# Assessment of White-bellied Heron (*Ardea insignis*) population and its distribution in Kurichhu and Drangmachhu basins, Eastern Bhutan

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## Introduction

White-bellied heron is the most critically endangered amongst many heron species found in Bhutan. Within the range countries of Bhutan, Myanmar, India and China, the second international range country workshop held in Lobesa Bhutan in 2015 there are only 60 individuals reported. Of these, there are about 28 individuals reported from Bhutan alone making the country home to nearly 50% of the world's white-bellied heron population. The annual monitoring of population by the Royal Society for Protection of Nature (RSPN) indicates that the population in Bhutan is slightly decreasing over the last ten years.

Although Bhutan is known to host major population of White-bellied heron, Habitat degradation due to anthropogenic activities are evidently contributing to population decline. The habitat mapping (Dorji, 2011) found about 347.86 $km^2$ of suitable habitat comprising just 0.9% of the total geographical area. The current distribution is confined only to 50% of the available habitat with best record from Punatsangchhu and Mangdechhu Basins. However, the decreasing population trend in those basins is likely to be attributed to disturbance such as construction of mega hydropower dams and powerhouse. There are possibilities that they might migrate to an areas that are relatively undisturbed.

The Kurichhu and Drangmachhu Basins are relatively undisturbed with high potential to form better habitat to this heron species. With the objectives to confirm their presence and assess their population and distribution, the survey has been conducted in the month of winter (Jan. to March) of 2017 and Pre monsoon (April to May) of 2018. While the physical threats and peoples' perceptions are assessed, the presence of species could not be confirmed as there was not a single individual was sighted during the study period.

The river characteristics based on the field observation shows that Drangmachhu has higher potential to host heron population in future. In terms of disturbance, the proposed Kulongchhu hydropower projects –the upper catchment of Drangmachhu will pose greater threats to survival of the species.

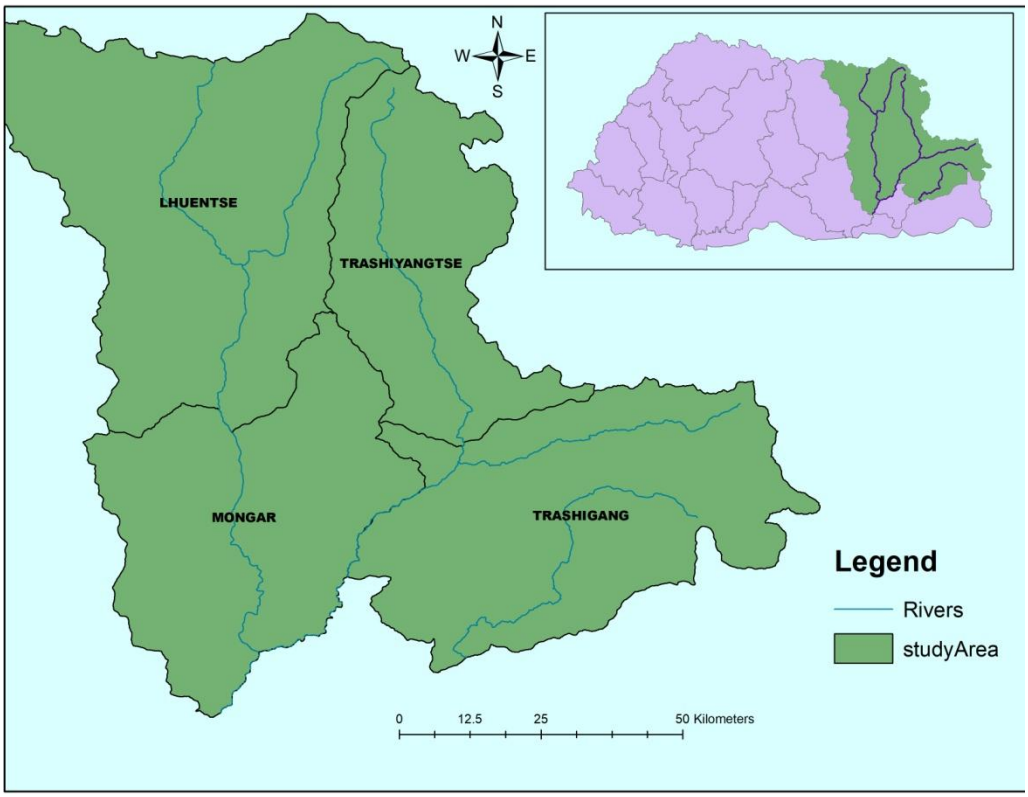
## Objectives

The study has been carried out with the following objectives

1. To validate the presence and absence of White-bellied heron in the eastern part of Bhutan projected by habitat suitability model
2. To assess population and distribution of white-bellied heron along Kurichhu and Drangmachhu Basins

## Study Area

The Kurichhu and Drangmachhu are two major tributaries of River Manas that flows across Royal Manas National Park, Bhutan and Manas National Park in India. As such they support many life forms, both aquatic and terrestrial from border of China in the North to India in the south. The records show that both the rivers are important habitat for golden mahaser (*Tor putitora*) and many water birds like black-necked crane and white-bellied heron. From the social perspectives, these rivers expand across Trashigang, Trashiyangtse, Mongar, Lhuntse and Zhemgang Districts benefiting thousand of settlements along its valley (See Map 1). Economically, a Kurichhu hydropower project at Gyalpozhing is one of the pioneer projects that have significantly contributed to socioeconomic development in the country.




**Map 1. Study area covering four districts and two Rivers Basins in the East**

## Materials and Methods

The line transects and point count methods were used in this project. Using river as transect, a 20 meter circular plot was laid at every 1000 meters alternately at both sides of the river. The habitat characteristics such as depth of water, topography, and water speed and vegetation type were noted. For questionnaire survey, the households falling within 500 meters buffer from river were randomly interviewed.

The survey has been carried out in two seasons with consistent monitoring for entire one year. The first phase survey in winter (January to March 2017) was conducted to basically ascertain the presence and absence of the species. This involved direct observation and scanning of areas by a team of surveyor. Simultaneously, the habitat has been assessed based on the physical threats observed along the river. The random household interview was conducted for people living adjacent to river seeking their expertise on recent sight of the species.

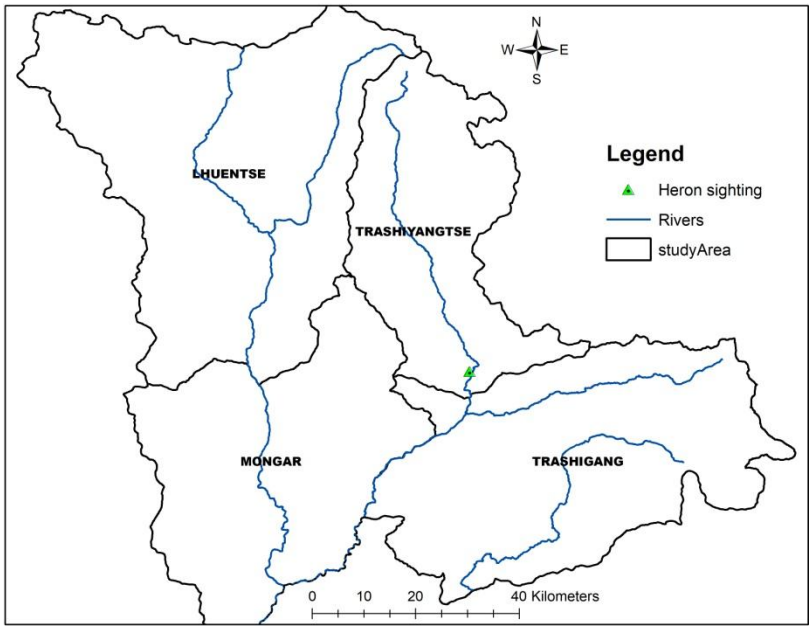
The second round of survey was conducted in pre-monsoon (April to May 2018) to assess the habitat characteristics and confirm the species presence.

## Results and Discussion

### Presence and absence

The lone sighting of white-bellied heron in 2015 was only record that confirms presence of White-bellied heron in Drangmachhu basin while no sighting has been recorded in Kurichhu basin (Map 2). The present survey in both the basins has not been able to confirm the current distribution in the study site.

Of the total interviewee (N=37), 97% (n=36) confessed that they are totally unaware of the bird based on the physical features and photographic evidence shown to them. This indicates that the Drangmachhu and Kurichhu are unlikely to be historical range for white-bellied heron. The single sighting in Doksum, Trashiyangtse could be recent dispersal from other known areas.



Map 2. The sighting location of White-bellied heron

**Population count**

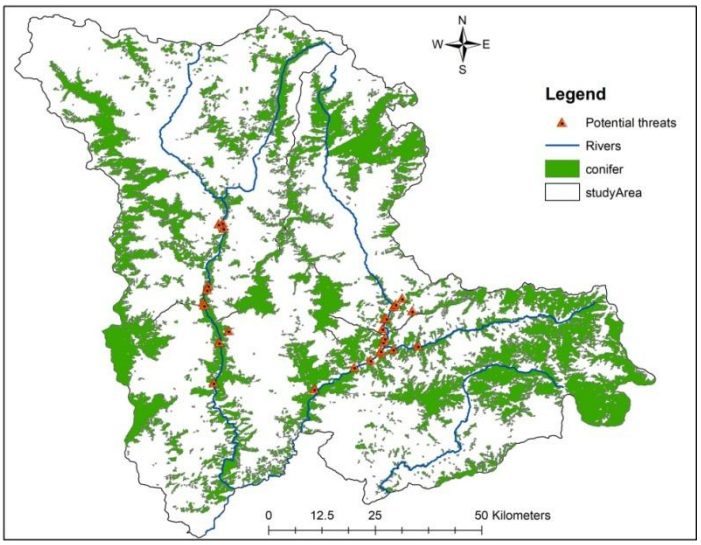
With no sighting recorded during the current survey, the population has not been able to ascertain within the study period but the past sighting records from 2015 is only the basis for single individual found in the entire eastern region.

**Habitat Assessment**

Although conifer forest primarily chirpine trees are found in both the basins, the mature stands are not available along the river (Map 3). The White-bellied heron requires mature chirpine trees to roost and nest based on the records from Punatshangchhu and Mangdechhu basins. Absence of mature chirpine trees could be one of the factors that are inhibiting their occurrence.

The shallow river valley, speedy water flow and high water depth are recorded at major stretch of both the river basins. These characteristics are likely to inhibit occurrence and distribution of white-bellied heron unlike in Punatsangchhu and Mangdechhu.

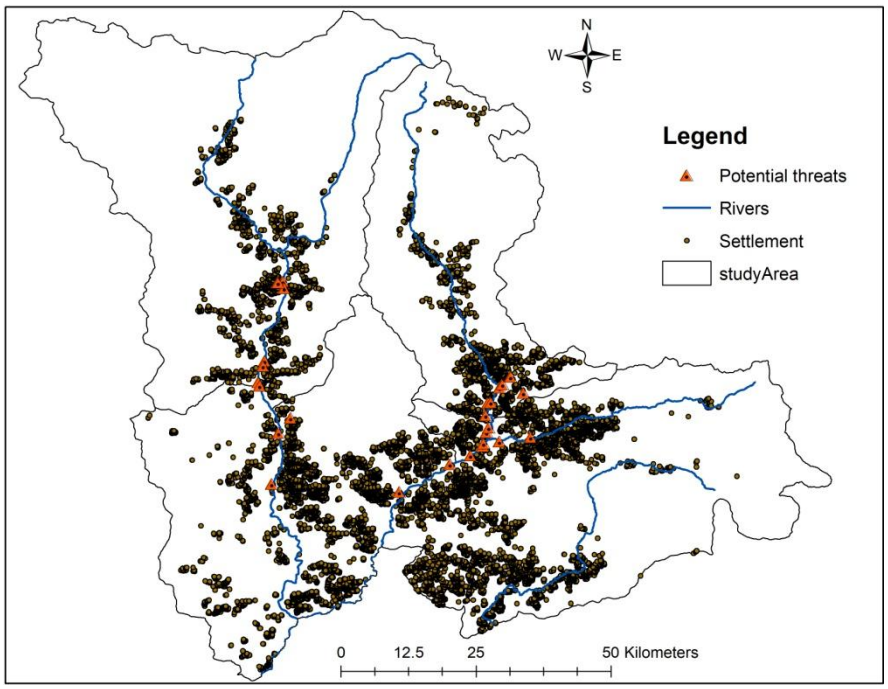
The potential threats in case of this study include surface collection of boulder and sand, small factory, bridges and settlements. In both the river basins there are anthropogenic activities but relatively in small scale (Map 3). The large scale potential threat in terms of disturbance to its movement could be from proposed kholongchhu hydropower project and Gyalpozhing-Nanglam highway.



Map 3. The habitat conditions showing availability of chirpine forests and potential threats

**Settlements**

The settlement density is high in both the river basins but mostly comprise of rural villages (Map 4). With low intensity of activity pattern in rural areas, the settlements may not be that detrimental to both habitat and survival of the species. The previous study from Punatsangchhu and Mangdechhu indicate that local people hardly pose any direct threats to this heron except indirect disturbance caused by cattle grazing and agriculture activities.



Map 4. Settlements along the river basins

**Recommendation**

Trashigang Forest Division and Mongar Forest Division may develop monitoring plan in their respective jurisdiction and include in their annual work plan of the field staff. Consistent effort is required to increase chances of observing the bird. In the process, both the Divisions will be able to document bird diversity in their respective locations.

**Acknowledgement**
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5. The local community of both the river basins for their time and valuable information during the survey
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**Annexure A**
**Habitat and threat assessment survey of White-bellied heron in Drangmachhu and Kurichhu**

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Date of survey: _____

| Observation | GPS Coordinate | | Elevation | Vegetation type | Water flow | Water depth | River topography |
|---|---|---|---|---|---|---|---|
| | N | E | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

**Annexure B**
**Presence-absence survey of White-bellied heron in Drangmachhu and Kurichhu**

Date of survey: _____

Starting GPS: N_____ E_____

End GPS: N _____ E _____

Elevation Start: _____ Elevation end: _____

**Observation details**

| Time | Name of bird | No. | GPS coordinates | | Behaviour | weather |
|---|---|---|---|---|---|---|
| | | | N | E | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**Note: Any other significant observation can be noted at the back page.**

**Annexure C**
**Questionnaire survey for White-bellied heron in Drangmachhu and Kurichhu**

Date of interview: _____
Name of Respondent: _____
Gender: _____ Age: _____
Village: _____ Geog: _____
District: _____ River Basin: _____
GPS Coordinates: N_____ E _____ Elevation: _____

1. Have you seen White-bellied heron (say local name) in your locality? YES NO
2. If YES, when did you see?
    a. First time: _____ (year)
    b. Last time: _____ (year)
3. If NO, do you see any other water birds in your locality? YES NO

1. Have you seen people hunt any water birds? YES NO
2. If YES, what could be the reasons for hunting?
    a. Feather
    b. Bush meat
    c. Other medicinal value
3. Have you seen people fishing in your locality? YES NO
4. If YES, how often do you see them?

a. Every day
b. Every week
c. Every month

5. Have you seen any water birds killed due to electric wire or road construction? YES NO
6. If YES, how many? _____
7. Have you seen people poisoning water? YES NO
8. Have you seen people using electrodes for fishing? YES NO

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1. Is there any conflict between people and water birds in your locality? YES NO
2. Do you think that the water birds should be protected? YES No
3. In the last few years have you seen any changes in river regime?
   a. Increase water volume
   b. Decrease water volume
   c. Change in flow direction
   d. Rapid flooding

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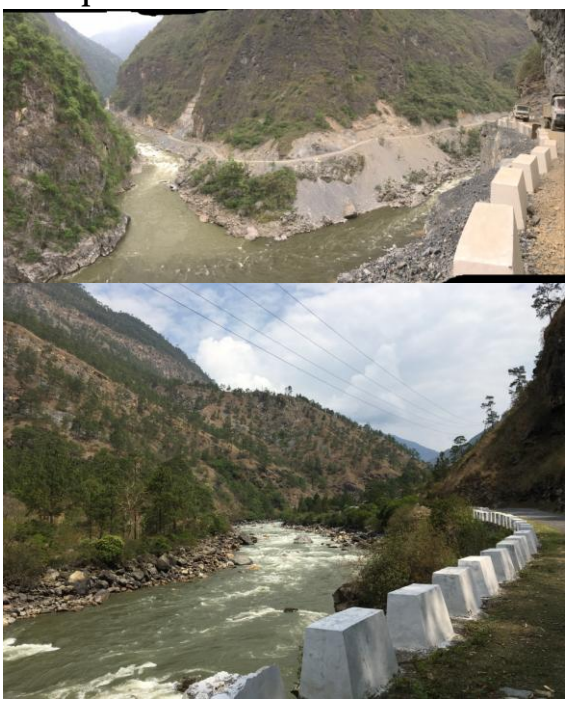
Name of interview: _____Contact No. _____

**Some pictures from the field**




**Potential habitat for white-bellied heron along Kurichhu and Drangmachhu**