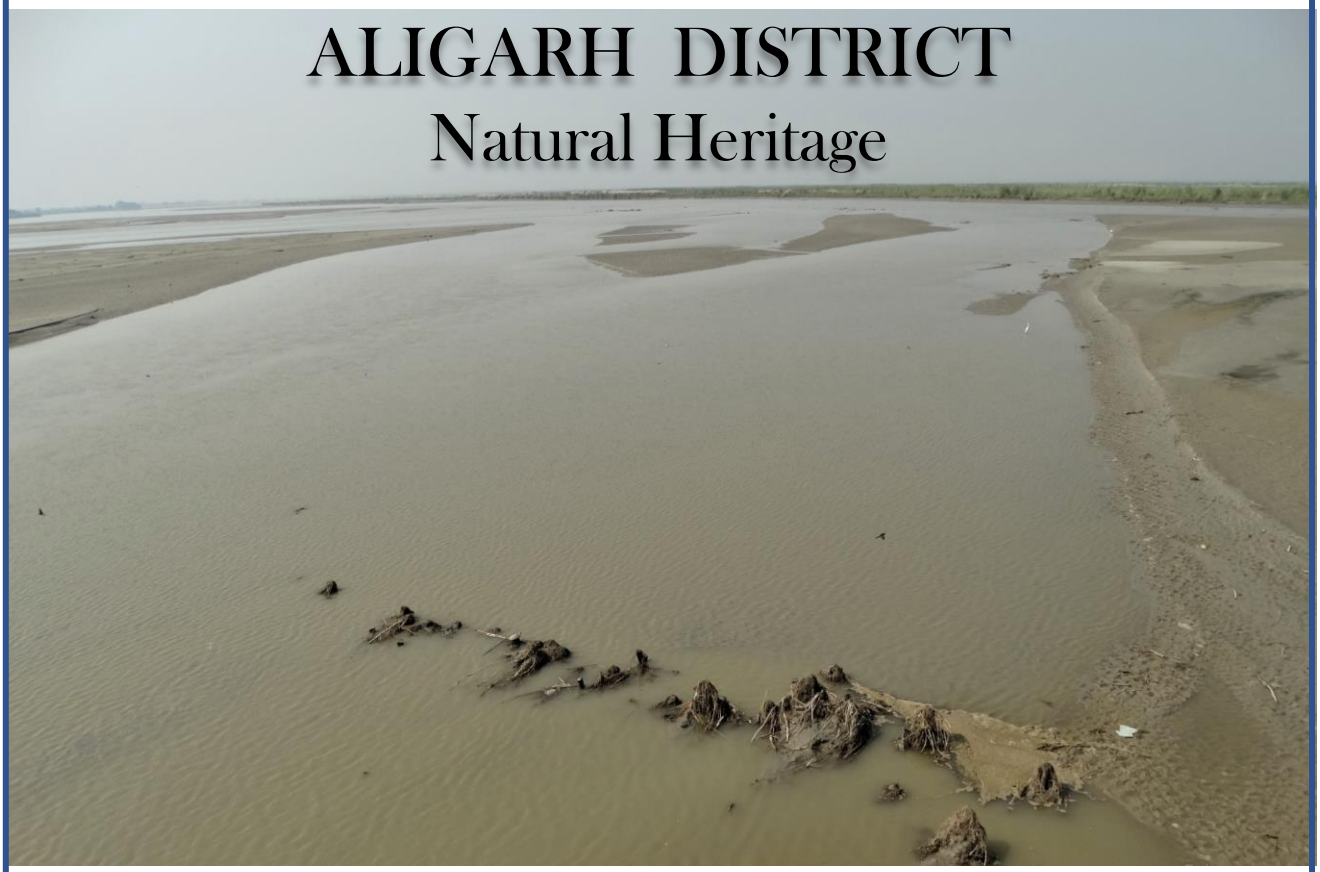
Ganga Cultural Documentation
2021

ALIGARH DISTRICT
Natural Heritage



National Mission for Clean Ganga

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Front Cover: Ganga River At Sankara Bridge, Distt. Aligarh

Background: Exposed River Islands In Ganga River, Sankara, Distt. Aligarh

Back cover: Sarus Crane Pair Sighted Near Ganga River, Distt. Aligarh

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GANGA CULTURAL DOCUMENTATION

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Sponsored by :

NAMAMI GANGE

National Mission for Clean Ganga

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1.0 Introduction

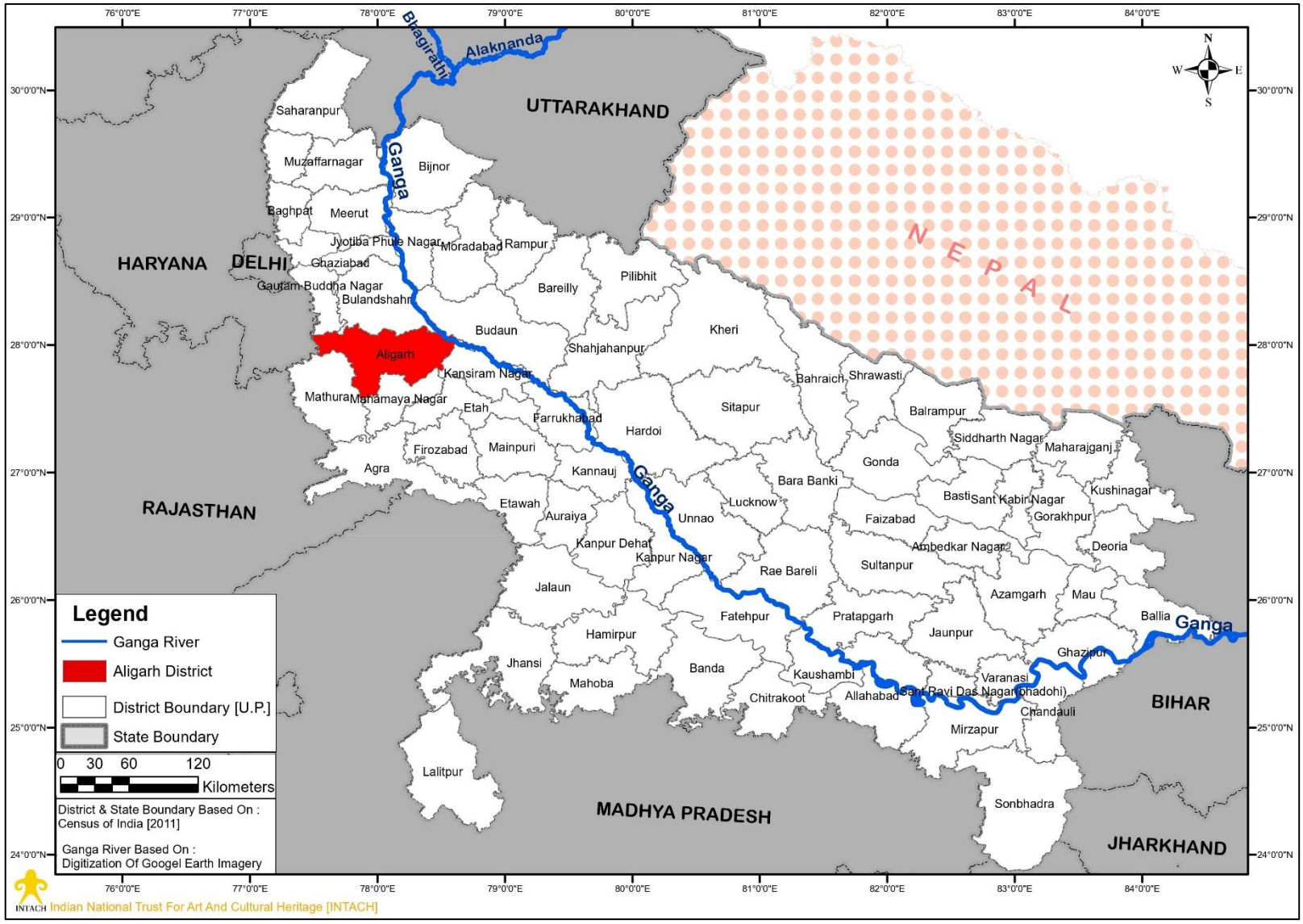
1.1 Distt. Aligarh, situated on the right bank of Ganga River [Approx. 15 km reach in the Distt.], is one of the 18 divisions [Mandal] of Uttar Pradesh covering districts of Aligarh, Hathras, Kasganj and Etah. Prior to 18th century it was known by the name of Kol or Koil which apparently linked to a tribe or name of a place or mountain or a demon[1]. Presently, the district is popularly known for Aligarh Muslim University founded by Sir Syed Ahmad Khan in 1875.

1.2 The geographical area of the Distt. is 3,650 Sq. km which is about 1.5 percent of the total Uttar Pradesh area. It shares boundary with Distt.s. Bulandshahr and Badaun in north and northeast, District Kasganj in east, Distt.s. Hathras and Mathura in South and District Palwal in west. The Distt. is divided into 5 tahsils and12 blocks and has around 1210 villages under its administration.

1.3 The Aligarh Distt. is a part of Yamuna-Ganga Doab sloping gently from north to south in the western side and northwest to west in the eastern side. Ganga River forms the natural boundary between Aligarh and Badaun in the north eastern corner of the district whereas the Yamuna River in the northwest forms the state boundary between Uttar Pradesh and Haryana[2]. Geomorphologically, the district can be grouped into younger floodplains, terrace zone and older alluvial plains composed of yellow colored clay, silt and sand of various grades.

1.4 Distt. Aligarh is known for its older industries of lock making and often referred to as 'City of Locks' with second largest link locks making industry dating back to 1870[3]. Other micro enterprises are agriculture-based, paper and paper products, leather, wooden and mineral/metal-based industries. Agriculture remains the major employer with wheat, rice and sugarcane as major crops. Other agrarian products include oil seeds, pearl millet, maize, groundnut, pulses, various vegetables and fruits.

[1] https://aligarh.nic.in/history/
[2] Ground Water Brochure of Aligarh Distt. U.P. [2012-2013]
[3] Aligarhonline.in/city-guide/history-of-aligarh



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

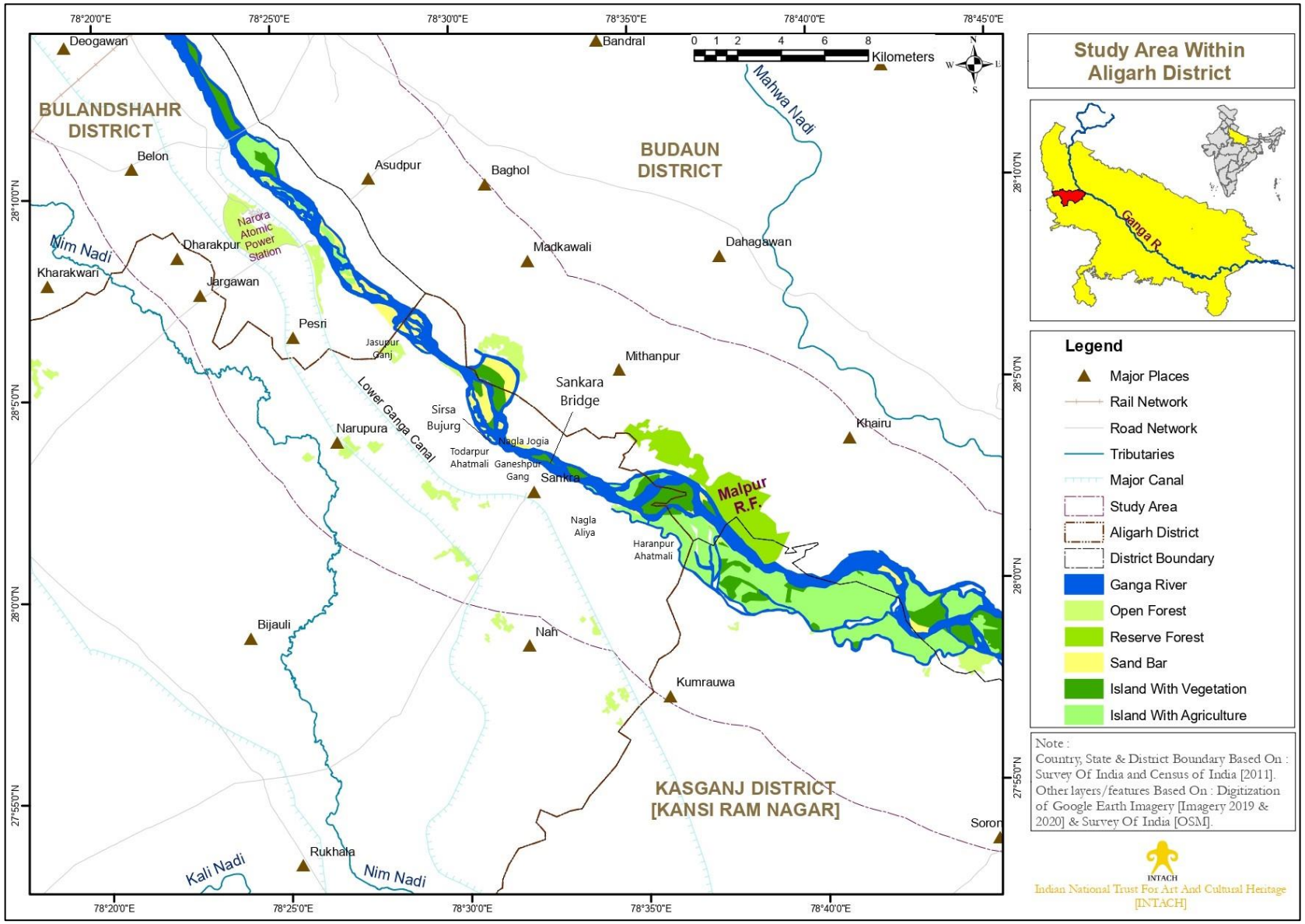
2.0 Ganga River in Aligarh Distt.

2.1 Ganga River enters Aligarh Distt. near Jasupur Ganj, after crossing Bulandshahr district [See Map No.2]. The river channel is around 1 km to 1.5 km in width here. The length of Ganga River in Aligarh Distt. is around 15 km, coursing along Distt. boundary on its right bank. Most of the Distt. boundary area along Ganga River consists of flat floodplain areas which are under cultivation, scrublands at some places, depressions and paleochannels. The Ganga River flows in southeast direction along the district with few meanders. The Lower Ganga Canal runs parallelly towards its right at a distance of 1.5 to 3.5 km. It takes a southwest turn at Sirsa Bujurg area and then flows southeast crossing through Sankara bridge. The Ganga River exits the district near Haranpur Ahatmali.

2.2 The Aligarh Gazetteer of 1909[4] describes Ganga River in the district as:

"The Ganga merely touches the district and its immediate effect is small, since it receives no tributaries and directly drains only –the narrow belt of Khadir and small portion of the uplands, from which the surface water is carried down by a few ravines of little magnitude. The deep stream forms the boundary between this district and Badaun and is constantly changing from side to side within the limits of its bed; but these changes have been greatly reduced since the construction of the canal works at Narora in the Bulandshahr district, while the protective works thrown across the khadir from the canal towards the river have tended to restrain the once erratic action of the stream. From Sankara, a subsidiary and almost abandoned channel, known as the Burhganga, flows through the khadir between the present stream and the high bank; but it is of no importance to save for the injury apt to be caused by the its changes to the lands in its vicinity in season of floods, since the bed is practically dry except in the rains".

[4] Aligarh : A Gazetteer being Volume VI of the district gazetteers of the United Provinces of the Agra and Oudh. Allahabad. Govt. Press United Provinces. 1909



Map 2 : Study Area In Aligarh Distt

3.0 Methodology

3.1 For carrying out surveys, a 7 km buffer zone of Ganga River in the Distt. was considered. Before carrying out surveys, various access points and routes to the river were located with the help of Google Earth. Special emphasis was given to the sites and features of interest such as river channel, biodiversity, floodplain conditions, farming and fishing activities, sites of natural heritage interest. Some known local residents living in villages near Ganga were contacted for field assistance.

3.2 The survey was undertaken during October, 2021 with the help of taxi, boat, bike and on foot. Sites were visited from downstream floodplain areas in Distt. to upstream areas. Sony Digital Camera Cyber-shot DSC-HX300 with 50X optical zoom and OnePlus 9 Pro mobile phone were used for photography. Garmin handheld GPS eTrex30 was used for marking locations and understanding elevation difference. Pre-marked Google Earth's Kml files and Google Maps were used for navigation. Field guides were used for flora and fauna identification. Information was obtained through informal interviews and discussion with farmers, fishermen, boatmen and local people.

4.0 Tributaries of Ganga River

4.1 There are no major tributaries of Ganga River in Aligarh district the district except Kali River [East] and its tributary Nim River. The details are given below:

a) **Kali River [East]:** It is generally known as Kali River [East] to distinguish it from Kali River [West] – a tributary of Hindon River. Kali River [East] rises in Distt. Muzaffarnagar and flows southwards into Bulandshahr finally joining River Ganga in District Fatehpur. The Aligarh Gazetteer of 1909[5], describes Kali River [East] and Nim River as :

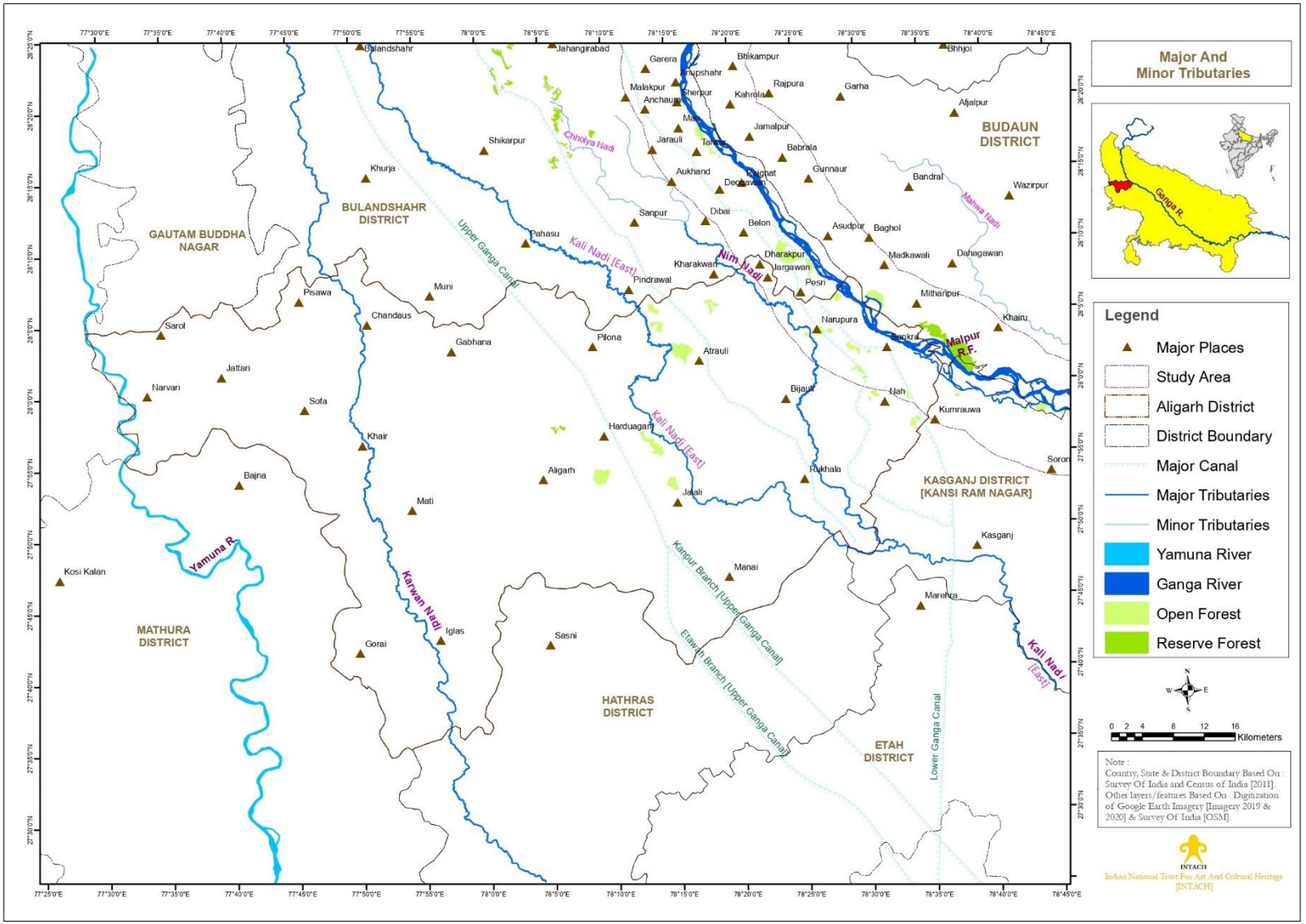
"*The Kali Nadi is practically the only tributary of the Ganges which traverses the district. Its name is properly Kalindri, the form Kali Nadi being apparently due to incorrect transliteration of the old name into Persian. Rising in Muzaffarnagar, it passes through Meerut and Bulandshahr before entering this district on the northern border, close to the Atrauli Road Railway station. Then it takes a devious but generally south-easterly course along the western and southern borders of the Atrauli tehsil, passing into Etah near the village of Barhari. The river is not navigable, but is of perennial nature and its volume is increased by the surplus water from the Ganges canal. Occasionally it rises in flood, doing much damage to the Khadir lands along its course, which after a series of wet seasons become saturated and take many years to recover. The water is used to some extent for irrigation, but only in the khadir and the tarai, the sandy uplands of the high bank on either side being of precarious nature and apt to suffer from drought. The width of the river where it enters the district shrinks to some 30 feet and the depth to 3 feet in the hot weather, but during the rains it becomes a stream of considerable magnitude, and at Hidramai on the Kasganj road it is about 250 feet wide in high flood, the normal width in summer being here about 60 feet. The only tributary of the Kali Nadi received in this district is a drainage channel called the Kothia, which has its origin in the depression to the south-east of the Atrauli and falls into the river just above Hindramai"*

b) **Nim Nadi :** "*Of Much importance, however is the Nim, which joins the Kali Nadi a short distance beyond Barhari, effecting its junction just within the borders of Etah. This stream rises in the Bulandshahr district, where its bed has been deepened and straightened by canal authorities, in order to improve the drainage, and after entering the Atrauli tahsil at Chakhatal flows in a southerly or south-easterly direction through the east of that subdivision, past the villages of Bijauli, Bhikampur and Gangiri. At Ramamai, it is joined on its right bank by a small drainage called by the generic name of*

[5] Aligarh : A Gazetteer being Volume VI of the district gazetteers of the United Provinces of the Agra and Oudh. Allahabad. Govt. Press United Provinces. 1909

Chhoiya, which has its source to the north of Atrauli, close to the district border, and during the rains carries off a good deal of flood water from the low ground in its vicinity. It is dry during hot weather, but the Nim almost invariably carries some water, and is utilised for irrigation purposes. It has a sandy bed with sloping banks, and on either side is a small strip of tarai, especially in its southern reaches as it approaches the Kali Nadi. Here the stream attains a considerable size during the rains, with a depth of 8 feet and maximum breadth of some 200 feet".

Image 1 : Polluted Kali River Near Wave Distilleries, Ramghat Road, Distt. Aligarh



Map 3 : Major and Minor Tributaries In Study Area [Distt. Aligarh]

5.0 Land Use Land Cover [LULC]

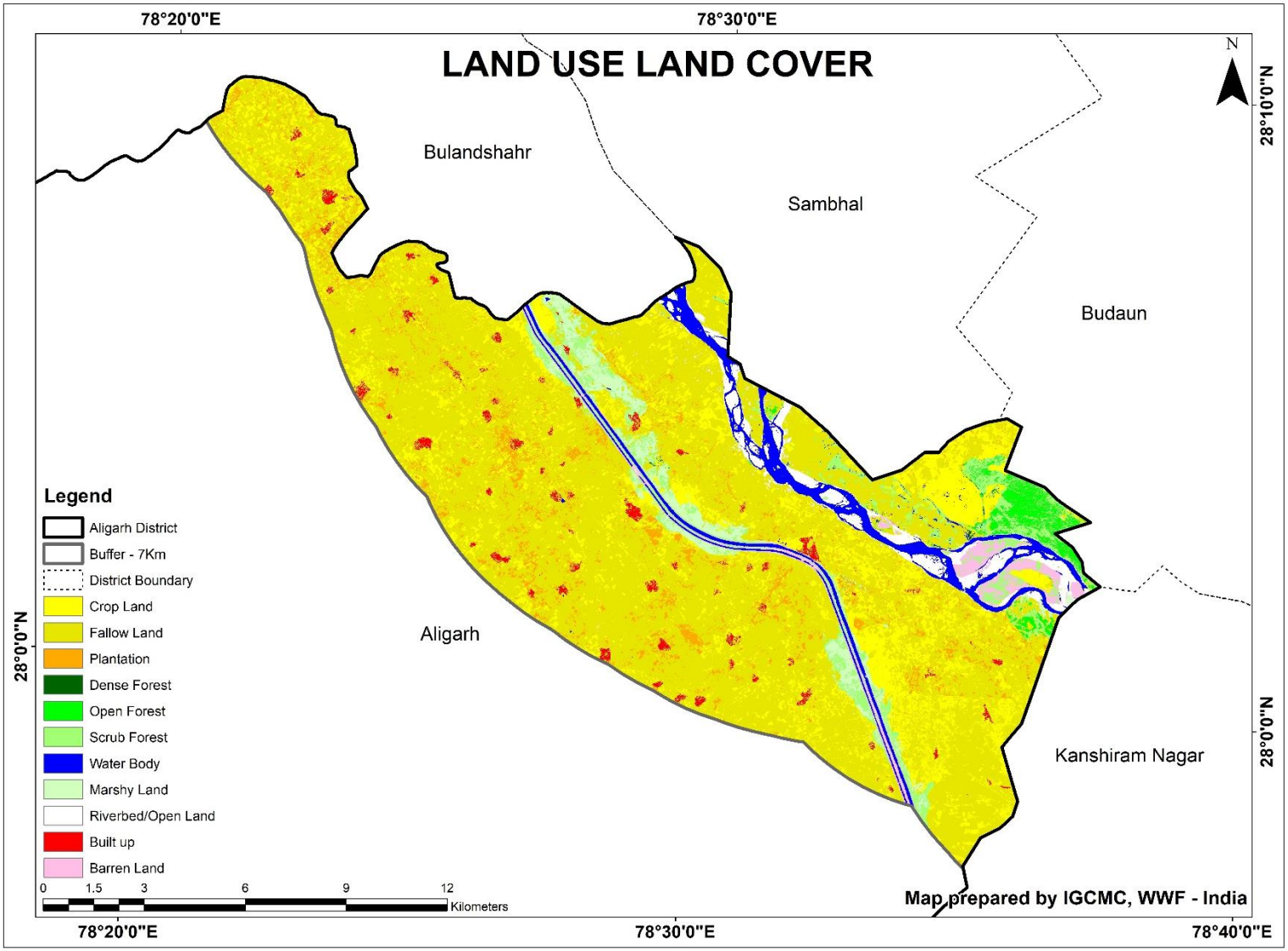
5.1 Land Use Land Cover [LULC] map of the study area has been prepared from Landsat imagery for the year 2020. [Table No.1] Using supervised classification system, 11 different classes were generated – crop land, fallow land, plantation, dense forest, open forest, scrub forest, waterbody, marshy land, riverbed/open land, built-up area, barren land [Map 4]. Since agriculture is the primary occupation in the Distt., cropland and fallow land area dominate other classes.

5.2 Major insights are the following :

i. Fallow land is the dominant land use with 60.33% area [131.83 Sq.Km]
ii. Crop land comes second with 16.12 % area under cultivation [35.22 Sq.Km]
iii. Together, the total area under agriculture is around 76.45% [167.05 Sq.km]
iv. Plantation accounted for 5.37% [11.72 Sq.km] which mostly includes mango orchards, poplar and eucalyptus plantation.
v. Dense forest cover is only 0.03% [0.05 Sq.km] while Open and Scrub Forest cover 2.89 Sq.km and 9.43 Sq.km of area respectively.
vi. Waterbody which also includes river area is around 3.97 % [i.e., 8.66 Sq.km]
vii. Built-up area is 1.22% [2.65 Sq.km] while barren land is 1.69% [3.70 Sq.km]
viii. Riverbed/Open land is only 2.66 % [5.80 Sq.km]
ix. Marshy land is around 2.98% [6.50 Sq.km]

Table 1 : Land Use Land Cover of Study Area In Aligarh Distt. [2020]

S.No.	Classes	Area (Ha)	Area (Sq.Km)	Area (%)
1.	Crop Land	3522.45	35.22	16.12
2.	Fallow Land	13183.4	131.83	60.33
3.	Plantation	1172.9	11.72	5.37
4.	Dense Forest	5.82	0.05	0.03
5.	Open Forest	289.63	2.89	1.33
6.	Scrub Forest	943.68	9.43	4.32
7.	Water Body	866.68	8.66	3.97
8.	Marshy Land	650.66	6.50	2.98
9.	Riverbed/Open Land	580.66	5.80	2.66
10.	Built up	265.9	2.65	1.22
11.	Barren Land	370.01	3.70	1.69
	Total	**21851.79**	**218.51**	**100%**

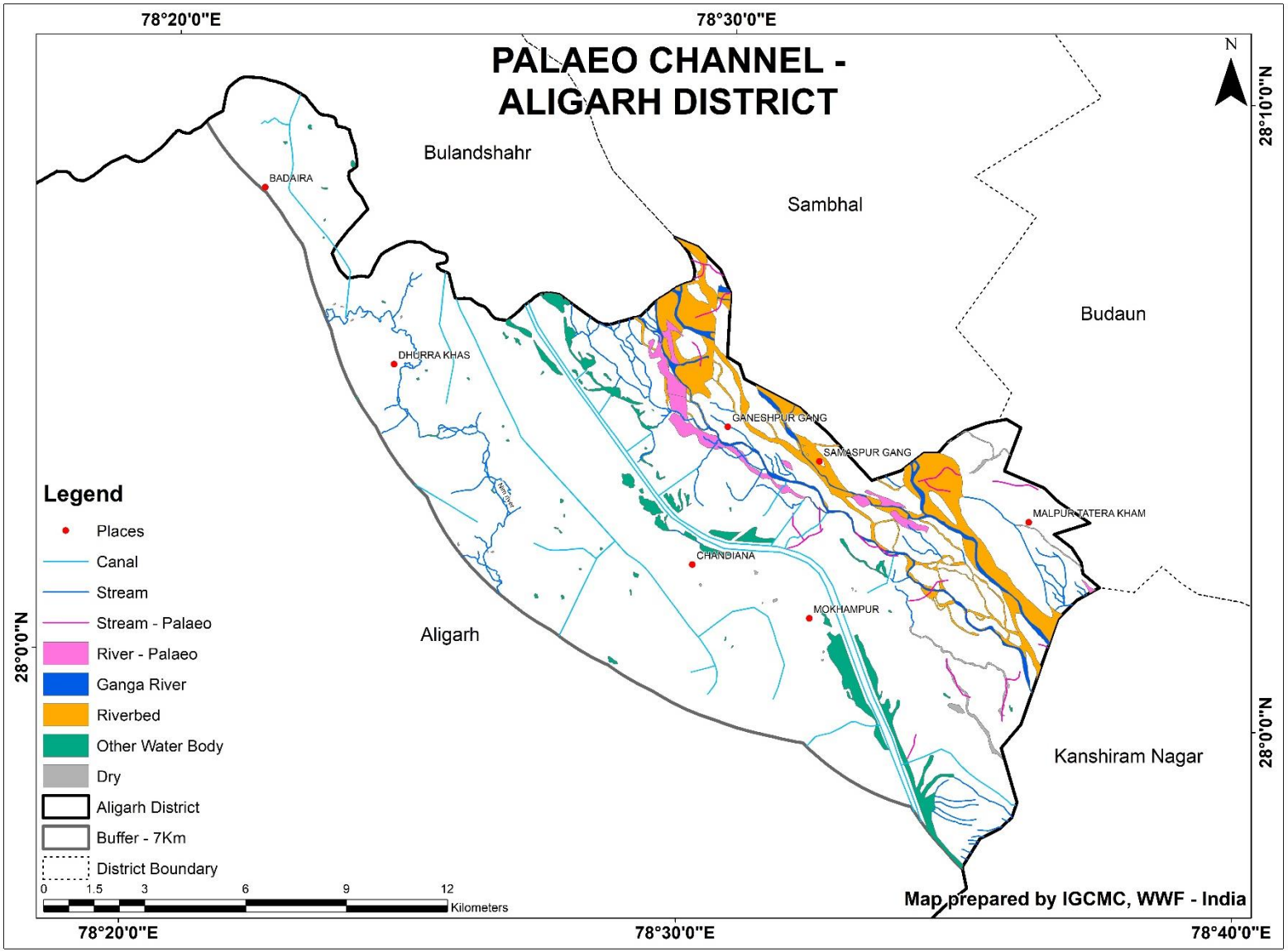


Map 4 : Landuse Landcover Map of Study Area [Distt. Aligarh]

6.0 Palaeochannels Of Ganga River In Aligarh Distt.

6.1 Palaeochannels are the remnants or old channels of once active rivers or streams, some of which are lie buried under the cover of younger sediments. They are formed when the rivers or streams migrate their courses and form new ones. Paleochannels are important to understand area geology, old river routes, sediment deposition and are considered suitable areas for ground water recharge. Factors such as change in land use pattern, sand mining, agricultural practices, and industrial activities lead to disappearance of such channels along rivers. Generally, such old channels do not carry water during most of the year but may flow during flood events. Such abandoned and silted palaeo-channels can be mapped using old maps and remote sensing techniques. Based on the available satellite data and remote sensing technique, Map No.5 was prepared, which depicts the various palaeo-channels in the study area of Aligarh Distt.

Image 2 : Palaeochannel Near Village Nagla Jogiya, District Aligarh



Map 5 : Palaeochannels In The Study Area [Distt. Aligarh]

7.0 Floodplain Of Ganga River In Aligarh Distt.

7.1 The active flood plain of a river is defined as an area on either side of the river channel with regular flooding on a periodic basis. Maintaining active flood plain of a river is critical for assuring equilibrium in ecosystem. The floodplains harbour rich biodiversity including riparian vegetation as well as many other groups of organisms which help in maintaining fertility of this region. Along with this, the floodplains have been of great cultural and economic importance with many early civilizations having risen in these fertile lands. As the rivers naturally meander through the landscape over a period of time, they deposit sand, silt and other soil forming materials in the floodplain region which make them ideal for agricultural production. Throughout history, people have learned to cultivate in the fertile floodplains and use their rich resources for sustaining livelihoods. Even today, in most of the riverine regions especially in India, the floodplains have been occupied by local farmers for carrying out their agricultural activities especially in the non-monsoon season. Ganga River floodplain is one such important floodplain in India which has been extensively utilized in almost all the Districts, where it passes through, for agricultural purposes.

7.2 Ganga River floodplains in Aligarh Distt. are generally flat with depressions, ravines, paleochannels and agriculture fields. Several riparian grasses [such as *Saccharum spontaneum, Phragmites Karka and Arundo donax*] plants were observed along the river in floodplain areas. Flat floodplain areas are cultivated for major crops such as wheat, rice, maize, sugarcane and seasonal vegetables. The agriculture fields could be observed extended up to the edge of the active channel of the river and between the paleochannels similar to pattern observed in adjacent district Bulandshahr. Agriculture is one of the major sources of income in the Distt. and farmers of floodplain areas are benefitted by the fertile alluvium brought in by the river. Sugarcane remains the dominant crop. Cucurbit and vegetable cultivation is mostly done in dry river bed areas and on river islands. Water melons, musk melons, cucumbers, ground-nut, tomatoes, oil seeds, potatoes, onions, garlic and ginger are mainly grown crops. According to riparian communities, the river reclaims its original channel every monsoon season, washing away these agriculture fields and changing their structure as it meanders downstream. Closer vicinity to Ganga River and older channels ensures water availability and thus irrigation of crops is easier in floodplain agriculture fields.

Image 3 : *Phragmites Karka* in Flowering, Ganga Floodplains, Distt. Aligarh

Image 4 : Typical Floodplain Vegetation Near Sankara, Distt. Aligarh
[*Saccharum Spontaneum* Grass (Kaans) in Flowering]

8.0 Wetlands In Aligarh Distt.

8.1 Wetlands are highly productive ecosystems and help in maintaining ecological balance by providing food and habitat to large number of living organisms. They also help in controlling floods, recharging groundwater, nutrient recycling, climate stabilization and carbon sequestration. A report 'Wetland Report for Ganga River Basin Management Plan' published in 2012 by consortium of IITs mentions that 57% of the wetlands in Uttar Pradesh are related to river/streams with 181935 ha area while the National Wetland Atlas [Uttar Pradesh] published by SAC, ISRO in 2010 as a part of project 'National Wetland Inventory and Assessment' of MoEF, estimates it to be 48.88%. It clearly indicates the majority of riverine wetlands and floodplain lakes in the state.

8.2 In the current exercise, a total of 26 wetlands have been mapped in the study area with the help of Google Earth satellite imagery and available maps. The list of mapped wetlands is given in Table No. 2 and their spatial distribution is shown in Map No. 6.

Table 2 : List Of Wetlands In The Study Area

Sr. No.	Wetland	Coordinates		Area [Hectares]
		Latitude	Longitude	
01	01	28° 0'3.06"N	78°35'48.11"E	1.00
02	02	27°59'55.23"N	78°35'31.53"E	0.45
03	03	28° 1'18.61"N	78°35'24.40"E	1.22
04	04	28° 0'14.49"N	78°34'37.96"E	0.97
05	05	28° 0'3.13"N	78°33'45.63"E	3.84
06	06	28° 0'46.76"N	78°30'43.26"E	0.70
07	07	28° 2'30.60"N	28° 0'46.76"N	2.90
08	08	28° 2'28.34"N	78°31'37.50"E	0.87
09	09	28° 0'25.59"N	78°28'35.66"E	3.74
10	10	28° 1'24.18"N	78°27'36.95"E	1.15
11	11	28° 1'22.38"N	78°27'8.50"E	1.27
12	12	28° 2'55.82"N	78°27'28.31"E	1.85
13	13	28° 2'1.01"N	78°26'15.83"E	0.75
14	14	28° 2'14.43"N	78°25'53.56"E	0.24
15	15	28° 4'2.50"N	78°27'2.65"E	0.33
16	16	28° 3'49.21"N	78°26'25.45"E	0.97
17	17	28° 4'2.40"N	78°26'18.55"E	0.60
18	18	28° 5'27.67"N	78°26'16.23"E	0.55

19	19	28° 4'46.53"N	78°25'37.10"E	0.29
20	20	28° 4'51.05"N	78°24'50.96"E	0.14
21	21	28° 4'43.55"N	78°24'43.32"E	0.32
22	22	28° 5'48.05"N	78°24'26.24"E	0.37
23	23	28° 6'42.00"N	78°24'24.72"E	0.24
24	24	28° 5'47.97"N	78°23'5.82"E	0.19
25	25	28° 7'18.58"N	78°23'4.75"E	0.71
26	26	28° 7'37.28"N	78°22'46.78"E	1.21
Total Area [Hectares]				**26.87**

8.3 Few waterbodies visited during field survey have been described below:

8.4 **Lahara Salempur Talab :** The talab lies on the southern edge of Lahara Salempur village [Wetland No. 6]. It is located on the main road [MDR-82W] leading to Lower Ganga Canal [3 km] and further to Ganga River [5 km]. The waterbody is completely covered with Water Hyacinth [*Eichhornia crassipes*] with barely any space for water. It receives sewage runoff from the village and also threatened by solid waste thrown on its edges. It is getting encroached from the its northern and western side [village side]. There is a 0.3 Ha plot on its south-eastern side which has been fragmented from the waterbody. According to local sources, it was once the part of main pond. Over time, villagers walking through the dry part of the waterbody chalked out the permanent road to the village. Few trees and wasteland species were observed near the waterbody. Major tree species noted were Sheesam [*Delonix regia*], Pipal [*Ficus religiosa*], and Jamun [*Syzygium cumini*], and Mango [*Mangifera indica*]. During interaction with the villagers, it was known that waterbody has been in the same condition for years now. Earlier it was used for bathing, fishing and chest nut cultivation.

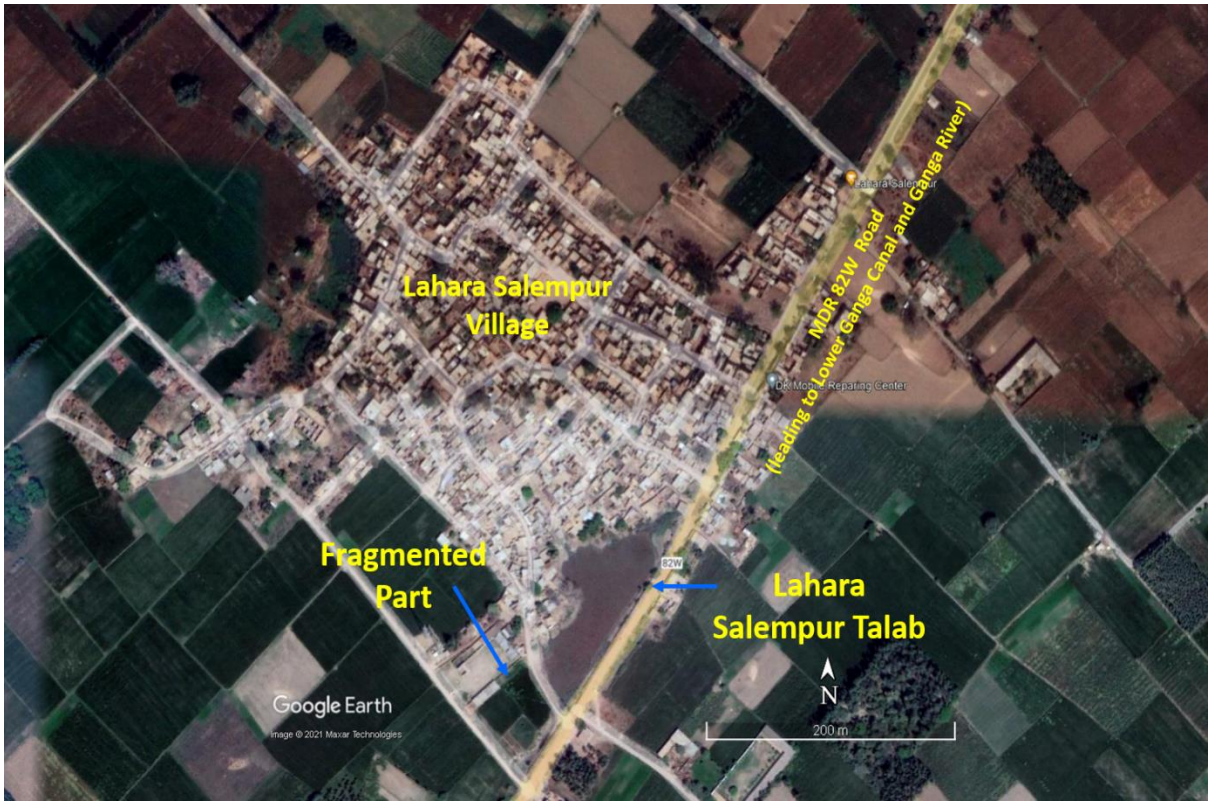


Image 5 : Location of Lahara Salempur Talab [28° 0'44.90"N, 78°30'42.66"E]

Image 6 : Lahara Salempur Talab Completely Covered With Water Hyacinth

8.5 **Hardoi Talab :** This pond is located on the eastern edge of Hardoi village and north of main road connecting Atrauli and Alampur Fatehpur village. [Wetland No. 9]. This is larges waterbody of the village. The water body was observed infested with Water Hyacinth [*Eichhornia crassipes*]. It receives sewage runoff from the village and also threatened by solid waste thrown on its edges. Over the years it has been excavated for clay by pottery making community living in the village. It has been divided into two parts by an earthen embankment for the purpose of fishing. It prevents the polluted water in the left portion [village side of pond] to enter the right portion – which is used for fishing. During summer season when water level gets down in the pond, it is filled with ground water through tube wells in order to sustain the fishing business. The edges of the pond were observed devoid of riparian vegetation except some trees of Peepal [*Ficus religiosa*], Neem [*Azadirachta indica*], and Subabool [*Leucaena leucocephala*].

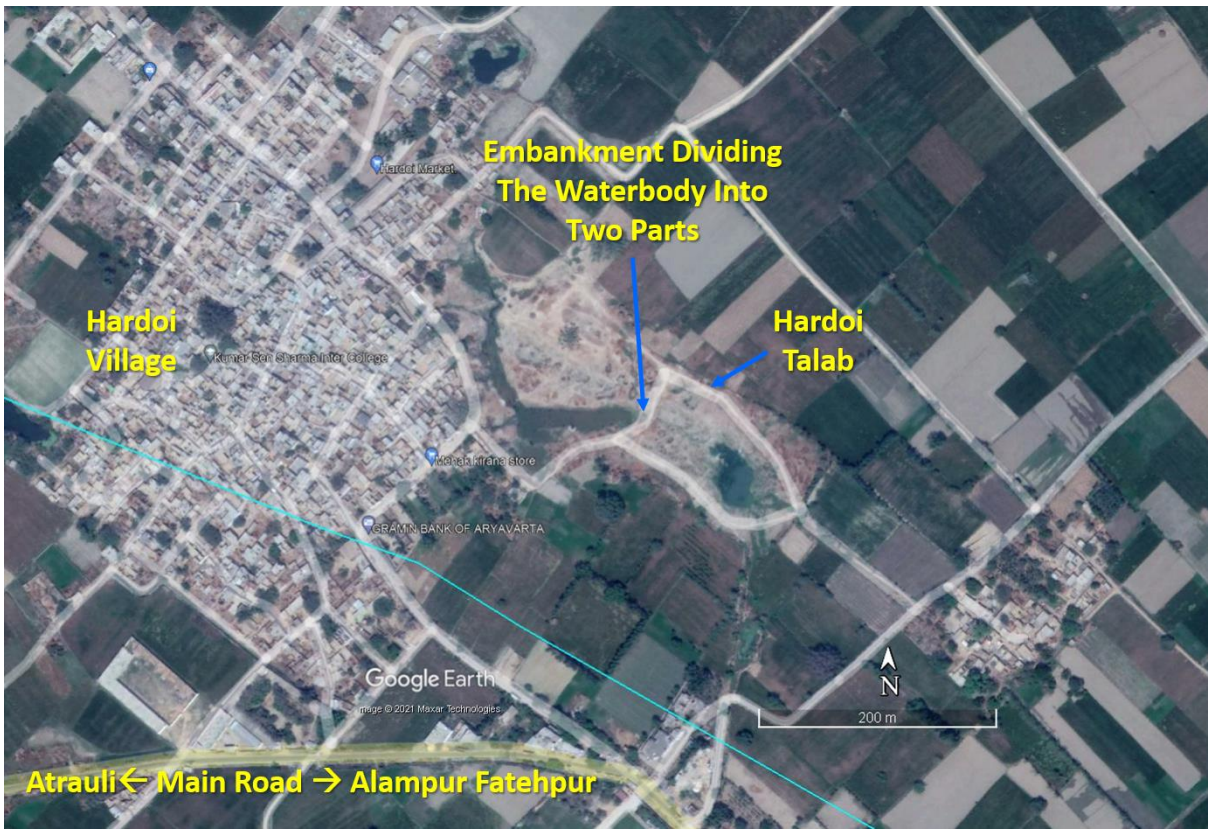
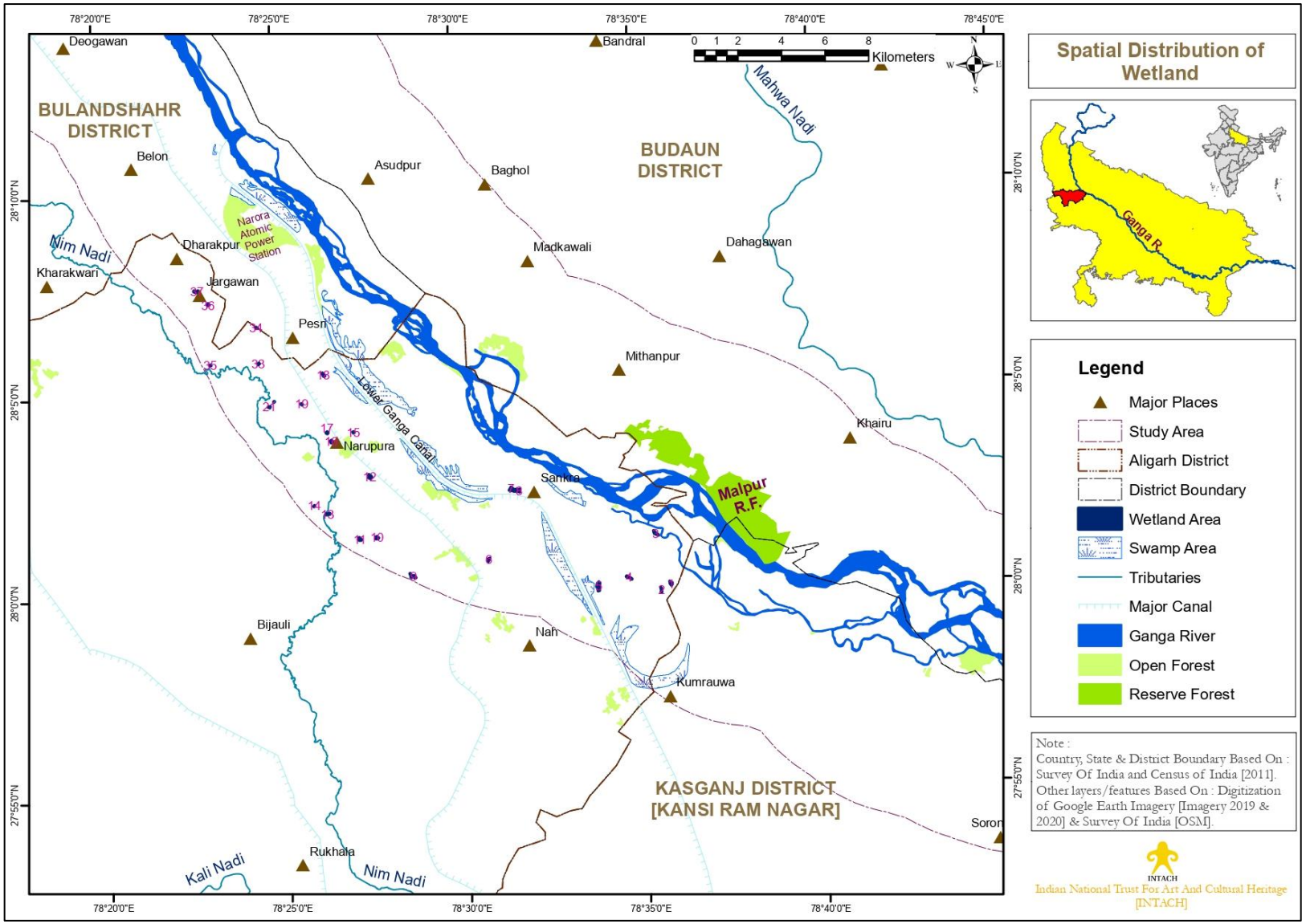


Image 7 : Location of Hardoi Talab [28° 0'25.41"N, 78°28'32.04"E]

Image 8 : Hardoi Talab Fragmented and Encroached [Looking Northeast]

Image 9 : Pottery Making Community Member At The Talab [Looking Northeast]



Map 6 : Spatial Distribution Of Wetlands In The Study Area

9.0 Riparian Flora Along Ganga River In Aligarh Distt.

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

9.2 Till recently, no systematic sampling had been undertaken or record had been maintained for the riparian plant diversity all along Ganga River. There are however, some scattered but significant works of Pallis [1934], Auden [1941], Sahai [1953], Gupta [1960], Bhattacharyya and Goel [1982], Groffmanet al. [1990], Krishanmurti [1991], Castelle al. [1994], Shyam [2008], Gangwar and Joshi [2006] and Gangwar and Gangwar --[2011] which have explored the biodiversity of Ganga river basin. Also, a detailed study published in the form of a book titled: "The Ganga – A Scientific Study" edited by Krishnamurti [1991] documents 475 riparian plant species from Rishikesh to Chinasura.

9.3 The pattern of riparian flora in Aligarh district is very similar to that of Bulandshahr Distts. located north. Although most of the floodplain area/island area is under agriculture, there are considerable patches of riparian vegetation at Ganeshpur gang, Nagla jogia, Sikari, Haranpur Ahatmali and aquatic weeds in the swampy areas along the river. Patches of Kaans [*Saccharum spontaneum*], Common Cattail [*Typha latifolia*], Narkul [*Phragmites Karka*], Doob [*Cynodon dactylon*], Giant cane or Elephant Grass [*Arundo donax*] were observed thriving along the river. The river bank tracts have mix cover of various shrub and tree species. Main tree species are Sheesham [*Dalbergia sisso*], Neem [*Azadirachta indica*], Banyan [*Ficus benghalensis*] Jamun [*Syzygium cumini*], Siris [*Albizia lebbeck*], Leucaena [*Leucaena leucocephala*], Peepal [*Ficus religiosa*], Mango [*Mangifera indica*], Bamboo [*Bambusa vulgaris*], Ber [*Ziziphus mauritiana*], and Eucalyptus spp.

9.4 Some herb/shrub species observed are Tephrosia [*Tephrosia purpurea*] Prickly Malvastrum [*Malvastrum coromandelianum*], Creeping Woodsorrel [*Oxalis corniculata*], Congress Grass [*Parthenium hysterophorus*], Goat Weed [*Ageratum*

conyzoides], India Mallow [*Abutilon indicum*], Country Mallow [*Sida cordifolia*], Devil's Thorn [*Tribulus terrestris*], Coffee Senna [*Cassia occidentalis*], Setaria [*Setaria viridis*], Khus [*Vetveria zizanoides*], Calotropis [*Calotropis procera*], Lantana [*Lantana camara*] along with riparian grasses.

9.5 Some riparian grasses are economically valuable in the district. Kaans [*Saccharum spontaneum*], Narkul [*Phragmites Karka*] Patera [*Typha elephantina*] are harvested from Ganga Khadar by local people. They are used for making hedges and thatch roof.

9.6 Major tree species found in the study are mentioned in table below:

Table 3 : Main Tree Species Recorded In The Study Area

S. No.	Botanical Name	Common Name	Family
1.	*Ficus religiosa* L.	Peepal	Moraceae
2.	*Ficus benghalensis* L.	Banyan	Moraceae
3.	*Ficus virens*	Pilkhan	Moraceae
4.	*Phoenix dactylifera L.*	Khajur	Arecaceae
5.	*Mangifera indica*	Aam	Anacardiaceae
6.	*Populus spp.*	Poplar	Salicaceae
7.	*Eucalyptus spp.*	Liptis	Myrtaceae
8.	*Ziziphus mauritiana*	Indian Jujube	Rhamnaceae
9.	*Aegle marmelos*	Bel	Rutaceae
10.	*Syzygium cumini*	Jamun	Myrtaceae
11.	*Terminalia arjuna*	Arjun	Combretaceae
12.	*Albizia lebbeck*	Black Siris	Fabaceae
13.	*Albizia procera*	White Siris	Fabaceae
14.	*Leucaena leucocephala*	Subabool	Fabaceae
15.	*Melia azedarach*	Bakain	Meliaceae
16.	*Acacia nilotica* L.	Babool/Kikar	Fabaceae
17.	*Albizia lebbeck*	Siris	Fabaceae
18.	*Morus alba*	Shahtoot	Moraceae
19.	*Butea monosperma*	Dhak	Fabaceae
20.	*Bambusa vulgaris*	Bamboo	Poaceae
21.	*Madhuca indica*	Mahua	Sapotaceae
22.	*Dalbergia sisso*	Sheesham	Fabaceae
23.	*Putranjiva roxburghii*	Putranjiva	Putranjivaceae
24.	*Azadirachta indica* A. Juss.	Neem	Meliaceae
25.	*Senna siamea*	Kassod Tree	Fabaceae

Image 10 : Riparian Vegetation On Ganga Banks Visible From Sankara Bridge

Image 11 : Tephrosia [*Tephrosia purpurea*]

Image 12 : A Narrow Trail Covered With *Saccharum spontaneum*
[Leading To Ganga River Near Mohkampur]

Image 13 : Aquatic Vegetation In A Shallow Depression Near Ganga River

10.0 Faunal Diversity Along Ganga River In Aligarh Distt.

10.1 Due to very little forest in the study area, the mammal diversity is poor and includes common terrestrial mammals which are sighted occasionally on floodplain areas along the Ganga. Common mammals presently found in the district include Indian Leopard [*Panthera pardus fusca*], Indian Jackal [*Canis aureus indicus*], Indian Fox [*Vulpes bengalensis*], Monkey [*Rhesus macaque*], Langur [*Semnopithecus spp.*], Indian Hare [*Lepus nigricollis*]. There have been few reports of Indian Leopard's [*Panthera pardus fusca*] presence in the district during the current year [2021]. According to news sources, one leopard was found dead and another was seen within a week during the month of January, 2021[6]. Nilgai [*Boselaphus tragocamelus*] and Wild Boar [*Sus scrofa*] are also found in variable numbers across the district and known to destroy crops. The Aligarh Gazetteer of 1909[7] also mentions about Indian wolves [*Canis lupus pallipes*] which are no more found or sighted in the district. Insects and Arthropods are poorly recorded groups, especially along rivers. During field visit many insects were sighted in riparian vegetation along Ganga River, near palaeochannels, near waterbodies. Most common were Dragonflies and Damselflies (Order: Odonata), Grasshoppers and Crickets (Order: Orthoptera), Stick insects and Leaf insects (Order: Phasmatodea), Butterflies and Moths (Order: Lepidoptera). Among Butterflies, Common Leopard Butterfly [*Phalanta phalantha*], Common Rose [*Pachliopta aristolochiae*], Plain Tiger [*Danaus chrysippus*], and Peacock pansy Butterfly [*Junionia almana*] were sighted. Among Dragonflies and Damselflies, Ruddy Marsh Skimmer [*Crocothemis servilla*], Blue Marsh Hawk [*Orthetrum glaucum*], Coromandel Marsh Dart [*Ceriagrion coromandelianum*] were sighted.

10.2 Some major aquatic fauna found in this stretch of Ganga River stretch have been described briefly below:

10.3 **Gangetic Dolphin** : The Gangetic River Dolphin (*Platanista gangetica gangetica*) is exclusively aquatic and piscivorous, occasionally found in small groups. It is one of the three freshwater dolphin species in the world and is distributed in the Ganga–Brahmaputra–Meghna and Sangu–Karnaphuli River systems in India, Nepal, and Bangladesh (Sinha & Kannan, 2014). It has been declared as the National Aquatic Animal by Govt. of India (Sinha & Kannan, 2014) and is classified as 'Endangered' in the

[6] https://www.livehindustan.com/uttar-pradesh/aligarh/story-leopard-shows-again-in-aligarh-panic-in-riyaz-colony-3841027.html

[7] Aligarh : A Gazetteer being Volume VI of the district gazetteers of the United Provinces of the Agra and Oudh. Allahabad. Govt. Press United Provinces. 1909

IUCN Red List owing to the decrease in its population in the last 3-4 decades. While there are considerable studies and records of Gangetic Dolphins from Upper Ganga stretch [Bijnor to Narora], there are no available records from the Aligarh stretch of Ganga River. However, nine Gangetic Dolphins were sighted downstream from Badaun district during January, 2021[8]. Based on the interactions with local people, it was known that dolphins are sighted very often in the Ganga River stretch of the district especially from the Sankara Ganga bridge. They are sighted frequently during monsoon season when the water level is high.

10.4 **Gharial** : Indian Gharial (scientifically known as *Gavialis gangeticus*) is the only surviving member of an ancient family of crocodiles found to reside mainly in Indian sub-continent. It derives its popular name – gharial or gavial from the bulbous knob like protuberance on a breeding male's snout which resembles a 'Ghara' meaning an earthen pitcher (Saikia, 2012). This species is endemic to the Indian sub-continent and is considered to be 'Critically Endangered' in the IUCN Red List. Once distributed across several major river systems in India and neighbouring countries, this species has seen an estimated 96-98% decline in its population owing and is now restricted to only few scattered locations in India and Nepal (Sinha, 2018).

10.5 Gharials are occasionally sighted by fishermen especially during summer season when the sandbars and island are exposed. In 2015, a batch of 678 Gharials was released in 2015 near Makhdumpur village [District Meerut – right bank of Ganga River, opposite northern part of district Amroha] in Hastinapur Wildlife Sanctuary – out of which only 16 Gharials survived[9]. During field visit, no gharial or crocodile was sighted., however their occasional sightings on sandbars has been confirmed through island farmers.

10.6 **Turtles :** India is one of the world's hotspots for turtle diversity representing 29 species of tortoises and freshwater turtles among which 13 different species find their abode in the Ganga river system. These turtles play a significant role in the river by scavenging dead organic material and diseases fish, controlling fish population as predators and controlling aquatic plants and weeds (WII, 2017). Variety of habitats such as muddy and sand banks, islands, varying depth of water in Ganga, and floodplain lakes supports chelonian diversity but major threats such as floodplain agriculture, increasing pollution, irregular flow of water and sandmining activities are altering their habitats and thus their population is continuing to decline.

[8] https://www.timesnownews.com/india/article/5-year-hiatus-over-9-gangetic-dolphins-spotted-in-budauns-ganga-stretch-uttar-pradesh/703231
[9] WWF rescues Gharial trapped in Ganga canal after gates shut monsoon. Oct.28, 2017

10.7 A report published by WWF-India[10] in 2011 mentioned the presence of 12 species of turtles between Bijnor and Kanpur stretch of Ganga River [Table-5]. Based on collections of shell and live specimens, eight species belonging to four genera and one family of hard-shell turtles, and four species belonging to three genera and one family of soft-shell turtles were identified by them. During the current field visit, around 7 Brown-roofed turtles were sighted on exposed sandbars from Sankara Ganga Bridge [Image-17].

Table 4 : Freshwater Turtles In Ganga River Between Bijnor and Kanpur

S.No.	Family	Genus	Species	Common Name
1.	Emydidae	*Hardella*	*thurjii*	Crown River Turtle
2.		*Geoclemys*	*hamiltonii*	Spotted Pond Turtle
3.		*Melanochelys*	*trijuga*	Indian Black Turtle
4.		*Batagur*	*kachuga*	Red-crowned Turtle
5.		*Pangshura*	*smithii*	Brown-roofed Turtle
6.		*Pangshura*	*tecta*	Indian-roofed Turtle
7.		*Pangshura*	*tentoria*	Indian Tent Turtle
8.		*Batagur*	*dhongoka*	Striped Roof Turtle
9.	Trionychidae	*Lissemys*	*punctata*	Indian Flapshell Turtle
10.		*Chitra*	*indica*	Narrow-headed soft-shell Turtle
11.		*Nilssonia*	*gangeticus*	Indian soft-shell Turtle
12.		*Nilssonia*	*hurum*	Indian Peacock Soft-shelled Turtle

Source: WWF-India, 2011

10.8 **Avian Diversity :** During field survey, the diversity of avian species was recorded using binoculars and identified using field guides (Grimmett et al., 2016 and others). During the field visit, a total of 33 bird species were sighted. Out of which 14 are aquatic species and remaining 21 are terrestrial birds [Table-5].

10.9 Important observations are:

- Bird population seems to be sizeable due to diversity of habitats – rivers, swamps, depressions, lakes, riparian buffer of channels, open lands, and agriculture fields.
- Aquatic vegetation and riparian grasses of palaeo-channels, waterbodies and depressions are serving as important habitats for birds in the river basin.

[10] Behera, S., G. Areendran, P. Gautam and V. Sagar (2011), For A Living Ganga–Working with People and Aquatic Species, New Delhi: WWF-India, 84 pp.

- Common birds sighted more often in and around the river are Yellow-wattled Lapwing, White-throated Kingfisher, River Tern, Grey Heron, Indian Pond Heron, Great Egret, Cattle Egret, and Cormorants.
- Birds sighted more frequently in and around waterbodies, swamps and palaeochannels are Purple Swamphen, Common Coot, Common Moorhen, Indian Pond Heron, Egrets, White-throated Kingfisher, and White Breasted Waterhen
- Sarus Crane and River Tern fall under 'Vulnerable Category' while River Lapwing comes under 'Near Threatened Category'

Table 5 : List Of Birds Sighted During Field Visit

S. No.	Common Name	Scientific Name	Conservation Status
1.	Little Cormorant	*Microcarbo niger*	Least Concern
2.	White-breasted Waterhen	*Amaurornis phoenicurus*	Least Concern
3.	Indian Pond Heron	*Ardeola grayii*	Least Concern
4.	Cattle Egret	*Bubulcus ibis*	Least Concern
5.	Great Egret	*Ardea alba*	Least Concern
6.	White-throated Kingfisher	*Halcyon smyrnensis*	Least Concern
7.	**River Tern**	***Sterna acuticauda***	**Vulnerable**
8.	**River Lapwing**	***Vanellus duvaucelii***	**Near Threatened**
9.	Yellow-wattled Lapwing	*Vanellus malabaricus*	Least Concern
10.	Purple Swamphen	*Porphyrio porphyrio*	Least Concern
11.	Grey Heron	*Ardea cinerea*	Least Concern
12.	Common Moorehen	*Gallinula chloropus*	Least Concern
13.	Common Coot	*Fulica atra*	Least Concern
14.	**Sarus Crane**	***Antigone antigone***	**Vulnerable**
15.	Black Drongo	*Dicrurus macrocercus*	Least Concern
16.	Bank Myna	*Acridotheres ginginianus*	Least Concern
17.	Common Myna	*Acridotheres tristis*	Least Concern
18.	Laughing Dove	*Spilopelia senegalensis*	Least Concern
19.	Black-winged Kite	*Elanus caeruleus*	Least Concern
20.	Asian Koel	*Eudynamys scolopaceus*	Least Concern
21.	Greater Coucal	*Centropus sinensis*	Least Concern
22.	Indian Robin	*Saxicoloides fulicatus*	Least Concern
23.	Common Pigeon	*Columba livia*	Least Concern
24.	Common Koel	*Eudynamys scolopaceus*	Least Concern
25.	House Sparrow	*Passer domesticus*	Least Concern

26.	Indian Jungle Crow	*Corvus culminatus*	Least Concern
27.	House Crow	*Corvus splendens*	Least Concern
28.	Common Tailorbird	*Orthotomus sutorius*	Least Concern
29.	Indian Silverbill	*Euodice malabarica*	Least Concern
30.	Yellow Wagtail	*Motacilla flava*	Least Concern
31.	Jungle Babbler	*Turdoides striata*	Least Concern
32.	Black Drongo	*Dicrurus macrocercus*	Least Concern
33.	Green bee-eater	*Merops-orientalis*	Least Concern

Image 14 : Pair of Sarus Crane Sighted In Agriculture Field Near Ganga River

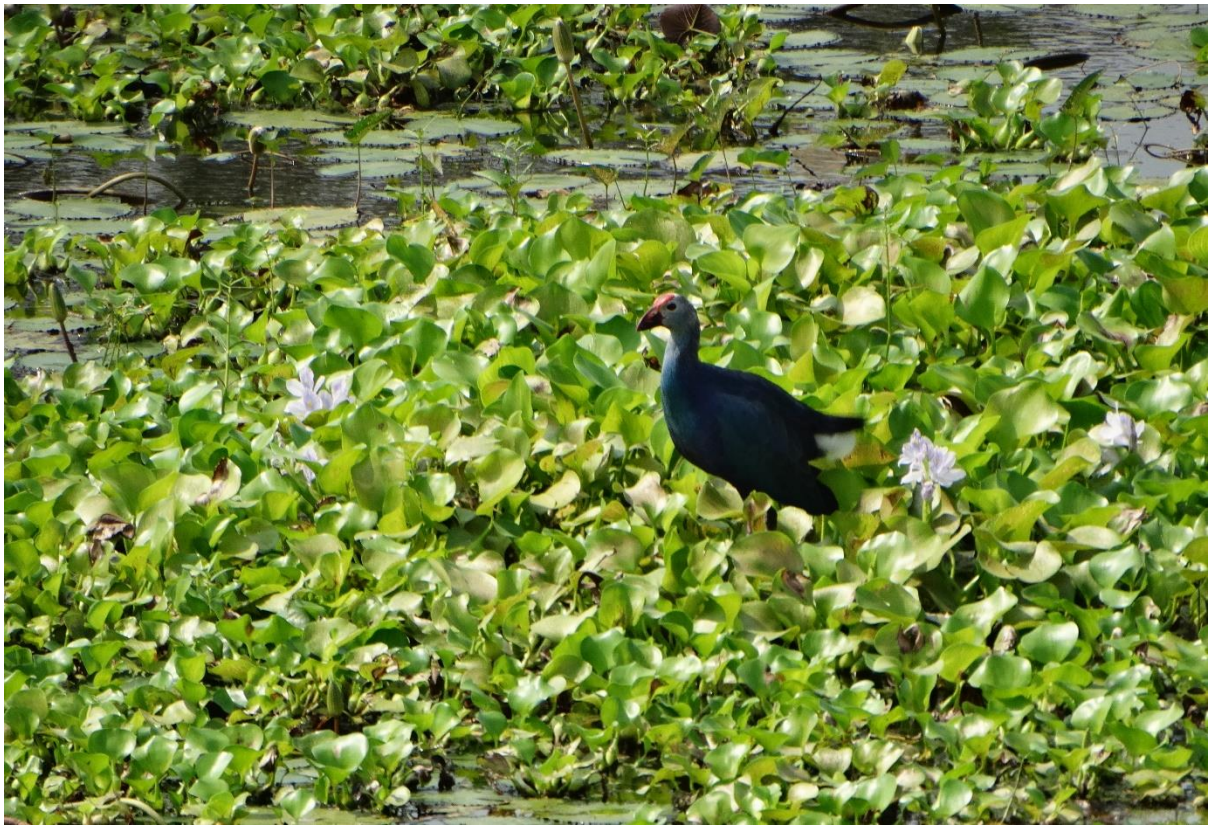


Image 15 : Purple Swamp Hen [*Porphyrio porphyrio poliocephalus*]

Image 16 : Laughing Dove [*Spilopelia senegalensis*]

Image 17 : Brown-roofed Turtles Basking On An Exposed River Island

11.0 Ganga Riverine Islands In Aligarh Distt.

11.1 The riverine fluvial islands are present in many major rivers and are defined as 'land masses within a river channel that are separated from the floodplain by water on all sides and exhibiting some kind of stability' [Osterkamp, 1998]. Such islands may not be permanent on the geologic time scale owing to the river meandering, climate change, etc. but can remain in place over decadal or century time scales and hence exhibit stability [Wyrick & Klingeman, 2011]. Islands are generally formed by sand or sediments mass by currents during higher level of river flow and are exposed during dry season. River islands provide habitat to a large variety of living organisms such as birds, butterflies, insects and smaller mammals.

11.2 During the field visit it was observed that in Aligarh stretch of Ganga River, there are many exposed and partially exposed river islands of varying shape and size – very similar to those in upstream districts. Almost, the entire channel of Ganga River in the district has such islands and sandbars. As per the fluvial island classification proposed by Wyrick & Klingeman (2011), the islands here would be fall under 'Braided' category – which means many channels divided by islands and bars, which may be

washed out in high flows. These islands and sandbars get immersed with the increased water flow in river – especially during monsoon season along with the river channels in between them. Such sand bars make it difficult for motor boats to navigate through as their outboard motor with propellor fan gets stuck in the sand. Local boatmen and fishermen identify these channels with the help of long bamboo or wooden poles which they use to propel their boats.

11.3 These river islands are used for agriculture by local farmers except smaller or less stable ones. Cucurbits such as cucumber, melons, bitter and bottle gourds, tomatoes, pumpkins are grown and known as '*Palez*'. Smaller wooden boats are used for to and fro movement from the main land. During non-monsoon period most of the river islands remain under cultivation. Only smaller islands and exposed sand beds act as remaining habitat to aquatic biodiversity especially migratory birds, turtles, gharials and crocodiles. During current study, brown-roofed turtles were sighted basking on exposed islands and sandbars. The width of the islands varies between 0.5 km – 1 km and length 1 km to 1.4 km as observed via Google Earth's satellite imagery [Image-18 and 19]

11.4 Post monsoon [September] these islands either get submerged under water or get covered with luxuriant growth of riparian grasses and aquatic vegetation. Plants such as Kaans [*Saccharum spontaneum*], Water Hyacinth [*Eicchornia crassipes*], Alligator weed [*Alternanthera philoxeroides*], Bush Morning Glory [*Ipomoea carnea*], were sighted on some exposed islands.

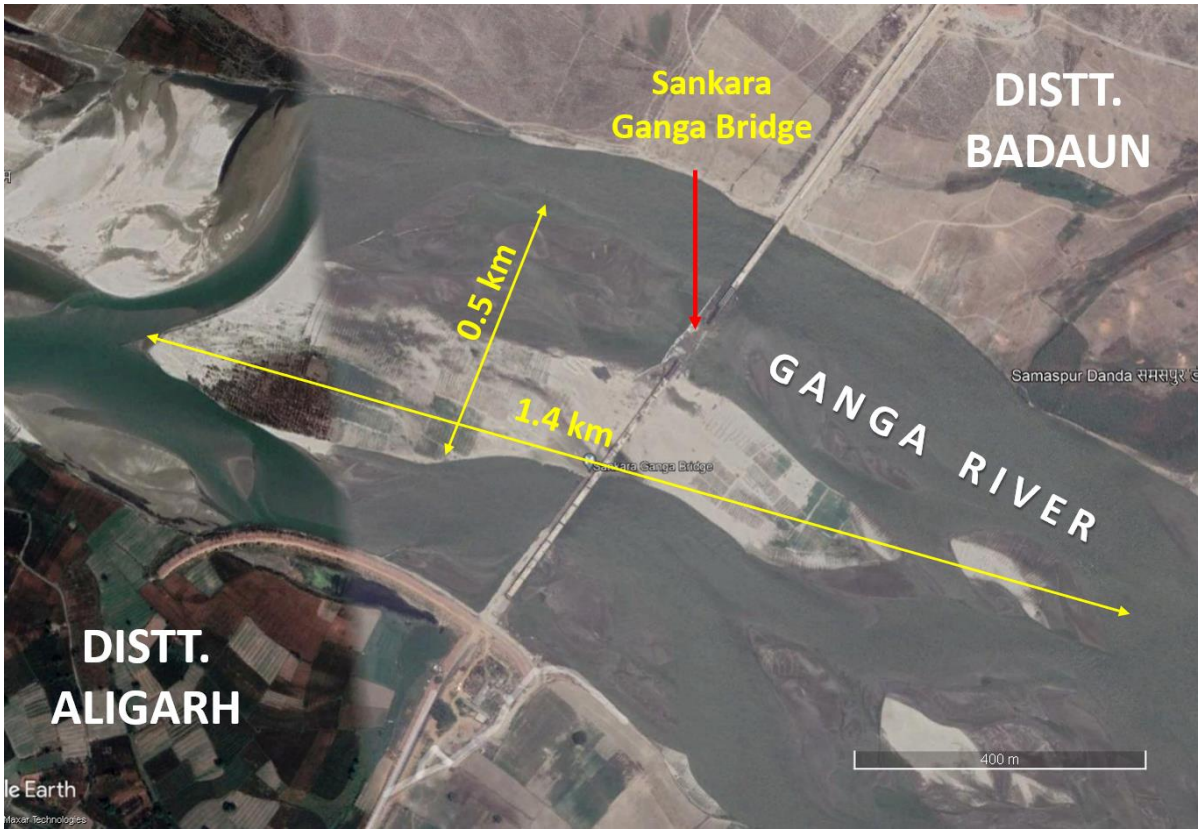


Image 18 : River Islands Under Sankara Ganga River Bridge

Image 19 : Braided Islands In Ganga River Between Aligarh and Badaun District

Image 20 : A River Island With *Saccharum spontaneum* [Kaans]

12.0 Fishing In Aligarh Distt.

12.1 Fish resources of Ganga River have been an important source of livelihood and food security for millions of people residing along its banks. Ganga river supports a diverse fish fauna with about 260 species reported for Indian waters (Sinha and Khan, 2001) among which about 35 species have been identified as having highest commercial value including carps (Cyprinidae), snakeheads (Channidae) and catfish (Siluriformes) (Islam et al., 2006). However, today these rich fish resources are threatened by various anthropogenic activities and resulting water pollution, accumulation of heavy metals, eutrophication, damming, alteration of hydrology and introduction of exotic species (Tripathi et al., 2017).

12.2 Aligarh Gazetteer of 1909[11] mentions about the insignificant role of fishing in supporting community livelihoods – "*The fisheries are unimportant, for there are few permanent lakes and the great rivers merely touch the fringe of the district. The usual*

[11] Moradabad : A Gazetteer being Volume XVI of the District Gazetteers of the United Provinces of Agra and Oudh by H.R. Nevill [1911], Govt. Press, Allahabad.

varieties common to the plains, principally of the carp tribe, are to be found in the tanks; but fish form no important item in the diet of the people, and the number of professional fishermen and fish dealers is extremely small"

12.3 However, fishing is an important source of income for fishermen and daily wagers in villages located on the river. Fishing is carried out by various means – nylon & rope nets, rods and nylon fishing lines (threads). Fishing is a favourite hobby of the local community especially for those living near to the Ganga River. Fish captured by fishermen are sold in the local markets and occasionally out of the district [Image-21].

12.4 Upon interaction with local fishermen Kanjarpur Mod local market, it was found that most of the common fish species are found in this stretch of Ganga River. The fish species diversity increases during monsoon season and decreases as water level goes down post monsoon every year. There are no specific techniques to identify the spots for fishing in river. It entirely depends on accessibility and area divided between fishermen. For rod fishing, stable embankments and levees are preferred.

12.5 The most common fish species are Barwari [*Wallagu attu*], Rohu [*Labeo rohita*], Catla [*Labeo catla*], Carp [*Cyprinus carpio*], Singhi [*Heteroneustes fossilis*], Singhara [*S. seenghala*], Gonch [*Bagarius bagarius*], or Sawli [*Channa striatus*] and [*Channa punctata*], *Naini* (*Cirrhinus mrigala*). All the fish species noted during field survey are mentioned in Table No.6 below:

Table 6 : Riverine Fish Found in Aligarh Distt.

S. No.	Common Name	Scientific Name
1.	Common Carp	*Cyprinus carpio*
2.	Grass Carp	*Ctenopharyngodon idella*
3.	Singhi	*Heteroneustes fossilis*
4.	Singhara	*Sperata seenghala*
5.	Sauli or Sawli	*Channa punctata*
6.	Sauli or Sawli	*Channa striatus*
7.	Raiya	*Cirrhina reba*
8.	Tenghra/Teenghra	*Mystus cavessius*
9.	Karaunch	*Labeo calbasu*
10.	Nain/Naraini	*Cirrhinus mrigala*
11.	Gonch	*Bagarius bagarius*
12.	Manghur	*Clarias gariepinus*
13.	Chilwa	*Oxygaster bacaila*

14.	Chaal	*Chela bacaila*
15.	Puthi	*Puntius sarana (Ham.)*
16.	Bata	*Labeo bata*
17.	Laanchi/Parhan	*Wallagu attu*
18.	Pabda	*Callichorous bimaculatus*
19.	Chiriya	*Engraulis spp.*
20.	Rohu	*Labeo rohita*
21.	Bhakur/Catla	*Labeo catla*
22.	Kawai	*Anabas testudineus*
23.	Chanda	*Parambassis ranga*

Image 21 : Fishermen Selling Fish At A Local Market Caught From Ganga River

Image 22 : A Local Person Fishing In A Palaeochannel Near Nagla Jogia

13.0 Groundwater Condition In Aligarh Distt.

13.1 As per Aquifer Mapping and Groundwater Management Plan Report[12] of the CGWB [District Aligarh, April, 2017], geologically, the district is underlain by moderately thick pile of quaternary sediments which comprises sands of various grades, clays and kankar. Alluvial deposits vary from 287 m to 380 m. Ground water occurs in the pore spaces of the unconsolidated alluvium in the zone of saturation. Deeper aquifers are under confined state of disposition and confining layers are impermeable clay beds. The general groundwater flow is from northwest to southeast direction.

13.2 As per lithological logs and perusal of fence diagrams by CGWB, the area reveals the occurrence of two aquifer groups. The aquifers have been grouped as Aquifer-I and Aquifer-II. These aquifer groups are separated by confining clay layers of thickness more than 10 m, consisting of several thin aquifers separated by clays and silts. Their depth range is mentioned in the table below:

[12] Report on Aquifer Mapping and Groundwater Management Plan, Aligarh, Uttar Pradesh by CGWB [2017]

Table 7 : Aquifer Groups In Aligarh District

Stratigraphic Group	Top Depth Range [mbgl]	Bottom Depth Range[mbgl]
Aquifer Group I	0	114
Aquifer Group II	120	300

[Source : Report on Aquifer Mapping and Groundwater Management Plan, Aligarh, Uttar Pradesh by CGWB [April,2017]

13.3 As noted in the above-mentioned report, depth to water levels [pre-monsoon-May 2016] in the district range from 1.75 mbgl to 26.17 mbgl and 0.35 mbgl to 27.57 mbgl in post-monsoon season [Nov.2016].

13.4 As per the 'National Compilation of Dynamic Groundwater Resource Assessment' of India (2019), the 'Total Annual Groundwater Recharge' of Aligarh district is 95421.14 Ham [Hectare metre] against 'Annual Extractable Ground Water Resources' of 89024.52 Ham. The 'Stage of Groundwater Development' is 68.86% which indicates 'Safe' status.

13.5 Major sources of irrigation are Lower Ganga Canal, Ganga River and its tributaries, govt. and private tube wells, permanent wells and ponds. Out of 12 blocks, 2 blocks viz. Iglas and Chandaus were noted as 'Over Exploited' [As on March 2013] by Aquifer Mapping and Groundwater Management Plan, Aligarh, CGWB [April, 2017] Report. Other ten blocks were observed as 'Safe'.

13.6 Groundwater levels noted in few villages during the survey are given below:

Table 8 : Groundwater Levels Of Some Villages Along Ganga In Aligarh Distt.

S. No.	Village	Coordinates		Depth to Water Table in Feet
		Lat.	Long.	
1.	Hardoi	28° 0'19.15"N	78°28'35.36"E	70-150
2.	Sankara	28° 2'23.37"N	78°31'58.33"E	10-50
3.	Nagla Jogia	28° 2'35.08"N	78°33'6.40"E	05-10
4.	Nagla Aliya	28° 1'39.83"N	78°34'12.68"E	05-10
5.	Mahmoodpur Pukhta	28° 0'3.80"N	78°36'32.02"E	30-50
6.	Todarpur Ahatmali	28° 3'50.23"N	78°29'31.20"E	05-20
7.	Haranpur Ahatmali	28° 1'6.17"N	78°35'31.55"E	05-20

14.0 Ganga Bank Erosion In Aligarh Distt.

14.1 Weathering of soils by natural forces is both constructive and destructive. Erosion is the chief agent responsible for the natural topographic cycles as it wears down higher elevations, banks (lateral erosion) and deposits sediments in the plains. However, erosion gets aggravated due to human interventions through land use change, excessive grazing and farming, deforestation and removal of riparian vegetation along river banks. It is well known that exposed soil may erode rapidly (Singh et al., 2004).

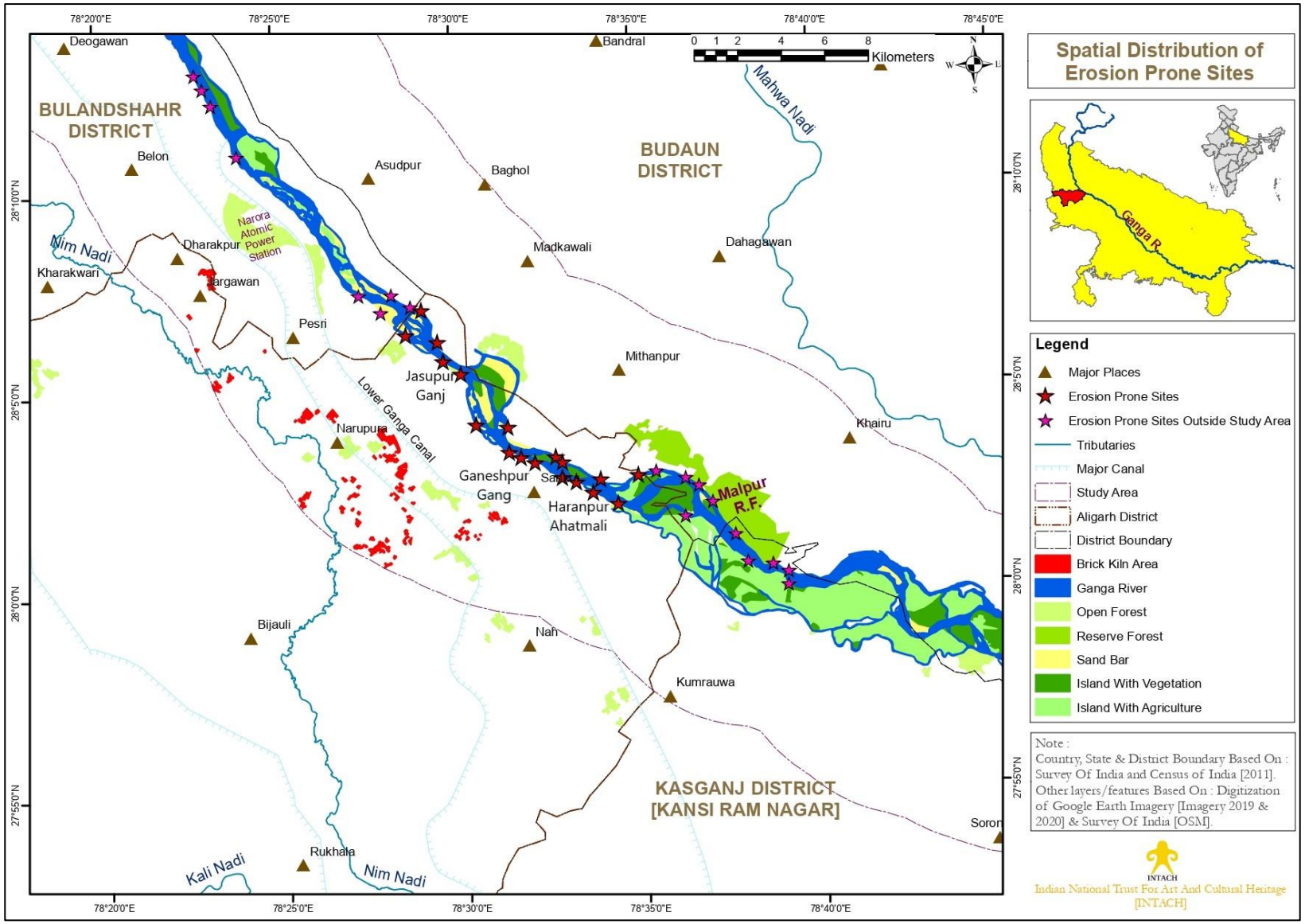
14.2 In a recent attempt to make river banks greener, the Uttar Pradesh State govt. claims to have planted more than 2.2 Crore trees along river banks as a part of annual plantation drive. The Ganga River has got the maximum – around 67 lakh trees and the plantation has been done in all the 27 Distt.s along Ganga in the State as noted by Times of India [August 20, 2020][13]. ***However, this exercise cannot prevent bank erosion which is preventable only through the binding of an extensive root system as available in native riparian grasses.***

14.3 As assessed from the Google Earth imagery [2020], there are few major erosion prone sites on Ganga River in Aligarh Distt.. The river bank areas which are more prone to erosion are at Ganeshpur Gang and Haranpur Ahatmali. At Ganeshpur Gang, the Ganga River forms a concave bank towards the right bank. It further meanders downstream taking sharp left turn near Haranpur Ahatmali making the river bank areas prone to erosion during high flow periods. During field visit, few bank erosion sites were observed at the above areas. [See Image-23]

[13] River banks made greener in Uttar Pradesh. Aug.20, 2020. Times of India

Image 23 : River Bank Erosion At Haranpur Ahatmali, Distt. Aligarh

Image 24 : River Bank Erosion Site At Ganeshpur Gang, Distt. Aligarh



Map 7 : Spatial Distribution Of Erosion Prone Sites In The Study Region

15.0 Mining And Brick Kilns In Aligarh Distt.

15.1 **Sand Mining** : Sand is one of the major minerals resource extracted from the Ganga River, especially in its mid and lower stretch. The demand is ever increasing due to rapid expansion of settlements and their upgradation across the country. Often carried out illegally and excessively to earn large profits, sand mining is altering rivers' overall health. Excessive sand mining results in the destruction of aquatic and riparian habitats and also poses threat to bridges, river banks and nearby structures[14].

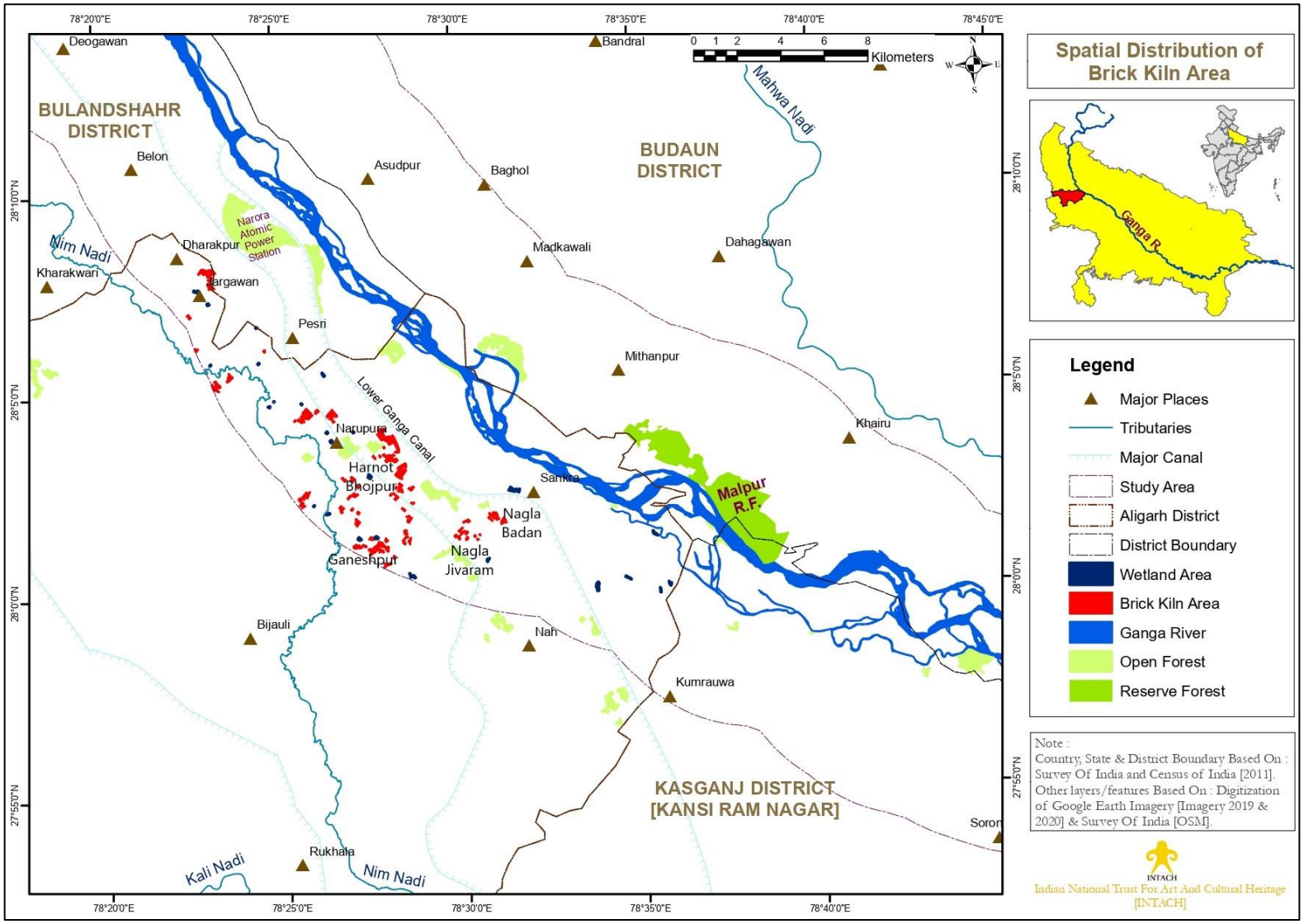
15.2 In Aligarh Distt., sand is the major mineral mined from Ganga River in the district. Areas for sand mining are leased out to private parties by mining division of the district administration. Although the district administration keeps regular check, there have been many incidences of illegal sand mining in the district. As per information obtained during field surveys, sand mining is carried out at Ganga River and the canal running through the district. Major mining hotspots are Ganeshpur Gang, Nagla Jogiya and Sankara. Local community members from villages situated along carry out sand mining regularly and transport it with the help of their bullock carts. Few such bullock carts were seen carrying sand during the field visit. The sand is sold locally for construction purposes. It becomes difficult during monsoon season when sand bars and accessible routes to the river bed are submerged under water.

15.3 **Brick Kilns:** Brick making is one of the major economic activities in the Distt., providing employment to many daily wage workers. With rapid urbanisation, bricks have become important building material with ever increasing demand. However, the industry has current and future implications for the soil, agriculture land and air quality of the region. In Aligarh district, there are many brick kilns that fall within study area [west of Lower Ganga Canal] – mainly scattered at Harnot Bhojpur, Ganeshpur, Nagla Jivaram, Nagla Badan [Map-8]. Expansion of various towns and villages has increased the demand for bricks and other construction materials. In the study area, the brick kilns and soil mining/brick making sites are mostly located between 3 km to 10 km away from the main Ganga River in a cluster of 4-5 units. There are distance obligations for establishment of brick kilns from roads, railways, villages, mango orchards etc. set in 'The Uttar Pradesh Brick Kilns (Siting Criteria from Establishment) Rules 2011' but there is no mention of distance from river, floodplains or a waterbody in these rules.

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

Image 25 : River Sand Loaded Bullock Cart On Sankara Ganga Bridge

Image 26 : Brick-Kiln Near Nagla Badan, Distt. Aligarh



Map 8 : Brick Kilns In The Study Area [Distt. Aligarh]

16.0 Boatmaking In Aligarh Distt.

16.1 Boatmaking is not a popular profession or income source in the Distt. Several fishermen or farmers whose livelihoods depend on the fishing or floodplain farming keep the smaller wooden boats. In district Aligarh, boats are either sourced from Bulandshahr situated upstream or made by local carpenters and blacksmiths from villages situated along the Ganga River.

16.2 As per information obtained from boatmen, boat making expenditures are lower in Aligarh than in nearby districts such as Bulandshahr, Hapur and Meerut. A simple small wooden boat making cost ranges between Rs. 12,000 to Rs.15,000 while an iron boat without motor costs somewhere between Rs. 50,000 to Rs. 60,000. Iron boat with country made motor costs with an additional cost of Rs. 14,000 i.e. at a cost between Rs, 54,000 to Rs. 64,000. Now days, wooden boats are being replaced by boats made up of iron because of their longevity and fewer leakage issues. There are fewer boats in Aligarh stretch of Ganga River due to absence of popular tourist sites. They are mostly used during religious festival and ceremonies. However, there are many smaller boats found parked along the Ganga River, which are used by island farmers and fisherman for their daily commute and transportation.

Image 27 : Iron Boats Parked At Sankara Bridge, Distt. Aligarh
[Made Of Wood and Thick Gauge GI Sheet]

17.0 Inland Navigation In Aligarh Distt.

17.1 The Ganga River at Aligarh Distt. has poor navigability due to presence of various sandbars and islands, which get exposed due to lower flow – leaving few running channels of water. Such channels are used by farmers and fisherman for their daily livelihood activities. They use small wooden boats to move around the river landscape.

17.2 As per the information obtained during field surveys, the Ganga River has poor navigability from Ramaghat in Bulandshahr district to Sankara due to presence of large number of islands and sandbars. River route is generally not used to travel downstream rather to cross the river by island farmers. The navigation is better downstream of Sankara bridge to Haranpur Ahatmali [A stretch of around 5 km in length].

Image 28 : Exposed River Island As Seen From Sankara Bridge [Looking Downstream]

18.0 Key Observations and Recommendations

18.1 **Flattening of Upland Tracts/Levees:** Naturally formed levees and upland tracts support growth of riparian vegetation and keep riverbanks stable – making them resilient to erosion. They also act as vantage points to enjoy the river scenery. As observed during field visit, they are being flattened by farmers to extend their agriculture lands or take soil for household/construction purposes. In absence of any legislation to protect river floodplains, such natural upland areas under serious threat. Authorities must take note of this ongoing practice and take appropriate measures to halt it.

Image 29 : Excavated Earth Material From River Floodplain Area

18.2 **Palaeochannels and Floodplain Lakes :** The Distt. authorities as well as farmers must acknowledge the role of palaeochannels, floodplain lakes and depressions along the Ganga River in the Distt. From acting as groundwater recharge zones to maintaining river biota especially aquatic plant species and fish diversity, their role along rivers have been undervalued. Their edges provide space for riparian grasses and trees and thus help in maintaining food chains by providing habitat to various birds, reptiles and insects. They provide invaluable service to farmers as water retention ponds for irrigation. They also add visual appeal to large and monotonous agricultural landscapes – especially in a state like Uttar Pradesh.

18.3 **Waterbodies Encroachment :** Waterbodies in the Distt. are highly threatened by encroachment, pollution and increasing eutrophication. During the field visit, it was observed that not even a single waterbody has been spared from solid waste dumping and illegal encroachment. There are settlements coming on their edges and thus decreasing their area and water spread. Healthy water bodies in villages and towns of the Distt. would ensure income generation options for the local people through fisheries and water chest nut production. They would also help in groundwater recharge as the current rate of withdrawal is high across villages due to installation of private submersible pumps.

18.4 **Riparian Flora :** The river banks along forest uplands are comparatively rich in riparian vegetation partly due to presence of swampy areas and palaeochannels. In addition to providing habitat to many aquatic and terrestrial species, riparian vegetation provides bank stability. Such areas may be marked and considered as 'Riparian and Aquatic Vegetation Bank' for Ganga River River ecological studies.

18.5 **Aquatic Fauna:** The stretch of Ganga is an important habitat of major aquatic fauna such as Gangetic Dolphin, Gharial, Crocodile and at least 12 species of turtles – many of which are threatened by multiple factors. And there are many other associated species such as frogs, toads, butterflies, insects, aquatic invertebrates that are poorly documented but form important part of the food web. Forest dept. should carry out annual faunal surveys in collaboration with expert institutions besides bird census. Such annual exercise would supplement the existing data on Ganga River biodiversity.

18.6 **Protection for River Islands :** River islands support better bird diversity in rivers and act as safe habitats for turtles, gharials, and crocodiles. Such islands and exposed sand-beds should be seen as refuges for biodiversity. River islands must be protected. Agriculture practices on such islands and sand-beds should be curbed and a central 'River Island Policy' must be drafted. Any conservation planning or initiative for rivers in the state should consider protection of islands an important priority.

18.7 **Sand and River Bed Mining** should be checked and curbed completely. Excessive mining alters the natural river bed forcing the river to change course and thus promotes banks erosion. It has also been noted that deep excavations due to mining transforms into deeper pools after the high flow in the river and thus endanger lives of people who come for bathing during religious ceremonies. To keep a regular track, distt. authorities may utilise Google Earth and drones to keep themselves updated. Excessive sand mined

areas could be easily spotted from the Google Earth or other high resolution satellite imageries.

18.8 **Cremation :** Cremation of dead bodies and immersion of their remains is quite common along the Ganga River and its tributaries. The ongoing practice of cremation by local communities at their nearest river banks instead of designated crematorium sites pollutes the river. This, on a daily basis is contributing to the pollution levels in the river. Distt. authorities should encourage them to cremate at the designated crematorium facilities.

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