

Birds of the Bangladesh Sundarbans: status, threats and conservation recommendations

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The Bangladesh Sundarbans (6,017 km²) is part of the largest single block of halophytic mangrove forest in the world, and parts of it are listed as a Ramsar and UNESCO World Heritage Site. The Sundarbans supports globally important populations of threatened species such as the White-rumped Vulture *Gyps bengalensis*, Masked Finfoot *Heliopais personatus*, Brown-winged Kingfisher *Pelargopsis amauroptera* and Mangrove *Pitta megarhyncha*. Despite its global significance, little information is available on its avifauna. Published checklists and accounts on the relative abundance of birds have been fragmentary or only covered a small part of the forest. Most ornithological studies carried out in the Sundarbans were on specific species or groups (e.g. waterbirds). Considering the global importance of this vast mangrove forest and our gaps in ornithological knowledge, the status and relative abundance of birds in the Bangladesh Sundarbans were assessed based on 33 visits by the author between 2005 and 2019, covering major habitat types. To generate a comprehensive, evidence-based and updated checklist of the birds of the Bangladesh Sundarbans, in addition to the author's own observations, published and unpublished materials were extensively reviewed. A total of 299 species are documented from the Bangladesh Sundarbans, comprising 160 resident and 139 migratory species. Current or historical status and distributions of three Critically Endangered, four Endangered, three Vulnerable and 19 Near Threatened species are discussed in detail. In addition, threats to the avian communities, key knowledge gaps and the need for long-term monitoring are also presented.

INTRODUCTION

The Sundarbans is the largest single block of mangrove forest in the world, stretching along the coast of south-west Bangladesh (6,017 km²) and north-east India (~4,000 km²). A total of 17.4% of the Bangladesh Sundarbans is listed as a Ramsar and UNESCO World Heritage Site and constitutes the largest protected area and reserve forest in Bangladesh (Hussain & Acharya 1994, Sarker *et al.* 2016). The global importance of this landscape is well documented, and some taxa such as tiger and dolphin are well studied. However, information on the avifauna of the Sundarbans remains scanty and scattered. Bird surveys (Sarker & Sarker 1985, Khan 2005, Neumann-Denzau *et al.* 2008, Chowdhury *et al.* 2017) and visits by birdwatchers (Thompson & Johnson 1996) have primarily been concentrated around regular tourist destinations in the eastern Sundarbans (Smith *et al.* 2010). Other areas in the Bangladesh Sundarbans, especially the western part, remain relatively less ornithologically explored. Besides the surveys already mentioned, additional surveys have also been undertaken targeting migratory waterbirds in the coastal islands of the Sundarbans (Rashid & Scott 1990, Islam *et al.* 1999, Chowdhury *et al.* 2014).

Many authors have discussed the status of birds in the Bangladesh Sundarbans (Thompson & Johnson 1996, Khan 2009, Khan 2013a), fragmentary checklists were produced (Hussain & Acharya 1994), new species for Bangladesh reported (Rasmussen 2000, Neumann-Denzau & Denzau 2003, Chowdhury 2011) and detailed studies and surveys on specific species (Neumann-Denzau *et al.* 2008, Chowdhury *et al.* 2017) or groups (Sarker & Sarker 1985, Rashid & Scott 1990, Islam *et al.* 1999, Chowdhury *et al.* 2014) conducted. Nonetheless, only Khan (2005) reported on the relative abundance and habitat use of birds in the freshwater-dominated zone in the Sundarbans East

Wildlife Sanctuary, covering 312 km² (5% of the Sundarbans) using systematic methods.

Over the past 15 years, the author visited various locations of the Bangladesh Sundarbans, covering its three ecological zones (freshwater-dominated zone, moderately saline zone and saline zone) as well as coastal islands. These visits were made principally to study the globally Endangered Masked Finfoot *Heliopais personatus* and largely covered the freshwater-dominated zones (Table 1), to conduct shorebird surveys, to carry out other basic ornithological surveys, to participate in volunteer work and to join opportunistic birdwatching tours. Recognising the global importance of the Sundarbans and gaps in ornithological knowledge of the area, this publication assesses the status, threats, conservation needs and key knowledge gaps of birds in the Bangladesh Sundarbans based on 33 visits by the author in the past 15 years. It summarises conservation recommendations and provides up-to-date accounts of three Critically Endangered, four Endangered, three Vulnerable and 19 Near Threatened species that occur in the Bangladesh Sundarbans. In addition, published and unpublished materials were reviewed, including eBird checklists (eBird 2020) and photographs posted on social media platforms (e.g. Facebook), in order to provide a comprehensive, evidence-based and updated checklist of the birds of the Bangladesh Sundarbans.

METHODS

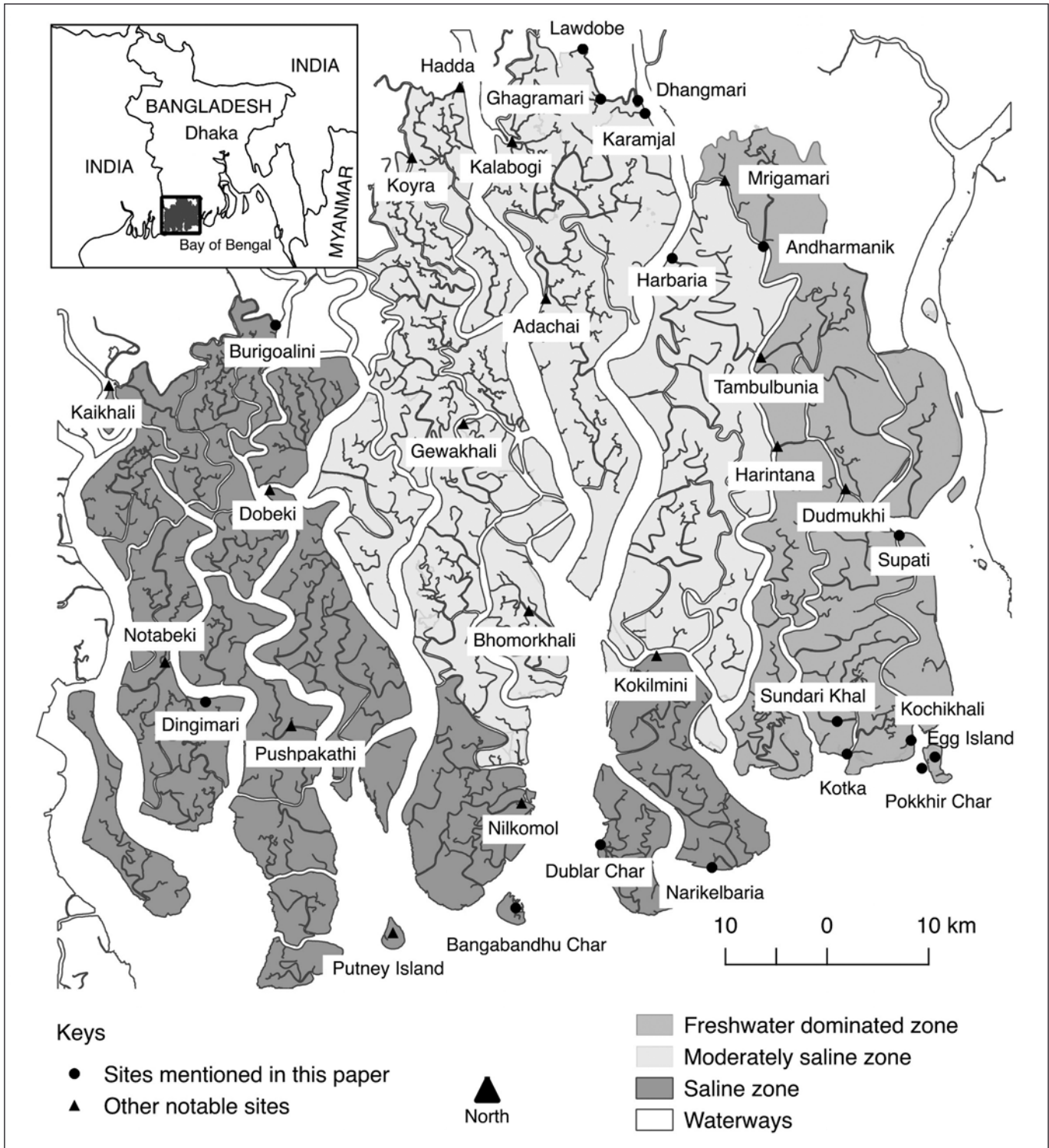
Study area

The 10,000 km² Sundarbans is located in the south-western corner of Bangladesh (60%) and north-eastern corner of India (40%). It is part of the Ganges delta (80,000 km²) on the northern coast of the Bay of Bengal. On the Bangladesh side, 69% is terrestrial mangrove forest and the rest comprises rivers, small streams and creeks that

Table 1. Different ecological zones of the Bangladesh Sundarbans (based on Siddiqi 2001, Siddique *et al.* 2017), observation effort, number of visits and waterways (km) surveyed in each zone. Note that more than one zone was visited during multiple visits.

Ecological zones	Located in	Observation effort	Number of visits	Waterways surveyed (km)
Freshwater-dominated zone	eastern part	Good	28	334
Moderately saline zone	central part	Moderate	12	120
Saline zone	western part	Poor	5	105
Coastal islands	southern part	Good	5	80

Figure 1. Map of the Bangladesh Sundarbans showing different ecological zones (following Siddique *et al.* 2017) and notable sites.



vary from a few metres to several kilometres wide (Wahid *et al.* 2007, Sarker *et al.* 2016). A major portion of this forest is inundated by tides twice a day, while the freshwater flow increases during the monsoon (June–September) and decreases during the dry season (October–May) (Ellison *et al.* 2000). Mean annual precipitation is 1700 mm (range 1474 to 2265 mm) and mean maximum annual temperature is between 29.4°–31.3°C (range: 9.3°–40.0°C) (Sarker *et al.* 2016). The dominant tree species of the Sundarbans include Sundri *Heritiera fomes*, Gewa *Excoecaria agallocha* and Goran *Ceriops decandra* (Siddiqi 2001). The coastal islands in the southern part of the Sundarbans consist of intertidal mudflats, sand-dunes and tidal marshes (Chowdhury *et al.* 2014). The Bangladesh

Sundarbans is generally divided into three ecological zones based on soil salinity and floral composition (Figure 1): (1) the oligohaline (salinity <2 decisiemens meter⁻¹) or freshwater zone in the eastern part covering Chandpai and Sarankhola ranges, (2) the mesohaline (salinity 2–4 dsm⁻¹) or moderately saline zone in the Khulna range, and (3) the polyhaline (salinity >4 dsm⁻¹) or saline zone in the western part of the Satkhira administrative range (Siddiqi 2001, Siddique *et al.* 2017, Islam & Gnauck 2011).

Field methods

Between 2005 and 2019, the author made 33 visits, produced a single checklist for each visit with detailed notes on all species detected,

and spent a total of 203 days covering approximately 639 km of waterways in various parts of the Sundarbans (Table 1). Out of these 33 visits, 17 were conducted during summer months (May–August) and 16 during winter months (October–March) when migratory species were present. Some of these results, as pertaining to research on specific species (Chowdhury *et al.* 2017, Chowdhury *et al.* 2018) or shorebird surveys (Chowdhury *et al.* 2014), are already published, but the majority of the data collected on the overall avian communities has remained unpublished. Observations were primarily made in the mornings (05h00–10h00) and afternoons (15h00–19h00), depending on the daylight for boat-based surveys and tidal conditions for coastal surveys. 10x42 binoculars, a 25–50x spotting scope, a digital voice recorder and a DSLR camera with a 300 mm lens were used to record observations.

Boat-based surveys

Details of all birds that were directly sighted and heard during these visits were recorded. As access to most of the Sundarbans is primarily by boat, 80% of the observations were made from a wooden boat paddled manually, travelling at 3–5 km/hr, which was immediately stopped if identification or photographing the bird required more time. Walking was carried out at popular tourist sites with boardwalks such as Karamjal, Harbaria, Kotka, Kochikhali and during waterbird observations on the coastal islands (Figure 1). Observation efforts were different in different ecological zones of the Sundarbans, with maximum and minimum efforts in the eastern and western zones (Table 1).

Coastal island surveys

At coastal islands all waterbirds were counted individually, and the time spent surveying each site varied depending on the number of birds present but was typically 3–8 hours. Each flock was counted twice (the second count immediately after the first) to avoid counting and identification errors (Bibby *et al.* 2000) and the maximum number was recorded. All counts were undertaken during neap or ebb tides, roosts were counted during high tide and mudflats during low tide (see Chowdhury *et al.* 2014 for further details).

Assessing relative abundance

Relative abundance was assessed under three broad categories (resident non-coastal, migratory non-coastal and coastal species) but roughly following the same method as Khan (2005) in order to ensure comparability of results. Resident non-coastal birds that were encountered on 75–100% of the 33 visits are listed as common, 50–74% of the visits as uncommon, 25–49% of the visits as occasional and <25% of visits as rare (also see Bibby *et al.* 2000). Similarly, relative abundance of non-coastal migratory species (winter, passage and summer migrants) was assessed based on 16 visits during winter months and 17 visits during summer months; and birds that occur only in coastal habitats such as mudflats or sand-dunes (e.g. Great Thick-knee *Esacus tenuirostris*) were assessed based on five visits (Table 1). Birds that were not seen during these visits but are reported in published materials and in unpublished sources (e.g. eBird, Facebook) with adequate evidence are listed as scarce. Detailed accounts of globally threatened, regionally important and unconfirmed species are presented in the results.

RESULTS

Overview

A total of 299 species were documented from the Bangladesh Sundarbans, comprising 263 species confirmed by the author and 36 species based on confirmed records collected from other sources (Appendix 1). Of these, 160 (53.5%) species are resident and 139 (46.5%) are migratory (winter, summer, passage and vagrant) to

Bangladesh. A total of 80 (26.8%) species were assessed as common, 39 (13%) as uncommon, 58 (19.4%) as occasional, 86 (28.8%) as rare and 36 (12%) as scarce. Also, 28 globally threatened and Near Threatened species were recorded from the Sundarbans, three of them Critically Endangered (Spoon-billed Sandpiper *Calidris pygmaea*, White-rumped Vulture *Gyps bengalensis* and Slender-billed Vulture *G. tenuirostris*), four Endangered (Masked Finfoot, Great Knot *Calidris tenuirostris*, Steppe Eagle *Aquila nipalensis* and Pallas's Fish Eagle *Haliaeetus leucoryphus*), three Vulnerable and 18 Near Threatened.

Globally threatened and near threatened species accounts

Ashy-headed Green-pigeon *Treron phayrei*

Near Threatened; scarce. Reported by Khan (2005) in 2001–2003 from Kotka-Kochikhali area located in the south-eastern corner of the Sundarbans, but no confirmed reports before or after.

Masked Finfoot *Heliopais personatus*

Endangered; occasional. The Bangladesh Sundarbans holds the only known resident breeding population of Masked Finfoot in the Indian Subcontinent, with an estimated 40 to 80 breeding pairs and arguably constitutes the most important global population in the world (Chowdhury *et al.* 2020). A total of 25 nests were found during dedicated surveys in 2011–2014 (Chowdhury *et al.* 2017) in narrow creeks (5–25 m) in Harbaria, Harintana, Dudmukhi and the area between Supati and Kotka (Figure 1) in the freshwater-dominated and moderately saline zones in the eastern part. They were also recorded during the non-breeding season in winter from the same area on channels up to 100 m wide, with regular sightings from Sundari Khal. Birds were mostly seen foraging during low tide by walking up and down along the muddy banks or swimming along the shallow edge of the creeks. During high tide, Masked Finfoot was observed roosting inside dense forest near the regular foraging creeks or sometimes on the overhanging branches.

Lesser Adjutant *Leptoptilos javanicus*

Vulnerable; uncommon. Widely distributed in all ecological zones (Table 1) throughout the Sundarbans, with regular records from areas near the coast, with a maximum of 12 birds at Kotka on 8 January 2008. Regular sightings of juveniles indicate the possibility of a resident breeding population within the Sundarbans.

Painted Stork *Mycteria leucocephala*

Near Threatened; rare. Two individuals were seen in flight at Dingimari on 11 January 2008. Another four were seen flying over Burigoalini in February 2005 (Thompson *et al.* 2014).

Asian Woollyneck *Ciconia episcopus*

Vulnerable; rare. It was considered extirpated from Bangladesh (Siddiqui *et al.* 2008) until one was seen flying from north to south at Kotka on 9 October 2009 (Chowdhury 2011). There have been regular records from Padma river of Rajshahi Division in the north-west of Bangladesh since 2015, including two nesting reports on communication towers in November 2017 and September 2018 (T. Hasan, pers. comm.).

Black-headed Ibis *Threskiornis melanocephalus*

Near Threatened; rare. Four individuals were seen flying over Dublar Char on 26 December 2017. Approximately 700–1,000 individuals are annually counted from other coastal sites of Bangladesh (pers. obs.).

Oriental Darter *Anhinga melanogaster*

Near Threatened; rare. A lone individual was seen in flight on 12 October 2009 near Lawdobe and another one at Dhangmari on 7 January 2016.

Great Thick-knee *Esacus recurvirostris*

Near Threatened; uncommon. Local resident occurring mainly in sandy areas of coastal islands throughout the year. A total of seven individuals were counted during a shorebird survey (Chowdhury *et al.* 2014) covering coastal islands of the Sundarbans on 14–16 January 2013, including two individuals each at Pokkhir Char and Narikelbaria, and three at Egg Island (Figure 1). Sundarbans remains one of the key locations for this species in Bangladesh, with irregular records from other islands off the south-central coast and Padma River in Rajshahi Division, northern Bangladesh.

Eurasian Oystercatcher *Haematopus ostralegus*

Near Threatened; occasional. Listed as a vagrant and former rare resident of Bangladesh (Siddiqui *et al.* 2008), with a single breeding record for South Asia in the Sundarbans in the 1930s (Stanford 1937). Three individuals were recorded at Bangabandhu Char (also known as Majhaer Char) on 15 January 2013. Of these, two individuals were identified as subspecies *longipes* and one as *osculans*. Three individuals were sighted here again on 25 December 2018 and on 26 January 2019 (Chowdhury & Melville 2018), and two individuals again on 19 February 2017 (S. Mohsanin *in litt.* 2017).

Eurasian Curlew *Numenius arquata*

Near Threatened; common. A regular winter visitor, most frequently seen along the coastal islands and on muddy banks of large rivers in the Sundarbans. Winter counts include 85 birds on 14–16 January 2013, including 29 at Egg Island and 23 at Bangabandhu Char (Chowdhury *et al.* 2014). Also, 18 individuals were counted at Bangabandhu Char on 25 December 2018.

Bar-tailed Godwit *Limosa lapponica*

Near Threatened; rare. The only record for the Sundarbans relates to 18 individuals on 14–16 January 2013, comprising four individuals at Narikelbaria and 14 individuals at Bangabandhu Char (Chowdhury *et al.* 2014). Regular winter visitor to other coastal wetlands of Bangladesh (Siddiqui *et al.* 2008).

Black-tailed Godwit *Limosa limosa*

Near Threatened; rare. Listed as 'fairly common' by Islam *et al.* (1999) and 'uncommon' by Khan (2005). However, the only recent record from the Sundarbans relates to 25 individuals at Bangabandhu Char on 25 December 2017. Common winter visitor to the coastal and freshwater wetlands of Bangladesh outside the Sundarbans (Siddiqui *et al.* 2008).

Great Knot *Calidris tenuirostris*

Endangered; rare. A total of 19 individuals were counted at Bangabandhu Char on 25 December 2017 and 15 individuals were seen at Egg Island on 5 February 1990 (Thompson *et al.* 1993). Annual winter counts from other important shorebird sites of Bangladesh (e.g. Sonadia Island in the south-east coast) involve 100–300 individuals (pers. obs.)

Red Knot *Calidris canutus*

Near Threatened; rare. One individual was observed foraging together with Great Knots at Bangabandhu Char on 25 December 2017. It is listed as a winter vagrant (Siddiqui *et al.* 2008) but is regularly seen at well-watched sites like Sonadia Island in the south-east coast of Bangladesh (pers. obs.).

Curlew Sandpiper *Calidris ferruginea*

Near Threatened; occasional. Listed as a 'rare' winter visitor to Sundarbans by Islam *et al.* (1999), while Khan (2005) did not record it. Recent counts include 20 individuals on 15 January 2013 (Chowdhury *et al.* 2014) and four individuals on 25 December 2017 at Bangabandhu Char.

Spoon-billed Sandpiper *Calidris pygmaea*

Critically Endangered; scarce. The first record from the Sundarbans related to four individuals at Egg Island on 24 February 1992 (Thompson *et al.* 1993). Targeted surveys in 2013 (Chowdhury *et al.* 2014) and 2017 have failed to find it, and other claims from the Sundarbans did not provide sufficient details or evidence. Confirmed nearest records include one individual from Frasersgunge, West Bengal, India, c.90 km east of the western border of the Bangladesh Sundarbans, in April 2018 (Chakraborty *et al.* 2018), and one individual at Andar Char (c.70 km west of the eastern border of the Sundarbans) on the south-central coast of Bangladesh in January 2020 (S. Mohsanin, pers. comm.).

Red-necked Stint *Calidris ruficollis*

Near Threatened; rare. Islam *et al.* (1999) and Khan (2005) did not report Red-necked Stint. It is often difficult to separate Red-necked Stint and Little Stint *C. minuta* under field conditions but a considerable amount of time was spent to identify 15 Red-necked Stints and five Little Stints at Bangabandhu Char on 15 January 2013 (Chowdhury *et al.* 2014). These winter plumaged stints were separated based on the bill structure, leg length and body shape.

Himalayan Griffon *Gyps himalayensis*

Near Threatened; rare. Islam *et al.* (1999) listed it as a 'rare' winter visitor and Khan (2005) did not report it. An individual was observed flying over Lawdobe on 7 January 2016.

White-rumped Vulture *Gyps bengalensis*

Critically Endangered; occasional. Breeds locally in the northern fringes of the Bangladesh Sundarbans (Siddiqui *et al.* 2008, Khan 2013b). Sarker (1986) reported 530 individuals and listed it as 'common' in the Sundarbans. More recently, 52 individuals were counted at Ghagramari in November 2017 (A. B. M. S Alam, pers. comm.), which is the maximum count from the Sundarbans in the last decade. In addition, seven adults were counted roosting on a tree at Dhangmari on 20 November 2017. Small flocks of 2–5 individuals are regularly seen along the northern margins but rarely seen elsewhere in the Bangladesh Sundarbans.

Slender-billed Vulture *Gyps tenuirostris*

Critically Endangered; scarce. Two individuals were seen at Ghagramari on 25 October and 20 November 2017 (T. Kabir, pers. comm.)

Greater Spotted Eagle *Clanga clanga*

Vulnerable; rare. Widespread winter visitor to Bangladesh (Siddiqui *et al.* 2008). Singles were seen at Karamjal on 15 January 2007 and 21 January 2013, and Harbaria on 6 January 2016.

Steppe Eagle *Aquila nipalensis*

Endangered; rare. An individual was seen flying over Supati on 17 January 2013.

Pallas's Fish Eagle *Haliaeetus leucorhynchus*

Endangered; rare. Sarker (1986) counted seven individuals during surveys conducted along 3,290 km of waterways in the Sundarbans between 1981 and 1983, and found two nests at Sutarkhali in March 1981. The last nest record from the Sundarbans was from Lawdobe (approximately 5 km east of Sutarkhali) in 2006 (R. Halder, pers. comm.) and the last sighting at the same location on 10 October 2010.

Grey-headed Fish Eagle *Ichthyophaga ichthyaetus*

Near Threatened; uncommon. Locally uncommon in the freshwater-dominated areas in the northern fringes of the Sundarbans and a widespread resident in Bangladesh.

Brown-winged Kingfisher *Pelargopsis amauroptera*

Near Threatened; common. Reza *et al.* (2003) estimated 2.58 individuals/km² at Kotka and Kochikhali areas but details of their methods were not given. Even so, the Bangladesh Sundarbans is likely to be one of the important strongholds of this declining species.

Blossom-headed Parakeet *Psittacula roseata*

Near Threatened; occasional. Restricted to the northern fringes of the Sundarbans, with regular sightings including a maximum of 30 individuals from Lawdobe, Ghagramari and Karamjal. The southernmost record was a flock of 20 individuals at Andharmanik on 15 July 2013.

Mangrove Pitta *Pitta megarhyncha*

Near Threatened; common. Widespread in the Sundarbans, calls heard at nearly all locations but rarely seen. Responds to playback, especially during the breeding season in May–July. Based on the author's extensive field experience and best-guess estimates, at least one pair occurs per km² and perhaps uniformly distributed across different ecological zones of the Sundarbans. If this estimate is realistic, the Bangladesh Sundarbans alone supports a minimum of 6,000 breeding pairs, which would be the largest population anywhere in the world (BirdLife International 2020). Moreover, it has been sighted c.30 km east of the Sundarbans at Kuakata in recent years (eBird 2020).

Firethroat *Calliope pectardens*

Near Threatened; scarce. Two individuals (male and female) were seen at Karamjal on 26 November 2012 (Thompson *et al.* 2014) and a female was photographed at the same location on 20 November 2015 (M. Hossen, pers. comm.). Bangladesh appears to be one of regular wintering areas of the Firethroat: 11 birds (9 males and 2 females) were caught during 24 days of ringing in February 2012 and March 2013 in freshwater wetlands in north-east Bangladesh (Round *et al.* 2014).

DISCUSSION

A total of 314 species were listed from the Bangladesh Sundarbans by Hussain & Acharya (1994), including many hypothetical species. Islam *et al.* (1999) reported 181 species that occur in winter and Khan (2005) listed 198 species from the Sundarbans East Wildlife Sanctuary. Out of 181 species reported by Islam *et al.* (1999), corroborating information regarding 16 species could not be traced, so they were not listed by Siddiqui *et al.* (2008), including the Roseate Tern *Sterna dougallii* that has never been reported from Bangladesh and is scarce elsewhere in South Asia (Grimmett *et al.* 2016). Records of Indian Nightjar *Caprimulgus asiaticus*, Eurasian Eagle-owl *Bubo bubo* and Streak-throated Woodpecker *Picus xanthopygaeus* (Khan 2005) were later withdrawn because of brief views in the field and uncertainties regarding their regional status at that time (M. M. H. Khan, *in litt.* 2020). Therefore, these species were not included in this (Appendix 1) checklist.

A total of 289 species are listed in the eBird checklist of the Indian Sundarbans (eBird 2020), which is 3.4% lower than for the Bangladesh side. Certain species seem to be unique to either side. For example, Loten's Sunbird *Cinnyris lotenius* is regularly recorded near Sudhanyakhal Watchtower inside the Sunderbans Tiger Reserve, West Bengal, India (S. Chatterjee, pers. comm.) and Streak-throated Woodpecker appears to be common on the Indian side (eBird 2020); these species remain undetected in Bangladesh. In contrast, Masked Finfoot and Orange-bellied Flowerpecker *Dicaeum trigonostigma* have never been recorded from the Indian side. This regional variation in avian diversity and abundance

could be attributed to the water salinity and thus the vegetational composition. Considering the distribution of globally threatened birds and overall species composition, it is clear that the freshwater and moderately saline zones (Figure 1) in the Bangladesh part of the Sundarbans are of great importance and should be treated as priority conservation areas.

Regionally important species

The Sundarbans supports multiple regionally important species, such as the Buffy Fish Owl *Ketupa ketupa* and Streak-breasted Woodpecker *Picus viridanus*, both species with a South-East Asian affinity whose only occurrence in South Asia is in the Sundarbans (Paynter 1970, Khan 2005). In Bangladesh, a handful of mangrove-adapted species are found only in the Sundarbans, including the Masked Finfoot, Brown-winged Kingfisher (also see Results), Ruddy Kingfisher *Halcyon coromanda*, Mangrove Whistler *Pachycephala cinerea* and Common Flameback *Dinopium javanense* (Siddiqui *et al.* 2008, Chowdhury 2016). Species scarcely found elsewhere in Bangladesh but common in the Sundarbans, with populations of possible national importance, include Orange-breasted Green Pigeon *Treron bicinctus*, Brown Wood Owl *Strix leptogrammica*, White-bellied Sea Eagle *Haliaeetus leucogaster*, Black-capped Kingfisher *Halcyon pileata* and Yellow-bellied Prinia *Prinia flaviventris* (Siddiqui *et al.* 2008, eBird 2020).

Ecological zones

Presently, little information is available on the variation of avian communities in different ecological zones of the Sundarbans (Table 1). However, certain species appear to occur chiefly in the freshwater zone and the northern part of the moderately saline zone, such as the Masked Finfoot, Pallas's Fish Eagle, Dusky Eagle-owl *Bubo coromandus* and Grey-headed Fish Eagle. A total of 228 species were recorded in the freshwater zone, 205 species in the moderately saline zone, 135 species in the saline zone and 71 species on the coastal islands. Vegetation composition and canopy density of these zones are different (Siddiqui 2001, Islam & Gnauck 2011), indicating that the abundance and diversity of birds are likely to be dissimilar, too. Most ornithological observations from the Bangladesh Sundarbans are concentrated around the eastern part, including the present surveys. Therefore, the western part of the Bangladesh Sundarbans remains comparatively little explored.

Conservation significance and threats

The Bangladesh Sundarbans is the last stronghold of the Masked Finfoot (Chowdhury *et al.* 2020) and important for many other species of conservation concern (e.g. Mangrove Pitta) in a global context. Apart from birds, the area is important for globally threatened vertebrates such as the Critically Endangered Common River Terrapin *Batagur baska*, Endangered Bengal Tiger *Panthera tigris tigris*, Olive Ridley Turtle *Lepidochelys olivacea*, Vulnerable Fishing Cat *Prionailurus viverrinus*, Asian Small-clawed Otter *Amblonyx cinereus* and Burmese Python *Python bivittatus*.

Beyond biodiversity, the Bangladesh Sundarbans has important socio-economic value. More than 3.5 million people are directly or indirectly dependent on the ecosystem services of the Sundarbans (Giri *et al.* 2007). A conservative estimate indicated the value of the Bangladesh Sundarbans' ecosystem services to be between US\$500 and US\$1,200 per hectare per year. The Bangladesh Forest Department's records show that in the fiscal year 2011–2012, 4,800 tons of fish, 165 tons of honey, 1,600 tons of firewood and 82,700 tons of nipa palm *Nypa fruticans* were harvested and 183,600 tourists visited the Bangladesh Sundarbans (IUCN Bangladesh 2014).

The Bangladesh Sundarbans faces a range of threats. Threats directly linked to the avian community include opportunistic hunting of waterbirds such as Masked Finfoot (pers. obs.), habitat loss, illegal tree-felling and encroachment (IUCN Bangladesh

2014, Sarker *et al.* 2016), river pollution including oil spills and poison fishing (Habib *et al.* 2020), a proposed coal-based power plant (Mukul *et al.* 2020) and climate change, including sea level rise, saltwater intrusion and their effects on vegetation composition (Ellison *et al.* 2000, Sarker *et al.* 2016).

Currently, the Bangladesh Sundarbans is classified as a reserve forest and major parts (52%) are designated as wildlife sanctuaries, which have higher protection status and more restricted access. In 2018, boundaries of these sanctuaries were extended from 1,052 km² to 3,179 km² (Bangladesh Forest Department 2018). In July 2019, the Forest Department banned access (mainly targeting fishermen and crab collectors) along 13 rivers and 450 creeks inside the Sundarbans for two months in order to ensure undisturbed breeding of aquatic animals and to prevent poison fishing in the waterways (Alam 2019). This intervention coincided with the Masked Finfoot breeding season. This restricted access approach should be continued and adjusted to benefit the Masked Finfoot by integrating areas that support their breeding population (Chowdhury *et al.* 2017). In addition, the duration of this ban could be extended to three months from June to August or enforced earlier in June instead of July to cover the peak breeding season of the Masked Finfoot (Chowdhury *et al.* 2018). Similar efforts should be undertaken to ensure the presence of undisturbed foraging creeks during the winter season.

Key knowledge gaps

This publication includes a checklist of birds reported from the Sundarbans and their relative abundance. However, it does not provide insights into population trends, densities or variations across different ecological zones due to mixed survey effort.

Citizen science has become one of the most powerful tools to understand bird population trends in modern ornithology (Tulloch *et al.* 2013). Popular platforms such as eBird have been used to evaluate 867 bird species in India (SoIB 2020). Modifying standard eBird data collection protocols based on the unique habitat types of the Sundarbans or using additional tools and applications during surveys or visits by birdwatchers could help us fill some of our knowledge gaps on the birds of the Sundarbans. For an example of how this approach has been successfully carried out for pelagic birds in India, see Karuthedathu & Praveen (2016).

Besides citizen science approaches, continued species-specific surveys should be conducted on globally threatened species such as the Masked Finfoot, White-rumped Vulture and Spoon-billed Sandpiper. For overall bird monitoring, distance sampling using point counts or transects along waterways may be the most suitable method for the Sundarbans as it is a simple, effective and widely used approach to estimate densities of biological populations in defined areas (Buckland *et al.* 2005, Thomas *et al.* 2010). Considering its uniqueness, global importance and the obvious threats to its biodiversity, it is imperative to initiate a long-term and robust bird monitoring scheme, covering all ecological zones of the Bangladesh Sundarbans.

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Appendix 1. A complete checklist of the birds of the Bangladesh Sundarbans with relative abundance, occurrences in different ecological zones and national status.

Legend

Under National Status, p = passage migrant, r = resident and w = winter visitor.

Under Ecological Zones, fz = freshwater-dominated zone, mz = moderately saline zone, sz = saline zone and cz = coastal islands/zones.

Under Relative Abundance, C = Common (75–100%), U = Uncommon (50–74%), O = Occasional (25–49%), R = Rare (<25%) and S = Scarce (% not assessed).

IUCN Red List status is given in brackets where CR = Critically Endangered, EN = Endangered, VU = Vulnerable and NT = Near Threatened. Species that occur chiefly in coastal habitats (e.g. mudflats) are indicated with *. Species nomenclature and taxonomy follow HBW & BirdLife (2019).

Species	National status	Relative abundance (%)	Ecological zones	Remarks
Asian Blue Quail <i>Coturnix chinensis</i>	r	S	fz	Khan 2005
Red Junglefowl <i>Gallus gallus</i>	r	C (76%)	fz, mz, sz	
Lesser Whistling Duck <i>Dendrocygna javanica</i>	w	R (13%)	fz, sz	
Bar-headed Goose <i>Anser indicus</i>	w	R (19%)	cz	
Common Shelduck <i>Tadorna tadorna</i> *	w	O (40%)	cz	
Ruddy Shelduck <i>Tadorna ferruginea</i>	w	O (44%)	cz, fz	
African Comb Duck <i>Sarkidiornis melanotos</i>	w	S	fz	T. Rahman, pers. comm.
Cotton Pygmy-goose <i>Nettapus coromandelianus</i>	r	S	fz	Khan 2005
Red-crested Pochard <i>Netta rufina</i>	w	S	cz	Khan 2005
Tufted Duck <i>Aythya fuligula</i>	w	R (13%)	fz, cz	
Garganey <i>Spatula querquedula</i>	w	R (19%)	fz, cz	
Northern Shoveler <i>Spatula clypeata</i> *	w	R (20%)	cz	
Gadwall <i>Mareca strepera</i>	w	R (19%)	fz, sz	
Indian Spot-billed Duck <i>Anas poecilorhyncha</i>	r	S	fz	Khan 2005
Eurasian Wigeon <i>Mareca penelope</i>	w	O (31%)	fz, cz	
Northern Pintail <i>Anas acuta</i>	w	O (38%)	fz, mz, cz	
Common Teal <i>Anas crecca</i> *	w	R (20%)	cz	
Little Grebe <i>Tachybaptus ruficollis</i>	r	R (9%)	fz	
Rock Pigeon <i>Columba livia</i>	r	R (12%)	fz	Northern fringes; near villages
Oriental Turtle-Dove <i>Streptopelia orientalis</i>	r	O (48%)	fz, mz, sz	
Eurasian Collared Dove <i>Streptopelia decaocto</i>	r	C (76%)	fz, mz, sz	
Red Turtle-Dove <i>Streptopelia tranquebarica</i>	r	O (27%)	fz, mz, sz	
Western Spotted Dove <i>Spilopelia suratensis</i>	r	C (97%)	fz, mz, sz	
Grey-capped Emerald Dove <i>Chalcophaps indica</i>	r	U (55%)	fz, mz	
Orange-breasted Green Pigeon <i>Treron bicinctus</i>	r	U (73%)	fz, mz, sz	
Ashy-headed Green Pigeon <i>Treron phayrei</i> (NT)	r	S		Khan 2005
Yellow-footed Green Pigeon <i>Treron phoenicopterus</i>	r	R (18%)	fz	Northern fringes; near villages
Large-tailed Nightjar <i>Caprimulgus macrurus</i>	r	C (79%)	fz, mz, sz	Mostly heard at night
Himalayan Swiftlet <i>Aerodramus brevirostris</i>	w	R (6%)	mz	
Asian Palm-Swift <i>Cypsiurus balasienis</i>	r	C (85%)	fz, mz, sz, cz	
House Swift <i>Apus nipalensis</i>	r	O (39%)	fz, mz, sz	Northern fringes; near villages
Greater Coucal <i>Centropus sinensis</i>	r	C (88%)	fz, mz, sz	
Green-billed Malkoha <i>Phaenicophaeus tristis</i>	r	C (76%)	fz, mz, sz	
Chestnut-winged Cuckoo <i>Clamator coromandus</i>	s	O (29%)	fz, mz	
Western Koel <i>Eudynamis scolopacea</i>	r	C (76%)	fz, mz, sz	
Plaintive Cuckoo <i>Cacomantis merulinus</i>	r	U (52%)	fz, mz	
Grey-bellied Cuckoo <i>Cacomantis passerinus</i>	r	S	fz	R. Halder, pers. comm.
Common Hawk Cuckoo <i>Hierococcyx varius</i>	r	U (52%)	fz, mz, sz	
Indian Cuckoo <i>Cuculus micropterus</i>	r	U (61%)	fz, mz, sz	
Common (Eurasian) Cuckoo <i>Cuculus canorus</i>	p	R (15%)	fz, sz	
Oriental (Himalayan) Cuckoo <i>Cuculus saturatus</i>	p	R (3%)	mz	
Masked Finfoot <i>Heliopais personatus</i> (EN)	r	O (48%)	fz, mz	
Slaty-legged Crane <i>Rallina eurizonoides</i>	r	S	fz	Thompson <i>et al.</i> 2014
Slaty-breasted Rail <i>Lewinia striatus</i>	r	O (33%)	fz, mz	
Ruddy-breasted Crane <i>Zapornia fusca</i>	r	R (15%)	fz	
White-breasted Waterhen <i>Amaurornis phoenicurus</i>	r	C (76%)	fz, mz, sz	
Lesser Adjutant <i>Leptoptilos javanicus</i> (VU)	r	U (73%)	fz, mz, sz, cz	
Asian Openbill <i>Anastomus oscitans</i>	r	O (27%)	fz, mz	Northern fringes
Painted Stork <i>Mycteria leucocephala</i> (NT)	w	R (6%)	fz, sz	
Asian Woollyneck <i>Ciconia episcopus</i> (VU)	w	R (6%)	fz	
Black-headed Ibis <i>Threskiornis melanocephalus</i> (NT)*	w	R (20%)	cz	
Cinnamon Bittern <i>Ixobrychus cinnamomeus</i>	r	R (21%)	fz, mz	
Malayan Night Heron <i>Gorsachius melanolophus</i>	r	R (12%)	fz	
Black-crowned Night Heron <i>Nycticorax nycticorax</i>	r	O (39%)	fz, mz, sz	

Species	National status	Relative abundance (%)	Ecological zones	Remarks
Green-backed (Striated) Heron <i>Butorides striatus</i>	r	C (85%)	fz, mz, sz	
Indian Pond Heron <i>Ardeola grayii</i>	r	C (100%)	fz, mz, sz, cz	
Cattle Egret <i>Bubulcus ibis</i>	r	R (21%)	fz, mz, sz	Northern fringes
Grey Heron <i>Ardea cinerea</i>	w	O (44%)	fz, sz, cz	
Goliath Heron <i>Ardea goliath</i>	v	S		Siddiqui <i>et al.</i> 2008
Purple Heron <i>Ardea purpurea</i>	r	R (24%)	mz, cz	
Great Egret <i>Ardea albus</i>	r	C (94%)	fz, mz, sz, cz	
Intermediate Egret <i>Ardea intermedia</i>	r	U (64%)	fz, sz, cz	
Little Egret <i>Egretta garzetta</i>	r	C (100%)	fz, mz, sz, cz	
Lesser Frigatebird <i>Fregata ariel</i>	v	S		Jahan <i>et al.</i> 2016
Little Cormorant <i>Microcarbo niger</i>	r	R (24%)	fz, sz, cz	
Oriental Darter <i>Anhinga melanogaster</i> (NT)	r	R (6%)	fz	
Great Thick-knee <i>Esacus recurvirostris</i> (NT)*	r	U (60%)	cz	
Eurasian Oystercatcher <i>Haematopus ostralegus</i> (NT)*	w	O (40%)	cz	
Pied Avocet <i>Recurvirostra avosetta</i> *	w	R (20%)	cz	
Black-winged Stilt <i>Himantopus himantopus</i>	w	S	fz	Khan 2005
Grey Plover <i>Pluvialis squatarola</i> *	w	U (60%)	cz	
Pacific Golden Plover <i>Pluvialis fulva</i> *	w	O (40%)	cz	
Kentish Plover <i>Charadrius alexandrinus</i>	w	C (100%)	cz	
Lesser Sandplover <i>Charadrius mongolus</i> *	w	C (100%)	cz	
Greater Sandplover <i>Charadrius leschenaultii</i> *	w	U (60%)	cz	
Grey-headed Lapwing <i>Vanellus cinereus</i>	w	R (24%)	fz, mz	
Red-wattled Lapwing <i>Vanellus indicus</i>	r	C (79%)	fz, mz, cz	Northern fringes; grasslands
Pheasant-tailed Jacana <i>Hydrophasianus chirurgus</i>	r	S	fz	Khan 2005
Whimbrel <i>Numenius phaeopus</i>	w	C (81%)	fz, mz, sz, cz	
Eurasian Curlew <i>Numenius arquata</i> (NT)*	w	C (80%)	cz	
Bar-tailed Godwit <i>Limosa lapponica</i> (NT)*	w	R (20%)	cz	
Black-tailed Godwit <i>Limosa limosa</i> (NT)*	w	R (20%)	cz	
Ruddy Turnstone <i>Arenaria interpres</i> *	w	O (40%)	cz	
Great Knot <i>Calidris tenuirostris</i> (EN)*	w	R (20%)	cz	
Red Knot <i>Calidris canutus</i> (NT)*	w	R (20%)	cz	
Curlew Sandpiper <i>Calidris ferruginea</i> (NT)*	w	O (40%)	cz	
Spoon-billed Sandpiper <i>Calidris pygmaea</i> (CR)*	w	S	cz	Thompson <i>et al.</i> 1993
Red-necked Stint <i>Calidris ruficollis</i> (NT)*	w	R (20%)	cz	
Sanderling <i>Calidris alba</i> *	w	U (60%)	cz	
Dunlin <i>Calidris alpina</i> *	w	R (20%)	cz	
Little Stint <i>Calidris minuta</i> *	w	U (60%)	cz	
Pintail Snipe <i>Gallinago stenura</i>	w	O (38%)	fz, mz, cz	
Common Snipe <i>Gallinago gallinago</i>	w	O (25%)	fz, mz, cz	
Terek Sandpiper <i>Xenus cinereus</i> *	w	O (40%)	cz	
Common Sandpiper <i>Actitis hypoleucos</i>	w	C (88%)	fz, mz, sz	
Green Sandpiper <i>Tringa ochropus</i>	w	R (19%)	fz	
Common Greenshank <i>Tringa nebularia</i>	w	U (69%)	fz, mz, sz, cz	
Spotted Redshank <i>Tringa erythropus</i> *	w	S		Thompson <i>et al.</i> 1993
Common Redshank <i>Tringa totanus</i>	w	C (81%)	fz, mz, sz, cz	
Wood Sandpiper <i>Tringa glareola</i>	w	O (25%)	fz	
Marsh Sandpiper <i>Tringa stagnatilis</i>	w	S	fz, mz	Khan 2005
Oriental Pratincole <i>Glareola maldivarum</i>	w	R (6%)	cz	
Small Pratincole <i>Glareola lactea</i>	r	R (9%)	fz, cz	
Brown-headed Gull <i>Larus brunnicephalus</i>	w	C (94%)	fz, mz, sz, cz	
Black-headed Gull <i>Larus ridibundus</i>	w	R (13%)	fz	
Pallas's Gull <i>Larus ichthyaetus</i> *	w	U (60%)	cz	
Lesser Black-backed (Heuglin's) Gull <i>Larus fuscus</i>	w	R (20%)	cz	
Little Tern <i>Sternula albifrons</i>	r	R (6%)	fz	
Common Gull-billed Tern <i>Gelochelidon nilotica</i>	w	O (44%)	fz, mz, cz	
Caspian Tern <i>Hydroprogne caspia</i> *	w	R (20%)	cz	
Whiskered Tern <i>Chlidonias hybridus</i>	w	C (75%)	fz, mz, sz, cz	
White-winged Tern <i>Chlidonias leucopterus</i>	w	R (19%)	sz, cz	
Common Tern <i>Sterna hirundo</i>	w	O (44%)	fz, cz	
Lesser Crested Tern <i>Thalasseus bengalensis</i>	w	S	cz	S. Saha, pers. comm.
Great Crested Tern <i>Thalasseus bergii</i> *	w	R (20%)	cz	
Common Barn Owl <i>Tyto alba</i>	r	R (9%)	fz	Northern fringes; near villages

Species	National status	Relative abundance (%)	Ecological zones	Remarks
Brown Boobook (Hawk Owl) <i>Ninox scutulata</i>	r	R (3%)	fz, mz	Mostly heard at night
Spotted Owlet <i>Athene brama</i>	r	O (27%)	fz, mz, sz	Northern fringes; near villages
Collared Scops Owl <i>Otus lettia</i>	r	R (6%)	fz	Mostly heard at night
Oriental Scops Owl <i>Otus sunia</i>	r	U (52%)	fz, mz, sz	Mostly heard at night
Short-eared Owl <i>Asio flammeus</i>	w	R (13%)	fz, mz	
Brown Wood Owl <i>Strix leptogrammica</i>	r	S	fz	Thompson & Johnson 2003
Dusky Eagle Owl <i>Bubo coromandus</i>	r	O (27%)	fz, mz	
Brown Fish Owl <i>Ketupa zeylonensis</i>	r	U (52%)	fz, mz, sz	
Buffy Fish Owl <i>Ketupa ketupa</i>	r	R (24%)	fz, mz	
Osprey <i>Pandion haliaetus</i>	w	C (75%)	fz, mz, sz, cz	
Black-winged Kite <i>Elanus caeruleus</i>	r	R (9%)	fz, mz	Northern fringes
Oriental Honey-buzzard <i>Pernis ptilorhynchus</i>	r	O (39%)	fz, mz, sz	
Crested Serpent Eagle <i>Spilornis cheela</i>	r	C (94%)	fz, mz, sz	
Short-toed Snake Eagle <i>Circaetus gallicus</i>	v	R (3%)	mz	
Himalayan Griffon <i>Gyps himalayensis</i> (NT)	w	R (6%)	mz	
White-rumped Vulture <i>Gyps bengalensis</i> (CR)	r	O (36%)	fz, mz, sz	Northern fringes
Slender-billed Vulture <i>Gyps tenuirostris</i> (CR)	r	S	mz	Northern fringes
Changeable Hawk Eagle <i>Nisaetus cirrhatus</i>	r	C (76%)	fz, mz, sz	
Greater Spotted Eagle <i>Clanga clanga</i> (VU)	w	R (13%)	mz	
Steppe Eagle <i>Aquila nipalensis</i> (EN)	w	R (6%)	fz	
Booted Eagle <i>Hieraetus pennatus</i>	w	R (13%)	fz, mz	
Western Marsh Harrier <i>Circus aeruginosus</i>	w	U (63%)	fz, mz, sz, cz	
Hen Harrier <i>Circus cyaneus</i>	w	S	mz	Thompson <i>et al.</i> 1993
Pied Harrier <i>Circus melanoleucos</i>	w	R (13%)	fz	
Crested Goshawk <i>Accipiter trivirgatus</i>	r	R (6%)	fz, mz	
Shikra <i>Accipiter badius</i>	r	C (88%)	fz, mz, sz	
Northern Goshawk <i>Accipiter gentilis</i>	v	S	mz	H. Rahman in eBird
White-bellied Sea Eagle <i>Haliaeetus leucogaster</i>	r	C (79%)	fz, mz, sz, cz	
Pallas's Fish Eagle <i>Haliaeetus leucoryphus</i> (EN)	w	R (6%)	mz	
Grey-headed Fish Eagle <i>Ichthyophaga ichthyaetus</i> (NT)	r	U (52%)	fz, mz	
Brahminy Kite <i>Haliastur indus</i>	r	C (100%)	fz, mz, sz, cz	
Black Kite <i>Milvus migrans</i>	r	C (76%)	fz, mz, sz, cz	
Japanese (Eastern) Buzzard <i>Buteo japonicus</i>	w	R (19%)	mz, cz	
Common Hoopoe <i>Upupa epops</i>	r	C (76%)	fz, mz, cz	
Asian Green Bee-eater <i>Merops orientalis</i>	r	C (82%)	fz, mz, sz	
Chestnut-headed Bee-eater <i>Merops leschenaulti</i>	r	O (33%)	fz, mz	
Blue-tailed Bee-eater <i>Merops philippinus</i>	r	C (76%)	fz, mz, sz	
Indian Roller <i>Coracias benghalensis</i>	r	O (27%)	fz, mz	
Dollarbird <i>Eurystomus orientalis</i>	r	S	fz	Khan 2005
Blue-eared Kingfisher <i>Alcedo meninting</i>	r	O (39%)	fz, mz	
Common Kingfisher <i>Alcedo atthis</i>	r	C (100%)	fz, mz, sz	
Pied Kingfisher <i>Ceryle rudis</i>	r	R (12%)	fz, mz	Northern fringes; near villages
Brown-winged Kingfisher <i>Pelargopsis amauroptera</i> (NT)	r	C (94%)	fz, mz, sz	
Ruddy Kingfisher <i>Halcyon coromanda</i>	r	U (67%)	fz, mz, sz	
White-breasted Kingfisher <i>Halcyon smyrnensis</i>	r	C (97%)	fz, mz, sz	
Black-capped Kingfisher <i>Halcyon pileata</i>	w	C (100%)	fz, mz, sz	
Collared Kingfisher <i>Todiramphus chloris</i>	r	C (100%)	fz, mz, sz	
Coppersmith Barbet <i>Psilopogon haemacephalus</i>	r	R (18%)	fz, mz	Northern fringes; near villages
Lineated Barbet <i>Psilopogon lineatus</i>	r	C (76%)	fz, mz	
Blue-throated Barbet <i>Psilopogon asiaticus</i>	r	R (24%)	fz, mz	
Eurasian Wryneck <i>Jynx torquilla</i>	w	U (50%)	fz, mz, sz	
Speckled Piculet <i>Picumnus innominatus</i>	r	O (39%)	fz, mz, sz	
Greater Flameback <i>Chrysocolaptes guttacristatus</i>	r	C (79%)	fz, mz, sz	
Common Flameback <i>Dinopium javanense</i>	r	U (52%)	fz, mz, sz	
Black-rumped Flameback <i>Dinopium benghalense</i>	r	C (76%)	fz, mz, sz	
Rufous Woodpecker <i>Micropternus brachyurus</i>	r	U (58%)	fz, mz, sz	
Greater Yellownappe <i>Chrysophlegma flavinucha</i>	r	U (52%)	fz, mz, sz	
Lesser Yellownappe <i>Picus chlorolophus</i>	r	O (45%)	fz, mz, sz	
Streak-breasted Woodpecker <i>Picus viridanus</i>	r	U (67%)	fz, mz, sz	
Black-naped Woodpecker <i>Picus guerini</i>	r	U (52%)	fz, mz, sz	
Grey-capped Pygmy Woodpecker <i>Picoides canicapillus</i>	r	O (45%)	fz, mz, sz	
Fulvous-breasted Woodpecker <i>Dendrocopos macei</i>	r	C (76%)	fz, mz, sz	

Species	National status	Relative abundance (%)	Ecological zones	Remarks
Common Kestrel <i>Falco tinnunculus</i>	w	O (44%)	fz, mz, sz	
Amur Falcon <i>Falco amurensis</i>	p	R (19%)	mz	
Eurasian Hobby <i>Falco subbuteo</i>	w	S	mz	T. Hasan, pers. comm.
Peregrine Falcon <i>Falco peregrinus</i>	w	C (88%)	fz, mz, sz, cz	
Blossom-headed Parakeet <i>Psittacula roseata</i> (NT)	r	O (33%)	fz, mz	Mostly northern fringes
Rose-ringed Parakeet <i>Psittacula krameri</i>	r	O (42%)	fz, mz	
Indian Pitta <i>Pitta brachyura</i>	s	S	mz	Khan 2005
Mangrove Pitta <i>Pitta megarhyncha</i> (NT)	r	C (82%)	fz, mz, sz	Usually heard
Black-hooded Oriole <i>Oriolus xanthornus</i>	r	C (85%)	fz, mz, sz	
Indian Golden Oriole <i>Oriolus kundoo</i>	w	R (6%)	mz	
Black-naped Oriole <i>Oriolus chinensis</i>	r	O (27%)	fz, mz	
Mangrove Whistler <i>Pachycephala cinerea</i>	r	R (24%)	fz, mz, sz	
Small Minivet <i>Pericrocotus cinnamomeus</i>	r	C (85%)	fz, mz, sz	
Scarlet Minivet <i>Pericrocotus flammeus</i>	r	U (70%)	fz, mz, sz	
Indian (Large) Cuckoo-shrike <i>Coracina macei</i>	r	C (76%)	fz, mz, sz	
Black-winged Cuckoo-shrike <i>Lalage melaschistos</i>	w	S	fz	Khan 2005
Black-headed Cuckoo-shrike <i>Lalage melanoptera</i>	r	U (61%)	fz, mz, sz	
Ashy Woodswallow <i>Artamus fuscus</i>	r	C (76%)	fz, mz, sz	
Bar-winged Flycatcher-shrike <i>Hemipus picatus</i>	r	U (58%)	fz, mz, sz	
Common Iora <i>Aegithina tiphia</i>	r	C (100%)	fz, mz, sz	
White-throated Fantail <i>Rhipidura albicollis</i>	r	C (82%)	fz, mz, sz	
Black Drongo <i>Dicrurus macrocercus</i>	r	C (100%)	fz, mz, sz	
Ashy Drongo <i>Dicrurus leucophaeus</i>	w	R (6%)	fz, mz	
Bronzed Drongo <i>Dicrurus aeneus</i>	r	C (76%)	fz, mz, sz	
Lesser Racquet-tailed Drongo <i>Dicrurus remifer</i>	w	S	fz	Khan 2005
Hair-crested Drongo <i>Dicrurus hottentotus</i>	r	O (27%)	fz, mz	
Greater Racquet-tailed Drongo <i>Dicrurus paradiseus</i>	r	C (76%)	fz, mz, sz	
Black-naped Monarch <i>Hypothymis azurea</i>	r	C (82%)	fz, mz, sz	
Indian Paradise-flycatcher <i>Terpsiphone paradisi</i>	s	R (15%)	fz, mz	
Brown Shrike <i>Lanius cristatus</i>	w	C (88%)	fz, mz, sz	
Long-tailed Shrike <i>Lanius schach</i>	r	C (76%)	fz, mz	
Grey-backed Shrike <i>Lanius tephronotus</i>	w	R (19%)	fz, mz	
Rufous Treepie <i>Dendrocitta vagabunda</i>	r	C (100%)	fz, mz, sz	
House Crow <i>Corvus splendens</i>	r	C (76%)	fz, mz, sz	
Large-billed Crow <i>Corvus macrorhynchos</i>	r	C (79%)	fz, mz, sz	
Great Tit <i>Parus major</i>	r	C (97%)	fz, mz, sz	
Bengal Bushlark <i>Mirafra assamica</i>	r	O (33%)	fz	
Eastern (Greater) Short-toed Lark <i>Calandrella dukhunensis</i>	w	R (6%)	mz	
Oriental Skylark <i>Alauda gulgula</i>	r	R (24%)	fz	Northern fringes; grasslands
Zitting Cisticola <i>Cisticola juncidis</i>	r	O (36%)	fz	Northern fringes; grasslands
Yellow-bellied Prinia <i>Prinia flaviventris</i>	r	O (27%)	fz, mz	
Plain Prinia <i>Prinia inornate</i>	r	O (39%)	fz, mz	
Common Tailorbird <i>Orthotomus sutorius</i>	r	C (100%)	fz, mz, sz	
Thick-billed Warbler <i>Arundinax aedon</i>	w	O (44%)	fz, mz, sz	
Black-browed Reed-warbler <i>Acrocephalus bistrigiceps</i>	w	R (6%)	fz	
Blyth's Reed-warbler <i>Acrocephalus dumetorum</i>	w	C (75%)	fz, mz, sz	
Clamorous Reed-warbler <i>Acrocephalus stentoreus</i>	w	U (69%)	fz, mz, sz	
Pallas's Grasshopper-warbler <i>Locustella certhiola</i>	w	R (6%)	mz	
Spotted Grasshopper-warbler <i>Locustella thoracica</i>	w	R (6%)	fz	
Streak-throated Swallow <i>Petrochelidon fluvicola</i>	r	S	fz	Thompson <i>et al.</i> 1993
Red-rumped Swallow <i>Hirundo daurica</i>	w	R (19%)	fz, mz	
Barn Swallow <i>Hirundo rustica</i>	w	C (100%)	fz, mz, sz, cz	
Collared Sand Martin <i>Riparia riparia</i>	w	O (38%)	fz, mz	
Red-whiskered Bulbul <i>Pycnonotus jocosus</i>	r	U (61%)	fz, mz, sz	
Red-vented Bulbul <i>Pycnonotus cafer</i>	r	C (100%)	fz, mz, sz	
Yellow-browed Warbler <i>Phylloscopus inornatus</i>	w	C (81%)	fz, mz, sz	
Dusky Warbler <i>Phylloscopus fuscatus</i>	w	C (100%)	fz, mz, sz	
Siberian Chiffchaff <i>Phylloscopus tristis</i>	w	O (25%)	fz, mz, sz	
Tickell's Leaf-warbler <i>Phylloscopus affinis</i>	w	U (69%)	fz, mz, sz	
Greenish Warbler <i>Phylloscopus trochiloides</i>	w	C (75%)	fz, mz, sz	
Large-billed Leaf-warbler <i>Phylloscopus magnirostris</i>	p	O (38%)	fz, mz	
Blyth's Leaf-warbler <i>Phylloscopus reguloides</i>	w	C (81%)	fz, mz, sz	

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Yellow-eyed Babbler <i>Chrysomma sinense</i>	r	S	fz	Khan 2005
Oriental White-eye <i>Zosterops palpebrosus</i>	r	C (88%)	fz, mz, sz	
White-browed Scimitar-babbler <i>Pomatorhinus schisticeps</i>	r	O (33%)	fz, mz, sz	
Chestnut-capped Babbler <i>Timalia pileata</i>	r	R (6%)	sz	
Pin-striped Tit-babbler <i>Mixornis gularis</i>	r	C (91%)	fz, mz, sz	
Abbott's Babbler <i>Malacocincla abbotti</i>	r	C (94%)	fz, mz, sz	
Striated Babbler <i>Argya earlei</i>	r	U (52%)	fz, mz, sz	
Jungle Babbler <i>Turdoides striata</i>	r	R (9%)	fz, mz	
Indian Nuthatch <i>Sitta castanea</i>	r	S	sz	Thompson & Johnson 2003
Velvet-fronted Nuthatch <i>Sitta frontalis</i>	r	C (76%)	fz, mz, sz	
Rosy Starling <i>Pastor roseus</i>	w	R (6%)	fz	
Purple-backed Starling <i>Agropsar sturninus</i>	v	S	fz	Thompson <i>et al.</i> 2014
Asian Pied Starling <i>Gracupica contra</i>	r	C (97%)	fz, mz, sz	
Chestnut-tailed Starling <i>Sturnia malabarica</i>	r	C (100%)	fz, mz, sz	
Common Myna <i>Acridotheres tristis</i>	r	U (70%)	fz, mz, sz	
Jungle Myna <i>Acridotheres fuscus</i>	r	C (97%)	fz, mz, sz	
Scaly Thrush <i>Zoothera dauma</i>	w	R (6%)	mz	
Orange-headed Thrush <i>Geokichla citrina</i>	r	R (9%)	mz	
Black-breasted Thrush <i>Turdus dissimilis</i>	w	S	mz	Siddiqui <i>et al.</i> 2008
Tickell's Thrush <i>Turdus unicolor</i>	w	S	mz	I. Babu, pers. comm.
Oriental Magpie-robin <i>Copsychus saularis</i>	r	C (97%)	fz, mz, sz	
Dark-sided Flycatcher <i>Muscicapa sibirica</i>	w	R (13%)	mz	
Asian Brown Flycatcher <i>Muscicapa dauurica</i>	p	R (6%)	mz	
Brown-breasted Flycatcher <i>Muscicapa muttui</i>	p	R (6%)	mz	
Verditer Flycatcher <i>Eumyias thalassinus</i>	w	U (69%)	fz, mz, sz	
Pale-chinned Flycatcher <i>Cyornis poliogenys</i>	r	R (12%)	fz, mz	
Blue-throated Blue-flycatcher <i>Cyornis rubeculoides</i>	w	O (31%)	fz, mz	
Indian Blue Robin <i>Larvivora brunnea</i>	p	S	mz	S. Rushdee, pers. comm.
Firethroat <i>Calliope pectardens</i> (NT)	w	S	mz	Thompson <i>et al.</i> 2014
Siberian Rubythroat <i>Calliope calliope</i>	w	O (31%)	fz, mz	
White-tailed Blue Robin <i>Miyomela leucura</i>	r	S	mz	M. M. Feeroz, pers. comm.
Taiga Flycatcher <i>Ficedula albicilla</i>	w	C (81%)	fz, mz, sz	
Black Redstart <i>Phoenicurus ochruros</i>	w	R (13%)	mz	
Blue Rock-thrush <i>Monticola solitarius</i>	w	O (31%)	fz, mz, sz	
Common Stonechat <i>Saxicola torquatus</i>	w	O (25%)	fz, mz	
Golden-fronted Leafbird <i>Chloropsis aurifrons</i>	r	C (79%)	fz, mz, sz	
Orange-bellied Flowerpecker <i>Dicaeum trigonostigma</i>	r	O (39%)	fz, mz	
Pale-billed Flowerpecker <i>Dicaeum erythrorhynchos</i>	r	R (21%)	fz, mz	
Scarlet-backed Flowerpecker <i>Dicaeum cruentatum</i>	r	U (52%)	fz, mz, sz	
Ruby-cheeked Sunbird <i>Chalcoparia singalensis</i>	r	U (61%)	fz, mz, sz	
Purple-rumped Sunbird <i>Leptocoma zeylonica</i>	r	R (24%)	fz, mz	
Purple Sunbird <i>Cinnyris asiatica</i>	r	C (94%)	fz, mz, sz	
Crimson Sunbird <i>Aethopyga siparaja</i>	r	C (76%)	fz, mz, sz	
Baya Weaver <i>Ploceus philippinus</i>	r	U (73%)	fz, mz, sz	
White-rumped Munia <i>Lonchura striata</i>	r	O (27%)	fz, mz	Northern fringes
Scaly-breasted Munia <i>Lonchura punctulata</i>	r	O (30%)	fz, mz	
House Sparrow <i>Passer domesticus</i>	r	O (42%)	fz, mz, sz	Northern fringes; forest outposts
Forest Wagtail <i>Dendronanthus indicus</i>	p	O (31%)	fz, mz, sz	
Olive-backed Pipit <i>Anthus hodgsoni</i>	w	U (50%)	fz, mz	
Richard's Pipit <i>Anthus richardi</i>	w	R (19%)	fz, mz	Northern fringes; grasslands
Paddyfield Pipit <i>Anthus rufulus</i>	r	O (30%)	fz, mz, sz	Northern fringes; grasslands
Western Yellow Wagtail <i>Motacilla flava</i>	w	U (69%)	fz, mz, sz, cz	
Grey Wagtail <i>Motacilla cinerea</i>	w	R (13%)	fz, mz	
Citrine Wagtail <i>Motacilla citreola</i>	w	U (63%)	fz, mz, sz, cz	
White Wagtail <i>Motacilla alba</i>	w	C (75%)	fz, mz, sz, cz	
Common Rosefinch <i>Carpodacus erythrinus</i>	w	R (6%)	fz	
Black-headed Bunting <i>Emberiza melanocephala</i>	w	R (6%)	fz	Chowdhury 2011
Grey-necked Bunting <i>Emberiza buchanani</i>	w	S	fz, mz	Thompson <i>et al.</i> 2014
Little Bunting <i>Emberiza pusilla</i>	w	S	fz	Thompson <i>et al.</i> 1993