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Population Expansion Of Vulnerable Stork Species Lesser Adjutant (*Leptoptilos Javanicus*, Horsfield, 1821) In Jharkhand, India

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Abstract: The Stork species are large sized wetland dependent birds belonging to Family Ciconiidae of Order Ciconiiformes. These birds are characterised by long legs, large bill and body but are unable to produce sound except hissing, moaning and clattering at nest. Presently the population of many avian species are on decline mainly due to climate change, habitat destruction, wetlands degradation, change in land use pattern, loss of nesting trees, habitat fragmentation and competition for food, use of pesticides and other anthropogenic activities like poaching. Lesser Adjutants are colonial breeders. Survey of nesting breeding population of Lesser Adjutant was conducted between August 2012 to March 2021 that include nine breeding seasons in Bokaro and neighbouring Districts of Jharkhand state. This survey reveals increasing and expanding population trend of the vulnerable Lesser Adjutant stork species within Bokaro District and neighbouring Districts as well as state like West Bengal. It is evident that habitat and climatic factors of Bokaro and adjoining area is supportive to the Lesser Adjutant storks.

I. KEY WORDS

STORK, WETLAND, HISSING, MOANING, CLATTERING, POPULATION, ANTHROPOGENIC ETC.

II. INTRODUCTION

Country like India is placed among 12 mega biodiversity rich countries of the world. It is due to its diverse habitats ranging from rain forest, desert, grasslands, hilly scrub areas, freshwater ponds, pools, rivers, agricultural fields, western ghat and eastern ghat as well as coastal marine areas. More than 9,000 bird species are found in world (Tabur and Ayaz, 2010; Islam and Rahmani, 2004). Ali and Ripley (1987) had reported about 1200 species of birds from Indian sub-continent. The avifauna of India includes about 1313 species (Grimmett *et al.*, 2011) of which 176 species are endemic to this sub-continent and 78 species are threatened. This constitutes over 13% of the world's birds. Recently Praveen *et al.*, (2016) have reported the occurrence of 1263 species of birds from India. Globally there are 19 species of storks of which 15 are regionally threatened. Nine (9) species of storks are found in India (Ali & Ripley, 1987.). In Jharkhand state 5 species of storks has been observed (Table-1).

Table- 1. Stork Species in Jharkhand

Sl. No	English Name	Scientific Name	Status	IUCN Status
1	Asian Openbill Stork	<i>Anastomus oscitans</i>	R/WDB	LC
2	Painted Stork	<i>Mycteria leucocephala</i>	R/WDB	NT
3	Woolly-necked Stork	<i>Ciconia episcopus</i>	R/WDB	NT
4	Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	R/WDB	NT
5	Lesser Adjutant	<i>Leptoptilos javanicus</i>	R/WDB	VU

Abbreviations: R= Resident, WDB= Wetland Dependent Bird, LC = Least Concern,

NT= Near Threatened, VU= Vulnerable

Among five reported storks, the Asian Openbill storks are commonest and are breeding in large colonies at different locations. Their breeding colony was observed in Argoda(Ranchi) in 2020 (Personnel comm. Sushil Kumar) and near Chandil railway station (M.D.Dwivedi, 2022). One sub-adult Painted Stork was seen by Chandresh Bharat Rathor (Chaibasa) in Kharsawan, September 2019 (Pers.comm.). The breeding site of Black-necked stork and Woolly-necked stork was not observed till date. Arvind Mishra (Mandar Nature Club) Bhagalpur photographed Black-necked stork at Topchanchi Jheel (1989) and also observed two flying birds in Udhwa Lake Bird Sanctuary,

Sahebganj District (28.1.2018) during Bird Survey (Pers. Comm.). Foraging Lesser Adjutant near Getalsud dam, Ranchi was observed by Mr. S. Goswami 2019, (pers. comm.). However, first successful nesting breeding record of Lesser Adjutants was observed near Peterwar in Bokaro District of the Jharkhand State (Dwivedi *et al.*, 2013). During study between 2012 – 2021 the population of Lesser Adjutant from Bokaro District reveals increasing and expanding trend in other neighbouring Districts like Hazaribag, Ranchi, Chatra, Garhwa, Giridih, Dhanbad and Baghmundi area of Ayodhya Hill in Purulia District of West Bengal where breeding was observed (Jibananda Banerjee, March 2021, Pers. Comm.).

The history of ornithological account in Jharkhand can be divided into pre and post independence periods. In pre-independence period credit goes to British officers who collected and studied birds in their working areas. Colonel Tickel made huge collection of birds from Chaibasa, Borabhum and Singhbhum. Mr. E. Blyth (1842) worked on the collection of Tickel from Chaibasa. Capt Beaven collected 121 species of birds in the then Manbhum District. Ball (1874) studied avifauna of Chuti (Chhota) Nagpur Division and reported 294 species of birds. He also reported two Lesser Adjutants from Lohardaga District of western Jharkhand.

In post-independence period, over 400 birds had been reported in Ranchi District gazetteer (Anon 1965). Ara (1966) published 97 bird species from Hazaribag Wildlife Sanctuary. A total of 170 avian species had been enlisted in Management Plan of Palamu Tiger Reserve (Sinha & Mukherjee, 1995). 83 species of birds had been reported from Udhwa Lake Bird Sanctuary (ULBS) in Sahebganj district of Jharkhand (Choudhary *et al.* (1992). Recent study in this lone bird sanctuary of Jharkhand reveals the presence of 107 bird species (Prakash *et al.* 2012). First time avian diversity of Bokaro district was documented by M. D. Dwivedi, under the supervision of Dr. M. Raziuddin (2011-2015, Ph.D. Thesis, V. B. U. Hazaribag, Jharkhand).

III. Geographical statistics

Jharkhand state is known for its mineral deposits and is part of Chhotanagpur Plateau. Its area is 79,714 km² that shares 2.42% of the country area. It lies between 22° 00' N- 24° 37' N Latitude and 83° 15' E- 87° 01' E Longitude. Its climate is Tropical with annual average rain fall of about 900 mm. Temperature varies between 4°C to 47°C. Peninsular dry, moist-mixed deciduous Sal forests are found in Jharkhand.

IV. Wetlands in Jharkhand

There are 2436 identified wetlands in Jharkhand covering 1568.27 sq. km. The small wetlands are 13327 in number. It includes rivers, dams, ponds / tanks in villages. As per the National Wetland Atlas (SAC, ISRO, 2010) the wetland area of Bokaro District is 11222 ha (Fig. 2.4). Reservoir / barrage rank first in terms of aerial extent (5121 ha) that accounts for 46 percent of wetlands in Bokaro District. River / stream is next wetland category that is significant in terms of extent (3899 ha). There are 106 tanks / ponds in this district which comprise about 12 percent of wetland area.

V. Wetland Birds of Jharkhand

About 22 percent of 1200 reported birds from Indian sub-continent are fully dependent on wetlands (BirdLife International, 2007). India has 310 wetland species of birds of which 130 are migrants, 173 residents while status of seven species is unknown (Kumar *et al.* 2006). Recent study on 25 major wetlands of Jharkhand reveals 78 wetland bird species including 11 threatened species (Prakash *et al.* 2015). In Bihar nesting breeding of both Lesser and Greater Adjutants were studied (Choudhary *et al.* 2007, 2008, 2010 ; Mishra *et al.* 2004 and 2010). For the first time nesting breeding of Lesser Adjutant was taken into consideration in Bokaro District of Jharkhand state to collect information and generate database so that conservation plan can be designed for the vulnerable Lesser Adjutant stork.

VI. Nesting breeding of Lesser Adjutant in Bokaro and its expansion in Jharkhand

The Lesser Adjutant *Leptoptilos javanicus* is placed in vulnerable category of the IUCN Red List of Birds (IUCN 2013). Its global population is decreasing rapidly. Earlier estimate of its global population was 5,000 (BirdLife International 2001), but based on extensive surveys it is now estimated between 6,500-8,000 or possibly more (BirdLife International 2013).

In India, it has been reported from many areas (Rahmani 2012), but its largest population is in Assam, West Bengal and Bihar where it is found in fair numbers (BirdLife International 2013; Choudhury 2000). Global range of Lesser Adjutant is across South and Southeast Asia. Presently, supposed to be extinct in China and Singapore (BirdLife International 2001, 2011).

In India, its breeding has been recorded from Assam, West Bengal, Bihar, Odisha, Tamil Nadu and Karnataka (Rahmani 2012). However, the maximum reports of breeding are from Assam (Barua and Sharma 2005).

In Bokaro District of Jharkhand, the nesting site is located 6 km north of Peterwar Block on the left side of National Highway 23 towards Bokaro Steel City. In the month of February 2013, a small breeding colony of Lesser Adjutant (*Leptoptilos javanicus*) was observed on a Banyan/Bargad tree for the first time in Ambadih-Uttasara village of Peterwar block in Bokaro District of Jharkhand (Dwivedi *et al.*, 2013). Three pairs of storks were doing nesting and breeding in three large size platform nest and some others (9) were found on nearby trees and flying. The nesting site was very much close to human habitation. Two nests had two nestlings each and the third one had only one nestling. These nestlings were approximately three months old. The fledglings fledged on 20 February 2013. However, they roost on nesting tree at night.

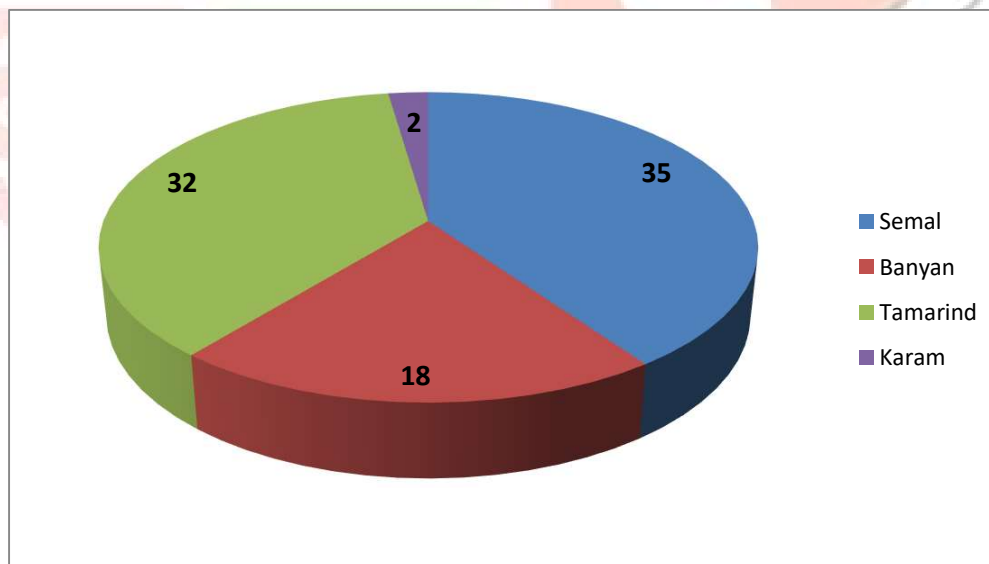
These birds are heavy and their chicks remain in nest for long duration so need bamboo sticks to make nest. At the place of nesting and few hundred metres away from nesting site thick bamboo plantation is present. These birds collect bamboo sticks, twigs from trees to make nest and bring soft leafy twigs of ground nut plants for cushioning of nest. Khajo river running from south to north is about five km from breeding site. A large water body on north side of the nesting site (aerial distance 7-8 km approx.) is Tenughat Dam on Damoder River which fulfil the foraging need of adults and food for nestlings.

The local villagers who call this bird as “Khat-Khat” were interviewed. The resident villagers (Shri Ganga Bhuia, Shri Hublal Mahto) said that in between 1960-1970 these birds were 45-50 in number and mainly nested on Semal tree (*Bombax cieba*) but all of them suddenly left this place. After a long gap in 2011 small group (about 20 individuals) started nesting on Tamarind tree (*Tamarindus indicus*). Since 2012-13 we started collecting data from breeding sites (Table: 2) till March 2021.

Table: 2 Nesting Tree Species

Sl. No	Common Name	Botanical Name	Number of nest	Year
1	Semal	<i>Bombax cieba</i>	35	2012-21
2	Banyan	<i>Ficus benghalensis</i>	18	2012-21
3	Tamarind	<i>Tamarindus indicus</i>	32	2012-21
4	Karam	<i>Adina cordifolia</i>	2	2012-21

Pie chart: Share of Nesting Tree:



VII. Methodology:

Breeding leads to behavioural responses in birds which can be used to count or estimate their numbers. These responses include territory formation, calling, clattering (storks) and colonial nesting. Nest count method was adopted to estimate the number of breeding pairs or individual birds (Javed, Salim and Kaul, Rahul. 2002.).The storks are colonial breeders. It is the easiest method to count the nest or incubating parents from the ground. Presence of nestlings also can be counted in each nest because they are also large in size and become visible. Photographic evidences of nest and nestlings were collected from ground or roof of the houses in the study area by following ethical norms. Nesting site was frequently visited during each breeding season and time to time telephonic information was collected from Site Support Group (SSG).

VIII. Tools Used

Celestron binocular (8x40) was used during observations and photographs were taken using Sony Cybershot HX 100 V-24X.

IX. Observations and Discussion

Observations

I. Nesting Period:

The Lesser Adjutants starts nesting in the month of August on tall trees like Semal, Banyan, Tamarind and Karam. They make nest on top branches of nesting tree at about 50-55 ft height from the ground or more. Both male and female are similar in appearance but the males are little larger and have comparatively bigger bill. Non breeding birds forage singly but make pairs during breeding season. The male first occupy the area on nesting tree and pointing their bill upwards as well as advertise by clattering (Khat-Khat) to keep other nest competitors away. During clattering they make arch of the body or keep their wings half open/drooped. The male gives twigs to their mates as token of love and is part of the courtship act. Both also perform up-down bobbing motions together. After selection of mate nest making starts to raise their future generation.

II. Nesting Materials:

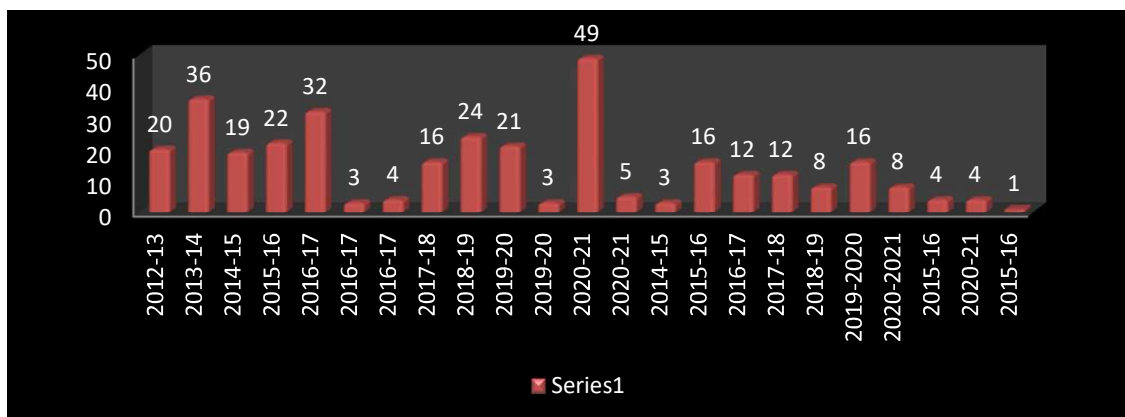
The nesting birds collect bamboo sticks to give strength to the nest. They bring branches from Tamarind and Shisam tree to make strong nest above bomboos sticks. They also collect soft plant parts for cushioning of nest such as Basar leaf (Bas Pata) it grows near nala, Satkad, Chiru grass, Kush grass and keep on woody sticks of platform nest. These leaves do not degrade in rain water easily and birds conserve energy consumption in nest repairing. These birds also use old nest by repairing. It was observed that they also bring leafy branches of Ground nuts from cultivated land to provide soft cushion for eggs. After pairing and nesting the eggs are laid by the females in 3rd week of August. The clutch size was observed from 2-4. In the beginning the eggs remain soft so, the female start incubation after 5-6 days of egg laying. However, it sits on margin of nest to protect eggs. The egg containing nests were guarded by one of the parent and they forage in alternate manner. The incubation period was of 28-30 days. On 18.9.2012 an empty broken egg shell was found under the nest (Banyan tree). It marks the beginning of hatching. Hatchlings were observed in 3rd- 4th week of September. In October all nests had chicks. The nests were scanned carefully with the help of Binocular and the number of chicks were counted and noted down per nest as below (Table: 3).

Table: 3- Showing Lesser Adjutant Population in Bokaro District and expansion in Jharkhand.

Location	Breeding Year	NBr. Popul ation (a)	Num ber of Nest	Br. Populati on (b)	Number of chicks (c)	Death (d)	Total Population (a+b+c)
Ambadih-Uttasara	2012-13	9	3	6	(2+2+1) 5	0	20
	2013-14	0	9	18	(9x2) 18	0	36
	2014-15	3	4	8	(4x2) 8	0	19
	2015-16	2	5	10	(5x2) 10	0	22
	2016-17	4	8	16	(6x2) 12	0	32
	2016-17				(1x3) 3	0	3
	2016-17				(1x4) 4	0	4
	2017-18	0	4	8	(4x2) 8	0	16
	2018-19	0	6	12	(6x2) 12	0	24

	2019-20	3	5	10	(4x2) 8	0	21
	2019-20				(1x3) 3	0	3
	2020-21	5	11	22	(11x2) 22	0	49
	2020-21		1	2	(1x3) 3	1	5
Jarangdih	2014-15	0	1	2	(1x1) 1	2	3
Bahadurpur	2015-16	0	4	8	(4x2) 8	1	16
	2016-17	0	3	6	(3x2) 6	0	12
	2017-18	0	3	6	(3x2) 6	0	12
	2018-19	0	2	4	(2x2) 4	0	8
	2019-20	0	4	8	(4x2) 8	0	16
	2020-21	0	2	4	(2x2) 4	0	8
Banchas	2015-16	0	1	2	(1x2) 2	0	4
PananaTand	2020-21	0	2	4	Inactive nest	0	4
Uperghat (Kachho)	2015-16	Rescu ed 1	0	0	0	0	1
	Total	27	78	156	155	4	338
		Total =	(a+b+c)-(d)		338-4=334		
Expanded Population							
Dumri Block Office	2020-21	0	8	16	(8x2) 16	0	32
Rangmatia	2012	Rescu ed 1	0	0	0	0	1
Banaso Hazaribag	2019	1	0	0	0	0	1
Ranchi	2019	1	0	0	0	0	1
Chatra	2016	Rescu ed 1	0	0	0	1	1
Garhwa		1	0	0	0	0	1
Topchanchi, Dhanbad		0	1	2	(1x2) 2	0	4
ULBS, Sahibganj	2009-14	11	0	0	0	0	11
	Total	16	9	18	18	1	52
				(a+b+c) - (d)=52-1=51			
By adding - 334+ 51=385 Number in Jharkhand.							

Note: NBr – Non- breeding, Br – Breeding.



Bar Chart: Population Growth of Lesser Adjutant in Bokaro District

III. Parental Care:

Both partners take care of nestlings. They serve fishes, frogs, crustaceans, snakes, rats, large invertebrates etc to chicks as food. At Jarangdih site a half killed fresh water snake was found under the nesting tree that may be dropped from the bill of the chick. On a bright sunny day it was observed that parent bird spreads its wings and folds after few minutes and repeat the same to provide shadow as protective step to newly hatched chicks. Fledging was observed after 55-60 days. However, final fledging in the colony was observed in month of January and beginning of February according to difference in hatching time of eggs in various nests. The fledglings remain with parent up to 4.5-5 months.

Discussion

From the table No-3 it is clear that Lesser Adjutants are nesting and breeding successfully in Bokaro district of Jharkhand state. There is significant increase in number from 20 in 2012-13 to 338 in 2020-21. It means the climatic condition is favourable for them to breed. Good number of wetlands and agricultural fields are providing food to raise their chicks. In nine years of study only death of two chicks and two adults were observed. The present population of Lesser Adjutants in Bokaro district is (338-4) 334 and by adding the number (51) of this stork from other parts of Jharkhand the population reached 385.

The increase in their number and less number of preferred nesting trees in the Peterwar area, are two factors imposing expansion of the population of Lesser Adjutant within the district and in other districts or state (Baghmundi, West Bengal). So, by this study it is evident that the number of this stork in Jharkhand state is 385 or may be more and is expanding. These birds are moving from Peterwar area to north-eastern side like Bahadurpur, Jarangdih, Topchanchi and Dumri. However, isolated population were also found in other places like Lesliganj (parshuram khap village), Chatra and Garhwa. We are sure that this number is not added in present global population of Lesser Adjutants. In 2022-23 scattered population of Lesser Adjutant has been reported by bird watcher from Gumla (Kaushik Sengupta), Lohardaga (Sunil Kumar) Districts of the Jharkhand state. At present the population of Lesser Adjutant in Jharkhand may be more than 400. Having bird eye view on distribution and presence of Lesser Adjutant in Jharkhand state it can be inferred that population in Gumla, Lohardaga, Lesliganj, Chatra and Garhwa are separate from resident population in Peterwar of Bokaro district. Population of Lesser Adjutant in ULBS, Sahebganj are considered to be visitor from West Bengal area. Therefore, a comprehensive study is needed to generate data of nesting breeding of these storks in Jharkhand and their conservation. So, that the specific threat to Lesser Adjutant and other stork species can be assessed in the Jharkhand state.

Threats

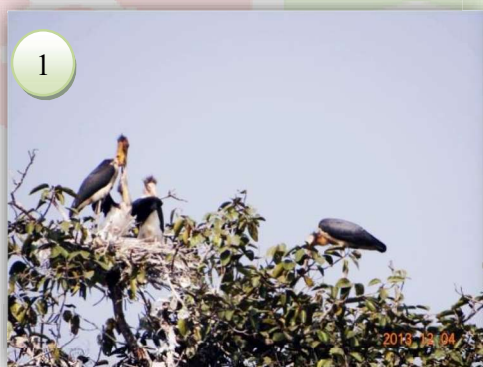
In Jharkhand Stealing of eggs and poaching of Lesser Adjutant is not reported. The villagers had religious thought that this stork is Carrier of Lord Vishnu so, they protect the bird. The stork feeds on snakes and resident villagers were happy that cases of snake bites are greatly reduced or negligible in the area due to their presence. However, one fledgling fell down from nest (Bahadurpur) and attacked by feral dogs. The injured bird was rescued by villagers and they called me. In my presence the bird was handed over to Forest Range Officer (Peterwar) Mr. Arun Kumar for treatment (2.1.2016).

The farmers sometimes cut Semal tree and sell it to get money for livelihood or to make shuttering used in building construction. It reduce nesting tree. Tamerind wood is not used by villagers so there is no threat in general. Banyan and Karam tree have religious protection by villagers. To increase the number of nesting trees awareness campaign should be started by Forest Department in the area of nesting breeding of these storks.

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PHOTOGRAPHS FROM DIFFERENT BREEDING SITES





1&3- Uttasara, 2- Bahadurpur, 4- Jarangdih, 5- Dumri, 6- Udhwa, 7&8- Rescue From Bahadurpur (7) and Uperghat (8) Dt. 2.1.2016.

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