

GOMTI RIVER

Ecological status and trends



नमामि
गंगे



भारतीय वन्यजीव संस्थान
Wildlife Institute of India



ASSESSMENT OF THE
ECOLOGICAL STATUS OF
GOMTI RIVER FOR
CONSERVATION
PLANNING

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Wildlife Institute of India, Dehra Dun**

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GOMTI RIVER

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PREFACE

India being a mega diverse country, hosts a wide number of landscapes and ecosystems. A vital component of these are their riverine networks, which are in themselves a complete ecosystem. The nation's Ganga River is an internationally revered and recognised river that has been and continues to be a haven for a variety of animals and birds, making it an extremely important area with regard to biodiversity conservation. A number of tributaries make up the mighty Ganga River, of which the Gomti River is also a part. They also provide essential provisioning and regulating ecosystem services. The Wildlife Institute of India through the Biodiversity Conservation and Ganga Rejuvenation Project and National Mission for Clean Ganga funded by the Ministry of Water Resources, River Development and Ganga Rejuvenation has been working towards the conservation of Gomti River, along with all the other tributaries of Ganga River, so as to strengthen concerted efforts for restoration of its biodiversity value. For a complete scientific assessment of Gomti River, robust information on the diversity, abundance and distribution of aquatic vertebrate fauna of Gomti River, their major threats and the various drivers of these threats causing decline in their populations and habitat is collated in the present report.

As a part of the National Mission for Clean Ganga (NMCG), in the first phase, detailed biodiversity profiling of the Ganga River was carried out and subsequently the importance of its tributaries like the Gomti River in supporting biodiversity was realized. With this in mind, in phase II the project "Planning and Management for Aquatic Species Conservation and Maintenance of Ecosystem Services in the Ganga River Basin for a Clean Ganga" was envisaged to prepare a holistic restoration plan for the Gomti River through the support and involvement of stakeholders of all the Gomti states. The Wildlife Institute of India through the Biodiversity Conservation and Ganga Rejuvenation Project and this report attempts to compile biodiversity of Gomti River through literature review and Rapid Biodiversity Assessment. This report aims to develop a thorough knowledge base for the priority species of Gomti River, aid in biological restoration, and assist policy planners and managers to judiciously use water from the Gomti River, in view of the needs of the aquatic species therein.

Ruchi Badola
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EXECUTIVE SUMMARY

A total of 930 km was covered during the survey of which predetermined fixed sampling points were laid maintaining distance of 5 km between two subsequent points using ArcGIS (ESRI 2020) to collect information on flora, fauna and habitat characteristics of the Gomti River. During the survey of middle and lower stretch of Gomti River, in total 1102 individuals of water birds from 9 orders, 14 families and 31 species, were recorded. A total 11 adult individuals of Mugger were sighted along the side banks of the river. We recorded total of 51 Individual turtles belonging to four families' viz., *Hardella thurjii*, *Lissemys punctata*, *Nilssonia gangetica*, *Pangshura tecta*, *Pangshura tentoria* were recorded in the Gomti River. Mostly individuals were recorded in clay substratum area. These sightings were recorded from Madhotanda, Shahjahanpur, Lucknow and Sultanpur area and in the stretch from Pilibhit to Sultanpur. Agriculture, Fishing, Free-ranging dogs were the most common threats found during the survey.

Out of the total 155 surveyed locations, a total of 143 (92.25%) locations has an Intensive Agriculture pattern. The Gomti River is one of the major tributaries of the Ganga River and joins from north bank near Saidpur, Kaithi in Varanasi, Uttar Pradesh (Tangri et al., 2018). In ancient texts such as Bhagavata Purana, the river is known as Gomati, described as daughter of Sage Vashisht. Gomti River is a perennial and groundwater fed river in the central part of the Gangetic Plain. While traversing across Uttar Pradesh, Gomati drains over 30,000 km² area within Ghaghara–Ganga interfluvial region.



1. INTRODUCTION

1.1 Course of the river

The Gomti River originates from a rain-fed natural depression basin known as Gomati Taal or FulharJheel, situated 50 km south of the Himalayas foothills in Madhotanda village of Pilibhit in Uttar Pradesh. The Gomati River joins Ganga River after traversing for 930 km through Shahjahanpur, Kheri, Hardoi, Sitapur, Lucknow, Barabanki, Sultanpur, and Jaunpur districts of Uttar Pradesh. The river merges in Ganga River near Kaithi in Varanasi district (Rai et al. 2009). Gomti river basin is one of the important sub-basins of the Ganga basin and covers 3.53% of the Ganga basin, and drains thirteen districts of Uttar Pradesh (12% of total area of the state) (Dutta et al. 2015) (Figure 1.1).

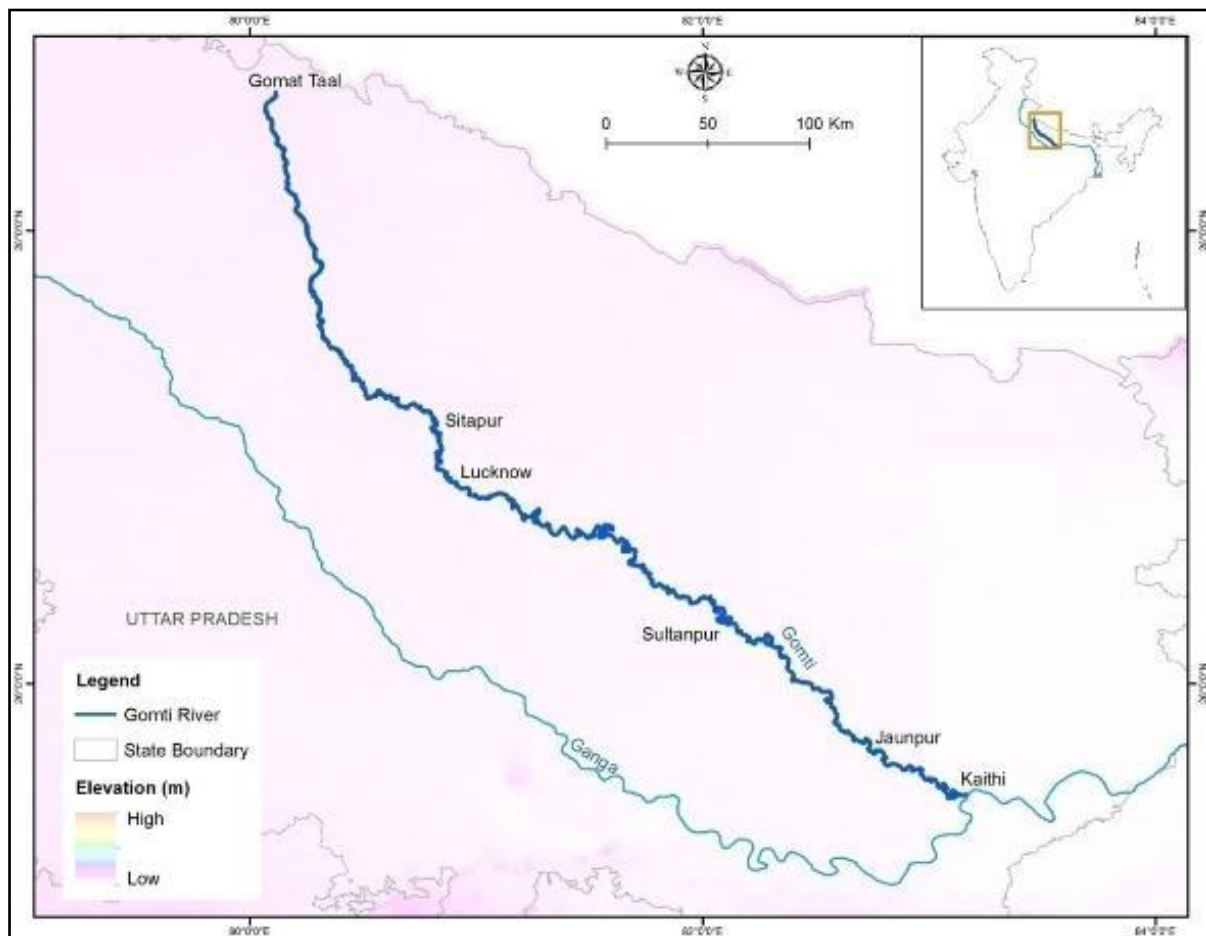


Figure 1.1 The course of the Gomti River

1.2 River zones

On the basis of the geology of the alluvial deposits, channel morphology such as meanders, landforms, confluences, aspect and slope, and flow barriers the river course was divided into three distinct stretches, viz., 1. Upper zone, 2. Middle zone, and 3. Lower zone (Figure 1.2 and 1.3).

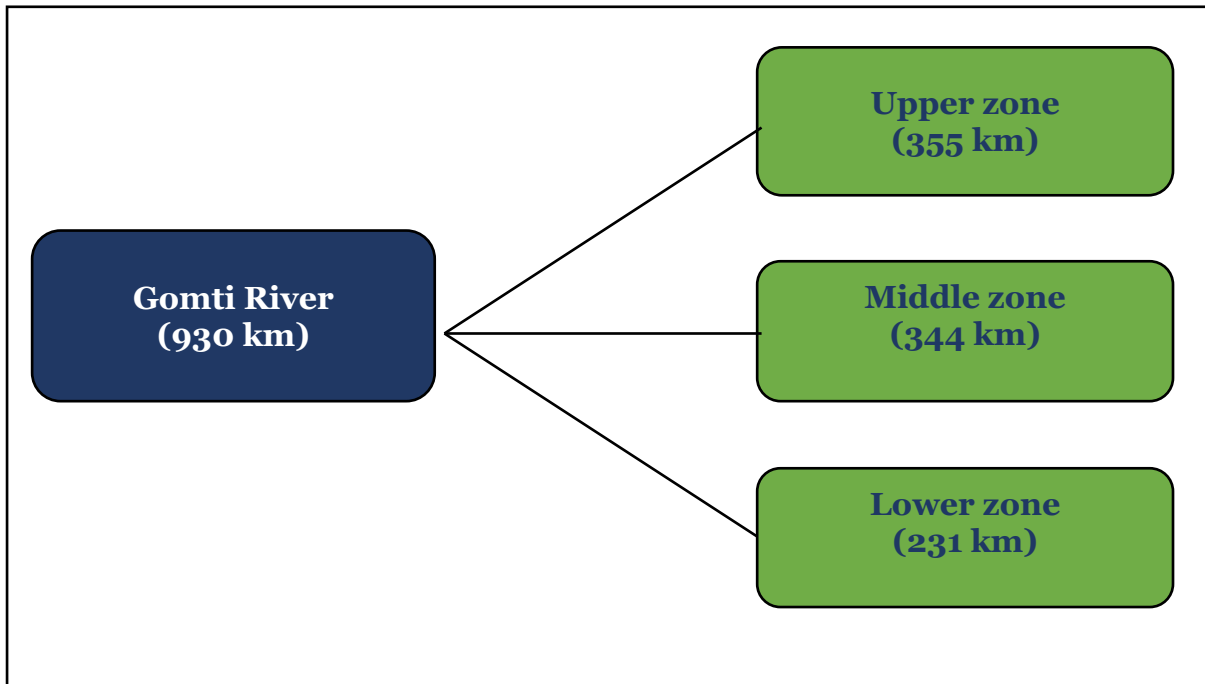


Figure 1.2 Zones of Gomti River

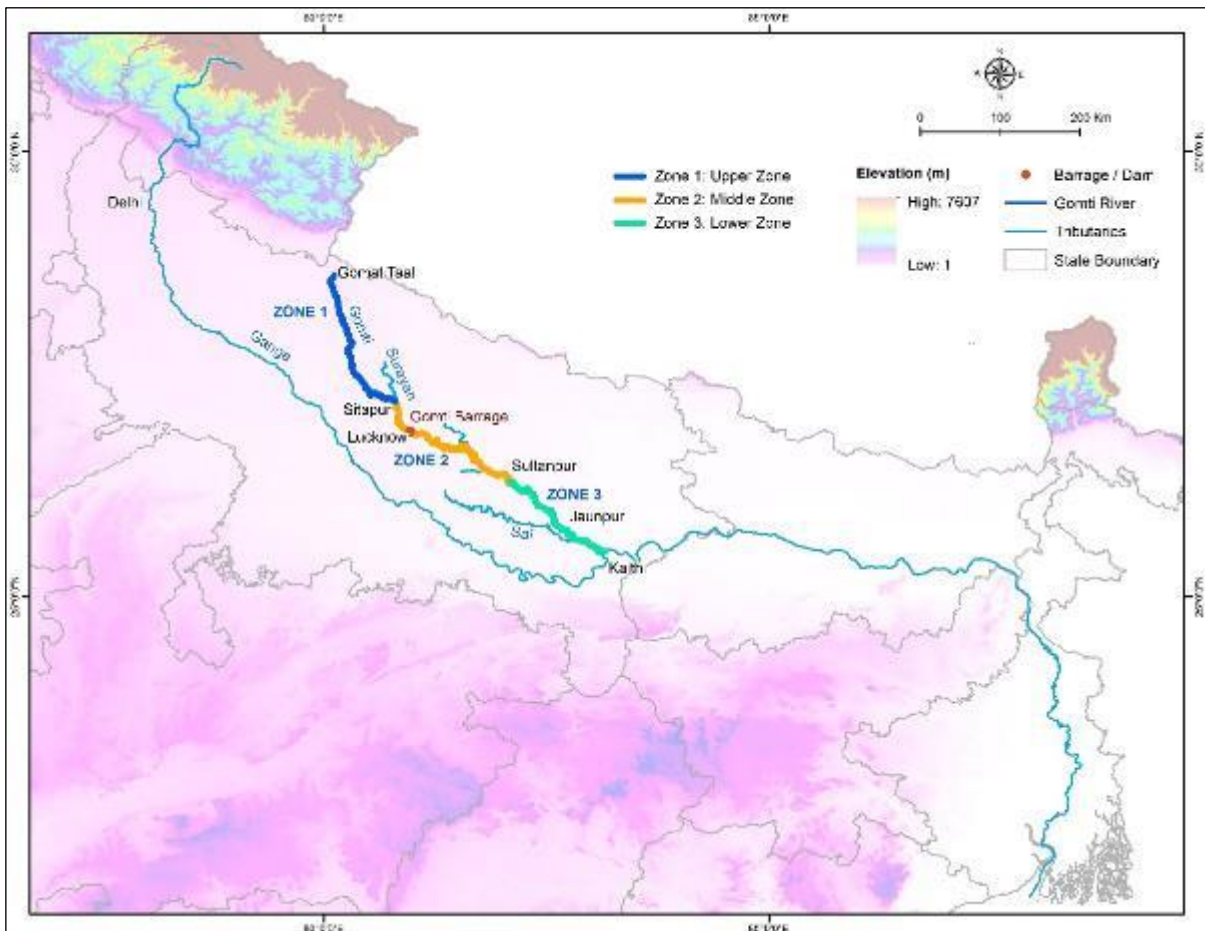


Figure 1.3 Zones of Gomti River

Upper zone

This stretch of river is 354 km long, flowing through the terai landscape. This zone starts from the Gomat taal and ends near Sitapur at the Surayan River confluence. This zone is rain fed, has very low flow and consists of small pools of water scattered over its entire length. The land use is predominantly agriculture.

Middle zone

This stretch of the river is 344 km long. This stretch lies between Surayan River confluence and Sultanpur. The capital of Uttar Pradesh state, Lucknow is in this stretch. Here, the Gomti River is fed by multiple networks of small tributaries. The water is diverted for agriculture near Lucknow at Gomti barrage. Land use is dominated by agricultural and industrial belt.

Lower zone

From Sultanpur up-till the confluence with the Ganga River at Kaithi, 231 km long Gomti can be classified as the lower zone. Sai a major tributary of Gomti joins near Jaunpur.

1.3 Drainage and hydrology

About 23 major and minor tributaries contribute to the flow of Gomti. The main tributaries of the Gomti River are Gachai, Sai, Jomkai, Barna, Chuha, Saryu, Giri, Kalyani and Kathna. After originating from GomatTaal, the Gomti River is joined by Gachai River in Pilibhit district from left bank. The river is joined by Jomkai and Barna tributaries in Shahjahanpur district. As the river flows through Khiritill Varanasi districts it receives many smaller tributaries such as Chuha, Saryu, Kathna, Bhainsi, Gon, Kalyani, Reth, Pili and Nand rivers. A major tributary, the Sai River joins from right bank at Jaunpur before confluence with the Ganga River (Tangri et al., 2018). Most of the smaller tributaries are groundwater-fed alluvial rivers. The total drainage area of the river is 30,437 km² constituting 12% of the area of the state of UP and 3.53% of the Ganga basin (NIH,1998). The river Drains the area lying between Ramganga and Sharda rivers in the upper reaches and between the area of the Ganga and Ghagra rivers in the lower reaches (Figure 1.3). It has a sluggish flow except for the monsoon, when heavy rainfall increases river's runoff. The annual discharge of river is about 7390 X 10⁶ m³ (Rao 1975).

1.4 Geology and geomorphology

Gomti is an interfluvial river of the middle Ganga plain, which is northern part of Indo-Gangetic foreland basin. The basin is elongated in shape and runs nearly parallel to the Himalayan front (Tangri et al., 2018). The basin is composed of unconsolidated sediments produced by weathering and erosion of the Himalayan and Peninsular rocks (Singh, 1999). The active channel has point bar deposits, with number and size of bar deposits increasing towards the lower segment of the river (Tangri et al., 2018).

1.5 Soil types

The Gomti basin contains mostly two types of alluvium, the older alluvium (Bangar) and the younger alluvium (Khadar) (Singh, 1996). The entire Gomti basin is underlain by thick alluvial sediments of the Quaternary age. The alluvial sediments consist of boulders, pebbles, gravels, sand, silt and clay. The younger alluvium occupies

the present-day floodplains while the older group occupies elevated portions mainly the doab (interfluvial) portions. The older alluvium is characterized by silicate nodules (Dutta, 2011). The soil of the basin is loam or dumat which is fertile and favourable for all type of seasonal crops, i.e., Rabi, Kharif, and Zaid (UP District Gazetters, 1959).

1.6 Climate

The climate of Gomti basin is sub-tropical monsoonal. The winter season (October to February) is cold and dry with occasional fogs and light showers. The summer season (March to early June) is hot and dry, and the monsoon season (middle June to September) is warm and humid, with frequent heavy rainfall. During winters, temperature ranges from 2–22 °C. In summer season, the temperature fluctuates between 28 to 44 °C and most part of the basin experiences the hot and dry wind known as the *loo*. During monsoon, the basin experiences heavy rainfall and high humidity. The rainfall in the upper zone ranges from 301.18 mm to 303.47 mm, whereas the rainfall in middle and lower zones of the basin ranges from 220.3 mm to 236.18 mm (Abeysingha et al., 2014)

1.7 Land use and land cover of the basin

The Gomti basin’s land use is predominately agriculture, followed by built-up area, which is highest in Lucknow. At the origin of the river deciduous forests is the major land cover type (Figure 1.4). The total forest cover in the Gomti Basin is 4.10% (Dutta, 2011).

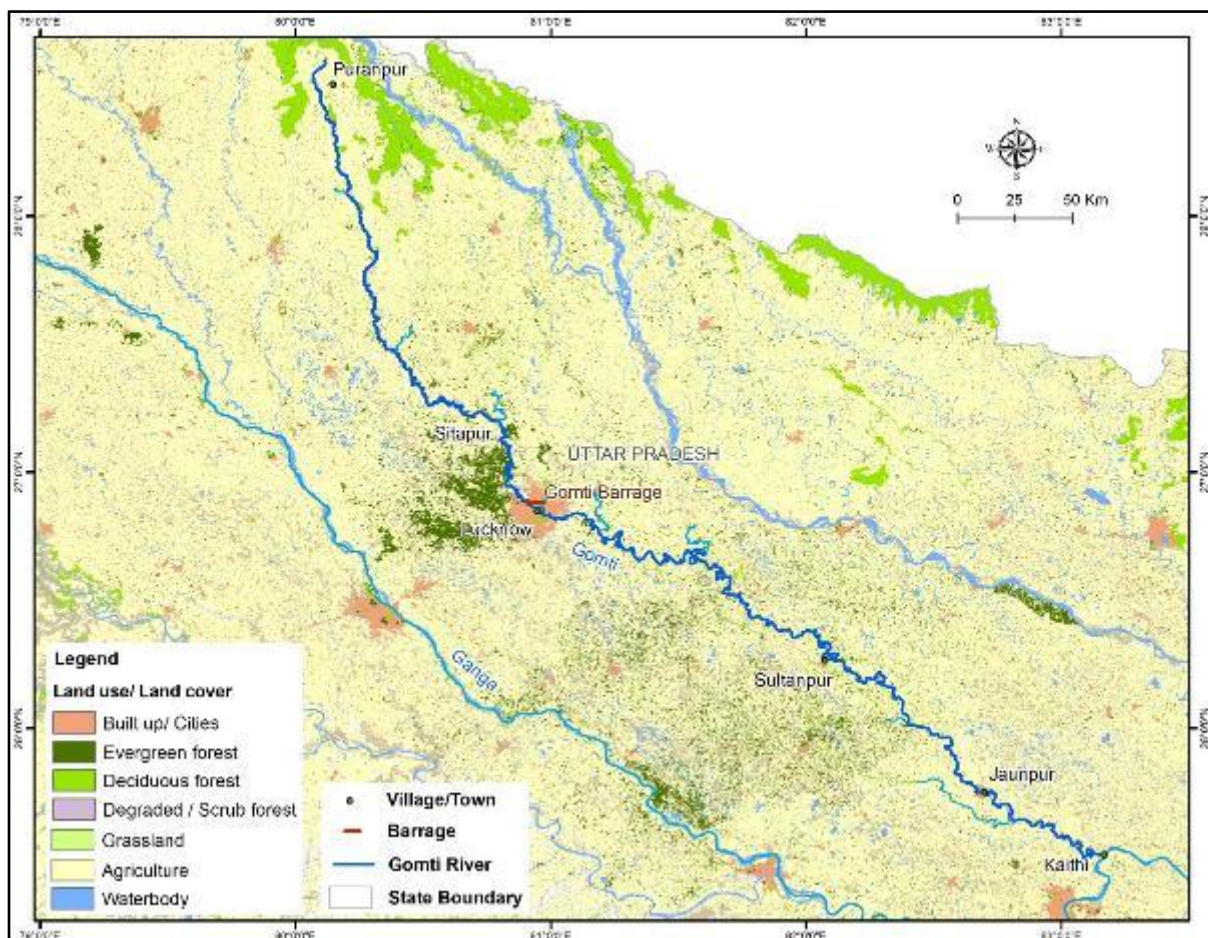


Figure 1.4 Land use and land cover along the Gomti River

1.8 Biogeography, flora and fauna

The Gomti River flows through the great alluvial fan of the Gangetic plain biogeographic zone (Upper Gangetic Plain – 7A), which is of Pleistocene-Holocene origin, and redistributes the weathered sediments Derived from Himalaya (Kumar & Singh, 1978). The Upper zone of the river falls under the Upper Gangetic Plain 7A province (Rodgers et al., 2000) and is a part of the greater Terai-Arc Landscape. Information on aquatic faunal assemblage from Gomti River is scantily documented. The literature on faunal assemblage is limited to few studies on birds and fish, that too from few locations along the river. Except for Pilibhit and Kheri districts, the remaining districts in the Gomti river basin have deficient forest cover (Dutta et al., 2015). Based on Champion and Seth (1968) the region falls under Tropical Dry deciduous forest type. Dominant forest type in this region are Northern tropical dry deciduous forest (*Shorea robusta*), Northern dry mixed deciduous forest (*Acacia catechu*), General edaphic types of dry deciduous forests (*Butea monosperma*, *Acacia arabica*), Dry tropical riverine forest (*Terminalia arjuna*, *Acacia catechu*, *Dalbergia sissoo*), Northern tropical thorn forests (*Acacia leucophloea*, *Acacia arabica*, *Prosopis cineraria*, *Zizyphus* spp.) (Singh & Chaturvedi, 2017) (Figure 1.5).

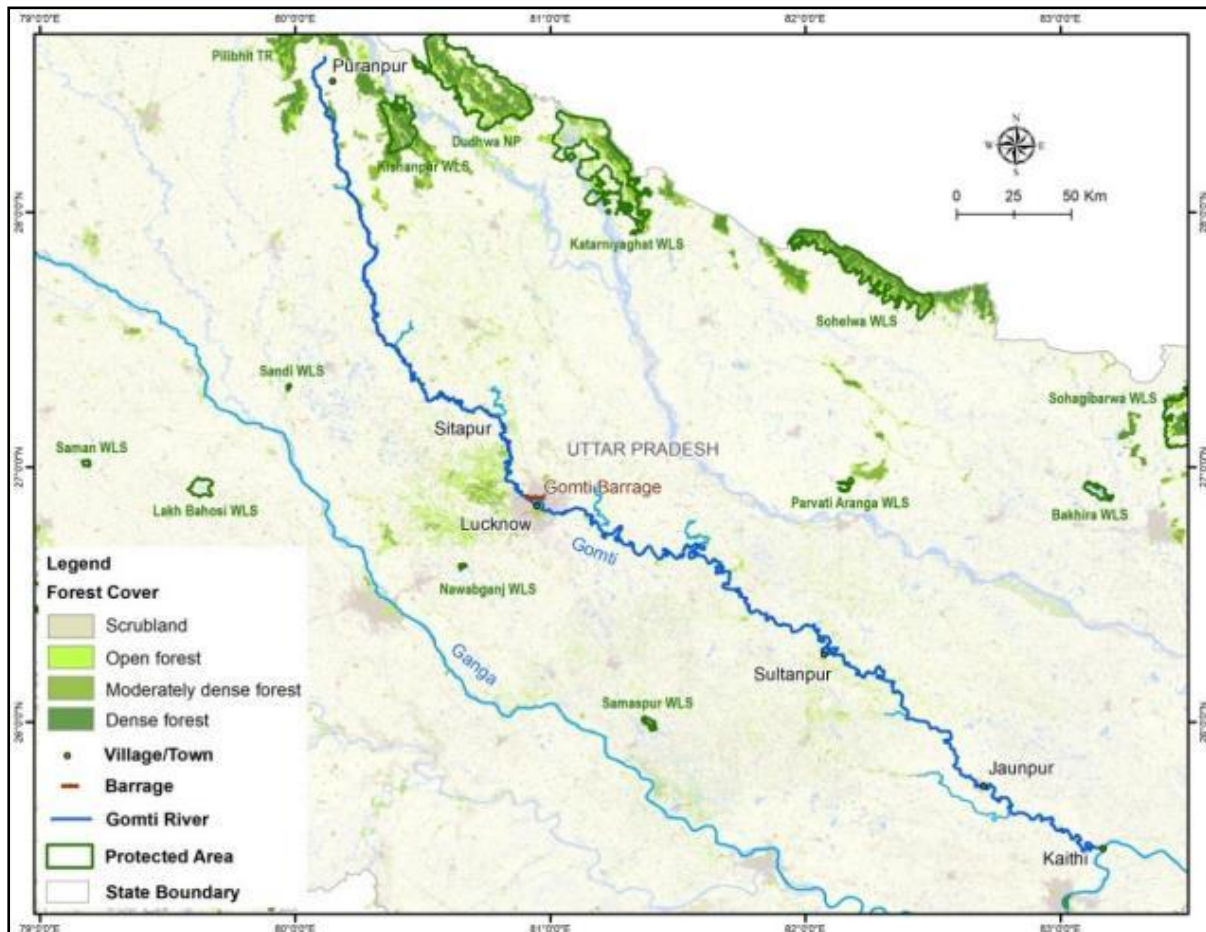


Figure 1.5 Forest cover of the Gomti basin

1.9 Demography

Thirteen districts of Uttar Pradesh state fall under the basin, with a total population of 46 million people and average human density of 1010.5 persons/km². The Gomti river basin has high population density, which ranges from 524 persons/km² to 2395 persons/km² (Banerjee, 2012. list: Census of India, 2011, (Table 1 and Figure 1.6).

Table 1: Human population density along the Gomti River (Source: Census of India, 2011)

| State | Zones | Population Density (persons/km ²) |
|---------------|--------------|---|
| Uttar Pradesh | Upper | 3225 |
| | Middle | 5332 |
| | Lower | 4580 |
| | Total | 13137 |

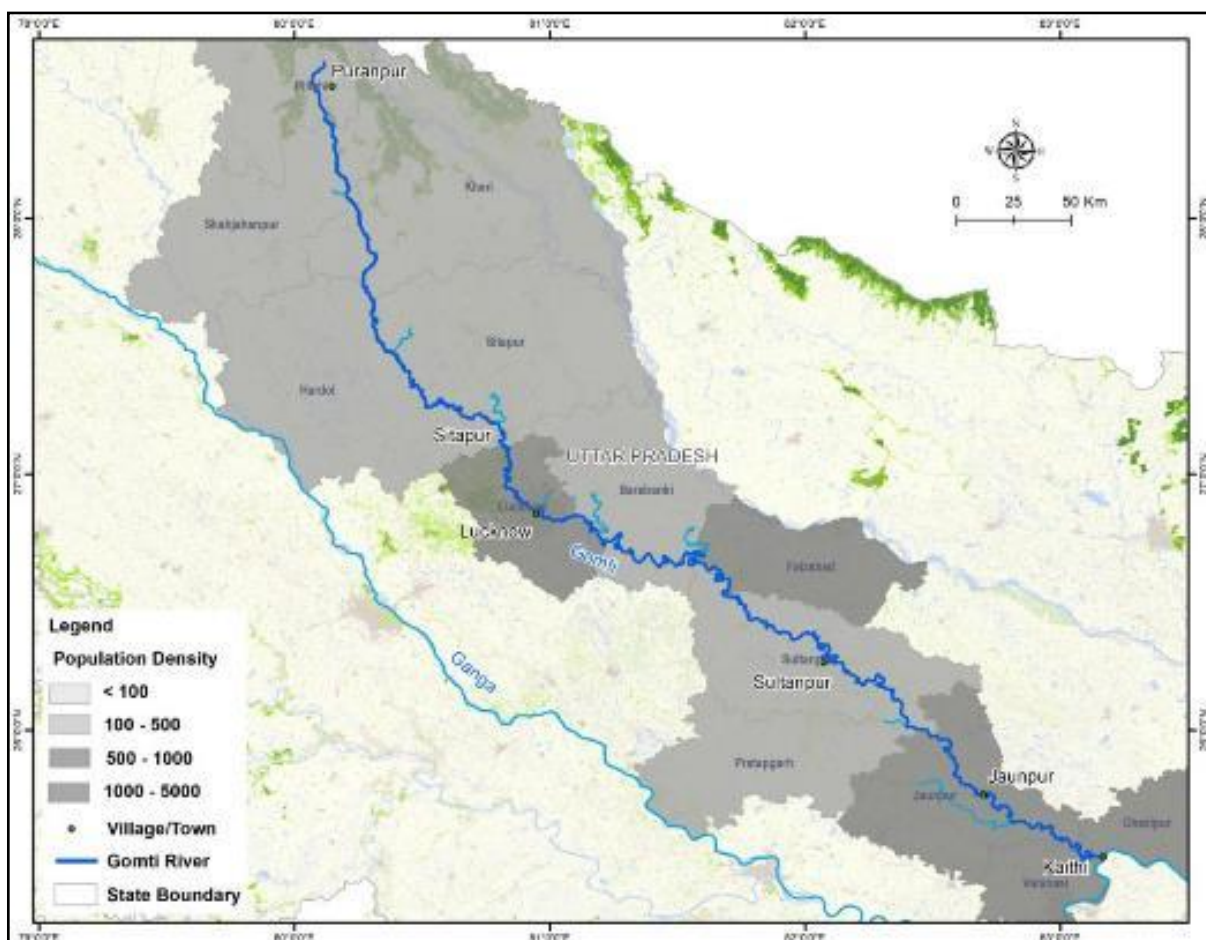


Figure 1.6 Population density along the Gomti River



2. ECOLOGICAL STATUS OF THE GOMTI RIVER

2.1 Methodological Framework

A multimodal framework was adopted to assess the state of aquatic wildlife of the Gomti River. In the first stage a comprehensive review of literature on the distribution, abundance and threats to the aquatic wildlife was carried out, which produced information on historical and current status of the aquatic wildlife of the river. In the second stage, a continuous ecological survey, combining boat based and on-foot transect methods, was carried out during winter (January-February 2020), from Madhav Tanda village in Pilibhit to Kaithi in Varanasi. The ecological assessment generated information on occurrence, distribution and relative abundance of aquatic wildlife, channel hydrology and morphometry and prevailing anthropogenic influences. In the third stage, land use/land cover, species distribution and threat maps were prepared.



2.2 Avifauna

The studies on avifauna of the Gomti River are restricted to smaller stretches of the river, which are mainly near Lucknow and from Sandi Bird Sanctuary. In two related publications Kanaujia et al (2015) and Kumar and Kanaujia (2016) have reported 70 species of waterbirds species, Hence the study reveals that in Lucknow there are maximum populations of Migratory water birds followed by residential, residential/local migratory and residential/migratory species.

During the first post monsoon survey overall, 435 individuals of waterbirds belonging to 7 orders, 10 families, 13 genera and 13 species were recorded across the Gomti River. Overall Rallidae (27%) was the most abundant

family followed by Phalacrocoracidae (15%). The family Recurvirostridae had the maximum number of observed individuals (88) followed by Rallidae (70) and Charadriidae (50) (ANNEXURE I)

During the second post monsoon survey of all stretch of Gomti River, in total individual counts of 1102 individuals of 9 orders, 14 families and 31 species, were recorded across the stretch. Of which, Charadriidae was the most abundant family followed by Rallidae and Ardeidae. The family Charadriidae had the maximum number of observed individuals (n= 76) (Figure 1.7).

During the survey period in February and March months, the migratory birds observed were Gadwall, Wood sandpiper, Green sandpiper, and Common sandpiper.

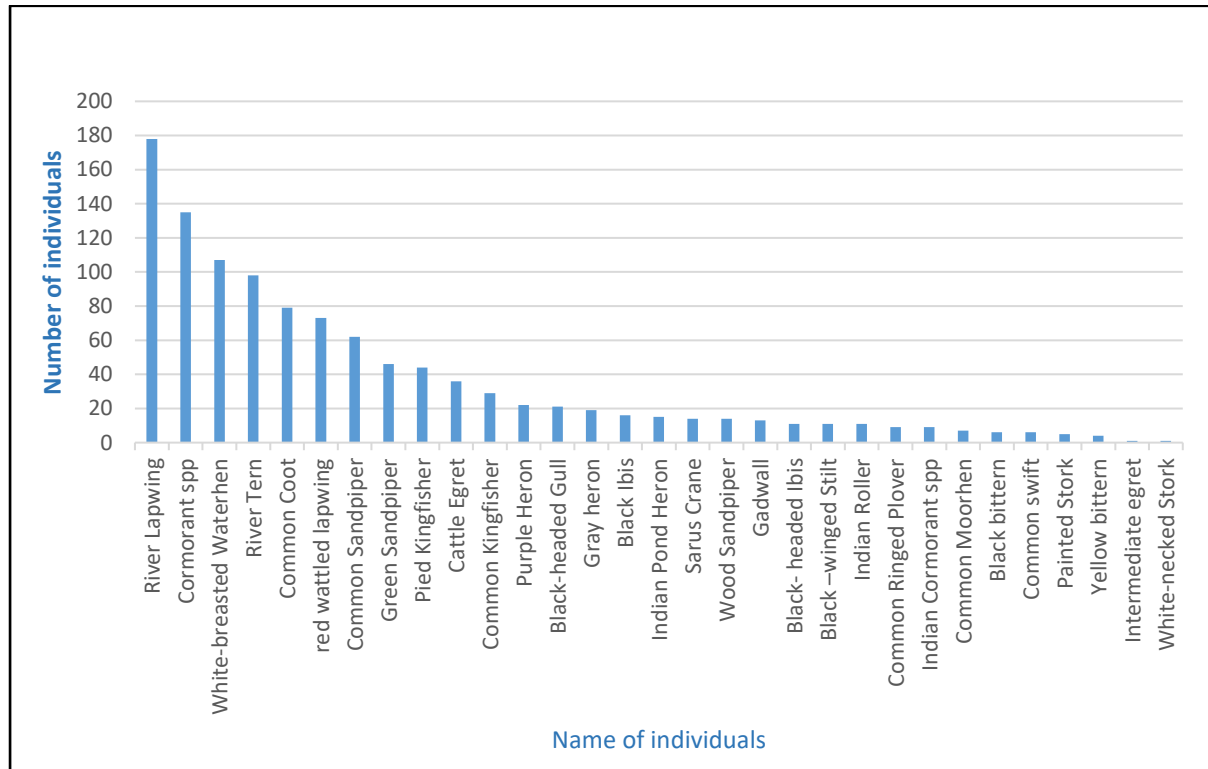


Figure 1.7 Distribution of birds during the survey



2.2.1 Rare Endangered Threatened (RET) species

Out of all the recorded species, 4 were Vulnerable in the IUCN Red List of Threatened Species (Table 2 and Figure 1.8 and 1.9), while rest were categorized as “Least Concern”.

Table 2: RET Species present in across the Gomti River

| Order | Family | Common Name | Scientific Name | IUCN Status |
|-----------------|--------------|---------------|------------------------------|-------------|
| Anseriformes | Charadriidae | River Lapwing | <i>Vanellus duvaucelli</i> | NT |
| Charadriiformes | Laridae | River Tern | <i>Sterna aurantia</i> | NT |
| Ciconiiformes | Ciconiidae | Painted Stork | <i>Mycteria leucocephala</i> | NT |
| Gruiformes | Gruidae | Sarus Crane | <i>Antigone antigone</i> | VU |

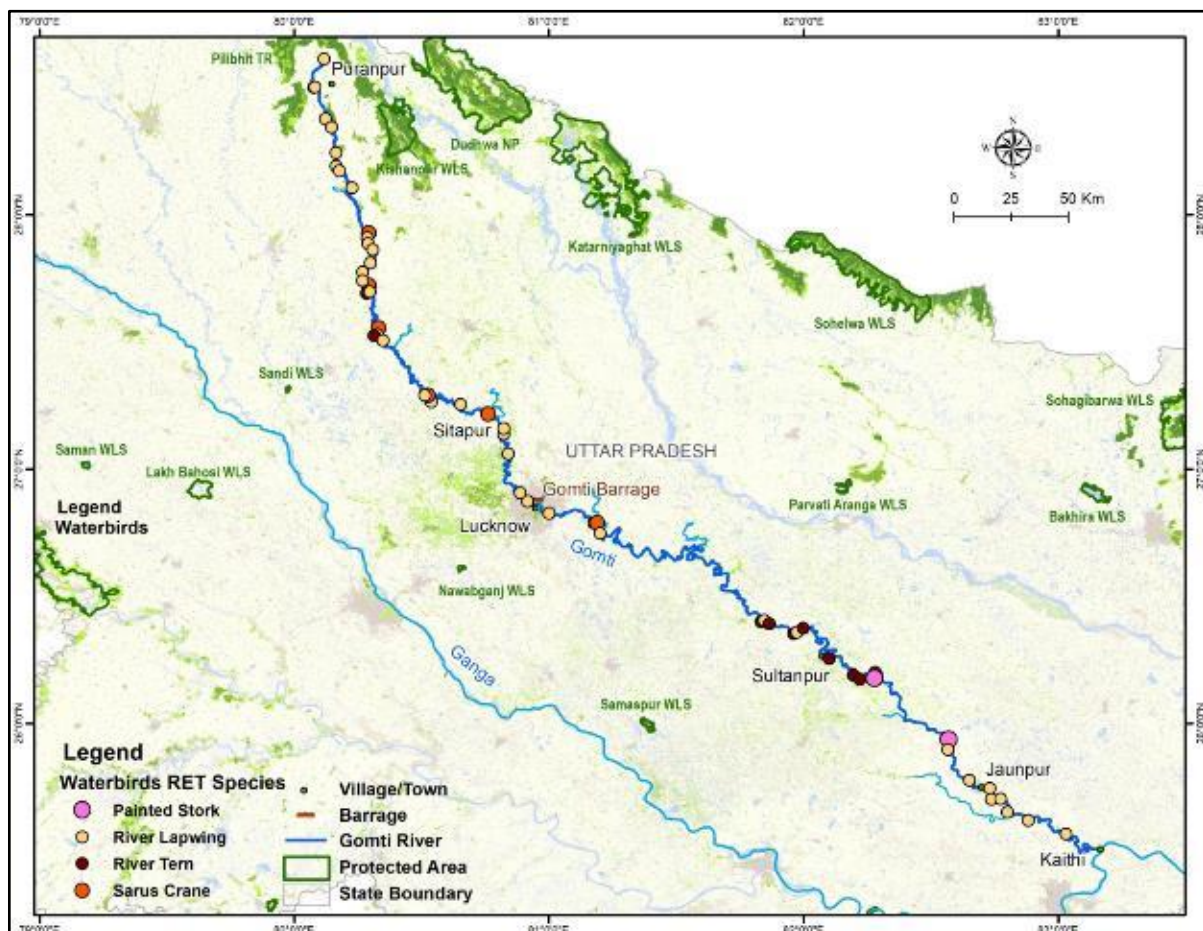


Figure 1.8 Distribution of RET Species

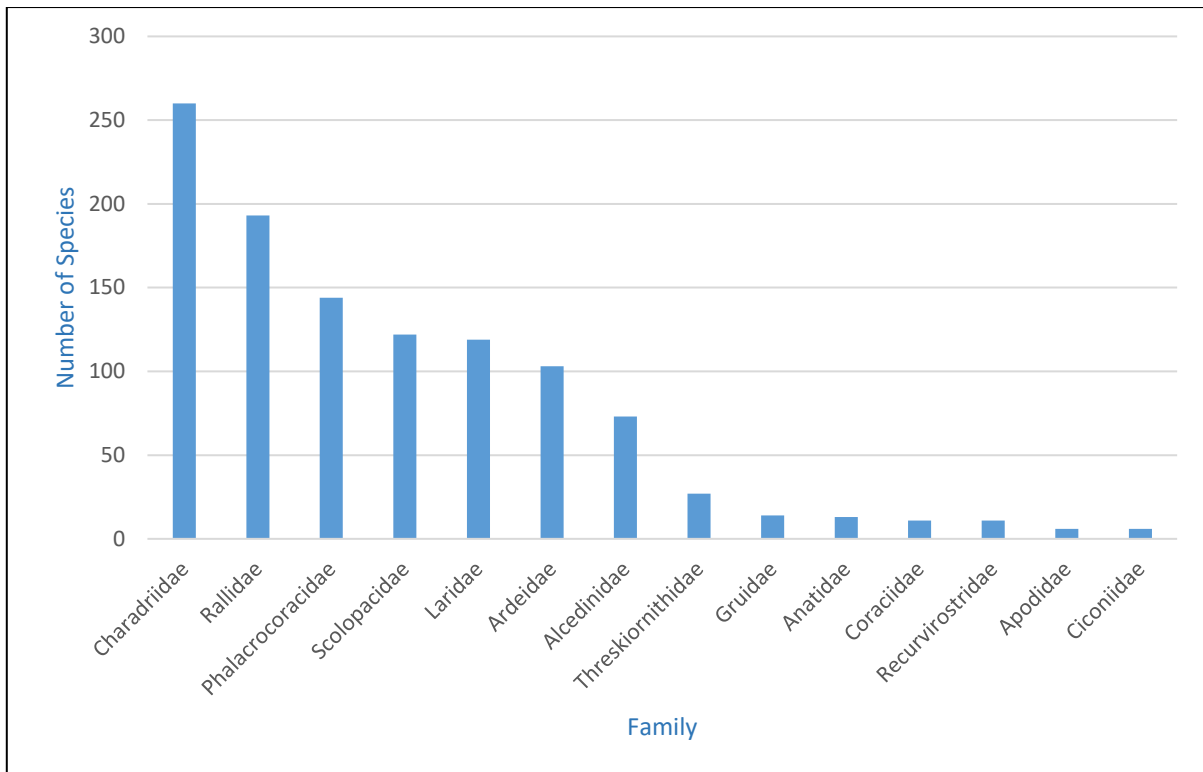


Figure 1.9 Family wise composition of birds

2.3 Mugger

During the survey, total 11 adult individuals of Mugger were sighted along the side banks of the river. In the upstream Rampura, Fatuhabad area and downstream Sultanpur, Pindra area. Most of the individuals were recorded in the clay islands and sandbar in proximity to agriculture land. (Figure 1.10).

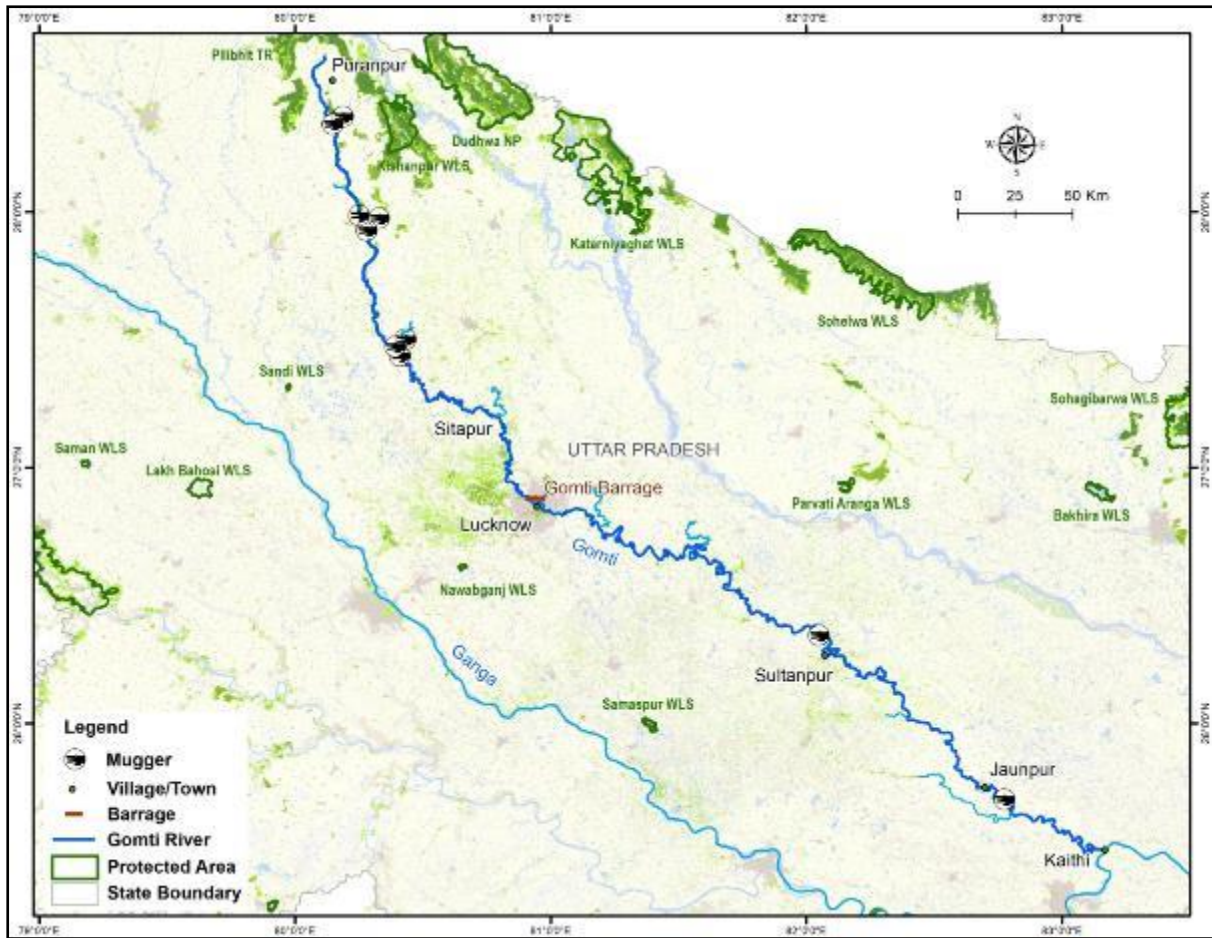


Figure 1.10 Distribution map of Mugger during the survey

2.4 Turtles

A total of 51 Individual turtles belonging to two families viz., Geoemydidae (Indian Roofed Turtle, *Pangshura tecta*; Indian tent Turtle, *Pangshura tentoria*; Crowned River Turtle, *Hardella thurjii*) and Trionychidae (Indian soft-shell turtle, *Nilssonina gangetica*; Indian Flap-shell turtle, *Lissemys punctata*) were recorded. These sightings were recorded from Madhotanda, Shahjahanpur, Lucknow and Sultanpur area and in the stretch from Pilibhit to Sultanpur (Figure 1.11 and 1.12).

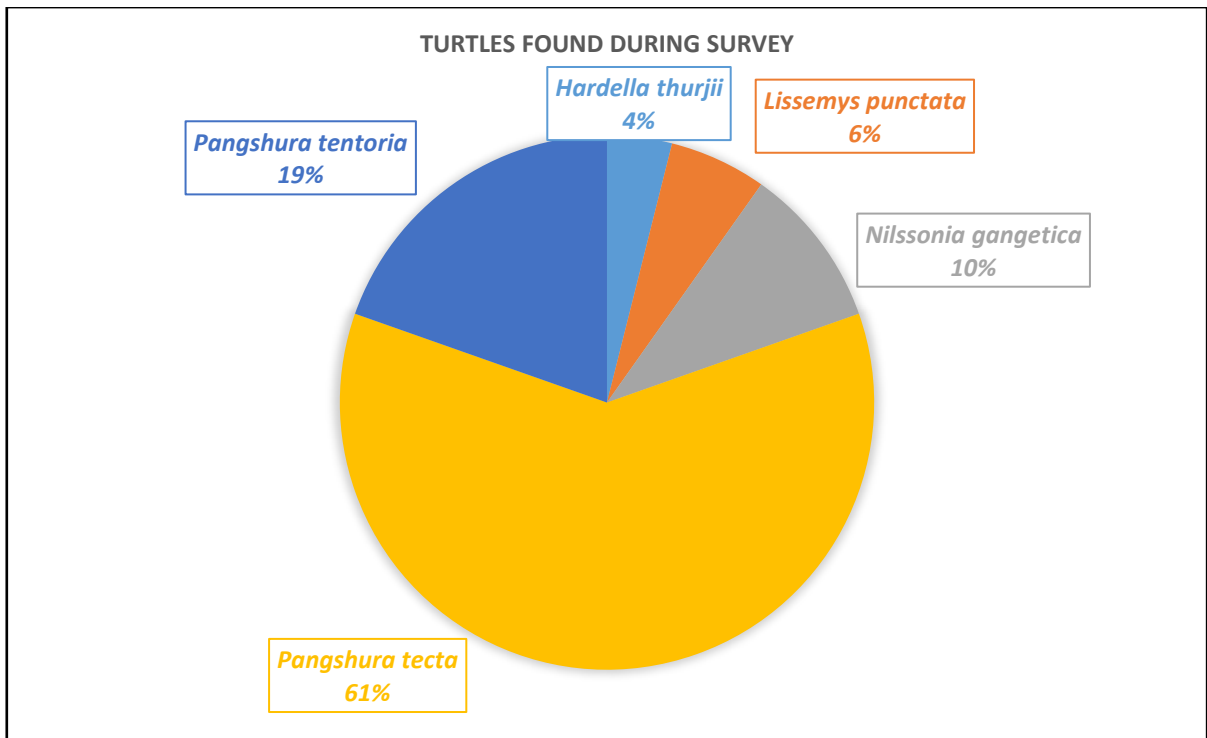


Figure 1.11 Species composition of turtles across the Gomti River

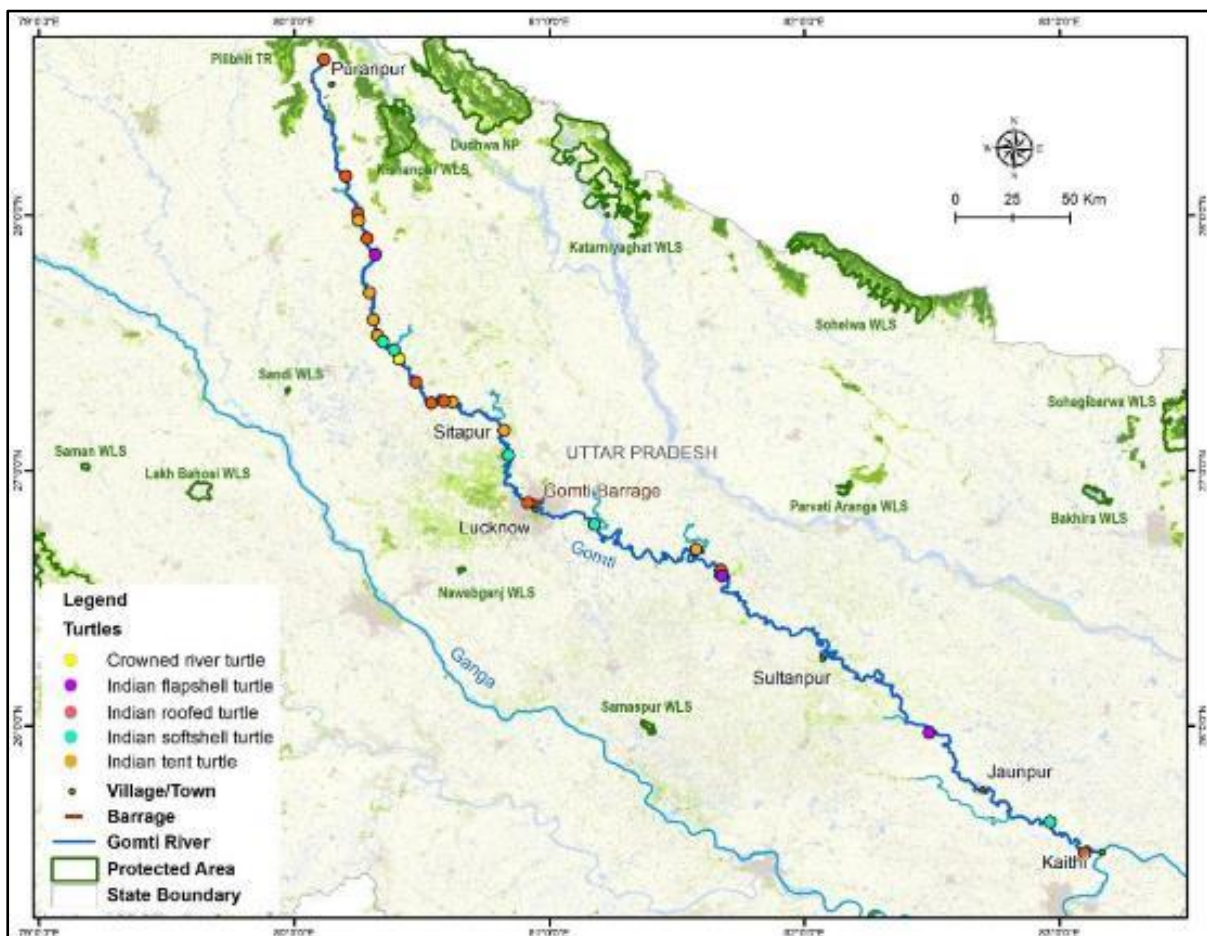


Figure 1.12 Distribution of turtles along the Gomti River

2.5 Fish

Sarkar et al (2010) recorded total of 56 freshwater fish species from Gomti river. These 56 fish species belong to 20 families and 42 genera, 8.9% of these belong to endangered and 19% to vulnerable categories as per IUCN redlist. The Indian major carps, *Chitala chitala*, *Notopterus notopterus*, *Ompok pabda*, *O. bimaculatus*, *Labeo bata*, *L. calbasu*, *Cirrhinus reba*, *Channa marulius*, *Bagarius bagarius*, and *Clupisoma garua* are the important species found in the Gomti river. The fish fauna of the River Gomti is also known to be highly threatened due to human induced threats like sewage pollution, habitat alteration. In this survey, 26 fish species in total were recorded from 8 families and 5 orders. The most common fishes reported in the middle and lower zone are represented by *Gudusia chapra*, *Setipinna phasa*, *Rita rita*, *Gibelion catla*, *Labeo rohita*, *C. mrigala*, *Pethia ticto* and *Macrognathus pancalus* (ANNEXURE II)

In the middle and lower stretch, we observed fishing activities at Ghaila, Saitha, Raitha, Kakarghata, Khemtau, Nijamuddinpur, Sultanpur and Brasin. In the lower stretch in Nizamuddinpur and sultanpur, the fishermen were found to be using funnel and cast net for fishing while in the middle stretch settlements of Ghaila, Saitha and Raitha the fishermen reported to use the Phansa method for fishing in the winter season (Figure 1.13).

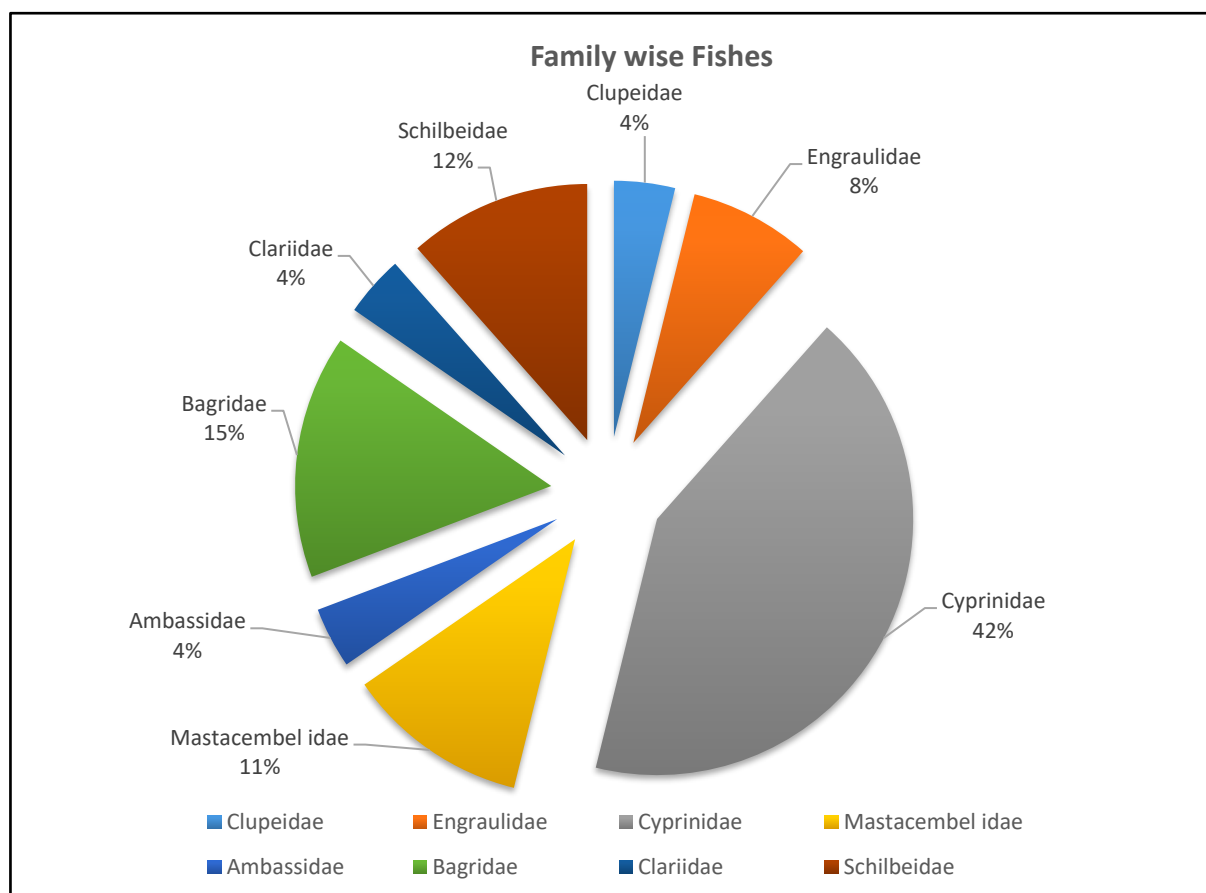


Figure 1.13 Family wise species richness across the Gomti River

2.6 Vegetation

A total 41 plant species and 26 families have been recorded during the survey period (Figure 1.14). The plants are classified according to their habit types into herbs, shrubs, climbers, grasses, reeds and sedges. A checklist of the recorded plant species has been given in Among 26 families, Habit wise classification of the recorded plants indicated that a majority of the plants along the Gomti River are herbs (32), followed by grasses (5), shrubs (2), sedges and reeds (1), climber (1) (Figure 1.15). Habitat wise classification of the recorded plants indicated that a majority of the plants along the Gomti River are four categories Riparian (15), Moist (13), Marshy (7) and Aquatic (6). (Figure 1.16). (ANNEXURE III)

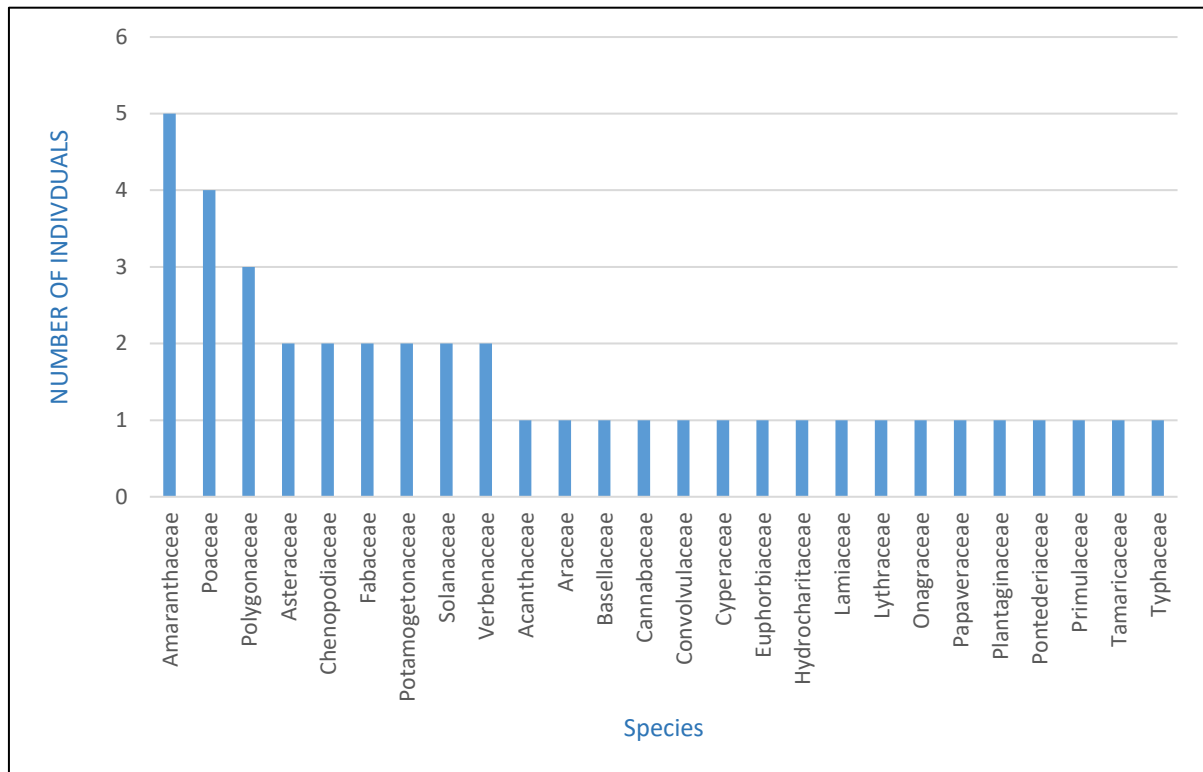


Figure 1.14 Floristic diversity recorded along the Gomti River

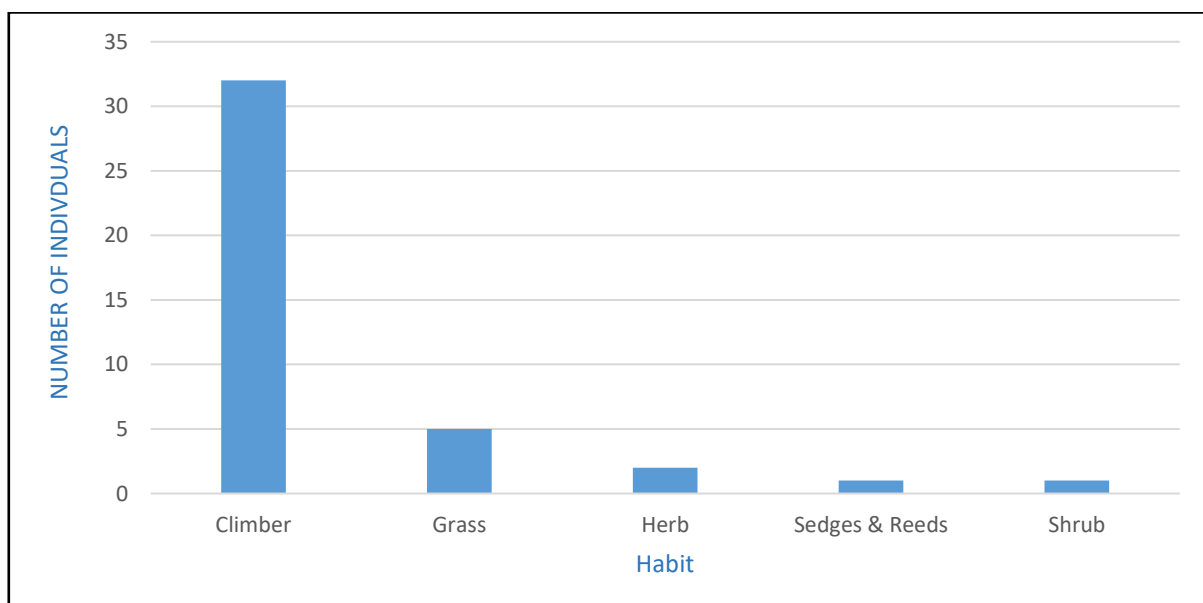


Figure 1.15 Plant Habit type recorded along the Gomti River

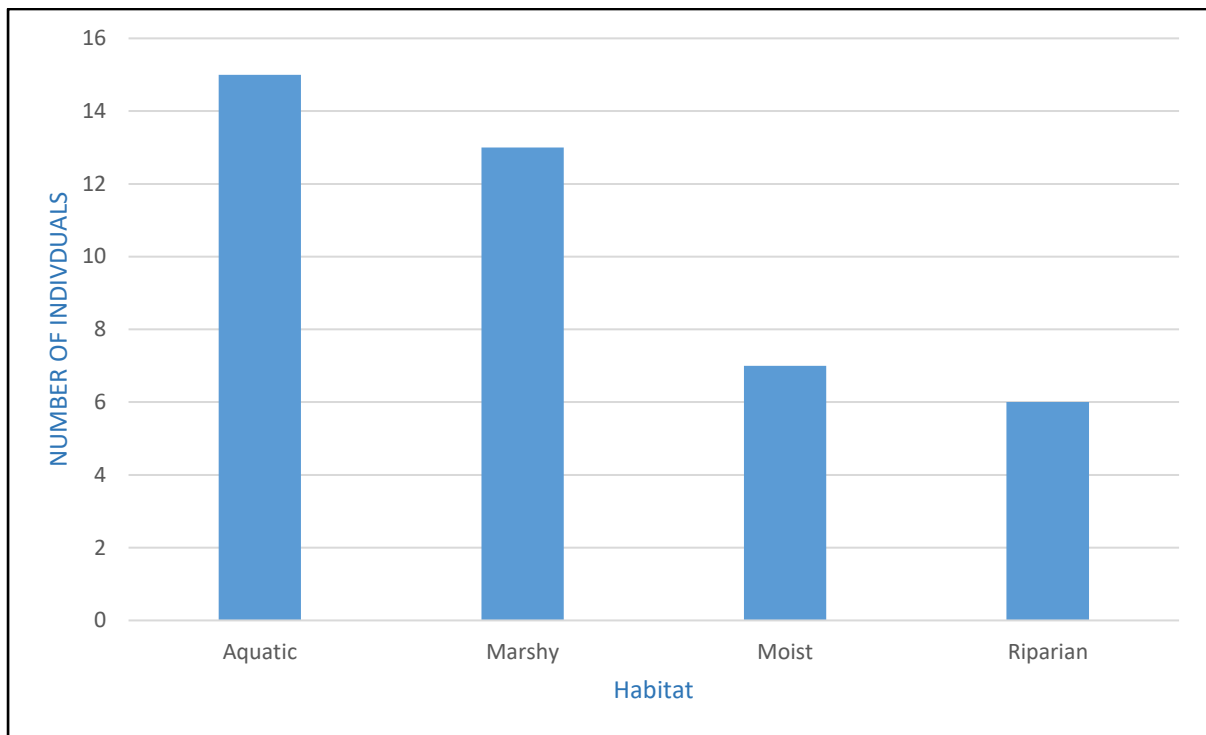


Figure 1.16 Plant Habitat type recorded along the Gomti River





3. THREATS

During its course, Gomti receives huge quantities of untreated sewage. Agricultural run offs bring huge load of pesticides, fertilizers, industrial wastes, which significantly alter the physico-chemical properties of water. Before reaching Lucknow city, the Gomti River receives wastes from sugar and distillery industries of Sitapur district. In Lucknow city, various industries like distillery, defence, dairy, vegetable oil, etc. pour effluents directly into the Gomti. Besides the industrial effluents, untreated domestic wastewater is also discharged into the Gomti. The major sources of pollution in the Gomti are the Industrial waste and effluent from sugar factories and distilleries, domestic waste water and sewage from habitations (Singh, 2011). Agriculture, fishing, free-ranging dogs were the most common threats found during the survey. Out of the total **155** surveyed locations, a total of 143 locations has an Intensive Agriculture pattern. A total of 93 individuals of free-ranging dogs were recorded in the entire stretch. Fishing activity was observed in 17 sites across the river stretch.

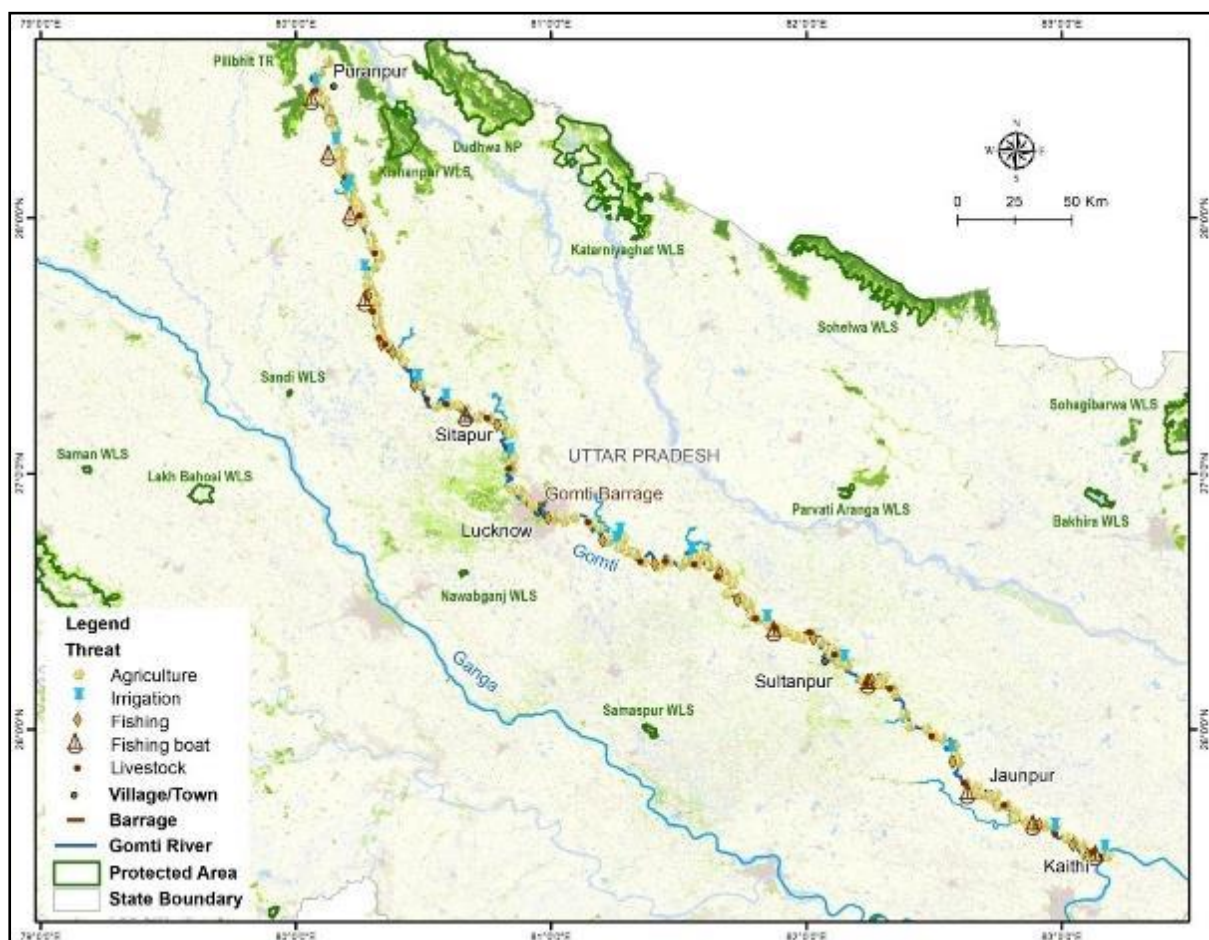


Figure 1.17 Threat map for Gomti River Pre-monsoon 2020

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- Above two are very poor quality references. The report relies heavily on these for migratory status (wrong in many cases), the paper on waders includes any bird that is near water as “wader” including Wagtails (which are passeriformes). Their contribution may be noted as the number of species observed and a consolidated checklist provided as an appendix. Including detailed appendices from these two papers is not wise
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ANNEXURE I

List of Birds sighted during the survey

| Order | Family | Species Name | Scientific name | IUCN Status |
|-----------------|-------------------|-------------------------|------------------------------|-------------|
| Charadriiformes | Charadriidae | Red wattled lapwing | <i>Vanellus indicus</i> | LC |
| Charadriiformes | Laridae | Black-headed gull | <i>Larus ridibundus</i> | LC |
| Charadriiformes | Recurvirostridae | Black-winged stilt | <i>Himantopus himantopus</i> | LC |
| Ciconiiformes | Ciconiidae | Asian open billed stork | <i>Anastomus oscitans</i> | LC |
| Coraciiformes | Alcedinidae | Pied Kingfisher | <i>Ceryle rudis</i> | LC |
| Gruiformes | Gruidae | Sarus crane | <i>Antigone antigone</i> | VU |
| Gruiformes | Rallidae | Common moorhen | <i>Gallinula chloropus</i> | LC |
| Gruiformes | Rallidae | Eurasian coot | <i>Fulica atra</i> | LC |
| Gruiformes | Rallidae | Purple swamphen | <i>Porphyrio porphyrio</i> | LC |
| Passeriformes | Motacillidae | Yellow wagtail | <i>Motacilla flava</i> | LC |
| Pelecaniformes | Ardeidae | Indian pond heron | <i>Ardeola grayii</i> | LC |
| Suliformes | Phalacrocoracidae | Great cormorant | <i>Phalacrocorax carbo</i> | LC |
| Suliformes | Phalacrocoracidae | Little Cormorant | <i>Microcarbo niger</i> | LC |

ANNEXURE II

List of fishes found during the survey

| Order | Family | Scientific Name | Common name | IUCN Status |
|----------------------|-----------------|-----------------------|------------------|-------------|
| Clupeiformes | Clupeidae | Gudusia chapra | Suiya | LC |
| | Engraulidae | Setipinna phasa | Phasia | LC |
| | | Amblypharyngodon mola | Moa | LC |
| Cypriniformes | Cyprinidae | Aspidoparia morar | Pirohia | LC |
| | | Gibelion catla | Katla | LC |
| | | Chela laubuca | Dendula | LC |
| | | Cirrhinus mrigala | Mrigal | LC |
| | | Labeo gonius | Bata | LC |
| | | Labeo pangusia | Rewa | NT |
| | | Labeo rohita | Rohu | LC |
| | | Osteobrama cotio | Chela | LC |
| | | Pethia ticto | Pothia | LC |
| | | Puntius chola | Siddhari | LC |
| | | Pethia conchonius | Pothi | LC |
| Synbranchiformes | Mastacembelidae | Puntius sophore | Sidhari, Pot | LC |
| | | Macrognathus pancalus | Bami, turi | LC |
| | | Mastacembelus armatus | Baam, gomi | LC |
| Perciformes | Ambassidae | Chanda nama | Chanari | LC |
| Siluriformes | Bagridae | Aorichthys aor | Daryai- Tenggara | LC |
| | | Aorichthys seenghala | Tengra | LC |
| | | Rita rita | Ritha | LC |
| | | Mystus cavasius | Daryai-Tengar | LC |
| | Clariidae | Clarias gariepinus | Thai magur | LC |
| | Schilbeidae | Ailia coila | Kajoli | NT |
| | | Clupisoma garua | Karahi | LC |
| Eutropiichthys vacha | | Banjhoo | LC | |

ANNEXURE III

List of vegetation found during survey

| Family | Species name | Habit | Habitat | IUCN Status |
|------------------|---|---------|----------|-------------|
| Basellaceae | Basella alba L. | Climber | Riparian | - |
| Poaceae | Eleusine indica (L.) Gaertn. | Grass | Moist | LC |
| Poaceae | Eragrostis amabilis (L.) Wight & Arn. | Grass | Moist | - |
| Cyperaceae | Cyperus rotundus L. | Grass | Moist | LC |
| Poaceae | Coix lacryma-jobi L. | Grass | Marshy | - |
| Poaceae | Saccharum ravennae (L.) L. | Grass | Moist | LC |
| Amaranthaceae | Achyranthes aspera L. | Herb | Moist | - |
| Amaranthaceae | Alternanthera paronychioides A.St.-Hil. | Herb | Moist | - |
| Amaranthaceae | Amaranthus spinosus L. | Herb | Riparian | - |
| Araceae | Pistia stratiotes L. | Herb | Aquatic | LC |
| Cannabaceae | Cannabis sativa L. | Herb | Riparian | - |
| Papaveraceae | Argemone mexicana | Herb | Riparian | - |
| Primulaceae | Anagallis arvensis L. | Herb | Moist | - |
| Chenopodiaceae | Suaeda fruticosa (L.) Forsk. | Herb | Moist | - |
| Amaranthaceae | Alternanthera philoxeroides (Mart.) Griseb. | Herb | Aquatic | - |
| Amaranthaceae | Alternanthera sessilis (L.) R. Br. ex DC. | Herb | Marshy | LC |
| Chenopodiaceae | Chenopodium album L. | Herb | Riparian | - |
| Solanaceae | Datura stramonium L. | Herb | Riparian | - |
| Lamiaceae | Anisomeles indica (L.) Kuntze | Herb | Riparian | - |
| Acanthaceae | Justicia adhatoda L. | Herb | Riparian | - |
| Asteraceae | Sonchus wightianus DC. | Herb | Riparian | - |
| Plantaginaceae | Veronica anagallis-aquatica L. | Herb | Marshy | LC |
| Tamaricaceae | Tamarix indica Willd. | Herb | Riparian | - |
| Euphorbiaceae | Euphorbia hirta L. | Herb | Moist | - |
| Polygonaceae | Polygonum plebeium R.Br. | Herb | Moist | - |
| Polygonaceae | Persicaria glabra (Willd.) M.Gómez | Herb | Moist | - |
| Potamogetonaceae | Potamogeton crispus L. | Herb | Aquatic | - |
| Fabaceae | Tephrosia purpurea (L.) Pers. | Herb | Riparian | - |
| Hydrocharitaceae | Vallisneria natans (Lour.) H. Hara | Herb | Aquatic | LC |
| Potamogetonaceae | Potamogeton nodosus Poir. | Herb | Aquatic | - |
| Solanaceae | Nicotiana plumbaginifolia Willd. | Herb | Marshy | - |
| Fabaceae | Cicer arietinum L. | Herb | Riparian | - |

| | | | | |
|----------------|--|-------------------|----------|----|
| Polygonaceae | Rumex dentatus L. | Herb | Moist | - |
| Asteraceae | Ageratina adenophora (Spreng.) R.M.King&H.Rob. | Herb | Riparian | - |
| Pontederiaceae | Eichhornia crassipes (Mart.) Solms | Herb | Aquatic | - |
| Lythraceae | Ammannia baccifera L. | Herb | Marshy | LC |
| Onagraceae | Ludwigia adscendens (L.) H.Hara | Herb | Marshy | - |
| Verbenaceae | Phyla nodiflora (L.) Greene | Herb | Moist | LC |
| Typhaceae | Typha angustata Bory. & Choub. = <i>Typha domingensis</i> Pers. | Sedges & Reeds | Marshy | LC |
| Convolvulaceae | Ipomoea carnea Jacq. | Shrub | Riparian | - |
| Verbenaceae | Lantana camara L. | Shrub | Riparian | - |



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