



*Socio-Ecological
Profile of*
**SOLANI
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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. The Ganga River, which flows across the 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 resourcefulness 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. Solani River a right bank tributary of Ganga River, which originates from the foothills of Himalayas in the Kaluwala Reserve Forest of Saharanpur district in Uttar Pradesh. Solani River joins Ganga River in Muzaffarnagar district, Uttar Pradesh. Based on the secondary literature review, the report attempts to compile the socio-ecological profile of the Solani River and will enable the reader to better understand the variety of the flora and fauna of the Solani River, change in forest cover and land use land cover patterns, and the threats faced by the River. This report aims to highlight the need for more focused scientific studies of the Solani River, conservation efforts, to develop a knowledge base for the species of Solani River, aid in biological restoration, and assist policy planners and managers to judiciously use water from the Solani River, given the needs of the species therein.

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INTRODUCTION

Solani, a small right-bank tributary of the Ganga River, flows through two Indian states, Uttarakhand and Uttar Pradesh (Uniyal et al., 2010; Kumar et al., 2016). It covers a length of about 136 km, of which 71 km flows through Uttarakhand and 65 km through Uttar Pradesh (Figure 1). The Solani River basin covers a total catchment area of about 1950 km², of which 78.02% falls in Uttarakhand and 21.98% in Uttar Pradesh. According to folklore Sage Sukhdev recited the *Shrimad Bhagwat Katha* to Maharaja Parikshit on the banks of Solani under the *Akshaya Vriksha*, the immortal sacred tree. After this, Maharaja Parikshit got rid of his curse and later on, this place was named Shukratal (Knapp, 2009).

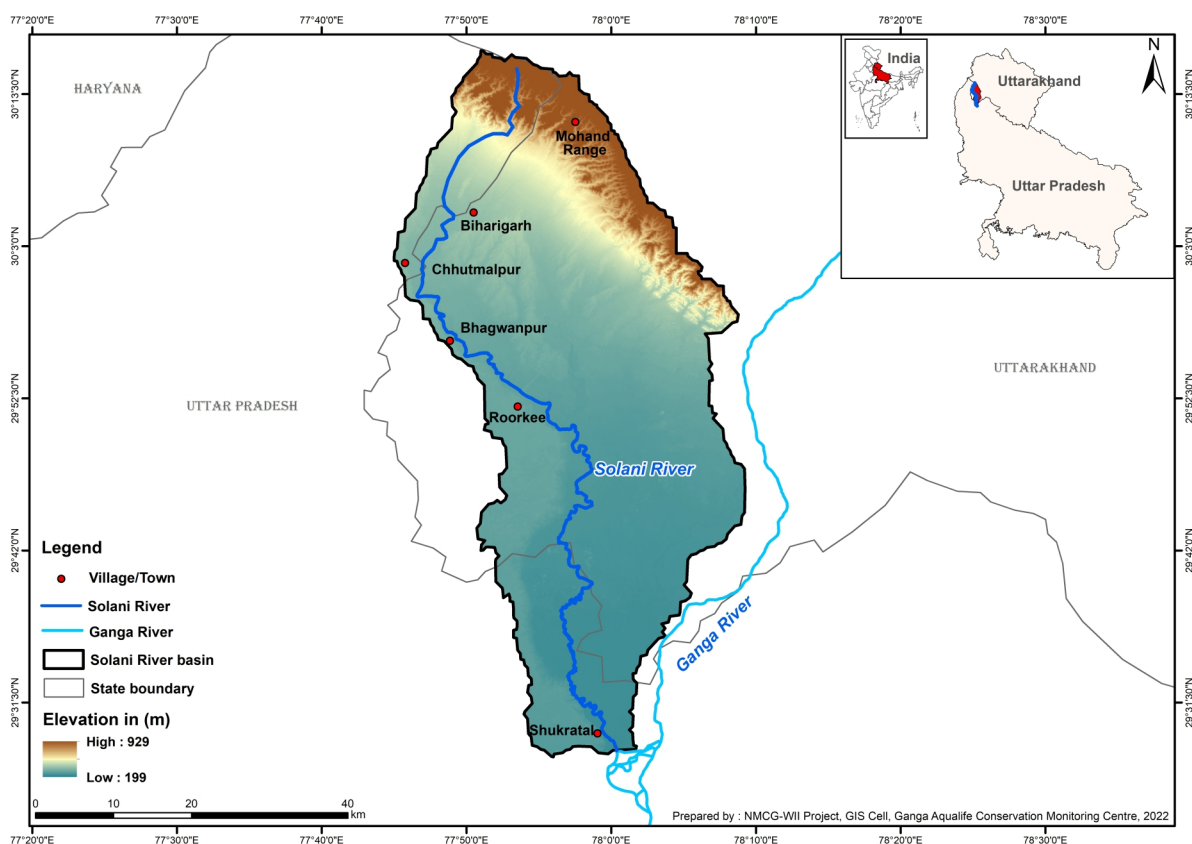


Figure 1. Map of Solani River



Solani River at Shukratal Ghat,
Muzaffarnagar, Uttar Pradesh

COURSE OF THE RIVER

Solani is a rain-fed river that originates from the foothills of the Himalayas in the Kaluwala Reserve Forest of Saharanpur district in Uttar Pradesh (CGWB, 2016). It enters Uttarakhand in Bihargarh and flows through Chhutmalpur, Bhagwanpur, and Roorkee. Again it enters Uttar Pradesh in Purkazi and flows through Morna and later joins the Ganga River in Shukratal village in the Muzaffarnagar district of Uttar Pradesh. Kaluwala, Chillawal, Shahjahanpur and Mohan are the key tributaries of the Solani river (Alhadithi, 2015).

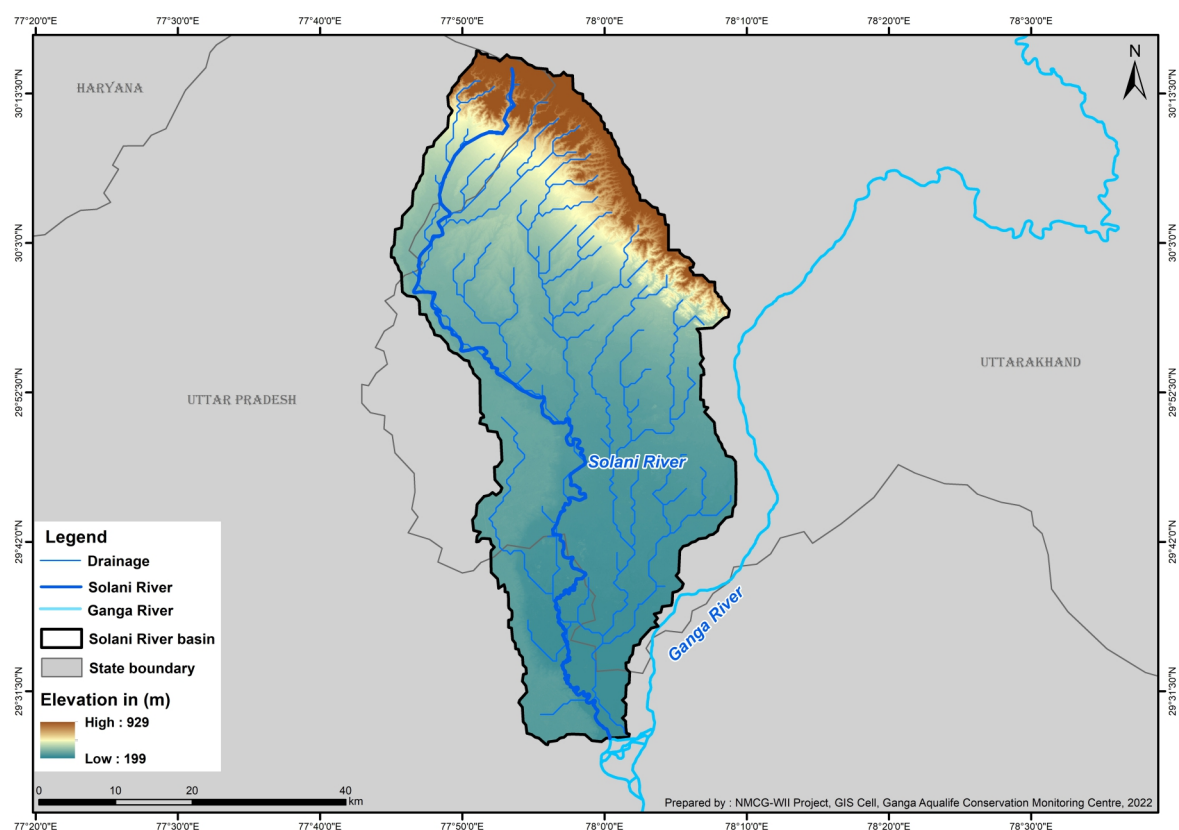


Figure 2. Drainage map of Salani River

GEOLOGY AND GEOMORPHOLOGY

Geologically Solani is comprised of Siwalik rocks and alluvial deposits. It contains sand, silt, and clays of the Holocene period and sandstone with boulders, cobbles, pebbles, conglomerate, siltstones, and shales with boulders, sand, and clay of the Pleistocene period (CGWB, 2016). Geomorphologically, the area is divided into four surface units: megafan, river valley terrace, piedmont fan and present-day active floodplain (Uniyal et al., 2010).

SOIL TYPE

The soil of the Solani River basin can be broadly grouped into two categories, alluvial and hilly soil (Champion & Seth, 1968). Older alluvium and newer floodplain deposits formed the alluvial soil, characterised by light to dark grey colour and fine texture. Derived from the weathered rocks, the hilly soil is coarse-grained, ferruginous, poor in nitrogen content, medium to high potash and acidic in nature. According to FAO-UNESCO (1977), the catchment of the Solani River is represented by 80.74% of Fluvisols soil and 19.26% of Regosols soil. Fluvisols soil occurs in the eastern, western, southern and central parts of the catchment and Regosols in the northern parts of the catchment.

CLIMATE

The climate of the Solani River basin is sub-tropical monsoon, which is characterised by four seasons, summer, southwest monsoon, post-monsoon and winter (Alhadithi, 2015). Summer from March to May is hot, while December to February is cold. The mean maximum temperatures ranges between 20°C to 40°C (Alhadithi, 2015). Most of the rainfall occurs during the southwest monsoon from June to September, with the annual precipitation ranging from 1200 to 1500 mm (Alhadithi, 2015).



Solani River at Morna, Muzaffarnagar, Uttar Pradesh

BIOGEOGRAPHY, FLORA AND FAUNA

The Solani River flows through only the Gangetic Plains biogeographic zone and the Upper Gangetic Plains (7A) biotic province. According to Champion and Seth (1968), the forest in the Solani River basin is represented by the northern dry tropical forest (5B), which is further divided into the dry Siwalik sal forest (5B/C1a) and the northern mixed deciduous forest (5B/C2). The vegetation of the Basin is represented by *Shorea robusta*, *Anogeissus latifolia*, *Buchanania lanzan*, *Bauhinia variegata*, *Ougeinia oojensis*, *Acacia catechu* and *Terminalia tomentosa*.

Solani River basin harbours important faunas such as the Gangetic dolphin (*Platanista gangetica*), smooth-coated otter (*Lutrogale perspicillata*), Pallas's fish eagle (*Haliaeetus leucoryphus*), Egyptian vulture (*Neophron percnopterus*), red-headed vulture (*Sarcogyps calvus*) and Indian tent turtle (*Pangshura tentoria*) (ZSI, 1995). Golden mahseer (*Tor putitora*), snow trout (*Schizothorax richardsonii*), silver mahseer (*Tor tor*), Spotted barb (*Puntius sophore*), wallago (*Wallago attu*) are some of the important fish species that occur in Solani River basin (Husain and Tilak, 1995). Most of the available information on the flora and fauna of the Solani River basin is from the protected areas. Therefore, there is a lack of scientific studies focusing specifically on the Solani River's biodiversity, making it one of the least studied rivers in the Ganga River basin.

CONSERVATION STATUS

Two protected areas, Rajaji National Park in Uttarakhand and Hastinapur Wildlife Sanctuary in Uttar Pradesh, fall in the Solani River Basin. Around a 28 km stretch of Solani River flows through Hastinapur Wildlife Sanctuary and has been protected since 1986 under Section 36 A of the Wild Life (Protection) Act, 1972. This Sanctuary supports the population of swamp deer (*Rucervus duvaucelii*), hog deer (*Axis porcinus*), blackbuck (*Antelope cervicapra*), nilgai (*Boselaphus tragocamelus*), wild boar (*Sus scrofa*), golden jackal (*Canis aureus*), jungle cat (*Felis chaus*) and fishing cat (*Prionailurus viverrinus*) (WII-GACMC, 2018). Among aquatic species, the Sanctuary supports the population of Critically Endangered gharial (*Gavialis gangeticus*), Endangered Gangetic dolphin (*Platanista gangetica*), and Vulnerable smooth-coated otter (*Lutrogale perspicillata*) (Khan and Abbasi, 2015). Sanctuary also supports 117 bird species belonging to 44 families, including the Indian skimmer (*Rynchops albigollis*), sarus crane (*Grus antigone*), black bellied tern (*Sterna acuticauda*) and painted stork (*Mycteria leucocephala*) (Khan et al., 2013). Rajaji National Park in the Solani River basin supports the population of the Asian elephant (*Elephas maximus*), tiger (*Panthera tigris*), leopard (*Panthera pardus*), sloth bear (*Melursus ursinus*), wild boar (*Sus scrofa*), Indian grey mongoose (*Herpestes edwardsii*), swamp deer (*Rucervus duvaucelii*) and small Indian civet (*Viverricula indica*) (Joshi, 2016; WII-GACMC, 2018). Among aquatic species, smooth-coated otters (*Lutrogale perspicillata*), Eurasian otter (*Lutra lutra*), mugger (*Crocodylus palustris*), golden mahseer (*Tor putitora*) have been reported from Rajaji National Park (WII-GACMC, 2018).

Hastinapur Wildlife Sanctuary



FOREST COVER

According to the Forest Survey of India (2015 & 2019), the catchment of the Solani River is dominated by non-forest cover, followed by moderately dense forest, open forest, very dense forest and scrubland (Figures 3a & 3b). From 2015 to 2019, an increase of 2.74% and 0.12% was recorded for the very dense forest and scrubland, respectively. However, a decrease of 1.65%, 0.94% and 0.27% was recorded for the moderately dense forest, open forest and non-forest area, respectively (Table 1).

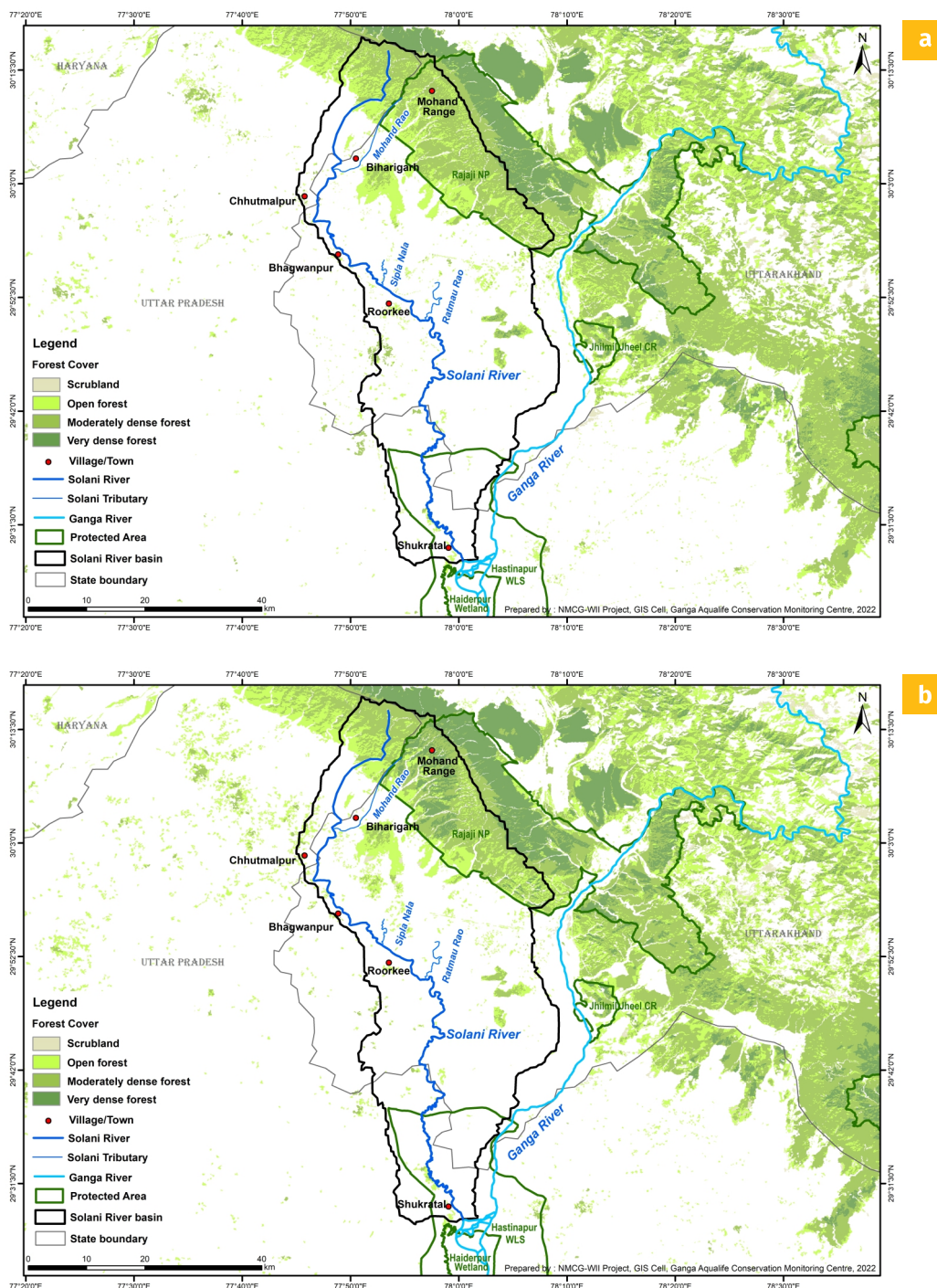


Table 1. Summary statistics of the forest cover of the Solani River basin from 2015 to 2019.

S.No.	Forest Cover Classes	2015		2019		Change (2015 to 2019)	
		Area (km ²)	Area (%)	Area (km ²)	Area (%)	Area (km ²)	Area (%)
1	Scrubland	0	0	2.35	0.12	2.35	0.12
2	Open Forest	216.78	11.11	198.32	10.17	-18.46	-0.94
3	Moderately Dense Forest	280.61	14.39	248.52	12.74	-32.09	-1.65
4	Very Dense Forest	4.22	0.22	57.64	2.96	53.42	2.74
5	Non-forest	1448.81	74.28	1443.59	74.01	-5.22	-0.27
Total Area		1950.42	100	1950.42	100		

Source: FSI (2015 & 2019)

DEMOGRAPHY

Solani River basin supports a population of 25.63 lakh, of which 13.61 lakh are in Uttarakhand and 12.02 lakh are in Uttar Pradesh (GOI, 2011). There are four districts in the Solani River basin, of which Haridwar fall in Uttarakhand and Bijnor, Muzaffarnagar and Saharanpur fall in Uttar Pradesh. Only the Haridwar district holds more than 50% of the human population. Bahadarabad, Muzaffarabad, Roorkee and Mohammedpur Deomal represent the most populated blocks in the Solani River basin (Figure 4 and Table 2).

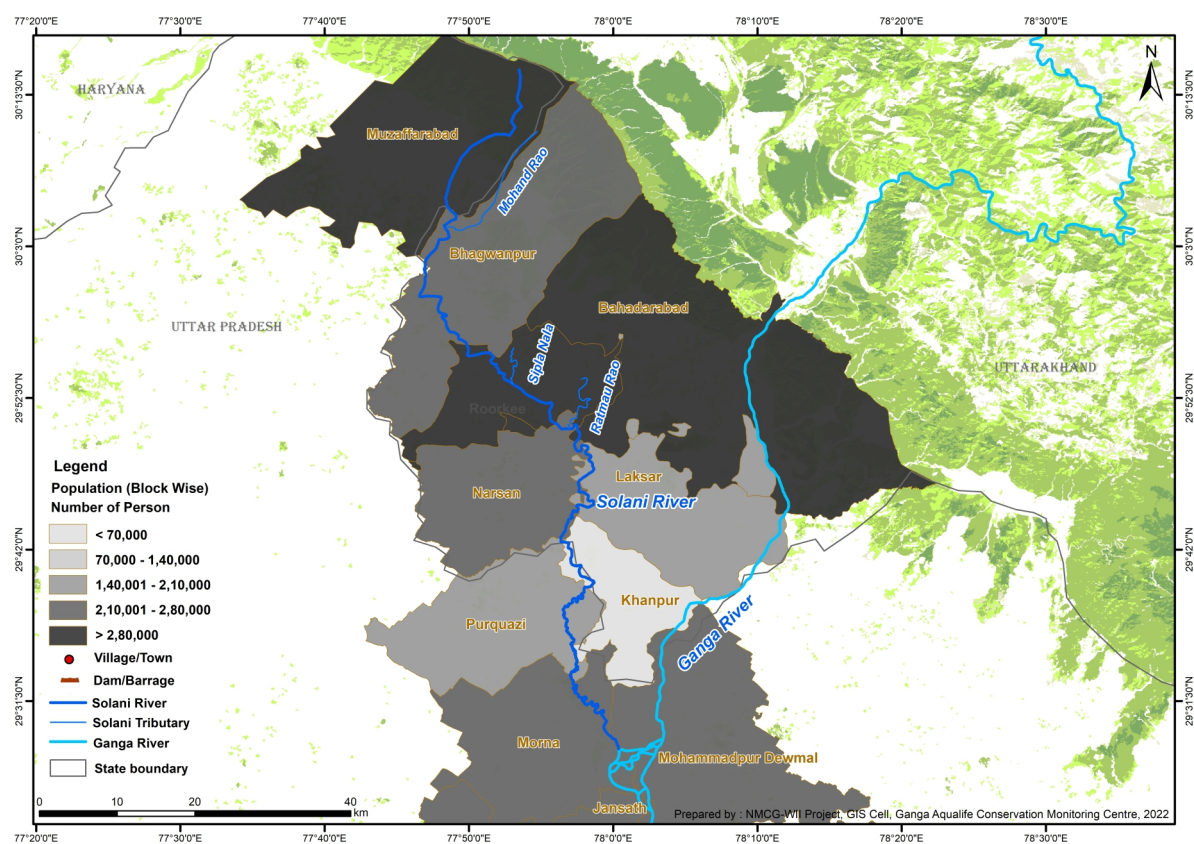


Figure 4. Human population status of Solani River basin (2011)

Table 2. Block-wise human population statistics of the Solani River basin for 2011

State	District	Block	Population	Population (%)
Uttarakhand	Haridwar	Bhagwanpur	228583	8.9
		Roorkee	301268	11.8
		Bahadradabad	357366	13.9
		Narsan	248251	9.7
		Laksar	171889	6.7
		Khanpur	53194	2.1
Uttar Pradesh	Saharanpur	Muzaffarabad	309055	12.1
	Muzaffarnagar	Purkaji	154996	6.0
		Morna	224721	8.8
		Jansath	246837	9.6
	Bijnor	Mohammadpur Devmal	266552	10.4
Total			2592654	100

Source: Government of India, 2011

LAND USE LAND COVER

Based on NRSC data (2008-09 and 2018-19), two Land Use and Land Cover (LULC) maps of the Solani River basin were prepared. For the Solani River basin, LULC can be categorised into 12 categories: built-up, Kharif crop, rabi crop, double/triple crop, fallow land, plantation, evergreen forest, deciduous forest, degraded/ scrub forest, grassland, wasteland and waterbodies. From 2008-09, the Solani River basin was dominated by 35.33% of double/triple crop, followed by 22.25% of deciduous forest, 11% of fallow land, 9.46% of wasteland, 5.18% of built-up area, 4.6% of waterbodies, 4.36% of plantation, 3.96% of Kharif crop, 2.23% of degraded/scrub forest, 0.77% of Rabi crop, and 0.43% each of evergreen forest and grassland. From 2018-19 the Basin was dominated by 27.21% of double/triple crop, followed by 22.67% of deciduous forest, 15.24% of Kharif crop, 8.37% of fallow land, 5.3% of built-up area, 5.19% of wasteland, 5.07% of waterbodies, 4.32% of plantation, 3.6% of Rabi crop, 2.21% of degraded/scrub forest, and 0.41% each of evergreen forest and grassland. LULC maps revealed that over a period of ten years, there was an increase of 11.28%, 2.83%, 0.47% and 0.42% in the Kharif crop, Rabi crop, waterbodies and deciduous forest, respectively. And a decrease of 8.12%, 4.27% and 2.63% in the wasteland, double/triple crop and fallow land area, respectively (Figure 5a & 5b and Table 3).



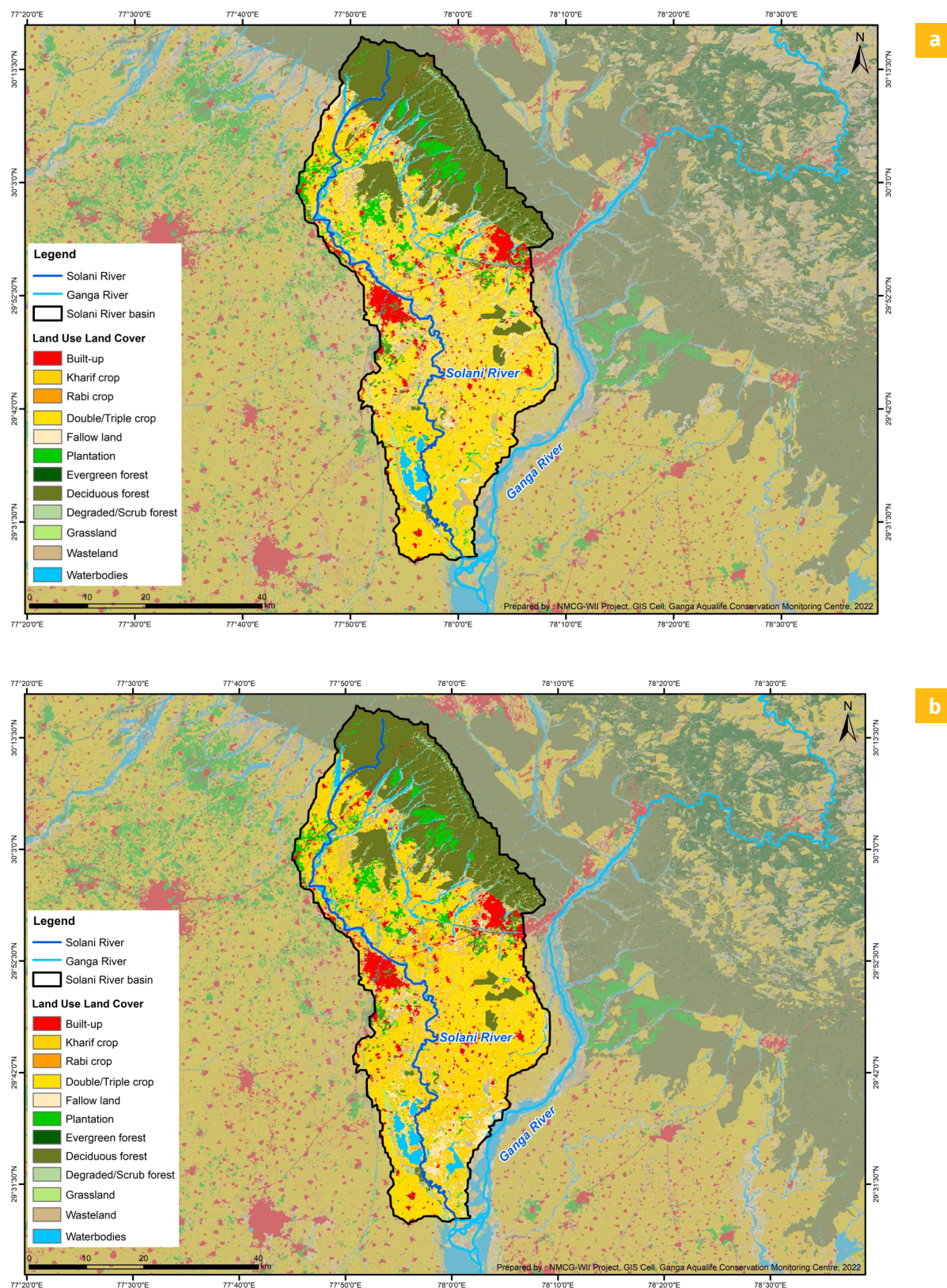


Figure 5. LULC map of Solani River basin a) 2008-09 and b) 2018-19

Table 3. LULC statistics of the Solani River basin for 2008-09, 2018-19 and 2008 to 2019.

S. No.	LULC Classes	2008-09		2018-19		Change (2008-19)	
		Area (km ²)	Area (%)	Area (km ²)	Area (%)	Area (km ²)	Area (%)
1	Built-up	101.04	5.18	103.42	5.3	2.38	0.12
2	Kharif crop	77.28	3.96	297.18	15.24	219.9	11.28
3	Rabi crop	15.08	0.77	70.17	3.6	55.09	2.83
4	Double/Triple crop	689.13	35.33	530.7	27.21	-158.43	-8.12
5	Fallow land	214.58	11	163.33	8.37	-51.25	-2.63
6	Plantation	85	4.36	84.22	4.32	-0.78	-0.04
7	Evergreen forest	8.3	0.43	8.04	0.41	-0.26	-0.02
8	Deciduous forest	433.96	22.25	442.01	22.67	8.05	0.42
9	Degraded/Scrub forest	43.46	2.23	43.16	2.21	-0.3	-0.02
10	Grassland	8.31	0.43	8.02	0.41	-0.29	-0.02
11	Wasteland	184.48	9.46	101.3	5.19	-83.18	-4.27
12	Waterbodies	89.8	4.6	98.87	5.07	9.07	0.47
Total Area		1950.42	100	1950.42	100		

Source: NRSC (2009 and 2019)

LIVELIHOOD

Agriculture, small industries, and tourism are important sources of livelihood in the Solani River basin. Agriculture covers more than 50% of the Basin area (NRSC, 2019). Sugarcane, paddy, maize, cherry, wheat, mustard and berseem represents the common crops of the Basin (Kumar et al., 2016). Several small industries, including pharma & cosmetics, iron & steel and paper & sugar mills, especially in the Roorkee, Bhagwanpur, and Purkazi stretch of the Solani, provide an important livelihood source to the locals. Shukratal temple in Muzaffarnagar district of Uttar Pradesh is a well-known religious place and is significant for tourism-based livelihood.

The Ministry of Jal Shakti, Government of India, through the National Mission for Clean Ganga (NMCG), has entrusted the Wildlife Institute of India (WII) with a project "Biodiversity Conservation and Ganga Rejuvenation" to develop a science-based aquatic species restoration plan for the Ganga River by involving multiple stakeholders. As a part of this project, WII has developed a trained cadre of volunteers known as Ganga Praharis from among the local people who are working for biodiversity conservation and Ganga rejuvenation. The project also aims to realize Arth Ganga in the Ganga River basin by linking local livelihoods with aquatic conservation through Jalaj, a model for symbiotic linkages between river and people. Through this initiative, *Jalaj Parikshit*, a Safari, has been established at Shukratal Ghat in Muzaffarnagar district of Uttar Pradesh to promote eco-tourism and mobilise local communities towards biodiversity conservation and sustainable livelihood practices.



Jalaj Parikshit at Shukratal Ghat, Muzaffarnagar

THREATS

Urbanisation and rapid expansion in agriculture have led to the Solani River basin encroachment. Direct discharge of untreated industrial effluents into the River, especially in the lower stretch of Solani in Uttar Pradesh, deteriorating the River's water quality. Kamboj et al. (2015) conducted a study on the water quality of the Solani River (downstream of Roorkee) and reported high concentrations of TDS, BOD, and pH might affect the riverine habitat and aquatic biodiversity of the River. Besides this, religious offerings by locals and tourists into the River also affect the water quality.



CONSERVATION IMPLICATIONS

The tributaries are known to increase in channel and habitat complexities, depth, and change in substrate composition, which increases the mainstem diversity downstream of the tributaries (Benda et al., 2004; Fernandez et al., 2004). Apart from contributing to the flow and aquatic diversity of the mainstem, the tributaries also contribute to the pollution load of the mainstem. Any conservation actions for the mainstem, thus, should also be directed at the tributaries. Thus, the smaller tributaries of the Ganga River were taken up for study. Despite being an important small tributary of the Ganga River, the Solani River hasn't received the attention of research institutions. The secondary literature review of the Solani River highlights the need for more scientific studies focusing on biodiversity in terms of flora and fauna, ecotoxicology and physicochemical parameters of river water and identification of threats to understand the ecological status of the River. Involving communities in the conservation of this tributary through various ways will certainly aid in the further rejuvenation of the River. Developing capacity building programmes focusing on various stakeholders will also help in the conservation and rejuvenation of Solani. Organic farming needs to be promoted to prevent water contamination from agricultural runoff laden with fertilisers and pesticides. Religious waste management practices should also need to be prioritised in the Basin.

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ANNEXURE I

Mammalian species of the Solani River Basin

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
Bovidae	Himalayan Goral	<i>Naemorhedus goral</i> (Hardwicke, 1825)	NT	Schedule III	a, b, d
	Nilgai	<i>Boselaphus tragocamelus</i> (Pallas, 1766)	LC	Schedule III	a, d
Canidae	Bengal Fox	<i>Vulpes bengalensis</i> (Shaw, 1800)	LC	Schedule II	a, d
	Dhole/ Indian Wild Dog	<i>Cuon alpinus</i> (Pallas, 1811)	EN	Schedule II	a
	Golden Jackal	<i>Canis aureus</i> (Linnaeus, 1758)	LC	Schedule II	a, d
Cervidae	Barking Deer	<i>Muntiacus muntjak</i> (Zimmermann, 1780)	LC	Schedule III	a, b, d
	Hog Deer	<i>Axis porcinus</i> (Zimmermann, 1780)	EN	Schedule I	a
	Indian Spotted Deer/Chital	<i>Axis axis</i> (Erxleben, 1777)	LC	Schedule III	a, b, d
	Sambar	<i>Rusa unicolor</i> (Kerr, 1792)	VU	Schedule III	a, b, d
	Swamp Deer	<i>Rucervus duvaucelii</i> (G. Cuvier, 1823)	VU	Schedule I	c
Cercopithecidae	Northern Plains Gray Langur	<i>Semnopithecus entellus</i> (Dufresne, 1797)	LC	Schedule II	a, d
	Rhesus Monkey	<i>Macaca mulatta</i> (Zimmermann, 1780)	LC	Schedule II	a, d
Erinaceidae	Long-eared Hedgehog	<i>Hemiechinus auritus</i> (Gmelin, 1770)	LC	Schedule IV	a
Elephantidae	Asian Elephant	<i>Elephas maximus</i> (Linnaeus, 1758)	EN	Schedule I	a, b, d
Felidae	Jungle Cat	<i>Felis chaus</i> (Schreber, 1777)	LC	Schedule II	a, d
	Leopard	<i>Panthera pardus</i> (Linnaeus, 1758)	VU	Schedule I	a, b, d
	Mainland Leopard Cat	<i>Prionailurus bengalensis</i> (Kerr, 1792)	LC	Schedule I	a, d
	Tiger	<i>Panthera tigris</i> (Linnaeus, 1758)	EN	Schedule I	a, b, d
Herpestidae	Indian Grey Mongoose	<i>Herpestes edwardsii</i> (E. Geoffroy Saint-Hilaire, 1818)	LC	Schedule II	a, d
	Small Indian Mongoose	<i>Herpestes auropunctatus</i> (Hodgson, 1836)	LC	Schedule II	a, d
Hipposideridae	Least Leaf-nosed Bat	<i>Hipposideros cineraceus</i> (Blyth, 1853)	LC	NL	a, d
Hystriidae	Indian Crested Porcupine	<i>Hystrix indica</i> (Kerr, 1792)	LC	Schedule IV	a, d

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
Hyaenidae	Striped Hyaena	<i>Hyaena hyaena</i> (Linnaeus, 1758)	NT	Schedule III	a, b, d
Leporidae	Indian Hare	<i>Lepus nigricollis</i> (F. Cuvier, 1823)	LC	Schedule IV	a, d
Manidae	Indian Pangolin	<i>Manis crassicaudata</i> (E. Geoffroy, 1803)	EN	Schedule I	a, d
Muridae	Common Indian Field Mouse	<i>Mus booduga</i> (Gray, 1837)	LC	Schedule V	a, d
	Greater Bandicoot Rat	<i>Bandicota indica</i> (Bechstein, 1800)	LC	Schedule V	a
	House Mouse	<i>Mus musculus</i> (Linnaeus, 1758)	LC	Schedule V	a, d
	House Rat	<i>Rattus rattus</i> (Linnaeus, 1758)	LC	Schedule V	a, d
	Indian Bush Rat	<i>Golunda ellioti</i> (Gray, 1837)	LC	Schedule V	a, d
	Indian Gerbil/Antelope Rat	<i>Tatera indica</i> (Hardwicke, 1807)	LC	Schedule V	a, d
	Indian Mole Rat/Lesser Bandicota Rat	<i>Bandicota bengalensis</i> (Gray, 1835)	LC	Schedule V	a, d
	Long Tailed Field Mouse	<i>Apodemus sylvaticus</i> (Linnaeus, 1758)	LC	Schedule V	a
	Short-tailed Bandicoot Rat	<i>Nesokia indica</i> (Gray, 1830)	LC	Schedule V	a, d
Mustelidae	Smooth-coated Otter	<i>Lutrogale perspicillata</i> (I. Geoffroy Saint-Hilaire, 1826)	VU	Schedule II	a, c, d
	Yellow-throated Marten	<i>Martes flavigula</i> (Boddaert, 1785)	LC	Schedule II	a, d
Platanistidae	Ganges River Dolphin	<i>Platanista gangetica</i> (Lebeck, 1801)	EN	Schedule I	c
Pteropodidae	Fulvous Fruit-Bat/Leschenault's Rousette	<i>Rousettus leschenaultii</i> (Desmarest, 1820)	NT	Schedule V	a, d
	Greater Short-nosed Fruit Bat	<i>Cynopterus sphinx</i> (Vahl, 1797)	LC	Schedule V	d
	Indian Flying Fox	<i>Pteropus giganteus</i> (Brünnich, 1782)	LC	NL	a, d
Rhinolophidae	Blyth's Horseshoe Bat	<i>Rhinolophus lepidus</i> (Blyth, 1844)	LC	NL	a
	Intermediate Horseshoe Bat	<i>Rhinolophus affinis</i> (Horsfield, 1823)	LC	NL	a
Sciuridae	Northern Palm Squirrel	<i>Funambulus pennantii</i> (Wroughton, 1905)	LC	Schedule IV	a, d
	Red Giant Flying Squirrel	<i>Petaurista petaurista</i> (Pallas, 1766)	LC	Schedule II	d

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
Soricidae	Asian House Shrew	<i>Suncus murinus</i> (Linnaeus, 1766)	LC	NL	a, d
Suidae	Wild Boar/Wild Pig	<i>Sus scrofa</i> (Linnaeus, 1758)	LC	Schedule III	a, b, d
Ursidae	Asiatic Black Bear	<i>Ursus thibetanus</i> (G. Cuvier, 1823)	VU	Schedule II	d
	Sloth Bear	<i>Melursus ursinus</i> (Shaw, 1791)	VU	Schedule I	a, b, d
Vespertilionidae	Hodgson's Bat	<i>Myotis formosus</i> (Hodgson, 1835)	NT	NL	a, d
	Indian Pipistrelle	<i>Pipistrellus coromandra</i> (Gray, 1838)	LC	NL	a, d
	Lesser Noctule	<i>Nyctalus leisleri</i> (Kuhl, 1817)	LC	NL	a
	Peter's Tube-nosed Bat	<i>Harpiola grisea</i> (Peters, 1872)	DD	NL	a
Viverridae	Common Palm Civet	<i>Paradoxurus hermaphroditus</i> (Pallas, 1777)	LC	Schedule II	a, d
	Himalayan Palm Civet	<i>Paguma larvata</i> (C. E. H. Smith, 1827)	LC	Schedule II	d
	Small Indian Civet	<i>Viverricula indica</i> (E. Geoffroy Saint-Hilaire, 1803)	LC	Schedule II	a, d

^aSinha (1995); ^bJoshi (2010); ^cKhan & Abbasi (2015); ^dJoshi (2016)

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ANNEXURE II

Bird species of the Solani River Basin

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
Accipitridae	Black Eagle	<i>Ictinaetus malaiensis</i> (Temminck, 1822)	LC	NL	b
	Black Kite	<i>Milvus migrans</i> (Boddaert, 1783)	LC	NL	a, b, c
	Black Winged Kite	<i>Elanus caeruleus</i> (Desfontaines, 1789)	LC	NL	a, b, c
	Bonelli's Eagle	<i>Aquila fasciata</i> (Vieillot, 1822)	LC	Schedule I	a
	Changeable Hawk-Eagle	<i>Nisaetus cirrhatus</i> (Gmelin, 1788)	LC	Schedule I	a, b
	Cinereous Vulture	<i>Aegypius monachus</i> (Linnaeus, 1766)	NT	Schedule IV	b
	Crested Serpent-eagle	<i>Spilornis cheela</i> (Latham, 1790)	LC	NL	a, b
	Egyptian Vulture	<i>Neophron percnopterus</i> (Linnaeus, 1758)	EN	Schedule IV	a, b, c
	Eurasian Marsh-Harrier	<i>Circus aeruginosus</i> (Linnaeus, 1758)	LC	NL	a, b, c
	Eurasian Sparrowhawk	<i>Accipiter nisus</i> (Linnaeus, 1758)	LC	Schedule I	b
	Grey-headed Fish-Eagle	<i>Ichthyophaga ichthyaetus</i> (Horsfield, 1821)	NT	Schedule IV	b
	Himalayan Griffon	<i>Gyps himalayensis</i> (Hume, 1869)	NT	Schedule IV	b
	Indian Vulture	<i>Gyps indicus</i> (Scopoli, 1786)	CR	Schedule I	a, b
	Lesser Spotted Eagle	<i>Clanga pomarina</i> (Brehm, 1831)	LC	NL	b
	Oriental Honey-Buzzard	<i>Pernis ptilorhynchus</i> (Temminck, 1821)	LC	NL	a, b
	Pallas's Fish-Eagle	<i>Haliaeetus leucoryphus</i> (Pallas, 1771)	EN	NL	b
	Red-headed Vulture	<i>Sarcogyps calvus</i> (Scopoli, 1786)	CR	Schedule IV	a, b
	Shikra	<i>Accipiter badius</i> (Gmelin, 1788)	LC	Schedule I	a, b, c
	Short-toed Snake-eagle	<i>Circaetus gallicus</i> (Gmelin, 1788)	LC	NL	a, b, c
	White-eyed Buzzard	<i>Butastur teesa</i> (Franklin, 1831)	LC	NL	a, b, c
	White -rumped Vulture	<i>Gyps bengalensis</i> (Gmelin, 1788)	CR	Schedule I	a, b
Aegithinidae	Common Iora	<i>Aegithina tiphia</i> (Linnaeus, 1758)	LC	Schedule IV	a
Alaudidae	Ashy-crowned Sparrow Lark	<i>Eremopterix griseus</i> (Scopoli, 1786)	LC	Schedule IV	a, c

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
	Crested Lark	<i>Galerida cristata</i> (Linnaeus, 1758)	LC	Schedule IV	a, c
	Sand Lark	<i>Alaudala raytal</i> (Blyth, 1844)	LC	Schedule IV	c
Alcedinidae	Cerulean Kingfisher	<i>Alcedo coerulescens</i> (Vieillot, 1818)	LC	Schedule IV	a
	Pied Kingfisher	<i>Ceryle rudis</i> (Linnaeus, 1758)	LC	Schedule IV	a, c
	White-breasted Kingfisher	<i>Halcyon smyrnensis</i> (Linnaeus, 1758)	LC	Schedule IV	a, c
Anatidae	African Comb Duck	<i>Sarkidiornis melanotos</i> (Pennant, 1769)	LC	Schedule IV	c
	Bar-headed Goose	<i>Anser indicus</i> (Latham, 1790)	LC	Schedule IV	c
	Common Pochard	<i>Aythya ferina</i> (Linnaeus, 1758)	VU	Schedule IV	a, c
	Common Teal	<i>Anas crecca</i> (Linnaeus, 1758)	LC	Schedule IV	a
	Cotton Pygmy-goose	<i>Nettapus coromandelianus</i> (Gmelin, 1789)	LC	Schedule IV	c
	Gadwall	<i>Mareca strepera</i> (Linnaeus, 1758)	LC	Schedule IV	c
	Garganey	<i>Spatula querquedula</i> (Linnaeus, 1758)	LC	Schedule IV	c
	Indian Spot-billed Duck	<i>Anas poecilorhyncha</i> (Forster, 1781)	LC	Schedule IV	c
	Lesser Whistling-duck	<i>Dendrocygna javanica</i> (Horsfield, 1821)	LC	Schedule IV	c
	Mallard	<i>Anas platyrhynchos</i> (Linnaeus, 1758)	LC	Schedule IV	a, c
	Northern Pintail	<i>Anas acuta</i> (Linnaeus, 1758)	LC	Schedule IV	a, c
	Northern Shoveler	<i>Spatula clypeata</i> (Linnaeus, 1758)	LC	Schedule IV	c
	Red-crested Pochard	<i>Netta rufina</i> (Pallas, 1773)	LC	Schedule IV	a
	Ruddy Shelduck	<i>Tadorna ferruginea</i> (Pallas, 1764)	LC	Schedule IV	a, c
Anhingidae	Oriental Darter	<i>Anhinga melanogaster</i> (Pennant, 1769)	NT	Schedule IV	c
Apodidae	Little Swift	<i>Apus affinis</i> (Gray, 1830)	LC	NL	a, c
Ardeidae	Black-crowned Night Heron	<i>Nycticorax nycticorax</i> (Linnaeus, 1758)	LC	Schedule IV	a, c
	Cattle Egret	<i>Bubulcus ibis</i> (Linnaeus, 1758)	LC	Schedule IV	a, c
	Cinnamon Bittern	<i>Ixobrychus cinnamomeus</i> (Gmelin, 1789)	LC	Schedule IV	a
	Great White Egret	<i>Ardea alba</i> (Linnaeus, 1758)	LC	Schedule IV	a, c

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
	Grey Heron	<i>Ardea cinerea</i> (Linnaeus, 1758)	LC	Schedule IV	a
	Indian Pond Heron	<i>Ardeola grayii</i> (Sykes, 1832)	LC	Schedule IV	a, c
	Intermediate Egret	<i>Ardea intermedia</i> (Wagler, 1829)	LC	Schedule IV	a, c
	Little Egret	<i>Egretta garzetta</i> (Linnaeus, 1766)	LC	Schedule IV	a, c
	Purple Heron	<i>Ardea purpurea</i> (Linnaeus, 1766)	LC	Schedule IV	c
Buceroidae	Indian Grey Hornbill	<i>Ocyrceros birostris</i> (Scopoli, 1786)	LC	NL	a, c
Burhinidae	Eurasian Thick-knee	<i>Burhinus oediconemus</i> (Linnaeus, 1758)	LC	NL	a
Campephagidae	Black-headed Cuckooshrike	<i>Lalage melanoptera</i> (Ruppell, 1839)	LC	NL	a
	Rosy Minivet	<i>Pericrocotus roseus</i> (Vieillot, 1818)	LC	Schedule IV	a
	Scarlet Minivet	<i>Pericrocotus flammeus</i> (Forster, 1781)	LC	Schedule IV	a
	Small minivet	<i>Pericrocotus cinnamomeus</i> (Linnaeus, 1766)	LC	Schedule IV	a
Caprimulgidae	Indian Night Jar	<i>Caprimulgus asiaticus</i> (Latham, 1790)	LC	Schedule IV	a
Charadriidae	Little Ringed Plover	<i>Charadrius dubius</i> (Scopoli, 1786)	LC	Schedule IV	a, c
	Red-wattled Lapwing	<i>Vanellus indicus</i> (Boddaert, 1783)	LC	NL	a, c
	River Lapwing	<i>Vanellus duvaucelii</i> (Lesson, 1826)	NT	NL	a, c
	Spur-winged Lapwing	<i>Vanellus spinosus</i> (Linnaeus, 1758)	LC	NL	a
Chloropseidae	Golden-fronted Leafbird	<i>Chloropsis aurifrons</i> (Temminck, 1829)	LC	NL	a
Ciconiidae	Asian Openbill	<i>Anastomus oscitans</i> (Boddaert, 1783)	LC	Schedule IV	c
	Asian Woollyneck	<i>Ciconia episcopus</i> (Boddaert, 1783)	NT	Schedule IV	c
	Painted Stork	<i>Mycteria leucocephala</i> (Pennant, 1769)	NT	Schedule IV	a, c
Cisticolidae	Ashy Prinia	<i>Prinia socialis</i> (Sykes, 1832)	LC	NL	c
	Dark-necked Tailorbird	<i>Orthotomus atrogularis</i> (Temminck, 1836)	LC	NL	a
	Jungle Prinia	<i>Prinia sylvatica</i> (Jerdon, 1840)	LC	NL	c
	Plain Prinia	<i>Prinia inornata</i> (Sykes, 1832)	LC	NL	c
	Tawny-flanked Prinia	<i>Prinia subflava</i> (Gmelin, 1789)	LC	NL	a

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
	Yellow-bellied Prinia	<i>Prinia flaviventris</i> (Delessert, 1840)	LC	NL	c
Columbidae	Rock Pigeon (Feral Pigeon)	<i>Columba livia</i> (Gmelin, 1789)	LC	Schedule IV	a, c
	Eurasian Collared-dove	<i>Streptopelia decaocto</i> (Frisvaldszky, 1838)	LC	Schedule IV	a, c
	Grey-capped Emerald Dove	<i>Chalcophaps indica</i> (Linnaeus, 1758)	LC	Schedule IV	a
	Laughing Dove	<i>Spilopelia senegalensis</i> (Linnaeus, 1766)	LC	Schedule IV	a, c
	Red Turtle-dove	<i>Streptopelia tranquebarica</i> (Hermann, 1804)	LC	Schedule IV	a
	Eastern Spotted Dove	<i>Spilopelia chinensis</i> (Scopoli, 1786)	LC	Schedule IV	a, c
	Yellow-footed Green-Pigeon	<i>Treron phoenicopterus</i> (Latham, 1790)	LC	Schedule IV	c
Coraciidae	Indian Roller	<i>Coracias benghalensis</i> (Linnaeus, 1758)	LC	Schedule IV	a, c
Corvidae	House Crow	<i>Corvus splendens</i> (Vieillot, 1817)	LC	NL	a, c
	Large-billed Crow	<i>Corvus macrorhynchos</i> (Wagler, 1827)	LC	NL	a, c
	Rufous Treepie	<i>Dendrocitta vagabunda</i> (Latham, 1790)	LC	Schedule IV	a, c
Cuculidae	Common Cuckoo	<i>Cuculus canorus</i> (Linnaeus, 1758)	LC	Schedule IV	a
	Greater Coucal	<i>Centropus sinensis</i> (Stephens, 1815)	LC	Schedule IV	a, c
	Indian Cuckoo	<i>Cuculus micropterus</i> (Gould, 1837)	LC	Schedule IV	a
	Jacobin Cuckoo	<i>Clamator jacobinus</i> (Boddaert, 1783)	LC	Schedule IV	a
	Sirkeer Malkoha	<i>Taccocua leschenaultii</i> (Lesson, 1830)	LC	Schedule IV	a
	Western Koel	<i>Eudynamis scolopaceus</i> (Linnaeus, 1758)	LC	Schedule IV	a, c
Dicaeidae	Fire-breasted Flowerpecker	<i>Dicaeum ignipectus</i> (Blyth, 1843)	LC	Schedule IV	a
	Thick-billed Flowerpecker	<i>Dicaeum agile</i> (Tickell, 1833)	LC	Schedule IV	a
Dicruridae	Black Drongo	<i>Dicrurus macrocercus</i> (Vieillot, 1817)	LC	Schedule IV	a, c
	Hair-crested Drongo	<i>Dicrurus hottentottus</i> (Linnaeus, 1766)	LC	Schedule IV	a
Emberizidae	Red-headed Bunting	<i>Emberiza bruniceps</i> (Brandt, 1841)	LC	Schedule IV	a
Estrildidae	Indian Silverbill	<i>Euodice malabarica</i> (Linnaeus, 1758)	LC	Schedule IV	a, c
	Red Avadavat	<i>Amandava amandava</i> (Linnaeus, 1758)	LC	Schedule IV	a, c

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
	Scaly-breasted Munia	<i>Lonchura punctulata</i> (Linnaeus, 1758)	LC	Schedule IV	a
Falconidae	Common Kestrel	<i>Falco tinnunculus</i> (Linnaeus, 1758)	LC	Schedule IV	a, b
	Lanner Falcon	<i>Falco biarmicus</i> (Temminck, 1825)	LC	Schedule I	a
	Red-headed Falcon	<i>Falco chicquera</i> (Daudin, 1800)	NT	Schedule I	a
Fringillidae	Common Rosefinch	<i>Carpodacus erythrinus</i> (Pallas, 1770)	LC	Schedule IV	a
	Yellow-breasted Greenfinch	<i>Chloris spinoides</i> (Vigors, 1831)	LC	Schedule IV	a
Glareolidae	Little Pratincole	<i>Glareola lactea</i> (Temminck, 1820)	LC	NL	a, c
Gruidae	Demoiselle Crane	<i>Anthropoides virgo</i> (Linnaeus, 1758)	LC	Schedule IV	a, c
	Sarus Crane	<i>Grus antigone</i> (Linnaeus, 1758)	VU	Schedule IV	a, c
Hirundinidae	African Plain Martin	<i>Riparia paludicola</i> (Vieillot, 1817)	LC	NL	c
	Red-rumped Swallow	<i>Cecropis daurica</i> (Linnaeus, 1771)	LC	NL	a, c
	Wire-tailed Swallow	<i>Hirundo smithii</i> (Leach, 1818)	LC	NL	a
Jacanidae	Bronze-winged Jacana	<i>Metopidius indicus</i> (Latham, 1790)	LC	Schedule IV	c
	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i> (Scopoli, 1786)	LC	Schedule IV	c
Laniidae	Bay-backed Shrike	<i>Lanius vittatus</i> (Valenciennes, 1826)	LC	NL	a
	Long-tailed Shrike	<i>Lanius schach</i> (Linnaeus, 1758)	LC	NL	a, c
Laridae	Black-bellied Tern	<i>Sterna acuticauda</i> (Gray, 1832)	EN	NL	a, c
	Black-headed Gull	<i>Larus ridibundus</i> (Linnaeus, 1766)	LC	NL	a
	Indian Skimmer	<i>Rynchops albicollis</i> (Swainson, 1838)	EN	NL	a, c
	Common Gull-billed Tern	<i>Gelochelidon nilotica</i> (Gmelin, 1789)	LC	NL	c
	Pallas's Gull	<i>Larus ichthyaetus</i> (Pallas, 1773)	LC	NL	c
	River Tern	<i>Sterna aurantia</i> (Gray, 1831)	VU	NL	a, c
Leiotrichidae	Common Babbler	<i>Argya caudata</i> (Dumont, 1823)	LC	Schedule IV	a, c
	Jungle Babbler	<i>Argya striata</i> (Dumont, 1823)	LC	Schedule IV	a, c
	Large Grey Babbler	<i>Argya malcolmi</i> (Sykes, 1832)	LC	Schedule IV	c

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
	Striated Babbler	<i>Argya earlei</i> (Blyth, 1844)	LC	Schedule IV	c
Lybiidae	Green Barbet	<i>Cryptolybia olivacea</i> (Shelley, 1880)	LC	Schedule IV	a
Megalaimidae	Blue-throated Barbet	<i>Psilopogon asiaticus</i> (Latham, 1790)	LC	Schedule IV	a
	Coppersmith Barbet	<i>Psilopogon haemacephalus</i> (Muller, 1776)	LC	Schedule IV	a, c
Meropidae	Asian Green Bee-eater	<i>Merops orientalis</i> (Latham, 1802)	LC	NL	a, c
	Blue-tailed Bee-eater	<i>Merops philippinus</i> (Linnaeus, 1766)	LC	NL	c
Monarchidae	Indian Paradise-flycatcher	<i>Terpsiphone paradisi</i> (Linnaeus, 1758)	LC	Schedule IV	a
Motacillidae	Citrine Wagtail	<i>Motacilla citreola</i> (Pallas, 1776)	LC	NL	c
	Olive-backed Pipit	<i>Anthus hodgsoni</i> (Richmond, 1907)	LC	Schedule IV	a
	Paddyfield Pipit	<i>Anthus rufulus</i> (Vieillot, 1818)	LC	Schedule IV	c
	Tawny Pipit	<i>Anthus campestris</i> (Linnaeus, 1758)	LC	Schedule IV	c
	White-browed Wagtail	<i>Motacilla maderaspatensis</i> (Gmelin, 1789)	LC	NL	a, c
	White Wagtail	<i>Motacilla alba</i> (Linnaeus, 1758)	LC	NL	a, c
	Western Yellow Wagtail	<i>Motacilla flava</i> (Linnaeus, 1758)	LC	NL	a
Muscicapidae	Black Redstart	<i>Phoenicurus ochruros</i> (Gmelin, 1774)	LC	NL	a
	Blue Whistling-thrush	<i>Myophonus caeruleus</i> (Scopoli, 1786)	LC	Schedule IV	a
	Bluethroat	<i>Cyanecula svecica</i> (Linnaeus, 1758)	LC	NL	c
	Common Stonechat	<i>Saxicola torquatus</i> (Linnaeus, 1766)	LC	NL	a, c
	Grey Bushchat	<i>Saxicola ferreus</i> (Gray, 1846)	LC	NL	a
	Indian Robin	<i>Saxicoloides fulicatus</i> (Linnaeus, 1766)	LC	NL	a, c
	Oriental Magpie-robin	<i>Copsychus saularis</i> (Linnaeus, 1758)	LC	Schedule IV	a, c
	Pied Bushchat	<i>Saxicola caprata</i> (Linnaeus, 1766)	LC	NL	a, c
	Plumbeous Water-redstart	<i>Phoenicurus fuliginosus</i> (Vigors, 1831)	LC	NL	a
	Verditer Flycatcher	<i>Eumyias thalassinus</i> (Swainson, 1838)	LC	Schedule IV	a, c
	White-capped Water-redstart	<i>Phoenicurus leucocephalus</i> (Vigors, 1831)	LC	NL	a

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
Nectariniidae	Crimson Sunbird	<i>Aethopyga siparaja</i> (Raffles, 1822)	LC	Schedule IV	a
	Purple Sunbird	<i>Cinnyris asiaticus</i> (Latham, 1790)	LC	Schedule IV	a, c
Oriolidae	Black-hooded Oriole	<i>Oriolus xanthornus</i> (Linnaeus, 1758)	LC	Schedule IV	a
	Indian Golden Oriole	<i>Oriolus kundoo</i> (Sykes, 1832)	LC	Schedule IV	a
Pandionidae	Osprey	<i>Pandion haliaetus</i> (Linnaeus, 1758)	LC	Schedule I	b
Paradoxornithidae	Yellow-eyed Babbler	<i>Chrysomma sinense</i> (Gmelin, 1789)	LC	Schedule IV	a
Paridae	Great Tit	<i>Parus major</i> (Linnaeus, 1758)	LC	Schedule IV	a
Passeridae	Chestnut-shouldered Bush-sparrow	<i>Gymnoris xanthocollis</i> (Burton, 1838)	LC	NL	a
	House Sparrow	<i>Passer domesticus</i> (Linnaeus, 1758)	LC	NL	a, c
Phalacrocoracidae	Indian Cormorant	<i>Phalacrocorax fuscicollis</i> (Stephans, 1826)	LC	Schedule IV	a, c
	Little Cormorant	<i>Microcarbo niger</i> (Vieillot, 1817)	LC	Schedule IV	a, c
Phasianidae	Black Francolin	<i>Francolinus francolinus</i> (Linnaeus, 1766)	LC	Schedule IV	a
	Grey Francolin	<i>Francolinus pondicerianus</i> (Gmelin, 1789)	LC	Schedule IV	a, c
	Indian Peafowl	<i>Pavo cristatus</i> (Linnaeus, 1758)	LC	Schedule I	a, c
	Jungle Bush Quail	<i>Perdica asiatica</i> (Latham, 1790)	LC	Schedule IV	a
	Kalij Pheasant	<i>Lophura leucomelanos</i> (Latham, 1790)	LC	Schedule I	a
	Red Junglefowl	<i>Gallus gallus</i> (Linnaeus, 1758)	LC	Schedule IV	a
Phylloscopidae	Common Chiffchaff	<i>Phylloscopus collybita</i> (Vieillot, 1817)	LC	NL	a
	Grey-hooded Warbler	<i>Phylloscopus xanthoschistos</i> (Gray, 1846)	LC	NL	a
Picidae	Black-rumped Flameback	<i>Dinopium benghalense</i> (Linnaeus, 1758)	LC	Schedule IV	a
	Grey-faced Woodpecker	<i>Picus canus</i> (Gmelin, 1788)	LC	Schedule IV	a
	Grey-capped Woodpecker	<i>Picoides canicapillus</i> (Blyth, 1845)	LC	Schedule IV	a
	Lesser Yellownape	<i>Picus chlorolophus</i> (Vieillot, 1818)	LC	Schedule IV	a
	Speckled Piculet	<i>Picumnus innominatus</i> (Burton, 1836)	LC	Schedule IV	a
	Yellow-crowned Woodpecker	<i>Leiopicus mahrattensis</i> (Latham, 1802)	LC	Schedule IV	a

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
Ploceidae	Baya Weaver	<i>Ploceus philippinus</i> (Linnaeus, 1766)	LC	Schedule IV	a, c
	Russet Sparrow (Family-Passeridae)	<i>Passer cinnamomeus</i> (Temminck, 1836)	LC	NL	a
Podicipedidae	Little Grebe	<i>Tachybaptus ruficollis</i> (Pallas, 1764)	LC	Schedule IV	a, c
Psittacidae	Alexandrine Parakeet	<i>Palaeornis eupatria</i> (Linnaeus, 1766)	NT	Schedule IV	a
	Plum-headed Parakeet	<i>Himalayapsitta cyanocephala</i> (Linnaeus, 1766)	LC	Schedule IV	a
	Rose-ringed Parakeet	<i>Alexandrinus krameri</i> (Scopoli, 1769)	LC	Schedule IV	a, c
	Slaty-headed Parakeet	<i>Himalayapsitta himalayana</i> (Lesson, 1832)	LC	Schedule IV	a, c
Pycnonotidae	Himalayan Bulbul	<i>Pycnonotus leucogenys</i> (Gray, 1835)	LC	Schedule IV	a
	Red-vented Bulbul	<i>Pycnonotus cafer</i> (Linnaeus, 1766)	LC	Schedule IV	a, c
Raliidae	Common coot	<i>Fulica atra</i> (Linnaeus, 1758)	LC	Schedule IV	c
	Common Moorhen	<i>Gallinula chloropus</i> (Linnaeus, 1758)	LC	NL	a, c
	Purple Swampphen	<i>Porphyrio porphyrio</i> (Linnaeus, 1758)	LC	NL	c
	Slaty-legged Crake	<i>Rallina eurizonoides</i> (Lafresnaye, 1845)	LC	NL	a
	White-breasted Waterhen	<i>Amaurornis phoenicurus</i> (Pennant, 1769)	LC	NL	a, c
Recurvirostridae	Black-winged Stilt	<i>Himantopus himantopus</i> (Linnaeus, 1758)	LC	Schedule IV	c
	Pied Avocet	<i>Recurvirostra avosetta</i> (Linnaeus, 1758)	LC	Schedule IV	c
Rhipiduridea	White-browed Fantail	<i>Rhipidura aureola</i> (Lesson, 1830)	LC	Schedule IV	a
Scolopacidae	Common Greenshank	<i>Tringa nebularia</i> (Gunnerus, 1767)	LC	Schedule IV	a, c
	Common Sandpiper	<i>Actitis hypoleucos</i> (Linnaeus, 1758)	LC	Schedule IV	a, c
	Curlew Sandpiper	<i>Calidris ferruginea</i> (Pontoppidan, 1763)	NT	Schedule IV	a, c
	Green Sandpiper	<i>Tringa ochropus</i> (Linnaeus, 1758)	LC	Schedule IV	a, c
	Common Redshank	<i>Tringa totanus</i> (Linnaeus, 1758)	LC	Schedule IV	a
Stenostiridae	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i> (Swainson, 1820)	LC	Schedule IV	a
Strigidae	Brown Boobook	<i>Ninox scutulata</i> (Raffles, 1822)	LC	Schedule IV	b
	Brown Fish-owl	<i>Ketupa zeylonensis</i> (Gmelin, 1788)	LC	Schedule IV	b

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
	Eurasian Eagle-owl	<i>Bubo bubo</i> (Linnaeus, 1758)	LC	Schedule IV	a
	Jungle Owlet	<i>Glaucidium radiatum</i> (Tickell, 1833)	LC	Schedule IV	b
	Northern Long-eared Owl	<i>Asio otus</i> (Linnaeus, 1758)	LC	Schedule IV	b
	Spotted Owlet	<i>Athene brama</i> (Temminck, 1821)	LC	Schedule IV	b, c
Sturnidae	Asian Pied Starling	<i>Gracupica contra</i> (Linnaeus, 1758)	LC	Schedule IV	a, c
	Bank Myna	<i>Acridotheres ginginianus</i> (Latham, 1790)	LC	Schedule IV	a, c
	Brahminy Starling	<i>Sturnia pagodarum</i> (Gmelin, 1789)	LC	Schedule IV	a
	Chestnut-tailed Starling	<i>Sturnia malabarica</i> (Gmelin, 1789)	LC	Schedule IV	a
	Common Myna	<i>Acridotheres tristis</i> (Linnaeus, 1766)	LC	Schedule IV	a, c
	Common Starling	<i>Sturnus vulgaris</i> (Linnaeus, 1758)	LC	Schedule IV	a
	Jungle Myna	<i>Acridotheres fuscus</i> (Wagler, 1827)	LC	Schedule IV	a
	Spot-winged Starling	<i>Saroglossa spilopterus</i> (Vigors, 1831)	LC	Schedule IV	a
Threskiornithidae	Eurasian Spoonbill	<i>Platalea leucorodia</i> (Linnaeus, 1758)	LC	Schedule I	c
	Red-naped Ibis	<i>Pseudibis papillosa</i> (Temminck, 1824)	LC	Schedule IV	a, c
Timaliidae	Black-chinned Babbler	<i>Cyanoderma pyrrhops</i> (Blyth, 1844)	LC	Schedule IV	a
Turdidae	Black-throated Thrush	<i>Turdus atrogularis</i> (Jarocki, 1819)	LC	Schedule IV	a
Upupidae	Common Hoopoe	<i>Upupa epops</i> (Linnaeus, 1758)	LC	NL	a, c
Zosteropidae	Indian White-eye	<i>Zosterops palpebrosus</i> (Temminck, 1824)	LC	Schedule IV	a

^aNarang (1995); ^bDas et al. (2011); ^cKhan et al. (2013)

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ANNEXURE III

Reptilian species of the Solani River Basin

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
Bovidae	Himalayan Goral	<i>Naemohedus goral</i> (Hardwicke, 1825)	NT	Schedule III	a, b, d
	Nilgai	<i>Boselaphus tragocamelus</i> (Pallas, 1766)	LC	Schedule III	a, d
Canidae	Bengal Fox	<i>Vulpes bengalensis</i> (Shaw, 1800)	LC	Schedule II	a, d
	Dhole/ Indian Wild Dog	<i>Cuon alpinus</i> (Pallas, 1811)	EN	Schedule II	a
	Golden Jackal	<i>Canis aureus</i> (Linnaeus, 1758)	LC	Schedule II	a, d
Cervidae	Barking Deer	<i>Muntiacus muntjak</i> (Zimmermann, 1780)	LC	Schedule III	a, b, d
	Hog Deer	<i>Axis porcinus</i> (Zimmermann, 1780)	EN	Schedule I	a
	Indian Spotted Deer/Chital	<i>Axis axis</i> (Erxleben, 1777)	LC	Schedule III	a, b, d
	Sambar	<i>Rusa unicolor</i> (Kerr, 1792)	VU	Schedule III	a, b, d
	Swamp Deer	<i>Rucervus duvaucelii</i> (G. Cuvier, 1823)	VU	Schedule I	c
Cercopithecidae	Northern Plains Gray Langur	<i>Semnopithecus entellus</i> (Dufresne, 1797)	LC	Schedule II	a, d
	Rhesus Monkey	<i>Macaca mulatta</i> (Zimmermann, 1780)	LC	Schedule II	a, d
Erinaceidae	Long-eared Hedgehog	<i>Hemiechinus auritus</i> (Gmelin, 1770)	LC	Schedule IV	a
Elephantidae	Asian Elephant	<i>Elephas maximus</i> (Linnaeus, 1758)	EN	Schedule I	a, b, d
Felidae	Jungle Cat	<i>Felis chaus</i> (Schreber, 1777)	LC	Schedule II	a, d
	Leopard	<i>Panthera pardus</i> (Linnaeus, 1758)	VU	Schedule I	a, b, d
	Mainland Leopard Cat	<i>Prionailurus bengalensis</i> (Kerr, 1792)	LC	Schedule I	a, d
	Tiger	<i>Panthera tigris</i> (Linnaeus, 1758)	EN	Schedule I	a, b, d
Herpestidae	Indian Grey Mongoose	<i>Herpestes edwardsii</i> (E. Geoffroy Saint-Hilaire, 1818)	LC	Schedule II	a, d
	Small Indian Mongoose	<i>Herpestes auropunctatus</i> (Hodgson, 1836)	LC	Schedule II	a, d
Hipposideridae	Least Leaf-nosed Bat	<i>Hipposideros cineraceus</i> (Blyth, 1853)	LC	NL	a, d
Hystriidae	Indian Crested Porcupine	<i>Hystrix indica</i> (Kerr, 1792)	LC	Schedule IV	a, d

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
Agamidae	Kashmir Rock Agama	<i>Laudakia tuberculata</i> (Gray, 1827)	LC	NL	a
	Oriental Garden Lizard	<i>Calotes versicolor</i> (Daudin, 1802)	LC	NL	a
Boidae	Red Sand Boa	<i>Eryx johnii</i> (Russell, 1801)	NT	Schedule IV	b
Colubridae	Barred Wolf Snake	<i>Lycodon striatus</i> (Shaw, 1802)	LC	Schedule IV	b
	Common Kukri Snake	<i>Oligodon arnensis</i> (Shaw, 1802)	LC	Schedule IV	b
	Common Trinket Snake	<i>Coelognathus helenae</i> (Daudin, 1803)	LC	Schedule IV	b
	Common Wolf Snake	<i>Lycodon aulicus</i> (Linnaeus, 1758)	LC	Schedule IV	b
	Copper-head Trinket Snake	<i>Coelognathus radiatus</i> (Boie, 1827)	LC	Schedule IV	b
	Diadem Snake	<i>Spalerosophis atriceps</i> (Fischer, 1885)	LC	Schedule IV	b
	Hardwicke's Rat Snake	<i>Platyceps ventromaculatus</i> (Gray, 1834)	LC	Schedule IV	b
	Indian Gamma Snake	<i>Boiga trigonata</i> (Schneider, 1802)	LC	Schedule IV	b
	Long-nosed Tree Snake	<i>Ahaetulla nasuta</i> (Lacepede, 1789)	LC	Schedule IV	b
	Oriental Rat Snake	<i>Ptyas mucosa</i> (Linnaeus, 1758)	LC	Schedule II	b
	Twin-spotted Wolf Snake	<i>Lycodon jara</i> (Shaw, 1802)	LC	Schedule IV	b
Crocodylidae	Mugger	<i>Crocodylus palustris</i> (Lesson, 1831)	VU	Schedule I	f
Elapidae	Common Indian Krait	<i>Bungarus caeruleus</i> (Schneider, 1801)	LC	Schedule IV	b
	Indian Cobra	<i>Naja naja</i> (Linnaeus, 1758)	LC	Schedule II	b
	King Cobra	<i>Ophiophagus hannah</i> (Cantor, 1836)	VU	Schedule II	b, d
	Sind Krait	<i>Bungarus walli</i> (Wall, 1907)	LC	Schedule IV	b
Geoemydidae	Brown Roofed Turtle	<i>Pangshura smithii</i> (Gray, 1863)	NT	NL	c
	Crowned River Turtle	<i>Hardella thurjii</i> (Gray, 1831)	EN	NL	c
	Indian Black Turtle	<i>Melanochelys trijuga</i> (Schweigger, 1812)	LC	NL	c
	Indian Roofed Turtle	<i>Pangshura tecta</i> (Gray, 1830)	VU	Schedule I	c
	Red-crowned Roofed Turtle	<i>Batagur kachuga</i> (Gray, 1831)	CR	Schedule I	c
	Spotted Pond Turtle	<i>Geoclemys hamiltonii</i> (Gray, 1830)	EN	Schedule I	c

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
	Tricarinate Hill Turtle	<i>Melanochelys tricarinata</i> (Blyth, 1856)	EN	Schedule I	c
Gekkonidae	Brooke's House Gecko	<i>Hemidactylus brookii</i> (Gray, 1845)	LC	NL	a
	Yellow-bellied House Gecko	<i>Hemidactylus flaviviridis</i> (Ruppell, 1835)	LC	NL	a
Gavialidae	Gharial	<i>Gavialis gangeticus</i> (Gmelin, 1789)	CR	Schedule I	e
Homalopsidae	Siebold's Mud Snake	<i>Ferania sieboldii</i> (Schlegel, 1837)	LC	NL	b
Lacertidae	Punjab Snake-eyed Lacerta	<i>Ophisops jerdonii</i> (Blyth, 1853)	LC	NL	a
Natricidae	Blackbelly Worm-eating Snake	<i>Trachischium fuscum</i> (Blyth, 1854)	LC	NL	b
	Buff Striped Keelback	<i>Amphiesma stolatum</i> (Linnaeus, 1758)	LC	NL	b
	Chequered Keelback	<i>Fowlea piscator</i> (Schneider, 1799)	LC	Schedule II	b
Pythonidae	Indian Rock Python	<i>Python molurus</i> (Linnaeus, 1758)	NT	Schedule I	b
Scincidae	Bronze Mabuya	<i>Eutropis macularia</i> (Blyth, 1853)	LC	NL	a
	Common Dotted Garden Skink	<i>Lygosoma punctata</i> (Gmelin, 1799)	LC	NL	a
	Striped Grass Mabuya	<i>Eutropis dissimilis</i> (Hallowell, 1857)	LC	NL	a
Sibynophiidae	Cantor's Black Headed Snake	<i>Sibynophis sagittarius</i> (Cantor, 1839)	LC	Schedule IV	b
Testudinidae	Indian Star Tortoise	<i>Geochelone elegans</i> (Schoepff, 1795)	VU	Schedule IV	c
Trionychidae	Indian Flapshell Turtle	<i>Lissemys punctata</i> (Lacepede, 1788)	VU	Schedule I	c
	Indian Narrow-headed Softshell Turtle	<i>Chitra indica</i> (Gray, 1830)	EN	Schedule IV	c
	Indian Softshell Turtle	<i>Nilssonia gangetica</i> (Cuvier, 1825)	EN	Schedule I	c
	Leith's Softshell Turtle	<i>Nilssonia leithii</i> (Gray, 1872)	CR	Schedule IV	c
Typhlopidae	Brahminy Blindsnake	<i>Indotyphlops braminus</i> (Daudin, 1803)	LC	Schedule IV	b
	Diard's Blindsnake	<i>Argyrophis diardii</i> (Schlegel, 1839)	LC	Schedule IV	b
	Stoliczka's Slender Blindsnake	<i>Indotyphlops porrectus</i> (Stoliczka, 1871)	LC	Schedule IV	b
Varanidae	Bengal Monitor Lizard	<i>Varanus bengalensis</i> (Daudin, 1802)	NT	Schedule I	a
Viperidae	Chinese Mountain Pit Viper	<i>Ovophis monticola</i> (Gunther, 1864)	LC	Schedule IV	b
	Saw-scaled Viper	<i>Echis carinatus</i> (Schneider, 1801)	LC	Schedule IV	b
	Western Russel's Viper	<i>Daboia russelii</i> (Shaw & Nodder, 1797)	LC	Schedule II	b

^aChopra (1995); ^bHusain & Tilak (1995a); ^cHusain & Tilak (1995b); ^dJoshi (2010); ^eKhan & Abbasi (2015); ^fChaudhary & Kumar (2021)

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ANNEXURE IV

Amphibian species of the Solani River Basin

Family	Common Name/s	Scientific Name	IUCN status	IWPA status	Previous studies
Bufonidae	Asian Common Toad	<i>Duttaphrynus melanostictus</i> (Schneider, 1799)	LC	NL	a
	Marbled Toad	<i>Duttaphrynus stomaticus</i> (Lütken, 1864)	LC	NL	a
Dicroglossidae	Asian Grass Frog	<i>Fejervarya limnocharis</i> (Gravenhorst, 1829)	LC	Schedule IV	a
	Indian Bull Frog	<i>Hoplobatrachus tigerinus</i> (Daudin, 1802)	LC	Schedule IV	a
	Indian Burrowing Frog	<i>Sphaerotheca breviceps</i> (Schneider, 1799)	LC	Schedule IV	a
	Indian Skipping Frog	<i>Euphlyctis cyanophlyctis</i> (Schneider, 1799)	LC	Schedule IV	a
	Jerdon's Bull Frog	<i>Hoplobatrachus crassus</i> (Jerdon, 1853)	LC	Schedule IV	a
Microhylidae	Ant Frog	<i>Microhyla ornata</i> (Duméril & Bibron, 1841)	LC	NL	a
	Marbled Globular Frog	<i>Uperodon systoma</i> (Schneider, 1799)	LC	NL	a
Rhacophoridae	Himalayan Tree Frog	<i>Polypedates maculatus</i> (Gray, 1830)	LC	NL	a

^aRay & Tilak (1995)

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ANNEXURE V

Fish species of the Solani River Basin

Family	Common Name/s	Scientific Name	IUCN status	Previous studies
Amblycipitidae	Indian Torrent Catfish	<i>Amblyceps mangois</i> (Hamilton, 1822)	LC	a
Badidae	Badis	<i>Badis badis</i> (Hamilton, 1822)	LC	a
Bagridae	Day's Mystus	<i>Mystus bleekeri</i> (Day, 1877)	LC	a
	Giant River Catfish	<i>Sperata seenghala</i> (Sykes, 1839)	LC	a
	Striped Dwarf Catfish	<i>Mystus vittatus</i> (Bloch, 1794)	LC	a
Belonidae	Freshwater Garfish	<i>Xenentodon cancila</i> (Hamilton, 1822)	LC	a
Botiidae	Gangetic Loach	<i>Botia rostrata</i> (Gunther, 1868)	VU	a
Channidae	Dwarf Snakehead	<i>Channa gachua</i> (Hamilton, 1822)	LC	a
	Spotted Snakehead	<i>Channa punctata</i> (Bloch, 1793)	LC	a
Cobitidae	Guntea Loach	<i>Lepidocephalichthys guntea</i> (Hamilton, 1822)	LC	a
Cyprinidae	Boalla	<i>Labeo dyocheilus</i> (McClelland, 1839)	LC	a
	Chaguni	<i>Chagunius chagunio</i> (Hamilton, 1822)	LC	a
	Dark Mahseer	<i>Naziritor chelynoides</i> (McClelland, 1839)	VU	a
	Dinnawah Snowtrout	<i>Schizothorax progastus</i> (McClelland, 1839)	LC	a
	Kalabans	<i>Bangana dero</i> (Hamilton, 1822)	LC	a
	Olive Barb	<i>Systemus sarana</i> (Hamilton, 1822)	LC	a
	Pool Barb	<i>Puntius sophore</i> (Hamilton, 1822)	LC	a
	Putitor Mahseer	<i>Tor putitora</i> (Hamilton, 1822)	EN	a
	Rosy Barb	<i>Pethia conchoni</i> (Hamilton, 1822)	LC	a
	Snowtrout	<i>Schizothorax richardsonii</i> (Gray, 1832)	VU	a
	Stone roller	<i>Tarigilabeo latius</i> (Hamilton, 1822)	LC	a
	Sucker Head	<i>Garra gotyla</i> (Gray, 1830)	LC	a
	Swamp Barb	<i>Puntius chola</i> (Hamilton, 1822)	LC	a
	Ticto Barb	<i>Pethia ticto</i> (Hamilton, 1822)	LC	a
	Tor Barb	<i>Tor tor</i> (Hamilton, 1822)	DD	a

Family	Common Name/s	Scientific Name	IUCN status	Previous studies
Danionidae	Barna Baril	<i>Opsarius barna</i> (Hamilton, 1822)	LC	a
	Flying Barb	<i>Esomus danrica</i> (Hamilton, 1822)	LC	a
	Hamilton's Barila	<i>Barilius bendelisis</i> (Hamilton, 1807)	LC	a
	Jaya	<i>Aspidoparia jaya</i> (Hamilton, 1822)	LC	a
	Sind Danio	<i>Devario devario</i> (Hamilton, 1822)	LC	a
	Slender Rasbora	<i>Rasbora daniconius</i> (Hamilton, 1822)	LC	a
	Trout Barb	<i>Raiamas bola</i> (Hamilton, 1822)	LC	a
	Vagra Baril	<i>Barilius vagra</i> (Hamilton, 1822)	LC	a
	Zebra Danio	<i>Danio rerio</i> (Hamilton, 1822)	LC	a
		<i>Barilius dimorphicus</i> (Tilak & Husain, 1990)	VU	a
Heteropneustidae	Stinging Catfish	<i>Heteropneustes fossilis</i> (Bloch, 1794)	LC	a
Horabagridae	Indian Potasi	<i>Pachypterus atherinoides</i> (Bloch, 1794)	LC	a
Mastacembelidae	Zig-Zag Eel	<i>Mastacembelus armatus</i> (Lacepède, 1800)	LC	a
Nemacheilidae	Creek Loach	<i>Schistura beavani</i> (Günther, 1868)	LC	a
	Mottled Loach	<i>Paracanthocobitis botia</i> (Hamilton, 1822)	LC	a
	Stone Loach	<i>Nemacheilus corica</i> (Hamilton, 1822)	LC	a
		<i>Schistura dayi</i> (Hora, 1935)	LC	a
		<i>Nemacheilus doonensis</i> (Tilak & Husain, 1977)	DD	a
	Stone Loach	<i>Schistura rupecula</i> (McClelland, 1838)	LC	a
		<i>Schistura savona</i> (Hamilton, 1822)	LC	a
Siluridae	Pabdah Catfish	<i>Ompok pabda</i> (Hamilton, 1822)	NT	a
	Wallago	<i>Wallago attu</i> (Bloch & Schneider, 1801)	VU	a
Sisoridae	River Cat	<i>Glyptothorax pectinopterus</i> (McClelland, 1842)	LC	a
		<i>Glyptothorax saisii</i> (Jenkins, 1910)	VU	a

^aHusain & Tilak (1995)

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Source of Solani River







National Mission for Clean Ganga,
Ministry of Jal Shakti,
Department of Water Resource,
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