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Distribution of Asian Woolly-necked Stork *Ciconia episcopus* in Majuli Island of Assam with observations on its nesting behavior

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Abstract:

Study on the Asian Woolly-necked Stork *Ciconia episcopus* in Majuli Island of Assam, India. Majuli Island is one of the largest river islands of the world. It is an IBA and BHS. There is no prior study on the species in Majuli and very little study is done in northeast India. We also tried to focus on its distribution across the island and tried to put some light on its nesting behavior. Proper long term study can be carried out on its ecology and behavior.

Keywords: Nest, Stork, River, Island, Habitat

Introducion

The Majuli Island of Brahmaputra River with an area of about is one of the largest river islands of the world situated in Assam, India. It is an Important Bird Area (IBA) and a Biodiversity Heritage Site (BHS) (BirdLife International 2022; Assam State Biodiversity Board 2019). Asian Woolly-necked Stork *Ciconia episcopus,* belonging to the Ciconiidae family is a stork species having a glossy black plumage with soft white neck feathers (del Hoyo et. al. 2020). The taxonomy of Woolly-necked Stork is a topic of debate and remains unresolved. Some authorities considers it as one species (*C. episcopus*) with three subspecies (*C. e. episcopus, C. e. microscelis* and *C. e. neglecta*). While others consider it as two separate species: the African Woolly-necked Stork (*C. microscelis*) and the Asian Woolly-necked Stork (*C. episcopus*). *C. e. episcopus and C. e. neglecta* are considered as subspecies of Asian Woolly-necked Stork (Sundar 2020 and del Hoyo et. al. 2020). Due to considerable decline of its population in its distribution range, the status of Asian Woolly-necked Stork is Near Threatened. The overall population size of the species is considered to be in between 50,000-249,999 mature individuals. The Asian Woolly-necked Stork is distributed across South Asia and South East Asia and vagrant to Iran and China (BirdLife International 2022 and del Hoyo et. al. 2020).

The preferable habitats of Asian Woolly-necked Stork are savanna, grassland, wetlands, rivers, lakes, floodplains, paddy fields, lagoons etc. It is also found in light woodland and forest clearings near rivers. The species is mostly carnivorous and includes mostly of fish, amphibians, insects, crabs, reptiles, molluscs, marine invertebrates, etc (BirdLife International 2022 and del Hoyo et. al. 2020).

In India, the Asian Woolly-necked Stork breeds during the rains between Jul and Sept in South and Dec to Mar in North. The solitary nest is built 10-30m above ground which is a large stick platform in trees with central depression lined with grass and rubbish. It is observed in Maharashtra, India and Bangladesh that it nests on towers. The clutch size is between 2 to 4 eggs; incubation 30 to 31 days; and fledging comes out in 55 to 65 days (BirdLife International 2022; Hasan, & Ghimire 2020 and del Hoyo et. al. 2020).

Objectives

1. Study of the distribution of the Asian Woolly-necked Stork *Ciconia episcopus* in Majuli.
2. Study of the nesting behavior of the Asian Woolly-necked Stork *Ciconia episcopus.*

Methodology

1. **Study site:** The Majuli Island is located between 26° 45' N - 27° 12' N Latitude and 93° 39' E – 94° 35' E Longitude with an altitude of about 84.5m above mean sea level. The total area of Majuli was about 484.34 sq. km. in 2008, and erosion is the main cause for its decrease (Dutta et al 2010, Saikia et al 2020). The island is formed by the Brahmaputra River in the south, the Kherkatia Xuti and joined by the Subansiri River in the north (Bhagabati and Lahkar 1998). Majuli receives an annual rainfall of about 2100 mm and temperature ranges from 7°C to 37°C (Saikia et al 2020).

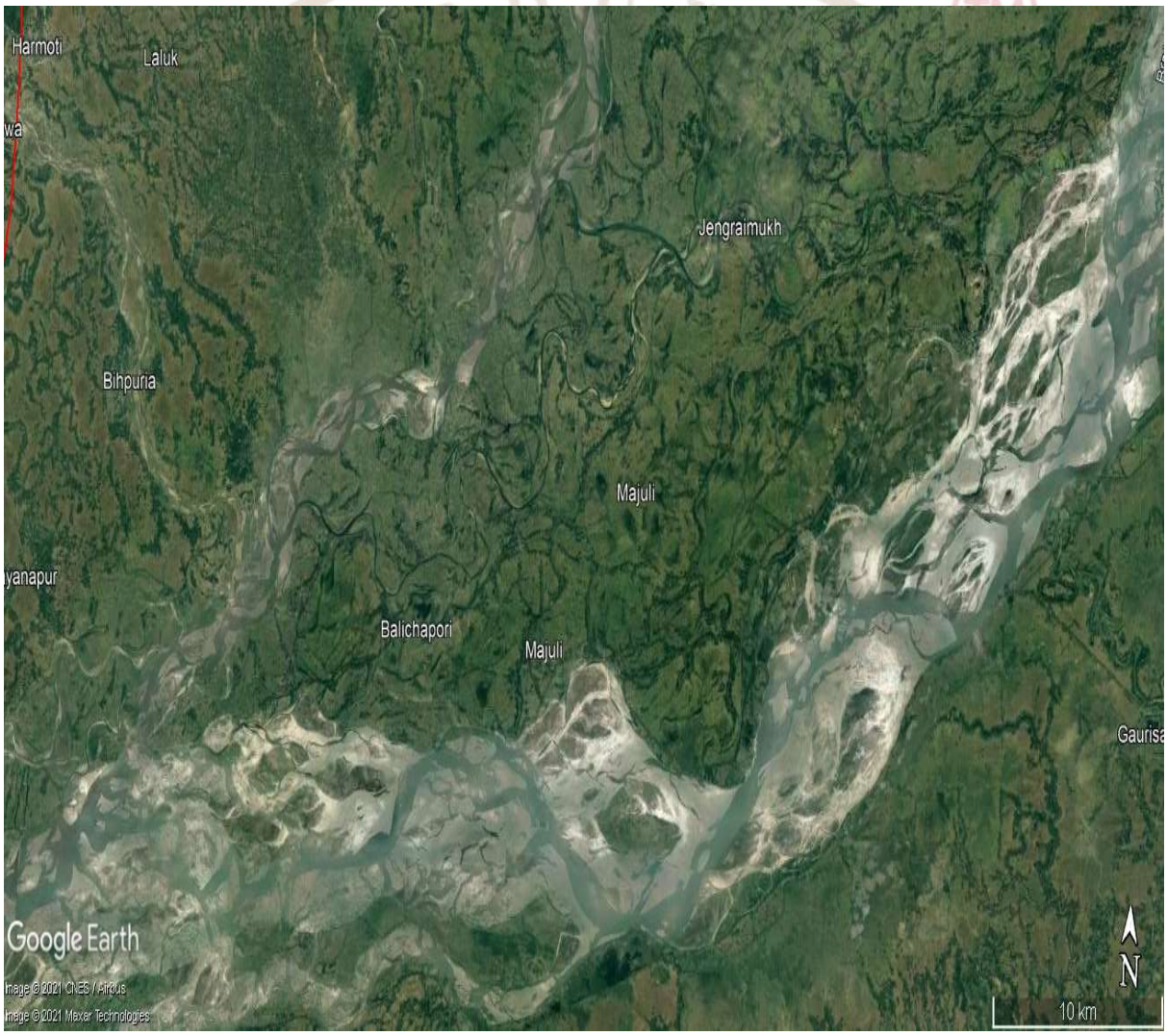

Fig 1: Geographical location of Majuli

2. **Material and Methods:** The survey was conducted randomly from 2019 to 2021. Direct observations using an 8x40 binocular was done in wetlands, paddyfields, grasslands, etc. Walking in transects through the habitats while observing bird behavior and direct search for nests in large trees, towers, and other potential substrates was done. Opportunistic observations were also taken into count. A camera was used to take pictures of the birds and their nests. Secondary data was collected by interviewing the local people.

Observations

During the survey we found Asian Woolly-necked Stork in 14 different sites in Majuli Island. Among them there are 4 sites where we found nests. Mostly the storks were seen in the paddyfield and wetlands foraging. They prefer paddyfields near wetlands for foraging. After the flood they are seen in the paddyfields looking for molluscs and amphibians. We encountered them either in small flocks or singly. During winter they are seen in mixed flock with Black Stork *Ciconia nigra* (a migratory stork seen in Majuli during winter) in the ponds of chapori (Sandbars).

Sl. No.	Location	Latitude	Longitude	Date	Behavior	Habitat	Flock Size
1	Kamalabari	26.94534	94.14611	10/1/2019	Foraging	Paddyfield	1
2	Salmora	26.95965	94.30362	06/04/2019	Roosting	Woodland	5
3	Salmora	26.95965	94.30362	19/06/2019	Nesting	Woodland	2
4	Jugunidhari	26.9262	94.12558	8/5/2020	Flying	Shrubland	1
5	Madhya Majuli	26.97724	94.20054	13/07/2020	Nesting	Roadside	2
6	Alimur	26.93174	94.11672	5/08/2020	Nesting	Roadside	3
7	Block Tiniali	26.94632	94.17242	10/08/2020	Nesting	Roadside	2
8	Jugunidhari	26.9262	94.12558	2/10/2020	Foraging	Shrubland	2
9	Madhya Majuli	26.97724	94.20054	15/12/2020	Roosting	Roadside	2
10	Vereki beel	26.92979	94.13953	16/1/2021	Foraging	Wetland	2
11	Kamalabari	26.94605	94.16027	14/1/2021	Flying	Paddyfield	1
12	Kamalabari	26.94605	94.16027	17/1/2021	Foraging	Paddyfield	2
13	Madhya Majuli	26.9762	94.19951	18/1/2021	Foraging	Roadside	2
14	Sakuli Beel	26.94534	94.14611	20/1/2021	Foraging	Wetland	1
15	Mohkhuti Jaan	26.98155	94.19931	21/1/2021	Flying	Pond	3
16	Ghutahula	26.92981	94.2533	7/2/2021	Foraging	Wetland	1
17	Mohkhuti Jaan	26.98155	94.19931	14/1/2021	Foraging	Pond	2
18	Madhya Majuli	26.9762	94.19951	20/7/2021	Nesting	Roadside	2
19	Bongaon	26.94939	94.29122	4/12/2021	Foraging	Grassland	1
20	Bongaon	26.93036	94.2963	5/12/2021	Foraging	Wetland	2
21	Laholial	26.9404	94.14209	15/12/2021	Roosting	Paddyfield	3
22	Darbar Chapori	26.90465	94.18223	21/12/2021	Foraging	River bank	3

Table 1: Asian Woolly-necked Stork *Ciconia episcopus* sightings (in chronological order) in Majuli Island.

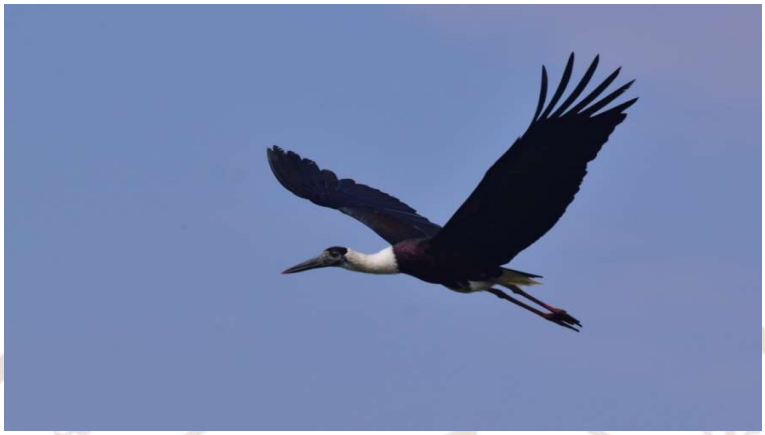

Fig: An adult Asian Woolly-necked Stork *Ciconia episcopus* in Kamalabari

Sl. No.	Location	Latitude	Longitude	Date	Height from Ground	Clutch Size	Incubation period	No. of Fledgling
1	Madhya Majuli	26.97724	94.20054	13/07/2020	25	3	26	2
2	Alimur	26.93174	94.11672	5/08/2020	30	Unknown	About 28	2
3	Block Tiniali	26.94632	94.17242	10/08/2020	25	2	30	1
4	Salmora	26.95965	94.30362	19/06/2019	30	Unknown	About 25	2
5	Madhya Majuli	26.9762	94.19951	20/7/2021	25	4	28	1

Table 2: Asian Woolly-necked Stork *Ciconia episcopus* nest observations

Fig 2: Asian Woolly-necked Stork *Ciconia episcopus* nest in a *Bombax ceiba* tree in Madhya Majuli.

The nests are constructed by both individuals solitarily with sticks, twigs, leafs, etc in *Bombax ceiba* trees between 20 and 30 m above the ground. The nesting begins from late June, till August the fledglings come out of the nest. It has a central depression lined with mostly grass. The female lays 2-4 white eggs. The incubation lasts about 25-30 days, which is done by both parents. At hatching, the chicks are covered in grey down with buff neck. They are fed by regurgitation.

Discussion:

There is a paucity of information on Asian Woolly-necked Stork in northeast India as it is not studied well. It faces several threats from hunting, deforestation, etc. During our survey we observed that the nesting tree in Alimur was cut and the next year we have not seen any Woolly-necked Stork in the area. Most of the nests of Asian Woolly-necked Stork in Majuli are constructed in trees near the roadside and due to several developmental activities these trees are cut down. Proper study, planning and conservation measures are required to conserve these trees, as other species of stork like Asian Openbill *Anastomus oscitans* and Lesser Adjutant *Leptoptilos javanicus* also prefer these trees for nesting. Lack of awareness is another problem that can be reduced by proper Awareness programs. Though uncommon, hunting is practiced in several places of Majuli and is a threat for not only Woollyneck but also for other avian fauna.

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