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Journal of Threatened Taxa

Building evidence for conservation globally

www.threatenedtaxa.org

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

NOTE

HIGH ALTITUDE WETLAND MIGRATORY BIRDS IN THE SIKKIM HIMALAYA: A FUTURE CONSERVATION PERSPECTIVE

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26 February 2021 | Vol. 13 | No. 2 | Pages: 17832–17836

DOI: [10.11609/jott.5610.13.2.17832-17836](https://doi.org/10.11609/jott.5610.13.2.17832-17836)



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High altitude wetland migratory birds in the Sikkim Himalaya: a future conservation perspective

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The Trans-Himalaya contain the most glaciated terrain outside of the polar regions (Owen 2017), and they generate and recharge high altitude wetlands (HAWs) via melting. HAWs are typically situated above 3,000m, between the tree line and permanent snow line (Khan & Baig 2017). Sikkim Himalaya wetlands play a vital role for migratory birds by providing breeding and winter grounds (Chandan et al. 2008; Ganguli-Lachungpa et al. 2011). Many migratory birds are attracted to the HAWs of the state, based on the compilation report of the Sikkim Forest Department over the past two decades, observed in the high altitude wetlands in northern and eastern Sikkim (Ganguli-Lachungpa et al. 2011). It is reported that Ruddy Shelduck *Tadorna ferruginea* (Pallas, 1764) visits high altitude lakes and marshes of the Sikkim Himalaya for breeding (Ganguli-Lachungpa 1990a, 1992). Many wetland migratory birds are reported from Sikkim Himalaya, viz.: Osprey *Pandion haliaetus* (Linnaeus, 1758), Little Grebe *Podiceps ruficollis* (Pallas, 1764), Common Coot *Fulica atra* (Linnaeus, 1758), Bar-headed Goose *Anser indicus* (Latham, 1790),

Northern Pintail *Anas acuta* (Linnaeus, 1758), Mallard *Anas platyrhynchos* (Linnaeus, 1758), Baer's Pochard *Aythya baeri* (Radde, 1863), Tufted Duck *Aythya ferina* (Linnaeus, 1758) (Ganguli-Lachungpa 1990a,b, 1994; 1998; 2003; Chhetri et al. 2005); Pallas's Gull *Larus ichthyaetus* (Pallas, 1773) (Sharma & Bhat 2016), Common Pochard *Aythya ferina* (Linnaeus, 1758), Great Cormorant *Phalacrocorax carbo* (Linnaeus, 1758); Goosander *Mergus merganser* (Linnaeus, 1758), and Black-necked Grebe *Podiceps nigricollis* (Brehm, 1831) (Acharya & Vijayan 2011; Ganguli-Lachungpa 1990a; 1992). For better preservation and conservation of HAW areas, an initiative has been started by the Sikkim Forest Department, in collaboration with local NGOs with the formation of a Pokhari Sanrakshan Samiti (PSS) on 24 May 2017. The three potential Ramsar sites have been proposed in the Sikkim Himalaya, the detailed information sheets (RIS: 2009–2012 version) have been submitted to the Ministry of Environment, Forest and Climate Change, India in 2011. The names of the proposed Ramsar sites are; Khecheopalri-

Editor: Hem Sagar Baral, Charles Sturt University, Albury, Australia.

Date of publication: 26 February 2021 (online & print)

Citation: Chhetri, P.K., K. Gurung, T.N. Lepcha & B. Chhetri (2021). High altitude wetland migratory birds in the Sikkim Himalaya: a future conservation perspective. *Journal of Threatened Taxa* 13(2): 17832–17836. <https://doi.org/10.11609/jott.5610.13.2.17832-17836>

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Funding: Self Funded.

Competing interests: The authors declare no competing interests.

Acknowledgements: We are grateful to the Forest Environment and Wildlife Department, Govt. of Sikkim and Barapathing Rage (T) for the support during the field study. Lastly, field suggestion and encouragement by Dr. H.K. Badola, Dr. B.K. Acharya, and friends will be highly appreciated.

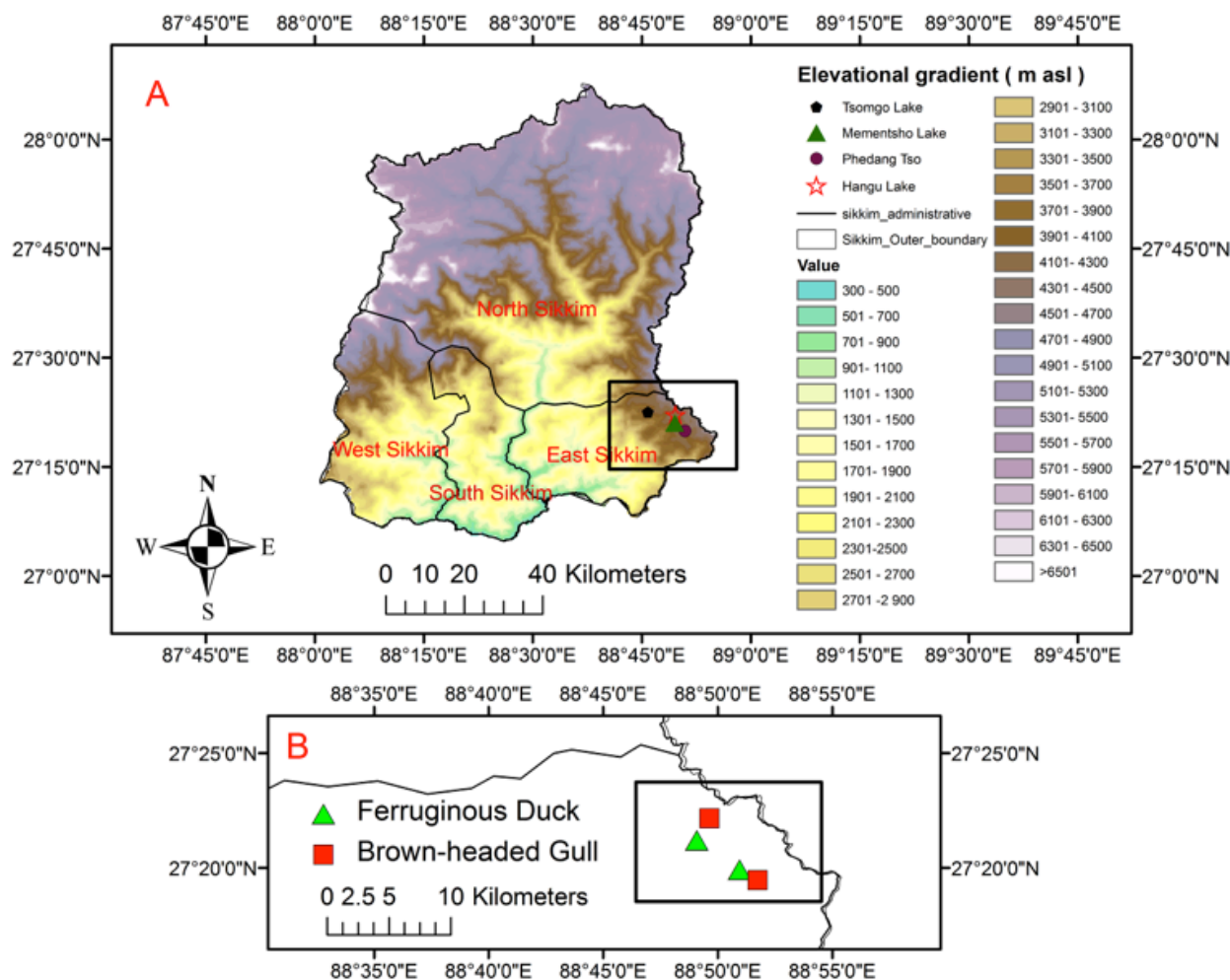


Figure 1. A—digital elevation model of the study area at the high altitude wetlands in the Sikkim Himalaya | B—point location of the first records of the Brown-headed Gull and Ferruginous Duck at the Hangu Lake and Phedang Tso in the Sikkim Himalaya.

Khangchendzonga-Lonak Complex, Tsomgo-Phedang Tso Complex, and Tso Lhamo plateau-Lashar-Yumesamdong-Tembao Complex (See Forest Environment and Wildlife Management Department 2015). Further, the detailed agenda regarding the high altitude Ramsar sites of the Sikkim Himalaya precisely discussed (see O'Neill 2019). The record of new species such as Ferruginous Duck *Aythya nyroca* (Near Threatened) and Brown-headed Gull *Chroicocephalus brunnicephalus* (Least Concern) indicates a potential habitat for wetland migratory birds in the Sikkim Himalaya. Therefore, immediate intervention is needed for improved conservation and habitat management for migratory birds in the Sikkim Himalaya through community-based conservation.

Sikkim Himalaya, a total area of 7,096 km², is a part of eastern Hindu-Kush Himalaya contiguous with eastern Himalaya. It lies between geographical coordinates 27.063–28.126 °N & 88.061–88.955 °E. The elevation

varies from 284 to 8,586 m, with a picturesque landscape of Mt. Khangchendzonga (8,586m). The geopolitical area of Sikkim is surrounded by Nepal (west), Tibet (north), Bhutan (east), and Tibet (east), and Darjeeling District of West Bengal (south). Sikkim Himalaya has a rich cultural and biological diversity. The surveys were conducted from December 2017 to April 2018 to assess the species richness of the high altitude wetland migratory birds in the Sikkim Himalaya. The four high altitude wetlands (lakes) were selected from East Sikkim as a case study—Tsomgo (approx. 24.47ha in area, 3,753m), Hangu (approx. 58ha, 4,237m), Mementsho (approx. 42ha, 3,810m), and Phedang Tso (approx. 45ha, 4,600m) (Figure 1). A 2-km line transect was laid down on both sides of the lakes to study the high altitude wetland migratory birds. The individuals of the species with the latitudes, longitudes, and altitudes were recorded within the transects. We used latitudes

and longitudes of the species for developing a digital elevation model of the study area (Figure 1). A line-transect sampling is a strategy commonly used to assess richness and abundance of large diurnal vertebrates in forests (de Thoisy et al. 2008). For the study, the permission obtained from the Forests, Environment and Wildlife Management Department, Government of Sikkim (Permit no. Home/Confid/149/2017/3414).

Total of 15 wetland migratory bird species were recorded from the study area. Out of the 15 species, two species—Brown-headed Gull and Ferruginous Duck—were recorded from the Kyongnosla Alpine Sanctuary (27.332N, 28.827E, 4,000m) of the Sikkim Himalaya (Image 1 & 2). The Ruddy Shelduck was found breeding in Sikkim HAWs. The species recorded belonged to five bird families, 10 species encountered under Anatidae family followed by Podicipedidae (two species), and rest of the families having single species each. The species richness of the migratory birds in Phedang Tso or Elephant Lake (14 species) followed by Hangu Lake (12 species), Tsomgo Lake (seven species), and Mementsho Lake (two species). Ruddy Shelduck was recorded from the highest elevation in the study area followed by Northern Pintail, Tufted Duck, Great Crested Grebe *Podiceps cristatus*, and so on (Table 1).

Many migratory birds have been recorded from the Sikkim Himalaya indicating that the Sikkim HAWs offer potential suitable breeding and winter grounds. Brown-headed Gull and Ferruginous Duck first reported from the high altitude wetlands is a new record to the state. The Brown-headed and Ferruginous Duck have been reported from other parts of India (Mishra & Humbert-Droz 1998; Mukherjee et al. 2002; Choudhury 2010). Maximum species richness of migratory birds was observed in Phedang Tso (Elephant Lake) in the study area. The area is out of anthropogenic pressure (like tourism activity) and falls under the restricted defence area and healthy undergrowth vegetation as compared to the other sites. The other lakes, Tsomgo (approx. 24.47ha, 3,753m), Mementsho (approx. 42ha, 3,810m) and Hangu (approx. 58ha, 4,237m) are under the disturbance of tourism. Compared to other states of India, having a small geographical area, the Sikkim Himalaya offers a hub for avian species; over 550 birds recorded from the landscape (Ali 1962; Acharya & Vijayan 2011) including migratory birds (Ganguli-Lachungpa et al. 2011). It is paramount to identify wetlands in the Tibetan Plateau of the Central Asian Flyway to conserve migratory birds because the birds need to refuel at these points to cross the Himalaya (Namgail 2017). The HAWs (lakes) of the Sikkim Himalaya, however, considered as



Image 1. Photographic record of Ferruginous Duck in the HAWs of the Sikkim Himalaya.



Image 2. Photographic record of Brown-headed Gulls in the HAWs of the Sikkim Himalaya.

sacred sites, makes their conservation the top priority (Chandan et al. 2008). Hitherto, Sikkim HAWs are under pressure of increasing tourism activities (Mazumdar et al. 2011). Worldwide, most of the migratory birds threatened by wetland habitat loss on its breeding and winter grounds (Ali & Ripley 1983; Scott & Rose 1996; Clements 2007; Grimmett et al. 2008). Appreciating the importance of globally threatened birds found in the Eastern Himalaya, 11 Important Birds Area or IBAs across the Sikkim Himalaya have been recognized by the government of Sikkim in 2003 for the conservation initiative (Ganguli-Lachungpa et al. 2011). Such actions will help to conserve the high altitude wetlands of Sikkim Himalaya and migrating birds as well.

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Table 1. Species richness of migratory waterfowl in the respective high altitude wetlands of the Sikkim Himalaya. ('+'—present | '—'—absent)

	Family	Common name	Scientific name	Phedang Tso (Elephant lake)	Mementsho Lake	Hangu Lake	Tsomo Lake	IUCN RL status	Estimated extent of occurrence (EOO) (km ²) based on IUCN, 2018	Population trend based on IUCN, 2018	Abundance (no. of individuals in the lakes)
1	Anatidae	Ruddy Shelduck	<i>Tadorna ferruginea</i> Pallas	+	+	+	+	LC	37900000	Unknown	100
2	Anatidae	Goosander	<i>Mergus merganser</i> Linnaeus	+	—	—	+	LC	77900000	Increasing	4
3	Rallidae	Common Coot	<i>Fulica atra</i> Linnaeus	+	—	—	—	LC	137000000	Increasing	1
4	Anatidae	Mallard	<i>Anas platyrhynchos</i> Linnaeus	+	—	+	—	LC	127000000	Increasing	6
5	Anatidae	Eurasian Wigeon	<i>Mareca penelope</i> Linnaeus	+	—	+	+	LC	34900000	Decreasing	12
6	Anatidae	Tufted Duck	<i>Aythya fuligula</i> Linnaeus	+	—	+	+	LC	34900000	Stable	50
7	Anatidae	Common Teal	<i>Anas crecca</i> Linnaeus	+	—	+	+	LC	81700000	Unknown	20
8	Phalacrocoracidae	Great Cormorant	<i>Phalacrocorax carbo</i> Linnaeus	+	+	+	+	LC	323,000,000	Increasing	6
9	Anatidae	Northern Pintail	<i>Anas acuta</i> Linnaeus	+	—	+	+	LC	69100000	Decreasing	12
10	Podicipedidae	Black-necked Grebe	<i>Podiceps nigricollis</i> Brehm	—	—	+	—	LC	155000000	Unknown	1
11	Podicipedidae	Great Crested Grebe	<i>Podiceps cristatus</i> Linnaeus	+	—	+	+	LC	152000000	Unknown	20
12	Anatidae	Bar-headed Goose	<i>Anser indicus</i> Latham	+	—	—	—	LC	5260000	Decreasing	2
13	Anatidae	Gadwall	<i>Mareca strepera</i> Linnaeus	+	—	—	—	LC	73100000	Increasing	7
14	Anatidae	Ferruginous Duck	<i>Aythya nyroca</i> Goldenstädt	+	—	+	—	NT	25900000	Decreasing	3
15	Laridae	Brown-headed Gull	<i>Chroicocephalus brunnicephalus</i> Jerdon	+	—	+	—	LC	851000	Stable	35

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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

February 2021 | Vol. 13 | No. 2 | Pages: 17611–17846

Date of Publication: 26 February 2021 (Online & Print)

DOI: 10.11609/jott.2021.13.2.17611-17846

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