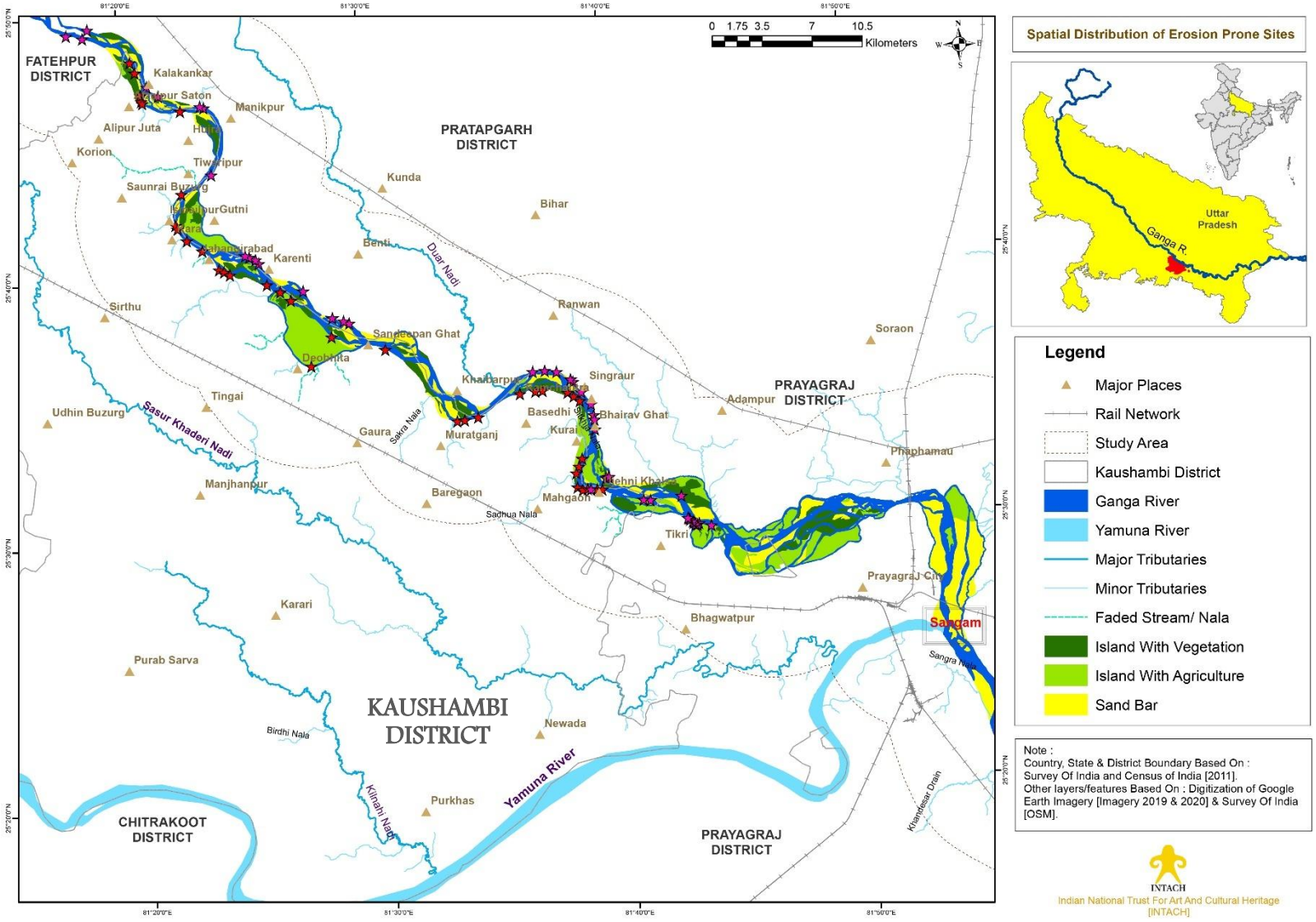
Image 54 : Erosion Prone Area And Eroded Sites Near Afzalpur Saton And Kanthua Village

[Source : Google Earth Imagery, May 2021]

Image 55 : Erosion Prone Bank At Ujehni Khalsa Village

Image 56 : Eroded Site Near Afzalpur Saton And Kanthua Village

Image 57 : Gully Erosion Near Badanpur Village



Map 8 : Spatial Distribution Of Erosion Prone Sites In The Study Region

15.0 Sand Mining And Brick Kilns Within Study Area

15.1 Sand Mining : Sand is one of the major minerals resource extracted from the Ganga River and its tributaries. The demand is ever increasing due to rapid expansion of settlements and their upgradation across the country. Often carried out illegally and excessively to earn large profits, sand mining is altering rivers' overall health. Excessive sand mining results in the destruction of aquatic and riparian habitats and poses threat to bridges, river banks and nearby structures[14]. Sand mining from Ganga River within the district is not reported during the field visit. However, seven sand mining sites are located in Mahewa Village [3 sites], Umrawa Village [1 site], Diya Village [2 sites] in Manjhanpur Tehsil and Kataiya Village [1 site] in Chayal Tehsil along Yamuna river in Kaushambi Distt..[15]

15.2 **Brick Kilns:** With rapid development bricks have become one of the important building materials 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. The clay digging process deteriorates the soil quality and productivity of the soil because the bricks are made from the top soil. It has been found that brick kiln sites in floodplain areas increases the rate of soil erosion.

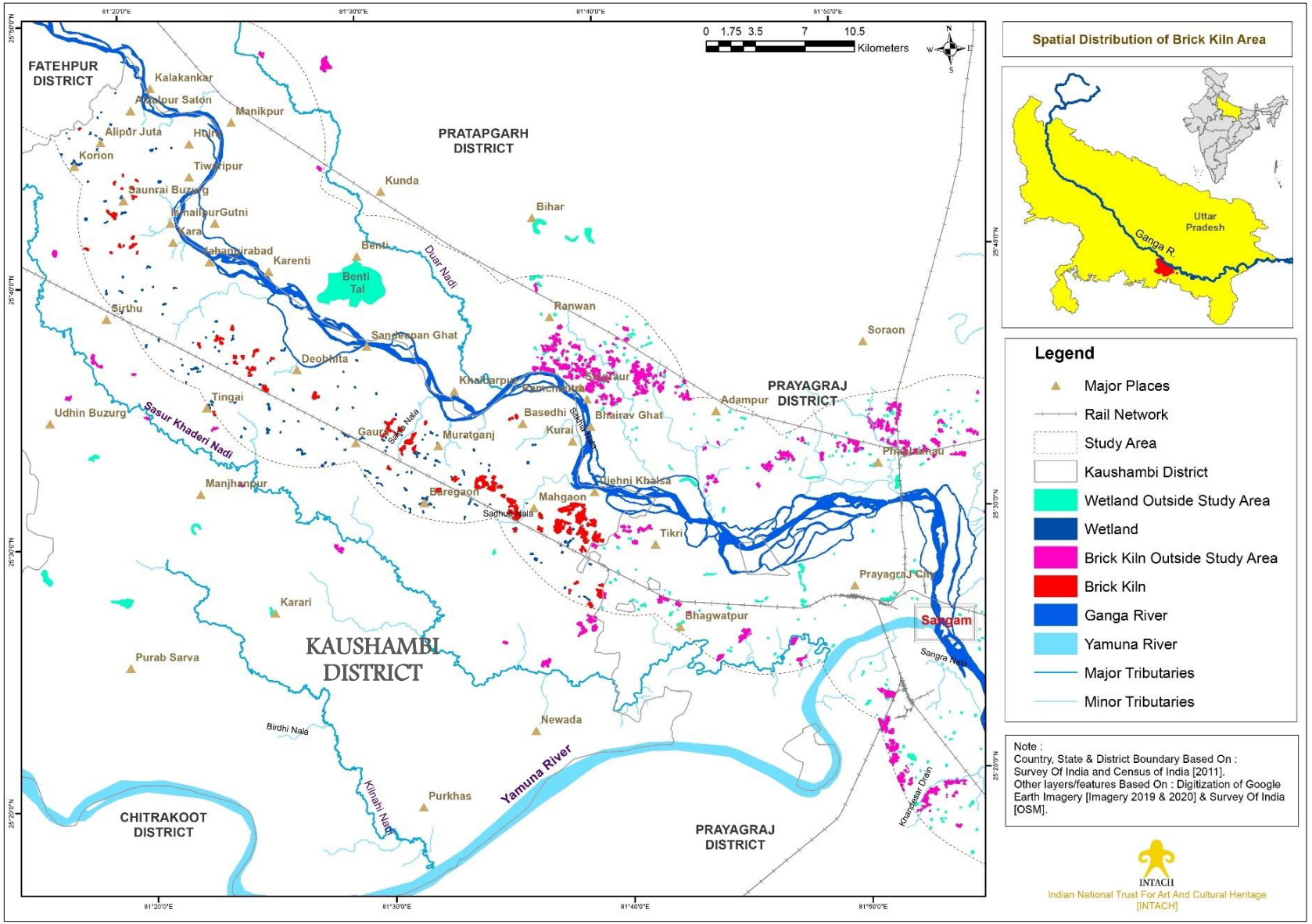
15.3 Brick kiln sites within Kaushambi distt. is spatially distributed throughout the study area [Refer Map No. 9]. Major sites are located near Mahgaon, Ujehni Khalsa and near Prayagraj-Kaushambi boarder area. Brick kiln sites located along Sadhua Nala and Sakra Nala is one of the major threats, which increases silt load and triggers lateral erosion. Brick kiln sites is also a reason behind shrinkage of riparian vegetation. A cluster of brick kiln site at Sita Kund and Srinverpur in Prayagraj Distt. is located in active floodplain is one of the reason behind lateral erosion [Refer Map No. 9].

[14] Impacts of Sand Mining, ENVIS Centre on Environmental Problems of Mining, IIT Dhanbad, Jharkhand

[15] E-Tender of Sand Mining Kaushambi District [Notification - Accessed dated 25.12.2021] *https://kaushambi.nic.in*

Image 58 : Cluster of Brick Kiln Sites Near Ujehni Khalsa Village

Image 59 : Brick Kiln Site In Tadaha Village



Map 9 : Spatial Distribution Of Brick kiln Area

16.0 Boatmaking In Kaushambi District

16.1 Boat making is not a popular or a profit-making profession in Kaushambi or nearby districts. Small sized boats (locally known as *Dongi*) are common for fishing activities. Medium sized boats having capacity of 10-15 people are used for ferry. Boats are mainly made up of Sal (locally known as Sekhua) wood [*Shorea robusta*] as it is very durable. However, the smaller dongis were also made from Babool (*Acacia nilotica*) and mango (*Mangifera indica*) wood which was readily available throughout the Distt. Now these days, iron boats are taking place of traditional boats. This is because iron boats area cheaper than traditional boats and are leak proof and easy to repair.

16.2 Boat making expenditures are same in Kaushambi, Prayagraj, Mirjapur and Bhadohi District. Small boats [Dongi] made from iron costs around 60,000-70,000 and Similar sized iron boat with motor costs around Rs.1,00,000/- to Rs.1,50,000/-. Traditional Dongi without motor costs around Rs.2,00,000/- to Rs.2,50,000/-. Medium sized traditional boats cost around Rs.7,00,000/- to Rs.8,00,000/-.

17.0 Inland Navigation Within Study Area In Kaushambi District

17.1 National Waterway [NW-1] is restricted upto Prayagraj District. The river is not navigable for major boats. However, ferrying is a crucial livelihood activity of the Mallah community within the Distt. People of Mallah community in Kaushambi District have been ferrying passengers for generations. There are 12 sites reported in the study area where ferry services are available. Out of 12 sites, there is 1 site where pontoon bridge has been constructed and ferry service is operated only during removal of pontoon bridge [Monsoon season]. Apart from 12 sites, ferry is once available between Muhammadpur [81°30'51.19"E, 25°36'3.88"N] and Naubasta of Pratapgarh District has been stopped due to construction of bridge on Ganga River near Sihori village. Details of Ferrying sites are provided in the table no. 13.

Table 13 : Details of Ferry Sites And Status Within The Study Area

Sr. No.	Latitude	Longitude	Nearest Settlements	No. of Boat & Ferry Season
01	25°46'40.29"N	81°20'50.90"E	Between Afzalpur Saton and Kalakankar	Two Boats (October to June)
02	25°46'30.45"N	81°21'19.52"E	Between Kanthua Village and Riverine Island **Purpose : Agricultural activities**	Two Boats (October to June)
03	25°42'10.83"N	81°22'3.25"E	Between Kaldhah Ghat [Near Kara] and Gutni **[Pontoon bridge constructed]**	Four Boats **Ferry service operates only during removal of pontoon bridge**
04	25°41'50.75"N	81°22'12.49"E	Between Kara Dham [Bazar Ghat] to riverine Island **Purpose : Agricultural activities, tourism**	Six-eight Boats (October to June)
05	25°41'20.56"N	81°22'37.49"E	Between Akbarpur and	Two Boats

			Ghutni via riverine Island	(October to June)
06	25°39'48.19"N	81°25'18.17"E	Between Shahzadpur and karenti	Two Boats (October to June)
07	25°37'15.87"N	81°29'53.69"E	Between Sangeti [Sandeepan Ghat] and Ballipur	Two Boats (October to June)
08	25°34'53.44"N	81°35'19.55"E	Between Badanpur and Manthan and Jahanabad	~~~~~~~
09	25°35'14.42"N	81°38'46.43"E	Between Riverine Islands and Singraur Ghat [Sringverpur **Purpose : Agricultural activities**	Two Boats (October to June)
10	25°33'43.88"N	81°39'6.49"E	Between Kurai Ghat [Kurai Village] and Bhairav Ghat [Sitakund]	Two Boats
11	25°31'16.78"N	81°39'20.04"E	Between Riverine Islands to Faridpur Chak Tejpur	Two Boats (October to June)
12	25°30'12.19"N	81°40'57.58"E	Between Ujehni Ghat to Singhapur and Arniksh Lalpur	Two Boats

Image 60 : Ferrying At Bazar Ghat [Kara Dham]

Image 61 : Ferrying Between Kurai and Bhairav Ghat [Sitakund]

18.0 Old And Sacred Trees In Kaushambi Distt.

18.1 Plant species *Ficus benghalensis* [Bargad], Ficus *religiosa* [Peepal], *Ficus virens* [Pakad] *Mangifera indica* [Aam], *Azadirachta indica* [Neem], *Phyllanthus emblica* [Awla] are considered as sacred and is found in association with ashrams, ghats, cremation sites and temple complexes across the study corridor. Out of all sacred trees, Ficus *religiosa* [Peepal] is most sighted species, generally found to be associated with temple. Peepal tree is also used to perform different rituals after cremation. Apart from the sacred trees, there are several old trees present at ghats and villages. A two hundred years old banyan tree [*Ficus benghalensis*] recoded at Ganga River Ghat in Afzalpur Saton Village [Refer Image No. 62].

Table 15 : List of Sacred And Old Trees Recorded Within The Study Area

Plant Species	Location and Nature of Tree	Coordinates	
		Latitude	Longitude
Neem [Azadirachta indica], Peepal *[Ficus religiosa],* **Bargad *[Ficus benghalensis]***	Saunrai Buzurg Sacred trees associated with Sabarmata Mandir	25°43'5.57"N	81°19'50.40"E
Peepal *[Ficus religiosa]*	Ujehni Khalsa Village Sacred Tree Associated With Village Temple	25°13'57.48"N	82°27'16.02"E
Bargad *[Ficus benghalensis]* **[200 years old sacred tree]** Peepal *[Ficus religiosa],* *Neem [Azadirachta indica],* Bargad *[Ficus benghalensis],* *Ficus virens* [Pakad]	Group of trees associated with Hanuman Temple at Ganau Baba Ki Kothi In Afzalpur Saton	25°46'47.6"N	81°20'38.2"E
Peepal *[Ficus religiosa]*	Afzalpur Saton 100 Years old tree	25°46'52.3"N	81°20'20.6"E
Bargad *[Ficus benghalensis]* Peepal *[Ficus religiosa],* *Neem [Azadirachta indica],* Bargad *[Ficus benghalensis],* *Ficus virens* [Pakad]	Bhueya Baba Temple Complex Group of sacred trees associated with temple complex	25°46'18.80"N	81°21'56.28"E

Peepal *[Ficus religiosa]*	Tiwaripur ***100-120 years old tree associated with Village Temple***	25°44'00.4"N	81°22'44.3"E
Peepal *[Ficus religiosa]*	Gobindpur Village ***200 years old tree***	25°44'00.2"N	81°22'35.3"E
Peepal *[Ficus religiosa]*	Girdharpur Garhi Old Tree Associated With Temple	25°42'52.3"N	81°22'01.8"E
Neem [Azadirachta indica]	Kara [Kada Dham] Sacred Neem Tree Associated With Seetala Mata Mandir	25°41'44.53"N	81°21'50.67"E
Peepal *[Ficus religiosa],* *Neem [Azadirachta indica],* Bargad *[Ficus benghalensis],* *Ficus virens* [Pakad]	Bhairav Temple Kara Group of sacred trees associated with temple	25°42'42.55"N	81°21'14.91"E
Peepal *[Ficus religiosa],* Bargad *[Ficus benghalensis],* *Ficus virens* [Pakad], Awla *[Phyllanthus emblica],*	Dandi Ashram Group of sacred tree associated with ashram	25°42'36.16"N	81°21'59.01"E
Peepal *[Ficus religiosa]*	Mahakaleshwar Dham Mandir, Kara ***200-250 Years old and sacred tree***	25°42'33.17"N	81°22'0.17"E
Peepal *[Ficus religiosa]*	Hanuman Ghat [cremation site] Sacred old tree	25°42'10.92"N	81°22'1.61"E
Peepal *[Ficus religiosa]*	Vrindavan Ghat [Near Jaichand Fort] Old Sacred tree associated with Shiva Temple	25°42'3.11"N	81°22'4.86"E
Bargad *[Ficus benghalensis]*	Akbarpur Ghat [cremation site]	25°41'20.79"N	81°22'40.83"E

	Old and sacred tree		
Peepal *[Ficus religiosa]*	Shahzadpur Old and sacred tree	25°39'26.0"N	81°24'48.5"E
Peepal *[Ficus religiosa]*	Shahzadpur Old and sacred tree	25°36'16.8"N	81°27'10.6"E
Peepal *[Ficus religiosa]*, Bargad *[Ficus benghalensis]*, *Ficus virens* [Pakad], Awla *[Phyllanthus emblica]*, Neem *[Azadirachta indica]*, Aam *[Mangifera indica]*	Sangeti [Sandeepan Ghat] Temple Complex	25°37'15.35"N	81°29'53.93"E
Peepal *[Ficus religiosa]*, Bargad *[Ficus benghalensis]*,	Badanpur Ashram	25°34'51.8"N	81°35'19.0"E

Image 62 : Old Banyan Tree In Afzalpur Saton Village

Image 63 : Group of Sacred Trees At Bhueya Baba Temple Complex

Image 64 : Group Of Sacred Trees At Dandi Ashram, Kara

19.0 Key Observation & Recommendation

19.1 Fading of Stream/Nara : Small stream/ Nara which directly drain to River Ganga are under threat due to removal of riparian vegetation, agriculture activities on stream bank and encroachment. Due to mentioned threats, six streams have faded completely while two streams namely sadhua Nala and Sakra Nala have partially faded and nine streams are under threat. Stream/Nara holds the vulnerable riparian zone, which protect from erosion, provides habitat to riparian fauna and serve as migratory routes to fish species in monsoon season. Disappearing of streams may damage local biota.

19.2 Conversion of riparian vegetation into agricultural fields : Products and finished products manufactured from Saccharum spp. are sources of income to the local communities. During the field visits, it has been reported that local administration provides riparian land to local communities for agricultural activities. The newly developed agricultural fields accelerate the runoff and trigger lateral erosion. Lateral erosion is very prominent in Afzalpur Saton [Saton Kachhar] village. In addition, local communities dependent on riparian flora loses their livelihood [Refer Image No. 65].

Image 65 : A Villager Making Ropes From Saccharum Spp.

Currently, riparian vegetation throughout the study corridor is under revenue department and is on lease for agricultural activities. Such areas may be transferred to

forest department for management. Local communities maybe allowed for sustainable harvesting of riparian flora.

19.3 Paleo-streams and Wetlands : Paleo-streams and wetlands are currently under cultivation. The study area is under semi-critical and Over-exploited category. In order to recharge the groundwater, the depression areas may be restored. Proper demarcation of such areas is required. Plantation of native species on such area may increase the overall forest area in the district. It will provide the addition habitat to fauna to the area and will further lower the man-animal conflict.

19.4 Groundwater Conditions : The study area exhibits declining trend in groundwater level. To arrest the decline of water level, artificial recharge technique should be adopted in the district due to occurrence of deep-water conditions. Efforts should be made to reclaim the barren land resulted due to saline efflorescence. In addition, Excessive use of fertilizers by the farmers should be discouraged particularly due to high nitrate concentration.

19.5 Protection for River Islands : Riverine Island is present throughout the stretch of River Ganga Within Kaushambi Distt.. Jurisdiction of the riverine islands lies in Kaushambi & Pratapgarh and Kaushambi-Prayagraj Distt.. Emerging islands under cultivation are mainly susceptible to erosion. Agricultural activities at the edge of stable islands erode the banks. There is requirement of comprehensive management plan [CAMP] for conservation, management and sustainable utilization of riverine islands.

19.6 Cremation and Burial : Cremation of dead bodies and immersion of their remains is reported throughout the stretch. Lack of cremation infrastructure, their maintenance and lack of awareness are reason behind such ongoing practices. Proper cremation infrastructure including the modern crematoria is required atleast at Akbarpur Ghat, Afzalpur Saton Ghat, Sandeepan Ghat and Shahzadpur Ghat. Burial at sand bar is common. Proper site should be provided and area should be demarcated.

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