Habitat Mapping and Assessing Conservation Threats to Black-necked Cranes wintering in Bhutan

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Abstract

The most vulnerable bird species, Black-necked crane's (Grus nigricollis) population is declining possibly due to habitat loss and degradation. However, little is known about which habitat has lost and degraded and which are presently being used by this bird. We examined the foraging and roosting habitat of Black-necked Cranes during the winter of 2013–2014 in Bhutan. 550 Black-necked cranes have been sighted during the study period in four roosting sites of the country. The crane's habitats were recorded using Garmin GPS map 60CSx.We identified four factors playing a greater role in Black-necked cranes' population decline. The factors are biological, social, political and natural threats. Of all the threats reported, Biological threat is found to have major threat to Black-necked cranes in Bhutan. We recommend the present roosting areas be designated as part of the conservation areas for cranes wintering in Bumthang Dzongkhag[1], as other three habitats in Bhutan are already declared as conservation area. In addition to preserving these areas, government should also take measures to decrease anthropogenic activities in the crane's roosting habitats and encourage farming in foraging habitats of cranes for the sustainability of the cranes. Because cranes mainly feed on barley, wheat, paddy, potatoes and buckwheat in the field besides roots tubers and insects in wetland.

***Key words**: Black-necked crane, Habitat, Conservation threats, Roosting*

[1] District

Introduction

Black-necked Cranes (*Grus nigricollis)* is the only alpine cranes species and the last of the world's 15 cranes species to be discovered by the Russian naturalist, Count Przhewalski near Lake Koko Nor in northeastern Tibet in 1876 (ICF, 2012). The population of Black-necked cranes is estimated at 10, 070 - 10,970 individuals globally (Birdlife international, 2012). The bird is classified as vulnerable under the revised IUCN Red List (IUCN 2009).

Bhutan is one of the major wintering areas for Black-necked cranes besides China and India. The cranes visit Bhutan from late October to mid February each year and the major habitats in Bhutan are Phobjikha, Khotokha, Bumdeling and Bumthang valley (Lhuendup, 2007). The Population of Black-necked cranes visiting Bhutan in total is found to be increasing (Figure 1), but this increase is attributed to the increase in number of Cranes visitation in one major wintering habitat in Phobjikha. While the cranes visiting in Bumthang and Bumdeling habitats are found to be decreasing (Figure 2).

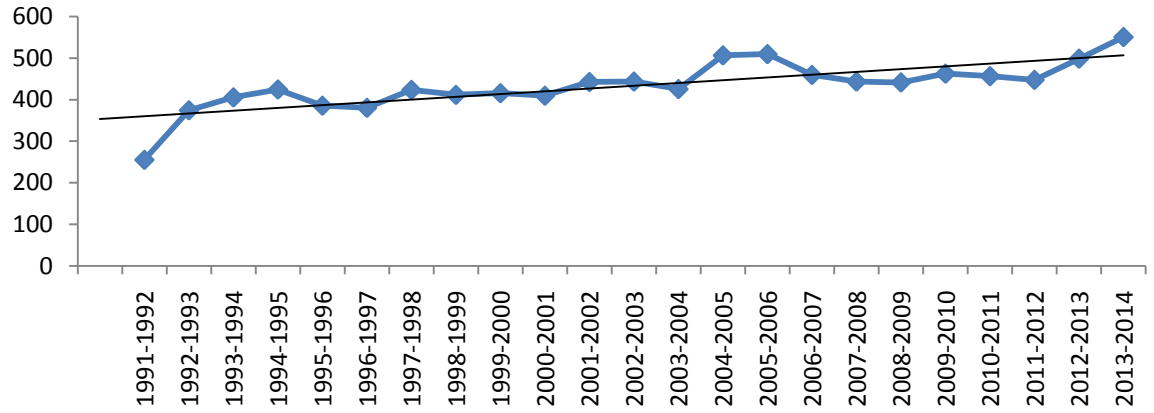

Figure 1: Trend of BNCs population in Bhutan.

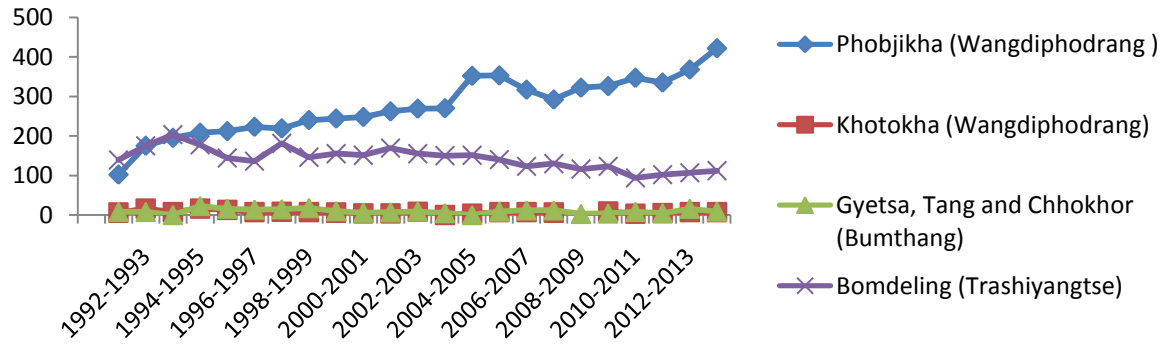

Figure 2: Habitat-wise population trend of BNCs in Bhutan

Black-necked cranes are found in three Dzongkhag, viz. Bumthang, Wangdiphodrang and Trashiyangtse in Bhutan. However, the inventory of roosting and foraging habitats of Black-necked cranes in these areas have not been done and mapped till now. As a result there was never a clear and precise documentation on cranes habitats in these Dzongkhag. Thus, this study besides assessing the conservation threats and peoples' perception on Black-necked cranes, also tries to come up with detail map of the cranes' habitats in Bhutan.

Methodology

Study area

The study was carried out in the wintering habitats of Black-necked cranes in Bhutan (Figure 3). The study covers three Dzongkhag viz. Bumthang, Trashiyangtse and Wangdiphodrang.

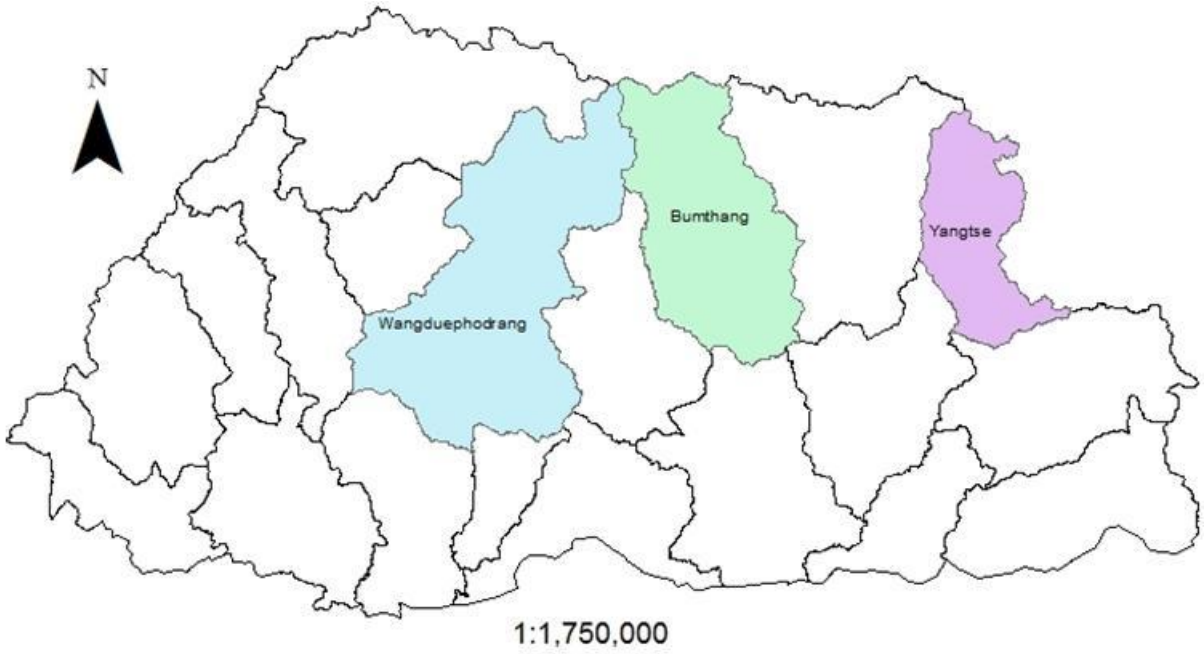

Figure 3: Map of the study area

The field survey for habitat mapping was carried out using the Garmin *GPSmap 60CSx* in recording the coordinates of the Black-necked cranes' habitats. The coordinates from both former (based on local people's information) and current roosting and foraging habitats in the study area were also collected.

For this study, we interviewed only those households falling within 3 km radial distance from the Black-necked crane's roosting or foraging habitats. A total of 107 households; 8 villages with 32 households under Trashiyangtse Dzongkhag, 7 villages with 53 households under Wangdiphodrang Dzongkhag and 5 villages with 22 households under Bumthang

Dzongkhag were determine using Yamane formula(Yamane, 1967)for household survey. Efforts were made to involve both the gender equally for the interview. Head of households and old people were targeted for interview with the assumption that they have more knowledge and experience about the household activities and their long acquaintance with Black-necked cranes and its habitats. In absence of the head of household, oldest members present in the family, at the time of visit, was interviewed.

The focused group discussions in the form of public meetings were conducted in all the three Dzongkhag to gather additional information on the conservation threats and the location of the habitats. The data gathered were further crosschecked through key informants viz. Gups[2], village Tshogpas[3], RNR extension staff, local forest officials and Non-governmental organizations.

Result and discussion

Current roosting and foraging habitats

The current roosting and foraging habitats of Black-necked cranes have been identified and the location mapped in all the wintering areas in the country (Figure 4).

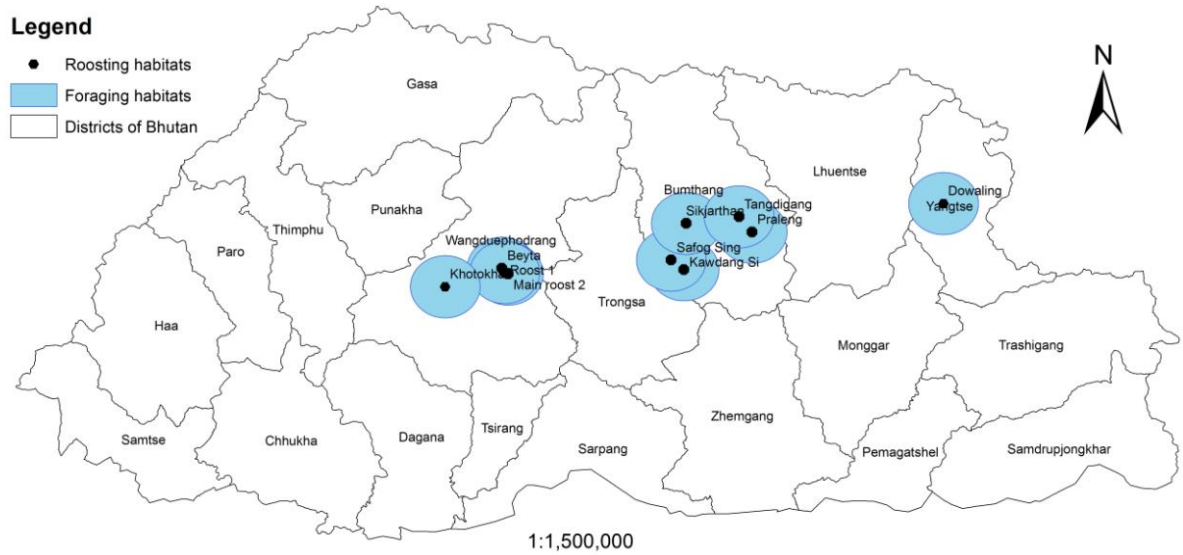

Figure 4: Habitat mapping of Black-necked Cranes wintering in Bhutan

[2] Elected block leader
[3] Elected village leader

In Bumthang Dzongkhag, there are five roosting habitats (two sites each in Chhume and Tang Geog[4] and one site in Chhokhor Geog) currently being used by Cranes wintering in Bumthang Dzongkhag. The roosting sites are Kawdang Singma (N27°29'01.0", E090°41'10.9) and Sagfog Singma (N27°30'41.4", E090°38'57.7") in Chhume Geog. Sikjarthang (N27°37'04.3", E090°41'35.5") in Chhokhor geog. And Tandigang (N27°38'12.5", E090°50'47.1") and Pralang (N27°35'33.7", E090°53'03.5") under Tang geog.

In Wangdiphodrang Dzongkhag, there are five roosting sites being used by cranes wintering in the valley of Phobjikha and Khotokha under Phobjikha and Gangtey Geog. The roosting sites are main roost ((N27°28'21.03", E090°10'31.70"), roost 1 (N27°28'15.77", E090°10'33.90"), Roost 2 (N27°28'32.00", E090°09'57.76"), Beyta ((N27°29'16.35", E090°09'28.12") and Khotokha ((N27°25'53.63", E089°59'29.99").

Trashiyangtse Dzongkhag has only one roosting sites at Dowaling (N27°40'31.9", E091°26'24.1") under Bumdeling Geog.

The foraging habitats of the Black-necked cranes include mostly the agriculture fields where barley, wheat and potatoes are cultivated and also include the wetlands. The current foraging habitats in all the sites are the agriculture field and wetland around the settlements and forages within a radial distance of 5-10 kilometers from the roosting sites.

The Black-necked cranes have also abandoned roosting habitats in two of the three Dzongkhag. They are Tshokhana and Samtengang roosting sites under Wangduephodrang Dzongkhag, Rodhungthang, Masaleng and Chamkhar roosting sites under Bumthang Dzongkhag. The roosting habitats may have been abandoned mainly due to drainage of wetland for agricultural land and construction of infrastructure for developmental activities. The foraging habitats were abandoned mainly due to agriculture lands being left fallow by the people, resulting in the reduction of the food availability for cranes and drainage of wetland for infrastructural development.

[4] Block

Conservation Threats

The conservation threats to Black-necked cranes wintering in Bhutan are divided into four major types and each of which is a combination of several interacting factors (Table 1).

Table 1. Conservation threats classification

Biological threats	Political threats	Social threats	Natural Threats
*Loss of habitats (Roosting, Foraging, Feeding, etc)	*Conversion of wetland for other purposes	*Hunting	*Mortality
*Food shortage	*Lack of well defined law and policies in Species conservation	*Trapping	*Predators
*Competition		*Killing	*Diseases
*Lack of scientific study		*Disturbances	*Environmental factors

Source: Upadhyaya, 2010

Of the total 84 respondents interviewed of the total 107 households, 47% of the respondents (Figure 3) were of the opinion that biological threat was the main threat to Black-necked cranes conservation in Bhutan, followed by social threat (18%), natural threats (8%) and political threat (7%). 20% of the respondents who did not define any threats were found to be from Wangdiphodrang Dzongkhag, where there has been an increase in cranes visitation.

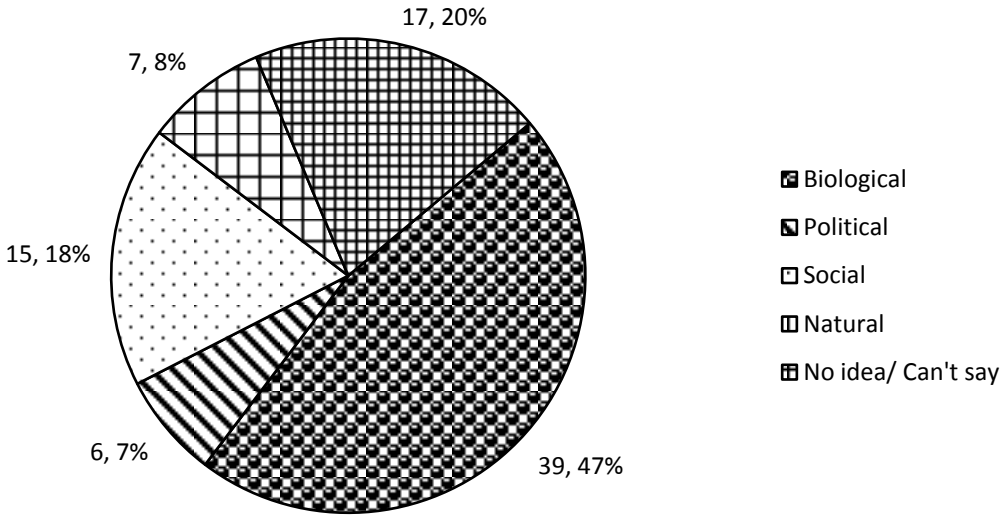

Figure 5. Conservation Threats to Black-necked cranes wintering in Bhutan

The analysis of the data confirmed that there is strong correlation between the population and farming trend in the study area $r = .698$, $p < .05$. This means that Black-necked cranes population trend in its wintering habitats is dependent or statistically significant on the way people practice farming in agriculture field. More areas under cultivation means, more foraging areas for cranes thus more number of cranes visitation. Likewise Biological threats is also statistically significant on the decline in the cranes population, $r = .727$, $p < .05$. This indicates that the biological threat has a direct affects on the decline in cranes population and vice versa.The use of chemical fertilizer in the agricultural field to increase crop productivity and population trend of cranes is not statistically significant to the decline or increase in crane population $r= -0.187$, $P>.05$, and thebiological threats and uses of chemical fertilizer isalso not statistically significant $r= 0.169$, $p >.05$. This contradicts the finding by Gu and Canjue, 1991 who have stated that the use of chemical fertilizer has significance to crane mortality.

The people's perceptions toward Black-necked cranes conservation analyzed using 5 point Likert scale on different aspects of Black-necked cranes had confirmed that the majority of the respondents choose to opt for the agreed option in the 5 point rating scale. Thus this study by looking at the likert scale analysis concludes that the people are an integral part and parcel of the sustainability of Black-necked cranes in its wintering ecology.

Conclusion

The Black-necked cranes have wintered in Bhutan since time immemorial. This is supplemented by the oldest respondent, 82 year old lady from Bumthang, where she states cranes being the part of Bumthang landscape from the day she could remember as a child. But saw a decrease in cranes coming to Bumthang each winter, even the record maintained with the RSPN showed a decreased in crane visitation in these two Dzongkhag from 1991-1992 year onward to till date, whereas cranes visitation in Phobjikha habitat showed an increasing trend.

The cranes were sighted during the study period in all the three Dzongkhag. The highest number of cranes, 422 birds was sighted in Phobjikha roosting habitat, followed by Bumdeling with112 birds, Bumthang with 9 birds and finally Khotokha with 7 birds. The study has confirmed the current roosting and foraging habitats of Black-necked cranes wintering in Bhutan.

The majority of the respondents reported biological threats as the major conservation threats to Black-necked cranes wintering in Bhutan. As a result, there is high possibility of Black-necked cranes abandoning their visit in Bhutan, if the conservation measures are not initiated on time. This study also acknowledges human and their agricultural practices to be an integral part of the Black-necked cranes sustainability.

This study recommends the inclusion of Bumthang cranes habitat to be brought under crane conservation areas like those in Phojikha and Bumdeling. And further researches are required to determine the effects of use of chemical fertilizers to the Black-necked cranes mortality and the significance of the farming practices to cranes population trend.

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