Ganga Cultural Documentation

Natural Heritage
Of
PRAYAGRAJ DISTRICT

March, 2020

NAMAMI GANGE

National Mission for Clean Ganga

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Front Cover : Ganga River at Triveni Sangam

Background : Macpherson Lake

Back cover : Floodplain agriculture near Mainiya Village

Formatting and Design by : Sumesh Dudani & Abhishek Kumar Upadhyay

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Recommendations For Prayagraj District

I. **Prayagraj should be included in the Green Pilgrim Cities Initiative :** Since Dwarka, Somanath, Ambaji and Amritsar were already included as part of this initiative in 2011 and Varanasi is in the process of nomination (Singh, Rana P.B; 2013). **It is advisable to include Prayagraj too in GPCI.** Prayagraj is known for its various sacred sites besides highly popular Kumbh and Magh melas therefore can set a good example as green pilgrimage for the environmental conservation.

II. The catchment areas of minor streams especially Ashrawal Nala, Haraiya Nala, Dholia Nala, Mohde Ke Nar and Mughalhawa Nala are colonized by pristine riparian vegetation. Increasing agricultural pressure, encroachment, sand mining and rapid establishment of bricks in the region possesses serious threat to these riparian patches. **Hence, it is recommended to identify and designate these vegetation sites as protected eco-sensitive areas.**

III. Several riparian zones, **vulnerable to erosion,** have been identified. **The erosded material gets deposited in the river bed resulting in raising of the river bed. These vulnerable zones need to be protected with various bio-engineering measures to counter the severity of lateral erosion.**

IV. Based on literature review it appears that there have been a few light surveys in some of the unexplored river stretches. These now need to be augmented by **extensive surveys to explore the biodiversity of the area specially the needs of vulnerable species like Indian Skimmers and ever decreasing population of freshwater turtles. An in-depth survey is also required to decide a suitable area for the turtle sanctuary.**

V. **Turtle Sanctuary** : The turtle sanctuary at Varanasi is being displaced to Prayagraj Distt. Sirsa is one such potential riparian site identified by the Forest Dept. At the same time the site will need to be protected by the impacts of proposed continuous dredging for National Waterway I which will pose a major threat to aquatic and avian fauna. It was observed that the Ganga meanders greatly and the stretch has several sandbars, riverine islands and extensive floodplains. **Therefore, the areas with large sandy banks and low human presence need to be marked for a potential conservation reserve (Turtle sanctuary) or local nature reserves. The outer edge of the floodplains should have a belt of riparian vegetation so as to provide terrestrial habitats for amphibians and reptiles.**

VI. **Ganga River in Prayagraj Distt. is also an important stretch for Gangetic River Dolphin** which is both an IUCN Endangered and Schedule I (Wildlife Protection Act, 1972) species. **It is recommended to carry out more surveys for identifying its tentative population and distribution in this region**

VII. The Ganga River stretch in Prayagraj Distt. comprises of many **riverine islands** of varying sizes, some of which are being exploited for cultivation and burials as well. There is a lack of data regarding the biodiversity, ownership status and management of

these islands. **Hence, it is recommended to frame policies for these islands in order to maintain biodiversity habitats and ensure sustainable utilization of resources.**

VIII. **Vindhyan Ranges : The uplands along headwaters of Tons and Karnawati rivers [albeit outside our study zone and also in Rewa Distt of MP] need to be densely forested. The decommissioned mining areas need to be rewided and open forestes need to be upgraded to dense forests. This would improve the flow of these rivers and consequently their contribution to the Ganga.**

IX. **Riparian Grasses :** These grow abundantly and naturally on the floodplains and are generally used as roofing material. Product designers and research institutions may be involved to **find out further uses for what is basically a renewable resource.** Thus the use of this material as building material in combination with say bamboo **can retard the requirement of brick making and sand mining.**

X. Several communities complained about the lack of separation of bathing ghats and cremation ghats. It is **recommended that steps be taken to make separate ghats on the grounds of religious sentiment as well as health issues.**

XI. There are many important wetlands such as Macferson Lake and Upardaha Taal in Prayagraj Distt. which are facing the brunt of pollution and other human induced disturbances. Owing to this, their biodiversity and hydrology has been adversely affected leaving them in a dismal state today. Hence, it is strongly recommended to develop conservation plans for these wetlands

XII. **Macpherson Lake** : This major lake is in a eutrophic status and may soon become a marshy area. This 6 ha lake as well as wetlands of Subedarganj and adjacent vegetated area, together comprising nearly 2.75 sq.km., **needs to be upgraded to the status of an urban forest and local nature reserve.**

XIII. **Fishermen** in the Distt. voiced their concern over the decline in fish catch and decline of individual size and subsequent loss of livelihoods associated with it. **It is recommended to determine the factors for decline in fish population through scientific techniques along with development of a program for revival of such populations.**

XIV. Man-Animal conflict related to mass destruction of agricultural produce by Nilgai and Wild Boar is also widespread. **This is an important issue in the study region that needs to be mitigated by creating awareness among the local people, ensuring sufficient compensation for their losses and incorporating non-violent techniques to keep these animals away from the fields.**

XV. **This climatic variability in the state has might have cascading effects on region's biodiversity, water resources, food productivity and dependent livelihoods. Certainly, poor groundwater recharge, increased evaporative losses and overall decrease in rainfall will impact the river flow and the riverine terrain of the study corridor. Options of improving recharge therough a variety of structures, water conserving agriculture, urban water efficiency and increased forestration in the uplands must be vigourously pursued.**

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1.0 Introduction

1.1 Covering an area of 5,482 sq.km., Prayagraj Distt. is one of the largest districts of Uttar Pradesh, bounded by Sant Ravi das Distt. in east, Kaushambi in west, Pratapgarh in north and Rewa (M.P.) in south respectively. The Distt. is divided into 8 tehsils namely – Allahabad, Handia, Phulpur, Soraon, Karchhana, Meja, Koraon and Bara. These 8 tehsils are further sub-divided into 20 development blocks [Ref. Map No. 2]. (https://prayagraj.nic.in/about-Distt./).

1.2 Prayagraj city (25.45°N, 81.84°E) is the distt. headquarters situated at an elevation of 98 m above mean sea level at the confluence of Ganga and Yamuna Rivers. This city is one of the historic and mythological cities of India having a glorious past spanning from the Vedic age to the British period. Every corner of the city has its share of history: from Shringverpur, the site where it is believed that Nishadraj helped Lord Rama and his retinue to cross the Ganga; to Anand Bhawan, the centre of India's freedom struggle; Triveni Sangam, the confluence of the three rivers; and the Fort built by Emperor Akbar, which prevented flooding and helped in attracting people to settle in the city.

1.3 The city is called Kaushambi in the Mahabharata. The present day city is laid down by Akbar and was recorded down in Ain-i-Akbari as *'Ilahabas or Ilahabad'* which later became Allahabad. Raja Birbal, who recorded his visit to the city on the pillar of Ashoka in the fort premises, has acknowledged the crowning of the city as 'Prayag-raj' – meaning "the place of sacrifice/ offering". It became the provincial capital in the Mughal Empire during Emperor Jahangir's reign from 1599 to 1604.

1.4 The city is situated at the confluence of Ganges, Yamuna and Saraswati collectively known as Triveni *Sangam* which accords a special religious significance among the Hindus. Hindus believe that bathing at the confluence of these rivers frees them from the karmic cycle of birth and death. The two rivers Ganga and Yamuna maintain their distinct coloration as they merge whereas the mythical river Saraswati remains invisible albeit present in the minds of the pilgrims.

1.5 In Hindu mythology, the elixir of life is filled in a *Kumbh* (pot) in *Swarg* (heaven) and with the occurrence of a certain positional combination of the Sun, Moon and Jupiter, the elixir falls from heaven to earth and in one of four sacred locations, Prayagraj being one of them. In celebration *Maha*kumbh is held once every 12 years. Pilgrimage has always been one of the important contributors to the economy of Prayagraj Distt. The Kumbh *mela* (fair) has been a socio-cultural mega event where millions of tourists and pilgrims visit the Triveni Sangam and the one at Prayag has always been one of the largest religious gatherings of the world. The major event of the festival is a ritual bath

at the banks of the rivers with a belief to shed off their sins and attain 'moksha' (salvation), along with some other activities including devotional singing, feeding in mass of saints along with the poor, and religious assemblies where doctrines are debated and standardized.

1.6 The Distt. experiences the typical version of a humid subtropical climate that is common to cities in north-central India. It features a tropical to subtropical climate with extreme hot (45°C) to extreme cold (5°C). According to weather statistic reports, the total yearly precipitation received by the city is around 1,027mm on an average and according to a UNDP report, it falls in a "low damage risk" wind and cyclone zone.

1.7 Standing at a strategic point both culturally and geographically, Prayagraj Distt. is an important portion of the Ganga-Yamuna Doab region. Whole Distt. is carpeted with vast stretches of alluvial soil as well as hard rock. At Prayagraj, Ganga river merges with River Yamuna through a unique Y-Shaped confluence dividing the Distt. into three main physiographic parts. "The Ganga and Jamuna, which unite at Prayagraj, divide the Distt. into three distinct parts which differ from one another so materially in their general appearance and physical features that each must be described separately. The tract between the two rivers, commonly known as the Duab, comprises the tehsils of Allahabad, Sirathu and Manjhanpur. The trans-Ganges or Gangapar tract includes Soran, Phulpur and Handia: while the trans-Jamuna country known as Jamunapar consists of Bara, Karchana and Meja" [Allahabad Gazetteer, 1911].

Image 1 : Ganga River At Prayagraj City

2.0 Ganga River In Prayagraj Distt.

2.1 After passing through Pratapgarh Distt., Ganga river enters Prayagraj Distt. near Jahanabad Kachhar just before Sita Ram Temple, Gaughat. It then flows in E-SE direction through the Distt. with an overall NW-SE trend (Pati et al., 2008). The river flows in a wide bed in the Distt. with a course having succession of large bends and maintains this characteristic throughout. After entering the distt., the river flows in south-easterly direction until it reaches close to New Cantt. near Dhoomanganj in Prayagraj where it takes a bold sweep to the north-east as far as Phaphamau bridge. Soon after this, the river bends sharply to the south as far as its confluence with Yamuna River near Allahabad fort. Thereafter, the river again flows south-eastwards between Jhusi and Handia in north and Naini and Sirsa in south to enter Mirzapur district near Chehara village. The total length of Ganga river in Prayagraj Distt. is approximately 80 km.

Image 2 : Ganga River Meandering Near Sirsa in Prayagraj Distt.

3.0 Methodology

3.1 For carrying out the ground survey a 7 km of a buffer zone on both the sides of river Ganga in Prayagraj Distt. was marked having a total area of 1137 sq. km. [left bank 315 sq. km. & right bank 822 sq. km.]. The study area was divided into gridsof 5 × 5 km for field survey (Ref. Map No. 2).

3.2 Based on the secondary information analyzed and the features noted on Google Earth imagery, plan for the fieldwork was constituted to cover different elements of natural heritage in these grids. Special focus was laid on denoting the sites important for riparian biodiversity, riverine fishing, boat making communities, turtle sanctuary, river and stream confluences, important water bodies, oxbow lakes. Furthermore, contacts were developed with various stakeholders and riparian communities in the Distt. for carrying out relevant interactions.

3.3 The field survey in Prayagraj Distt. was carried out from 31st January, 2020 to 8th February, 2020. 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 noted by hand-held GPS devices and the representative images of various parameters were taken with the help of DSLR cameras. The information on cultural, social, religious and natural linkages of people with Ganga River and other elements in the study were also recorded.

4.0 Tributaries Of Ganga River

4.1 The rivers of Prayagraj Distt. belong to the main system of the Ganga and comprise several sub-systems of which the most important are the Yamuna and the Tamas. Tons or Tamasa river outflows into Ganga river near Sirsa [right bank] while Yamuna joins Ganga river at Triveni Sangam. Study area [7 km. Buffer] including major tributaries falls under catchment 2C1, 2B5, 2A6 and sub-catchment 2C1A, 2B5B, 2B5A, 2A6E [of Watershed Atlas of India]. [Refer Map No. 2]

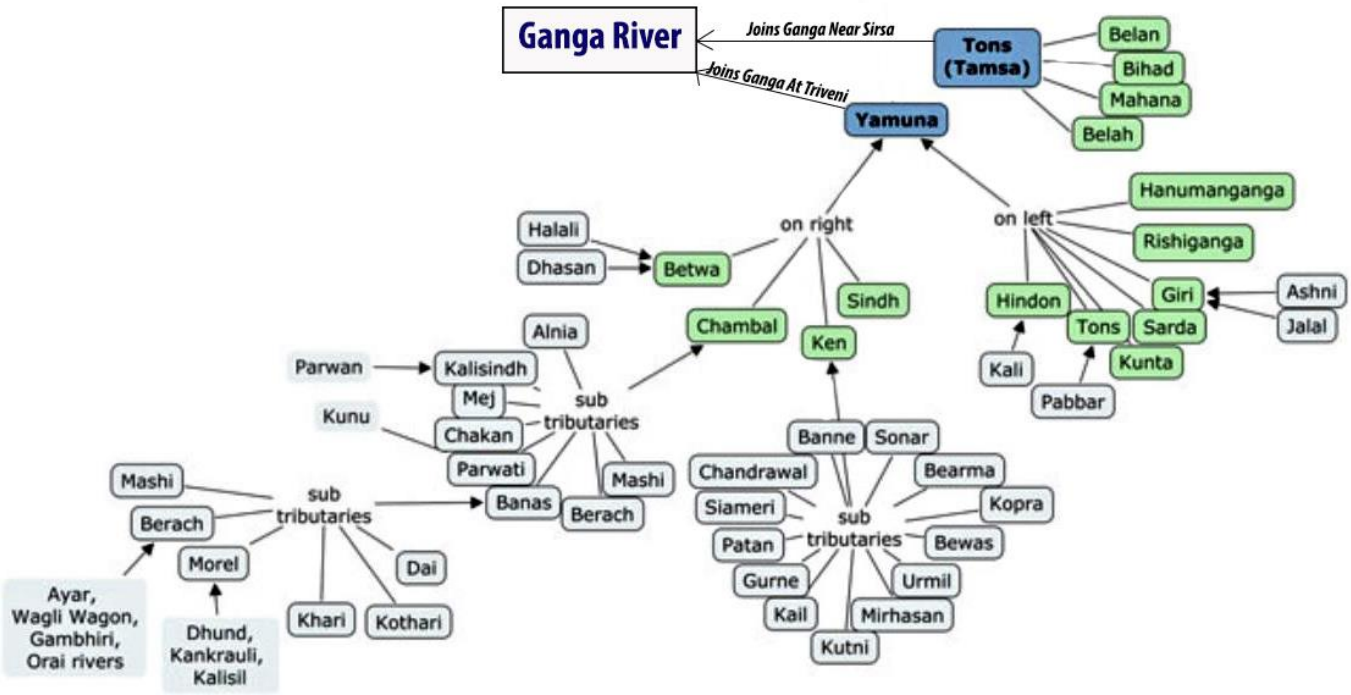


Image 3 : Yamuna And Tons River Tributaries
[Image Modified after Adapting from Sanghi & Kausal (2014)]

4.2 Yamuna River

4.2.1 Yamuna river originates from Yamunotri glacier (60 km. away from Kedarnath) in Uttrakhand state and joins Ganga River in Prayagraj Distt. The River and its catchment area contribute 40.14% of total Ganga River Basin i.e. 345848 sq.km. area (CPCB). Total length of Yamuna river is about 1,376 km. Out of this, a stretch of 8.93 Km of Yamuna river is recorded within the study area. Within this stretch, the river is joined by a stream named Sasur Khaderi Nadi near village Bakshi Mohda at latitude 25°24'1°48'27.32"E.

4.2.3 Periodic decrease in the Natural River flow during last few decades and increasing quantity of sewage discharge has posed a serious threat on water quality and in-stream biota of this river. Domestic sources contribute about 85% of the total

pollution in which urban spaces like NCT – Delhi, Agra and Mathura contribute the most (CPCB 2006). Out of 1376 km. of the river, the stretch from Wazirabad to Chambal river confluence is critically polluted. After getting inflow from Chambal river the pollutant loaded Yamuna gets diluted.

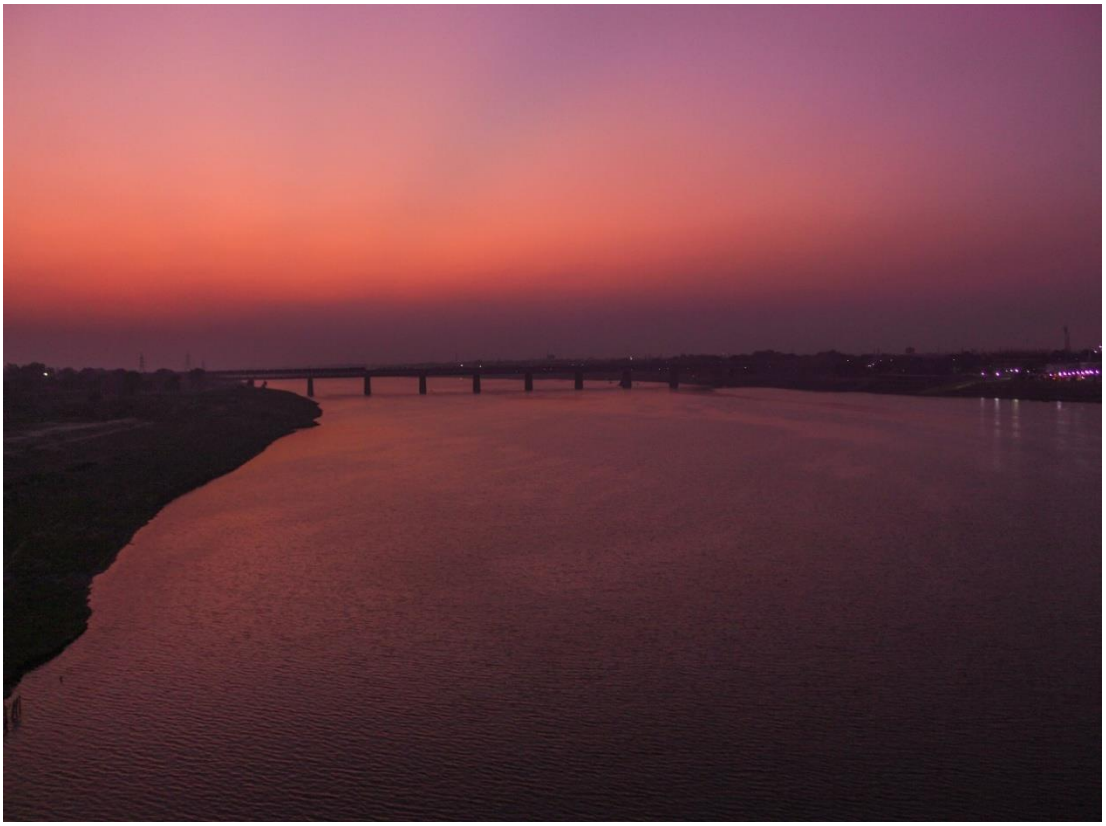


Image 4 : Yamuna River As Viewed From New Yamuna Bridge [looking south]

Image 5 : Satellite Image Showing Ganga-Yamuna Sangam [Triveni Sangam]
[Source : Google Earth Pro, Image Dated – 13.04.2019]

4.3 Tons River

4.3.1 Tons or Tamsa river originates from a tank called 'Tamkund' of Kaimur Hills [Madhya Pradesh] and joins the river Ganga near Sirsa of Prayagraj Distt. [Uttar Pradesh] at 82°4'56.09"E, 25°16'30.41"N. Total catchment area of the river is 17,617 sq. km., out of which 11,974 sq. km. lies in MP and the remaining area 5,643 sq. km. lies in UP (Singh et al., 2018).

4.3.2 Around 15 Km. of the river stretch falls within the study area. This stretch provides a suitable habitat to national freshwater animal the 'Gangetic Dolphin *(Platanista gangetica)*' and its huge active floodplain area provides alluvial and fertile soil for growing crops especially the 'Zaid crops'.

4.3.3 Within the study area [7 Km. Buffer] there are five minor streams locally called *Nala or Nara* outflows to Tamsa River. Length of these streams varies between 5 Km. to 16 Km. Details of the streams are provided in the table below [Refer Map No. 2]:

Table 1 : Minor Tributaries Of Tons River [Within Study Area]

Stream	Origin	Confluence	Remarks
Ashrawal Nala	Near Village Mawarpur [25°11'34.77"N, 81°57'42.99"E]	Near Village Hatsara [25°12'56.97"N, 82° 3'32.79"E]	Stream Length approximately 16 Km. Potential Threat : Extensive Agricultural Practices and Brick Kilns
Haraiya Nala	Near Village Basdila [25°15'31.38"N, 82° 0'4.66"E]	Near Village Mendra [25°15'23.35"N, 82° 2'48.08"E]	Stream Length approximately 7 Km. Potential Threat : Extensive Agricultural Practices and Brick Kilns
Dholia Nala	Near Village Amla [25°17'37.98"N, 82° 0'7.72"E]	Near Village Bhagesar Dahli [25°15'31.85"N, 82° 2'31.32"E]	Stream Length approximately 6.5 Km. Potential Threat : Extensive Agricultural Practices and Brick Kilns
Jwalamukhi Nala	Near Village Badai Ka Pura [25°18'18.37"N, 82° 0'56.02"E]	Near Village Panasa [25°16'16.29"N, 82° 2'57.31"E]	Stream Length approximately 9.7 Km. Potential Threat : Extensive Agricultural Practices and Brick Kilns
Nara	Near Village Knapur [25°14'19.85"N, 82° 5'23.49"E]	Near Village Janwar [25°12'45.30"N, 82° 3'48.42"E]	Stream Length approximately 5.2 Km. Potential Threat : Extensive Agricultural Practices and Brick Kilns

4.3.4 The catchment area of Ashrawa lNala, Haraiya Nala and Dholia Nala is surrounded by the grasses mainly of *Saccharum Spontaneum [Kaans], Desmostachya bipinnata [Kusha]* and *Saccharum Munja [Munj/Sarpat].* This area is among one of the remaining sites of riparian vegetation in the Prayagraj Distt. However, the increasing agricultural pressure and rapid establishment of bricks in the region poses serious threat to these riparian patches.

Image 6 : Tamsa Or Tons River Before Tons-Ganga Confluence

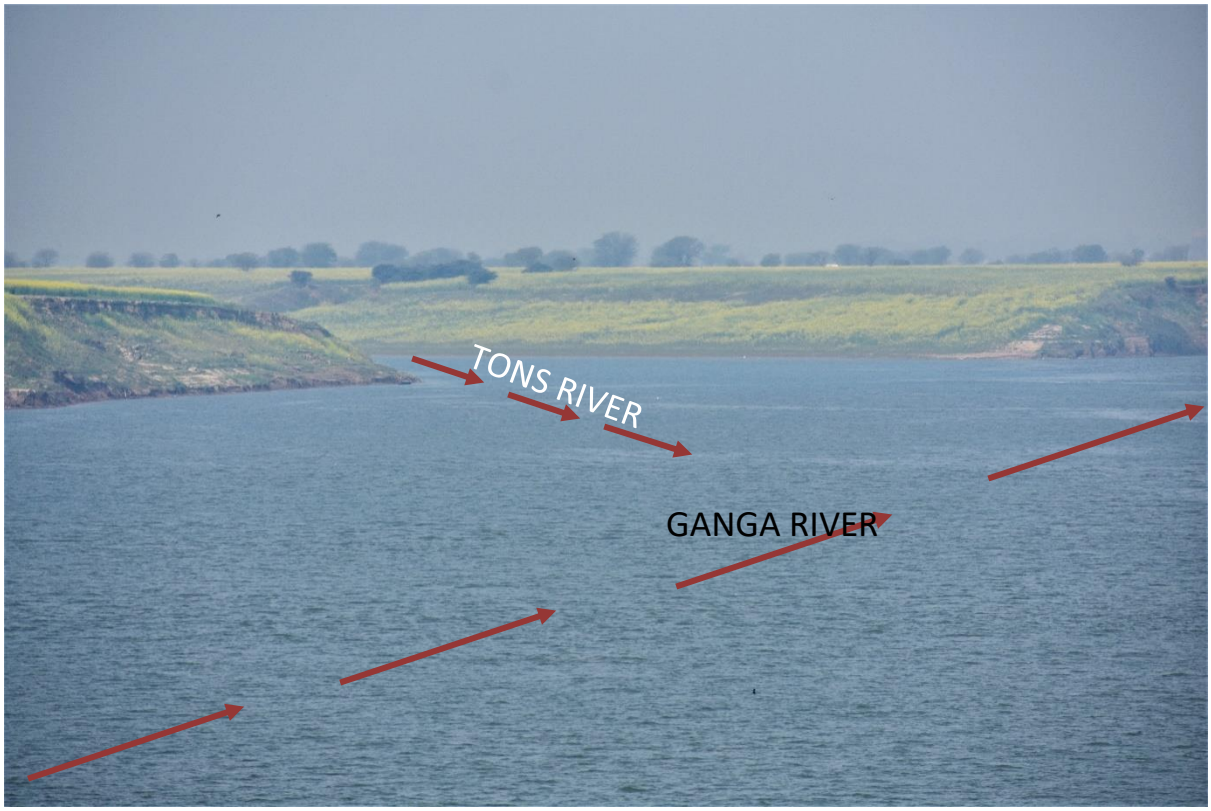


Image 7 : Tons Ganga Confluence

Image 8 : Extensive Agricultural Practices Along Tamsa River

4.4 Streams Within Study Area

4.4.1 Apart from the major tributaries, there are 10 minor streams identified and studied within the study area that outflow into river Ganga. The lengths of these streams range between 2 Km. to 44 Km. Within this, few streams are recorded for the first time which include – Mughalwa Nala, Mohde Ke Nar, Bahadura Nala and Koharwa Ke Nala. The Details of these minor streams are provided in Table 2 [Refer Map No. 2] :

Table 2 : Minor Streams Out - Flowing Into Ganga River

Stream	Origin	Confluence	Remarks
Nara	Near Village Ranwan [25°38'14.13"N, 81°38'25.17"E]	Near Village Mubarakpur [25°31'15.62"N, 81°41'6.93"E]	Stream Length approximately 24 Km. Potential Threat : Extensive Agricultural Practices and Brick Kilns
Nara	Umran Tal and Chandwa Tal [25°42'2.93"N, 82° 2'28.79"E]	Near Village Dharampur [25°29'27.21"N, 81°54'46.62"E]	Stream Length approximately 48 Km. Potential Threat : Sewage Discharge, Encroachment, Extensive Agricultural Practices and Brick Kilns
Nala	Near Village Diha[25°35'14.47"N, 81°50'30.08"E]	Near Phaphamau [25°30'27.72"N, 81°52'2.45"E]	Stream Length approximately 14 Km. Potential Threat : Sewage Discharge, Encroachment, Extensive Agricultural Practices and Brick Kilns
Aughar Nala	Near Village Kasrawa [25°28'54.31"N, 81°57'52.40"E]	Near Jhusi [25°26'32.19"N, 81°54'12.94"E]	Stream Length approximately 11 Km. Potential Threat : Extensive Agricultural Practices and Brick Kilns
Bairagiya Nala	From Lake Near Village Rasulpur Kanejhar [25°27'18.60"N, 82° 3'43.59"E]	Near Village Jhalaiya Ka Pura [25°19'4.02"N, 82° 5'1.39"E]	Stream Length approximately 24 Km. Potential Threat : Sand Mining, Extensive Agricultural Practices and Brick Kilns

Audaua Nala	Near Village Kasrawa [25°19'51.64"N, 82° 8'0.11"E]	Near Lachhagir [25°19'2.85"N, 82°10'45.96"E]	Stream Length approximately 5.5 Km. Potential Threat : Extensive Agricultural Practices and Brick Kilns
Gondri Nala	Upardaha Tal [25°21'27.82"N, 82°14'33.16"E]	Near Gondri Village [25°18'28.24"N, 82°12'8.74"E]	Stream Length approximately 14.78 Km. [Ref. Image 8] Potential Threat : Shrinking of Upardaha Tal, Encroachment, Sewage Discharge, Extensive Agricultural Practices and Brick Kilns
Kolhubir Nala	Near Nimi Village [25°29'42.79"N, 82°16'27.83"E]	Joins Gondri Nala Near Khamaria Village [25°24'57.42"N, 82° 9'56.52"E]	Stream Length approximately 44 Km. Potential Threat : Encroachment, Sewage Discharge, and Brick Kilns
Mughalwa Nala	Near Kochavanpur Village [25°18'17.64"N, 81°54'33.50"E]	Near Mainiya Village [25°19'33.83"N, 81°57'6.01"E]	Stream Length approximately 11 Km. [Ref. Image 9] Potential Threat : Encroachment, Industrial Sewage Discharge [Based on conversation with local community], and Brick Kilns
Mohde Ke Nar	Near Barbojha Village [25°18'17.64"N, 81°54'33.50"E]	Near Mainiya Village [25°19'10.22"N, 81°57'47.70"E]	Stream Length approximately 9.3 Km. [Ref. Image 10] Potential Threat : Extensive Agricultural Practices
Bahadura Nala	Near Tarwai Village [25°15'54.21"N, 82° 7'34.21"E]	Near Devhatta Village [25°16'25.10"N, 82° 6'47.34"E]	Stream Length approximately 3.1 Km. Potential Threat : Extensive Agricultural Practices
Koharwa Ke Nala	Near Pakri Siwar Village [25°16'45.67"N, 82° 8'45.59"E]	Near Sambhu Chak Village [25°17'35.86"N, 82° 8'26.34"E]	Stream Length approximately 2 Km.

			Potential Threat : Extensive Agricultural Practices
Choukhata Nala	Near Sonai Village [25°11'41.18"N, 82° 9'32.61"E]	Near Choukhata Narwar Village [25°12'0.99"N, 82°11'46.68"E]	Stream Length approximately 2 Km. Potential Threat : Encroachment, Extensive Agricultural Practices and Brick Kilns

Image 9 : Nara As Seen From State Highway 38 [25°31'27.67"N, 81°51'44.41"E]

Image 10 : Gondri Nala At Its Confluence With River Ganga Near Gondri Village

Image 11 : Mughalwa Nala Near Mainiya Village [Note Steep Bank Erosion]

Image 12 : Mohde Ke Nar Before Joining Into Ganga River

5.0 Land Use And Land Cover

5.1 Land Use Land Cover (LULC) Map of the study area has been prepared from Landsat imagery. Using unsupervised classification system, 7 classes were generated namely – Vegetation, Agriculture, Fallow land, Built-up Land, Open Land, Water Area and Scrub Land.

5.2 The total study area constitutes 1358.98 sq.km. covering both the left and right banks of River Ganga for which the following observations were drawn based on this classification:

- Agricultural land covers 523.9 sq.km. area i.e. 38.55% of the total study area. It dominates in majority of the area of blocks such as Handa, Manda, Karchhana, Bahadurpur, Saidabad and Chaka.
- Fallow land has a distribution of 20.98% which also includes agricultural fallow.
- Vegetation and Scrub land together constitute 14.15% of the total study area. This includes urban green spaces in Prayagraj city, riparian vegetation patches and vegetation on riverine islands.
- Open land has a distribution of 10.17% of total study area. It covers river bed, abandoned construction sites, brick kiln areas and mining sites.

- **Mining area and brick kin area comprises 1.4 % and 2.0% respectively in the overall land area.**
- Water area constitutes 4.37% of the study area. It covers lentic and lotic water systems within the study area.
- The built-up land is third largest class having area of 11.78%. This class covers the area of Prayagraj city, Jhusi, Naini, Sirsa and small settlements distributed all over the study corridor.

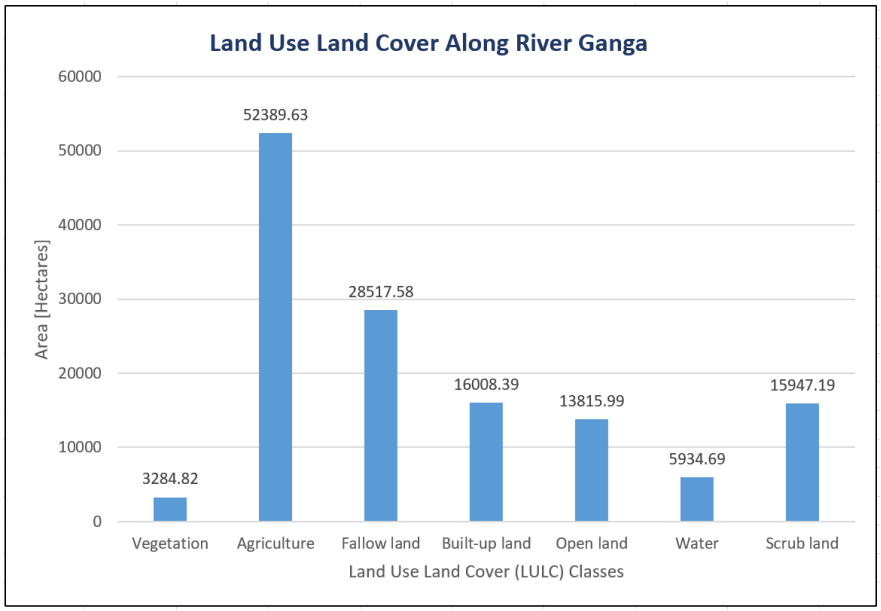


Figure 1 : Land Use Land Cover (LULC) Of The Study Area

6.0 Paleochannels Of River Ganga

6.1 Decline in the natural flow of a river or stream decreases its sediment flushing ability. In Distt.s like Prayagraj there are other factors such as stone quarrying, mining, encroachment, extensive agricultural practices, brick kilns and loss of vegetation in the catchment area which act as a catalyst for the disappeared river channels. 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 the wetlands.

6.2 In order to identify paleo-channels, paleo-wetlands and threatened river channels in the study region, Survey of India (SOI) toposheets from 1930-1931 to 2005 and Google Imagery upto April, 2019 were analysed. Further, ground truthing was carried out in January-February, 2020. [Ref. Map No. 4]. Based on that, it has been found that :

- River channel of Ganga in Prayagraj Distt. has migrated between 1930-1931 to 2005 [Ref. Map No. 6].
- Major migration was recorded near Kurai Village [25°33'16.94"N, 81°38'25.75"E (Right Bank)], between Sringverpur and Bhairav Ghat [Sitakund, (Left Bank)], Mubarakpur [Left Bank], Phaphamau [25°31'9.90"N, 81°51'13.22"E (Left Bank] and Dharampur [25°30'56.91"N, 81°54'49.43"E (Left Bank)]. The details are provided in Table 3.
- Between 2005 and 2020, the river has migrated towards Bhairav Ghat i.e. away from Kurai Village Ghat. This may be due to lack of inflow and increasing sediment load due to increased number of brick kilns in the active floodplain area [Ref. Map No. 4].

Table 3 : Temporal Migration Of River Ganga In Prayagraj Distt.

Settlement	Coordinates	River Migration	
		1930-1931 to 2005	2005 – April 2019
Hatwa Village [right Bank]	25°30'56.91"N, 81°54'49.43"E	1.78 km	0.36 km
Singhapur [Left Bank]	25°32'37.80"N,	2.27 km	0.08 km
Kurai Village [Right Bank]	25°33'20.41"N, 81°38'33.77"E	0.12 km	0.52 km
Mubarakpur [Left Bank]	25°32'23.52"N, 81°41'16.28"E	2 km	No Change
Phaphamau [Left Bank]	25°31'9.90"N, 81°51'13.22"E	0.5 km [From Main Channel]	No Change

Kuresar Kachar	25°29'57.26"N, 81°45'18.80"E	1.7 km	0.3 km
Tekri Village	25°30'55.96"N, 81°47'28.46"E	0.4 km	0.62 km

6.3 The study of SoI map series, Google Imagery (in time series) and ground survey highlighted there are/were several 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. A stream named Aughar Nala is fading due to encroachment, agricultural runoff and increasing number of settlements [Ref. Map No. 3]. Wetlands like Upardaha Tal and Chhendi Tal are facing gradual extinction. Between 2005 and 2019, the water spread area of Chhendi Tal has reduced significantly [Ref. Image 13 & 14].

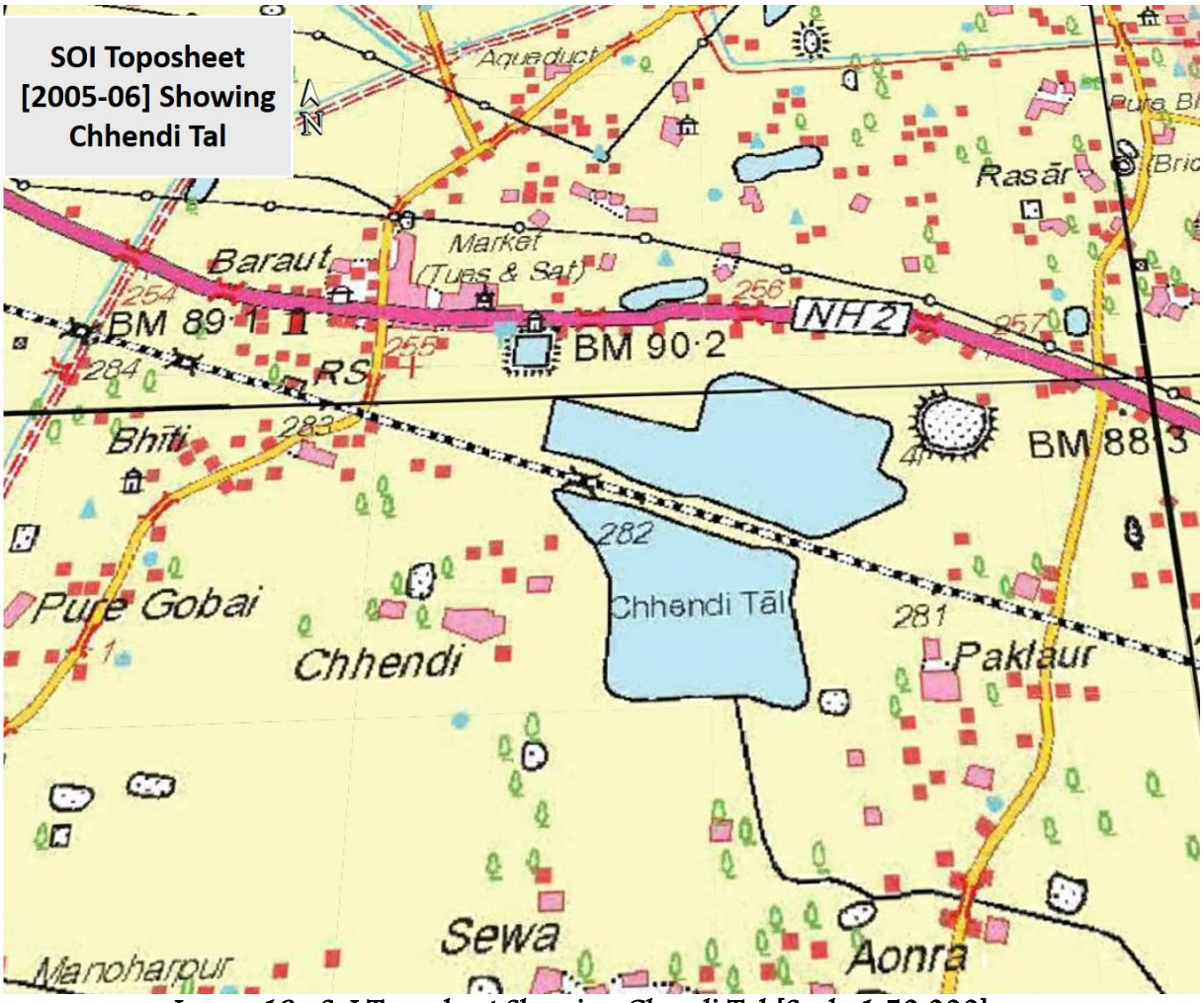


Image 13 : SoI Toposheet Showing Chendi Tal [Scale 1:50,000]

[Source : SoI, 2005]

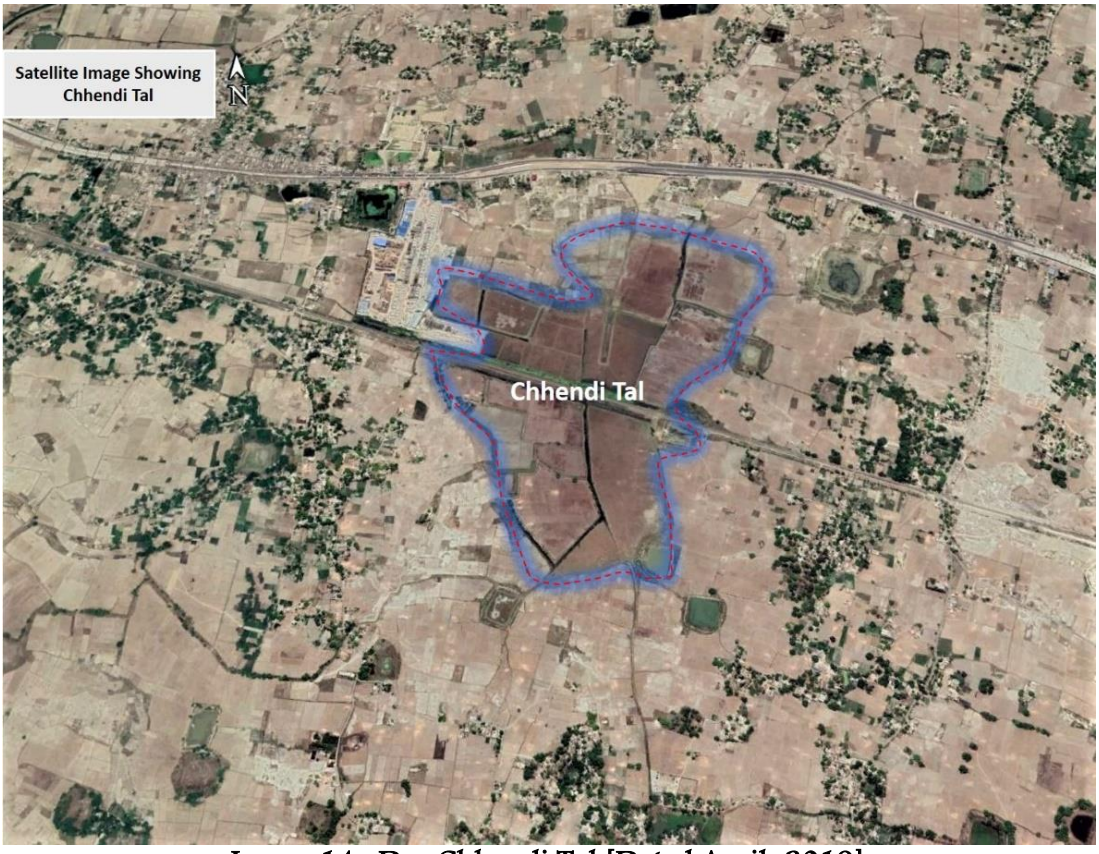
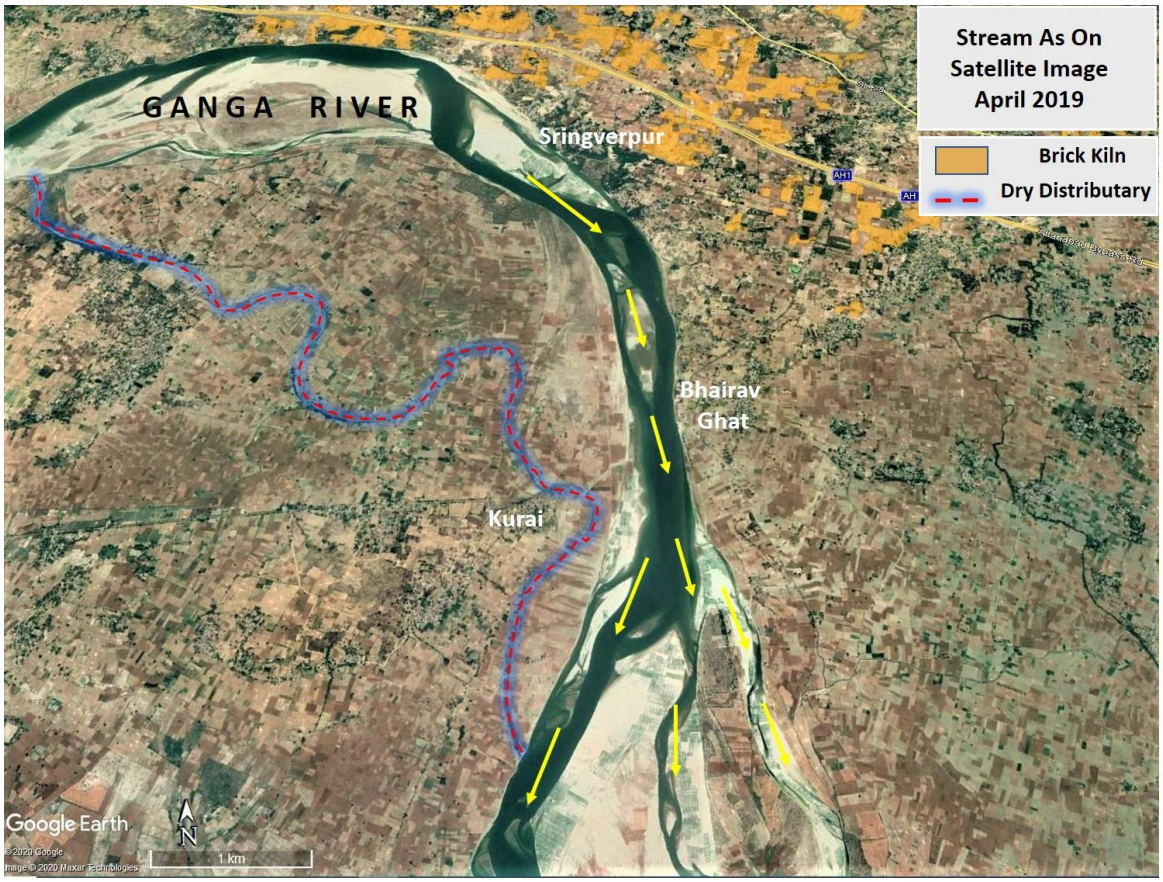
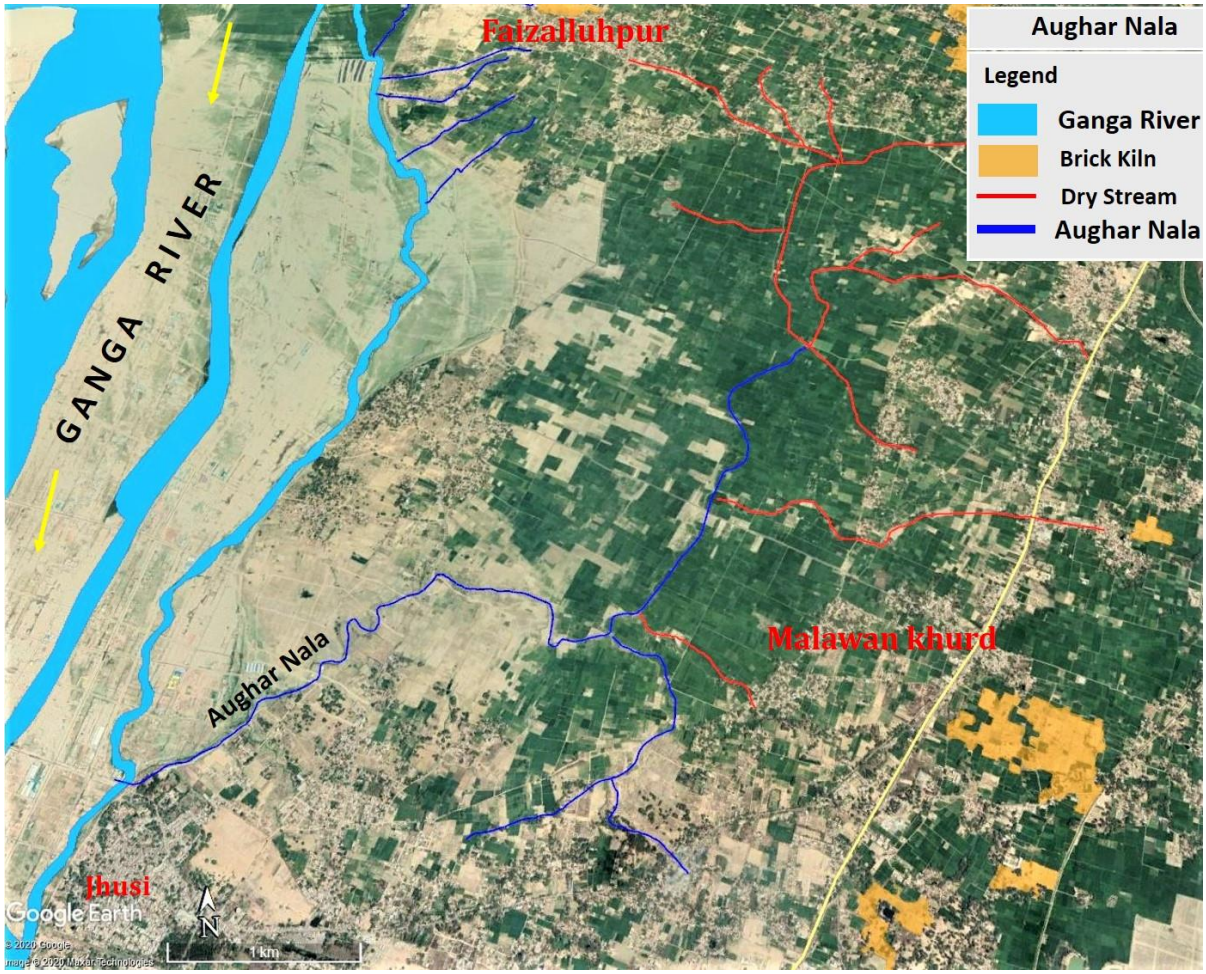


Image 14 : Dry Chhendi Tal [Dated April, 2019]

[Source : Google Earth Pro]



Map 4 : Dry Distributary Of Ganga River Near Kurai Village



Map 5 : Dry Stream Of Aughar Nala

7.0 Floodplain Of River Ganga In Prayagraj

7.1 Prayagraj Distt. has long back shifted from rain-fed farming to irrigated farming and the intensity of agriculture has also enhanced during the last few decades (Salman, 2013). After the Green Revolution Prayagraj Distt. has also witnessed a change in agricultural practices.

7.2 The study corridor is extremely fertile and productive which may be due to high concentrations of nutrients, meandering of the river and low velocities. Agriculturally the Ganga-Yamuna Doab region is one of the most important parts of Uttar Pradesh. The entire region is characterized by marked productivity variations. The northern part of Prayagraj Distt.'s Trans Ganga tract, popularly known as *Gangapar,* is endowed with rich fertile soil for the cultivation of pulses, oilseeds and vegetables. The southern part of Allahabad, known as *Yamunapar* is partly hilly and agriculturally poor.

7.3 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 an active flood plain is critical for assuring equilibrium in the ecosystem. The floodplains harbour rich biodiversity including riparian vegetation as well as diverse fauna and microorganisms which help in maintaining the fertility of this region. As the rivers naturally meander through the landscape over time, they deposit sand, silt and other soil-forming materials in the flood plain region which make it ideal for agricultural production.

7.4 The Distt. is endowed with rich and fertile soil, adequate groundwater and three growing seasons i.e., Rabi, Kharif and Zayed. The main crop of wheat is followed by rice, millets, paddy, barley. Pulses like arhar, urad, moong, gram and masoor are the other important agricultural crops grown in the Distt. Mustard is also grown in the region as a mixed crop [not pure farming]. In many villages such as Gondari, the crops were found to be growing up to the edge of the flowing channel. The details of the villages surveyed and the flood plain crops grown there are provided in Table 4 and some of the flood plain fields are depicted in Images 15-16.

Table 4 : Flood Plain Produce Of Different Villages In Prayagraj Distt.

S. No.	Village Name	Flood Plain Produce
1.	Mahewa Kalan village	Mustard, Arhar, Wheat
2.	Kanegra village	Mustard, Arhar, Mutter, Chana
3.	Kotwa village	Mustard, Rice, Wheat, Bajra
4.	Sita Kund village	Mustard, Wheat, Potato, Tomato
5.	Mawaiya Kalan village	Mustard, Wheat, Lauki, Karela, Parwal
6.	Gondari village	Mustard, Chana

Image 15 : Mustard Grown In Ganga River Floodplain Near Gondari Village

Image 16 : Potato Crops Grown In Ganga River Floodplain Of Sita Kund Village

7.5 **Floodplain Grasses :** Ganga river floodplain in Prayagraj supports a rich growth of three major grass species – *Saccharum spontaneum* L. (*Kans*), *Saccharum munja* Roxb. (*Sarpat*) and *Desmostachya bipinnata* (L.) Stapf (*Kusa/Moonj*). Among these three, Kusa is a perennial grass species that holds great sacred value owing to its role in many rituals and ceremonies since Vedic times [Ref. Image 17]. The elaborations of Vedic literature reveal a metaphysical character of *Kusa* (also referred as Darbha in Sanskrit), that can enhance mental power to overcome anger, grief and influence a person to be friendly with everyone (Padhy, 2017). Another religious importance of this grass is its use in form of a ring that has to be worn in fingers before starting any kind of worship procedure. This fact was strongly reiterated by locals including temple pundits and other religious scholars across our study region. Along with this, *Kusa* grass has been known for various medicinal properties in the Indian traditional system of medicine which include the use of its roots dysentery, diarrhea, bladder & skin diseases (Subramaniam & Sivasubramanian, 2015). The other two floodplain grasses of Saccharum sp. are tall and perennial grasses growing luxuriantly in vast areas along Ganga River. These grasses, when in dried form, are collected by the locals and used for thatching the roofs of their dwellings [Ref. Image 18].

Image 17 : Sacred Kusa Grass (*Desmostachya bipinnata*) Growing On Ganga River Bank

Image 18 : Dried Sarpat Grass (*Saccharum spontaneum*) Collected For Roof Thatching

8.0 Wetlands In The Study Region

8.1 Wetlands are one of the most productive and unique ecosystems. They help in maintaining the food web and provide habitat for the aquatic biodiversity. They also help in controlling floods, recharging groundwater, nutrient recycling, climate stabilization and carbon sequestration.

8.2 In this study, 766 wetlands were identified with the help of Google imagery (April, 2019) and ground truthing of significant wetlands [conducted in February, 2020]. Details of these wetlands are presented in Table 5 and their locations are depicted in Map 8. The identified water bodies are categorised into village pond, wetlands of mining area, urban wetland and oxbow lakes. After identification and field verification of wetlands, it was found that :

- Total area of identified water bodies is approximately 1491 ha. which is 0.99% of the total study area.
- Most of the wetlands are village ponds and are mainly distributed on the right bank of river Ganga.
- Out of 766 wetlands, 605 wetlands were of less than two hectares having total area of approximately 546 hectares.
- 159 wetlands were in the range of 2 to 25 hectares. Two wetlands namely Upardaha Lake and Chhendi Tal together constituted 17.84% of the total wetland area.
- Wetlands like Macpherson lake (16.7 ha.), Subedarganj Talab (9.96 ha.), oxbow lake near Mubarakpur village (19 ha.) are significant wetlands in or nearby Prayagraj city area.

Table 5 : List Of Wetlands Recorded In The Study Area

Sr. No.	Wetland	Location		Area [Hectares]
		Longitude	Latitude	
1	Bharatganj Talab	82° 16' 31.310" E	25° 7' 11.768" N	4.17
2	2	82° 16' 36.724" E	25° 7' 10.734" N	0.93
3	Guru Ka Talab	82° 16' 46.177" E	25° 6' 58.435" N	1.23
4	4	82° 17' 7.634" E	25° 7' 10.429" N	1.08
5	5	82° 17' 5.769" E	25° 7' 21.041" N	2
6	6	82° 17' 24.476" E	25° 7' 26.578" N	10
7	7	82° 17' 0.557" E	25° 7' 44.204" N	1.32
8	8	82° 16' 44.942" E	25° 7' 52.836" N	1.2
9	9	82° 16' 54.584" E	25° 8' 5.455" N	1.57
10	10	82° 17' 3.425" E	25° 7' 58.365" N	0.38
11	11	82° 17' 28.253" E	25° 8' 48.540" N	2.12
12	12	82° 16' 54.877" E	25° 9' 1.369" N	2.48
13	13	82° 16' 55.627" E	25° 9' 7.388" N	1.59

14	14	82° 17' 44.657" E	25° 8' 35.723" N	0.18
15	15	82° 17' 44.965" E	25° 8' 29.478" N	0.13
16	16	82° 18' 0.861" E	25° 8' 48.454" N	0.69
17	17	82° 18' 0.712" E	25° 9' 4.053" N	0.3
18	18	82° 15' 48.414" E	25° 9' 25.211" N	0.31
19	19	82° 14' 59.518" E	25° 10' 19.917" N	0.47
20	20	82° 15' 57.184" E	25° 7' 4.039" N	3.01
21	21	82° 16' 9.423" E	25° 7' 12.538" N	2.54
22	22	82° 15' 27.123" E	25° 8' 32.658" N	5.08
23	23	82° 16' 36.287" E	25° 8' 32.661" N	1.24
24	24	82° 16' 33.929" E	25° 8' 42.606" N	0.73
25	25	82° 15' 59.219" E	25° 8' 37.670" N	1.2
26	26	82° 16' 20.722" E	25° 9' 38.219" N	1.28
27	27	82° 15' 39.235" E	25° 7' 21.234" N	1.15
28	28	82° 15' 17.354" E	25° 7' 37.004" N	0.6
29	29	82° 15' 24.791" E	25° 9' 0.449" N	0.37
30	30	82° 15' 10.308" E	25° 9' 11.503" N	1.29
31	31	82° 15' 40.416" E	25° 9' 58.564" N	1.22
32	32	82° 14' 30.441" E	25° 7' 13.431" N	0.4
33	33	82° 14' 57.513" E	25° 7' 29.653" N	3.24
34	34	82° 14' 39.092" E	25° 7' 50.378" N	1.14
35	35	82° 15' 5.192" E	25° 8' 14.580" N	0.76
36	36	82° 14' 43.435" E	25° 8' 29.423" N	0.24
37	37	82° 14' 32.241" E	25° 8' 50.559" N	0.55
38	38	82° 14' 54.063" E	25° 8' 59.281" N	0.24
39	39	82° 15' 0.936" E	25° 9' 42.431" N	0.56
40	40	82° 14' 32.212" E	25° 10' 5.007" N	1.23
41	41	82° 14' 36.862" E	25° 10' 7.769" N	0.57
42	42	82° 14' 33.948" E	25° 10' 1.490" N	0.81
43	43	82° 14' 14.674" E	25° 7' 15.612" N	2.83
44	44	82° 14' 24.034" E	25° 8' 15.326" N	1.97
45	45	82° 14' 15.490" E	25° 8' 19.611" N	1.02
46	46	82° 13' 57.925" E	25° 8' 21.827" N	0.21
47	47	82° 14' 27.934" E	25° 9' 18.202" N	0.62
48	48	82° 14' 10.550" E	25° 9' 23.950" N	0.24
49	49	82° 14' 5.140" E	25° 9' 23.959" N	0.42
50	50	82° 14' 15.785" E	25° 10' 20.245" N	0.33
51	51	82° 13' 23.269" E	25° 7' 50.982" N	0.99
52	52	82° 13' 27.639" E	25° 8' 1.987" N	1.26
53	53	82° 13' 29.724" E	25° 8' 25.476" N	0.79
54	54	82° 13' 28.290" E	25° 8' 31.910" N	0.6
55	55	82° 13' 8.966" E	25° 9' 43.919" N	1.47
56	56	82° 13' 10.422" E	25° 10' 27.133" N	0.4

57	57	82° 12' 39.768" E	25° 7' 27.464" N	3.05
58	58	82° 12' 59.820" E	25° 10' 20.852" N	2.41
59	59	82° 12' 25.229" E	25° 7' 4.700" N	0.41
60	60	82° 12' 21.231" E	25° 7' 9.260" N	0.43
61	61	82° 12' 29.747" E	25° 7' 21.896" N	0.21
62	62	82° 12' 37.461" E	25° 10' 13.484" N	1.51
63	63	82° 12' 29.328" E	25° 10' 17.507" N	0.12
64	64	82° 12' 37.781" E	25° 10' 34.474" N	0.47
65	65	82° 11' 33.633" E	25° 7' 16.043" N	1.42
66	66	82° 12' 5.360" E	25° 7' 59.154" N	2.28
67	67	82° 12' 12.598" E	25° 7' 58.625" N	1.08
68	68	82° 12' 4.864" E	25° 8' 26.379" N	3.93
69	69	82° 11' 42.562" E	25° 8' 41.104" N	1.11
70	70	82° 12' 4.692" E	25° 8' 43.229" N	1.92
71	71	82° 12' 9.638" E	25° 9' 29.992" N	0.81
72	72	82° 11' 54.140" E	25° 9' 53.845" N	0.53
73	73	82° 11' 55.246" E	25° 10' 48.715" N	0.12
74	74	82° 11' 15.960" E	25° 8' 38.528" N	0.87
75	75	82° 11' 17.933" E	25° 10' 9.902" N	1.91
76	76	82° 11' 44.527" E	25° 10' 12.920" N	0.6
77	77	82° 11' 42.991" E	25° 10' 23.336" N	0.68
78	78	82° 11' 24.708" E	25° 10' 46.784" N	1.7
79	79	82° 11' 21.339" E	25° 10' 57.996" N	0.66
80	80	82° 11' 41.191" E	25° 11' 19.932" N	0.26
81	81	82° 11' 33.243" E	25° 11' 27.928" N	1.63
82	82	82° 11' 29.349" E	25° 11' 37.362" N	0.56
83	83	82° 11' 41.655" E	25° 11' 33.149" N	0.08
84	84	82° 12' 13.519" E	25° 15' 31.411" N	1.18
85	85	82° 11' 43.253" E	25° 14' 20.608" N	0.2
86	86	82° 12' 5.597" E	25° 16' 24.744" N	1.16
87	87	82° 11' 47.746" E	25° 16' 40.871" N	0.86
88	88	82° 12' 5.999" E	25° 16' 53.957" N	0.67
89	89	82° 11' 45.712" E	25° 18' 9.436" N	0.9
90	90	82° 11' 29.140" E	25° 17' 15.226" N	1.04
91	91	82° 11' 22.976" E	25° 16' 38.262" N	1.02
92	92	82° 11' 27.947" E	25° 16' 11.603" N	1.82
93	93	82° 11' 29.526" E	25° 15' 11.062" N	1.24
94	94	82° 11' 21.591" E	25° 14' 22.767" N	1.48
95	95	82° 11' 17.357" E	25° 13' 18.122" N	0.76
96	96	82° 11' 5.847" E	25° 12' 44.427" N	0.88
97	97	82° 11' 22.816" E	25° 12' 19.110" N	0.64
98	98	82° 11' 14.869" E	25° 11' 37.417" N	0.14
99	99	82° 11' 10.457" E	25° 11' 36.710" N	0.15

100	100	82° 11' 3.469" E	25° 11' 14.553" N	0.33
101	101	82° 11' 7.769" E	25° 10' 16.269" N	2.74
102	102	82° 10' 57.089" E	25° 9' 15.728" N	0.2
103	103	82° 11' 5.336" E	25° 7' 40.791" N	0.41
104	104	82° 10' 54.801" E	25° 7' 39.584" N	1.11
105	105	82° 10' 41.676" E	25° 7' 41.239" N	0.63
106	106	82° 10' 35.576" E	25° 8' 9.193" N	1.35
107	107	82° 10' 10.785" E	25° 8' 16.603" N	0.8
108	108	82° 10' 17.552" E	25° 8' 18.466" N	0.72
109	109	82° 10' 48.989" E	25° 10' 41.035" N	1.37
110	110	82° 10' 52.968" E	25° 10' 36.948" N	0.64
111	111	82° 10' 37.459" E	25° 11' 2.410" N	1.5
112	112	82° 10' 16.919" E	25° 11' 10.349" N	0.62
113	113	82° 10' 52.788" E	25° 11' 34.468" N	3.4
114	114	82° 10' 31.792" E	25° 12' 2.605" N	0.45
115	115	82° 10' 59.298" E	25° 12' 19.924" N	2.07
116	116	82° 10' 34.565" E	25° 12' 51.905" N	0.58
117	117	82° 10' 47.422" E	25° 13' 18.309" N	1.76
118	118	82° 10' 49.564" E	25° 13' 36.313" N	0.51
119	119	82° 10' 44.655" E	25° 13' 34.776" N	0.81
120	120	82° 10' 45.606" E	25° 14' 22.935" N	0.39
121	121	82° 10' 52.843" E	25° 14' 19.259" N	0.23
122	122	82° 10' 34.959" E	25° 14' 48.489" N	0.28
123	123	82° 10' 36.826" E	25° 14' 59.450" N	0.75
124	124	82° 11' 7.812" E	25° 15' 25.931" N	0.6
125	125	82° 10' 33.554" E	25° 15' 22.615" N	0.56
126	126	82° 10' 37.039" E	25° 15' 30.593" N	0.2
127	127	82° 10' 37.761" E	25° 15' 40.705" N	1.75
128	128	82° 10' 49.151" E	25° 15' 48.848" N	0.71
129	129	82° 10' 55.752" E	25° 16' 7.611" N	0.78
130	130	82° 10' 41.333" E	25° 16' 9.205" N	0.54
131	131	82° 10' 42.814" E	25° 16' 37.224" N	0.93
132	132	82° 10' 35.151" E	25° 16' 34.875" N	0.97
133	133	82° 10' 58.326" E	25° 17' 35.808" N	1.84
134	134	82° 11' 4.177" E	25° 17' 30.586" N	0.64
135	135	82° 9' 46.085" E	25° 8' 42.484" N	2
136	136	82° 10' 7.023" E	25° 9' 33.705" N	0.37
137	137	82° 9' 41.422" E	25° 10' 23.597" N	2.44
138	138	82° 9' 52.683" E	25° 11' 41.726" N	0.65
139	139	82° 9' 59.445" E	25° 12' 33.406" N	1.03
140	140	82° 9' 41.419" E	25° 12' 39.024" N	0.99
141	141	82° 10' 16.604" E	25° 12' 35.781" N	0.41
142	142	82° 10' 2.194" E	25° 12' 39.896" N	0.46

143	143	82° 9' 46.196" E	25° 12' 49.738" N	0.95
144	144	82° 9' 51.319" E	25° 12' 57.773" N	1.31
145	145	82° 10' 21.671" E	25° 13' 22.426" N	0.58
146	146	82° 10' 18.677" E	25° 13' 21.555" N	0.25
147	147	82° 9' 46.006" E	25° 13' 15.105" N	0.62
148	148	82° 9' 57.579" E	25° 13' 19.098" N	0.5
149	149	82° 9' 57.285" E	25° 13' 35.455" N	1.66
150	150	82° 9' 57.367" E	25° 13' 45.031" N	0.35
151	151	82° 10' 19.758" E	25° 13' 55.811" N	0.54
152	152	82° 10' 2.005" E	25° 14' 17.743" N	1
153	153	82° 9' 58.448" E	25° 14' 7.846" N	0.7
154	154	82° 10' 3.310" E	25° 14' 43.857" N	0.99
155	155	82° 9' 56.642" E	25° 15' 2.024" N	0.97
156	156	82° 10' 12.261" E	25° 15' 0.480" N	0.3
157	157	82° 9' 46.842" E	25° 15' 16.158" N	1.16
158	158	82° 9' 52.470" E	25° 15' 23.585" N	1.08
159	159	82° 10' 11.820" E	25° 15' 26.073" N	2.15
160	160	82° 10' 10.602" E	25° 15' 13.162" N	2.11
161	161	82° 10' 9.871" E	25° 15' 38.893" N	3.22
162	162	82° 9' 43.571" E	25° 15' 43.120" N	1.62
163	163	82° 9' 49.273" E	25° 15' 50.034" N	2.24
164	164	82° 10' 6.425" E	25° 16' 19.606" N	0.76
165	165	82° 9' 52.708" E	25° 16' 13.119" N	1.41
166	166	82° 10' 7.813" E	25° 16' 10.192" N	0.28
167	167	82° 10' 20.367" E	25° 16' 5.224" N	0.7
168	168	82° 9' 57.107" E	25° 16' 45.681" N	1.23
169	169	82° 10' 4.826" E	25° 16' 31.959" N	1.25
170	170	82° 10' 30.576" E	25° 16' 27.672" N	0.82
171	171	82° 9' 55.700" E	25° 17' 9.978" N	0.62
172	172	82° 10' 8.034" E	25° 17' 25.695" N	5.39
173	173	82° 10' 31.389" E	25° 17' 14.075" N	0.83
174	174	82° 10' 22.652" E	25° 16' 57.751" N	0.86
175	175	82° 10' 19.589" E	25° 17' 32.120" N	1.59
176	176	82° 10' 22.457" E	25° 17' 49.123" N	0.71
177	177	82° 9' 24.445" E	25° 10' 29.517" N	0.26
178	178	82° 9' 8.627" E	25° 10' 39.893" N	0.37
179	179	82° 8' 54.967" E	25° 11' 2.510" N	3.14
180	180	82° 8' 55.066" E	25° 12' 13.178" N	1.63
181	181	82° 9' 19.786" E	25° 13' 4.134" N	1.31
182	182	82° 9' 0.136" E	25° 13' 21.833" N	0.73
183	183	82° 9' 5.431" E	25° 13' 45.598" N	1.33
184	184	82° 8' 59.172" E	25° 13' 45.022" N	0.96
185	185	82° 9' 4.259" E	25° 13' 51.651" N	1.58

186	186	82° 9' 21.289" E	25° 14' 0.714" N	1.59
187	187	82° 9' 15.711" E	25° 14' 7.311" N	0.65
188	188	82° 9' 8.681" E	25° 14' 27.304" N	0.86
189	189	82° 9' 0.049" E	25° 14' 29.467" N	1.88
190	190	82° 9' 23.734" E	25° 14' 30.547" N	0.78
191	191	82° 9' 21.956" E	25° 15' 15.164" N	0.7
192	192	82° 9' 23.727" E	25° 15' 5.092" N	1.47
193	193	82° 9' 28.692" E	25° 15' 8.074" N	0.89
194	194	82° 9' 35.550" E	25° 15' 5.473" N	0.6
195	195	82° 9' 5.397" E	25° 15' 25.125" N	2.1
196	196	82° 9' 9.529" E	25° 15' 57.934" N	4.33
197	197	82° 9' 24.243" E	25° 15' 52.738" N	0.6
198	198	82° 9' 17.626" E	25° 16' 21.147" N	5.73
199	199	82° 9' 16.864" E	25° 16' 10.386" N	4.29
200	200	82° 9' 37.950" E	25° 16' 53.966" N	0.81
201	201	82° 9' 16.823" E	25° 16' 36.371" N	1.12
202	202	82° 9' 11.824" E	25° 16' 34.411" N	0.48
203	203	82° 9' 22.717" E	25° 17' 12.905" N	0.73
204	204	82° 9' 8.220" E	25° 16' 58.594" N	3.57
205	205	82° 9' 28.672" E	25° 17' 6.482" N	1.9
206	206	82° 9' 50.642" E	25° 17' 22.467" N	1.35
207	207	82° 8' 40.287" E	25° 10' 25.328" N	1.17
208	208	82° 8' 22.579" E	25° 10' 30.320" N	2.6
209	209	82° 8' 42.261" E	25° 10' 8.990" N	2.41
210	210	82° 8' 13.590" E	25° 10' 21.526" N	0.88
211	211	82° 8' 40.312" E	25° 10' 56.975" N	1.14
212	212	82° 8' 22.275" E	25° 11' 0.329" N	0.64
213	213	82° 8' 27.615" E	25° 11' 36.342" N	0.47
214	214	82° 8' 10.448" E	25° 11' 53.829" N	0.93
215	215	82° 8' 39.988" E	25° 12' 21.950" N	2.06
216	216	82° 8' 13.042" E	25° 12' 48.821" N	0.41
217	217	82° 8' 31.236" E	25° 12' 41.258" N	3.6
218	218	82° 8' 30.569" E	25° 13' 41.679" N	0.36
219	219	82° 8' 14.599" E	25° 13' 56.979" N	1.06
220	220	82° 8' 35.288" E	25° 13' 57.218" N	1.89
221	221	82° 8' 33.095" E	25° 14' 14.748" N	1.3
222	222	82° 8' 14.833" E	25° 14' 36.961" N	1.3
223	223	82° 8' 31.418" E	25° 14' 50.906" N	2.46
224	224	82° 8' 18.471" E	25° 15' 5.464" N	2.5
225	225	82° 8' 19.031" E	25° 15' 19.612" N	0.25
226	226	82° 8' 32.816" E	25° 15' 15.677" N	2.56
227	227	82° 8' 30.653" E	25° 15' 22.440" N	1.46
228	228	82° 8' 55.862" E	25° 15' 29.621" N	0.58

229	229	82° 8' 19.857" E	25° 15' 52.548" N	0.99
230	230	82° 8' 16.691" E	25° 16' 11.073" N	2.09
231	231	82° 8' 39.096" E	25° 16' 35.388" N	1
232	232	82° 8' 59.562" E	25° 16' 38.482" N	1.13
233	233	82° 8' 42.338" E	25° 16' 45.086" N	1.64
234	234	82° 8' 3.107" E	25° 11' 27.044" N	0.69
235	235	82° 7' 49.797" E	25° 12' 0.559" N	0.48
236	236	82° 7' 42.343" E	25° 12' 17.684" N	3.23
237	237	82° 7' 50.553" E	25° 12' 36.787" N	0.9
238	238	82° 7' 42.237" E	25° 12' 45.498" N	1.31
239	239	82° 7' 51.950" E	25° 13' 8.931" N	1.62
240	240	82° 8' 2.171" E	25° 13' 7.774" N	3.22
241	241	82° 7' 22.672" E	25° 13' 30.264" N	2.42
242	242	82° 7' 15.289" E	25° 13' 27.723" N	1.49
243	243	82° 7' 10.547" E	25° 13' 35.490" N	1.8
244	244	82° 8' 6.414" E	25° 13' 25.242" N	1.82
245	245	82° 7' 31.778" E	25° 13' 32.301" N	0.9
246	246	82° 7' 41.871" E	25° 13' 47.346" N	1.23
247	247	82° 7' 44.969" E	25° 14' 13.180" N	0.89
248	248	82° 8' 2.838" E	25° 14' 7.496" N	1.64
249	249	82° 7' 33.412" E	25° 14' 56.686" N	0.27
250	250	82° 7' 59.047" E	25° 15' 18.401" N	0.84
251	251	82° 7' 49.025" E	25° 15' 27.060" N	1.31
252	252	82° 7' 39.987" E	25° 15' 52.556" N	3.87
253	253	82° 7' 45.482" E	25° 16' 13.174" N	0.88
254	254	82° 7' 40.805" E	25° 16' 14.623" N	0.74
255	255	82° 8' 5.522" E	25° 16' 32.678" N	0.39
256	256	82° 8' 5.132" E	25° 16' 57.702" N	1.1
257	257	82° 7' 11.161" E	25° 12' 24.181" N	0.58
258	258	82° 7' 8.079" E	25° 12' 49.718" N	0.38
259	259	82° 6' 56.663" E	25° 13' 4.721" N	2.42
260	260	82° 7' 8.657" E	25° 13' 17.183" N	2.12
261	261	82° 6' 51.072" E	25° 13' 38.732" N	1.54
262	262	82° 7' 16.093" E	25° 14' 0.221" N	1.17
263	263	82° 6' 34.453" E	25° 14' 16.427" N	1.77
264	264	82° 6' 52.232" E	25° 14' 7.283" N	1.9
265	265	82° 6' 53.643" E	25° 14' 14.244" N	0.83
266	266	82° 7' 12.773" E	25° 14' 37.773" N	0.71
267	267	82° 7' 4.831" E	25° 14' 35.188" N	0.9
268	268	82° 6' 41.069" E	25° 14' 39.890" N	0.82
269	269	82° 6' 57.464" E	25° 14' 58.763" N	0.56
270	270	82° 6' 44.271" E	25° 15' 10.221" N	5.64
271	271	82° 6' 49.237" E	25° 15' 27.529" N	0.23

272	272	82° 6' 57.496" E	25° 15' 45.848" N	0.59
273	273	82° 5' 55.452" E	25° 12' 16.525" N	0.37
274	274	82° 6' 5.571" E	25° 12' 15.310" N	0.6
275	275	82° 6' 21.863" E	25° 12' 17.381" N	2.19
276	276	82° 6' 29.645" E	25° 12' 26.865" N	3.02
277	277	82° 6' 3.789" E	25° 12' 30.109" N	1.23
278	278	82° 6' 10.156" E	25° 12' 41.897" N	1.15
279	279	82° 6' 29.363" E	25° 12' 37.490" N	0.48
280	280	82° 6' 27.526" E	25° 13' 7.421" N	0.45
281	281	82° 6' 4.092" E	25° 13' 22.954" N	0.22
282	282	82° 6' 29.499" E	25° 13' 31.363" N	2.3
283	283	82° 6' 39.168" E	25° 13' 31.707" N	4.22
284	284	82° 6' 8.120" E	25° 13' 29.482" N	0.31
285	285	82° 6' 16.530" E	25° 13' 43.941" N	2.92
286	286	82° 6' 0.168" E	25° 13' 58.923" N	2.42
287	287	82° 6' 31.277" E	25° 13' 54.879" N	0.3
288	288	82° 5' 51.298" E	25° 14' 8.093" N	0.96
289	289	82° 5' 51.200" E	25° 14' 21.143" N	1.8
290	290	82° 6' 13.443" E	25° 14' 26.911" N	0.99
291	291	82° 6' 27.344" E	25° 14' 31.235" N	1.24
292	292	82° 6' 10.473" E	25° 14' 45.074" N	1.13
293	293	82° 6' 7.196" E	25° 15' 21.368" N	0.82
294	294	82° 5' 52.342" E	25° 15' 31.647" N	0.82
295	295	82° 6' 29.897" E	25° 15' 10.585" N	1.89
296	296	82° 6' 2.299" E	25° 15' 47.045" N	0.41
297	297	82° 5' 45.036" E	25° 12' 25.890" N	1.01
298	298	82° 5' 36.390" E	25° 12' 23.511" N	1.71
299	299	82° 5' 32.571" E	25° 12' 15.037" N	4.22
300	300	82° 5' 45.499" E	25° 12' 16.100" N	6.34
301	301	82° 4' 59.244" E	25° 12' 46.341" N	2.28
302	302	82° 5' 0.698" E	25° 12' 33.732" N	2.83
303	303	82° 5' 37.649" E	25° 12' 50.426" N	1.16
304	304	82° 5' 19.069" E	25° 12' 59.420" N	2.55
305	305	82° 5' 20.054" E	25° 13' 11.903" N	2.41
306	306	82° 5' 24.405" E	25° 13' 25.725" N	0.54
307	307	82° 5' 4.743" E	25° 14' 5.394" N	24.7
308	308	82° 5' 12.261" E	25° 14' 2.955" N	1.31
309	309	82° 5' 8.386" E	25° 13' 57.240" N	1.63
310	310	82° 5' 21.949" E	25° 14' 3.102" N	1.54
311	311	82° 5' 18.073" E	25° 14' 49.241" N	1.06
312	312	82° 5' 36.972" E	25° 14' 44.037" N	0.75
313	313	82° 5' 44.255" E	25° 14' 45.845" N	0.57
314	314	82° 5' 47.914" E	25° 14' 36.728" N	0.59

315	315	82° 5' 7.623" E	25° 14' 10.411" N	0.39
316	316	82° 5' 58.581" E	25° 15' 7.839" N	0.95
317	317	82° 5' 38.727" E	25° 15' 10.461" N	0.33
318	318	82° 5' 40.366" E	25° 15' 3.744" N	0.98
319	319	82° 5' 32.871" E	25° 15' 28.948" N	0.58
320	320	82° 5' 30.344" E	25° 15' 39.350" N	0.77
321	321	82° 4' 44.331" E	25° 12' 25.535" N	1.23
322	322	82° 4' 39.292" E	25° 12' 19.477" N	2.56
323	323	82° 4' 38.512" E	25° 14' 28.462" N	0.68
324	324	82° 4' 37.663" E	25° 14' 21.860" N	1.5
325	325	82° 4' 56.902" E	25° 14' 49.165" N	0.28
326	326	82° 4' 51.681" E	25° 15' 13.381" N	1.18
327	327	82° 4' 41.145" E	25° 15' 23.099" N	0.53
328	328	82° 4' 30.844" E	25° 15' 20.247" N	0.27
329	329	82° 5' 19.300" E	25° 15' 18.022" N	0.54
330	330	82° 5' 12.723" E	25° 15' 22.561" N	1.36
331	Krishnanagar Talab	82° 5' 1.839" E	25° 15' 26.439" N	2.64
332	332	82° 5' 14.979" E	25° 15' 32.975" N	0.48
333	333	82° 4' 18.404" E	25° 15' 19.460" N	0.85
334	334	82° 4' 23.669" E	25° 14' 38.108" N	1.01
335	335	82° 4' 5.421" E	25° 13' 53.701" N	0.76
336	336	82° 3' 22.449" E	25° 13' 28.045" N	1.62
337	337	82° 3' 17.613" E	25° 13' 28.553" N	0.89
338	338	82° 3' 22.746" E	25° 13' 42.229" N	0.69
339	339	82° 3' 25.391" E	25° 13' 35.319" N	0.73
340	340	82° 3' 28.420" E	25° 13' 49.460" N	1.41
341	341	82° 3' 33.991" E	25° 15' 42.176" N	0.25
342	342	82° 2' 50.368" E	25° 13' 40.132" N	0.64
343	343	82° 2' 37.302" E	25° 13' 55.476" N	0.81
344	344	82° 2' 24.149" E	25° 16' 8.594" N	0.21
345	345	82° 2' 32.117" E	25° 16' 8.211" N	2.05
346	346	82° 2' 43.875" E	25° 16' 14.910" N	0.92
347	347	82° 2' 53.510" E	25° 16' 23.457" N	1.14
348	348	82° 2' 39.954" E	25° 17' 39.263" N	1.32
349	349	82° 2' 5.526" E	25° 17' 47.475" N	1.38
350	350	82° 2' 15.201" E	25° 17' 36.953" N	1.34
351	351	82° 2' 8.307" E	25° 17' 8.234" N	1.25
352	352	82° 2' 15.074" E	25° 16' 31.018" N	0.5
353	353	82° 1' 22.137" E	25° 15' 6.043" N	0.51
354	354	82° 1' 52.678" E	25° 17' 40.887" N	1.57
355	355	82° 1' 5.040" E	25° 17' 52.148" N	1.28
356	356	82° 1' 25.729" E	25° 18' 3.631" N	2.3

357	357	82° 0' 36.053" E	25° 15' 44.643" N	0.96
358	358	82° 0' 49.915" E	25° 15' 46.323" N	1.38
359	359	82° 0' 37.541" E	25° 16' 24.742" N	2.65
360	360	82° 0' 31.628" E	25° 16' 29.249" N	0.92
361	361	82° 0' 30.328" E	25° 18' 37.978" N	0.95
362	362	82° 0' 44.989" E	25° 18' 22.928" N	0.55
363	363	82° 0' 45.862" E	25° 18' 8.405" N	0.89
364	364	81° 59' 33.115" E	25° 16' 14.543" N	2.38
365	365	81° 59' 42.394" E	25° 16' 15.100" N	2.13
366	366	81° 59' 43.620" E	25° 16' 42.020" N	1.27
367	367	81° 59' 57.380" E	25° 16' 45.120" N	1.41
368	368	81° 59' 46.625" E	25° 17' 37.571" N	1.06
369	369	81° 59' 36.793" E	25° 17' 16.044" N	1.58
370	370	81° 59' 24.402" E	25° 17' 50.674" N	0.73
371	371	81° 59' 52.120" E	25° 18' 0.453" N	2.4
372	372	81° 59' 31.323" E	25° 18' 41.911" N	1.29
373	373	81° 59' 29.666" E	25° 18' 24.971" N	1.4
374	374	81° 59' 53.133" E	25° 18' 43.340" N	1.61
375	375	81° 59' 46.516" E	25° 18' 35.439" N	1.31
376	376	81° 59' 55.068" E	25° 18' 26.008" N	1.11
377	377	81° 58' 58.524" E	25° 18' 37.410" N	0.56
378	378	81° 59' 4.552" E	25° 18' 46.120" N	0.5
379	379	81° 59' 2.220" E	25° 18' 5.852" N	0.83
380	380	81° 59' 7.176" E	25° 17' 43.031" N	1.99
381	381	81° 58' 51.208" E	25° 16' 56.785" N	1.47
382	382	81° 58' 49.154" E	25° 17' 7.595" N	2.12
383	383	81° 58' 7.448" E	25° 15' 24.570" N	1.19
384	384	81° 57' 52.802" E	25° 15' 56.193" N	3.78
385	385	81° 58' 0.768" E	25° 16' 10.284" N	1.02
386	386	81° 58' 8.234" E	25° 16' 11.418" N	0.64
387	387	81° 58' 18.260" E	25° 16' 8.771" N	1.33
388	388	81° 57' 48.927" E	25° 16' 22.549" N	0.71
389	389	81° 58' 24.003" E	25° 17' 13.681" N	0.79
390	390	81° 58' 8.898" E	25° 17' 13.814" N	2.71
391	391	81° 58' 11.219" E	25° 17' 41.979" N	2.15
392	392	81° 58' 36.975" E	25° 18' 46.203" N	1.26
393	393	81° 58' 30.780" E	25° 18' 25.557" N	1.14
394	394	81° 57' 9.385" E	25° 15' 51.029" N	1.87
395	395	81° 57' 21.407" E	25° 15' 41.459" N	1.78
396	396	81° 57' 20.004" E	25° 15' 59.577" N	2.37
397	397	81° 56' 33.384" E	25° 16' 54.884" N	6.56
398	398	81° 57' 15.384" E	25° 16' 40.313" N	1.47
399	399	81° 56' 45.659" E	25° 15' 48.000" N	1.33

400	400	81° 56' 26.707" E	25° 15' 44.331" N	1.16
401	401	81° 57' 15.781" E	25° 16' 58.633" N	0.78
402	402	81° 56' 45.065" E	25° 17' 12.113" N	1.47
403	403	81° 55' 55.648" E	25° 19' 2.375" N	1.64
404	404	81° 56' 19.010" E	25° 18' 30.987" N	0.81
405	405	81° 56' 9.218" E	25° 18' 37.441" N	1.89
406	406	81° 56' 32.076" E	25° 18' 24.811" N	0.79
407	407	81° 56' 52.765" E	25° 18' 52.308" N	2.11
408	408	81° 56' 36.594" E	25° 18' 33.333" N	0.73
409	409	81° 56' 29.302" E	25° 18' 55.198" N	2.13
410	410	81° 56' 19.207" E	25° 18' 52.531" N	1.02
411	411	81° 56' 1.081" E	25° 18' 41.146" N	1.16
412	412	81° 56' 9.329" E	25° 15' 59.710" N	0.67
413	413	81° 56' 8.113" E	25° 17' 0.543" N	1.58
414	414	81° 56' 26.766" E	25° 16' 42.076" N	3.34
415	415	81° 56' 2.353" E	25° 16' 41.175" N	0.59
416	416	81° 56' 2.411" E	25° 16' 34.257" N	0.76
417	417	81° 55' 11.087" E	25° 16' 23.048" N	0.54
418	418	81° 55' 11.334" E	25° 17' 44.068" N	3.2
419	419	81° 54' 40.666" E	25° 21' 57.217" N	1.54
420	420	81° 54' 49.882" E	25° 20' 39.664" N	1.9
421	421	81° 54' 15.485" E	25° 16' 44.237" N	0.62
422	422	81° 54' 28.994" E	25° 17' 35.512" N	2.99
423	423	81° 54' 19.860" E	25° 18' 35.759" N	1.39
424	424	81° 53' 51.134" E	25° 18' 27.813" N	5.45
425	425	81° 53' 24.547" E	25° 23' 58.919" N	0.72
426	426	81° 53' 12.798" E	25° 21' 56.498" N	1
427	427	81° 54' 6.509" E	25° 22' 4.814" N	0.66
428	428	81° 53' 36.305" E	25° 22' 8.653" N	1.19
429	429	81° 53' 44.573" E	25° 21' 20.109" N	0.43
430	430	81° 53' 36.035" E	25° 21' 5.648" N	1.76
431	431	81° 53' 21.923" E	25° 21' 11.678" N	1.17
432	432	81° 53' 21.386" E	25° 20' 6.443" N	0.59
433	433	81° 52' 54.168" E	25° 18' 26.098" N	1.7
434	434	81° 53' 2.213" E	25° 18' 4.704" N	0.87
435	435	81° 53' 12.209" E	25° 18' 5.302" N	1.07
436	436	81° 53' 13.518" E	25° 18' 19.730" N	0.56
437	437	81° 53' 4.951" E	25° 17' 58.064" N	0.82
438	438	81° 52' 36.439" E	25° 18' 4.084" N	0.97
439	439	81° 52' 33.883" E	25° 17' 45.165" N	1.68
440	440	81° 52' 27.374" E	25° 19' 45.221" N	1.56
441	441	81° 52' 15.380" E	25° 19' 57.180" N	0.46
442	442	81° 51' 55.471" E	25° 20' 29.475" N	0.56

443	443	81° 51' 53.833" E	25° 20' 12.864" N	16.8
444	444	81° 52' 34.677" E	25° 20' 16.490" N	1.33
445	445	81° 52' 0.258" E	25° 18' 41.210" N	1.43
446	446	81° 51' 58.267" E	25° 19' 1.060" N	3.58
447	447	81° 52' 2.357" E	25° 19' 41.744" N	0.88
448	448	81° 51' 35.510" E	25° 20' 54.354" N	0.77
449	449	81° 51' 25.157" E	25° 20' 42.591" N	1.71
450	450	81° 51' 5.453" E	25° 23' 7.467" N	1.43
451	451	81° 50' 59.716" E	25° 23' 17.640" N	0.61
452	452	81° 51' 3.536" E	25° 23' 29.183" N	1.23
453	453	81° 50' 48.722" E	25° 21' 58.603" N	0.32
454	454	81° 50' 32.454" E	25° 22' 9.485" N	0.4
455	455	81° 50' 12.281" E	25° 22' 39.255" N	0.43
456	456	81° 51' 1.485" E	25° 22' 45.161" N	6.01
457	457	81° 50' 23.259" E	25° 24' 9.060" N	1.91
458	458	81° 50' 3.287" E	25° 23' 47.870" N	1.44
459	459	81° 52' 25.043" E	25° 27' 33.895" N	1.76
460	460	81° 52' 2.097" E	25° 30' 11.364" N	4.54
461	461	81° 52' 28.877" E	25° 26' 30.659" N	0.61
462	462	81° 52' 16.432" E	25° 26' 32.065" N	0.72
463	463	81° 51' 34.871" E	25° 26' 46.032" N	0.64
464	464	81° 51' 46.060" E	25° 27' 21.529" N	2.51
465	465	81° 52' 27.338" E	25° 27' 59.336" N	0.98
466	466	81° 51' 13.602" E	25° 26' 33.612" N	1.15
467	467	81° 50' 46.145" E	25° 29' 11.438" N	13.1
468	468	81° 49' 25.575" E	25° 26' 24.400" N	1.7
469	Gudiya Talab	81° 48' 51.387" E	25° 24' 53.423" N	0.28
470	470	81° 49' 5.367" E	25° 28' 23.698" N	1.78
471	471	81° 48' 13.520" E	25° 24' 21.259" N	0.51
472	472	81° 48' 8.494" E	25° 25' 56.945" N	0.83
473	473	81° 47' 41.187" E	25° 27' 42.566" N	0.23
474	Macpherson Lake	81° 47' 42.718" E	25° 26' 34.666" N	16.7
475	Subedarganj Talab	81° 47' 26.276" E	25° 25' 57.365" N	9.96
476	476	81° 46' 23.260" E	25° 24' 41.311" N	0.68
477	477	81° 46' 30.007" E	25° 24' 33.855" N	1.42
478	478	81° 46' 59.863" E	25° 24' 15.321" N	0.91
479	479	81° 46' 8.378" E	25° 25' 17.942" N	0.25
480	480	81° 46' 8.644" E	25° 26' 49.828" N	0.87
481	481	81° 45' 47.595" E	25° 26' 44.045" N	2.29
482	482	81° 44' 25.272" E	25° 24' 55.143" N	3.1
483	483	81° 44' 32.197" E	25° 24' 52.841" N	0.55
484	484	81° 44' 33.677" E	25° 25' 0.776" N	1.01

485	485	81° 44' 33.034" E	25° 26' 31.772" N	0.47
486	486	81° 43' 49.623" E	25° 27' 51.356" N	1.93
487	487	81° 43' 18.689" E	25° 26' 29.885" N	3.23
488	488	81° 42' 23.721" E	25° 26' 1.040" N	0.86
489	489	81° 42' 35.293" E	25° 26' 5.050" N	1.82
490	490	81° 42' 5.542" E	25° 26' 25.014" N	1.98
491	491	81° 42' 12.392" E	25° 26' 45.170" N	2.89
492	492	81° 42' 23.540" E	25° 26' 33.478" N	0.24
493	493	81° 41' 54.543" E	25° 27' 19.780" N	0.39
494	494	81° 42' 5.136" E	25° 27' 12.889" N	0.41
495	495	81° 41' 0.458" E	25° 26' 48.204" N	0.9
496	496	81° 40' 44.906" E	25° 26' 39.178" N	3.36
497	497	81° 40' 52.685" E	25° 26' 47.726" N	1.01
498	498	81° 41' 17.312" E	25° 27' 48.947" N	0.88
499	499	81° 40' 43.961" E	25° 28' 10.615" N	0.77
500	500	81° 40' 27.955" E	25° 27' 0.070" N	0.49
501	501	81° 40' 34.534" E	25° 27' 0.763" N	1.65
502	502	81° 40' 41.781" E	25° 26' 56.417" N	0.47
503	503	81° 39' 37.437" E	25° 27' 43.999" N	0.41
504	504	81° 39' 50.036" E	25° 27' 50.208" N	1.78
505	505	81° 39' 57.549" E	25° 28' 8.652" N	1.57
506	506	81° 40' 32.824" E	25° 29' 21.826" N	1.2
507	507	81° 40' 0.837" E	25° 29' 2.832" N	1.36
508	508	81° 39' 13.438" E	25° 26' 46.163" N	2.18
509	509	81° 39' 25.936" E	25° 29' 3.297" N	1.38
510	510	81° 37' 5.214" E	25° 39' 31.498" N	0.99
511	511	81° 37' 11.721" E	25° 39' 18.390" N	14.1
512	512	81° 37' 16.456" E	25° 39' 13.051" N	0.79
513	513	81° 37' 16.683" E	25° 38' 7.028" N	2.68
514	514	81° 37' 51.548" E	25° 38' 4.070" N	1.54
515	515	81° 37' 17.889" E	25° 36' 34.653" N	2.37
516	516	81° 37' 27.728" E	25° 36' 38.982" N	1.28
517	517	81° 36' 56.036" E	25° 36' 50.337" N	0.58
518	518	81° 36' 59.732" E	25° 36' 45.926" N	1.16
519	519	81° 37' 40.594" E	25° 36' 57.827" N	0.49
520	520	81° 37' 55.523" E	25° 36' 23.379" N	0.35
521	521	81° 38' 25.518" E	25° 36' 5.822" N	1.26
522	522	81° 38' 39.193" E	25° 36' 30.260" N	0.47
523	523	81° 39' 4.351" E	25° 34' 48.646" N	1.07
524	524	81° 39' 7.287" E	25° 35' 44.347" N	0.41
525	525	81° 39' 5.469" E	25° 36' 9.088" N	0.62
526	526	81° 39' 41.851" E	25° 34' 24.466" N	0.67
527	527	81° 39' 38.928" E	25° 34' 20.725" N	0.66

528	528	81° 39' 30.833" E	25° 34' 52.460" N	0.55
529	529	81° 39' 44.714" E	25° 35' 23.069" N	0.3
530	530	81° 40' 16.172" E	25° 35' 33.194" N	1.14
531	531	81° 39' 54.042" E	25° 36' 53.460" N	0.7
532	532	81° 40' 21.013" E	25° 36' 46.116" N	2.14
533	533	81° 40' 24.888" E	25° 36' 40.457" N	1.03
534	534	81° 40' 26.569" E	25° 37' 33.775" N	0.41
535	535	81° 41' 0.710" E	25° 33' 8.364" N	0.48
536	536	81° 40' 40.117" E	25° 33' 14.886" N	0.63
537	537	81° 40' 52.304" E	25° 33' 31.534" N	0.24
538	538	81° 41' 3.083" E	25° 33' 35.141" N	0.5
539	539	81° 40' 16.533" E	25° 34' 31.546" N	0.73
540	540	81° 40' 48.528" E	25° 36' 9.560" N	1
541	541	81° 40' 40.330" E	25° 36' 24.462" N	1.61
542	542	81° 41' 3.326" E	25° 37' 9.958" N	1.28
543	543	81° 40' 58.747" E	25° 37' 2.863" N	3.79
544	544	81° 41' 6.191" E	25° 37' 19.386" N	1.29
545	Anapur Sagar	81° 40' 52.415" E	25° 37' 50.810" N	0.56
546	546	81° 41' 32.444" E	25° 34' 36.587" N	0.58
547	547	81° 41' 8.868" E	25° 36' 16.000" N	0.46
548	548	81° 41' 45.357" E	25° 36' 46.512" N	0.72
549	549	81° 41' 27.086" E	25° 36' 41.252" N	2.72
550	550	81° 41' 45.275" E	25° 37' 0.326" N	1.19
551	551	81° 41' 40.782" E	25° 37' 31.273" N	1
552	552	81° 43' 9.681" E	25° 31' 26.743" N	0.91
553	553	81° 42' 23.592" E	25° 32' 0.303" N	18.5
554	554	81° 42' 20.075" E	25° 35' 32.142" N	1.47
555	555	81° 43' 3.473" E	25° 35' 7.580" N	2.1
556	556	81° 43' 30.414" E	25° 33' 59.800" N	1.76
557	557	81° 43' 20.118" E	25° 33' 26.708" N	0.51
558	558	81° 44' 32.358" E	25° 30' 18.322" N	0.61
559	559	81° 44' 30.409" E	25° 33' 43.914" N	3.37
560	560	81° 45' 0.823" E	25° 34' 1.595" N	1.25
561	561	81° 45' 34.018" E	25° 33' 44.698" N	1.54
562	562	81° 45' 13.933" E	25° 33' 19.496" N	3.19
563	563	81° 45' 30.624" E	25° 33' 22.338" N	1.56
564	564	81° 45' 38.185" E	25° 31' 50.360" N	0.66
565	565	81° 47' 28.402" E	25° 33' 6.564" N	1.63
566	566	81° 47' 20.767" E	25° 32' 55.557" N	0.67
567	567	81° 47' 15.196" E	25° 31' 59.140" N	0.48
568	568	81° 47' 18.162" E	25° 32' 5.166" N	0.57
569	569	81° 47' 25.068" E	25° 31' 43.542" N	0.36
570	570	81° 48' 20.123" E	25° 31' 20.522" N	1.06

571	571	81° 48' 13.638" E	25° 32' 38.788" N	4.48
572	572	81° 49' 23.307" E	25° 32' 50.643" N	1.64
573	573	81° 49' 24.036" E	25° 32' 17.889" N	1.01
574	574	81° 49' 14.872" E	25° 32' 8.729" N	0.68
575	575	81° 49' 38.249" E	25° 32' 6.314" N	0.53
576	576	81° 49' 6.796" E	25° 32' 7.335" N	0.57
577	577	81° 49' 51.851" E	25° 31' 45.701" N	0.57
578	578	81° 50' 7.779" E	25° 31' 48.584" N	0.36
579	579	81° 50' 25.900" E	25° 32' 18.120" N	0.52
580	580	81° 49' 56.148" E	25° 32' 17.059" N	1.02
581	581	81° 49' 51.893" E	25° 32' 58.847" N	1.09
582	582	81° 50' 52.375" E	25° 34' 10.960" N	0.97
583	583	81° 50' 45.070" E	25° 33' 49.020" N	0.53
584	584	81° 51' 30.438" E	25° 33' 34.417" N	0.8
585	585	81° 51' 38.167" E	25° 33' 33.164" N	0.76
586	586	81° 51' 50.258" E	25° 33' 40.167" N	1.21
587	587	81° 51' 26.776" E	25° 33' 15.534" N	3.87
588	588	81° 51' 34.803" E	25° 31' 52.233" N	0.56
589	589	81° 50' 56.040" E	25° 31' 40.983" N	0.63
590	590	81° 51' 2.142" E	25° 31' 46.120" N	4.26
591	591	81° 50' 49.017" E	25° 32' 6.856" N	0.62
592	592	81° 51' 36.217" E	25° 34' 2.943" N	1.15
593	593	81° 51' 54.512" E	25° 31' 0.760" N	0.87
594	594	81° 52' 4.769" E	25° 31' 37.803" N	22.8
595	595	81° 53' 43.219" E	25° 33' 36.048" N	0.46
596	596	81° 52' 54.157" E	25° 32' 16.641" N	2.35
597	597	81° 52' 58.562" E	25° 31' 38.626" N	0.59
598	598	81° 54' 14.961" E	25° 34' 24.972" N	2.02
599	599	81° 53' 36.778" E	25° 33' 30.035" N	0.38
600	600	81° 54' 2.738" E	25° 33' 38.303" N	0.51
601	601	81° 54' 19.061" E	25° 33' 28.668" N	0.79
602	602	81° 54' 17.962" E	25° 33' 19.229" N	0.48
603	603	81° 54' 2.095" E	25° 33' 4.443" N	0.43
604	604	81° 53' 37.437" E	25° 32' 43.885" N	2.71
605	605	81° 54' 59.444" E	25° 24' 47.990" N	0.58
606	606	81° 55' 2.592" E	25° 25' 13.765" N	0.73
607	607	81° 54' 14.645" E	25° 25' 49.119" N	0.55
608	608	81° 54' 55.684" E	25° 26' 7.798" N	1.87
609	609	81° 54' 33.577" E	25° 32' 46.820" N	0.41
610	610	81° 54' 46.951" E	25° 33' 11.801" N	1.09
611	611	81° 54' 37.902" E	25° 33' 33.973" N	0.52
612	612	81° 55' 24.992" E	25° 33' 56.659" N	0.91
613	613	81° 56' 3.153" E	25° 28' 37.900" N	0.86

614	614	81° 55' 19.156" E	25° 25' 29.408" N	2.42
615	615	81° 55' 10.466" E	25° 25' 53.464" N	1.09
616	616	81° 55' 9.311" E	25° 24' 52.904" N	0.68
617	617	81° 54' 59.180" E	25° 24' 28.825" N	0.96
618	618	81° 55' 15.865" E	25° 24' 30.776" N	1.41
619	619	81° 55' 53.918" E	25° 23' 56.200" N	0.63
620	620	81° 56' 25.555" E	25° 23' 13.500" N	0.63
621	621	81° 56' 10.829" E	25° 23' 29.302" N	0.27
622	622	81° 56' 53.887" E	25° 23' 47.127" N	0.54
623	623	81° 56' 47.425" E	25° 24' 11.954" N	0.52
624	624	81° 56' 36.427" E	25° 25' 37.080" N	0.44
625	625	81° 56' 56.122" E	25° 25' 33.301" N	2.25
626	626	81° 56' 44.911" E	25° 25' 33.091" N	1.68
627	627	81° 56' 41.793" E	25° 26' 6.066" N	2.27
628	628	81° 57' 14.093" E	25° 23' 6.883" N	0.82
629	629	81° 57' 5.571" E	25° 24' 30.241" N	0.87
630	630	81° 57' 16.086" E	25° 24' 33.898" N	0.78
631	631	81° 57' 33.632" E	25° 24' 35.318" N	0.85
632	632	81° 57' 30.971" E	25° 24' 21.463" N	0.54
633	633	81° 57' 25.853" E	25° 24' 58.287" N	0.46
634	634	81° 57' 17.569" E	25° 25' 54.066" N	0.4
635	635	81° 57' 45.546" E	25° 25' 47.340" N	4.67
636	636	81° 57' 13.136" E	25° 26' 48.294" N	1.39
637	637	81° 57' 13.166" E	25° 26' 44.231" N	0.87
638	638	81° 57' 45.409" E	25° 28' 12.674" N	0.15
639	639	81° 57' 36.874" E	25° 28' 10.759" N	0.37
640	640	81° 57' 43.675" E	25° 28' 19.281" N	0.21
641	641	81° 57' 12.366" E	25° 30' 4.271" N	0.4
642	642	81° 57' 27.737" E	25° 30' 7.634" N	1.66
643	643	81° 57' 31.162" E	25° 31' 17.101" N	0.43
644	644	81° 57' 56.387" E	25° 22' 45.133" N	0.36
645	645	81° 57' 38.806" E	25° 22' 49.196" N	0.39
646	646	81° 57' 50.564" E	25° 22' 41.492" N	0.7
647	647	81° 57' 58.269" E	25° 22' 59.683" N	0.15
648	648	81° 57' 37.137" E	25° 23' 26.165" N	0.61
649	649	81° 57' 57.437" E	25° 23' 37.789" N	0.31
650	650	81° 57' 43.618" E	25° 24' 2.007" N	0.53
651	651	81° 58' 0.516" E	25° 24' 4.833" N	0.87
652	652	81° 58' 2.836" E	25° 24' 53.625" N	0.44
653	653	81° 58' 0.938" E	25° 27' 3.164" N	0.31
654	654	81° 58' 45.483" E	25° 27' 52.231" N	0.31
655	655	81° 58' 23.496" E	25° 32' 50.852" N	0.65
656	656	81° 58' 30.753" E	25° 32' 36.380" N	2.08

657	657	81° 58' 37.249" E	25° 23' 21.486" N	0.57
658	658	81° 58' 25.192" E	25° 24' 0.306" N	0.31
659	659	81° 58' 19.853" E	25° 24' 27.210" N	0.46
660	660	81° 58' 31.498" E	25° 24' 38.755" N	0.93
661	661	81° 58' 31.657" E	25° 24' 57.629" N	0.7
662	662	81° 58' 18.020" E	25° 25' 36.609" N	0.55
663	663	81° 58' 7.413" E	25° 25' 29.318" N	0.9
664	664	81° 58' 10.485" E	25° 25' 36.188" N	0.42
665	665	81° 59' 3.951" E	25° 22' 22.361" N	0.36
666	666	81° 59' 36.313" E	25° 22' 40.691" N	0.22
667	667	81° 59' 41.570" E	25° 22' 5.892" N	3.35
668	668	81° 59' 9.943" E	25° 22' 2.840" N	1.64
669	669	81° 59' 28.192" E	25° 22' 35.196" N	0.46
670	670	81° 59' 24.275" E	25° 23' 14.228" N	0.18
671	671	81° 59' 7.333" E	25° 23' 9.924" N	0.85
672	672	81° 59' 58.348" E	25° 23' 36.207" N	1.22
673	673	81° 59' 55.752" E	25° 23' 8.790" N	0.69
674	674	81° 59' 19.717" E	25° 23' 56.551" N	3.9
675	675	82° 0' 25.142" E	25° 23' 8.648" N	0.47
676	676	82° 0' 3.155" E	25° 22' 55.279" N	2.17
677	677	81° 59' 37.676" E	25° 23' 9.220" N	1.16
678	678	82° 0' 35.743" E	25° 23' 11.804" N	0.75
679	679	82° 0' 22.577" E	25° 23' 0.334" N	0.52
680	680	82° 0' 47.347" E	25° 25' 7.994" N	0.71
681	681	82° 0' 33.227" E	25° 25' 27.646" N	0.6
682	682	82° 1' 26.576" E	25° 23' 41.588" N	0.8
683	683	82° 0' 52.536" E	25° 23' 9.129" N	0.68
684	684	82° 0' 48.662" E	25° 22' 42.871" N	2.11
685	685	82° 0' 43.951" E	25° 23' 10.942" N	1.21
686	686	82° 0' 38.048" E	25° 23' 2.247" N	0.43
687	687	82° 1' 49.241" E	25° 23' 43.643" N	0.9
688	688	82° 1' 27.793" E	25° 25' 0.954" N	0.46
689	689	82° 2' 37.042" E	25° 23' 37.448" N	1.34
690	690	82° 2' 58.237" E	25° 23' 16.578" N	1.84
691	691	82° 3' 13.779" E	25° 24' 24.294" N	0.37
692	692	82° 4' 51.730" E	25° 22' 48.463" N	2.21
693	693	82° 4' 42.324" E	25° 22' 47.561" N	0.78
694	694	82° 5' 1.477" E	25° 23' 11.996" N	1.16
695	695	82° 5' 43.412" E	25° 22' 37.318" N	1.05
696	696	82° 5' 4.991" E	25° 18' 48.924" N	2.04
697	697	82° 5' 3.075" E	25° 17' 47.894" N	2.82
698	698	82° 5' 49.612" E	25° 18' 13.950" N	0.38
699	699	82° 6' 15.901" E	25° 21' 31.757" N	0.5

700	700	82° 6' 10.220" E	25° 22' 15.505" N	1.49
701	701	82° 6' 47.167" E	25° 21' 24.404" N	2.35
702	702	82° 6' 40.961" E	25° 19' 50.765" N	1.13
703	703	82° 7' 18.705" E	25° 19' 47.017" N	2.6
704	704	82° 7' 37.409" E	25° 20' 50.596" N	0.5
705	705	82° 7' 22.319" E	25° 20' 56.184" N	1.59
706	706	82° 8' 5.423" E	25° 21' 48.017" N	0.6
707	707	82° 8' 8.309" E	25° 21' 37.871" N	0.53
708	708	82° 8' 52.860" E	25° 22' 36.670" N	1.99
709	709	82° 9' 18.908" E	25° 22' 12.712" N	2.23
710	710	82° 8' 56.909" E	25° 19' 57.399" N	3.1
711	711	82° 9' 48.521" E	25° 20' 3.046" N	2.04
712	712	82° 11' 18.656" E	25° 22' 13.414" N	1
713	713	82° 10' 11.512" E	25° 22' 2.514" N	2.34
714	714	82° 10' 45.322" E	25° 21' 46.625" N	4.62
715	715	82° 10' 14.158" E	25° 21' 24.630" N	1.93
716	716	82° 11' 4.430" E	25° 21' 15.315" N	1.22
717	717	82° 10' 24.395" E	25° 19' 46.938" N	3.23
718	718	82° 11' 24.780" E	25° 21' 13.312" N	1.96
719	719	82° 11' 15.992" E	25° 19' 3.751" N	4.27
720	720	82° 12' 8.897" E	25° 20' 59.790" N	6.18
721	721	82° 12' 2.536" E	25° 20' 55.231" N	0.73
722	722	82° 12' 18.240" E	25° 21' 33.595" N	0.42
723	723	82° 12' 27.132" E	25° 21' 53.481" N	0.27
724	724	82° 12' 1.424" E	25° 22' 6.431" N	2.86
725	725	82° 11' 38.621" E	25° 22' 14.260" N	7.05
726	726	82° 11' 26.269" E	25° 21' 53.539" N	4.43
727	727	82° 11' 4.431" E	25° 21' 43.135" N	17
728	728	82° 11' 38.205" E	25° 21' 58.676" N	3.76
729	729	82° 11' 40.791" E	25° 21' 49.312" N	2.06
730	730	82° 12' 45.664" E	25° 19' 20.666" N	1.8
731	731	82° 12' 46.315" E	25° 19' 55.172" N	2.03
732	732	82° 13' 10.028" E	25° 20' 28.871" N	1.15
733	733	82° 12' 43.333" E	25° 20' 29.815" N	4.07
734	734	82° 12' 51.809" E	25° 20' 46.960" N	4.16
735	735	82° 13' 5.706" E	25° 21' 25.295" N	2.89
736	736	82° 13' 3.945" E	25° 21' 14.465" N	9.16
737	737	82° 13' 30.182" E	25° 21' 30.427" N	5.57
738	738	82° 13' 38.606" E	25° 21' 12.750" N	3.54
739	739	82° 14' 18.115" E	25° 21' 47.513" N	2.02
740	740	82° 14' 36.453" E	25° 20' 34.164" N	2.7
741	Upardaha Lake	82° 14' 9.112" E	25° 19' 12.753" N	176

742	742	82° 14' 5.241" E	25° 19' 32.890" N	3.03
743	743	82° 14' 44.901" E	25° 19' 17.276" N	4.58
744	744	82° 14' 7.295" E	25° 17' 53.343" N	3.19
745	745	82° 13' 35.872" E	25° 18' 4.766" N	5.36
746	746	82° 14' 12.637" E	25° 18' 9.940" N	5.14
747	747	82° 14' 42.423" E	25° 17' 53.758" N	1.91
748	748	82° 14' 42.657" E	25° 18' 19.958" N	2.8
749	749	82° 14' 29.747" E	25° 18' 56.182" N	1.45
750	750	82° 14' 33.643" E	25° 18' 40.563" N	3.17
751	751	82° 16' 36.724" E	25° 19' 44.643" N	1.09
752	752	82° 16' 15.409" E	25° 18' 6.898" N	1.63
753	Chhendi Tal	82° 15' 30.374" E	25° 20' 41.064" N	89.6
754	754	82° 15' 23.317" E	25° 19' 18.703" N	11
755	755	82° 17' 12.070" E	25° 18' 10.951" N	17.4
756	756	82° 16' 47.532" E	25° 17' 57.508" N	19.8
757	757	82° 16' 22.110" E	25° 17' 53.259" N	0.94
758	758	82° 15' 41.517" E	25° 17' 39.668" N	1.48
759	759	82° 15' 23.008" E	25° 17' 44.647" N	3.41
760	760	82° 14' 55.339" E	25° 16' 28.204" N	1.65
761	761	82° 15' 24.053" E	25° 17' 7.124" N	3.71
762	762	82° 13' 52.255" E	25° 17' 14.556" N	2.24
763	763	82° 13' 58.860" E	25° 17' 18.582" N	2.74
764	764	82° 13' 54.936" E	25° 17' 45.403" N	1.6
765	765	82° 16' 31.310" E	25° 7' 11.768" N	1.14
766	766	82° 16' 36.724" E	25° 7' 10.734" N	1.81
Total				**1491.46**

[Ref. Map No. 8]

8.3 Some of the following wetlands are surveyed in Prayagraj Distt.:

8.3.1. **Macferson Lake or Macpherson Lake** : Located in the Cantonment area of Dhoomanganj in Prayagraj city, the8 ha Lake was once an important water body known as Newa or Neema Lake, enclosed inside Nehru Park [Ref. Images 19-20]. Today, the lake is extremely polluted due to the inflow of untreated sewage into it. The vegetation around the lake has grown wild and extremely dense such that the Lake cannot be accessed easily. The spillover from the Lake passes through a 600m long drain before discharging into the Ganga River. The Lake is covered with Pennywort (*Centella spp.*) which covers the maximum surface area along with the water hyacinth (*Eichhornia crassipes*) and *Typha latifolia.* Plants such as *Canna indica*, *Sagittaria* sp. and *Marsilea minuta* were also observed during field visits. Pollution from the effluent of industries severely affects the water quality in the lake by diminishing dissolved oxygen and thereby harming aquatic life. In order to rejuvenate this wetland, the Army authorities had set up a wetland rejuvenation plan couple of years ago. However, the Lake continues to receive polluted inflows and has become eutrophic with profuse bloom of macrophytes and emergent vegetation. The littoral zone and immediate basin area has become heavily infested with wild vegetation dominated by *Acacia nilotica* (Babool). The area is poorly visited with only some villagers venturing into it to collect wood or graze cattle.

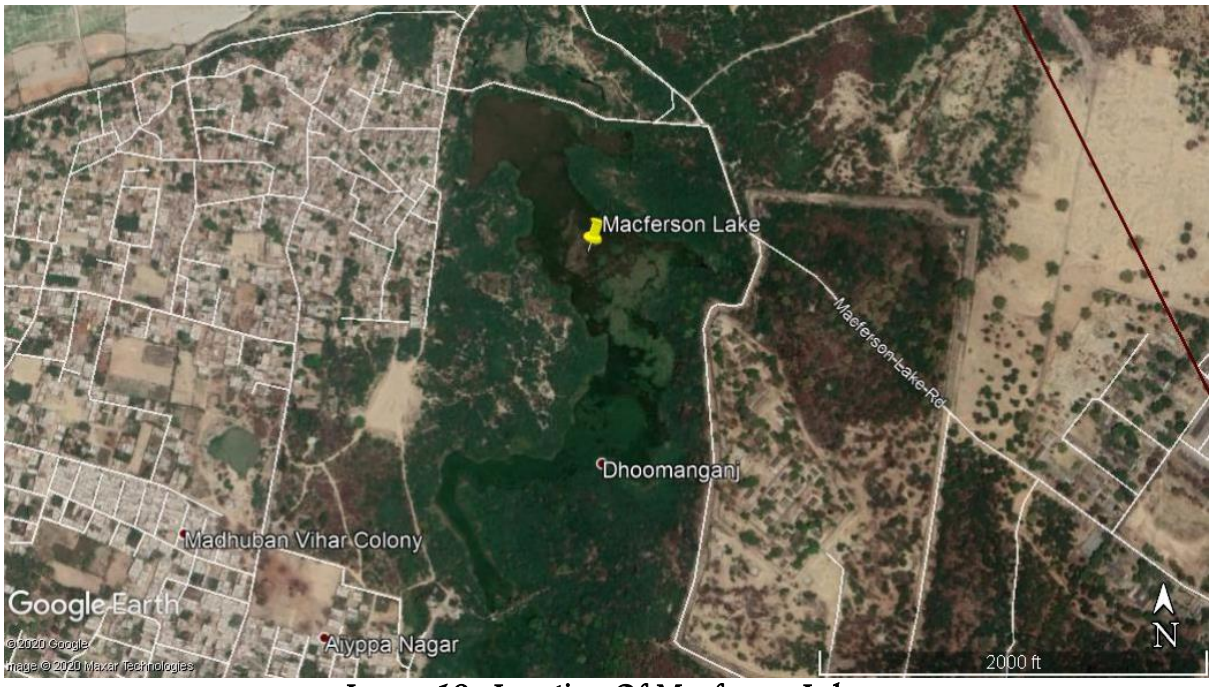


Image 19 : Location Of Macferson Lake

Image 20 : Macferson Lake With Polluted Water In Prayagraj City

8.3.2 **Subedarganj Talab** : This 1 ha water body is located adjacent to Grand Trunk Road south of Dhoomanganj area in Prayagraj city (Refer Image 21). A boundary wall was constructed around it separating it from the main road. The water of this pond was mainly covered by *Typha* grass and water hyacinth [Ref. Image 22]. Interactions with the local community revealed that the water of this pond was used to cultivate water chestnut (*Eleocharis dulcis*) and for fisheries. The presence of Mangur (catfish) and Flap Shell Turtles is also found in this water body. The common water birds such as Egrets and Red Wattled Lapwings are also observed in the vicinity of this pond. The local residents also mentioned about an old Imli (tamarind) tree near this pond which was used by erstwhile British officers to hang the 'rebels' after the 1857 uprising. Although the tree has not survived, a board and a chabutra have been constructed at this place mentioning its historical importance.

Image 21 : Location Of Subedargunj Talab

Image 22 : Growth Of Typha Grass In Subedargunj Talab

8.3.3 **Mubarakpur Kachar** : An oxbow lake was present near MubarakpurKachar village towards the northern part of Prayagraj Distt [Ref. Image 23]. The periphery of the lake is surrounded by agricultural fields growing mustard as the main crop [Ref. Image 24]. No fishing activity has been noticed around the lake. In some places near the water body, graves were also observed.

Image 23 : Location of Oxbow Lake

Image 24 : Oxbow Lake With Mustard Plantations Near Mubarakpur Kacchar Village

8.3.4 **Mahant Ka Talab** : Located in the Bharatganj village of PrayagrajDistt. [Ref. Image 25], the pond was created by a local *mahant* (chief priest) 70-80 years ago and hence, its name. The pond is infested with *Azolla pinnata* commonly known as mosquito fern [Ref. Image 26]. It is a feeding ground for a number of water birds like Indian pond heron, cattle egrets, little cormorants and cotton pygmy goose. Quite a few migratory birds also visit the ponds during winter as informed by the local communities. The fish in the pond are caught by the local community for their own consumption.

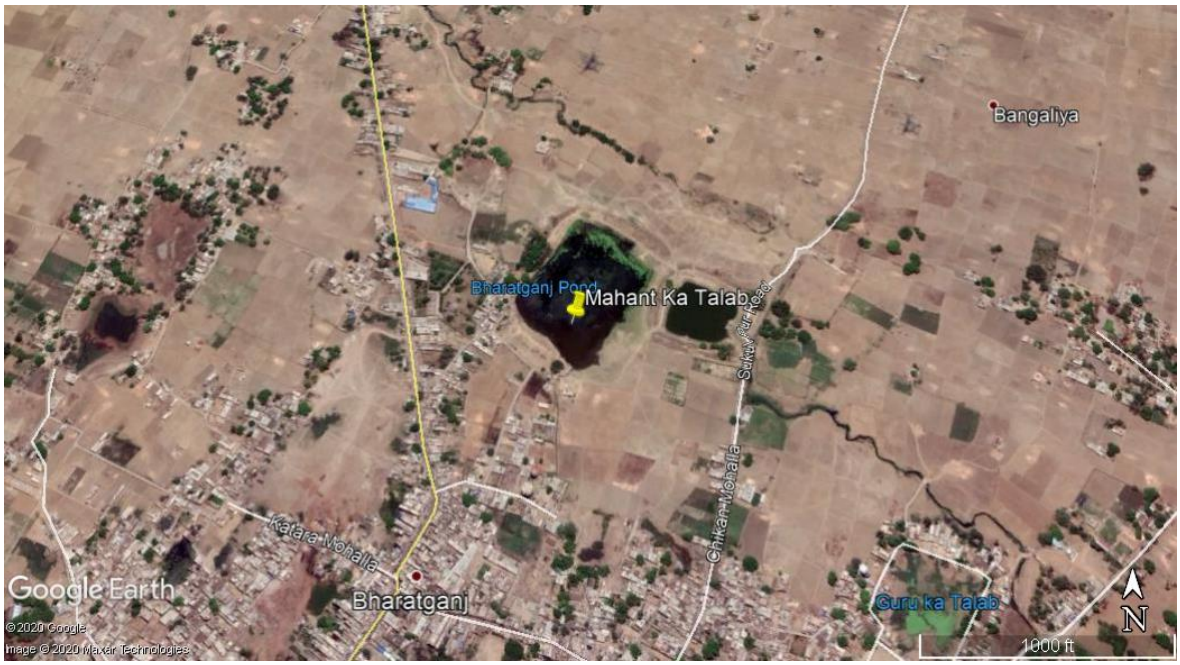


Image 25 : Location Of Mahant Ka Talab

8.3.5 **Krishnanagar ka Talab** : The pond is located in the Krishnanagar village of Prayagraj Distt. and remains filled with water all year round but is not used for any domestic usage [Ref. Images 27-28]. Water-birds like Little Cormorant, Cattle Egrets, Pond heron and Moorhen have been observed during the field visit. However, recently some villagers have introduced fish in this pond mainly Rohu (*Labeo rohita*) and Common carp (*Cyprinus carpio*) which are then caught for local consumption.

Image 26 : Mahant Ka Talab With Growth Of *Azollapinnata* In Bharatganj Village

Image 27 : Location Of Krishnanagar Talab

Image 28 : Krishnanagar Talab In Prayagraj Distt.

8.3.6 **Upardaha Taal :** This lake is the biggest water body in the entire study region with an area of 176 ha [Ref. Image 29]. Located in Upardaha village at a distance of about 47 kms from Prayagraj city, this lake was once abuzz with numerous resident and migratory birds. However, since the last 15-20 years most of this lake has been covered with wild growth of *Typha* and *Saccharum* sps. grasses which has led to a sharp decline in the birds visiting here [Ref. Image 30]. A small part of this lake was used by a villager for rearing fishes such as *Rohu*, *Bhakur*, *Catla*, *Tengara* and *Sidhari*. The extensive growth of grasses on this lake has sheltered large number of wild boars which create nuisance for the villagers by destroying the agricultural fields.

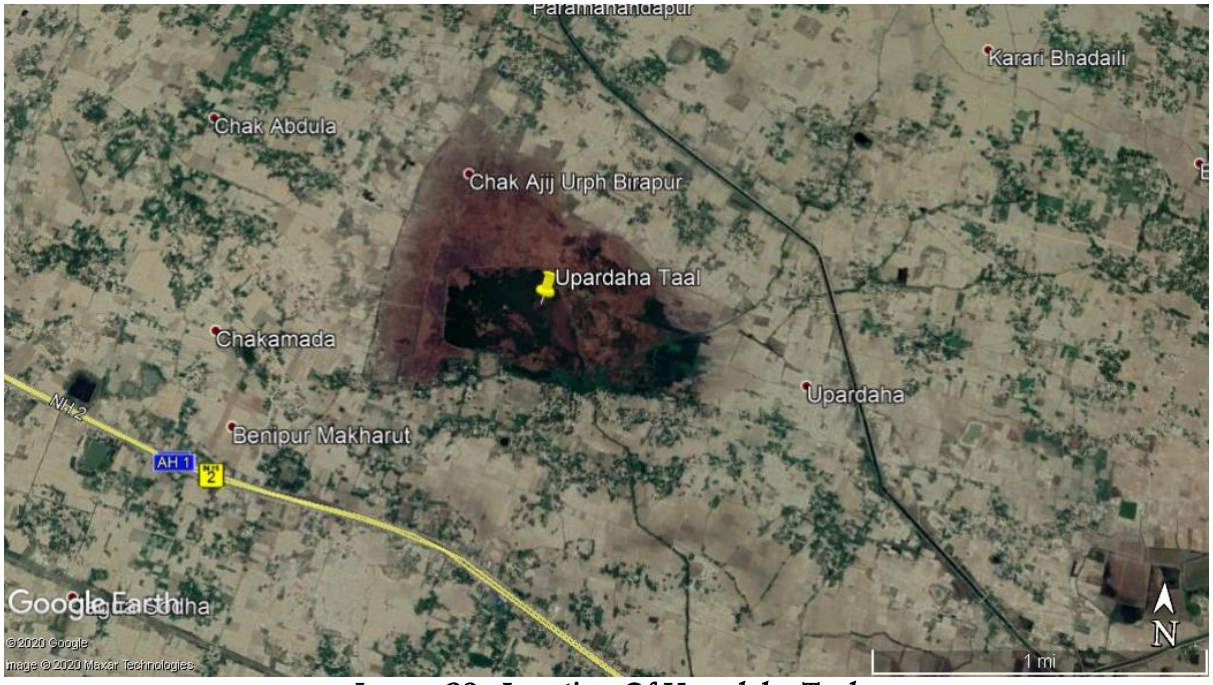


Image 29 : Location Of Upardaha Taal

Image 30 : Upardaha Taal With Wild Growth Of Grasses

9.0 Riparian Flora Along Ganga River In Prayagraj

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

9.2 The riparian vegetation had patchy occurrence in different stretches of the floodplain with sparse tree cover generally. *Acacia nilotica* (commonly known as *Babool*) is the dominant tree in riparian areas of Prayagraj Distt [Ref. Image 31]. Local communities use babool wood as firewood and its thorny twigs as makeshift fencing to protect their crops from wild animals. Other important riparian tree species in the Distt. are – *Bombax ceiba, Madhuca indica* and *Ficus* spp. Among the ground vegetation, *Ziziphus nummularia* (Wild *Ber*) has a widespread presence in the Distt. along with *Lantana camara*, *Argemone Mexicana* and *Calatropis* sp. The riparian plant species recorded in this survey are presented in Table 6 and some of the important species are depicted in Images 32-35.

Table 6 : Riparian Plant Species Recorded In Prayagraj Distt.

Sr. No.	Botanical name	Family	Common name	Habit
1.	*Acacia nilotica* (L.) Delile	Fabaceae	Babool	Tree
2.	*Azadirachta indica*A.Juss.	Meliaceae	Neem	Tree
3.	*Bombax ceiba* L.	Bombacaceae	Semal	Tree
4.	*Ficus benghalensis* L.	Moraceae	Banyan tree	Tree
5.	*Ficus religiosa* L.	Moraceae	Peepal	Tree
6.	*Madhuca longifolia* var. *latifolia* (Roxb.) A.Chev.	Sapotaceae	Mahua	Tree
7.	*Tectona grandis* L.f.	Lamiaceae	Teak	Tree
8.	*Calotropis procera* (Aiton) Dryand.	Apocynaceae	Aak	Shrub
9.	*Lantana camara* L.	Verbenaceae		Shrub
10.	*Lippia alba* (Mill.) N.E.Br. ex Britton &P.Wilson	Verbenaceae		Shrub
11.	*Polygonum glabrum* Willd.	Polygonaceae		Shrub

12.	*Ricinus communis* L.	Euphorbiaceae	Wild castor	Shrub
13.	*Ziziphus nummularia* (Burm.f.) Wight &Arn.	Rhamnaceae	Wild ber	Shrub
14.	*Achyranthes aspera* L.	Amaranthaceae	Chirchira	Herb
15.	*Argemone mexicana* L.	Papaveraceae		Herb
16.	*Anagallis arvensis L.*	Primulaceae		Herb
17.	*Croton bonplandianus* Baill.	Euphorbiaceae	Ban Tulsi	Herb
18.	*Parthenium hysterophorus* L.	Asteraceae	Congress grass	Herb
19.	*Phyla nodiflora (L.) Greene*	Verbenaceae		Herb
20.	*Tephrosia purpurea (L.) Pers.*	Fabaceae	Sharpunkha	Herb
21.	*Xanthium strumarium*L.	Asteraceae	Chhota Dhatura	Herb
22.	*Desmostachya bipinnata (L.) Stapf.*	Poaceae	Kusha/Kusa	Grass
23.	*Saccharum bengalense* Retz.	Poaceae	Kans/Munj	Grass
24.	*Saccharum spontaneum L.*	Poaceae	Sarpat	Grass

Image 31 : Riparian Vegetation Near Teliyatara Village Dominated By *Babool* Trees

Image 32 : *Ziziphus nummularia*

Image 33 : *Polygonum glabrum*

Image 34 : *Argemone Mexicana*

Image 35 : *Anagallis arvensis*

10.0 Faunal Diversity In Prayagraj Distt.

10.1 A Doab is the tract of land between two converging or confluent rivers and the Ganga-Jamuna Doab, of which Allahabad is a part on the western Indus-Gangetic Plain region. The Doab and Yamunapar region are mainly responsible for the unique biodiversity (especially along the banks of the Ganga). Even though the bed of Ganga is shallow here but the Yamuna is quite deep (around 40 ft.). The Yamuna terminates here and the cities which come after Allahabad have rich biodiversity because of the integration of the Yamuna with Ganga providing more volume to it. While interacting with local communities they have informed that wild animals are found especially along the banks of Ganga and in Yamunapar area. The Fox (*Vulpes bengalensis*), Hare (*Lepus ruficaudatus*), Indian Porcupine (Hystrix leucura) and Golden Jackal (*Canis aureus*) are found throughout the Distt. During field survey the Golden jackal was spotted in Kaneda uparhar village [Ref. Image 36].

Image 36 : Golden Jackal Spotted In Kaneda Uparhar Village

10.2 **Gangetic River Dolphin :** The Gangetic River Dolphin is exclusively aquatic and piscivorous, occasionally found in small groups. The Ganges River Dolphin is one of the three freshwater dolphin species in the world and is distributed in the Ganges–Brahmaputra–Meghna and Sangu–Karnaphuli River systems in India, Nepal, and Bangladesh (Sinha & Kannan, 2014). It is locally known as '*Sos/Sus*' in the Middle Ganga stretch and is classified as 'Endangered' in the IUCN Red List owing to the decrease in its population in the last 3-4 decades. During the survey, presence of dolphins was recorded based on visual sightings and secondary information provided by the respondents. Based on this information, the presence of dolphins can be stated

almost throughout the Ganga River stretch in PrayagrajDistt. though the frequency of sightings has reduced in the last two-three decades. Dolphins have been sighted near Lakshagraha area (5 Nos.), Kanegra village (2 Nos.) and Mahewa Kalan (2 Nos.) during the survey.

10.3 **Crocodile :** In Hindu mythology Makara (crocodile) appears as the Vahana (mount) of the river goddess Ganga who is believed to travel from the Himalayas to the Bay of Bengal on the back of the Makara. There are two crocodilian species - Mugger crocodile and the Gharial which were abound in Ganga and its tributaries Yamuna and Tamas (Gazetteer,1911). Interaction with riparian community suggests that the sighting of crocodiles have reduced drastically in last 10 -15 years.

10.4 **Avian diversity** : The diversity of avian species was recorded using binoculars and identified by using field guides. (Salim ali.,2012; Grimmett et al.,2016). A total of 42 species of birds were sighted during the field visits (Ref. Table 7) out of which 10 were wetland avian species and the remaining 32 were species of the grassland and forest community. Water birds viz., Common teal (*Anas crecca*), Cotton pygmy goose (*Nettapus coromandelianus*), Indian spot billed duck (*Anas poecilorhyncha*), Asian openbill (*Anastomus oscitans),* Black headed Gulls (*Chroicocephalus ridibundus*), Great cormorant (*Phalacrocorax carbo*), River lapwing (Vanellus duvaucelii), Ruddy shelduck (Tadorna ferruginea), Temminck's stint (*Calidris temminckii*), Eurasian moorhen (*Gallinula chloropus*), and White wagtail (*Motacilla alba*), were sighted during field visits.

Image 37 : Temminck's Stint (*Calidris temminckii*)

Image 38 : Great Cormorant (*Phalacrocorax carbo*)

10.5 The channels of River Ganga form wetlands near Phaphamau Bridge which are annually visited by migratory water birds. The Asian openbill (*Anastomus oscitans*) (Ref. Image 39), Ruddy shelduck (*Tadorna ferruginea*) (Ref. Image 40), Little cormorant (Microcarbo niger) were reported in good numbers during field visits. The Indian skimmer (*Rynchops albicollis*) is a riverine bird belonging to the family Laridae is listed as 'vulnerable' in the IUCN Red list. The first nesting site was identified near Phaphamau Bridge upstream of Ganga River in Prayagraj (Sharma, 2017).

Image 39 : Asian Openbill Stork (*Anastomus oscitans*) Near Phaphamau Bridge

Image 40 : Ruddy Shelduck (*Tadorna ferruginea*) Near Phaphamau Bridge

10.6 Migratory Black-headed gulls (*Chroicocephalus ridibundus*) present a mesmerizing -view at the Triveni sangam throughout the winter season (Ref. Images 41-42). These birds travel to a number of other wetlands which includes the Triveni sangam, Bhirpur, Narayanpurkalan, Dehraon, and Sirsa. The maximum number of nesting colonies of the gulls is encountered between Allahabad and Varanasi (Anonymous, 2018).

Image 41 : Black Headed Gull (*Chroicocephalus ridibundus*) – Adult Winter Plumage

Image 42 : Black Headed Gull (*Chroicocephalus ridibundus*) – Adult Summer Plumage

Table 7 : Birds Observed During Field Survey In Prayagraj Distt.

Sr. No.	Common Name	Scientific Name
1	Rose ringed parakeet	*Psitta culakrameri*
2	Blossom headed parakeet	*Psitta cularoseata*
3	Spotted munia	*Lonchura punctulata*
4	Common hoopoe	*Upupa epops*
5	Small green bee-eater	*Merops orientalis*
6	House swift	*Apus nipalensis*
7	Tailor bird	*Orthotomus sutorius*
8	Jungle babbler	*Turdoides striata*
9	Common babbler	*Argya caudata*
10	Magpie robin	*Copsychus saularis*
11	Black Drongo	*Dicrurus macrocercus*
12	Grey wagtail	*Motacilla cinerea*
13	House sparrow	*Passer domesticus*
14	Jungle myna	*Acridotheres fuscus*
15	Common myna	*Acridotheres tristis*
16	Bank myna	*Acridotheres ginginianus*
17	House crow	*Corvus splendens*
18	Jungle crow	*Corvus macrorhynchos*

19	Weaver bird	*Ploceus philippinus*
20	Red vented bulbul	*Pycnonotus cafer*
21	Red whiskered bulbul	*Pycnonotus jocosus*
22	Common kingfisher	*Alcedo atthis*
23	Spotted owlet	*Athene brama*
24	Greater Coucal	*Centropus sinensis*
25	Black kite	*Milvus migrans*
26	Grey partridge	*Perdix perdix*
27	Peafowl	*Pavo cristatus*
28	Red Jungle fowl	*Gallus gallus*
29	Rock Pigeon	*Columba livia*
30	Spotted dove	*Spilopelia chinensis*
31	Eurasian-collared dove	*Streptopelia decaocto*
32	Little brown dove	*Spilopelia senegalensis*
33	Common teal	*Anas crecca*
34	Cotton pygmy goose	*Nettapus coromandelianus*
35	Indian spot billed duck	*Anas poecilorhyncha*
36	Ruddy shelduck	*Adorna ferruginea*
37	Asian *openbill stork*	*Anastomus oscitans*
38	Cattle egret	*Bubulcus ibis*
39	Black headed gull	*Chroicocephalus ridibundus*
40	Great cormorant	*Phalacrocorax carbo*
41	Temminck's stint	*Calidris temminckii*
42	Jungle Prinia	*Prinia sylvatica*

10.7 **Saraswati Ghat**: Saraswati Ghat is one of the main Ghats of Prayagraj as it is where boats are hired to visit the Triveni sangam and to take a closer look at the Fort which is under the Indian Army, therefore, not open to public visitation. Though the Ghat is relatively clean and temples nearby but with the increase in tourists, the boat operators have started to lure the migratory birds with balls of flour. This attracts the birds all around the boat greatly delighting the people sitting inside, but these items are packed in plastic which are then discarded carelessly endangering the lives of the birds greatly (Ref. Images 43-44).

Image 43 : The Presence Of The Old But Ruined River Harbor/ Embankment By Akbar And The Hathi Gate Of The Fort Signifying The Importance Of Saraswati Ghat Historically

Image 44 : *Black-Headed Gull* (*Chroicocephalus ridibundus*) Inadult Winter Plumage Feeding On Plastic Near Sangam

10.8 Amphibians play a pivotal role in both aquatic and terrestrial ecosystems as secondary consumers in many food chains. Acording to ZSI, Indian burrowing frog (*Tomopterna breviceps*), Marbled Baloon Frog (*Uperodon systoma*), are commonly found in Prayagraj.

10.9 At Sirsa, a town 50 Kms downstream of Allahabad/Prayagraj, the river Tamas merges with Ganga and as per the forest department this site has been identified as the potential area for the turtle sanctuary [Ref. Image 45]. The site is closer to a huge sand bar which can become a perfect habitat for birds, turtles and dolphins. A lot of water birds like White wagtail (*Motacilla alba*), Grey francolin (*Francolinus pondicerianus*) and Little cormorant (*Microcarbo niger*) along with sighting of Dolphin (*Platanista gangetica*) are recorded here.

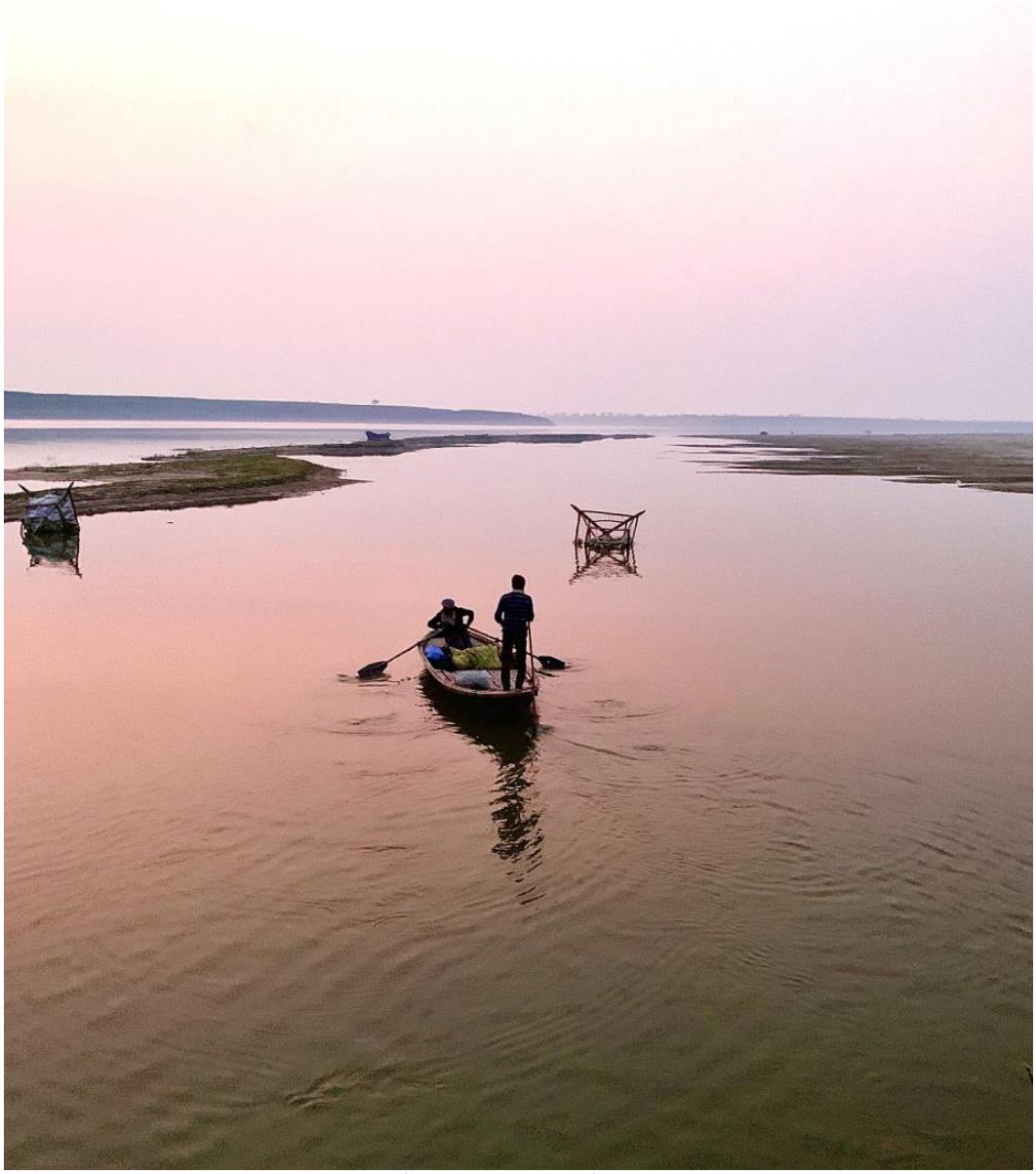


Image 45 : Potential Area For Turtle Sanctuary Near Sirsa

10.10 **Human-wildlife conflict in Prayagraj Distt.:** During the survey, Nilgai, an antelope – *Boselaphus tragocamelus* was found to be foraging in agricultural fields at different areas such as Ibrahimpur village near Lakshagriha road, Sirsa and Kotwa villages. Apart from this, the villagers in other areas such as Sita Kund village and Mainiya village also reiterated about the damages caused by this species to the agricultural fields. However, villagers use electric fences around the agriculture fields to keep them away. Due to prolonged breeding activity and lack of potential predators, the numbers of Nilgai have increased considerably and become over abundant in several states including Uttar Pradesh. In the due course of time, this species has successfully adjusted to the human-altered landscapes and in many places have become serious pests of agricultural crops.

Image 46 : Nilgai (*Boselaphustragocamelus*) Spotted Near Sirsa

11.0 Ganga Riverine Islands In Prayagraj Distt.

11.1 River islands are typically exposed land parts surrounded by river water channels. These islands generally result from changes in the course of a river such as interactions with a tributary or the opposing fluvial actions of deposition and/or erosion such as forming a natural cut and meander. These islands exhibit various shapes and varying surface areas but are generally elongated along the course of the flow. The islands also divide the river into multiple channels and form the connection of interrelation and interaction between two channels.

11.2 A large riverine island is found to be present in the southern part of Prayagraj Distt. at a distance of about 20 kms from Prayagraj city. The island is about 12 kms long and 3 kms wide with access through a mud road near Kotwa village [Refer Map 02]. Upon interaction with the locals, it is observed that the island was cultivated upon by the people residing in Kotwa and neighboring villages. They used to grow watermelon, mutter, mustard and wheat on this fertile island till about 5-10 years back. However, currently the island is mostly covered with wild vegetation dominated by *Acacia nilotica* (*Babool*) along with *Saccharum spontaneum* (*Sarpat*) and *Ziziphus* sp. (*Ber*). The braid channel of Ganga River near Kotwa village dries up during the non-monsoon period exposing a mud road which provides access to this island. The villagers go there to collect wild *ber* and dried *babool* wood [Ref. Image 47]. The *sarpat* grass growing on this island is also collected for thatching roofs of the dwellings.

Image 47 : A Villager Bringing Dried Babool Wood From The Riverine Island Near Kotwa Village

11.3 Another small riverine island is found near Shringverpur, which is an important place from history and mythology point of view [Refer Map 02]. This place is located at about 45 kms distance from Prayagraj city. The island is covered with vegetation comprising mainly *Babool* trees and *Sarpat* grass. An interesting observation is the use of this island as burial ground where many Hindus from nearby villages bury their dead relatives on this island [Ref. Image 48].

Image 48 : A Small Riverine Island Near Shringverpur With Hindu Burials

11.4 Yet another small riverine island of about 1 km length and 300 m width is present near BhairavGhat which is a sacred place in Ganipur village of Prayagraj Distt. [Refer Map 02]. Mustard crops are grown on this island and wild growth of Sarpat grass is also observed. Some villagers from the opposite bank were seen bringing their cattle on this island for grazing also [Ref. Image 49].

11.5 Another large riverine island is formed near Niva area of Dhoomanganj at close proximity to Prayagraj city. This irregular shaped island was about 10-12 kms long and about 1-2 kms wide [Ref Map 02]. Upon interacting with the people present it was found that they cultivated agricultural crops such as mustard, potato and green peas on the island. Intermixed with the agricultural fields was wild vegetation mainly comprising of *Babool, Sarpat* and wild *ber* [Ref. Image 50].

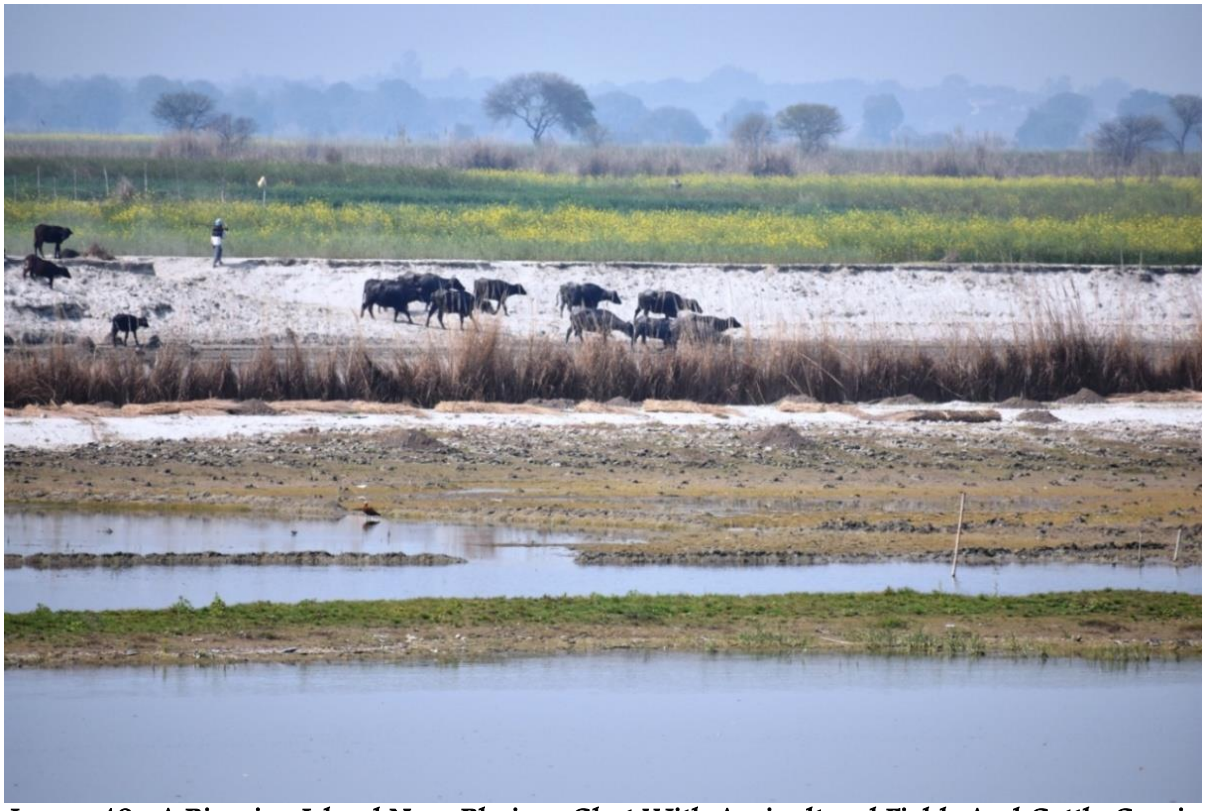


Image 49 : A Riverine Island Near Bhairav Ghat With Agricultural Fields And Cattle Grazing

Image 50 : Riverine Island Near Niva Area Of Dhoomanganj

12.0 Fishing In Prayagraj

12.1 Ganga River supports a rich diversity of fish including Indian Major Carps, Mullets, Clupeids, Feather backs, large and small Catfish and miscellaneous fish which form an important source of livelihood for many fishermen throughout its stretch. A total number of 3090 villages have been reported spread in 8 tehsils in Prayagraj district. Out of which a total number of approx.1300 villages have ponds. Amongst which 716villagesare reportedly engaged in fishing. Handia tehsil has maximum number of villages having fishing ponds while Allahabad tehsil has minimum villages having fishing ponds, (Dwivedi, et al. 2018). These ponds are mainly fed by rain water and have not been maintained by embankments or outlets and inlets. Ponds are used for fishing culture mostly performed by traditional technique in wild ponds consequently resulting in low produce.

12.2 There are 8 main fishing villages aound the city of Paraygraj. 5 on the river Ganga banks namely Rasoolabad, Mehdauri, New Jhusi, Meerapur and Daraganj and 3 on the Yamuna bank namely Gaughat, Jhusi and Sadiapur. Gill nets and seine nets need to be laid in the water therefore they are operated only in families who own or hire boats. The families without boats use hook and line and other nets, e.g. cast and scoop nets and traps [Ref. Images 51-53].

Image 51 : Hook And Line Fishing

Image 52 : Drag Net Fishing

Image 53 : Cast Net Fishing

12.3 Fishermen record the highest catches in October and November (Based on conversation with fishermen community). The River Ganga as a whole is home to more than 143 species of fish with the stretch in Allahabad alone supporting 76 fish species belonging to 53 genera, 24 families and 10 orders. According to fishermen, the major portion of the daily catch comprises the common carp fishes throughout

the stretch of Ganga River in this Distt. Hilsa (*Tenua losailisha*), the 'Queen of fishes' which was abundant some decades back became extinct in Allahabad due to the construction of the Farakka River Barrage. The fishermen also reiterated that the overall fish catch had declined by upto 60-80% in the last 3-4 decades which they attributed to the declining water quality, increase of exotic fishes and changing weather patterns. The common Gangetic Fish caught by the fishermen in this Distt. are provided in Table 8.

Table 8 : List Of Fishes Caught From Ganga River In Prayagraj Distt.

Common Name	Scientific Name
Baikiri	*Eutropii chtyhsvacha*
Bansputta	*Ailia coila*
Bhakur	*Catla catla*
Rohu	*Labeo rohita*
Tengra	*Mystus tengra*
Bam	*Anguilla bengalensis*
Kawai or Koi	*Anabas testudineus*
Padhan	*Wallago attu*
Chela	*Chila cachius*
Gegra	*Rita rita*
Sidhri	*Puntius chola*
Common carp	*Cyprinus carpio*
Mrigal	*Cyrhinus mrigala*
Tengra	*Aorichthys aor*

12.4 There are 3 main fish landing sites –Sadipur, Gaughat, Daraganj. The main landing site of Sadiapur, is on the bank of Yamuna River. Here, the fishing communities and the middlemen are completely dependent on fishing as livelihood. The area is known for making baskets and fishing gear too. However, during our visit due to the Maghmela most of the fishermen were engaged with the boat trips for the pilgrims and tourists. Gaughat is downstream of Sadiapur, and is a much smaller landing site. Fish found in the rivers and in the lakes and ponds of the Distt. are sold here. The common species being Rohu (*Labeo rohita*), Karaunch (*Labeo calbasu)*, Tergri

(*Gagalia cenis*) and Singhi (*Heteropneustes fossilis*). The bulk catch consists of catfishes and major carps particularly in the Yamuna (Sadiapur and Gaughat). The Ganga harbours smaller fish varieties like cyprinids. Some of the important fish caught from Ganga River are depicted in Images 54-56.

Image 54 : Rohu (*Labeo rohita*) Fish

Image 55 : Bansputta (*Ailia coila*) Fish

13.0 Groundwater

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. The soil resource of the study area falls under soils of Gangetic plain and Vindhyan Scarplands.

13.2 On the basis of groundwater resource utilization, Uttar Pradesh Ground Water Department (UPGWD) has categorized the different blocks of Prayagraj Distt into over-exploited, critical, semi-critical and safe. Block Chaka [Right Bank], Bahadurpur [Left Bank] and Saidabad [Left Bank] of the study area has been categorized as over-exploited, critical and semi-critical respectively [Ref. Annexure 2]. Over-exploitation of groundwater resource is mainly in the major built-up areas like Prayagraj city, Jhusi and Nini area. Block Manda, Handa, Uruwan, Karchhana, Soraon and Kaurihar has been categorized as safe. [Refer Annexure 1].

13.3 In field visits, the survey team have interacted with the local communities throughout the study area and observed that, groundwater level is declining on a yearly basis. Communities in Manda Block [Mahewa Khurd] told the team that, 'they use wells in summer period after drying up of handpumps'. The same situation is reported in Uruwan, Handa and Saidabad block. Banaglia Pahar of Manda block is a stone quarrying site which has a groundwater level of 40 mbgl [February, 2020]. Local communities claimed that the groundwater of their area is declining due to the mining activities.

13.4 Major interaction sites for groundwater observations are - Mahewa Khurd and Choukhata Village, BanagliaPahar, Badpur Uparhar, Kaneda Uparhar, Kotwa Village, Mubarakpur, Upardaha and Mainiya Village. The groundwater observations were noted and are presented in Table 9.

Table 9 : Water Levels In Dug Wells (Based on interactions with local communities)

Location	Coordinates	GW Level (in mbgl)	
		Post-Monsoon	Pre-Monsoon
Mahewa Khurd	25°10'13.20"N, 82°14'36.05"E	24-25	30-32
Choukhata Village	25°11'41.75"N, 82°11'34.86"E	~~~~~~	35-37
BanagliaPahar	25° 8'3.24"N, 82°17'1.27"E	40-45	~~~~~
BadpurUparhar	25° 9'56.51"N, 82°15'25.09"E	27-30	33-35
Bagaha Village	25°21'51.51"N, 82°19'39.84"E	24-27	~~~~~
Kaneda Uparhar	25°14'44.45"N, 82°11'55.32"E	24-26	32-34
Kotwa Village	25°23'0.02"N, 82° 1'17.77"E	22-24	~~~~~

Mubarakpur Upardaha	25°31'20.77"N, 81°43'35.52"E	18-20	21-22
Mainiya Village	25°19'25.77"N, 81°57'10.40"E	24-26	~~~~~~

Image 56 : An Old Sacred Well In Ram Chaura Temple Complex

Image 57 : An Old Well InKatahara Village[25°14'51.58"N, 82°12'3.85"E]

14.0 Ganga River Bank In Prayagraj Distt.

14.1 Left and right banks within the study area together constitute 1358.98 sq.km. [Left bank approximately 710 sq.km. and Right bank 648 sq.km.]. Left bank of river Ganga is more stable than the right bank throughout the study area (Ref. Image 48). This is due to the presence of several riparian vegetation patches along the left bank. Also, there are several sacred places clustered along the banks which play a vital role in the bank stability. On the right bank especially in Manda, Uruwan and Karchhana blocks, the bank is prone to lateral erosion. This may be due to the extensive agricultural activities, mining in the upper catchment area, brick kilns and loss of vegetation.

Image 58 : Stable Bank of River Ganga Between Ramchaura And Sringverpur [left Bank]

14.2 Cremation Ground Along Ganga River Bank

14.2.1 Ganga River Banks are used as cremation and burial ground for generations. In Prayagraj Distt. two sites, namely Sringverpur [Left Bank] and Tons-Ganga Confluence area [(Right Bank), 25°16'31.30"N, 82° 5'41.52"E] are used for both burial and cremation by Hindus while other sites were used only as cremation ground [Ref. Table 10 & Image 61].

Table 10 : Cremation Sites In The Study Area

Site	Location		Remarks
	Latitude	Longitude	
Sringverpur	25°35'15.24"N	81°38'22.18"E	Used for burial and cremation
Tons Ganga Confluence Area [Right Bank]	25°16'31.30"N	82° 5'41.52"E	Used for burial and cremation
Bhairav Ghat	25°33'43.91"N	81°39'4.48"E	Not in use
Lachhagir/Lachhagrih	25°19'1.04"N	82°10'43.70"E	Used for cremation
Dubeypur	25°16'46.37"N	82° 7'21.55"E	Used for cremation
Choukhata Narwar	25°11'57.08"N	82°11'43.14"E	Used for cremation
Mainiya	25°19'31.03"N	81°57'6.23"E	Used for cremation

Image 59 : Abandoned Caves Near Ramchaura (Once Used For Penance)

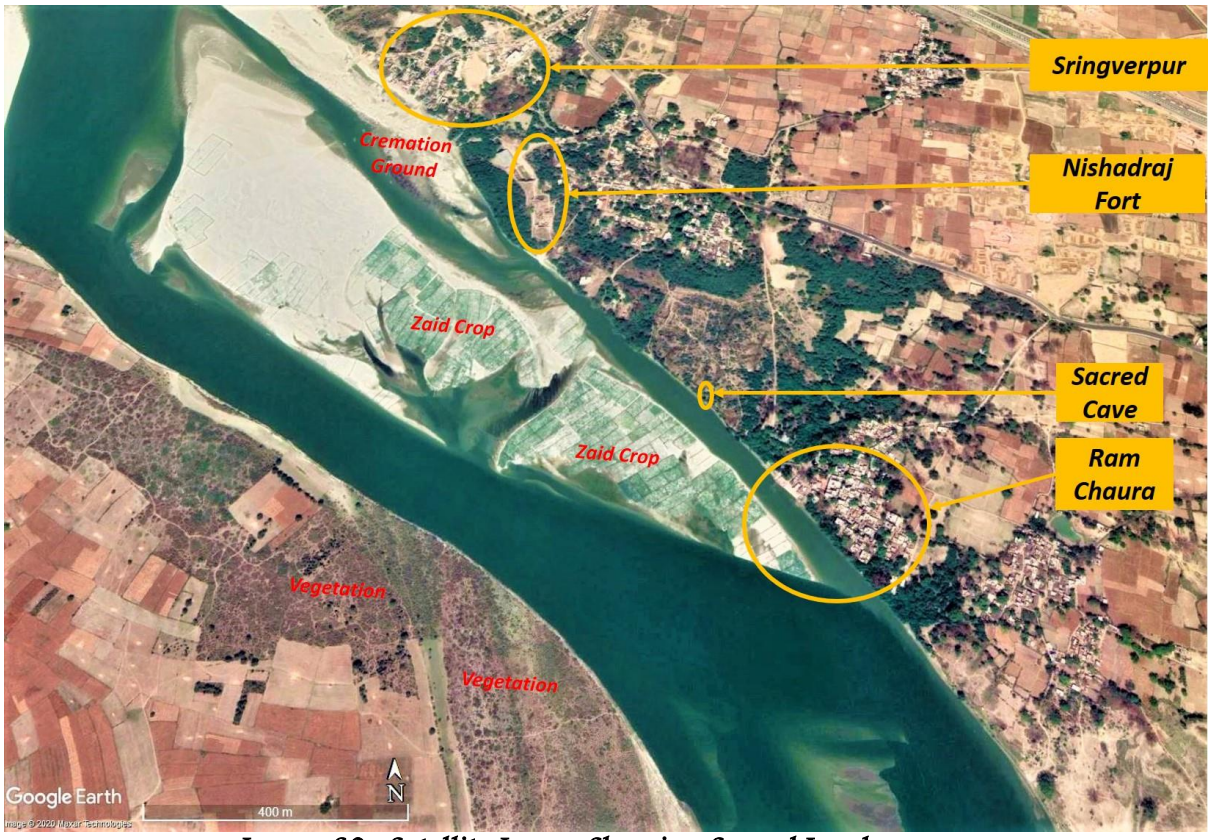


Image 60 : Satellite Image Showing Sacred Landscape
[Source : Google Earth Pro, Image Dated : 13/04/2019]

Image 61 : Hindu Burials and Cremation Near Ganga-Tons Confluence

14.3 Bank Erosion

14.3.1 Weathering of soils by natural forces is both constructive and destructive. Erosion is the chief agent responsible for the natural topographic cycles as it wears down higher elevations, banks (lateral erosion) and deposits sediments in the plains. However, erosion gets aggravated due to human interventions through change in land use, excessive grazing, extensive farming, cultivation without taking proper conservation measures, destruction of forest and riparian vegetation. It is well known that exposed soil may erode rapidly (Singh et al., 2004).

14.3.2 Depending on the intensity and severity of erosion, the study area [7km Buffer] is grouped under slight erosion category (Singh et al., 2004). However, the ongoing mining activities, increasing number of brick kilns [Ref. Map No. 10], decrease in riparian vegetation area and change in land use may increase the rate of erosion. Decline in riparian vegetation and extensive agricultural practices are major anthropogenic reason behind the lateral erosion of banks of River Ganga and its tributaries. The action of forceful water flow on the left and right banks of the River Ganga could be easily observed throughout the study area. The lateral erosion of the banks occurs under intense rainfall accompanied by torrential flow in rivulets generating vast quantities of sediment transported downstream.

14.3.3 There are 97 lateral erosion sites marked within the study area and provided in Table 11. Major eroded sites are found near village – Mahewa, Umanpur Kalan, Narwar, Kothri, Jera, Khemanpur, Tela Khas, Lachhagir, PakriSiwar, Dumduma, Diha and Khandesara [Ref. Images62-65 and Map No. 10].

Table 11 : Erosion Prone Sites

Sr. No.	Latitude [N]	Longitude [E]	Nearest Settlement
1	25°35'53.89"N	81°36'38.19"E	Between Garhwa Akhairajpur Village and Sringverpur [Left Bank]
2	25°35'54.94"N	81°37'8.29"E	
3	25°35'51.08"N	81°37'37.63"E	
4	25°35'32.73"N	81°38'11.87"E	
5	25°35'27.00"N	81°38'17.48"E	
6	25°34'9.55"N	81°39'5.10"E	Between Tikra Village and Sitakund [Left Bank]
7	25°33'59.30"N	81°39'6.02"E	
8	25°33'36.87"N	81°39'6.58"E	
9	25°32'14.22"N	81°38'21.76"E	Between Mohnapur, and Faridpur Chak Tajpur Village [Right Bank]
10	25°31'59.44"N	81°38'14.36"E	
11	25°31'30.31"N	81°38'13.75"E	
12	25°31'23.81"N	81°38'20.12"E	
13	25°31'21.91"N	81°38'22.90"E	
14	25°31'21.01"N	81°38'29.11"E	
15	25°31'23.00"N	81°38'41.30"E	
16	25°31'21.53"N	81°38'49.04"E	
17	25°31'21.42"N	81°39'4.74"E	

18	25°31'20.02"N	81°39'17.22"E	
19	25°31'48.46"N	81°39'35.62"E	Near Jhinga Village [Left Bank]
20	25°31'46.77"N	81°39'34.21"E	
21	25°31'45.26"N	81°39'28.19"E	
22	25°30'52.44"N	81°40'58.55"E	Between Mubarkpur and Kuresar Village [Left Bank]
23	25°30'50.38"N	81°41'16.33"E	
24	25°30'57.13"N	81°42'33.68"E	
25	25°30'5.92"N	81°42'47.25"E	
26	25°30'4.33"N	81°42'49.79"E	
27	25°30'2.12"N	81°42'52.58"E	
28	25°29'57.76"N	81°42'59.04"E	
29	25°29'54.37"N	81°43'0.84"E	
30	25°29'50.04"N	81°43'5.15"E	
31	25°29'50.39"N	81°43'10.49"E	
32	25°29'53.10"N	81°43'14.26"E	
33	25°29'47.23"N	81°43'44.74"E	
34	25°19'49.58"N	81°56'25.88"E	Near Khandesara Village [Right Bank]
35	25°19'0.14"N	81°59'0.41"E	Between Kabra and Diha Village [Right Bank]
36	25°19'6.36"N	81°59'23.66"E	
37	25°19'23.82"N	82° 0'6.30"E	
38	25°21'52.76"N	82° 1'21.58"E	Near Lilapur Kalan Village [Left Bank]
39	25°21'42.42"N	82° 1'41.70"E	
40	25°20'21.41"N	82° 4'26.70"E	Near Dhokri Village [Left Bank]
41	25°20'13.59"N	82° 4'29.12"E	
42	25°18'39.64"N	82° 4'55.20"E	Between Dumdum and Mahutar Village [Left Nank]
43	25°18'11.67"N	82° 4'52.94"E	
44	25°18'20.56"N	82° 4'20.49"E	Between Babura, Laktaha and Sirsa [right Bank (Near Tons-Ganga Confluence]
45	25°17'41.88"N	82° 4'23.27"E	
46	25°17'24.46"N	82° 4'28.73"E	
47	25°17'12.43"N	82° 4'34.27"E	
48	25°16'51.65"N	82° 4'41.95"E	
49	25°16'9.25"N	82° 5'18.80"E	
50	25°16'0.47"N	82° 5'51.72"E	
51	25°16'48.04"N	82° 7'24.13"E	Near Dubepur [Right Bank]
52	25°17'13.84"N	82° 7'54.99"E	Near PakriSiwar [Right Bank]
53	25°19'2.64"N	82°10'3.54"E	Near Amilauti Village [Left Bank]
54	25°19'3.47"N	82°10'31.09"E	
55	25°18'58.75"N	82°10'59.27"E	Lachhagir/Lachhagrih [Left Bank] • Lateral Erosion may severe because of river sand mining in opposite river bank (near village Tanaria and Raipura)
56	25°18'40.21"N	82°11'46.05"E	Near Gondri Village [Left Bank (along Gondri Nala – Ganga River confluence)]

57	25°17'33.84"N	82°13'15.84"E	Near Kihuni Village [left Bank]
58	25°17'13.42"N	82°13'24.64"E	Between Tela Khas and Karaundha Village [Left Bank]
59	25°17'6.73"N	82°13'26.26"E	
60	25°16'51.66"N	82°13'27.42"E	
61	25°16'40.37"N	82°13'27.83"E	
62	25°16'25.98"N	25°16'25.98"N	
63	25°16'19.05"N	82°13'24.54"E	
64	25°16'2.68"N	82°13'22.17"E	
65	25°15'39.30"N	82°13'17.80"E	Near Khemanpur and Katra Village [Left Bank]
66	25°15'28.48"N	82°13'12.80"E	
67	25°15'11.59"N	82°13'2.78"E	
68	25°15'3.29"N	82°12'58.56"E	
69	25°16'47.23"N	82°13'13.62"E	Near Arai and Parwa Village [Right Bank]
70	25°16'21.88"N	82°13'9.96"E	
71	25°13'48.61"N	82°11'44.89"E	Between Jera and Achhola Village [Right Bank]
72	25°13'34.82"N	82°11'43.69"E	
73	25°13'30.71"N	82°11'40.54"E	
74	25°13'14.80"N	82°11'39.44"E	
75	25°13'1.94"N	82°11'37.07"E	
76	25°12'51.45"N	82°11'36.84"E	
77	25°12'39.28"N	82°11'37.95"E	
78	25°12'36.16"N	82°11'38.30"E	
79	25°12'13.36"N	82°11'40.22"E	
80	25°12'1.40"N	82°11'43.25"E	Along ChoukhataNala [right Bank]
81	25°11'42.29"N	82°11'48.45"E	Between Narwar and Kusamha Village [Right Bank]
82	25°11'10.51"N	82°12'8.35"E	
83	25°10'51.02"N	82°12'30.45"E	
84	25°10'40.87"N	82°12'47.71"E	
85	25°10'36.61"N	82°12'59.49"E	
86	25°10'34.81"N	82°13'3.96"E	
87	25°10'34.35"N	82°13'7.46"E	
88	25°10'30.79"N	82°13'16.65"E	Near Village Umanpur Kalan, Birukhar, Dingurpur and Mahewa [Right Bank]
89	25°10'27.83"N	82°13'23.98"E	
90	25°10'26.02"N	82°13'33.66"E	
91	25°10'24.39"N	82°13'44.36"E	
92	25°10'25.24"N	82°13'55.00"E	
93	25°10'26.22"N	82°14'8.68"E	
94	25°10'27.36"N	82°14'19.60"E	
95	25°10'27.75"N	82°14'24.36"E	
96	25°10'28.23"N	82°14'29.49"E	
97	25°10'30.19"N	82°14'37.26"E	

Image 62 : Eroded Ganga River Bank In Mahewa Village [Right Bank]

Image 63 : Erosion Prone Bank In Kusamha Village [Right Bank]

Image 64 : Erosion Prone Bank Near Lachhagir [left Bank]

Image 65 : Eroded Bank Near Birukhar Village [Right bank]

15.0 Mining And Brick Kilns Within Study Area

15.1 **Sand mining in Ganga River :** Reckless sand mining causes degradation of river ecosystem. Instream mining lowers the stream bottom, which may cause lateral and enhanced river bed erosion. During the survey six sand mining sites are reported to be present in Ganga River in Prayagraj Distt.. These sites are located near village Achhola, Tanaria, Rajpura, Dasrathpur, Bara, PakriSiwar and Diha village [Ref. Table 12]. **Sand mining sites located near Tanaria and Rajpura villages are potential threats to the river bank along Lachhagir because lowering down of river bed may change the river flow direction and cause lateral erosion** [Ref. Image 66]. Upon interactions, the local communities claimed that there are other places where illegal mining is carried out by some people. The **'Enforcement and Monitoring Guidelines for Sand Mining 2020' are not being enforced on the ground to the detriment of the River.**

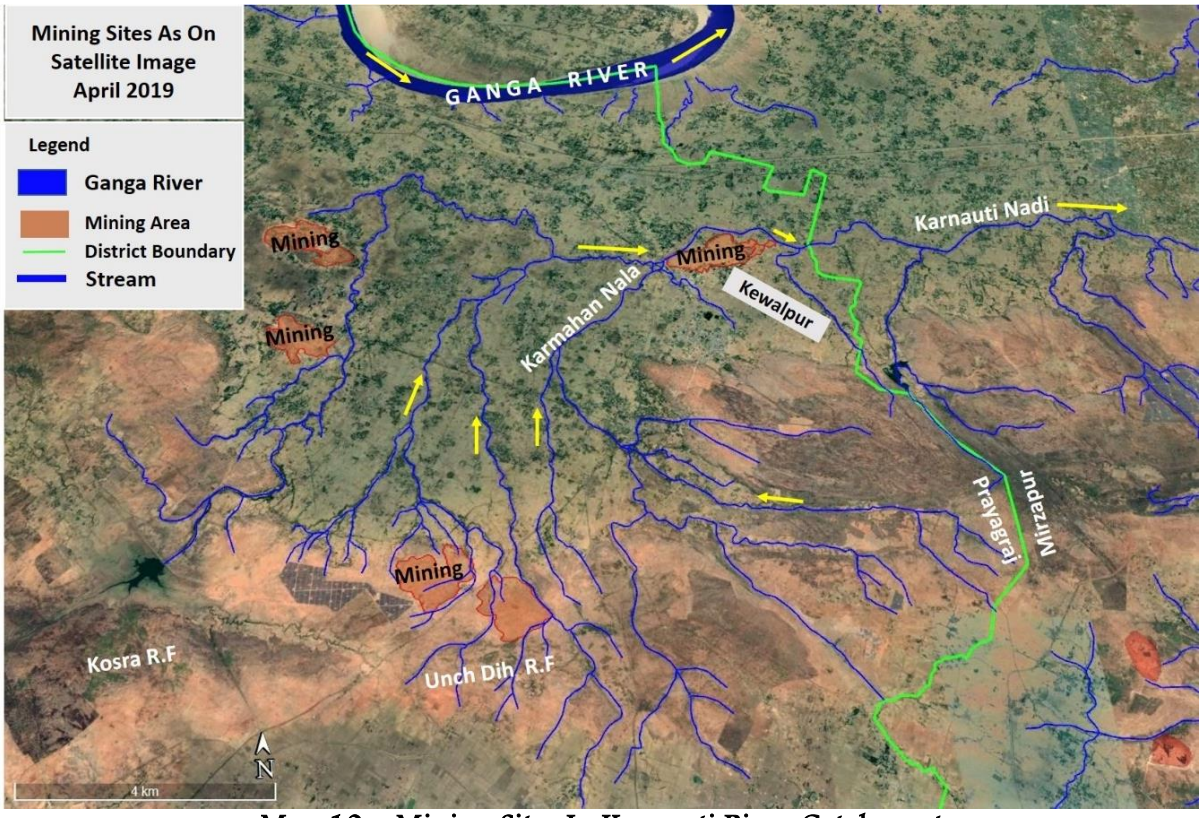
Table 12 : Location Sand Mining Sites In Ganga River

Sr. No.	Latitude	Longitude	Nearest Settlement
1	25°12'45.73"N	82°12'1.61"E	Near Achhola Village
2	25°18'34.74"N	82°11'2.31"E	Near Tanaria and Rajpura Villahe [Right Bank]
3	25°18'33.21"N	82° 9'49.15"E	Near Bara Village [Right bank]
4	25°18'15.42"N	82° 9'9.74"E	Near Dasrathpur and Bara Village [Right bank]
5	25°17'52.75"N	82° 8'37.22"E	Near PakriSiwar Village [Right Bank
6	25°19'51.44"N	82° 0'34.09"E	Near Rampur Village, Diha Village and Riverine Island

15.2 **Stone Quarrying :** Stone quarrying in Prayagraj Distt. is mainly present in Manda, Koraon and Meja blocks. However, only three mining sites [near Kewalpur village, Surwan Dalapur and Chapartala village] of Manda Block fall within the study area. These mining sites are in direct catchment of Karnauti Nadi [Ref. Image 67 & Map 11].

Image 66 : Sand Mining In Ganga River [Near Tanaria And Rajpura Village]

Image 67 : Stone Quarrying Site Near Kewalpur



Map 10 : Mining Sites In Karnauti River Catchment

Image 68 : Mining Site Along Karnauti River Near Kewalpur

15.3 **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. During field visits, farmers claimed that the eroded land may filled up in few years, either by sediments transported during rainy season or during flood pulsing. However, it has been found that brick kiln sites in flood plain areas contribute to soil erosion during flood.

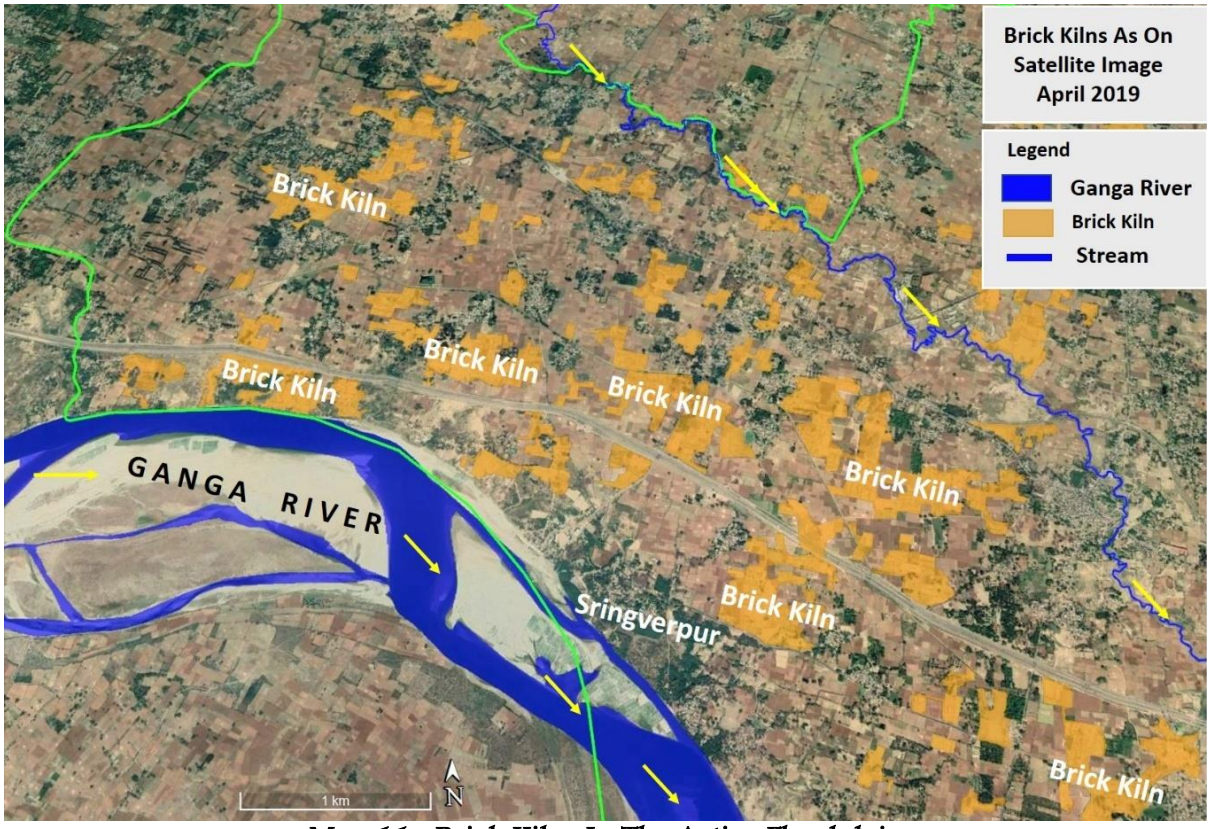
15.3.1 Location of brick kilns, clay and river sand mining sites have initially been identified from Google imagery (April, 2019) and thereafter verified during field surveys conducted in January-February, 2020. The spatial distribution of brick kilns in the study area is delineated in Map 12. After identification of sites, it was found that:

- Brick Kilns constitutes 27.96 sq.km. i.e. 2% of the total study area. This area is just double of the identified wetlands in the study area.

- Brick kilns are situated near rivers and water bodies to meet their water requirement and also to use alluvial soil [Ref. Map 11].

- In the study corridor the brick kilns are distributed throughout the Distt. and are mainly clustered along Left Of River Ganga in Kaurihar Block [Left bank], Soraon block [Left Bank[and Manda block [Right Bank].

- Some kilns were located very close to streams and are adversely impacting the course of these streams



Map 11 : Brick Kilns In The Active Floodplain


Image 69 : Brick Kiln Near Shringverpur [Prayagraj Bypass Road]

16.0 Inland Navigation

16.1 The stretch of Ganga River in Parayagraj Distt. is a part of 1620 km long National waterway (NW 1). The waterway covers approximately 69 km. length of river Ganga [From Mirzapur border to Prayagraj City] in the Distt. [Ref. Map No. 13]. For making the waterway workable Inland Waterway Authority of India (IWAI) is planning to maintain atleast 3.0 meters of Least Available Depth (LAD) in the river by continuous dredging.

16.2 The NW1 extends upto Prayagraj city from the Mirzapur side. Riverine islands divide the river into two channels and as yet it the channel for navigation has not been finalized. The left channel is shallow and is an important habitat for migratory/winter visitor avian species in the region. Also, the pristine riparian patches on riverine islands needs special care as these patches are vulnerable to several human induced disturbances [Ref. Image 70].

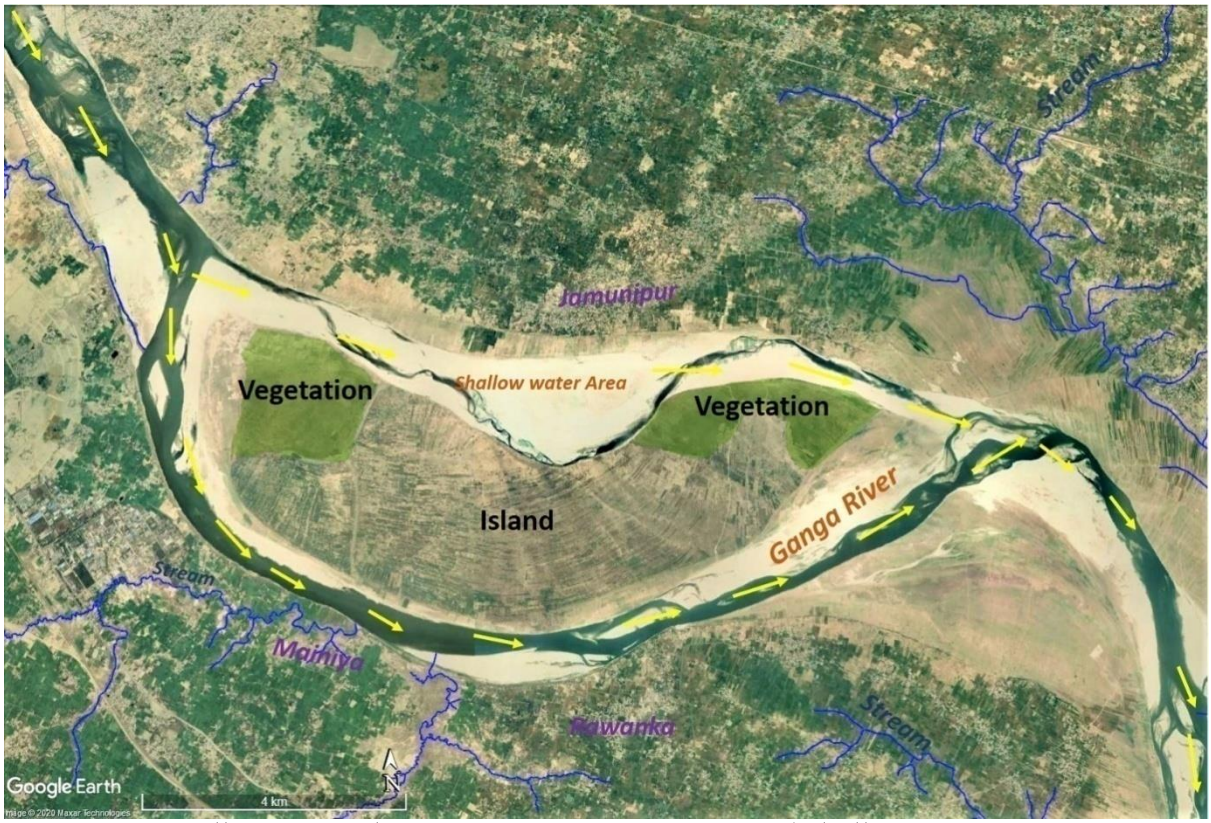


Image 70 : Satellite Image Showing Riparian Vegetation and Shallow Water Area Of Ganga River

Source : Google Earth Pro [Image Dated : 31.03.2019]

16.3 **Ferry Services :** Ferrying is a crucial livelihood activity of the Mallah community living in the villages on the banks of river Ganga. People of Mallah community in Prayagraj Distt. have been ferrying passengers for generations. There are 19 sites reported in the study area where ferry services are available. However, there are

several sites where ferry services were once operated especially in Prayagraj City but in recent years, ferrying is not workable due to lack of water in the distributaries. Details of Ferrying sites are provided in the Table 13 :

Table 13 : Details of Ferry Services In The Study Area

Sr. No.	Latitude	Longitude	Nearest Settlements	No. of Boat & Ferry Season
01	25°35'14.42"N	81°38'46.43"E	Between Singraur Ghat [Sringverpur] to Riverine Islands ***Purpose : Agricultural activities**	Two Boats (October to June)
02	25°33'43.88"N	81°39'6.49"E	Between BhairavGhat [Sitakund] to Kurai Ghat [Kurai Village]	Two Boats
03	25°31'16.78"N	81°39'20.04"E	Between Riverine Islands to Faridpur Chak Tejpur	Two Boats (October to June)
04	25°30'12.19"N	81°40'57.58"E	Between Fatehpur and Mubarakpur (Purana Kachhar)	Two Boats
05	25°27'48.71"N	81°46'35.53"E	Between Yadavpur to Jahangarwa **Current Status : Ferry service is stopped due to drying up of Ganga Channel**	~~~~~~~~~~~~~
06	25°28'8.46"N	81°48'36.76"E	Between Sadar Bazar and Dilshadpur **Current Status : Ferry service is stopped due to drying up of Ganga Channel**	~~~~~~~~~~~~~
07	25°25'23.58"N	81°53'11.27"E	Between Sarswarti Ghat and Allahabad Fort Area to Triveni Sangam ***Mainly during Magh Mela, Mahashivratri and Kumbh**	~~~~~~~~~~~~~
08	25°19'29.03"N	81°57'13.78"E	Between Manaiya Village to Riverine Island	Two Boats (October to June)
09	25°19'0.03"N	81°59'53.61"E	Between Diha Village to Goshmalpatti Village Via Riverine Islands	Two Boats (October to June)

10	25°16'12.32"N	82° 7'24.08"E	Between Devhatta Village to Gangapur Village	Two Boats (October to June)
11	25°17'28.03"N	82° 7'20.77"E	Between Barhauli Village to PakriSiwar Village	Two Boats (October to June)
12	25°19'2.77"N	82°10'47.70"E	Between LachhagirGhat to Paranipur Village	Two Boats (October to June)
13	25°18'28.30"N	82°12'8.51"E	Between Gondri Village to Raipura Village	Two Boats (October to June)
14	25°17'4.74"N	82°13'25.65"E	Between Makundpur Village to Tela Khas Village	Two Boats (October to June)
15	25°15'37.77"N	82°13'17.40"E	Between Parwa Village to Khemanpur Village	October to June
16	25°15'10.25"N	82°13'0.69"E	Between Bhamora Village to Khemanpur Village	Two Boats (October to June)
17	25°13'39.07"N	82°11'41.51"E	Between Jera Village to Doguna Village	October to June
18	25°12'20.35"N	82°12'20.20"E	Between ChoukhataNarwar Village to Kundi Khurd Village	October to June
19	25°10'28.85"N	82°14'44.21"E	Between Mahewa Village to Hari Rampur Village	Two Boats (October to June)

Image 71 : Ferrying In Ganga River From Kurai Ghat To Bhairav Ghat

Image 72 : Ferrying In Ganga River From Gondri Village To Raipura Village

17.0 Old And Sacred Trees In Prayagraj Distt.

17.1 **Sacred trees at Ram Shayan Ashram [25°34'53.07"N, 81°38'49.95"E]** : The Ram Shayan Ashram is situated near Sita Ram Gaughat on the banks of Ganga River at a short distance of about 2 kms from Shringverpur. According to the *Pujari* of this temple, this was the place from where Lord Ram along with Sita and Lakshmana crossed Ganga River. As per mythology in Ramayana Ram, Sita and Lakshmana during their exile, reached this place where Nishadraj made them to rest under a group of Shisham trees (*Dalbergia sissoo*) on a mat made of *Kusha* grass. Hence, this place is also popularly known as '*Ram Chaura*' till today. The old Shisham trees were protected in the Ashram and eventually they fell down after which new Shisham trees are growing at the same place (Ref. Image 73). People believe that these trees have divine powers and take back dried fallen leaves with the belief that it'll heal them of their ailments.

Image 73 : Sacred Shisham Trees At Ram Shayan Ashram Near Shringverpur

17.2 **Sacred trees at Baba Maharaj Temple [25°18'02.1"N 82°10'28.4"E] :** This temple is located in Paranipur village close to Ganga River in Prayagraj Distt.. As per legend, an unmarried man used to penance at this place about 700-800 years ago. However, some people were adamant on taking over this land for construction, to oppose this, he committed suicide. Soon after, a temple was constructed in his remembrance which came to be known as Baba Maharaj temple. A *Peepal* tree (*Ficus religiosa*)

believed to be more than 100 years old was growing near the temple along with other trees such as *Banyan* tree (*Ficus benghalensis*) and *Semal* (*Bombax ceiba*). All these trees are considered sacred and are not disturbed in any condition (Ref. Image 74).

Image 74 : Sacred And Old trees Associated With Baba Maharaj Temple In Paranipur Village

17.3 **Sacred trees in Pakari Sevar Village [:** This village is situated on the banks of Ganga River and home to Koteshwar Nath Mandir dedicated to Lord Shiva. This temple is believed to be more than 200 years old. Just outside the temple there is an old Banyan tree (*Ficus benghalensis*) which is worshipped during auspicious occasions especially by the ladies from nearby villages. Close by, there is an Ashram which belonged to Swami Paglanand who carried out penance under a group of five different trees on the banks of Ganga River. Now known as 'Panchvati', these trees include – *Ficus religiosa* (*Peepal*), *Ficus benghalensis* (*Bargad*), *Ficus* sp. (*Pakad*), *Mangifera indica* (*Mango*) and *Syzigium cumini* (*Jamun*). **Gangetic dolphins were sighted in this area.** Once in a year a fair is organized at this place where people from the nearby areas come for worshipping (Ref. Images 75-76).

Image 75 : Swami Paglanand Ashram With Five Sacred Trees In Background At Pakari Sevar Village In Prayagraj Distt.

Image 76 : Sacred Ficus Tree Associated With Koteshwar Nath Mandir In Pakari Sevar Village

17.4 **Sacred tree of Gondari village [25°18'34.8"N, 82°11'58.9"E] :** According to the villagers, a *Peepal* tree (*Ficus religiosa*) was planted by their elders about 50-60 years ago and a small temple dedicated to Lord Shiva was established below it. Since then, this tree and the associated temple have become the village temple where everyone comes for worshipping (Ref. Image 77).

Image 77 : Sacred Ficus Tree InGondari Village

17.5 **Sacred tree in Mahewa Khurd village [25°13'38.3"N, 82°11'41.5"E] :** A temple on the bank of Ganga River was present in Mahewa Khurd village near Allahabad-Mirzapur border region. An old *Peepal* tree (*Ficus religiosa*) was growing adjacent to this temple which was considered as sacred by the villagers (Ref. Image 78). The tree was worshipped by the female devotees in the village every Saturday and by other villagers during auspicious occasions. The river is very erosive here and meanders. During floods, the water reaches the temple. Along with agriculture, fishing is also a prime livelihood source here. Birds like Egrets, Pond heron, Black Drongo, Redstart, Asian Pied starling etc. have been observed.

Image 78 : Sacred Ficus Tree In Mahewa Khurd Village

17.6 **Sacred Fig Trees in Shiv Kuti :** There is an old Shiva temple on the banks of Ganges and ashram which was built in 1948. The place has Mela space which according to the locals was large some 10-20 years ago but now has been encroached by people for residential purpose due to which the place is also losing its historical value. The 'sawan mela' is held annually. **There are two fig trees (*Ficus carica)* considered sacred in the temple.** The significance of this temple lies in the belief that Lord Rama on his way to exile from Ayodhya, worshiped Lord Shiva here after crossing Ganges. The flow of the river Ganga is this area is quite slow and heavy with silt due to which it has developed sandbars which are now used for agriculture and the narrow channels interspersed between used for fishing and other activities.

17.7 **VilayatiImly of Jhusi :** On the bank in Jhusi there is a huge mound of mud which has a sacred tree growing on it. There is a tomb of the Sufi saint Baba Shaikh Taqi at approximately 5 m from the tree. The story as told by the locals says that Shaik Taqi had placed his "datun" upside down on the ground to calm the swollen Ganga, which later developed into this tree. The locals mistook it as "*vilaitiimli*" which is not and actually is an African Baobab tree (*Adansonia digitata*) (Ref. Image 79). The tree is more than 800 years old and has a huge girth of approx. 18m. The belief of the soil near the tree being auspicious has also led to soil loss. Tree has a cluster structure and consists of several fused stems. Continuous erosion by the Ganga River resulted in slow degradation of this site.

Image 79 : Sacred Tree – *Adansonia digitata* at Jhusi [African Baobab]

17.8 **Akshaya Vat tree, Allahabad Fort :** Akshayavat, the "indestructible Banyan tree" is a holy tree located within the Patalpuri Temple at the Allahabad Fort. According to puranic lore this sacred tree was said to have been the only thing that survived the last cosmic dissolution. In the deluge when everything else drowned, only the top of the 'Akshaya vat" could be seen. In the Ramayana, before crossing the Ganga at Shringverpur, Rama and his retinue rested for three days under this tree and was blessed by Sita for the refuge provided by the tree. The banyan tree is also considered to be the mythical tree of wisdom that stands as a sentinel at the confluence of the sacred rivers. The sanctum of the Akshaya Vat houses the Patalpuri temple, which is the only place open in the Fort to the public. Inside the temple, the trunk of the tree is graced by a row of silver masks representing the sons of Brahma. A total of 43 deities are worshipped in this temple but an idol of Prayagraj, the city apotheosized as a deity is the primary one. Adjoining the temple is the famous **Saraswati Koop** which is believed to be the place where the vanished river Saraswati emerges from the depths of the earth to merge with the Yamuna and Ganga.

18.0 Urban Green Spaces

18.1 Owing to the rapid urbanization, the stress on natural resources such as water bodies and biodiversity rich areas has increased manifolds. This has impacted urban dwellers in the form of poor air quality, decreased water availability and increased levels of noise pollution. In the wake of this, the importance of urban green spaces has been realized worldwide for their numerous tangible and intangible benefits to mankind. Among the different cities in India, Prayagraj city has also witnessed massive urbanization in the last few decades owing to its historical and mythological importance. Despite this, there are many important green spaces in the city which continue to shelter native biodiversity and serve as an important retreat for the local residents. Most of these green spaces are in the form of parks and gardens containing plants of ornamental value. Some major green spaces of Prayagraj city surveyed are discussed in this section and the plants recorded are presented in Table 14.

18.2 **Khusro Park :** This walled garden is a huge green space in the heart of Prayagraj city located very close to Allahabad junction railway station [Ref. Image 80]. The park has been divided into zones where various indigenous trees like Mango (*Mangiferaindica*), Gooseberry (*Phyllanthus emblica*), Guava (*Psidium guajava*), lychee (*Litchi chinensis)*, and orange (*Citrus sinensis*) orchards are created. The bagh has also been decorated with as many as 64 bottle palm saplings. There is a nursery inside Khusrobagh where plantations of Peepal (*Ficus religiosa*), Goolar (*Ficus racemosa*), kusha (*Saccharum spontaneum*), khair (*Senegalia catechu*), palash (*Butea Monosperma*), apmarg (*Achyranthes aspera),* doob (*Cynodon dactylon*), madar (*Calotropis gigantea*) are being grown to create a 'nav grighavatika' . It is based on the nine plants which play an important role in horoscopes. The entire Khusro Bagh is being converted into an eco-knowledge.

Image 80 : Khusro Park

18.3 **Gudiya Talab** : The Gudiya talab is situated behind the KhusroBagh and is not in good condition. Locals said that it was renovated some years back but due to lack of maintenance there is no water in the pond most of the year. Every year on the occasion of Nag Panchami people celebrate 'Gudiya' mela and that is when the Allahabad Jal board fills the pond artificially up to two feet.

18.4 **Chandrashekhar Azad Park** : Chandrashekhar Azad Park (also known by its former name Alfred Park and company bagh) is a public park in Prayagraj [Ref. Image 81]. The park is spread over 133 acres with a variety of trees, plants and shrubs. Company bagh forms the perfect habitat for a variety of birds and other animals like mongoose and civets. The park is home to different species of resident birds mainly grassland, woodland, a few water birds many of which are migratory also use artificial lake inside the park as a wintering spot as told by locals. The park has some amazing diversity of native trees and also some exotic ones. The traditional old trees of neem, goolar, pakkad, jamun, bael, bargad, etc. and mango, guava, amla and jackfruit observed during field visit. It is one of the best eco learning spots in the middle of Prayagraj city.

Image 81 : Chandrashekhar Azad Park

18.5 **Madan Mohan Malviya Park**: Belonging to British period, Minto Park is a lush green park which is also known as Minto Park is located on the bank of Yamuna River [Ref. Image 82]. The highlight of the park is a white pillar topped by four fierce looking lions on either side. The park is replete with shady trees and verdant greens.

Image 82 : Madan Mohan Malviya Park

18.6 **Cantonment Area** : The cantonment region including parts of Macferson lake also form an important green space in Prayagraj city. While the cantonment establishments mainly comprise of planted trees which are strictly protected, the region around Macferson lake adjacent to the cantonment region is a huge patch of wild vegetation dominated by Babool trees [Ref. Image 83]. The locals often visit this wild vegetation for collection of firewood and dried leaves.

Image 83 : Wild Growth OfBabool Near Cantonment Region In Dhoomanganj

Table 13 : Tree Species Recorded From Urban Green Spaces In Prayagraj City

Sr. No.	Botanical Name	Common name
1.	*Acacia nilotica* (L.) Delile	Babool
2.	*Ailanthus excels* Roxb.	~~~~~~
3.	*Alstonia scholaris* R. Br.	Scholar tree
4.	*Azadirachta indica* A. Juss.	Neem
5.	*Bauhinia purpurea* Linn.	~~~~~~
6.	*Bombax ceiba* L.	Semal

7.	*Borassus flabellifer* L.	~~~~~~
8.	*Callistemon lanceolatus* (Sm.) Sweet	Bottle brush
9.	*Caryotaurens* L.	Shivjata
10.	Dalbergia sisoo Roxb.	Shisham
11.	Delonix regia (Hook.) Raf.	Gulmohar
12.	*Eucalyptus globulus* Labill.	Nilgiri
13.	*Ficus benghalensis* L.	Banyan tree
14.	*Ficus religiosa* L.	Peepal
15.	*Mangifera indica* L.	Mango
16.	*Peltophorum pterocarpum* (DC.) K. Heyne	~~~~~~
17.	*Phyllanthus emblica* Linn.	Amla
18.	*Plumeria rubra* L.	~~~~~~
19.	*Polyalthia longifolia* (Sonn.) Thwaites	False Ashok
20.	*Roystonea regia* (Kunth) O. F. Cook	~~~~~~
21.	*Syzygium cuminii* (Linn.) Skeels	Jamun
22.	*Tectona grandis* L.f.	Teak
23.	*Thespesia populnea* (L.) Sol. ex Corrêa	~~~~~~
24.	*Wodyetia bifurcata* A.K. Irvine	~~~~~~

19.0 Climate Change Impacts

19.1 Climate change has emerged as a global challenge as it has led to average global temperature being warmed by 0.5 C in the last century and also affected spacio-temporal patterns of precipitation. The increasing concentration of anthropogenic gases in the atmosphere is mainly responsible for these rapid changes in the climate (IPCC 2007). The global climate change may further influence long term rainfall patterns impacting the availability of water, along with the risk of increasing occurrences of droughts and floods (Deo et al., 2016). Climate change is also considered to be a major obstacle in the overall development of a resource rich country like India where exemplary biodiversity, agricultural production and other natural livelihood resources are being threatened by it.

19.2 Among the different states in India, Uttar Pradesh is considered most vulnerable to climate change impacts. The state climate action plan warns of erratic climate patterns in future on the basis of climate projections. As per State Climate Change Report (UPSAPCC, 2014), the rainfall is predicted to increase by 15% to 20% and higher towards 2050s (25% to 35%). On the other hand the report ['Observed Rainfall Variability and Changes'] of Ministry of Earth Sciences, GoI, indicates a significant increase in the number of dry days [daily rainfall less than 2.5mm or less] as well as 'significant decreasing trends in annual rainfall in last 30 years. The report also stated that the frequency of rainfall of lower intensity, favourable forsoil and groundwater recharge was decreasing. The temperature predictions are not favourable too. There is a predicted temperature rise of 1.8°C to 2.1°C during the same period. Moreover, Uttar Pradesh [East and West] also falls under frequently drought prone area (probability of occurrence of drought 10-20%) as per time series (1875-2009) delineation done by Indian Meteorological Dept. (Attri& Tyagi, 2010). **This climatic variability in the state has might have cascading effects on region's biodiversity, water resources, food productivity and dependent livelihoods. Certainly, poor groundwater recharge, increased evaporative losses and overall decrease in rainfall will impact the river flow and the riverine terrain of the study corridor. Options of improving recharge therough a variety of structures, water conserving agriculture, urban water efficiency and increased forestration in the uplands must be vigourously pursued.**

19.3 **Impact on Fish Resources :** Vass et al. (2009) studied in detail the impact of climate change on fisheries in Ganga river system. Their study pointed out factors such as: flood magnitude and frequency owing to intense precipitation events and low flows owing to increased evaporation, would have significant impact on the fish resources of Ganga river. They also analyzed the monthly rainfall data at Allahabad site of the middle stretch of river Ganga from 1974-2003 which revealed that the rainfall had declined by 5% in the peak breeding season of fisheries while it had increased by 7% in the post breeding period when resorption of eggs of Indian Major Carps begins. The fish production in the middle stretch of Ganga River was also severely impacted

by the decrease in fish spawn availability and continued deterioration of Indian Major Carps seed coupled with increase of minor carps and catfish seed. **The fishermen in Prayagraj Distt. reiterated their concerns over the significant decline in the fish catch (about 60-70%) during the last few decades and blamed the changing weather patterns coupled with decreased water quality for it. Many fishermen claimed that most of them have now shifted their main occupation from fishing to boating for the large number of tourists incoming in this Distt. as that provides a better source of livelihood.**

19.4 **Impact on Ganges River Dolphin :** The Gangetic Dolphin (*Platanista gangeticagangetica*) is an indicator species for the river ecosystem and is at the apex of the food chain. Already classified as 'Endangered' by IUCN and with its population declining, this species is further threatened by climate change which impacts Ganga River and its tributaries. Other anthropogenic factors such as increasing pollution due to large-scale discharge of industrial and municipal waste, siltation, mechanised boats and overfishing have also affected the distribution and survival of dolphins in Ganga. **The dolphin sightings in Prayagraj Distt. along with secondary information provided by the respondents demonstrate this stretch of Ganga River as an important habitat for this species. However, upon interacting with some people living near Ganga River since last 4-5 decades voiced their concern over the diminished dolphin presence in many patches such as near Ram Chaura Ghat and Bhairav Ghat. The diminishing levels of water, increased turbidity, increased surface water temperatures and availability of fish resources for food are major reasons for their habitat and population shift in this Distt.**

19.5 **Impact on Hydrology :** Ganga River and its plains are one of the most densely populated areas due to availability of drinking water, fertile soil and suitable landscapes. However, this region is also facing the brunt of climate change which is evident from many studies that have examined the increasing trend in temperature, hydrological processes, ecosystems, and water resources due to effects of climate change in Ganga Basin. A study conducted by Singh and Kumar (2018) highlights the vulnerability of Ganga-Brahmaputra-Meghna river basins which may encounter alteration in river discharge, higher runoff generation, low groundwater recharge and melting of glaciers in the near future. Besides this, the increased water temperatures in Ganga river also accelerate various chemical and biological processes leading to increased growth of various phytoplanktons, macrophytes and aquatic organisms which results in eutrophication and degradation of water quality.

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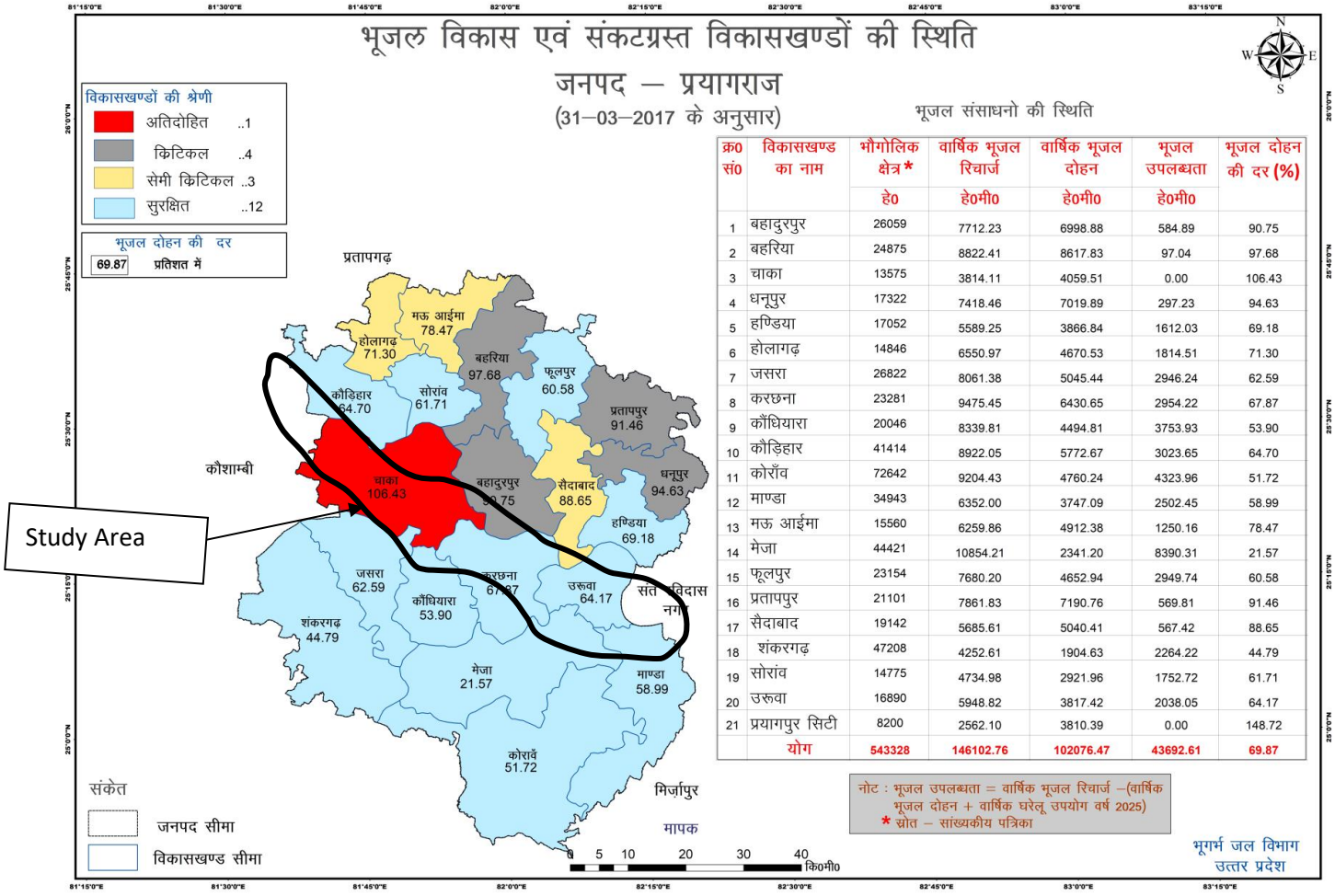
21.0 Annexure

Annexure 1: Groundwater Resource Of Prayagraj District



क्र0 सं0	विकासखण्ड का नाम	भौगोलिक क्षेत्र *	वार्षिक भूजल रिचार्ज	वार्षिक भूजल दोहन	भूजल उपलब्धता	भूजल दोहन की दर (%)
		हे0	हे0मी0	हे0मी0	हे0मी0	
1	बहादुरपुर	26059	7712.23	6998.88	584.89	90.75
2	बहरिया	24875	8822.41	8617.83	97.04	97.68
3	चाका	13575	3814.11	4059.51	0.00	106.43
4	धनूपुर	17322	7418.46	7019.89	297.23	94.63
5	हण्डिया	17052	5589.25	3866.84	1612.03	69.18
6	होलागढ़	14846	6550.97	4670.53	1814.51	71.30
7	जसरा	26822	8061.38	5045.44	2946.24	62.59
8	करछना	23281	9475.45	6430.65	2954.22	67.87
9	कौंधियारा	20046	8339.81	4494.81	3753.93	53.90
10	कौड़िहार	41414	8922.05	5772.67	3023.65	64.70
11	कोरॉंव	72642	9204.43	4760.24	4323.96	51.72
12	माण्डा	34943	6352.00	3747.09	2502.45	58.99
13	मऊ आईमा	15560	6259.86	4912.38	1250.16	78.47
14	मेजा	44421	10854.21	2341.20	8390.31	21.57
15	फूलपुर	23154	7680.20	4652.94	2949.74	60.58
16	प्रतापपुर	21101	7861.83	7190.76	569.81	91.46
17	सैदाबाद	19142	5685.61	5040.41	567.42	88.65
18	शंकरगढ़	47208	4252.61	1904.63	2264.22	44.79
19	सोरांव	14775	4734.98	2921.96	1752.72	61.71
20	उरूवा	16890	5948.82	3817.42	2038.05	64.17
21	प्रयागपुर सिटी	8200	2562.10	3810.39	0.00	148.72
	योग	543328	146102.76	102076.47	43692.61	69.87

Source: Uttar Pradesh Groundwater Board

Annexure 02 : Flora Of Prayagraj District		
Sr. No.	**Local Name**	**Scientific Name**
Trees		
1	Akol	*Alangium salviifolium*
2	Augusti/August	*Chamaedorea ernesti*
3	Arjun	*Terminalia arjuna*
4	Amrud	*Psidium guyava*
5	Amaltas	*Cassia fistula Linn*
6	Arru	*Ailanthus altissima*
7	Ashok	*Saraca asoca*
8	Aam	*Mangifera indica*
9	Sal	*Shorea robusta*
10	Awla	*Phyllanthus emblica*
11	Anjir	*Ficus carica*
12	Imli	*Tamarindus indica*
13	Kachnar	*Bauhinia variegata*
14	Kadamb	*Neolamarckia cadamba*
15	Karghai	*Anogeissus pendula*
16	Kanji	*Pongamia pinnat*
17	Kathal	*Artocarpus heterophyllus*
18	Kathsagaun	*Haplophragma adenophyllum*
19	Kankachampa	*Pterospermum acerifolium*
20	Vaja	*Bridelia retusa*
21	Kari	*Miliusa tomentosa*
22	Kantiya/kateya	*Flacourtia indica*
23	Kamrakh	*Averrhoa carambola*
24	Kosia	*Cassia siamea*
25	Kaitha	*Feronia limonia*
26	Kumhar	*Callicarpa arborea*
27	Karula	*Diospyros cordifolia*
28	Kala Siras	*Albizia lebbeck*
29	Galgal	*Sterculia urens*
30	Kusum	*Schleichera trijuga*
31	Kumbi	*Careya arborea*
32	Kaner (Red)	*Nerium indicum*
33	Kaner (Yellow)	*Thevetia neriifolia*
34	Kagazi Nimbu	*Citrus aurantifolia*
35	Khajur	*Phoenix sylvestris*
36	Khajarjal, pilu	*Salvadora persica*
37	Kharhar	*Gardenia turgida*
38	Kharpat	*Garuga pinnata*
39	Khirni	*Mimusops hexandra*
40	Khair	*Acacia catechu*
41	Rudariya	*Wrightia tinctoria*
42	Gamhar	*Gmelina arborea*

43	Gavadi	*Cochlospermum religiosum*
44	Gular	*Ficus glomerata*
45	Gutel	*Trewia nudiflora*
46	Gulmohar	*Delonix regia*
47	Godni	*Cordia sinensis*
48	Gorakh Imli	*Adansonia digitata*
49	Ghata	*Schrebera swietenioides*
50	Chamror	*Ehretia laevis*
51	Tendu	*Ziziphus xylopyrus*
52	Chakotra	*Citrus maxima*
53	Chandan	*Santalum album*
54	Chilla	*Casearia tomentosa*
55	Chheukur	*Prosopis cineraria*
56	Chhitwan	*Alstonia scholaris*
57	Jarul	*Lagerstroemia*
58	Jungle Jalebi	*Pithecellobium dulce*
59	Jakranda	*Jacaranda mimosifolia*
60	Mamri	*Elaeodendron glaucum*
61	Virsaved	*Salix tetrasperma*
62	Jamun	*Syzygium cumini*
63	Jheegan	*Lannea coromandelica*
64	Palash	*Butea monosperma*
65	Tarcharvi	*Sapium sebiferum*
66	Taad	*Borassus flabellifer*
67	Tun	*Toona ciliata*
68	Tendu	*Diospyros* melanoxylon
69	Dudi	*Holarrhena antidysenterica*
70	Dhamina	*Grewia tiliifolia*
71	Dho/Dhawa	*Anogeissus latifolia*
72	Ghee/Vankali	*Anogeissus latifolia wall*
73	Naspati	*Pyrus communis*
74	Nnimboo	*Citrus medica*
75	Nimboo mitha	*Citrus limettioides*
76	Neem	*Azadirachta indica*
77	Neem chameli	*Millingtonia hortensis*
78	Chapara	*Gardenia latifolia*
79	Pakad	*Ficus lacor*
80	Chilbil	*Holoptelea integrifolia*
81	Pilkhan	*Ficus rumphii*
82	Peepal	*Ficus religiosa*
83	Pyle	*Stereospermum suaveolens*
84	Pindar	*Randia uliginosa*
85	Peelu	*Salvadora oleoides*
86	Papeeta	*Carica papaya*
87	Anjan	*Hardwickia binata*
88	Poola	*Kydia calycina*

89	Pumanjeeva	*Putranjiva roxburghii*
90	Pepa khalbari	*Broussonetia papyrifera*
91	Faras	*Tamarix aphylla*
92	Madar	*Erythrina suberosa*
93	Falsa	*Grewia asiatica*
94	Babool	*Acacia arabica*
95	Bargad	*Ficus benghalensis*
96	Badeha	*Terminalia bellirica*
97	Beejasal	*Pterocarpus marsupium*
98	Bakain	*Melia azedarach*
99	Bakar	*Premna latifolia*
100	Badhal	*Artocarpus lakoocha*
101	Bel	*Aegle marmelos*
102	Ber	*Ziziphus mauritiana*
103	Barna	*Crataeva adansonii*
104	Vansa	*Albizia odoratissima*
105	Bakail	*Gymnosporia spinosa*
106	Bhurkut	*Hymenodictyon excelsum*
107	Mahua	*Madhuca indica*
108	Mahuli	*Bauhinia racemosa*
109	Malta	*Citrus sinensis*
110	Mausammi	*Citrus aurantifolia*
111	Molshree	*Mimusops elengi*
112	Eucalyptus	*Eucalyptus hybrid*
113	Reetha	*Sapindus emarginatus*
114	Reuja	*Acacia leucophloea*
115	Rohini	*Mallotus philippensis*
116	Lameda	*Cordia dichotoma*
117	Litchi	*Nephelium litchi*
118	Lukat	*Eriobotrya japonica*
119	Vilayati babool	*Prosopis juliflora*
120	Shareefa	*Annona squamosa*
121	Sheesham	*Dalbergia sissoo*
122	Shahtoot	*Morus alba*
123	Sagaon	*Tectona grandis*
124	Saadan	*Ougeinia oojeinensis*
125	Cirus safed	*Albizia procera*
126	Sinhori	*Streblus asper*
127	Seja	*Lagerstroemia parviflora*
128	Semal	*Bombax ceiba*
129	Sejna	*Moringa oleifera*
130	Vilayti Himot / Satpatiya	*Hesperethusa crenulata (Roxb.)*
131	Silver Oak	*Grevillea robusta A. Cunn.*
132	Sal/ Sakhu	*Shorea robusta Gaern.*
133	Sanvni	*Lagerstroemia indica*

134	Harra / Harr / Harad	*Terminalia chebula retz.*
135	Haltu	*Adina cordifolia Hook. F.*
136	Subabool	*Laucaena leucocephala*
137	Subabool	*Cassia auricula*
138	Subabool	*Khaya senegalensis*
139	Subabool	*Kigelia pinnata*
140	Australian Babool	*Acacia auriculiformis*
141	Poplar	*Populus spp.*
142	Peltophorum	*Peltophorum pterocarpus*
143	Parkinsonia	*Parkinsonia aculeate Linn.*
Shrubs and Herbs		
144	Ased / Juhir	*Solanus verbascifolium Linn.*
145	Aak / Madar	*Aclotropis procera R.Br.*
146	Arhar	*Cajanus cajan (Linn) Miu*
147	Arusa / Kansha	*Adhatoda vasica ness*
148	Inni	*Clerodendron phlomoidis Linn.*
149	Utkatar / Gokhru	*Echinopis echinatus*
150	Kataeyya	*Flacourtia indica*
151	Karil	*Capparis decidua (forsk) edgw.*
152	Karinda	*Carissa spinarum Linn*
153	Kairi	*Dichrostachys cinerea (Linn) w&A*
154	Kuri	*Lantana camara Linn*
155	Kathmar	*Ficus cuniea*
156	Kankohar / Menpal	*Randia dumetorum*
157	Kankar	*Abutilon indicum Linn sweet*
158	Kharber / Karber	*Zizyphus nummlaria (Burm.f.)*
159	Khadiyar / Piluwa	*Salvadora persica Linn.*
160	Nanaela / kathniya	*Murayya koenigii Spreng.*
161	Gudsakri	*Grewia hirsute Vahl*
162	Chakunda	*Cassia occidentalis Linn.*
163	Chakvad	*Cassia tora*
164	Gudgava	*Grewia flavescens Juss.*
165	Chinari	*Grawia tenax (Forsk) Fiori*
166	Jangli piyaz	*Urginea indica, Kunth*
167	Jawasa	*Alhagi camelorum*
168	Jhadperi	*Zizyphus mauritiana, Lamk*
169	Jhau	*Tamarix dioica Roxb.*
170	Dhota/ dhavai	*Woodfordia fruticosa, Kurz*
171	Neel/ Basanta	*Indigofera hirsute Linn.*
172	Patera	*Typha elephantina Roxb.*
173	Pransi	*Crotolaria medicaginea Lam.*
174	Bhang	*Cannabis sativa Linn.*
175	Bhot	*Clerodendron viscosum vent.*
176	Bhatkataiya	*Solanum xanthocarpum Linn.*
177	Mola/ Manju/ Shivari	*Vitex negundo Linn*
178	Ram Bans	*Agave amricana Linn.*

179	Sarphonk	*Tephrosia purpurea (Linn.)*
180	Harsingar/ Sinharu	*Nycan thes arbortristris Linn.*
181	Hingot	*Balanites aegyptica (Linn.)*
182	Hons	*Capparis decidua (forsk) edgw.*
Climbers		
183	Amarbel/ Akashbel	*Cuscuta relexa. Roxb.*
184	Aal	*Mimosa himalayana Gamble*
185	Aadi/ Kakrora	*Capparis sepiraia Linn.*
186	Indrayan	*Trichosanthes bracteata (Lam) Voigt.*
187	Kokibel	*Combretum decandrum Roxb.*
188	Kyohi/ Hariya/ Bawri	*Ventilago calyculata, Tulasne*
189	Kubri/ Aaila	*Acacia pennata willd*
190	Kundru	*Coccinea indica w&A*
191	Konch	*Mucuna pruita*
192	Gonj	*Milletia auriculata baker*
193	Gurich	*Tinospora malabarica (Lam)*
194	Ghodhvi/ Hatti/ Mulathi	*Abrus precatorius Linn*
197	Chabuk Chari/ Uthvalata	Cryptostegia grandiflora
198	Charaedi	Cocculus hirsutus (Linn.)
199	Charhari bel/ Tameran	Maerua arenaria
200	Duddhi/ Dudhiya	Echnocarpus frustescens
201	Duddhi	Cryptolepis buchanni
202	Duddhi bel	Vallaris salabacea
203	Pani bel	Vitis repanda, w&A
204	Parwal	Trichosanthes dioica Roxb.
205	Thurena/ Harjuri	Cissampelos pareira Linn.
206	Padhasij	Butea superba Roxb.
207	Banda	Dendrophthoe falcata Linn.
208	Maurain	Bauhinia vahlii w&A
209	Makoh	Zizyphus oenoplia Mill
210	Malkangani	Celastrus paniculatus Willd
211	Ramdutan	Smilax prolifera Roxb
212	Satavar	Asparagus racemosa
213	Baas	Dendrocalamous strictus (Roxb) Nees.
214	Kathbans	Bembusa arundinacea Hook. F.
Grasses		
215	Anajan/ Anjana	Cenchrus ciliaris Linn
216	Usri	Sporobolus marginatus Hochst. Ex. A. Rich
217	Kans	Saccharum spontaneum Linn
218	Kus	Chrysopogen fulvus
219	Kala Lampa	Hateropogan contortus (Linn) Beauy ex. R. Br.
220	Khas/ Garder	Vetiveria zizaniodes (Linn)

221	Gangeruva	Andropogon pumilis Roxb.
222	Guner/ Ganer	Themeda quadrivalvis (Linn.)
223	Chakva/ Guriya	Chrysopogon montenus
224	Chori Garvi/ Phalureriya	Bothriochloa pertusa (Linn.) A. Camus.
225	Jama/ Janeva	Dichanthium annulatum (Porsk) Stapf
226	Dab	Desmostachya bipinnata Stapf
227	Dub	Cynodon dactylon (Linn.) Pers
228	Naltura	Arundo donax Linn.
229	Parva / Lampa	Hrteropogon contortus
230	Vindra	Setaria glauca (Linn.) P. Beauv.
231	Baij/ Bamai/ Bavad	Eulaliopsis binata (Retz.) Hubb
232	Bhujri/ Phuleka	Apluda mutica Linn.
233	Bhunj	Saccharum munja (Roxb. Jesweit
234	Murjhauna	Eremopogon fovelatus (Dol) Stapf.
235	Musel	Iseilena laxum Hack
236	Ritar	Cymbopogon martinil Roxb.
237	Safed	Eristida depressa Retz.
238	Siru	Emperata cylindrica (Linn.) P. Beauy.
239	Seta	Sehima nervosum (Rottl) Stapf
240	Santur	Chloris dolichostachya Leg.

Source : Forest Working Plan, Prayagraj District

Annexure 03 : Fauna Of Prayagraj District		
Sr. No.	**Common Name**	**Scientific name**
	Mammals	
	Family: Cercopithecidae	
1	Rhesus Macaque	*Macaca* mulatta
2	Langur	*Semnopithecus sp.*
	Family: Delphinidae	
3	Dolphin	*Platanista gangetica*
	Family: Felidae	
4	Jungle cat	*Felis chaus*
5	Fishing Cat	*Prionailurus viverrinus*
6	Caracal	*Felis caracal*
	Family: Mustelidae	
7	Common Otter	*Lutra lutra*
8	Ratel	*Mellivora capensis*
	Family: Canidae	
9	Jackal	*Canis aureus*
10	Wolf	*Canis lupus*

11	Common fox	*Vulpes vulpes*
	Family: Herpestidae	
12	Common mongoose	*Herpestes edwardsii*
13	Small Indian Mongoose	*Herpestes javanicus*
	Family: Hyaenidae	
14	Striped hyna	*Hyaena hyaena*
	Family: Ursidae	
15	Sloth bear	*Melursus ursinus*
	Family: Bovidae	
16	Blue bull	*Boselaphus tragocamelus*
17	Black buck	*Antilope cervicapra*
	Family: Cervidae	
18	Chital	*Axis axis*
19	Sambhar	*Rusa unicolor*
	Family: Suidae	
20	Wild boar	*Susscrofa*
	Family: Sciuridae	
21	Palm squirrel	*Funambulus palmarum*
22	Grey musk shrew	*Suncusmurinus*
	Family: Muridae.	
23	Common house rat	*Rattus rattus*
24	Indian mole rat	*Bandicota bengalensis*
25	Long tailed tree mouse	*Vandeleuria nilagirica*
	Family: Leporids	
26	Rufous tailed hare	*Lepus nigricollaris ruficaudatus*
	Family: Vespertilionidae	
27	Common yellow bat	*Scotophilus heathii*
28	Indian fly fox	*Pteropus giganteus*
	Fishes	
1	Calabasu	*Labeo calbasu*
2	Katla	*Catla catla*
3	Kuchia	*Monopterus cuchia*
4	Chilwa	~~~~~~~~~~~~~~~
5	Tengan	*Mystus cavasius*

6	Mrigal	*Cirrhinus cirrhosus*
7	Spiny eal	*Mastacembelus armatus*
8	Mahaseer	*Tor putitora*
9	Ratra	*Notopterus chitala*
10	Mangoor	*Clarias batrachus*
11	Rohu	*Labeo rohita*
12	Singhi	*Heteropneustes fossilis*
13	Saur	*Channa striatus*
14	Bachua	*Clupisoma garua*
15	Giarai	*Channa gachua*
Birds		
1	Black partridge	*Melanoperdix niger*
2	Red spurfowl	*Galloperdix spadicea*
3	Grey partridge	*Perdix perdix*
4	Common quail	*Coturnix coturnix*
5	Jungle bush quail	*Perdicula asiatica*
6	Common bustard quail	*Turnix suscitator*
7	Peafowl	*Pavo cristatus*
8	Red Jungle fowl	*Gallus gallus*
9	Rock Pigeon	*Columba livia*
10	Spotted dove	*Spilopelia chinensis*
11	Rufous turtle dove	*Streptopelia orientalis*
12	Eurasian collared dove	*Streptopelia decaocto*
13	Little brown dove	*Spilopelia senegalensis*
14	Red turtle dove	*Streptopelia tranquebarica*
15	Yellow-footed green pigeon	*Treron phoenicoptera*
16	Knob-billed duck	*Sarkidiornis melanotos*
17	Common teal	*Anas crecca*
18	Cotton pygmy goose	*Nettapus coromandelianus*
19	Indian spot-billed duck	*Anas poecilorhyncha*
20	Ruddy shelduck	*Tadorna ferruginea*
21	Blue-winged teal	*Anas discors*
22	Greylag goose	*Anser anser*
23	Bar-headed goose	*Anser indicus*
24	Northern shoveler	*Spatula clypeata*
25	Eurasian wigeon	*Mareca penelope*
26	Gadwall	*Mareca strepera*
27	Red-crested pochard	*Netta rufina*
28	Ferruginous duck	*Aythya nyroca*
29	Mallard	*Anas platyrhynchos*
30	Lesser whistling duck	*Dendrocygna javanica*
31	Northern pintail	*Anas acuta*
32	Little grebe	*Tachybaptus ruficollis*
33	Common snipe	*Gallinago gallinago*
34	Little egret	*Egretta garzetta*

35	Grey heron	*Ardea cinerea*
36	White-necked stork	*Ciconia episcopus*
37	Cattle egret	*Bubulcus ibis*
38	Black-headed gull	*Chroicocephalus ridibundus*
39	Sarus crane	*Antigone antigone*
40	Black-winged kite	*Elanus caeruleus*
41	Black kite	*Milvus migrans*
42	Brahminy kite	*Haliastur indus*
43	Shikra	*Accipiter badius*
44	Kestral	*Falco tinnunculus*
45	Pied crested cuckoo	*Clamator jacobinus*
46	Common Hawk cuckoo	*Hierococcyx varius*
47	Indian cuckoo	*Cuculus micropterus*
48	Coucal	*Centropus sinensis*
49	Barn owl	*Tyto alba*
50	Collared scops owl	*Otus lettia*
51	Great horned owl	*Bubo virginianus*
52	Barred jungle owl	*Glaucidium radiatum*
53	Spotted owlet	*Athene brama*
54	Brown wood owl	*Strix leptogrammica*
55	Common Indian nightjar	*Caprimulgus asiaticus*
56	Blue jay	*Cyanocitta cristata*
57	Common kingfisher	*Alcedo atthis*
58	Common grey hornbill	*Ocyceros birostris*
59	Large pied hornbill	*Buceros bicornis*
60	Golden-backed woodpecker	*Dinopium benghalense*
61	Large yellow-naped woodpecker	*Picus chlorolophus*
62	Rufous woodpecker	*Micropternus brachyurus*
63	Black Drongo	*Dicrurus macrocercus*
64	Grey wagtail	*Motacilla cinerea*
65	House sparrow	*Passer domesticus*
66	Jungle myna	*Acridotheres fuscus*
67	Common myna	*Acridotheres tristis*
68	Bank myna	*Acridotheres ginginianus*
69	House crow	*Corvus splendens*
70	Jungle crow	*Corvus macrorhynchos*
71	Weaver bird	*Ploceus philippinus*
72	Red-vented bulbul	*Pycnonotus cafer*
73	Red-whiskered bulbul	*Pycnonotus jocosus*
74	Paradise flycatcher	*Terpsiphone paradisi*
75	Common swallow	*Hirundo rustica*
76	Red munia	*Amandava amandava*
77	Jungle babbler	*Turdoides striata*
78	Common babbler	*Argya caudata*

79	Magpie robin	*Copsychus saularis*
80	Golden oriole	*Oriolus kundoo*
81	Black headed oriole	*Orioluslarvatus*
82	Crested lark	*Galerida cristata*
83	Tailor bird	*Orthotomus sutorius*
84	Shama	*Copsychus malabaricus*
85	White-throated munia	*Euodice malabarica*
86	White-backed munia	*Lonchura striata*
87	Spotted munia	*Lonchura punctulata*
88	Common hoopoe	*Upupa epops*
89	Small green bee-eater	*Merops orientalis*
90	House swift	*Apus nipalensis*
91	Large indian parakeet	*Psittacula eupatria*
92	Rose-ringed parakeet	*Psitta culakrameri*
93	Blossom-headed parakeet	*Psitta cularoseata*
Reptiles		
1	The sail terrapin, Indian black terrapin	*Batagur baska*
2	Common indian monitor	*Varanus bengalensis*
3	Common garden lizard	*Calotes versicolor*
4	Northern house gecko	*Hemidactylus flaviviridis*
5	Indian python	*Python molurus*
6	Common indian krait	*Bungarus caeruleus*
7	Indian cobra	*Naja naja*
8	King cobra	*Ophiophagus hannah*
9	Rat snake	*Panthero phisobsoletus*
10	Russell's viper	*Daboia russelii*
11	Smooth water snake	*Enhydris sieboldii*
12	Blind snake	*Indotyphlops braminus*
13	Gharial	*Gavialis gangeticus*
14	Indian marsh crocodile	*Crocodylus palustris*

Source : Forest Working Plan, Prayagraj District

Annexure 04 : Gazetteer of Allahabad [Source : https://archive.org/]

ALLAHABAD:

A GAZETTEER,

BEING

VOLUME XXIII

OF THE

DISTRICT GAZETTEERS OF THE UNITED PROVINCES OF AGRA AND OUDH.

BY

H. R. NEVILL, I.C.S., F.R.G.S., F.S.S., M.R.A.S.

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CHAPTER I.

General Features.

The district of Allahabad, or Ilahabad as it should properly be written, forms the easternmost portion of the straggling division of the same name and lies between the parallels of 24°47′ and 25°47′ north latitude and of 81°9′ and 82°21′ east longitude. It is bounded on the north for about a third of the distance by the river Ganges, which separates it from Rai Bareli and Partabgarh, while for the remainder it marches with the latter district and Jaunpur. To the east and south-east lies the Mirzapur district, to the south and south-west is the Rewah state, and to the west are the districts of Banda and Fatehpur, separated from each other by the river Jumna. In places the boundary is extremely irregular. Several villages of Partabgarh and Rewah lie embedded in the district, while the greater portion of the Mirzapur pargana, as well as two or three detached villages, are entirely surrounded by Oudh territory in the extreme north, and the small block which comprises the villages of Chaukhandi and Khoha is situated within the Rewah state, some twelve miles distant from the rest of the district. The area is very large, for the greatest breadth from east to west is 74 miles and the extreme length some 64 miles from north to south. Owing to the variations in the course of the Ganges and to a less extent along the Jumna, the area is apt to fluctuate from year to year; but as loss in one place is usually compensated by gain elsewhere the net change is inconsiderable. The average for the five years ending with 1906-07 was 1,825,165 acres or 2,851·8 square miles.

The Ganges and Jumna, which unite at Allahabad, divide the district into three distinct parts, which differ from one another so materially in their general appearance and physical features that each must be described separately. The tract between the two rivers, commonly known as the Duab, comprises the tahsils of Allahabad, Sirathu and Manjhanpur. The trans-Ganges

or Gangapar tract includes Soraon, Phulpur and Handia; while the trans-Jumna country, known as Jamnapar, consists of Bara, Karchana and Meja.

The Duab.

The Duab forms an easterly continuation of the Fatehpur district and is a roughly triangular block of country with an area of 816·73 square miles. Its northern boundary is the Ganges, and between the river and the high sandy ridge, broken by ravines, which marks the flood bank, is a strip of alluvial land, in places very narrow, but elsewhere widening out into a broad stretch of sand and silt. Sometimes, as in the neighbourhood of Kara and Shahzadpur, this low alluvium produces little more than tamarisk and thatching grass; but often there is a considerable area of rich land, beyond the reach of all but extraordinary floods, on which magnificent *rabi* crops are raised. The high bank itself is covered with a poor and gritty soil, full of *kankar* and impoverished by the action of innumerable ravines, some of which extend inland for several miles; but as the level drops towards the interior the soil improves into a light loam, which in turn gives place to a stiff clay in the central depression that marks the valley of the Sasur Khaderi. There is in most places a belt of poor undulating soil along the course of this drainage channel, especially in its lower reaches, the ground being broken by a network of ravines as it approaches its confluence with the Jumna. When it first enters the district the banks are usually on a level with the surrounding country and for a considerable distance are covered with a thick growth of *dhak* jungle, notably in the Sirathu tahsil. The clay belt continues for some distance to the south of the Sasur Khaderi in the western Duab, where *usar* plains are frequently to be seen and small *jhils* and tanks are very numerous; but this gives place again to a light loam as the high bank of the Jumna is approached. As in Fatehpur the land along that river is of an inferior description, the soil being full of *kankar*, cut up by ravines and devoid of natural means of irrigation, though an immense improvement has been effected since the introduction of canal water along the westernmost extensions of the Fatehpur branch. The lowlands of the Jumna valley are almost negligible except in the extreme south-west, where is a considera[illegible] ta[illegible]

block of land, covered in many places with *dhak* and scrub jungle, containing the great basin of the Alwara *jhil*. Here the soil is dark and friable, closely resembling the *mar* of Bundelkhand. It differs wholly from that of the rest of the Duab and the resemblance to Bundelkhand is heightened by the rocky outcrop of the Pabhosa hill, the only eminence of any note between the Jumna and the southern slopes of the Himalayas. Taken as a whole the Duab presents the appearance of a rich and fertile country. Save in the ravine belts it is remarkably well wooded, and though there is said to have been a great diminution in the grove area since the introduction of the railway, the number of mango and *mahua* trees is still the chief feature of the country.

Gangapar.

The trans-Ganges tract bears a close resemblance to the adjoining parts of Oudh and Jaunpur. Its southern edge is formed throughout by the Ganges and here again are to be seen in places broad strips of rich *kachhar*, especially in Nawabganj and the south of pargana Jhusi. The high bank of the river is generally broken and sandy, but where the stream flows close below the upland the belt of poor land is very narrow and its influence slight. North of this bank comes a stretch of a light, loam, generally of a fertile character and varying in width, being broadest in Nawabganj and Jhusi. North of this again is a broad expanse of clay which extends to the district boundary. Water is here close to the surface and the drainage collects in numerous *jhils*. The surplus water makes its escape either northwards into the tributaries of the Sai or southwards into the Manseta and other minor affluents of the Ganges or else eastwards into the Barna. This clay belt is of a very rich description. Rice is the main staple, but large quantities of wheat and sugarcane are produced and rents are very high. While both parts of the district are unusually well wooded, the Gangapar tract differs in many respects from the Duab. In the latter *jhils* of any size are very rare, while in Gangapar they form the most noticeable feature of the country. The villages are as a rule extremely small and are split up into numerous hamlets, whereas in the Duab there are many large sites, especially in pargana Atharban. Even the houses present a different appearance, being lower and built with sloping roofs, in contradistinction to the high flat-roofed dwellings

of the Duab tahsils. The total area of the trans-Ganges tract is 853·48 square miles.

Jamnapar.

The third and largest tract is Jamnapar, which is entirely different from the rest of the district. It covers an area of 1,181·86 acres and geographically belongs to Bundelkhand or Mirzapur. In some respects the Karchana tahsil resembles the Duab in both its crops and its soils, being an upland plain of loam and clay, with the usual belt of light and indifferent soil along the banks of the Ganges, Jumna and Tons. On its western side, however, the Duab soils are replaced by a mixture of clay and the *mar* of Bundelkhand, which extends over the eastern portion of Bara. That pargana has a narrow strip of high and fairly stable alluvium along the Jumna, but this gives place to a low range of hills which extend centrally through the pargana from its southern border on the Tons to within a few miles of the former river. These hills form an irregular outwork of the Vindhyan system and the country on their summit and western slopes resembles the *patha* of Banda, having a thin deposit of poor stony soil and an execrable climate, while the population is extremely sparse and water is very scanty. South of the Tons in the Meja tahsil there is a fairly rich plain of alluvium in the east, between the Ganges and the Manda hills, and this closely resembles the adjacent parts of Karchana. The Vindhyan hills run from the Mirzapur border past Manda, Meja and Kohrar to the western boundary; and from their crest northwards as far as the Belan there extends a plateau of inferior *mar* and clay soils, drained by the Lapri and a few small tributaries of the Belan. The surface of the ground is broken by small hills and rocky outcrops, while the population is as scanty as in Bara and the cultivation is poor and precarious. The hot west winds sweep over these stony uplands with incredible fury and during the rains the *mar* is converted into an unhealthy morass. The unstable nature of the tillage and the existence of much waste and fallow leads to the spread of the weed called *kans*, which has caused much land to be abandoned. Between the Belan and the crest of the Panna range which marks the Rewah boundary is a small belt of land divided into two portions by a rocky spur. That to the east is either covered with low forest or else resembles the central *mar*

plateau, but the western half is of a superior quality, as *mar* gives place to loam, *kans* disappears, the population is relatively dense and good crops can be grown even without irrigation.

Geology.

More detailed accounts of the various tracts will be found in the several tahsil articles. From the foregoing summary it is obvious that in its physical features, especially as regards soils and geological conditions, Allahabad presents a greater complexity than any other plains district of the United Provinces, with the possible exception of Mirzapur. The whole of the trans-Ganges tract consists of the ordinary alluvium of the Gangetic plain, and the same may be said of the greater part of the Duab as also of the Karchana tahsil and the north-east of Meja. The alluvial detritus of the Bundelkhand hills, however, makes its appearance in the south of the Duab, particularly in pargana Atharban, which contains a considerable proportion of the true Bundelkhand soils, and here the Vindhyan rock series extends to the north of the Jumna, as typified by the Pabhosa outcrop. In the trans-Jumna tract the detritus from the Vindhyans merges in the sand and silt of the Ganges valley, the resultant blend being clearly illustrated in the west of Karchana and the east of Bara. The hilly country in the south and west of Jamnapar represents three subdivisions of the Vindhyan series. The lowest is called the Bindhachal range and rises up boldly from the alluvial plain in an irregular chain from Manda to beyond Kohrar, reappearing in the south of Bara whence an outlying range extends northwards to the Jumna. The upper strata consists of massive Kaimur sandstone of a light reddish colour, extremely homogeneous, moderately hard and suitable for every kind of work. These Bindhachal hills have a bold scarp to the north, save in the lower valley of the Tons, where they gradually descend to the level of the alluvium. South of the escarpment is an irregular plateau occupied by the lower Rewah group, which consists of an upper shaly band known as the Jhiri shales and a lower one forming the Panna shales, the two being separated by an intermediate sandstone band known as the lower Rewah sandstone. The third and highest subdivision is the upper Rewah group, represented for some ten miles along the southern boundary of the district by the fine scarp of massive sandstone

known as the Panna range. It is very similar to the Bindhachal range but attains a greater elevation. All these subdivisions are clearly seen in the hills round Barokhar. In the extreme west of the area occupied by the lower Rewah group the well-known diamond-bearing conglomerate occurs as a subordinate band in the Panna shales, but the outcrop in this district is unproductive. About many of the falls on the northern and southern escarpments large masses of stalagmite are found, and from this considerable quantities of very fine lime are burned in various places, the lime for the Jumna bridge having been obtained, it is said, from Sohagi-ghat in Rewah.

Levels.

The highest point in the Panna range is 1,218 feet above the level of the sea and the crest in most places exceeds 1,000 feet. The drop northwards is very sudden, the recorded height falling from 1,187 feet at Parthia to 420 feet a mile to the north. Similarly there is a fall from 1,191 feet on the hills south of Daiya to 400 feet at that place, and from 1,156 on the Barokhar spur to 390 at Barokhar itself. The Bindhachal range is much lower, the greatest elevations being 617 feet at Bagala in tahsil Bara and less than 600 feet in the Meja tahsil. The general level of the alluvial portion of Jamnapar is illustrated by the bench-marks on the Jubbulpore road, which rises to 357 feet at Nari and thence drops gradually to 311 feet at Gauhani, subsequently rising slightly as it approaches the Jumna bank. The latter is 320 feet on the Banda border and about 300 feet at the confluence of the Tons. In the Duab the slope of the country is from west to east. The grand trunk road closely follows the main water-parting and when it enters the district is 347 feet above the sea, thence falling gradually to 315 feet at Allahabad. In the Gangapar area the slope is for the most part easterly or south-easterly, the grand trunk road running at a level of 307 feet at Jhusi and thence dropping almost imperceptibly to 293 feet on the Mirzapur border. There are eight principal stations of the great trigonometrical survey in the district. They are situated at Kara and Pabhosa in the Duab, at Meja and Bagala in Jamnapar and at Singraur in pargana Nawabganj, Birwa in Sikandra, Siona in Mah and Ganeshpur in Kiwai.

Soils.

The soils in the Duab and the trans-Ganges tracts present few peculiarities. They consist as usual of *balua* or sand, corresponding to the *bhur* of other districts, found on the highest levels, especially on the river banks ; of *matiar* or clay in the depressions, the heavy variety which is fitted solely for rice cultivation and can only be worked when thoroughly soaked going by the local name of *chanchar* ; and of the mixture of sand and clay known as *dumat* or loam, which is usually a rich and rather dark soil, or as *sigon*, the name applied to sandy loam of a less fertile nature. In the trans-Jumna country all these soils occur in the ordinary alluvium, while in addition there are others which are characteristic of Bundelkhand, though they are found, as already mentioned, along the north bank of the Jumna in the Manjhanpur tahsil. The chief is *mar*, commonly described as black cotton soil, a dark friable earth which absorbs an immense amount of moisture but on drying splits into great fissures, so that irrigation is almost impossible. It varies greatly in quality and in the uplands of tahsil Meja it is often of a very poor description. The stony soil on the hills is called *bhota* and is of little value, while the inferior kind of *chanchar* at the foot of the hills is known as *chopar*. All these natural soils are generally recognised by the people, but sometimes the conformation of the country and sometimes again the situation of the field with reference to the village site is taken as the basis of classification. Thus the land falls under the two main heads of *kachhar* or lowland and *uparhar* or upland, the former being identical with the *tari* of the Jumna and Tons basins, which closely resembles the Ganges *kachhar* though in most cases it is far less valuable and productive. The conventional classification is restricted mainly to the *goind* area which immediately adjoins the inhabited sites and is much more highly manured than the *har*, the general term for the rest of the village. Of the same nature as *goind* is the *kachhiana* land near the city, which is used for market gardening.

Rivers.

The rivers of the district belong without exception to the main system of the Ganges ; but this admits of several subdivisions, of which the most important are the Jumna and Tons, while others include the minor systems of the Barna and the Sai.

Ganges.

After passing along the northern confines of the Fatehpur district the Ganges forms the northern boundary of the Sirathu and Allahabad tahsils for about 23 miles till it enters this district at Patti Naraur. It flows in a wide bed, within the limits of which it is continually shifting its channel, past the village of Afzalpur Saton and the old towns of Kara and Shahzadpur. Its course is a succession of large bends and it maintains this characteristic throughout. Passing between the Allahabad tahsil on the south and Soraon on the north, it flows in a south-easterly direction till it reaches the new cantonment of Allahabad. There it takes a bold sweep to the north-east as far as Phaphamau and the railway bridge, where it bends sharply to the south as far as its junction with the Jumna near the fort of Allahabad. Then turning south-eastwards again, between the Phulpur and Handia tahsils on the north and Karchana and Meja on the south, it passes into Mirzapur, forming the boundary between that district and the Meja tahsil for eleven miles. Its total length in this district is 78 miles. Below Jhusi and Allahabad the chief places on its banks are Sirsa, just below the junction with the Tons, on the right, and Lachhagir or Kasaundhan on the left or north; the latter at one time being the terminus of the steamer service whenever the boats were unable to reach Allahabad by reason of the sandbanks. The changes in this portion of the river are very great, and near the mouth of the Tons, in the extreme north of Meja and at several other places, there are old beds of the river at a considerable distance from the present channel. Everywhere the *dhar dhura* or deep-stream rule prevails, and after the rains the villagers wait with deep anxiety to see whether the main channel will be found on the north or south side of the sandy bed. The large island of Jamnipur, a short distance below the confluence with the Jumna, is a fertile source of dispute and has in consequence been nicknamed the *arazi mutanaza*. At the present time it is considered to belong to pargana Jhusi, though not long ago it was in Arail. During the rains the whole bed is filled and the Ganges is then a magnificent body of water, of immense depth and an average breadth of two or three miles. In the winter and hot weather, however, it shrinks to comparatively small

dimensions and often breaks up into two or more channels which thread their way among the numerous sandbanks. In summer the river is fordable in several places, such as Bela Sailabi, Chapri, Singraur, Ramchaura and Ugahni, though the position of these fords varies from year to year. The lowest mean level of the Ganges is about 237 feet above the sea or even less, for the height of the river has been greatly diminished of late owing to the increasing demands of the canals in its upper reaches. The maximum flood level is some 280 feet in August and 245 feet in October, these figures being fairly constant.

Ganges tributaries.

Save for the Jumna and Tons, to be separately described, the Ganges receives no notable affluents in this district. Numberless ravines and drainage channels lead down from the uplands, carving their way through the high bank, but they are seldom of any great size or length and in most cases are nameless. The Bisnar rises near Sheogarh in pargana Soraon and flows southwards to join the river near the Phaphamau bridge. Of more importance is the Manseta, which has its source in the *jhil* country in the extreme north-west of pargana Sikandra and flows southwards, being joined at Buapur by the Bandi or Sisahi, which rises near Mau Aimma and is reinforced by a small channel called the Narsinghaban. Further south the Manseta receives the Bhulaiya and Barwa from the south-east of Soraon on its right and the Khara on its left bank, while just before its confluence with the Ganges at Jhusi it is fed by the Aughar, a small stream from the direction of Malawan. The Bairagia rises in the clay tract of pargana Mah and flows southwards along the Jhusi boundary to join the Ganges above Usmanpur. It contains water only during the rains and is said to derive its name from its wandering course. The Andawa, a still more insignificant channel, joins the Ganges at Lachhagir, and about a mile further down the Godari, a mere ravine which is fed by the Kolhwabir, a *nala* rising close to Handia, discharges itself into the river. The tributaries on the right bank are equally insignificant. In the Duab there are several small *nalas*, of which the chief are the Sakara, rising near Bharwari; the Sitkhia, which falls into the river just above Nurpur; and the Saidua, which extends inland beyond the grand trunk road and discharges into the Ganges near Ugahni. In the

Karchana tahsil a large drainage channel known as the Bara *nala* rises in a *jhil* near Panwara and passes eastwards across the subdivision to join the Ganges to the east of Karchana station. In Meja there are no direct tributaries beyond a few insignificant ravines; but a number of streams which take their rise in the Bindhachal hills above Manda drain the extreme east of the tahsil and discharge into the Ganges in the Mirzapur district after joining the Saraiha. The latter is the principal channel and has its source to the south-east of Manda. Before reaching that town it is joined by several hill torrents, such as the Mirthia, Mardaha, Khoda and Aonradh. Further north it is fed by a considerable stream named the Gularia, which rises in the hill country to the south-west and is reinforced by many affluents such as the Haraunia and Ranhua on the left bank and the more important Karmati and Patpar on the right; the confluence of the river with the Saraiha lying a short distance to the south of Rajapur, where the latter stream bends eastwards into Mirzapur.

Jumna.

The Jumna first touches the district in the extreme west and for a long distance separates the Atharban, Karari and Chail parganas from the Kamasin and Mau tahsils of Banda. The deep-stream rule prevails everywhere, but the Jumna differs from the Ganges in possessing a narrower valley, a more constant channel and steeper banks. The changes in its course are of little importance, while the cliff rises in places to a great height, for at one point, near Nagriha in Atharban, the fall from the uplands to the river bed is no less than 110 feet. Elsewhere it is generally less, but as a rule it is as much as 35 or 40 feet. After cutting off the lofty hill of Pabhosa from the rest of the Vindhyan range, the river maintains an easterly course as far as Partabpur, where it enters this district, thereafter separating pargana Chail on the north from Bara and Arail on the south till it reaches its confluence with the Ganges at the Allahabad fort, the union marking the trijunction of the Chail, Arail and Jhusi parganas. At Bisauna in pargana Chail it bends southwards as far as Deoria, where is the remarkable temple of Siyawan or Sujan Deota standing on a lofty rock in the middle of the stream; and then it turns sharply to the north, taking an easterly turn as it approaches Allahabad The junction is effected about half a mile below the

great railway bridge, and the total length of the river in this district is some 63 miles. The Jumna has a more rapid stream and a greater slope than the Ganges; so that in heavy flood it holds up the latter river, causing the lowlands opposite Daraganj to be inundated. Its waters contain much less silt and are consequently clearer than those of the Ganges, the blue water of the Jumna contrasting sharply with the yellow stream of the larger river for some distance below the confluence. The average breadth of the river is about a mile and a half in flood and half a mile in dry weather, while the depth is vastly greater in the rains than in summer. The maximum recorded rise registered at the railway bridge is 49½ feet above the lowest mean level; but in spite of this the alterations in the channel are very slight, and the large sandy island of Majhiari in the north of Bara has remained unchanged for very many years.

Jumna tributaries.

Most of the streams which join the Jumna in this district are mere drainage channels or ravines, which contain water only for a brief period of the year. In pargana Atharban a ravine called the Kanihia runs westwards from Hinauta to join the river near Nagriha. The Dorman drains a small tract of broken country to the east of the Alwara *jhil*, and next comes a mere ravine called the Karaia, with its feeder the Bandrana, and then the Kalli, which is fed by the Kathabhara and the Damgarhi, joins the river just west of Pabhosa. The Pali and Intaha *nalas* flow to the west and east of the Kosam ruins, but are quite unimportant. Further east, at Shampur, before reaching the Bara border, the Jumna is joined by a considerable stream named the Kinahi. This takes its rise to the west of Karari and flows through the pargana of that name in a south-easterly direction as far as Sondhia, where it is crossed by the aqueduct carrying the Dhata distributary of the canal. Then it bends to the south, and as it enters the south-west corner of pargana Chail its bed becomes deeper and its banks are scored by numerous ravines. Near Sondhia it is joined on the right bank by a tiny tributary named the Berdi, while close to its junction with the Jumna it receives on the same bank a larger stream named the Basundhara. At Simri in pargana Bara the Jumna is joined by the Saraoli *nala*, which issues from the lower hills

but of much more consequence is the Jhigra Baria, which drains a large tract of the hill country of Bara and flows northwards, doing considerable damage to the land on its banks, till at Ichhaura it enters the lowlands and turns east for a considerable distance till it falls into the Jumna between Jagdispur and Birwal, opposite Bisauna. A short distance further east, near Deoria, the river is joined by a large *nala* named the Gahera, which rises near Gurmhi and flows past Jasra in a northerly direction.

Sasur Khaderi.

Just before reaching the Allahabad waterworks at the Karela Bagh the Jumna is joined on the left bank by the Sasur Khaderi. This river enters the Sirathu tahsil in the north-west, taking its rise in the low country to the north of Fatehpur, and at first flows in a narrow but well defined bed, with a south-easterly but very tortuous course, through the centre of the Duab. Throughout its length in the Sirathu tahsil the banks are on a level with the surrounding country and in many places are clothed with *dhak* jungle; but lower down, along the northern boundary of Manjhanpur, the channel becomes deeper and the banks are broken by ravines. Passing into Chail, on the borders of which it receives the Chhoti Kinahi from the west, these characteristics become more marked; the ravines become more numerous and extensive, while in the centre and east of the pargana there is a considerable stretch of high undulating country on either bank of the river. The Sasur Khaderi forms the central drainage channel of the Duab and during the rains carries a large volume. In the hot weather the water almost wholly disappears, but the bed is always moist and in many places is full of dangerous quicksands, especially towards its junction with the Jumna.

Tons.

The Tons is a large river which rises in the hill country of the Rewah state and first touches the south of pargana Bara near Deora. After following the boundary eastwards for a few miles it enters the district and takes an irregular course, generally in a north-easterly direction, as far as its confluence with the Ganges near Sirsa. The river forms the boundary between Bara and Karchana on the north and tahsil Meja on the south for a distance of some 40 miles. Though it carries a considerable volume of water its bed is full of boulders and stony rapids,

so that it is quite unnavigable. The banks in most places are steep and fissured by ravines, while the floods during the rains are of great magnitude, the maximum rise at the railway bridge being 65 feet above mean low water. In the rains the river attains a breadth of nearly 400 yards, filling the whole valley, but in the dry weather it is never more than 150 and in places is but 40 yards wide. It is crossed by ferries at several points and at Kaundi there is an Irish bridge. The railway bridge was built in 1863-64 at a cost of Rs. 14,08,402. It is constructed of iron girders on brick piers, with a roadway underneath the rails: it consists of nine spans, seven of 150 and two of 32 feet each in clear, the total length being 1,206 feet.

Belan.

The chief affluent of the Tons is the Belan, a large river which rises in the highlands of the Bijaigarh and Barhar parganas of Mirzapur and flows through that district in a westerly direction before entering the Meja tahsil on its south-eastern border, in the gap between the Bindhachal hills and the Panna range. It maintains the same direction through the south of Meja for about 31 miles, flowing past Pura Lachhan, the proposed headworks of the Belan canal, Daiya and its ruined fortress, Lonmati, and Deoghat. It then passes for nine miles through Rewah territory and subsequently follows the district boundary for five miles till it falls into the Tons near Kaundi, at the junction of Meja and Bara. The Belan resembles the Tons in its general features, having a narrow and well defined valley, with no alluvial land. It is essentially a hill torrent, but carries water throughout the year. Shortly after entering the district the river is joined on the right bank by the Gadhaia, Belhaia and Samrawa torrents from the Manda hills to the north. A few other insignificant tributaries, such as the Sori and Sitalha, join it on the right bank, but its chief feeders are those which rise in the southern heights. The Seoti is a very large torrent, which enters this district from Mirzapur and carries down the drainage of innumerable ravines into the Belan at Daiya. Another is the Tundiari, which flows to the east and north of the Barka Bahira hill above Barokhar. It rises on the Rewah border and is reinforced by the Midahwa, Marahna, Sesta, Sarwani and many other streams. Further west again, to the

south of Barokhar, is the Gurman, which passes into Rewah and joins the Belan in that state.

Tons tributaries.

Before receiving the Belan, the Tons is joined at Deora by the Loni, a torrent which rises in the hills of Bara and is fed by the Jirwa and Mahua, the latter in turn receiving the Bhagdewa *nala*. Other affluents on the north or left bank are the Patpari and Katha in pargana Bara and the Karchi, Ghughuwa and Asrawal in Arail, but only the last of these is of any significance. The Jwalamukhi, which falls into the river near Panasa, probably represents an old bed of the Ganges. On the right bank the Tons is joined by many streams from the hills of Meja, but all of these are dry for the greater part of the year. By far the most important is the Lapar or Lapri, which rises on the western slopes of the Manda hills and flows westwards through the uplands to join the Tons near Kharka. It has many feeders, including the Teri, Kharoncha, Mahuakota and Ladhota *nalas* on the south, and the Belha, Majhla, Dolaha and Khamaria on the north or right bank. The remaining tributaries of the Tons are very small. The Pahari joins the river at Gadaria, the Kajri at Kohrar, the Jania at Bhatauli, the Garwa at the old fort of Khairagarh and the Sobarna two miles lower down, while there are many nameless channels, all of which contribute a large volume of water during the rains.

Other rivers.

The remaining rivers belong to the trans-Ganges tract and are of very little importance. The *jhils* of Soraon drain northwards into the Bakulahi, a tributary of the Sai, whose course lies wholly in the Partabgarh district. The clay country in the north-east of pargana Sikandra contains the source of the Barna, which gradually develops into a small stream and for a few miles follows the district boundary. Then it bends southwards into pargana Mah and passes in an easterly direction towards the trijunction of this district, Jaunpur and Benares. At first its bed is shallow and floods cause it to overflow its banks, but lower down the channel deepens and is flanked on either side by a high strip of sandy soil. Near Wari the Barna is joined by the Basaia, which rises in the *jhil* to the south of Sarai Mamrez.

Lakes and jhils.

In most parts of the district the rivers carry off the drainage with great rapidity, but in a few tracts the natural

outlets for the surface water are inadequate, with the result that large and shallow *jhils* are formed. They are to be found mainly in the rice country of the north, where there is a long but disconnected series of *jhils* extending across the three tahsils of Soraon, Phulpur and Handia. The largest of these are the Jogi Tal near Simra, the Masiaon and the Raiya *jhils* in pargana Soraon; the great Ananchha *jhil*, the Dani Tal and the Rauwai, Sahdawa, Jhauchand and Basaudha *jhils* in Sikandra; the Bara, Majhla and Karan Tals in Jhusi; the Basua and Qazipur *jhils* in Mah, and the Kiwai, Upardaha and Baraut *jhils* in the Kiwai pargana. The Duab contains the large Mungri Tal on the borders of Kara and Fatehpur, near Udhin Buzurg, and the huge basin of the Alwara lake some 2,500 acres in extent in the south-west of Atharban, while in Chail the only *jhil* of any size is that of Rasulpur Tappa. There are no important stretches of water in Bara, and in Arail only the Basepra and Kanti Tals are of any size; but Meja possesses the *jhils* at Aminia Kalan, Jarar, Lendi and Sakra in the north-eastern portion. Almost all these *jhils* are extensively used for the purposes of irrigation and during the rains are surrounded by rice fields. In the cold weather the water is drained off rapidly for the *rabi* crops and in a year of drought almost every *jhil* in the district except Alwara is completely dry.

Waste lands.

The average area described as barren, calculated from the returns of the five years ending with 1906-07, is 370,865 acres or 20·32 per cent. of the entire district. This is a relatively high figure, but from it should be deducted 144,148 acres under water and 63,075 acres occupied permanently by railways, roads, sites, buildings and the like, leaving an actually unculturable area of 163,642 acres or 8·97 per cent. Of this amount 67,994 acres lie in the trans-Jumna tracts and mainly in the Meja tahsil, which contains a large area of sterile and stony ground. The area is also very large in the trans-Ganges tahsils, which have 59,612 acres of barren land. This lies for the most part in the low clay belt of the Soraon, Sikandra and Mah parganas, where *usar* is extremely prevalent. The natural drainage is defective, for there is no adequate outlet for the flood water, so that saturation of the subsoil has caused the saline elements

to rise to the surface, rendering large areas unfit for cultivation. In the Duab 36,036 acres are described as barren, nearly half of this lying in the Sirathu tahsil. That subdivision contains a large amount of *usar* in the clay tract which extends eastwards from Fatehpur, while all the Duab parganas have much barren soil along the banks of the rivers, in the shape of sandy wastes or ground broken by ravines. During the monsoon a scanty growth of grass springs up on much of the barren area, and this is either preserved and cut after the rains or else is grazed over by cattle, the owners paying to the *zamindar* a small fee for every animal.

Forests and jungle

The trans-Ganges tahsils contain no forests and very little jungle. Here and there are patches of *dhak* or *chhiul*, the chief being between Phulpur and Sarai Mamrez, while along the Ganges there are considerable areas covered with tamarisk, which is of some economic value. In the Duab *dhak* jungles are far more numerous, especially in the Sirathu tahsil and pargana Atharban. Fairly extensive patches exist along the course of the Sasur Khaderi, along the grand trunk road between Bharwari and Sirathu, and in the neighbourhood of the Alwara *jhil*. The banks of the Ganges are covered in places with a good growth of *babul* and *ber*, while in the lowlands of the river *sarpat* grass grows in abundance. In the trans-Jumna tract alone is the jungle area of any great importance, and there it is mainly confined to the Bara and Meja tahsils. In the south of Karchana, as also in the *mar* lands of the other parganas, the *gandar* grass grows in abundance, and this is utilised for thatching and making brooms, while its roots are well known as *khas-khas*. In the same areas the *babul* is very common, but other trees are comparatively scarce. On the upland plateaux of Meja and Bara grass and shrubs are interspersed with more or less thick jungle consisting of *ber*, *tendu*, *jamun*, *seoha* and *guthar*, with a sprinkling of *mahua*, mango, *salai* and *gular* trees and clusters of bamboos. In some parts of Meja are to be found *haldi*, *chhagan* and *sagon* or teak. The largest of these jungles are the Loni in Meja and the Gadhewa in Bara, both possessing fine clumps of bamboos in addition to tree growth, the area in either case being two or three

square miles. Other good jungles occur to the south of the Belan, at the foot of the hills of Barokhar, Deoghat and Sansarpur. The best is that of Lonmati, but it is very inaccessible and ill adapted for commercial exploitation. A noteworthy feature of this tract is the luxuriant growth of the *pipal*, especially in the village of Pahtia. In former days a considerable sum was paid for the privilege of collecting the gum which exudes from the trees, but at the present day barely Rs. 50 per annum is realised on this account in the whole pargana. Altogether there are about 13,000 acres of grass and tree jungle in Meja and 8,000 acres in Bara.

Groves.

Save in the few tracts where natural tree jungles are found, the number and extent of the artificial groves is most remarkable. In 1870 the total area under groves was 72,164 acres, and though it was then said that there had been a great decline owing to the destruction of groves for supplying the railway with fuel and timber, there has been no subsequent diminution. The average for the five years ending with 1906-07 was 72,734 acres or 3·99 per cent. of the entire district. The proportion is only 2·75 in the Jamnapar tract for, though it reaches the high figure of 5·39 in Karchana, it is but 1·69 in Bara and 2·13 per cent. in the Meja tahsil. The Duab is well wooded with 4·11 per cent. of the area under groves, pargana Atharban having a larger proportion than the rest; but in the trans-Ganges tract the grove land is 5·57 per cent. of the whole, pargana Jhusi coming first with the extraordinary figure of 7·7 per cent., which is hardly exceeded in the most thickly wooded parts of Oudh. These groves consist mainly of mango and *mahua* trees, the latter predominating in the Duab and particularly its western half; but other species, such as the guava, *ber* and *jamun*, are well represented everywhere.

Minerals.

The chief mineral products of the district are stone, *kankar* and brick earth. As already observed, the Kaimur sandstone is of excellent quality and is exported in considerable quantities from Sheorajpur. The workable stone lies in beds varying from six inches to eight feet in thickness and is extracted either by blasting or by splitting with wedges, rough ashlar being landed in Allahabad at a cost of 14 annas or one rupee per

cubic foot. Deposits of *kankar* are found throughout the Duab and the trans-Ganges tract, while there are excellent beds at Lawain and Banswar in Karchana. The cost depends mainly on the distance to which it has to be carried, but the average is from Rs. 3-12-0 to Rs. 4-4-0 per hundred cubic feet. Good lime is obtained by burning *kankar*, but it is inferior to that made from the limestone of Sheorajpur and the Khairagarh hills, which costs about one rupee per maund. Allahabad is celebrated for its brick and tile works, and country bricks are made at many other places, though they are rapidly being displaced by moulded bricks of the European pattern. Salt earth is found in pargana Sikandra and elsewhere, but the manufacture of saltpetre is unimportant; though the saline deposits known as *reh*, which are found on *usar* land, are utilised for the production of crude glass and as a substitute for soap.

Building materials.

The chief building materials, other than those already mentioned, are timber and bamboos. In the great majority of houses locally grown timber, such as mango and *mahua*, is employed and is obtainable everywhere at a low price, the *zamindar* usually supplying the requisite materials for his tenants' houses free of cost. The better sorts, such as *shisham* and *sal*, have to be imported from the forests of the north, the former costing about Re. 1-12-0 and the latter Rs. 2-4-0 per cubic foot. Bamboos are brought to Allahabad in large quantities from the Shahabad district of Bengal, those of large size fetching some Rs. 46 per hundred, while the price decreases rapidly for small ones. Country-made tiles for roofing cost from Re. 1-4-0 to Re. 1-8-0 per thousand.

Fauna.

Save in the trans-Jumna tract the wild animals of the district do not differ from those found in the Benares division and the Duab, but in the south the number of species is much greater. Occasionally a tiger finds its way over the Rewah or Mirzapur border, generally into the Lonmati forest: but such visits are rare. Bears too are said to stray into this district, while leopards are sometimes found in the south of Meja and in the Jumna ravines of the Bara tahsil. In the latter neighbourhood the *chinkara* or ravine deer is not uncommon while the *sambhar* occurs in small numbers in the south of Meja. he

trans-Jumna country also contains hyænas, considerable herds of antelope and quantities of pig, which do much damage to cultivation in the more remote tracts. Wolves too are very numerous and in 1830 became such a pest that the reward for their destruction was increased and a special staff of *shikaris* was temporarily entertained. They are far from uncommon too in the Duab, especially along the Ganges bank; while the *kachhar* of that river is frequented by the wild pig. Other animals include the *nilgai*, which is found in the trans-Jumna tahsils and occasionally in the *dhak* jungles of Sirathu and elsewhere, the jackal, the fox, the hare, the porcupine and the Gangetic porpoise, which is very common in both the Ganges and the Jumna. Snakes are common everywhere, and of the dangerous species the cobra, the *karait* and Russell's viper are most frequently found, though the last is rare beyond the limits of the hill country. Among other reptiles may be mentioned the alligators known as *magar* and *gharial*, which abound in the Ganges, Jumna and Tons.

Birds.

The usual species of birds common to the Gangetic plain are found in the district. The game birds include peafowl, the grey partridge, several varieties of quail and the lesser sand-grouse which occur almost everywhere, while in the stony hills and intervening grassy plains of the south the florican and occasionally the great Indian bustard are found. Snipe seldom visit the district in great numbers, but during the cold weather the rivers and *jhils* are the haunt of enormous numbers of geese, while other water-fowl, such as duck, pochards and teal, are to be seen so long as sufficient water remains in the natural depressions.

Fish.

The chief fisheries of the district are the Ganges, Jumna and Tons rivers and the Alwara lake, supplemented by the larger *jhils* of the northern parganas. The supply, however, is not equal to the demand and consequently fish fetch a very high price in the city. According to the census returns there were no persons who depend solely on fishing for a livelihood, but large numbers betake themselves to fishing as a subsidiary occupation, most of them being Mallahs and Kahars by caste. The usual varieties of fish are found, the most common being the *rohu, bachua, pariasi* and *chilwa*, while the mahseer is fairly common in the Tons and other hill streams. Fish are generally caught with nets of varying form and mesh, and in the rivers other methods of capture are seldom adopted; but in the *jhils* the spear and different descriptions of wicker traps and baskets are frequently utilised.