

**Population status and Distribution of Lesser Adjutant
Stork *Leptoptilos javanicus* in
Far western lowland (Bardia, Kailai and Kanchanpur Districts)
Nepal**

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Introduction:

Global distribution of Lesser Adjutant:

The Lesser Adjutant ranges from India, south through Myanmar and Thailand to Laos, Cambodia, Vietnam and Peninsular Malaysia to the Greater Sundas including Sumatra, Kalimantan, Java and Bali (Indonesia), Sabah and Sarawak (Malaysia) and Brunei. There are unconfirmed records from Bhutan, and it occurs as a vagrant east of Bali in the Lesser Sunda Islands (Nusa Tenggara), Indonesia (Birdlife International 2001)

Distribution of Lesser Adjutant in Nepal:

Nepal has many different types of wetlands that range from areas of permanently flowing rivers to areas of seasonal streams, lowland oxbow lakes, high altitude glacial lakes, swamp and marshes, paddy field, reservoir and ponds (Scott, 1989). These areas are rich in biodiversity and known to be regularly support more than 20000 waterfowl during the period between December-February (IUCN 2004). Out of 861 birds of Nepal 193 birds are wetland dependent. Out of 193 birds 180 are dependent in wetlands of Terai (IUCN 2004). Out of these birds Lesser Adjutant is also wetland dependent bird which is listed in IUCN Red Data book. Lesser Adjutant is one, which is listed as globally threatened species, (Birdlife International, 2001) among 8 species of storks found in Nepal (Grimmett et.al. 2000). It belongs to ciconiidae family. In Nepal it was found in the southern part of Nepal. Due to habitat loss, alternation and human disturbance, this species is now mainly restricted to some isolated pockets of lowland Nepal (Birdlife International 2001). Mostly it is recorded in Koshi Tappu Wildlife Reserve and its surrounding areas, Royal Chitwan National Park and its surroundings areas, Beeshagari Lake, Kapilvastu, Navalparasi, Rupendehi districts, Royal Bardia National Park, Ghodaghodi Lake and Royal Suklaphata Wildlife Reserve and its surrounding areas.

Fig. Distribution of Lesser Adjutant in Nepal



○= Historical (pre-1950) ◐= Fairly recent (1950-1979) ●= Recent (1980-present) □= Undated

Source: Birdlife international

General Description:

Lesser Adjutant is resident as well as nomadic (especially during rain). It has a long neck with dirty yellowish stout, wedge shape bill. Its head and the necks are nearly naked, but with scatter brown feather, thicker quite close towards the nape. The back, wings and tail are black, glossed with green. Iris is white. Under wings converts black. Most of the lower part is white (Pokharel 1998). Smaller than Greater Adjutant, with slimmer bill that has straighter ridge to column. Compared with the Greater

Adjutant, the adults show a pale frontal plate on the head, and a denser feathering on the head and hind neck which forms small crest (Grimmett et al. 2000).

There is concern about the species both internationally and within Nepal at the present time as there is evidence that it is declining. Apart from the studies in Koshi Tappu Wildlife Reserve (Fleming et al. 1984, Pokharel 1998, Baral 2004), Royal Chitwan National Park (Gyawali 2003ab, Hungden and Clarkson 2003, Tamang 2003, Choudhary 2004) Royal Bardia National Park and Suklaphata Wildlife Reserve (Schaaf 1978); systematic survey of the species has not been carried out to find its population status, breeding success and habitat preferences in Far-Western part of Nepal. Therefore, it was essential to study the current population status, breeding success and habitat utilization of Lesser Adjutant that would be helpful in developing management plans to conserve this threatened species in its natural habitat. Accordingly OBC has also helped a lot in conserving this species as it has released 3 small grants to study this species in eastern (Baral 2004), central (Gyawali 2003) and far western (current study). This study focuses to the Far-western part of Nepal.

Study Area:

Location:

The study was carried out in Bardia, Kailali and Kanchanpur districts of Nepal. Bardia district is located at 28°39'N and 81°16'E situated at Mid-Western Terai Region. Royal Bardia National Park (RBNP), which is the largest, protected area in lowland region, is located in the Bardia district. Kailali district is located at 28° 22'-29°05'N and 80° 30'-81°18'E situated at Far-Western lowland Region. Ghodaghodi Lake (150 ha.), which is included in Ramsar wetland, is located in this district. Kanchanpur district is located at 28°32'-29°08'N and 80°03'-80°33'E situated at Far-Western lowland Region. Royal Suklaphata Wildlife Reserve (RSWR) is situated inside the district. Whole boundaries of study area extend from Nepal Indo border in South-West and Banke district in the East and Surkhet, Doti, Dadeldhura in the North.

Climate:

The climate is subtropical monsoonal type. About 90% of the precipitations occur during the month of July, August and September. The temperature recorded for the year 2002 shows mean monthly maximum temperature of 40.2°C in the month of April and mean monthly minimum temperature of 5.2°C in January (HMG/N, 2003). So, it's extreme hot in April i.e. sometime the temperature reaches 47°C and extreme cold in January i.e. the temperature reaches below 3°C. So lowland of Mid-Far Western Region has an extreme type of climate.

Biodiversity

The study area is reputed for its rich Bio-diversity of Terai region. The study was focused in different Lakes of Royal Suklaphata Wildlife Reserve in Kanchanpur district, Ghodagodi Lake, which is recently included under Ramsar site in Kailali district and Lakes of Royal Bardia National Park and Badhaiya Lake in Bardia district.

Flora

The major forest type in study area include

(I) Sal forest:

Most of the lands within districts are covered with Sal forest. Sal tree associated with *Terminalia tomentosa*, *Terminalia belerica*, *Anogeisus latifolia*, *Largerstomia parviflora* and *Syzygium cumuni*.

(II) Riverain Forest:

Riverain Forest consist mainly *Dalbergia sisoo* and *Acacia catechu* forest along the deposited alluvium, often gravelly, along streams and rivers of the study area.

(III) Other Riverain Forest:

Small patches of forest are found in moist localities near stream. This forest includes tropical deciduous forest of *Bombax cieba* and *Trewia nudiflora*.

(IV) Grassland:

Study area includes large *Phatas* (Grassland) of RSWR, RBNP and around the Ghodaghodi Lake. The main grass species of the Phatas include *Imperata cylindrca*, *Heteropogon contortus*, which area used for thatching by local people. (DNPWC, 2002)

Fauna:

Study area is a vivid storehouse of wild fauna diversity.

(I) Mammals:

Study area is home for more than 50 different kinds of mammals. Endangered mammals include Swamp deer, Bengal Tiger, Wild Elephant, One Horn Rhino, Hispid Hare and Blackbuck.

(II) Birds:

About 426 species of birds are recorded in RBNP, 372 species of birds are recorded in RSWR, 140 birds are recorded in Ghodaghodi Lake (Tamang, 2003) and 20 species of birds are recorded in Badhaiya Lake (Khadka J.B, 2004) Salgoudi Lake, Rani Lake, Ghodagodi Lake, Khoda lake and other wetlands are extremely pretty and have abundance of Birdlife and other much grassland and forest provides habitat for terrestrial birds.

(III) Reptiles /Amphibian:

Study area is home to Marsh Mugger Crocodile, Gharial Crocodile, Monitor lizard, Cobra and python.

(IV) Fishes:

More than 21 species of fishes are included in the study area including Mahaseer, Rohu and Tenger etc (DNPWC, 2002).

[Map of the study area \(here\)](#)

Aims and Objectives:

The main aim of research is to understand the ecological significance of Lesser Adjutant and provide outline management practices to ensure long-term survival in its natural habitat.

Specific objectives include:

1. To study population status of Lesser Adjutant in Bardia, Kailai and Kanchanpur Districts.
2. To map out the distribution pattern of Lesser Adjutant and its potential habitats.
3. To outline the current and long-term threat to the population of Lesser Adjutant.

Methodology:

Data was collected from April 27 to June 10. Lakes of RBNP, Badhaiya Lake, Lakes of RSWR, and Ghodaghodi Lake were surveyed during this period.

Population Status:

Preliminary survey of the study area was conducted to find out the potential and previous recorded sites. This was done by questioning the park authorities (chief warden, rangers and game scouts), biologist, elephant drivers, cattle herders and local people.

Direct observation to the field was done for verification. Direct point count was adopted, which was done with the help of binocular. All the possible habitat of Lesser Adjutant was observed. Counts were made in the morning between 07:00 and 11:00 hours and in the evening between 16:00 and 17:00 hours as the birds were found to be active in the morning and evening hours. To minimize double counting, the

counts were made in the same time at all sites. The count was repeated for at least three times in each site and the maximum number recorded in all sites was considered as the total population.

Distribution pattern and mapping

Distribution pattern of Lesser Adjutant was determined by direct observation. Geographic locations of the observed groups of individuals and potential habitat were taken using GPS and later these points were transferred into the map using GIS.

Threats:

Questionnaire survey and interviews were done among the park authorities, naturalist, biologist and knowledgeable local people to find out the threats of Lesser Adjutant. Direct observation was also done to the site to know why it is declining.

Result and discussion:

Population:

Most of the areas in these districts where, Lesser Adjutant is thought to be found were visited. As the study was conducted in the dry season no nesting sites except two deserted nest in Jilmila area of RSWR, as well as no any Lesser Adjutants were recorded in paddy field, pasture land and other agriculture land.

Total 21 Lesser Adjutants were counted in the study area, out of which 14 were counted in Kanchanpur District (RSWR), 5 were counted in the Bardia district (RBNP), and 2 were counted in Kailali district (Ghodaghodi Lake). Among these areas the largest flocks i.e. 8 were counted in Baba Lake (RSWR). The population was found more inside the reserve then outside the reserve. It is may be the reason that buffer zone area is more disturbed by the local people and grazing by the domestic animals as the bird is very sensitive to disturbance. The population was also found more in RSWR then in RBNP. In this aspect I concluded that RSWR has more wetland and concentrated area than RBNP. Another cause may be the closeness of the Duduwa National Park of India.

Number of species found in resting, flying and feeding condition is given in the figure 1. Among the 21 Lesser Adjutant most of them were sighted in the resting stage in *Bombax ceiba* tree and in *Adina cardifolia* tree. Percentage of the species found in *Bombax ceiba* and *Adina cardifolia* tree in given in figure 2.

Figure 1: Location of number of Lesser Adjutant in different condition

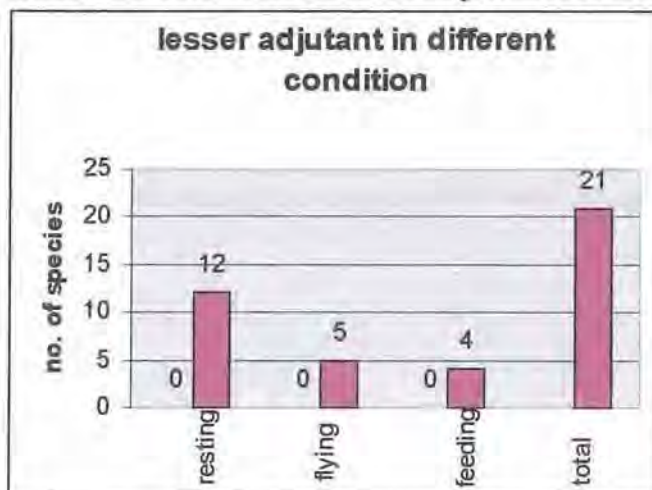
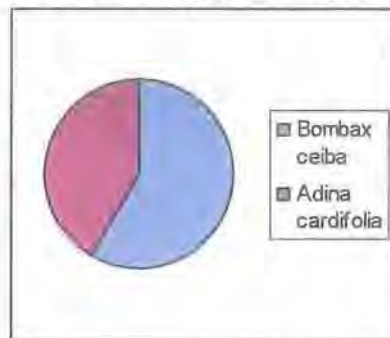


Figure 2: No. of Lesser Adjutant in found in different species in resting condition



Estimate of total population in Nepal:

Recent study carried out in eastern Nepal by Hem Sagar Baral estimates about 231 individuals (109 young with 61 pair of adults attending the nest). Another study carried out by Nabin Gyawali in 2003 in central Nepal estimates 51 individuals. Then total recent estimate of this species in eastern, central and far-western region becomes 303 individuals. According to wetland international (2002), estimated global population of this bird is only 5000. So Nepal holds 6.06% of the total global population. This estimate falls within the predicted 100 to 500 (Baral 1998 in litt. to Birdlife International) and population indeed appears to be slowly declining.

Distribution pattern:

Lesser Adjutants were found to be distributed within the reserves wetlands and wetlands outside the reserve. Out of total population, 8 were found in Baba Lake (RSWR), 2 were found in Salgaudi Lake (RSWR), 2 in Kalikech Lake (RSWR), 2 in between 26 and 27 number pillar of the Indo-Nepal Border of Jhilmila area (RSWR), 2 in Ghodaghodi Lake, 1 in Khoda Lake (RBNP), 2 in Hatti Lake (RBNP) and 2 west of Hatti Lake i.e. 2 km far (RBNP). Observation was also done in Lake (100 ha) of Bardia district which is supposed to have a good habitat for Lesser Adjutant but no any Lesser Adjutant was found there at the time of study.

Observation was also done in the south of Dhangarhi, Mohana River as previously observed by Birdlife International (2001, Birdlife international) but no any sighting was found there. The survey was also done in Patero Lake, Rani Lake and Suklaphata Lake of RSWR and Betkot Lake outside RSWR. In Kailai district observation was also done Narcrodi Lake (100 ha.), Deukhuria Lake (22 ha.). In Bardia district the observation was done in Laguna Machan, flood plain of Karnali River, Manau Ghat and Nilgai Lake inside RBNP and Badhaiya Lake outside the RBNP.

Regarding to Salgaudi Lake, when I first visited there was very little water and I found two species there but after 4 days again I visited there I found no species as the lake was dry. Again in Rani Lake, which is the biggest lake inside RSWR, there no Lesser Adjutant was observed. From the above observation I concluded that Lesser Adjutant mostly feed in the small lakes where they can find their food easily. Most of the artificial (man made) lakes inside RSWR dry in the summer. Therefore it is necessary to stop the small lakes from drying, as the RSWR holds the good population of Lesser Adjutant.

Table: 1 location and number of birds observed in the study area.

Location	Number of birds recorded	Geographical location (DMS)
Salgaudi lake	2	N28 ⁰ 52' 48.9" E80 ⁰ 13' 20.8"
Kalikech lake	2	N28 ⁰ 48' 37.5" E80 ⁰ 15' 20.4"
Jhilmila area	2	N28 ⁰ 46' 54.4" E80 ⁰ 11' 43.5"
Baba lake	8	N28 ⁰ 53' 00.4" E80 ⁰ 12' 15.4"
Ghodaghodi lake	2	N28 ⁰ 36' E80 ⁰ 45'
Hatti lake	2	N28 ⁰ 34' 0.03 " E81 ⁰ 17' 15.3"
2 km west of Hatti lake	2	N28 ⁰ 33' 57.2" E81 ⁰ 16' 11.3"
Khoda lake	1	N28 ⁰ 31' 50.3" E81 ⁰ 16' 59.3"
Total	21	

Distribution map

Threats:

Use of pesticides in the croplands, poisoning, lakes and river system for fishing and habitat loss and alternation have been found to pose a serious threats to Lesser Adjutant (Pokharel,1998, Gwayali, 2003ab).

Habitat alternation and loss:

Loss of nest trees, mainly the *Bombax ceiba*, is recognized as the major threat at Chitwan even inside a protected area (Gyawali 2003b). Illicit cutting and felling of *Bombax ceiba*, *Adiana cardifolia* and other species trees affect nesting and roosting habitat and canopy composition. In RSWR, mainly in the west of Jilmila area, where there are large *Bombax ceiba* trees in which nesting is done, is being destroyed mainly by habitat alternation. *Bomabax ceiba* tree is being slowly replaced by the other riverian trees such as *Dalbergia sissoo*, *Acacia catechu*, *Trewia nudiflora* etc. The same problem is also seen in RBNP too. Widespread looping branches to feed several dozens domesticated elephant kept at RSWR and RBNP for catering visitors is serious threat to these birds.

Changes in agricultural practice are noticed throughout the country. Farmers have shifted to cash crop from traditionally grown crops such as paddy and wheat. Since Lesser Adjutant depend on paddy

field for the part of the year to feed, the change in agricultural practice may bring serious consequence in this birds (Baral, 2004).

Drying and destruction of Wetland:

Nepal's wetland face threat from drainage, diversion, abstraction, siltation, pollution and poisons used to kill fish (Grimmett et al, 2000). The species is reliant on wetlands for foraging the tall trees for nesting so the on going destruction of wetland through drainage, encroachment, over fishing etc, and woodland through fire etc. exert greater population in its population (Gyawali 2003b). Many lakes inside RSWR and RBNP becomes dry during the summer so it necessary to pump artificial water for survival of the bird. During my survey I found 4 lakes of RSWR are dried. In RBNP also most of the lakes are dried in the summer. It directly hampers to the survival of these birds, as the birds are confined with the protected area in the dry season due to no water in the paddy field in this season. Due to construction of irrigation canal by Mahakali irrigation project, Kalikech Lake of RSWR has been destroyed. The lake is good habitat for Lesser Adjutant. The water in the lake has been covered by the sand brought by the canal and the lake is too disturbed by the human for collecting foods of mainly fishes. The greatest danger faced by the wetlands in the study area is the dense and rapid growth of water-hyacinth. This obstructs the penetration of the light into the water preventing necessary light stimulated reaction (Pokharel, 1998). This leads the decline in population of birds. It is imperative to control the water pollution and drying by enforcing the laws and regulation and creating the awareness among the locals that not safeguard the declining population of Lesser Adjutant but also help in conserving waterfowls and migratory birds in and around the protected area.

Photo of dry lake

Human and livestock pressure:

Regular rafting in Karnali River has caused much disturbance to these birds in RBNP. Illegal collection of firewood and grazing in inside the protected area has much disturbed the habitat of bird. According to my data in RSWR daily 240 cattle graze inside the park and about 100 tons of fuel wood is collected daily from the reserve. Therefore strict rules and regulation for illegal entry inside the reserve should be implemented.

Photo of collection of firewood collection and live stock grazing inside the protected area

In Ghodaghodi Lake system, the trees around the Lake are felled illegally due to wide human pressure. The forest of Ghodaghodi Lake system provides the daily necessity of fuel and firewood to each family living in neighborhood. Only in ward no. 5 of Darakh Village Development Committee, the daily fodder consumption for their live stock exceeds 2250 kg of leaves and young shoot manually (Baral, ?). Due to the highway running side of Lake, has caused much disturbance to these birds as the bird is sensitive to human disturbance.

Poisoning of the river water:

There is also a system in a village to kill fish by poisoning the entire water system, such cases of poisoning are almost everywhere in the country including inside the protected area (Dahal 1999, pers. Obs.). Such practices severely damage the local ecosystem killing the entire Texas in the system and affecting those who feds on such poisoned food, including Lesser Adjutant and human beings (Baral, 2004) The Bahunia River in RSWR, which used to have plenty of fishes is now being destroyed by the poising the river water for collection of fishes. In RBNP too the Kauraha River is used by the people for poisoning the water for collection of fishes.

Use of pesticides:

Increasingly, farmers are also utilizing agro chemicals. This includes various fertilizer and pesticides. Pokharel (1998) and Gyawali (2003b) have strongly highlighted the effect of pesticide on this species. During my study I did not notice any effect of pesticide on Lesser Adjutant in the area but from the questionnaire survey it was found that most of the farmers of buffer zone area of protected area use chemical fertilizer for the annual crops such as paddy, wheat etc. At this, we do not know how dependent the birds are on the paddy field and future studies should address this issue.

Hunting:

Illegal hunting of Lesser Adjutant for meat (Baral 1993) has threatened its long term survival. Illegal hunting and trapping of birds is rampant in the area. As it is a large bird heavily dependent on agricultural field, it is an easy target for many hunters and youngsters killing birds (Baral, 2004). Several instances of hunting noted in the past (Anon, 1992, pers. obs.).

Conservation awareness:

Although increased efforts are underway to raise public awareness on birds mainly initiated by Bird Conservation Nepal (BCN), there is still lack of value of birds to a local person (Baral, 2004). To date department of National Park and Wildlife Conservation (HMG/N) has not included Lesser Adjutant in its list of protected birds. Inadequate avifauna conservation awareness among the communities residing the adjacent to the park has become one of the most serious challenging among conservation agencies. Extensive conservation awareness programs targeted to the stakeholders is of prime importance.

Recommendations:

Out of 861 birds found in Nepal 193 (22.5%) are wetlands dependent birds (IUCN, 2004). So for the protection of Lesser Adjutant the following program should be implemented:

- Potential habitats of Lesser Adjutant in the study area should be protected and managed.
- Currently branches of *Bombax ceiba* are lopped for feeding elephants inside the protected area. It should be strictly stopped. For this alternative trees for the elephants should be used.
- Lesser Adjutant should be listed as protected bird under Department of National Park and Wildlife Reserve (HMG/N).
- Wetlands especially Ghodaghodi Lake should be managed properly. This area should be declared as Ghodaghodi Lake conservation area, which will make related authority and organization work efficiently and productively.
- Wetlands inside the protected area should be avoided from drying. Artificial pumping should be implemented.
- The collection of firewood, fodder and livestock pressure inside the protected area should be controlled immediately. For this park should develop good coordination with the local people live side of the park. Protected area's staffs should motivate people by giving them alternative choices. Community forestry should be made for the people for firewood and fodder.
- The water in the Kalikech Lake, Ghodaghodi Lake, Badhaiya Lake is being covered by water-hyacinth *Jalkumbhi* plant so the food of wetlands birds and reptiles to decreasing day by day. Proper management should be done to eliminate such water pollutant plant.

- Poisonings of Lakes, Ponds and Rivers system for fishing and hunting of this bird should be strictly prohibited.
- Massive conservation awareness program should be launched in and outside the buffer zone area to protect this bird.
- Farmers should be encouraged to practice traditional crops with minimal use of pesticide and chemical fertilizer.
- The nesting period of this species is November to January so I was unable to find out the accurate number of nesting of Lesser Adjutants as the survey was not made during this time. As this is the breeding season when the species is active it is necessary to study this species in winter. A comparative study should be done which will help to determine a more accurate population number for this species in the study area and to follow up this work.

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