

SOCIO-ECOLOGICAL PROFILE OF

CHANDRABHAGA RIVER



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Preface

India, as a megadiverse country, is home to a diverse range of landscapes and ecosystems, including freshwater ecosystems that comprise rivers and associated wetlands. Among them, the Ganga River basin is an important life-support system that has sustained human civilizations since ages. The Ganga River, which flows across five states is a vital source of life for more than 40 per cent of India's billion-plus population. The Ganga River is fed by several tributaries, which contribute to the river's integrity by providing adequate nutrients, drift, and favourable ecological conditions for the species it houses. On the contrary, such tributaries also bring with them numerous pollutants and toxic waste resulting in the increase of the pollution load on the Ganga River.

The Wildlife Institute of India through the *Biodiversity Conservation and Ganga Rejuvenation Project* funded by the Ministry of Jal Shakti "National Mission for Clean Ganga" under its flagship programme 'Namami Gange' has been working towards the conservation of the Ganga River, to strengthen concerted efforts for restoration of its biodiversity value. During the project's first phase, which focused on the detailed biodiversity profiling of the Ganga River, the importance of conservation of its tributaries in supporting the biodiversity of Ganga River was realized. As a result, phase II of the project "*Planning and Management for Aquatic Species Conservation and Maintenance of Ecosystem Services in the Ganga River Basin for a Clean Ganga*" was designed to develop a comprehensive restoration and long-term plan for the Ganga River's tributaries. In view of this the project undertook study of major tributaries of Ganga River and studied smaller tributaries in the Ganga basin.

Chandrabhaga River is a right bank tributary of Ganga River, which originates near Deoli Temple in Lesser Himalayan Mountain range in the Tehri district of Uttarakhand and joins Ganga River in Rishikesh, Dehradun district, Uttarakhand. Based on a primary survey and secondary literature review, this report attempts to compile the social-ecological profile of the Chandrabhaga River and will enable the reader to better understand the variety of the flora and fauna of the Chandrabhaga River, change in forest cover and land use land cover patterns, and the threats faced by it. A total of 40 mammalian species, 165 bird species, 21 reptilian species, 10 amphibian species, 62 fish species, are reported from the Chandrabhaga River basin. A preliminary survey of riparian vegetation recorded a total of 158 angiosperm taxa, representing 128 genera and 50 families along the Chandrabhaga River. This report highlights the need for focused scientific studies and integrated conservation efforts for the Chandrabhaga River to build a comprehensive knowledge base on its species, support ecological restoration, and guide policy makers and managers in making judicious water use decisions.

**Ruchi Badola
Syed Ainul Hussain**

INTRODUCTION

The Chandrabhaga River a perennial river, is one of the minor tributary of the Ganga River. It flows through Dehradun and Tehri Garhwal districts in Uttarakhand, India. It is a spring fed river and drained by two tributaries - Koti Khal and Soni Gad. Chandrabhaga River further drains into Ganga River at Triveni Ghat, Mayakund, Rishikesh (Figure 1) (Kulshrestha, 2021). This river basin is dominated by forest followed by agricultural land and built-up area. Currently, the Chandrabhaga River and its associated Rishikesh Valley are still exposed to many threats such as water abstraction, channel and riverbank modification, sand mining and urbanization. The entire Chandrabhaga River basin falls in Uttarakhand and is spread across an area of 68.33 km² (ICAR-IISWC 2020). However, the extended basin area as delineated by HydroSHEDS (2020), accounting with the influence of the Rishikesh Valley, covers a total of 190.04 km². This status report is based on the extended basin area. Geographically, the extended basin is spread between latitudes 30.11°N to 30.26°N and longitudes 78.14°E to 78.24°E.

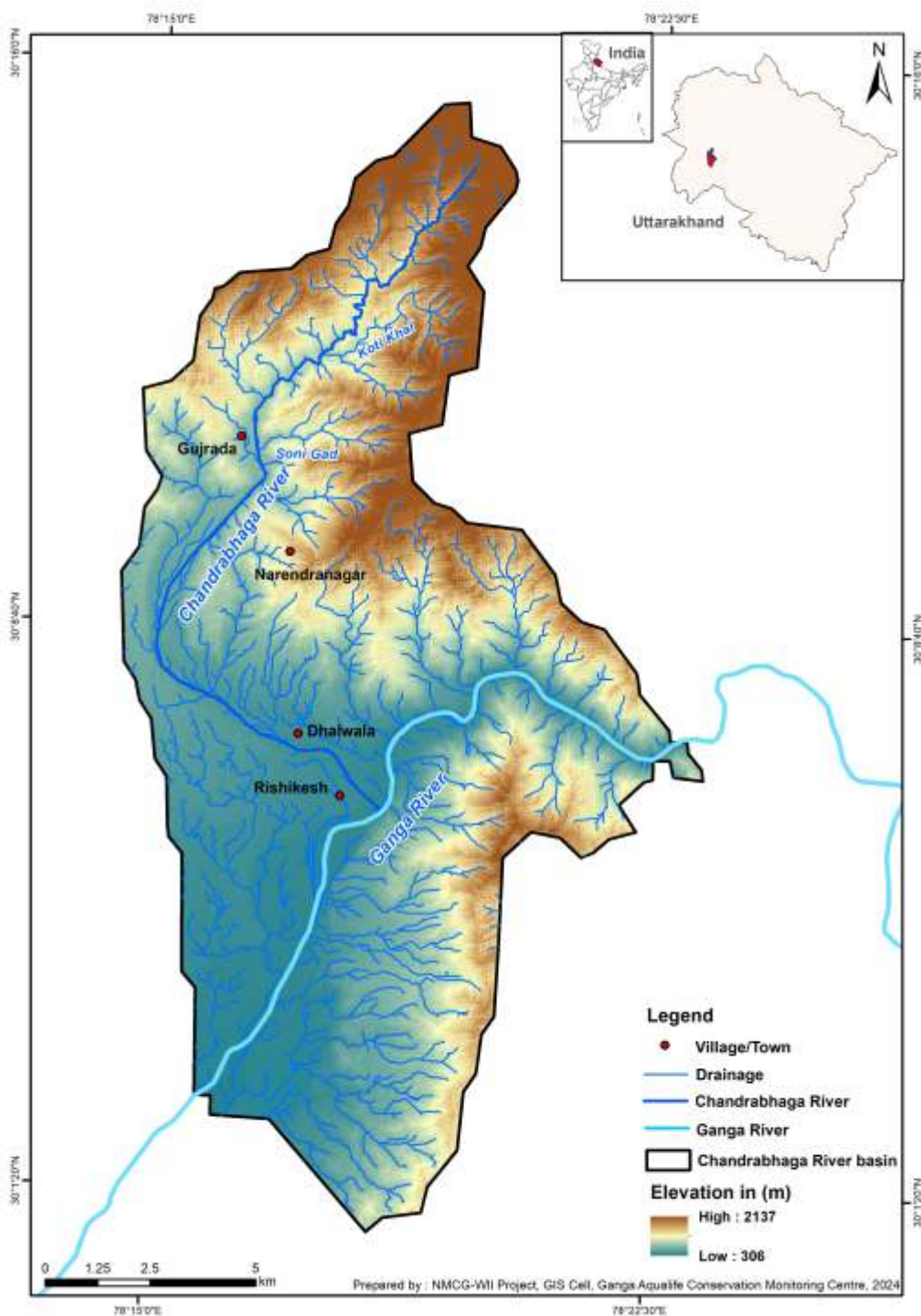


Figure 1
Drainage map of
Chandrabhaga
River Basin

COURSE OF THE RIVER

Chandrabhaga originates near Deoli Temple, at an elevation of 1,800 meters above sea level, in Lesser Himalayas mountain range in the Tehri district of Uttarakhand, India. The elevation of the basin ranges from 2,137 meters to 306 meters above sea level. Initially, the River flows in a southwest direction for about 15 km before taking a turn towards the southeast near Narendranagar until it merges with the Ganga River at Triveni Ghat, Mayakund, Rishikesh (Figure 1) (Kulshrestha, 2021). In total, it covers a distance of 23 km.

GEOLOGY AND GEOMORPHOLOGY

The geological formation of Chandrabhaga River mainly comprises of Alluvium, Krol, Damta and Jaunsar formations (Rupke & Sharma, 1974; Singh et al., 2007). The Main Boundary Thrust (MBT) cuts across the River. The Krol, Damta and Jaunsar formations are highly susceptible to landslide and erosion as compared to alluvium formation (Rupke & Sharma, 1974). The basin can be divided into a narrow steep upper region draining the Lesser Himalayan ranges and a relatively plain flat plateau with gentle slope lower region. Its topography is also responsible for the heavy gully formation and extensive soil erosion (ICAR-IISWC 2020).

The Chandrabhaga River, once a perennial river, has become seasonal with water flow in it, is largely observed in the monsoon season. It is due to the heavy deposit of boulders and the creation of a deep bed of sand. Sediment enters through the high-flow months, carried by rapid-flowing rainwater from the raised hilly tracts to the Rishikesh plains. As a result, a thick and broad sand bed has formed, which is changing the river's dynamics. Seepage into the thick sand bed leads to a large decrease in the river's water quantity, making it less conspicuous and, in certain areas, seem like the river has disappeared (Kulshrestha, 2021). The occurrence of friction clays implies the presence of fine-grained, cohesive sediments with characteristics favorable to shearing along geological structures. The carbonaceous material shows the existence of organic matter, which can contribute to the geochemical and geochemical activities in the region. Upstream and in the relatively middle section, the riverbed is made up of bedrocks, boulders, and gravels, which give it a strong foundation. But as the river continues downstream, the substratum becomes sand, silt, and clay, depending on the changes in the composition of sediments (Saklani & Satendra, 1986 and Bhatt & Satendra, 1990).

SOIL TYPE

Chandrabhaga River basin is solely characterised by Cambisols soil, which further comprises the subtypes- Dystric Cambisols and Eutric Cambisols. While Dystric Cambisols dominates the north part of the basin covering 30.88% of the basin, Eutric Cambisols is prevalent in south covering 69.12% of the basin (FAO-UNESCO, 1977).



Upper Stretch of Chandrabhaga River near Gujrada Village

CLIMATE

The region exhibits a diverse climate influenced by altitude, encompassing subtropical, humid, and temperate characteristics. In the hot and predominantly dry summer months extending from March to June, the temperatures vary between a minimum of 14°C and a maximum of 41°C. On the other hand, the cold winter period from November to February sees minimum and maximum temperatures ranging from 2°C to 21°C. January stands out as the coldest month, while June takes the lead as the hottest month in this climatic spectrum. The monsoon rainfall usually occurs between the months of June and September with July and August being the rainiest months of the season. The average annual rainfall is about 2100 mm. Western disturbances in the winter months, from December to February, cause winter rainfall.

LAND USE LAND COVER

Based on NRSC, ISRO data (2008-09 and 2018-19), two Land Use and Land Cover (LULC) maps of the Chandrabhaga River basin were prepared. The LULC of the Chandrabhaga River basin was categorised into 11 categories: Built-up, Kharif crop, Rabi crop, Double/Triple crop, Fallow land, Plantation, Evergreen Forest, Deciduous forest, Degraded/Scrub forest, Wasteland, Waterbodies.

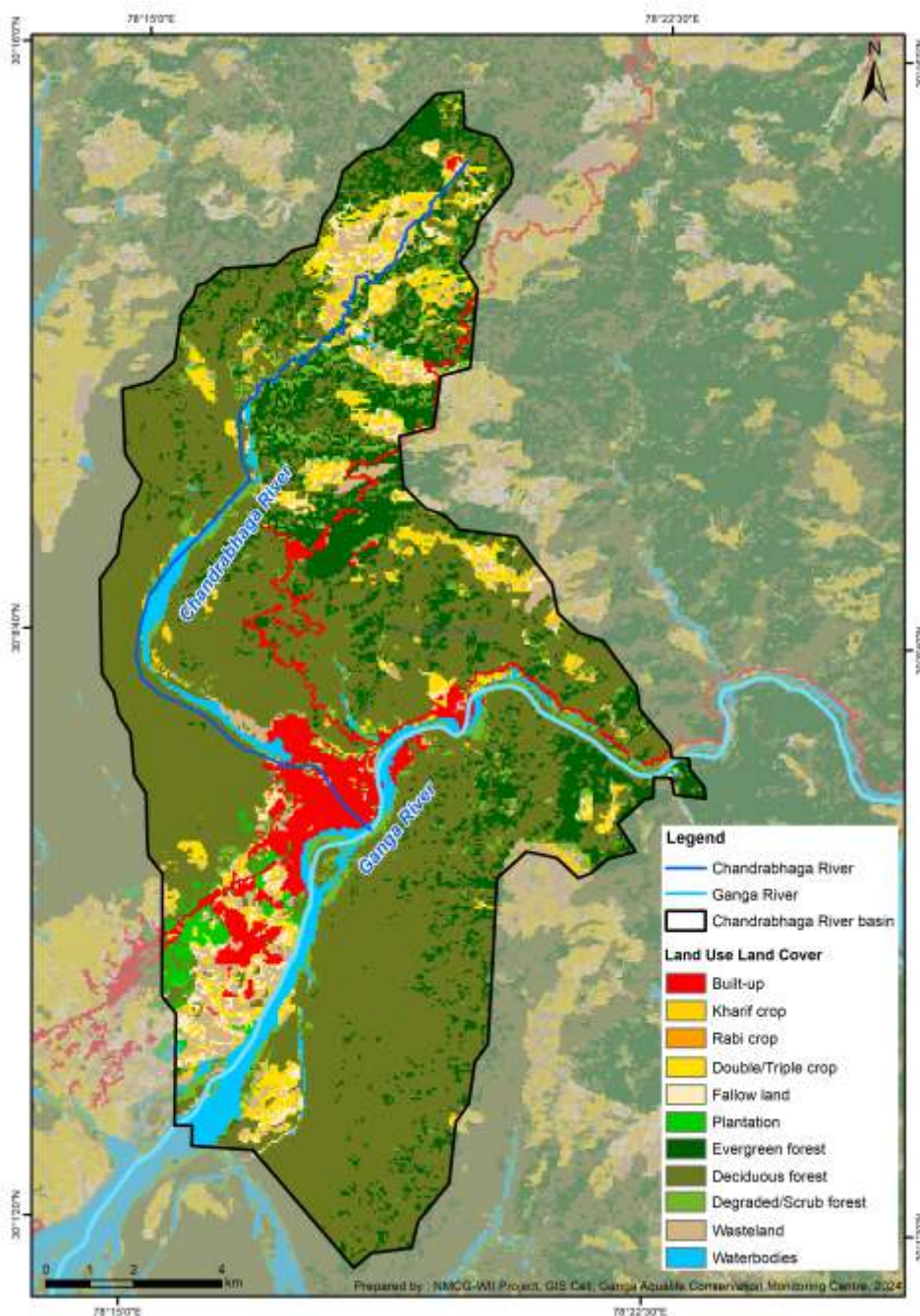


Figure 2a
LULC map of
Chandrabhaga
River basin
(2008-09)

Deciduous Forest, Degraded/Scrub Forest, Wasteland, and Waterbodies. During 2008-09, the Chandrabhaga River basin was dominated by Deciduous forest (56.62%), followed by Evergreen forest (14.80%) while Plantation (0.98%) and Rabi crop (0.03%) occupied the least area. During 2018-19 the basin was dominated by of Deciduous forest (56.24%), followed by Evergreen forest (15.21%) while Plantation (0.94%), Fallow land (0.76%) and Rabi crop (0.09%) were the categories with least area (Table 1). LULC maps revealed that over ten years, there was an increase of 6.93%, 0.79%, 0.33%, 0.32%, 0.12% in the Double/triple crop, Evergreen Forest, Built-up area, Degraded/Scrub Forest & Rabi crop respectively. Furthermore, a decrease of 3.51%, 3.03%, 0.84%, 0.71%, 0.33% & 0.07% in the Fallow land, Wasteland, Kharif crop, Deciduous Forest, Waterbodies, Plantation respectively (Figures 2a & 2b).

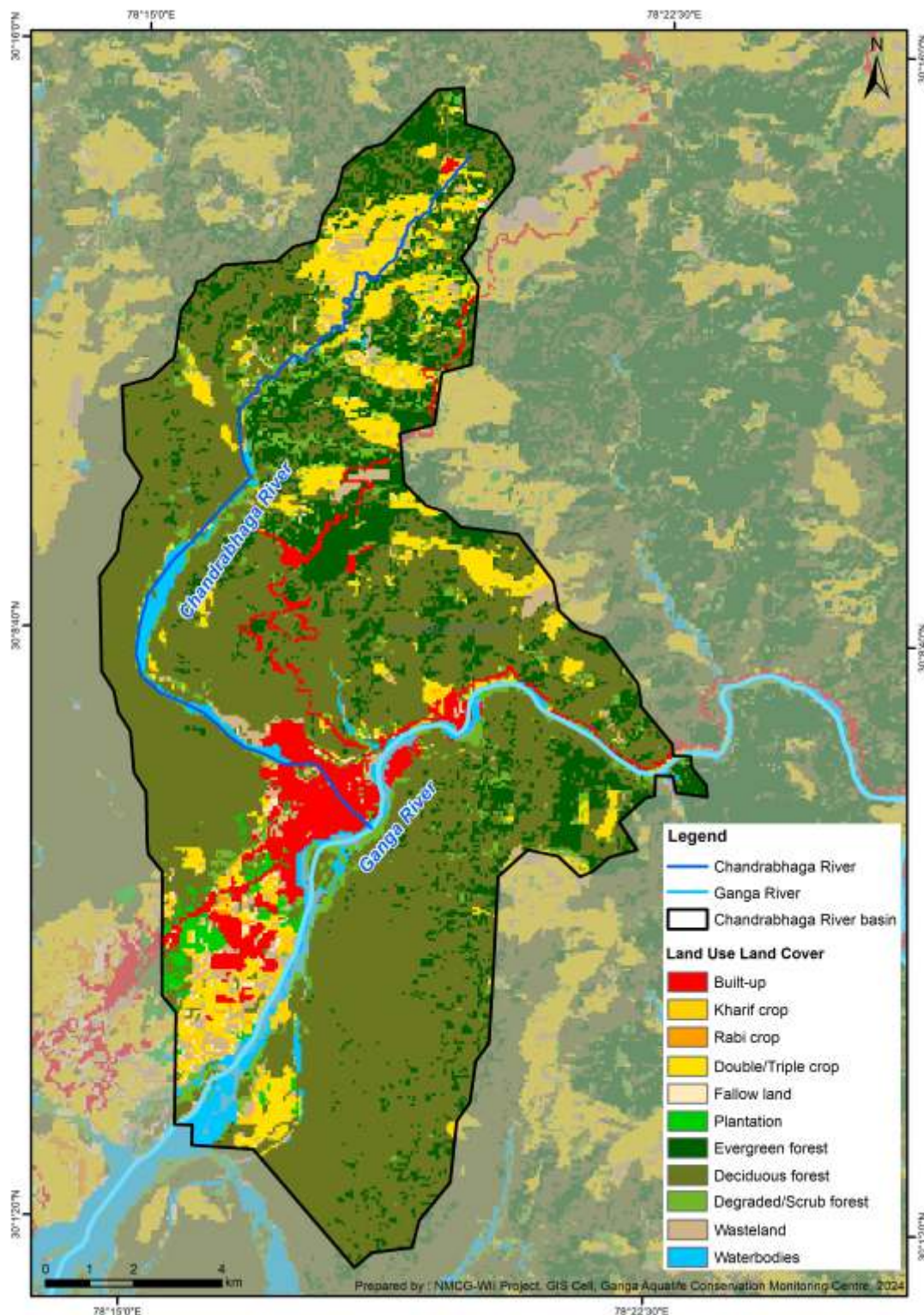


Figure 2b LULC map of Chandrabhaga River basin (2018-19)

Table 1 Summary statistics of the forest cover of the Chandrabhaga River basin from 2015 to 2019.

LULC Classes	(2008-09) Area in km ²	(2008-09) Area in %	(2018-19) Area in km ²	(2018-19) Area in %	Area Change in km ²	Area Change in %
Built-up	10.46	5.50	10.79	5.68	0.33	0.18
Kharif crop	3.82	2.01	2.98	1.57	-0.84	-0.44
Rabi crop	0.05	0.03	0.17	0.09	0.12	0.06
Double/Triple crop	8.29	4.36	15.22	8.00	6.93	3.64
Fallow land	4.95	2.60	1.44	0.76	-3.51	-1.84
Plantation	1.86	0.98	1.79	0.94	-0.07	-0.04
Evergreen forest	28.11	14.80	28.9	15.21	0.79	0.41
Deciduous forest	107.6	56.62	106.89	56.24	-0.71	-0.38
Degraded/Scrub forest	8.91	4.69	9.23	4.86	0.32	0.17
Wasteland	8.88	4.67	5.85	3.08	-3.03	-1.59
Waterbodies	7.11	3.74	6.78	3.57	-0.33	-0.17
Total Area	190.04	100	190.04	100		

Source:

- 1) Land Use Land Cover (2008-2009), National Remote Sensing Centre, ISRO, Government of India, Hyderabad, India.
- 2) Land Use Land Cover (2018-2019), National Remote Sensing Centre, ISRO, Government of India, Hyderabad, India.

FOREST COVER

The Chandrabhaga River basin has 138.75 km² or 73.01% of the total area under forest (FSI, 2019). According to the Forest Survey of India (2015 & 2019), the catchment area of the river is dominated by moderately dense forest, followed by non-forest, open forest, very dense forest and scrubland. (Figures 3a & 3b). From 2015 to 2019, while there was an increase of 0.12% in the very dense forest, 1.38% in moderately dense forest and 1.23% in the non-forest area. A decrease of 2.77% was recorded for moderately dense (Table 2).



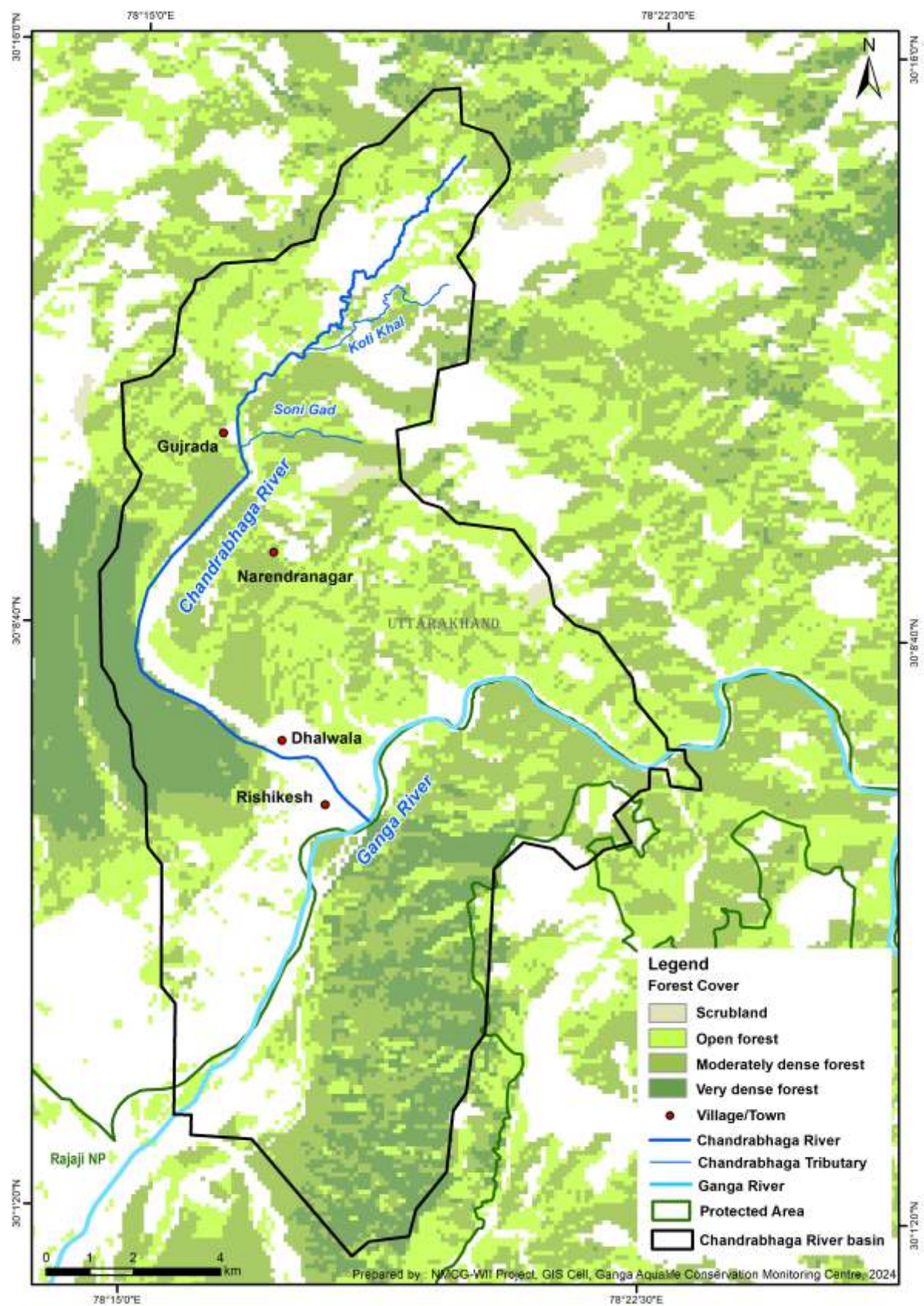


Figure 3a Forest Cover of Chandrabhaga River basin in 2015

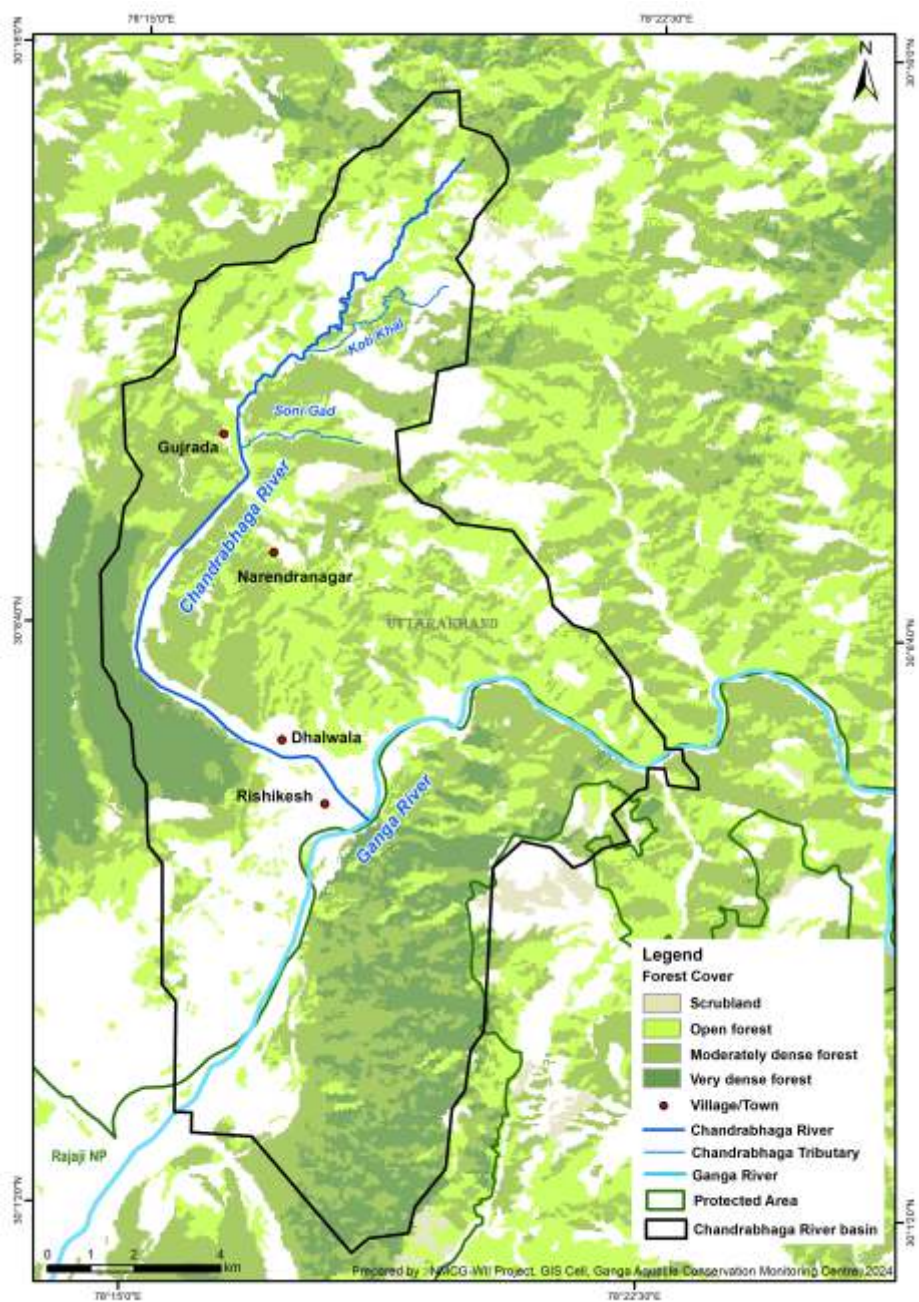


Figure 3b
Forest Cover of
Chandrabhaga
River basin
in 2019

Table 2 Summary statistics of the forest cover of the Chandrabhaga River basin from 2015 to 2019.

Forest Cover Classes	(2015) Area in km ²	(2015) Area in %	(2019) Area in km ²	(2019) Area in %	Area Change in km ²	Area Change in %
Scrubland	0.61	0.32	0.69	0.36	0.08	0.04
Open Forest	54.86	28.87	49.6	26.1	-5.26	-2.77
Moderately Dense Forest	59.43	31.27	62.05	32.65	2.62	1.38
Very Dense Forest	26.19	13.78	26.41	13.9	0.22	0.12
Non-forest	48.95	25.76	51.29	26.99	2.34	1.23
Total Area	190.04	100	190.04	100		

Source:

- 1. FSI. (2015). Indian State of Forest Report, Forest Survey of India.
- 2. FSI. (2019). Indian State of Forest Report, Forest Survey of India.

BIOGEOGRAPHY, FLORA AND FAUNA

The river basin falls into two biogeographic zones, the Himalaya and the Gangetic plain and two biotic provinces, namely, the Western Himalaya (2B) and the Upper Gangetic Plain (7A) (Rodgers et al., 2014). Based on Champion and Seth (1968), classification of Indian forests, the forest area in and around Chandrabhaga River basin is typically North Indian Tropical Moist Deciduous Forest (3C) and Northern Tropical Dry Deciduous Forest (5B). The North Indian Tropical Moist Deciduous Forest (3C) has type Moist Sal-bearing Forest (3C/C2) and is further divided into two sub-types viz. Moist Siwalik Sal Forest (3C/C2a) and Moist bhabar Sal Forest (3C/C2b). Northern Tropical Dry Deciduous Forest (5B) has type Dry Sal-bearing Forest (5B/C1) and its sub-type Dry Siwalik Sal forest (5B/C1a).

In a preliminary reconnaissance survey done in January 2024, a total of 158 taxa (Angiosperms) were recorded representing 128 genera, 50 Families, 23 order. Poaceae was found to be the most dominant family with 23 species followed by Fabaceae (18 spp.), Asteraceae (13 spp.); Amaranthaceae (9 spp.) (Annexure VI). The life form (Habit) dominance in Chandrabhaga River on the basis of number of species is dominated by Herbaceous flora (84 spp.), followed by Grasses (29 spp.), Shrubs (25 spp.), Trees (17 spp.) and Climbers (3 spp.). Habitat preference of species found in survey is as follow, Aquatic (5 spp.), Semi-aquatic (102 spp.) and Terrestrial (51 spp.). Among the plants recorded, 42 plants were introduced and 116 plants were native to the river basin. Dominant families with highest number of introduced plants were Asteraceae & Fabaceae (9 spp. each). Dominant Exotic plants observed during the survey include *Alternanthera ficoidea*, *Alternanthera philoxeroides*, *Amaranthus spinosus*, *Croton bonplandianus*, *Eclipta prostrata*, *Ipomoea carnea*, *Jatropha curcas*, *Lantana camara*, *Lepidium didymium*, *Lippia alba*, *Melilotus albus* and *Nasturtium officinale*.

Husain (2015) meticulously documented the presence of 10 amphibian species across 4 families from the river basin (Annexure IV). Extensive literature, reveals a rich reptilian diversity with 21 species spanning 8 families inhabiting the river basin (Bhatnagar, 1969; Hussain & Roy, 1992; Husain & Tilak, 1995; Singh et al., 2017; Singh & Joshi, 2018) (Annexure III). Moreover, the area boasts a diverse mammalian population, comprising 41 distinct species spanning 20 families including several endangered species like the Asian elephant (*Elephas maximus*), hog deer (*Axis porcinus*), and the iconic tiger (*Panthera tigris*) (Joshi & Dixit, 2012; Joshi, 2016; Roy, 2016). The Chandrabhaga River basin has elements from the Himalayas and the Gangetic Plains, visible through the presence of Himalayan goral and the Himalayan yellow throated marten, representing the Himalayan elements. While the presence of barasingha (*Rucervus duvaucelii*), hog deer, and nilgai (*Boselaphus tragocamelus*) represent the Gangetic Plain elements. Rajaji National Park, situated along the river's edge, provides a habitat for diverse wildlife, including the tiger, common leopard (*Panthera pardus*), Asian elephant, cheetal (*Axis axis*), barking deer (*Muntiacus muntjak*), sambar (*Rusa unicolor*), and wild boar (*Sus scrofa*) (Annexure I). The basin also supports several critically endangered bird species, as per the IUCN Red List of Threatened Species, including vultures such as the red-headed vulture (*Sarcogyps calvus*), white-rumped vulture (*Gyps bengalensis*), and Indian vulture (*Gyps indicus*). Among waterbirds, species like the river tern (*Sterna aurantia*), black-bellied tern (*Sterna acuticauda*), common pochard (*Aythya ferina*), and sarus crane (*Antigone antigone*) have also been reported from the basin area (Annexure II).

The Chandrabhaga River basin also supports several important fish species, including, endangered putitor mahseer (*Tor putitora*), vulnerable dark mahseer (*Naziritor chelynoides*), and goonch (*Bagarius bagarius*) (Hora & Mukerji, 1936; Singh et al., 1983; Husain & Tilak, 1994, Khanna et al., 2013; Rana et al., 2017) (Annexure V). This underscores the area's ecological significance and emphasizes the need for conservation efforts to safeguard these vulnerable and valuable species. Annexure I to VI provides a list of floral and faunal species reported from the Chandrabhaga River basin.

CONSERVATION STATUS

The Chandrabhaga River basin is encompassed by several forest ranges and divisions, including Saklana Chamba & Shivpuri Forest Ranges in the Narendranagar Forest Division, the Thano, Badkot & Rishikesh Forest Range in the Dehradun Forest Division, and Gohari Forest Range located within the Rajaji Tiger Reserve Forest Division. While the mainstem of Chandrabhaga River does not fall into any other protected area, both Rajaji National Park (RNP) and the Shivalik Elephant Reserve (SER) in Uttarakhand form critical parts of the river's catchment. Rajaji NP is protected under the Wild Life (Protection) Act, 1972 and SER was notified in 2002 under Project Elephant. Rajaji NP is also an Important Bird and Biodiversity Area (IBA).

DEMOGRAPHY

Chandrabhaga River basin supports a human population of 3.02127 lakhs (GOI, 2011). Two blocks, Doiwala of Dehradun district and Narendranagar of Tehri Garhwal District, are part of the Chandrabhaga River basin (Figure 4). Doiwala with a human population of 2.21 lakh is more densely populated (381.22 person/km²) than Narendranagar (Figure 4 & Table 3). Agriculture, industrial activities and tourism constitute the primary sources of livelihood in the basin.

Table 3 Block-wise human population statistics of the Chandrabhaga River basin for 2011

State	District	Name	Population	Population (%)
Uttarakhand	Dehradun	Doiwala	2,21,513	73.32
	Tehri Garhwal	Narendranagar	80,614	26.68
	Total		302,127	100

Source: Government of India, 2011

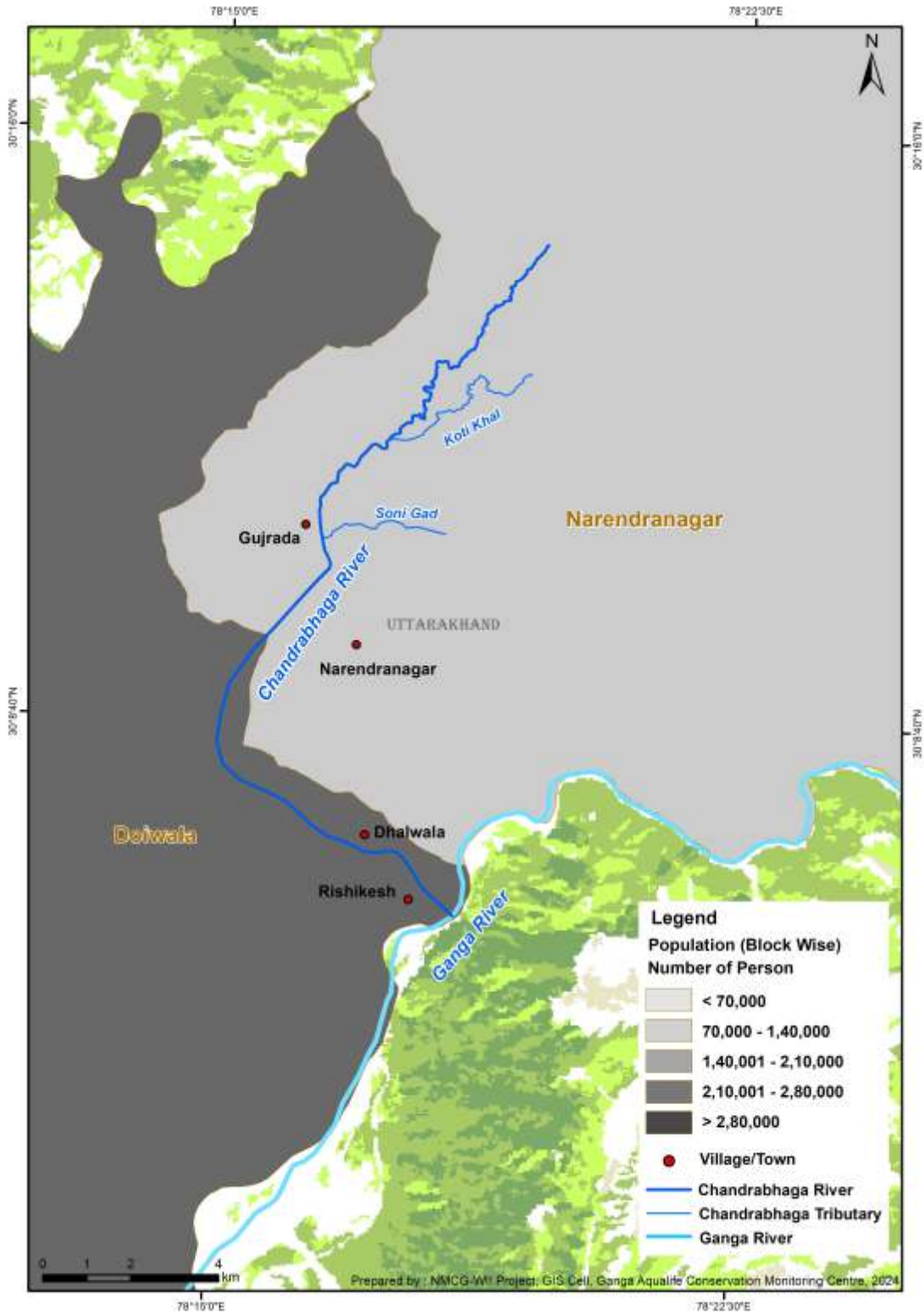


Figure 4 Human population status of the Chandrabhaga River basin (2011)

WATER QUALITY

In the recce survey conducted along Chandrabhaga River, four parameters of water quality viz. Temperature in °C, pH, Electrical Conductivity (EC) in $\mu\text{S}/\text{cm}$, and Total Dissolved Solid (TDS) in mg/L at four sites were assessed. Temperature value was found to range from 14.4°C to 17°C (Figure 5a). The pH value ranged from 7.61 to 7.94, which is under limit as per United States Environmental Protection Agency (USEPA) standards viz. 6.5 - 8.5 (Figure 5b). The upper stretch of Chandrabhaga River had EC and TDS values of less than $500\ \mu\text{S}/\text{cm}$ and $500\ \text{mg}/\text{L}$, respectively, as shown in Figures 5c and 5d. The EC and TDS ranged in the lower portion of the area following the Dhalwala settlement up to the Ganga River confluence exceeds the permissible limits according to USEPA (2023), which are greater than $500\ \mu\text{S}/\text{cm}$ and $500\ \text{mg}/\text{L}$, respectively. As per the study conducted by Haritash et al. (2016), the EC and TDS value of Ganga River at Chandrabhaga-Ganga confluence was highest as compared with the other 19 sampling sites in Rishikesh. These high values are due to addition of wastewater of Chandrabhaga River in Ganga River.

The Honorable Prime Minister inaugurated two STPs in September 2020: a five-MLD facility at Chorpani, Dhalwala, and a four-story, 7.5 MLD facility at Chandrashwar Nagar. However, to prevent the discharge of domestic wastewater into the Chandrabhaga River, which eventually drains into the Ganga River, various nallahs will need to be tapped (Kulshrestha, 2021).

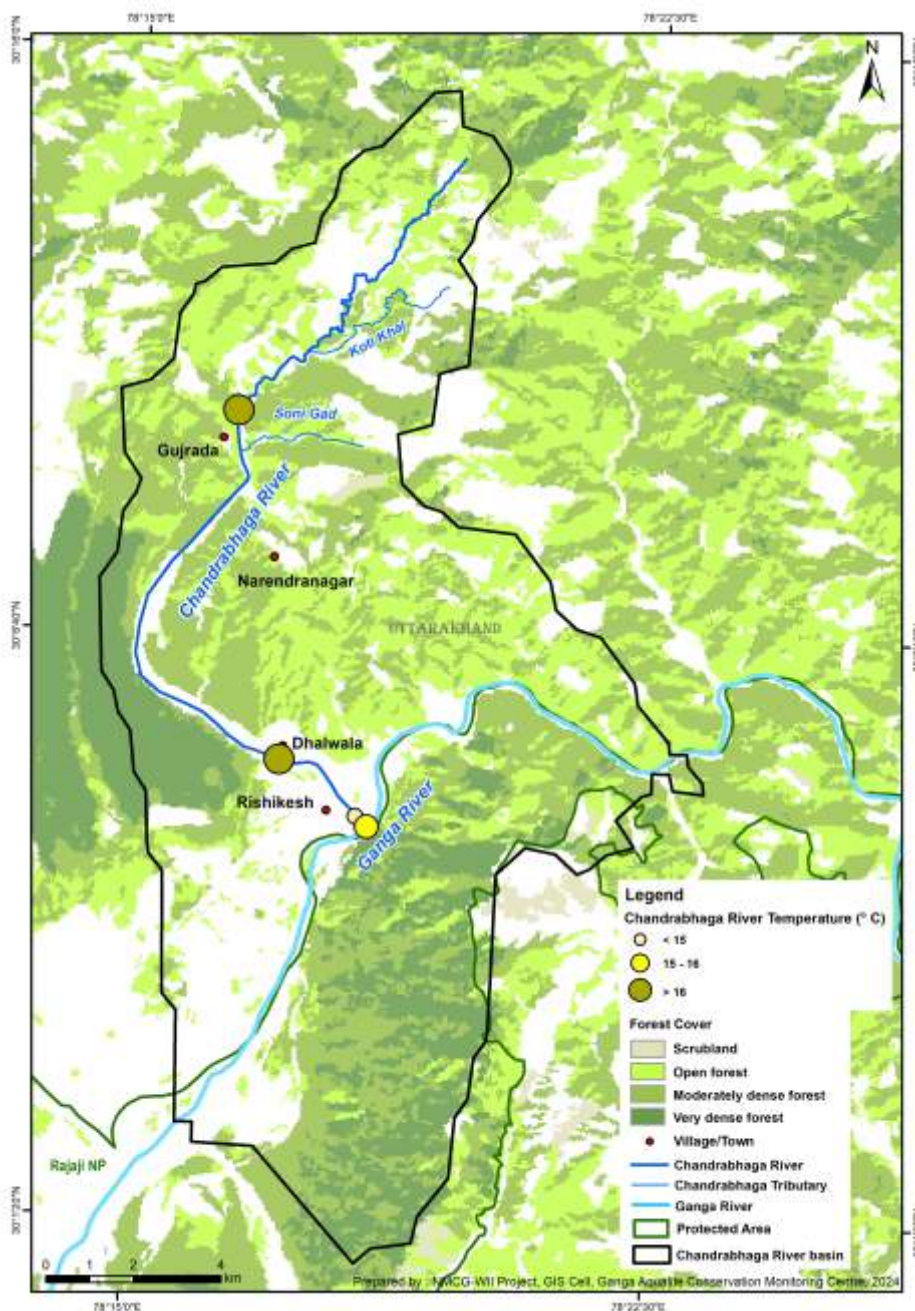


Figure 5a
Temperature
map of
Chandrabhaga
River

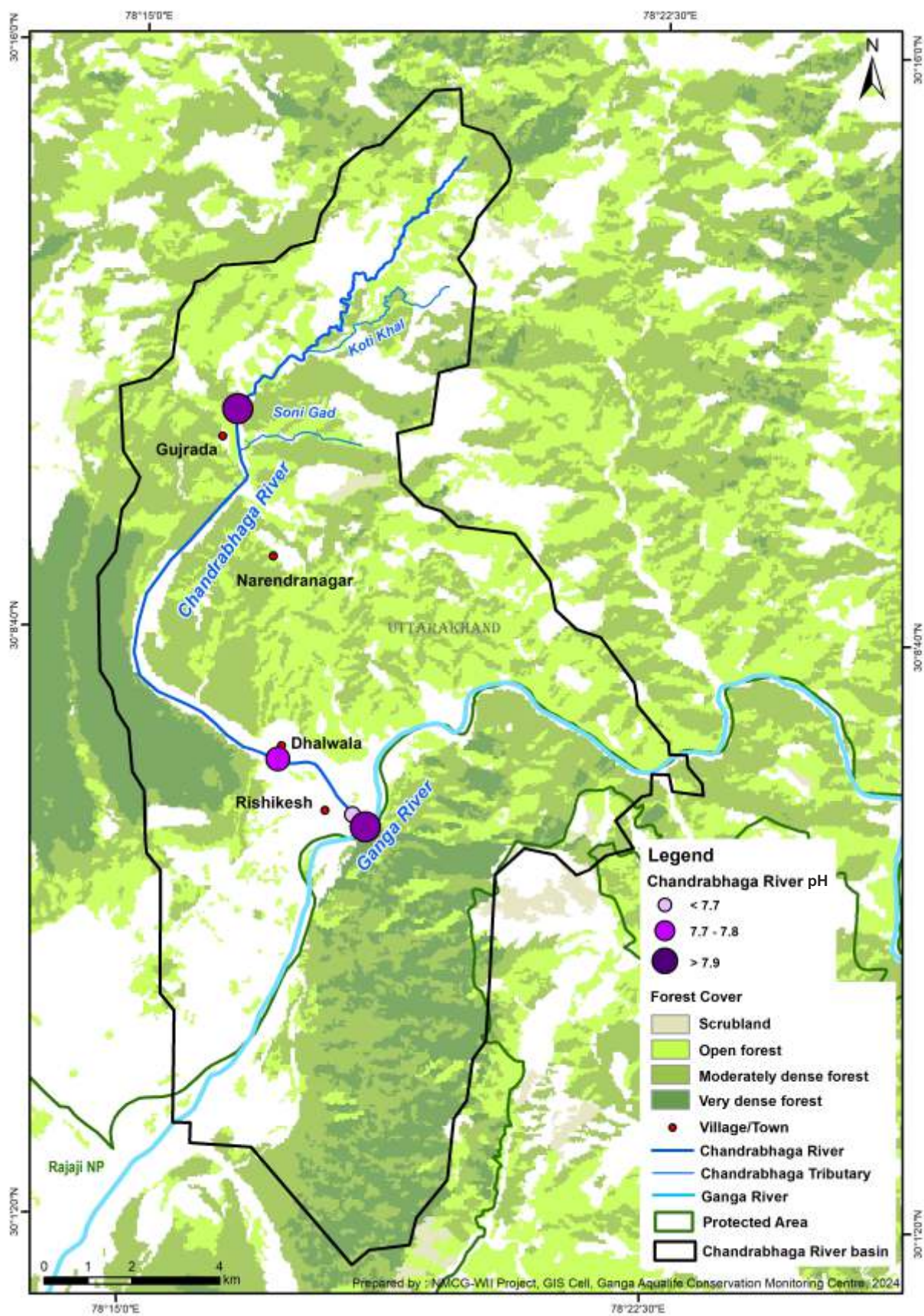


Figure 5b pH map of Chandrabhaga River

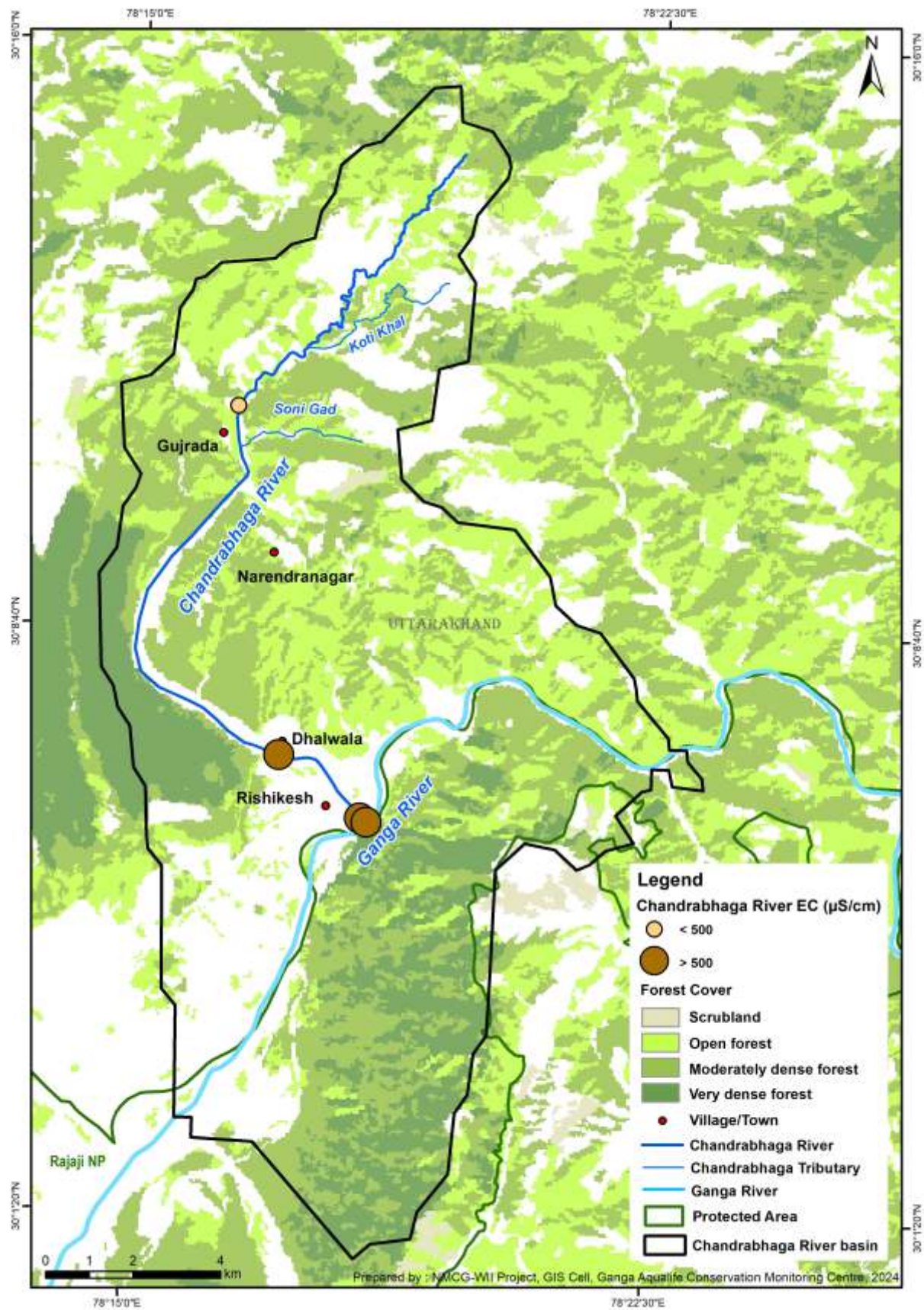


Figure 5c EC map of Chandrabhaga River

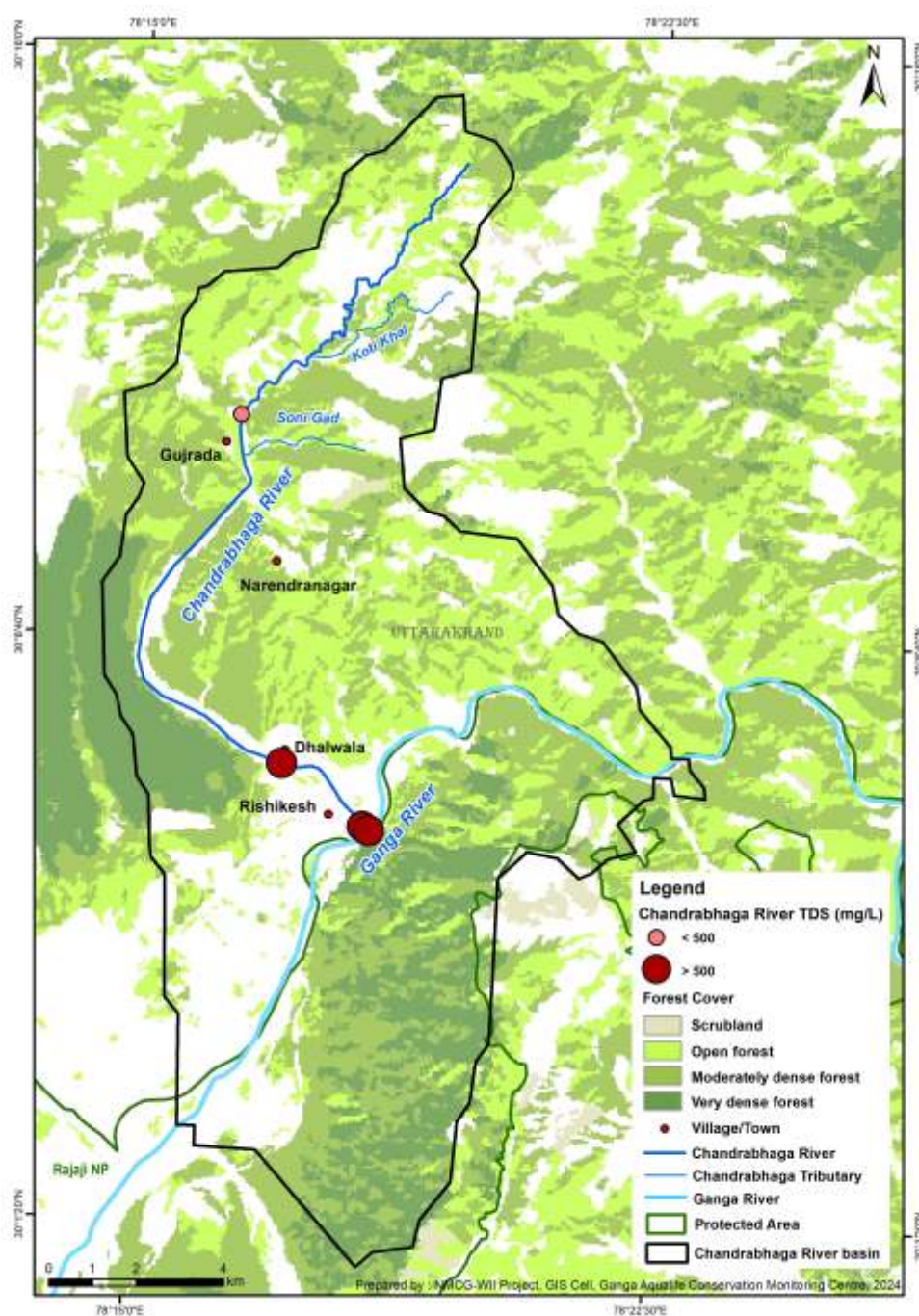


Figure 5d
TDS map of
Chandrabhaga
River



Present water condition of Chandrabhaga River at Dhalwala, Rishikesh

THREATS

The ecological integrity of Chandrabhaga River is challenged by several threats like dependency on river water for irrigation, unregulated development in its floodplains and discharge of domestic waste and sewage into the river leading to pollution of river water (Figure 6). While there is availability of water in the upper stretch of Chandrabhaga until Gujrada village, we observed that water was being diverted from river channel through a make shift canal to fulfill the water requirement for irrigation and drinking for nearby rural settlements. After Gujrada village, the river remains mostly dry and after entering Rishikesh, it appears to flow again in form of thin streams after the addition of wastewater from nearby settlements. The stretch running through Rishikesh city, which extends from Chandrabhaga Railway Bridge till Chandrabhaga-Ganga confluence remains under intense anthropogenic pressure due to establishments like hotels, dhabas, restaurants, unauthorized temporary settlements of slum dwellers, migrants and seasonal labourers, human settlements. These commercial and household establishments not only release their waste into the river impacting the water quality of river but they have also impacted the river structure and habitat quality by modifying the river channel and banks. During monsoon, runoff from surrounding open areas, streets and settlements flow into the riverbed, which further degrades the water quality of Chandrabhaga River and poses a significant threat to the overall health of the river.

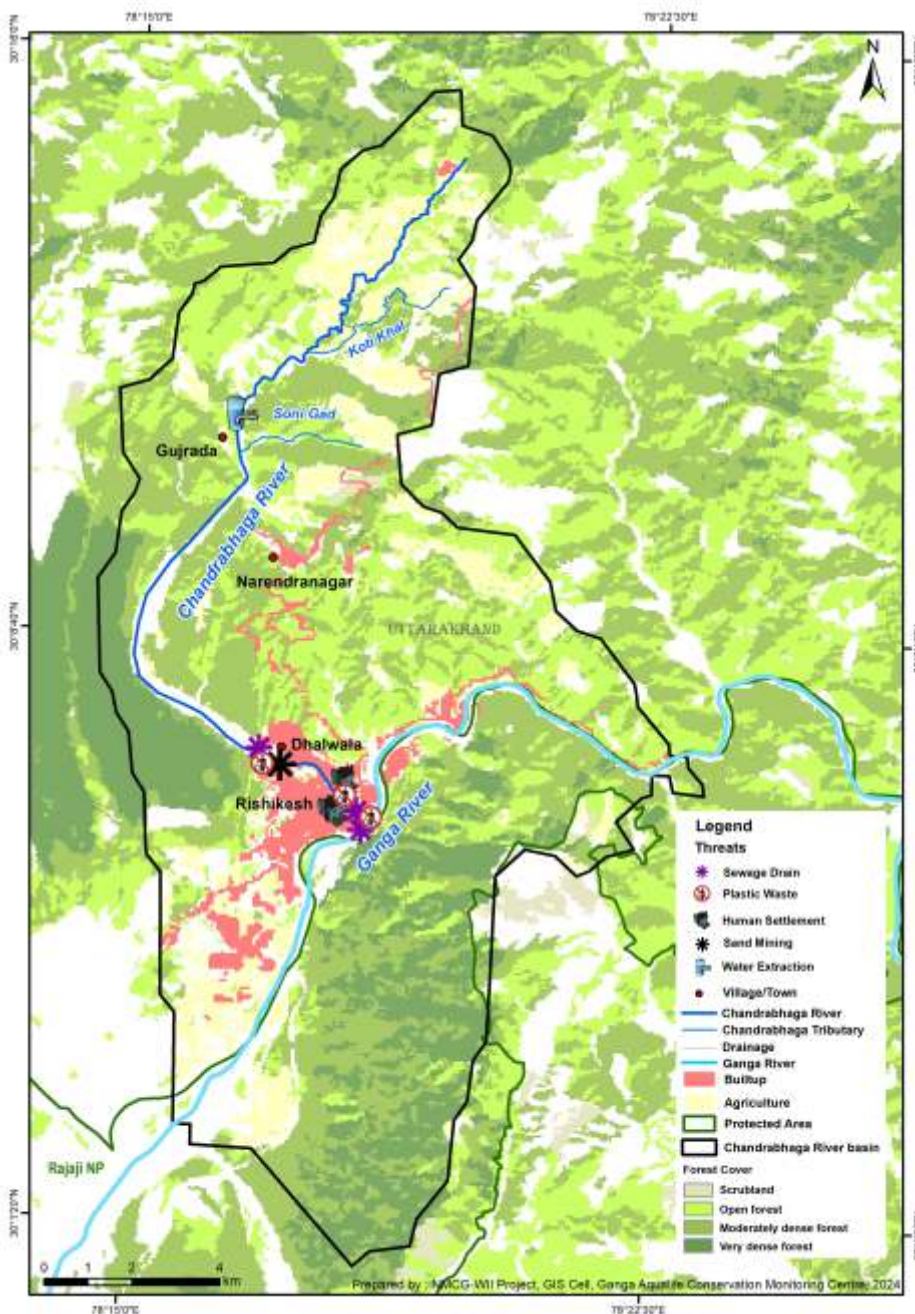


Figure 6
Threat map of
Chandrabhaga
River basin



Human disturbance and degraded water quality in Chandrabhaga River

CONSERVATION IMPLICATIONS

Due to its seasonal nature, water remains only in the upper stretch of Chandrabhaga River round the year and the rest of the stretch remains dry. Only during monsoon, the river channel has water and is reported to be flowing. During the recce survey, it was observed that only the upper stretch of Chandrabhaga River had water good enough for drinking and irrigation. The lower stretch was found to be highly polluted and have undergone modification due to intense human pressure.

As a minor-tributary of the Ganga River, the Chandrabhaga River adds a significant amount of pollution load into the Ganga River resulting in an evident contamination of river water (Haritash et al., 2014). Despite this concern, Chandrabhaga River is yet to receive adequate attention from relevant stakeholders.

Hence, there is a pressing need for more scientific investigations specifically centered on the ecological aspects of the Chandrabhaga River and its restoration. This includes in-depth studies on biodiversity, encompassing flora and fauna, as well as research on ecotoxicology and the physicochemical characteristics of river water. Mapping and understanding the threats to the river is crucial for identifying conservation actions that can enhance the ecological status of the Chandrabhaga River. Improved knowledge about the river's ecosystem will contribute to informed management planning.

Given that the Chandrabhaga River flows through a densely populated area where unplanned habitations contribute to solid and liquid waste, involving local communities and stakeholders in conservation planning is paramount. Engaging stakeholders in various ways will undoubtedly aid in the further rejuvenation of the river. However, for effective and resource-efficient planning, the roles of stakeholders in the rejuvenation program should be clearly defined based on their stakes and interests. Establishing a common platform or authority, aligned with the district Ganga committee, can be instrumental in formulating, implementing, and monitoring the rejuvenation activities.

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ANNEXURE I

Mammal species of the Chandrabhaga River basin

Family	Common name	Scientific name	IUCN status	IWPA status	Previous studies
Bovidae	Nilgai	<i>Boselaphus tragocamelus</i> (Pallas, 1766)	LC	Schedule II	b, c
Bovidae	Himalayan goral	<i>Naemorhedus goral</i> (Hardwicke, 1825)	NT	Schedule I	c
Canidae	Golden jackal	<i>Canis aureus</i> (Linnaeus, 1758)	LC	Schedule I	a, b
Canidae	Indian fox	<i>Vulpes bengalensis</i> (Shaw, 1800)	LC	Schedule I	b
Cercopithecidae	Rhesus macaque	<i>Macaca mulatta</i> (Zimmermann, 1780)	LC	-	a, b, c, d
Cercopithecidae	Gray langur	<i>Semnopithecus entellus</i> (Dufresne, 1797)	LC	Schedule II	b, d
Cervidae	Chital	<i>Axis axis</i> (Erxleben, 1777)	LC	Schedule III	a, b, c
Cervidae	Sambar	<i>Rusa unicolor</i> (Kerr, 1792)	VU	Schedule I	a, b, c
Cervidae	Barking deer	<i>Muntiacus muntjak</i> (Zimmermann, 1780)	LC	Schedule I	b, c
Cervidae	Hog deer	<i>Axis porcinus</i> (Zimmermann, 1780)	EN	Schedule I	c
Elephantidae	Asian elephant	<i>Elephas maximus</i> (Linnaeus, 1758)	EN	Schedule I	b, c
Felidae	Jungle cat	<i>Felis chaus</i> (Schreber, 1777)	LC	Schedule I	b, c, d
Felidae	Leopard cat	<i>Prionailurus bengalensis</i> (Kerr, 1792)	LC	Schedule I	a, b, c
Felidae	Common leopard	<i>Panthera pardus</i> (Linnaeus, 1758)	VU	Schedule I	a, b
Felidae	Tiger	<i>Panthera tigris</i> (Linnaeus, 1758)	EN	Schedule I	b, c
Herpestidae	Small Indian mongoose	<i>Herpestes javanicus auropunctatus</i> (Hodgson, 1836)	LC	Schedule I	b
Herpestidae	Indian grey mongoose	<i>Herpestes edwardsii</i> (E. Geoffroy Saint-Hilaire, 1818)	LC	Schedule I	a, b, c, d
Hipposideridae	Least leaf-nosed bat	<i>Hipposideros cineraceus</i> (Blyth, 1853)	LC	-	b
Hystriidae	Indian crested porcupine	<i>Hystrix indica</i> (Kerr, 1792)	LC	Schedule I	a, b, d
Leporidae	Indian hare	<i>Lepus nigricollis</i>	LC	Schedule II	c
Manidae	Indian pangolin	<i>Manis crassicaudata</i> (E. Geoffroy, 1803)	EN	Schedule I	a, b
Muridae	Lesser bandicoot-rat	<i>Bandicota bengalensis</i> (Gray, 1835)	LC	-	b
Muridae	Indian bush rat	<i>Golunda ellioti</i> (Gray, 1837)	LC	-	b

Family	Common name	Scientific name	IUCN status	IWPA status	Previous studies
Muridae	Common Indian field mouse	<i>Mus booduga</i> (Gray, 1837)	LC	-	b
Muridae	House mouse	<i>Mus musculus</i> (Linnaeus, 1758)	LC	-	b
Muridae	House rat	<i>Rattus rattus</i> (Linnaeus, 1758)	LC	-	b
Mustelidae	Yellow-throated marten	<i>Martes flavigula</i> (Boddaert, 1785)	LC	Schedule I	b
Pteropodidae	Indian flying fox	<i>Pteropus giganteus</i> (Brunnich, 1782)	LC	Schedule II	a, b
Pteropodidae	Fulvous fruit bat	<i>Rousettus leschenaultii</i> (Desmarest, 1820)	NT	-	b
Sciuridae	Northern palm squirrel	<i>Funambulus pennantii</i> (Wroughton, 1905)	LC	-	a, b, c, d
Sciuridae	Red giant flying squirrel	<i>Petaurista petaurista</i> (Pallas, 1766)	LC	Schedule I	b
Soricidae	Grey musk shrew	<i>Suncus murinus</i> (Linnaeus, 1766)	LC	-	b
Suidae	Wild boar	<i>Sus scrofa</i> (Linnaeus, 1758)	LC	Schedule I	b
Ursidae	Sloth bear	<i>Melursus ursinus</i> (Shaw, 1791)	VU	Schedule I	b
Ursidae	Himalayan black bear	<i>Ursus thibetanus</i> (Cuvier, 1823)	VU	Schedule I	b
Vespertilionidae	Hodgson's bat	<i>Myotis formosus</i> (Hodgson, 1835)	NT	-	b
Vespertilionidae	Indian pipistrelle	<i>Pipistrellus coromandra</i> (Gray, 1838)	LC	-	b
Viverridae	Small Indian civet	<i>Viverricula indica</i> (E. Geoffroy Saint-Hilaire, 1803)	LC	Schedule I	a, b, c, d
Viverridae	Common palm civet	<i>Paradoxurus hermaphroditus</i> (Pallas, 1777)	LC	Schedule I	b
Viverridae	Himalayan palm civet	<i>Paguma larvata</i> (C.E.H. Smith, 1827)	LC	Schedule I	b

^aJoshi, R. and Dixit, A. (2012); ^bJoshi, R. (2016); ^cRoy, A. (2016); ^dJoshi et al. (2018)

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ANNEXURE II

Avifauna of the Chandrabhaga River basin

Family	Common name	Scientific name	IUCN status	IWPA status	Previous studies
Accipitridae	Black kite	<i>Milvus migrans</i> (Boddaert, 1783)	LC	Schedule II	d
	Shikra	<i>Accipiter badius</i> (Gmelin, 1788)	LC	Schedule II	d
	Black-winged kite	<i>Elanus caeruleus</i> (Desfontaines, 1789)	LC	Schedule II	a
	Oriental honey buzzard	<i>Pernis ptilorhynchus</i> (Temminck, 1821)	LC	Schedule II	a
	Eurasian sparrowhawk	<i>Accipiter nisus</i> (Linnaeus, 1758)	LC	Schedule I	a
	Changeable hawk-eagle	<i>Nisaetus cirrhatus</i> (Gmelin, 1788)	LC	Schedule I	a
	Bonelli's eagle	<i>Aquila fasciata</i> (Vieillot, 1822)	LC	Schedule I	a
	Tawny eagle	<i>Aquila rapax</i> (Temminck, 1828)	VU	Schedule I	a
	Red-headed vulture	<i>Sarcogyps calvus</i> (Scopoli, 1786)	CR	Schedule I	a
	White-rumped vulture	<i>Gyps bengalensis</i> (Gmelin, 1788)	CR	Schedule I	a
	Indian vulture	<i>Gyps indicus</i> (Scopoli, 1786)	CR	Schedule I	a
	Egyptian vulture	<i>Neophron percnopterus</i> (Linnaeus, 1758)	EN	Schedule I	a
Aegithinidae	Common lora	<i>Aegithina tiphia</i> (Linnaeus, 1758)	LC	Schedule II	a
Alaudidae	Ashy-crowned Sparrow-lark	<i>Eremopterix griseus</i> (Scopoli, 1786)	LC	Schedule II	a
	crested lark	<i>Galerida cristata</i> (Linnaeus, 1758)	LC	Schedule II	a
Alcedinidae	Pied kingfisher	<i>Ceryle rudis</i> (Linnaeus, 1758)	LC	Schedule II	d
	Common kingfisher	<i>Alcedo atthis</i> (Linnaeus, 1758)	LC	Schedule II	a
	White-breasted kingfisher	<i>Halcyon smyrnensis</i> (Linnaeus, 1758)	LC	Schedule II	a, d
	Common kingfisher	<i>Alcedo atthis</i> (Linnaeus, 1758)	LC	Schedule II	d
Anatidae	Ruddy shelduck	<i>Tadorna ferruginea</i>	LC	Schedule II	d
	Northern pintail	<i>Anas acuta</i> (Linnaeus, 1758)	LC	Schedule II	a
	Common teal	<i>Anas crecca</i> (Linnaeus, 1758)	LC	Schedule II	a
	Indian spot-billed duck	<i>Anas poecilorhyncha</i> (Forster, 1781)	LC	Schedule II	a
	Mallard	<i>Anas platyrhynchos</i> (Linnaeus, 1758)	LC	Schedule II	a
	Red-crested pochard	<i>Netta rufina</i> (Pallas, 1773)	LC	Schedule II	a

Family	Common name	Scientific name	IUCN status	IWPA status	Previous studies
	Common pochard	<i>Aythya ferina</i> (Linnaeus, 1758)	VU	Schedule I	a
	Bar-headed goose	<i>Anser indicus</i> (Latham, 1790)	LC	Schedule II	d
Apodidae	Little swift	<i>Apus affinis</i> (Gray, 1830)	LC	Schedule II	a
Ardeidae	Grey heron	<i>Ardea cinerea</i> (Linnaeus, 1758)	LC	Schedule II	d
	Cattle egret	<i>Bubulcus ibis</i> (Linnaeus, 1758)	LC	Schedule II	d
	Little egret	<i>Egretta garzetta</i> (Linnaeus, 1766)	LC	Schedule II	d
	Indian pond heron	<i>Ardeola grayii</i> (Sykes, 1832)	LC	Schedule II	a
	Great egret	<i>Ardea alba</i> (Linnaeus, 1758)	LC	Schedule II	a
	Intermediate egret	<i>Ardea intermedia</i> (Wagler, 1829)	LC	Schedule II	a
	Black-crowned night heron	<i>Nycticorax nycticorax</i> (Linnaeus, 1758)	LC	Schedule II	a
	Cinnamon bittern	<i>Ixobrychus cinnamomeus</i> (Gmelin, 1789)	LC	Schedule I	a
	Bucerotidae	Indian grey hornbill <i>Ocyrceros birostris</i> (Scopoli, 1786)	LC	Schedule II	a
	Oriental pied hornbill	<i>Anthraceroceros albirostris</i> (Shaw, 1808)	LC	Schedule I	c
Burhinidae	Eurasian thick-knee	<i>Burhinus oedicnemus</i> (Linnaeus, 1758)	LC	NL	a
Campephagidae	Black-headed cuckooshrike	<i>Lalage melanoptera</i> (Ruppell, 1839)	LC	Schedule II	a
	Scarlet minivet	<i>Pericrocotus flammeus</i> (Forster, 1781)	LC	Schedule II	a
	Rosy minivet	<i>Pericrocotus roseus</i> (Vieillot, 1818)	LC	Schedule II	a
	Small minivet	<i>Pericrocotus cinnamomeus</i> (Linnaeus, 1766)	LC	Schedule I	a
Caprimulgidae	Indian nightjar	<i>Caprimulgus asiaticus</i> (Latham, 1790)	LC	Schedule II	a
Charadriidae	Little ringed plover	<i>Charadrius dubius</i> (Scopoli, 1786)	LC	Schedule II	a
	Red-wattled lapwing	<i>Vanellus indicus</i> (Boddaert, 1783)	LC	Schedule II	d
	River lapwing	<i>Vanellus duvaucelii</i> (Lesson, 1826)	NT	Schedule II	d
Chloropseidae	Golden-fronted leafbird	<i>Chloropsis aurifrons</i> (Temminck, 1829)	LC	NL	a
Ciconiidae	Painted stork	<i>Mycteria leucocephala</i> (Pennant, 1769)	NT	Schedule II	a
Cisticolidae	Common tailorbird	<i>Orthotomus sutorius</i> (Pennant, 1769)	LC	Schedule II	d
	Ashy prinia	<i>Prinia socialis</i> (Sykes, 1832)	LC	Schedule II	a

Family	Common name	Scientific name	IUCN status	IWPA status	Previous studies
Columbidae	Spotted dove	<i>Spilopelia chinensis</i> (Scopoli, 1786)	LC	Schedule II	d
	Rock dove	<i>Columba livia</i> (Gmelin, 1789)	LC	NL	a
	Eurasian collared dove	<i>Streptopelia decaocto</i> (Fridvaldszky, 1838)	LC	Schedule II	a
	Red collared dove	<i>Streptopelia tranquebarica</i> (Hermann, 1804)	LC	Schedule II	a
	Asian emerald dove	<i>Chalcophaps indica</i> (Linnaeus, 1758)	LC	Schedule II	a
Coraciidae	Indian roller	<i>Coracias benghalensis</i> (Linnaeus, 1758)	LC	Schedule II	a
Corvidae	Rufous treepie	<i>Dendrocitta vagabunda</i> (Latham, 1790)	LC	Schedule II	d
	House crow	<i>Corvus splendens</i> (Vieillot, 1817)	LC	NL	a
	Large-billed crow	<i>Corvus macrorhynchos</i> (Wagler, 1827)	LC	Schedule II	a
	Jungle crow	<i>Corvus culminates</i> (Sykes, 1832)	LC	Schedule II	d
Cuculidae	Pied cuckoo	<i>Clamator jacobinus</i> (Boddaert, 1783)	LC	Schedule II	a
	Indian cuckoo	<i>Cuculus micropterus</i> (Gould, 1837)	LC	Schedule II	a
	Common cuckoo	<i>Cuculus canorus</i> (Linnaeus, 1758)	LC	Schedule II	a
	Asian koel	<i>Eudynamys scolopaceus</i> (Linnaeus, 1758)	LC	Schedule II	a
	Sirkeer malkoha	<i>Taccocua leschenaultii</i> (Lesson, 1830)	LC	Schedule II	a
	Greater coucal	<i>Centropus sinensis</i> (Stephens, 1815)	LC	Schedule II	a
Dicaeidae	Fire-breasted flowerpecker	<i>Dicaeum ignipectus</i> (Blyth, 1843)	LC	Schedule II	a
	Thick-billed flowerpecker	<i>Dicaeum agile</i> (Tickell, 1833)	LC	Schedule II	a
Dicruridae	Black drongo	<i>Dicrurus macrocercus</i> (Vieillot, 1817)	LC	Schedule II	d
	Hair-crested drongo	<i>Dicrurus hottentottus</i> (Gould, 1842)	LC	Schedule II	a
Emberizidae	Red-headed bunting	<i>Emberiza bruniceps</i> (Brandt, 1841)	LC	Schedule II	a
Estrildidae	Scaly-breasted munia	<i>Lonchura punctulata</i> (Linnaeus, 1758)	LC	Schedule II	a
	Red avadavat	<i>Amandava amandava</i> (Linnaeus, 1758)	LC	Schedule II	a
	Indian silverbill	<i>Euodice malabarica</i> (Linnaeus, 1758)	LC	Schedule II	a
Falconidae	Red-headed falcon	<i>Falco chicquera</i> (Daudin, 1800)	NT	Schedule I	a
	Lagger falcon	<i>Falco jugger</i> (Temminck, 1825)	LC	Schedule I	a
	Common kestrel	<i>Falco tinnunculus</i> (Linnaeus, 1758)	LC	Schedule II	a

Family	Common name	Scientific name	IUCN status	IWPA status	Previous studies
Fringillidae	Yellow-breasted greenfinch	<i>Chloris spinoides</i> (Vigors, 1831)	LC	Schedule II	a
	Common rosefinch	<i>Carpodacus erythrinus</i> (Pallas, 1770)	LC	Schedule II	a
Glareolidae	Small pratincole	<i>Glareola lactea</i> (Temminck, 1820)	LC	Schedule II	a
Gruidae	Sarus crane	<i>Grus antigone</i> (Linnaeus, 1758)	VU	Schedule I	a
Hirundinidae	Wire-tailed swallow	<i>Hirundo smithi</i> (Leach, 1818)	LC	Schedule II	a
	Red-rumped swallow	<i>Cecropis daurica</i> (Linnaeus, 1771)	LC	Schedule II	a
Laniidae	Bay-backed shrike	<i>Lanius vittatus</i> (Valenciennes, 1826)	LC	Schedule II	d
	Long-tailed shrike	<i>Lanius schach</i> (Linnaeus, 1758)	LC	Schedule II	a
Laridae	Black-headed gull	<i>Larus ridibundus</i> (Linnaeus, 1766)	LC	Schedule II	a
	River tern	<i>Sterna aurantia</i> (Gray, 1831)	VU	Schedule I	a
	Black-bellied tern	<i>Sterna acuticauda</i> (Gray, 1832)	EN	Schedule I	a
Leiothrichidae	Jungle babbler	<i>Argya striata</i> (Dumont, 1823)	LC	Schedule II	d
	Common babbler	<i>Argya caudata</i> (Dumont, 1823)	LC	Schedule II	a
Megalaimidae	Brown-headed barbet	<i>Psilopogon zeylanicus</i> (Gmelin, 1788)	LC	Schedule II	a
	Blue-throated barbet	<i>Psilopogon asiaticus</i> (Latham, 1790)	LC	Schedule II	a
	Coppersmith barbet	<i>Psilopogon haemacephalus</i> (Muller, 1776)	LC	Schedule II	a
Meropidae	Asian green bee-eater	<i>Merops orientalis</i> (Latham, 1802)	LC	Schedule II	a
Monarchidae	Indian paradise-flycatcher	<i>Terpsiphone paradisi</i> (Linnaeus, 1758)	LC	Schedule II	a
Motacillidae	White-browed wagtail	<i>Motacilla maderaspatensis</i> (Gmelin, 1789)	LC	Schedule II	d
	White wagtail	<i>Motacilla alba</i> (Linnaeus, 1758)	LC	Schedule II	d
	Western yellow Wagtail	<i>Motacilla flava</i> (Linnaeus, 1758)	LC	Schedule II	a
Muscicapidae	Verditer flycatcher	<i>Eumyias thalassinus</i> (Swainson, 1838)	LC	Schedule II	a
	Bluethroat	<i>Cyanecula svecica</i> (Linnaeus, 1758)	LC	Schedule II	a
	Oriental magpie-robin	<i>Copsychus saularis</i> (Linnaeus, 1758)	LC	Schedule II	a
	Black redstart	<i>Phoenicurus ochruros</i> (Gmelin, 1774)	LC	Schedule II	a
	Plumbeous water -redstart	<i>Phoenicurus fuliginosus</i> (Vigors, 1831)	LC	Schedule II	a
	Common stonechat	<i>Saxicola torquatus</i> (Linnaeus, 1766)	LC	NL	a
	Grey bushchat	<i>Saxicola ferreus</i> (Gray, 1846)	LC	Schedule II	a

Family	Common name	Scientific name	IUCN status	IWPA status	Previous studies
	White-capped redstart	<i>Phoenicurus leucocephalus</i> (Vigors, 1831)	LC	Schedule II	a, d
	Indian robin	<i>Saxicoloides fulicatus</i> (Linnaeus, 1766)	LC	Schedule II	a
	Blue whistling-thrush	<i>Myophonus caeruleus</i> (Scopoli, 1786)	LC	Schedule II	a
Nectariniidae	Purple sunbird	<i>Cinnyris asiaticus</i> (Latham, 1790)	LC	Schedule II	a
Oriolidae	Eurasian golden oriole	<i>Oriolus oriolus</i> (Linnaeus, 1758)	LC	Schedule II	a
	Black-hooded oriole	<i>Oriolus xanthornus</i> (Linnaeus, 1758)	LC	Schedule II	a
Paradoxornithidae	Yellow-eyed babbler	<i>Chrysomma sinense</i> (Gmelin, 1789)	LC	Schedule II	a
Paridae	Great tit	<i>Parus major</i> (Linnaeus, 1758)	LC	Schedule II	a
Passeridae	House sparrow	<i>Passer domesticus</i> (Linnaeus, 1758)	LC	Schedule II	d
	Chestnut-shouldered petronia	<i>Gymnoris xanthocollis</i> (Burton, 1838)	LC	NL	a
Phalacrocoracidae	Great cormorant	<i>Phalacrocorax carbo</i> (Linnaeus, 1758)	LC	Schedule II	a
	Little cormorant	<i>Microcarbo niger</i> (Vieillot, 1817)	LC	Schedule II	d
Phasianidae	Black francolin	<i>Francolinus francolinus</i> (Linnaeus, 1766)	LC	Schedule II	d
	Grey francolin	<i>Francolinus pondicerianus</i> (Gmelin, 1789)	LC	Schedule II	a
	Jungle bush quail	<i>Perdica asiatica</i> (Latham, 1790)	LC	Schedule II	a
	Kalij pheasant	<i>Lophura leucomelanos</i> (Latham, 1790)	LC	Schedule I	a
	Indian peafowl	<i>Pavo cristatus</i> (Linnaeus, 1758)	LC	Schedule I	a
Phylloscopidae	Common chiffchaff	<i>Phylloscopus collybita</i> (Vieillot, 1817)	LC	Schedule II	a
	Grey-hooded warbler	<i>Phylloscopus xanthoschistos</i> (Gray, 1846)	LC	Schedule II	a
Picidae	Speckled piculet	<i>Picumnus innominatus</i> (Burton, 1836)	LC	Schedule II	a
	Grey-faced woodpecker	<i>Picus canus</i> (Gmelin, 1788)	LC	Schedule II	a
	Yellow-crowned woodpecker	<i>Leiopicus mahrattensis</i> (Latham, 1801)	LC	Schedule I	a
	Great slaty woodpecker	<i>Mulleripicus pulverulentus</i> (Temminck, 1826)	VU	NL	a
Ploceidae	Russet sparrow	<i>Passer cinnamomeus</i> (Temminck, 1836)	LC	Schedule II	b
	Baya weaver	<i>Ploceus philippinus</i> (Linnaeus, 1766)	LC	Schedule II	a
Podicipedidae	Little grebe	<i>Tachybaptus ruficollis</i> (Pallas, 1764)	LC	Schedule II	a
Psittacidae	Alexandrine parakeet	<i>Psittacula eupatria</i> (Linnaeus, 1766)	NT	Schedule II	a

Family	Common name	Scientific name	IUCN status	IWPA status	Previous studies
	Plum-headed parakeet	<i>Himalayapsitta cyanocephala</i> (Linnaeus, 1766)	LC	Schedule II	a
	Slaty-headed parakeet	<i>Himalayapsitta himalayana</i> (Lesson, 1832)	LC	Schedule II	a
Psittaculidae	Rose-ringed parakeet	<i>Psittacula krameri</i> (Scopoli, 1769)	LC	Schedule II	a
Pycnonotidae	Himalayan bulbul	<i>Pycnonotus leucogenys</i> (Gray, 1835)	LC	Schedule II	d
	Red-vented bulbul	<i>Pycnonotus cafer</i> (Linnaeus, 1766)	LC	Schedule II	d
Rallidae	Slaty-legged crane	<i>Rallina eurizonoides</i> (Lafresnaye, 1845)	LC	Schedule II	d
	White-breasted waterhen	<i>Amaurornis phoenicurus</i> (Pennant, 1769)	LC	Schedule II	a
	Common moorhen	<i>Gallinula chloropus</i> (Linnaeus, 1758)	LC	Schedule II	a
Rhipiduridae	White-browed fantail	<i>Rhipidura aureola</i> (Lesson, 1831)	LC	NL	d
Scolopacidae	Common redshank	<i>Tringa totanus</i> (Linnaeus, 1758)	LC	Schedule II	a
	Common greenshank	<i>Tringa nebularia</i> (Gunnerus, 1767)	LC	Schedule I	a
	Common sandpiper	<i>Actitis hypoleucos</i> (Linnaeus, 1758)	LC	Schedule II	a
Stenostiridae	Grey-headed canary flycatcher	<i>Culicicapa ceylonensis</i> (Swainson, 1820)	LC	Schedule II	d
Strigidae	Spotted owl	<i>Athene brama</i> (Temminck, 1821)	LC	Schedule II	a
	Eurasian eagle-owl	<i>Bubo bubo</i> (Linnaeus, 1758)	LC	Schedule I	a
Sturnidae	Common myna	<i>Acridotheres tristis</i> (Linnaeus, 1766)	LC	Schedule II	a
	Bank myna	<i>Acridotheres ginginianus</i> (Latham, 1790)	LC	Schedule II	d
	Jungle myna	<i>Acridotheres fuscus</i> (Wagler, 1827)	LC	Schedule II	a
	Common starling	<i>Sturnus vulgaris</i> (Linnaeus, 1758)	LC	Schedule II	a
Threskiornithidae	Red-naped ibis	<i>Pseudibis papillosa</i> (Temminck, 1824)	LC	Schedule II	a
Timaliidae	Black-chinned babbler	<i>Cyanoderma pyrrhops</i> (Blyth, 1844)	LC	Schedule II	a
Turdidae	Black-throated thrush	<i>Turdus atrogularis</i> (Jarocki, 1819)	LC	Schedule II	a
Upupidae	Common hoopoe	<i>Upupa epops</i> (Linnaeus, 1758)	LC	Schedule II	a
Zosteropidae	Indian white-eye	<i>Zosterops palpebrosus</i> (Temminck, 1824)	LC	Schedule II	a

^aNarang (1995), ^bKumar, & Shahabuddin (2012); ^cSingh (2000); ^dPrimary Survey conducted in January 2024

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- Primary survey conducted in January 2024

ANNEXURE III

Reptilian species of the Chandrabhaga River basin

Family	Common name	Scientific name	IUCN status	IWPA status	Previous studies
Boidae	Red sand boa	<i>Eryx johnii</i> (Russell, 1801)	NT	NL	b
Colubridae	Himalayan trinket snake	<i>Elaphe hodgsoni</i> (Günther, 1860)	LC	NL	d
Colubridae	Copper-head trinket snake	<i>Coelognathus radiatus</i> (Boie, 1827)	LC	NL	a
Colubridae	Common wolf snake	<i>Lycodon aulicus</i> (Linnaeus, 1758)	LC	NL	b
Colubridae	Twin-spotted wolf snake	<i>Lycodon jara</i> (Shaw, 1802)	LC	NL	c
Colubridae	Common kukri snake	<i>Oligodon arnensis</i> (Shaw, 1802)	LC	NL	b
Colubridae	Trinket snake	<i>Coelognathus helenae</i> (Daudin, 1803)	LC	NL	b
Colubridae	Common rat snake	<i>Ptyas mucosa</i> (Linnaeus, 1758)	LC	Schedule II	b
Colubridae	Indian gamma snake	<i>Boiga trigonata</i> (Schneider, 1802)	LC	NL	b
Geoemydidae	Spotted pond turtle	<i>Geoclemys hamiltonii</i> (Gray, 1831)	EN	NL	b
Geoemydidae	Brown roofed turtle	<i>Pangshura smithii</i> (Gray, 1863)	NT	NL	b
Geoemydidae	Indian roofed turtle	<i>Pangshura tecta</i> (Gray, 1831)	VU	Schedule IV	b
Geoemydidae	Indian black turtle	<i>Melonochelys trijuga</i> (Schweigger, 1812)	LC	NL	b
Natricidae	Checkered keelback	<i>Fowlea piscator</i> (Schneider, 1799)	LC	NL	b
Natricidae	Buff striped keelback	<i>Amphiesma stolatum</i> (Linnaeus, 1758)	LC	NL	b
Pythonidae	Indian rock python	<i>Python molurus</i> (Linnaeus, 1758)	NT	Schedule IV	b
Trionychidae	Indian flapshell turtle	<i>Lissemys punctata</i> (Bonnaterre, 1789)	VU	Schedule IV	b
Typhlopidae	Brahminy blind snake	<i>Indotyphlops braminus</i> (Daudin, 1803)	LC	NL	b
Viperidae	Himalayan white-lipped pitviper	<i>Trimeresurus septentrionalis</i> (Kramer 1977)	LC	NL	e
Viperidae	Saw-scaled viper	<i>Echis carinatus</i> (Schneider, 1801)	LC	NL	b
Viperidae	Western Russel's viper	<i>Daboia russelii</i> (Shaw & Nodder, 1797)	LC	Schedule I	b

^aBhatnagar (1969); ^bHussain & Roy (1992); ^cHusain & Tilak (1995); ^dSingh et al. (2017); ^eSingh & Joshi (2018).

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ANNEXURE IV

Amphibian species of the Chandrabhaga River basin

Family	Common name	Scientific name	IUCN status	IWPA status
Bufonidae	Indian common toad	<i>Duttaphrynus melanostictus</i> (Schneider, 1799)	LC	NL
Bufonidae	Marbled toad	<i>Duttaphrynus stomaticus</i> (Lutken, 1894)	LC	NL
Dicroglossidae	Skittering frog	<i>Euphlyctis cyanophlyctis</i> (Schneider, 1799)	LC	NL
Dicroglossidae	Paddy-field frog	<i>Fejervarya limnocharis</i> (Gravenhorst, 1829)	LC	NL
Dicroglossidae	Jerdon's bullfrog	<i>Hoplobatrachus crassus</i> (Jerdon, 1853)	LC	Schedule II
Dicroglossidae	Indian bullfrog	<i>Hoplobatrachus tigerinus</i> (Daudin, 1802)	LC	Schedule II
Dicroglossidae	Short-headed burrowing frog	<i>Sphaerotheca breviceps</i> (Schneider, 1799)	LC	NL
Microhylidae	Indian ornate frog	<i>Microhyla ornata</i> (Dumeril and Bibron, 1841)	LC	NL
Microhylidae	Marbled globular frog	<i>Uperodon systoma</i> (Schneider, 1799)	LC	NL
Rhacophoridae	Himalayan tree frog	<i>Polypedates maculatus</i> (Gray, 1830)	LC	NL

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ANNEXURE V

Fish species of the Chandrabhaga River basin

Family	Common name	Scientific name	IUCN status	Previous studies
Amblycipitidae	Indian torrent catfish	<i>Amblyceps mangois</i> (Hamilton 1822)	LC	a, b, c, e
Badidae	Badis	<i>Badis badis</i> (Hamilton 1822)	LC	c, f, e
Bagridae	Tengara catfish	<i>Mystus tengara</i> (Hamilton 1822)	LC	d, e, f, h
	Day's mystus	<i>Mystus bleekeri</i> (Day 1877)	LC	c, d, e, f, h
	Striped dwarf catfish	<i>Mystus vittatus</i> (Bloch 1794)	LC	b, c, h
	Giant river catfish	<i>Sperata lamarrii</i> (Valenciennes 1840)	LC	d, h
Belonidae	Freshwater garfish, Needlefish	<i>Xenentodon cancila</i> (Hamilton 1822)	LC	a, b, c, d, e, h
Channidae	Spotted snakehead	<i>Channa punctata</i> (Bloch 1793)	LC	c, d, e, f, h
	Dwarf snakehead	<i>Channa gachua</i> (Hamilton 1822)	LC	a, c, d, e, f, h
	Striped snakehead	<i>Channa striata</i> (Bloch 1793)	LC	h
	Bullseye snakehead, great snakehead	<i>Channa marulius</i> (Hamilton 1822)	LC	e, f, h
Clariidae	Walking catfish	<i>Clarias batrachus</i> (Linnaeus 1758)	LC	d, e, h
Cobitidae	Guntea loach	<i>Lepidocephalichthys guntea</i> (Hamilton 1822)	LC	a, b, c, d, e, f
	Annandale loach	<i>Lepidocephalichthys annandalei</i> (Chaudhuri 1912)	LC	e, f
Cyprinidae	Swamp barb or chola barb	<i>Puntius chola</i> (Hamilton 1822)	LC	b, c, d, e, f, h
	Rosy barb	<i>Pethia conchonius</i> (Hamilton 1822)	LC	b, c, e, f, h
	Olive barb	<i>Puntius sarana</i> (Hamilton 1822)	LC	b, c, d, e, f, h
	Pool barb, spotfin swamp barb	<i>Puntius sophore</i> (Hamilton 1822)	LC	b, c, d, e, f, h
	Ticto barb, Two-spot barb	<i>Pethia ticto</i> (Hamilton 1822)	LC	a, b, c, d, e, f, h
	Onespot barb	<i>Puntius terio</i> (Hamilton 1822)	LC	e, g, f, h
	Spottedsail barb	<i>Pethia phutunio</i> (Hamilton 1822)	LC	b, d
	Chaguni	<i>Chagunius chagunio</i> (Hamilton 1822)	LC	a, b, c, d, e
	Mrigal, White carp	<i>Cirrhinus mrigala</i> (Hamilton 1822)	LC	d
	Large razorbelly minnow	<i>Salmostoma bacaila</i> (Hamilton 1822)	LC	d
	Rohu labeo	<i>Labeo rohita</i> (Hamilton 1822)	LC	d
	Orangefin labeo	<i>Labeo calbasu</i> (Hamilton 1822)	LC	d

Family	Common name	Scientific name	IUCN status	Previous studies
	Kali	<i>Labeo dyocheilus</i> (McClelland 1839)	LC	b, d, e, h
	Pangusia labeo	<i>Labeo pangusia</i> (Hamilton 1822)	NT	e
	Kalabans	<i>Labeo dero</i> (Hamilton 1822)	LC	a, b, c, d, e, h
	Boga labeo	<i>Labeo boga</i> (Hamilton 1822)	LC	b
	Gangetic latia, Stone roller	<i>Crossocheilus latius</i> <i>latius</i> (Hamilton 1822)	LC	a, b, c, d, e
	Sucker head	<i>Garra gotyla</i> <i>gotyla</i> (Gray 1830)	LC	a, b, c, e
	Lamta garra	<i>Garra lamta</i> (Hamilton 1822)	LC	b
	Putitor mahseer	<i>Tor putitora</i> (Hamilton 1822)	EN	a, b, c, d, e
	Tor barb	<i>Tor tor</i> (Hamilton 1822)	DD	a, b, c, d, e
	Dark Mahseer	<i>Naziritor chelynoides</i> (McClelland 1839)	VU	b
Danionidae	Jaya	<i>Cabdio jaya</i> (Hamilton 1822)	LC	e, g
	Morari	<i>Cabdio morar</i> (Hamilton 1822)	LC	e, g
	Barna baril	<i>Opsarius barna</i> (Hamilton 1822)	LC	b, c, d, e, g, h
	Barred baril	<i>Barilus barila</i> (Hamilton 1822)	LC	b
	Indian hill trout	<i>Barilius bendelisis</i> (Hamilton 1807)	LC	a, b, c, d, e, g, h
	Trout barb	<i>Raiamas bola</i> (Hamilton 1822)	LC	a, b, d
	Vagra baril	<i>Barilius vagra</i> (Hamilton 1822)	LC	b, c, d, e, g, h
	Zebra danio	<i>Danio rerio</i> (Hamilton 1822)	LC	a, b, c, e, f, g, h
	Giant danio	<i>Devario aequipinnatus</i> (McClelland 1839)	LC	b
	Sind danio	<i>Devario devario</i> (Hamilton 1822)	LC	b, c, d, e, f, g, h
	Indian flying barb	<i>Esomus danricus</i> (Hamilton 1822)	LC	b, d, e, f, g, h
	Slender rasbora	<i>Rasbora daniconius</i> (Hamilton 1822)	LC	a, b, c, d, e, f, g, h
	Mola carplet	<i>Amblypharyngodon</i> <i>mola</i> (Hamilton 1822)	LC	h
Heteropneustidae	Asian stinging catfish	<i>Heteropneustes fossilis</i> (Bloch 1794)	LC	e, h
Mastacembelidae	Barred spiny eel, Indian spiny eel	<i>Macrognathus pancalus</i> (Hamilton 1822)	LC	e, f, h
	Zig-zag eel	<i>Mastacembelus armatus</i> (Lacepede 1800)	LC	a, b, c, d, e, f, h
Nemacheilidae	Mottled loach	<i>Acanthocobitis botia</i> (Hamilton 1822)	LC	a, b, c, d, e, f
		<i>Schistura scaturigina</i> (McClelland 1839)	LC	a, b

Family	Common name	Scientific name	IUCN status	Previous studies
	Creek loach	<i>Schistura savona</i> (Hamilton 1822)	LC	a, b, c, d
		<i>Schistura rupecula</i> McClelland 1838	LC	b, d
		<i>Schistura beavani</i> (Gunther 1868)	LC	b, d
		<i>Nemacheilus corica</i> (Hamilton 1822)	LC	b
Osphronemidae	Banded gourami, striped gourami	<i>Trichogaster fasciata</i> (Bloch and Schneider 1801)	LC	d, e, f, h
Sisoridae		<i>Glyptothorax telchitta</i> (Hamilton 1822)	LC	e
	River cat	<i>Glyptothorax pectinopterus</i> (McClelland 1842)	LC	a, b, c, d, e
	Goonch	<i>Bagarius bagarius</i> (Hamilton 1822)	VU	d

^aHora and Mukerji (1936), ^bSingh et al., (1983), ^cHusain and Tilak (1994), ^dKhanna et al. (2013), ^eRana et al. (2017),
^fRana and Gupta (2017), ^gHusain (2018), ^hPemola et al. (2023)

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ANNEXURE VI

Floral species of the Chandrabhaga River basin

Plant Name (Botanical name)	Family	Habit	Habitat	Nativity
<i>Colocassia esculenta</i> (L.) Schott.	Araceae Juss.	H	A	Native
<i>Lemna perpusilla</i> Torr.	Araceae Juss.	H	A	Native
<i>Dioscorea bulbifera</i> L.	Dioscoreaceae R.Br.	H	T	Native
<i>Calamus tenuis</i> Roxb.	Arecaceae Bercht. & J.Persel	S	SA	Native
<i>Cyperus rotundus</i> L.	Cyperaceae Juss.	G	SA	Native
<i>Cyperus difformis</i> L.	Cyperaceae Juss.	G	SA	Native
<i>Cyperus mindorensis</i> (Steud.) Huygh, syn. <i>Kyllinga nemoralis</i> (J.R.Forst. & G.Forst.) Dandy ex Hutch. & Dalziel	Cyperaceae Juss.	G	SA	Native
<i>Fimbristylis dichotoma</i> (L.) Vahl	Cyperaceae Juss.	G	SA	Native
<i>Erioscirpus comosus</i> (Wall.) Palla syn. <i>Eriophorum comosum</i> (Wall.) Nees	Cyperaceae Juss.	G	SA	Native
<i>Enteropogon dolichostachyus</i> (Lag.) Keng	Poaceae Barnhart	G	SA	Native
<i>Eragrostis tenella</i> (L.) P.Beauv. ex Roem. & Schult.	Poaceae Barnhart	G	SA	Native
<i>Eragrostis unioides</i> (Retz.) Nees ex Steud.	Poaceae Barnhart	G	SA	Native
<i>Dichanthium annulatum</i> (Forssk.) Stapf	Poaceae Barnhart	G	SA	Native
<i>Digitaria stricta</i> Roth	Poaceae Barnhart	G	SA	Native
<i>Coix lacryma-jobi</i> L.	Poaceae Barnhart	G	SA	Native
<i>Chrysopogon fulvus</i> (Spreng.) Chiov.	Poaceae Barnhart	G	SA	Native
<i>Chrysopogon zizanioides</i> (L.) Roberty	Poaceae Barnhart	G	SA	Native
<i>Cynodon dactylon</i> (L.) Pers.	Poaceae Barnhart	G	SA	Native
<i>Cyrtococcum patens</i> (L.) A. Camus	Poaceae Barnhart	G	SA	Native
<i>Apluda mutica</i> L.	Poaceae Barnhart	G	SA	Native
<i>Arundo donax</i> L.	Poaceae Barnhart	G	SA	Native
<i>Imperata cylindrica</i> (L.) Raeusch.	Poaceae Barnhart	G	SA	Native
<i>Paspalum dilatatum</i> Poir.	Poaceae Barnhart	G	SA	Introduced
<i>Paspalum distichum</i> L.	Poaceae Barnhart	G	SA	Introduced
<i>Paspalidium flavidum</i> (Retz.) A. Camus	Poaceae Barnhart	G	SA	Native
<i>Poa annua</i> L.	Poaceae Barnhart	G	SA	Native
<i>Phragmites karka</i> (Retz.) Trin. ex Steud.	Poaceae Barnhart	G	SA	Native
<i>Polypogon monspeliensis</i> (L.) Desf.	Poaceae Barnhart	G	SA	Native
<i>Saccharum spontaneum</i> L.	Poaceae Barnhart	G	SA	Native
<i>Thysanolaena latifolia</i> (Roxb. ex Hornem.) Honda	Poaceae Barnhart	G	SA	Native
<i>Oplismenus compositus</i> (L.) P. Beauv.	Poaceae Barnhart	G	SA	Native
<i>Eleusine indica</i> (L.) Gaertn.	Poaceae Barnhart	G	SA	Native
<i>Typha angustifolia</i> L.	Typhaceae Juss.	G	SA	Native
<i>Potederia crassipes</i> Mart.	Pontederiaceae Kunth	H	A	Introduced
<i>Commelinia benghalensis</i> L.	Commelinaceae Mirb.	H	SA	Native
<i>Ranunculus sceleratus</i> L.	Ranunculaceae Juss.	H	SA	Native
<i>Argemone mexicana</i> L.	Papaveraceae Juss.	H	T	Introduced
<i>Cissampelos pareria</i> L.	Menispermaceae Juss.	C	T	Native
<i>Cayrtia trifolia</i> (L.) Domin	Vitaceae Juss.	C	T	Native
<i>Celastrus paniculatus</i> Willd.	Celastraceae R.Br.	S	T	Native

Plant Name (Botanical name)	Family	Habit	Habitat	Nativity
<i>Oxalis corniculata</i> L.	Oxalidaceae R.Br.	H	SA	Native
<i>Croton bonplandianus</i> Baill.	Euphorbiaceae Juss.	H	SA	Introduced
<i>Euphorbia hirta</i> L.	Euphorbiaceae Juss.	H	SA	Introduced
<i>Mallotus nudiflorus</i> (L.) Kulju & Welzen	Euphorbiaceae Juss.	T	SA	Native
<i>Ricinus communis</i> L.	Euphorbiaceae Juss.	S	T	Introduced
<i>Jatropha curcas</i> L.	Euphorbiaceae Juss.	S	SA	Introduced
<i>Phyllanthus niruri</i> L.	Phyllantaceae Martynov	H	SA	Native
<i>Phyllanthus urinaria</i> L.	Phyllantaceae Martynov	H	SA	Native
<i>Phyllanthus virgatus</i> G. Forst.	Phyllantaceae Martynov	H	SA	Native
<i>Putranjiva roxburghii</i> Wall.	Putranjivaceae Meisn.	T	SA	Native
<i>Bergia ammannioides</i> Heyne ex. Roth.	Elatinaceae Dumort	H	SA	Native
<i>Acacia catechu</i> (L.) Willd.,Oliv.	Fabaceae Lindl.	T	T	Native
<i>Acacia nilotica</i> (L.) P.J.H.Hurter & Mabb.	Fabaceae Lindl.	T	T	Native
<i>Cassia fistula</i> L.	Fabaceae Lindl.	T	T	Native
<i>Caesalpinia bonduc</i> (L.) Roxb.	Fabaceae Lindl.	S	SA	Native
<i>Desmodium triflorum</i> (L.) DC.	Fabaceae Lindl.	H	SA	Native
<i>Medicago polymorpha</i> L.	Fabaceae Lindl.	H	SA	Introduced
<i>Medicago lupulina</i> L.	Fabaceae Lindl.	H	SA	Native
<i>Melilotus albus</i> Medik.	Fabaceae Lindl.	H	SA	Introduced
<i>Melilotus indicus</i> (A.) All.	Fabaceae Lindl.	H	SA	Native
<i>Mimosa himalayana</i> Gamble	Fabaceae Lindl.	S	T	Native
<i>Mimosa pudica</i> L.	Fabaceae Lindl.	H	T	Introduced
<i>Pithecellobium dulce</i> (Roxb.) Benth.	Fabaceae Lindl.	T	T	Introduced
<i>Senna occidentalis</i> (L.) Link	Fabaceae Lindl.	S	SA	Introduced
<i>Senna tora</i> (L.) Roxb.	Fabaceae Lindl.	H	SA	Introduced
<i>Trifolium resupinatum</i> L.	Fabaceae Lindl.	H	SA	Introduced
<i>Trifolium alexandrinum</i> L.	Fabaceae Lindl.	H	SA	Introduced
<i>Vicia faba</i> L.	Fabaceae Lindl.	H	SA	Introduced
<i>Vicia sativa</i> L.	Fabaceae Lindl.	H	SA	Native
<i>Ficus semicordata</i> Buch.Ham. ex Sm.	Moraceae Gaudich.	T	SA	Native
<i>Ficus virens</i> Aiton	Moraceae Gaudich.	T	SA	Native
<i>Holoptelea integrefolia</i> (Roxb.) Planch.	Ulmaceae Mirb.	T	T	Native
<i>Potentilla indica</i> (Andrews) Th.Wolf	Rosaceae Juss.	H	SA	Native
<i>Ziziphus nummularia</i> (Burm.f.) Wight & Arn.	Rhamnaceae Juss.	S	T	Native
<i>Ziziphus oenophlia</i> (L.) Mill.	Rhamnaceae Juss.	H	T	Native
<i>Pouzolzia pentandra</i> (Roxb.) Benn.	Urticaceae Juss.	H	SA	Native
<i>Terminalia arjuna</i> (Roxb.) Wight & Arn.	Combretaceae R.Br.	T	SA	Native
<i>Syzygium cumini</i> (L.) Skeeles.	Myrtaceae Juss.	T	SA	Native
<i>Ammania baccifera</i> L.	Lythraceae J.St.-Hil	H	SA	Native
<i>Ammannia multiflora</i> Roxb.	Lythraceae J.St.-Hil	H	SA	Native
<i>Woodfordia fruticosa</i> (L.) Kurz	Lythraceae J.St.-Hil	S	SA	Native
<i>Melia azedarach</i> L.	Meliaceae Juss.	T	T	Native
<i>Toona ciliata</i> M. Roem.	Meliaceae Juss.	T	T	Native
<i>Aegle marmelos</i> (L.) Correa	Rutaceae Juss.	T	T	Native
<i>Glycosmis pentaphylla</i> (Retz.) DC.	Rutaceae Juss.	S	T	Native
<i>Murraya koenigii</i> (L.) Sprenge	Rutaceae Juss.	S	T	Native

Plant Name (Botanical name)	Family	Habit	Habitat	Nativity
<i>Malvestrum coromandelianum</i> (L.) Garcke	Malvaceae Juss.	H	T	Native
<i>Sida acuta</i> Burm.f.	Malvaceae Juss.	H	T	Native
<i>Urena lobata</i> L.	Malvaceae Juss.	S	T	Native
<i>Capparis zeylanica</i> L.	Capparaceae Juss.	S	T	Native
<i>Lepidium didymum</i> L.	Brassicaceae Burnett	H	SA	Introduced
<i>Cardamine hirsuta</i> L.	Brassicaceae Burnett	H	T	Native
<i>Rorippa dubia</i> (Pers.) H.Hara	Brassicaceae Burnett	H	SA	Native
<i>Nasturtium officinale</i> W.T.Aiton syn. <i>Rorippa officinalis</i> (W.T.Aiton) P.Royen	Brassicaceae Burnett	H	A	Introduced
<i>Polygonum barbatum</i> L.	Polygonaceae Juss.	H	SA	Native
<i>Polygonum glabrum</i> (Willd.) M.Gomez	Polygonaceae Juss.	H	SA	Native
<i>Polygonum plebeium</i> R.Br.	Polygonaceae Juss.	H	SA	Native
<i>Rumex dentatus</i> L.	Polygonaceae Juss.	H	SA	Native
<i>Rumex hastatus</i> D.Don	Polygonaceae Juss.	H	SA	Native
<i>Achyranthes aspera</i> L.	Amaranthaceae Juss.	H	T	Native
<i>Aerva lanata</i> (L.) Juss. ex Schult.	Amaranthaceae Juss.	H	T	Native
<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	Amaranthaceae Juss.	H	SA	Native
<i>Alternanthera ficoidea</i> (L.) Sm.	Amaranthaceae Juss.	H	SA	Introduced
<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	Amaranthaceae Juss.	H	SA	Introduced
<i>Amaranthus spinosus</i> L.	Amaranthaceae Juss.	H	T	Introduced
<i>Amaranthus viridis</i> L.	Amaranthaceae Juss.	H	T	Introduced
<i>Chenopodium album</i> L.	Amaranthaceae Juss.	H	T	Native
<i>Chenopodium murale</i> (L.) S. Fuentes, Uotila & Borsch	Amaranthaceae Juss.	H	T	Native
<i>Tamarix dioica</i> Roxb. ex Roth	Tamaricaceae Lnk	S	SA	Native
<i>Anagallis arvensis</i> L.	Primulaceae Batsch ex Borkh.	H	SA	Introduced
<i>Dicliptera paniculata</i> (Forssk.)	Acanthaceae Juss.	H	T	Native
<i>Hygrophila polysperma</i> Anderson	Acanthaceae Juss.	H	SA	Native
<i>Justicia adhatoda</i> L.	Acanthaceae Juss.	S	SA	Native
<i>Lepidagathis incurva</i> Buch.-Ham. ex D.Don	Acanthaceae Juss.	H	T	Native
<i>Lepidagathis cuspidata</i> Nees	Acanthaceae Juss.	H	SA	Native
<i>Clerodendrum viscosum</i> Vent.	Lamiaceae Martinov	S	T	Native
<i>Colebrookia oppositifolia</i> Sm.	Lamiaceae Martinov	S	T	Native
<i>Colebrookia oppositifolia</i> Sm.	Lamiaceae Martinov	S	T	Native
<i>Nepeta hindostana</i> (B. Heyne ex Roth) Hanines	Lamiaceae Martinov	H	SA	Native
<i>Vitex negundo</i> L.	Lamiaceae Martinov	S	SA	Native
<i>Lindernia ciliata</i> (Colsm.) Pennell	Linderniaceae Borsch, K.Müll. & Eb. Fisch.	H	SA	Native
<i>Lindernia crustacea</i> (L.) F.Muell.	Linderniaceae Borsch, K.Müll. & Eb. Fisch.	H	SA	Native
<i>Mazus pumilus</i> (Burm. f.) Steenis	Linderniaceae Borsch, K.Müll. & Eb. Fisch.	H	SA	Native
<i>Scoparia dulcis</i> L.	Plantaginaceae Juss.	H	SA	Introduced
<i>Veronica anagallis-aquatica</i> L.	Plantaginaceae Juss.	H	SA	Native
<i>Mecardonia procumbens</i> (Mill.) Small	Plantaginaceae Juss.	H	SA	Introduced
<i>Lindenbergia macrostachya</i> (Benth.) Benth.	Orobanchaceae Vent.	H	SA	Native

Plant Name (Botanical name)	Family	Habit	Habitat	Nativity
<i>Verbascum chinense</i> (L.) Santapau	Scrophulariaceae Juss.	H	SA	Native
<i>Verbascum thapsus</i> Linnaeus	Scrophulariaceae Juss.	H	SA	Native
<i>Lantana camara</i> L.	Verbinaceae J.St.-Hil.	S	T	Introduced
<i>Lippia alba</i> (Mill.) N.E. Br. Britton & P.Wilson	Verbinaceae J.St.-Hil.	S	T	Introduced
<i>Phyla nodiflora</i> (L.)	Verbinaceae J.St.-Hil.	H	SA	Native
<i>Ipomoea carnea</i> Jacq.	Convolvulaceae Juss.	S	T	Introduced
<i>Nicotiana plumbaginifolia</i> Viv.	Solanaceae Juss.	H	SA	Introduced
<i>Solanum nigrum</i> L.	Solanaceae Juss.	H	T	Native
<i>Solanum torvum</i> Sw.	Solanaceae Juss.	S	T	Introduced
<i>Solanum erianthum</i> D. Don	Solanaceae Juss.	T	SA	Introduced
<i>Solanum chrysotrichum</i> Schltdl.	Solanaceae Juss.	S	SA	Introduced
<i>Ichnocarpus frutescens</i> (L.) W.T. Aiton	Apocynaceae Juss.	C	T	Native
<i>Haldina cordifolia</i> (Roxb.) Ridsdale	Rubiaceae Juss.	T	T	Native
<i>Spermadictyon suaveolens</i> Roxb.	Rubiaceae Juss.	S	T	Native
<i>Wendlandia heynei</i> (Schult.) Santapau & Merchant	Rubiaceae Juss.	T	T	Native
<i>Ageratum houstonianum</i> Mill.	Asteraceae Bercht. & J.Presl	H	SA	Introduced
<i>Acmella ciliata</i> (Kunth) Cass.	Asteraceae Bercht. & J.Presl	H	SA	Introduced
<i>Bidens pilosa</i> L.	Asteraceae Bercht. & J.Presl	H	SA	Introduced
<i>Caesulia axillaris</i> Roxb.	Asteraceae Bercht. & J.Presl	H	SA	Native
<i>Cirsium arvense</i> (L.) Scop.	Asteraceae Bercht. & J.Presl	H	T	Native
<i>Cirsium wallichii</i> DC. Species	Asteraceae Bercht. & J.Presl	H	T	Native
<i>Eclipta prostrata</i> (L.) L.	Asteraceae Bercht. & J.Presl	H	SA	Introduced
<i>Gnaphalium pensylvanicum</i> Willd.	Asteraceae Bercht. & J.Presl	H	SA	Introduced
<i>Parthenium hysterophorus</i> L.	Asteraceae Bercht. & J.Presl	H	T	Introduced
<i>Tridax procumbens</i> L.	Asteraceae Bercht. & J.Presl	H	T	Introduced
<i>Soliva anthemifolia</i> (Juss.) Sweet	Asteraceae Bercht. & J.Presl	H	SA	Introduced
<i>Sonchus oleraceus</i> L.	Asteraceae Bercht. & J.Presl	H	T	Introduced
<i>Xanthium strumarium</i> L.	Asteraceae Bercht. & J.Presl	H	T	Native
<i>Hydrocotyle sibthorpioides</i> Lam.	Apiaceae Lindl.	H	A	Native
<i>Lobelia alsinoides</i> Lam. Hel.	Campanulaceae Juss.	H	SA	Native
<i>Centella asiatica</i> (L.) Urb.	Apiaceae Lindl.	H	SA	Native





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नमो
गंगे



भारतीय वन्यजीव संस्थान
Wildlife Institute of India

NMCG

National Mission for Clean Ganga,
Department of Water Resources, River
Development & Ganga Rejuvenation
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