

Article Information

Received date: May 28, 2020

Published date: June 22, 2020

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Keywords Bucerotidae; Decline;  
Frugivorous; Threatened; Habitat loss

# Exploring Distributional Evidences and Threats to Initiate Conservation of Great Hornbill (*Buceros bicornis*) In Nepal

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## Abstract

Great hornbill (*Buceros bicornis*) which belongs to *Bucerotidae* family is a big bird found in the Indian subcontinent and Southeast Asia. It is recorded as Endangered in Red data book of Nepal, Vulnerable in IUCN Red list, Appendix I of CITIES and protected species in NPWC Act 1973. It requires large and dense forest for feeding, roosting and nesting. Principally, the species is frugivorous, often an opportunist and prey on reptiles, small mammalian and avian species. In Nepal, it is distributed in the pocket areas of Chitwan, Bardia, Parsa districts and occasionally in Shuklaphanta National Park and patchily distributed outside protected areas. Despite being ecologically important species and severely threatened, the species is poorly studied and documented in Nepal. Thus, this paper aimed to review different published secondary sources to explore the conservation evidences of Great hornbill in Nepal. Numbers of papers are utilized to filter the results and interpret the information regarding its status, distribution and threats. We found that the population status of Great hornbill is in declining trend and the present population is expected to be on the range of 80-150 in Nepal. Habitats are threatened and endangered due to conventional hunting, deforestation, habitat loss and forest modifications at alarming rate. This study has suggested some action with ground level evidence in favor of Giant Hornbill to conserve this beautiful creature in wild.

## Introduction

Avifaunal diversity of Nepal is the reflection of country's unique geographical position, altitudinal variation and climatic differences [1]. Till date, 887 species of birds have been recorded for Nepal [2], of which southern lowland of the country embodies the highest avian diversity. So far 54 species of hornbills have been distinguished within order Bucerotiformes and among them 32 are Asian hornbills [3,4]. Great hornbill (*Buceros bicornis*), Indian Gray hornbill (*Ocyrocerus birostris*) and Oriental Pied hornbill (*Anthracoeros albirostris*) are the 3 species of Asian hornbills found in Nepal [5]. Great hornbill (*Buceros bicornis*) is listed as Vulnerable globally by IUCN (BirdLife International 2018), Endangered nationally [1] and listed in Appendix I by Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITIES). Similarly, National Parks and Wildlife Conservation (NPWC) Act, 1973 kept them under Schedule-I (protected) species (NPWC 1973). It is the largest avian frugivores found in the tropical woods of South and South-east Asia [6]. The species is recorded in several countries including Nepal, India, Bangladesh, Bhutan, China, Laos, Sri-lanka, Indonesia, Malaysia, Myanmar, Thailand, and Vietnam (Birdlife International 2018). It is commonly known as Raj Dhanesh in Nepali, which is a rare and local resident species unevenly distributed in dense forests of lowland Terai region and duns at an elevation below 250 m [1]. It exhibits seasonal movements [7].

Figs are the major component of their diet [8,9] however, the species feed eggs, reptiles, insects, amphibians, mammals and small birds [10]. Breeding season begins in between December and January and last about 4 months [3]. They are recognized to range over large space [11,12]. It voyages in excess of 10 km between feeding locus and perches outside the mating season (Leighton, 1986). They have been symbolized to as the 'farmers of the forest' as they play a significant role in seed dispersal in tropical woods [13]. Despite having significant role in the ecosystem, this species is threatened by hunting for their trophies, meat and body fat, which is believed to have medicinal properties [14]. Furthermore, they face noteworthy dangers from logging [15] and habitat fragmentation [16]. Today, just 33% of their regular environment remains, an enormous extent of it in a fragmented state and with remarkably significant levels of threats to their persistence [13] (Figure1).

In the context of declining population throughout their range, it is essential to have information on the abundance, population density and threats from the sites that are most likely to harbor hornbill population for the long-term persistence [9]. Thus this paper aimed to explore the conservation evidences of Great hornbill in Nepal. Additionally, we provided comprehensive and up to date accounts of Great hornbill in Nepal by assessing its status, distribution and existing threats. Based on the findings, we recommended some suitable measures for its conservation.

## Methods and Materials

This paper was set up by checking and minding on the relevant published scholarly works globally and nationally on Great hornbill from 1833 till 2020. Most of the literatures were focus on status, ecology and threats of Great hornbill. We found more studies conducted from 2003 on this species. We found only few papers with population density estimates and with threat assessment. Thus, numbers of papers on different thematic areas of hornbill were utilized to filter the outcomes and deliver appropriate assets to delineate crucial and explicit issues on this species. Gathered information were subjectively dissected and interpreted well.

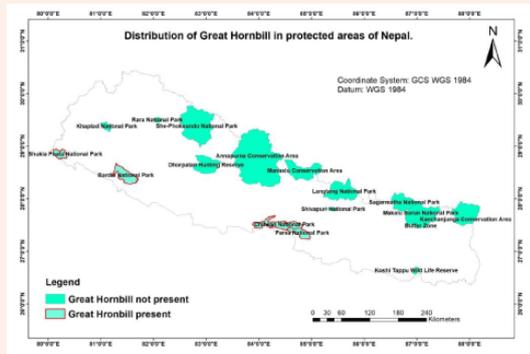
## Results and Discussions

### Status and Distribution

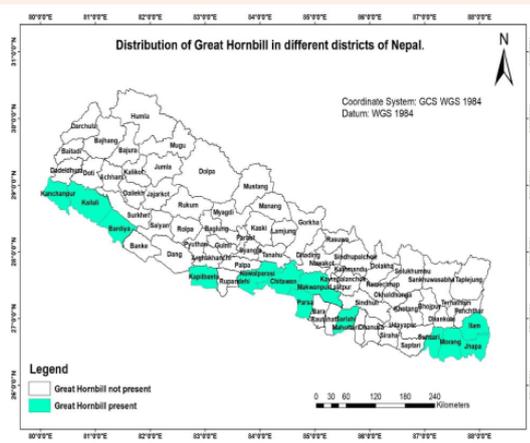
In Nepal, Great hornbill is patchily distributed in the lower land of Terai region beneath 250 m [1]. Within the lowland



**Figure 1:** A Pair of Great Hornbill (*Buceros bicornis*) at Chitwan National Park @ Chungba Sherpa.



**Figure 2:** Distribution of Great hornbill in Protected Areas of Nepal.



**Figure 3:** Distribution of Great hornbill outside Protected Areas of Nepal.

region, this species is mostly sited in Chitwan, Bardia and Parsa National Parks [1] and occasionally reported from Shuklaphanta National Park [17] as shown in Figure 2. This species is likewise documented from non-protected areas of Nepal i.e. Jhapa, Ilam, Sunsari, Sarlahi, Makawanpur, Morang, Parsa, Chitwan, Nawalparasi, Kapilvastu, Bardia, Kanchanpur and Kailali districts [1,17] (DNPWC 2020) as shown in Figure 3.

Great hornbill was first recorded in 19<sup>th</sup> century at Hetauda in Makwanpur district

[18]. In May 1947, the species was next recorded when the specimen of the species was collected from Hetauda [19] and was then marked as rare in the central dun. It was recorded 19 times from 5 different localities of Sunischare, Jhapa district in 1964 & 1965 [20]. A study of [7] revealed a declining trend of the species on its major ranges within Nepal with an estimate of less than 500 individuals. A total of 53 hornbills flying for roosting were recorded in western part of Chitwan National Park on March 2009 [1]. Similarly, a study accomplished in the Chitwan National Park in 2010 documented 25 individuals [21]. In December 2010, 62 Great hornbills were observed at Devi Tal of Chitwan National Park, which is the most extreme known record in Nepal [1]. Pair of hornbills flying over the Chure at an elevation of 986m were recorded in 23 July 2019, which is probably the highest elevation record in the country [17]. A pair of the species was photo captured on 4<sup>th</sup> June 2019 by the wildlife photographer Vikram Tiwari in the Shuklaphanta National Park [17]. Thus, from the several studies, the population of the Great hornbill was evaluated to be on the range of 80 to 150 in Nepal [1].

**Major Threats**

Despite being charismatic and world’s most distinct bird species, its habitat quality is threatened and vulnerable due to anthropogenic activities. The Great hornbill is mainly threatened by habitat fragmentation, deforestation and human disturbances [1,22].

**Habitat Fragmentation**

Great hornbills are the sensitive markers of woodland conditions and human interference since they need huge tracts of large woodland with enormous fruiting stands for nourishing, roosting and nesting (Gale [23]. Being second-hand cavity nesters, hornbills rely on cavities framed in large stands for nesting [24] the decreased accessibility of reasonable nest stands due to habitat fragmentation and modification may impact the population dynamics of the species [25].

**Deforestation**

Hornbills are severely affected when the assorted variety and plentitude of fruiting stands and natural food sources accessibility decreases in upset living spaces [26]. A survey of deforestation carried out in between 2000 and 2012 within the species ranges assessed the forest loss at 26.1% over three age lengths i.e. 55.2 years [27]. Accepting the ongoing pace of decrease stays steady, the species is anticipated to decline by 30-49% throughout the following three generations. Subsequently, it has been proposed that the central driver of decrease in this species is living space misfortune [27].

**Human Disturbance**

Similarly, human disturbance is one of the major drivers of hornbill threats that includes hunting by tribe peoples for their conventional ceremonies and headgear [15]. Being devoured as food and customary medication, its casqued and feathers are utilized as decorative stuffs in nearby networks, and thus might be affected by the pet trade Eames [28,29].

**Conservation Measures**

In 1971, Ministry of Forest and Soil Conservation (MoFSC) initiated a national conservation program in Nepal. This gave a lawful premise by passing the National Parks and Wildlife Conservation (NPWC) Act 2029 in March 1973. This act gave a provision of establishing protected areas in Nepal. This Act guide the policy and actions of Department of National Parks and Wildlife Conservation (DNPWC). Under this Act 9 species of birds that are found in Nepal are protected by law [22]. One of them is Great hornbill, however no safeguarding measures have been passed on expressly for Great Hornbill [1].

**Conclusion**

After collecting and reviewing the scholarly works on Great hornbill thoroughly, we concluded that although this species is categorized as “Vulnerable” by IUCN and sensitive by CITIES, it is getting less attention from conservation stakes in the context of Nepal. Anthropogenic interventions such as deforestation, illegal hunting, habitat loss and fragmentation are impeding the population growth of Great hornbill. Similarly, National Parks and Wildlife Conservation (DNPWC) Act, 1973 kept them under Schedule-I (protected) species, but detailed documentation on its status, distribution, threats and behavioral ecology of this species is lacking. Insufficient data is a major barricade for conservation and management efforts. Hence, ground level collective evidences on population density, distribution, threats, breeding biology, diet composition and behavioral ecology should be explored to conserve and maintain viable population of this ecologically important species in wild.

**Ways forward**

Hornbill Conservation Action Plan must be prepared for implementing specific



action to maintain viable population in wild. Detailed research activities should be conducted focusing on the status, distribution, threats, breeding biology, diet composition and behavioral ecology throughout the range of Great Hornbill to sustain its population and to tackle out urgent conservation needs of the species. Conservation awareness programs among the local people and park staffs are of vital importance so as to make people aware how this species is important and yet in the verge of extinction. People should be made aware about the prevalent laws and regulations that could be exercised if the species is harmed. Impact of climate change on its behavioral ecology need to be documented as it can explain about species habitat condition, food habits in the face of impacts of climate change.

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