



*(Ardea insignis)*

# White-bellied Heron Conservation Action Plan

2022 - 2031



**Royal Society for Protection of Nature  
Department of Forests and Park Services**

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### **Citation**

RSPN and DoFPS (2022). White-bellied Heron Conservation Action Plan (2022-2031). Royal Society for Protection of Nature and Department of Forests and Park Services, Ministry of Agriculture and Forests, Thimphu, Bhutan.



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**Royal Government of Bhutan**  
**Ministry of Agriculture and Forests**  
**Department of Forests and Park Services**  
**Thimphu**



### MESSAGE FROM DIRECTOR

The White-bellied Heron is one of the rarest birds in the world with an extremely small and rapidly declining population of fewer than 60 individuals found only in Bhutan, India and Myanmar. The population is projected to decline further in the near future as a result of the loss and degradation of the habitats and from direct threats. Nevertheless, Bhutan is a proud home to close to fifty percent of the total global population. The population in Bhutan remained quite stable during the last decade which is an indication of the success of our collective conservation efforts.

In Bhutan, the White-bellied Heron is one of our priority species for conservation and is listed under schedule I of the Forest and Nature Conservation Act thereby providing the highest legal protection. During the last three decades, the species received constant and collective conservation support from different conservation organizations and partners led by the Royal Society for Protection of Nature.

However, the riverine landscapes in Bhutan which is the prime habitat for this rare and elusive bird are under tremendous pressure from rapid developmental activities and global climate change. In addition, the extremely small population size with a restricted distribution range of the species poses added extinction risk to the species.

Therefore, I feel it is very timely to come up with this conservation plan to protect and increase the White-bellied Heron population in Bhutan. I am also very happy to share that this plan was developed as a collaborative effort between the Department of Forests and Park Services and the Royal Society for Protection of Nature and I would like to express my appreciation to the planning team. Further, for the plan implementation, I look forward to continued support and collaboration from the different conservation organizations and partners including our local communities.

I wish successful implementation of the plan.

Tashi Delek

**Lobzang Dorji**

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# ལྷ། ། རྒྱལ་འཛོལ་རང་བཞིན་སྲུང་སྐྱོབ་ཚོགས་སྡེ། Royal Society for Protection of Nature

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## Message from the Executive Director

White-bellied Heron (WBH) is a Critically Endangered species of the world, listed under the IUCN Red List Category since 2007. The International WBH Conference held in Bhutan in 2015 reported that there were less than 60 individuals in the whole world where Bhutan hosts more than 45% of the global population. WBH has reportedly disappeared from Nepal and Bangladesh and the current population is restricted to Northern Myanmar, Northeast India and Bhutan. The species is under extensive pressure from multiple increasing threats and has shown the population declining from all of its habitat range countries. WBH is likely to disappear from Bhutan if very low natural population recruitment dynamic persists for a long time and no interventions are planned to address this problem. RSPN has robustly ventured into in-situ conservation since 2003 and has leveraged and flagged several international and local communities' support in the conservation of WBH. RSPN has also embarked on the ex-situ conservation initiatives with the establishment of the White-bellied Heron Conservation Center at Chachey Dovan, Tsirang, to supplement the declining population through breeding and release back initiatives.

RSPN is supported by various international projects such as International Climate Initiative (IKI), German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), MAVA Foundation, BTFEC, Synchronicity Earth, International Crane Foundation (ICF), KNCF, PHPA I and II, National Geographic, Zlin Zoo, and Prague Zoo.

Implementing several projects of varying sizes on the singular species was thought to have duplication of efforts in WBH conservation, Therefore, this Action Plan was prepared in line with RSPN's five-year strategy document and it also serves as an information tool for collaborators and stakeholders. The Action Plan highlights the in-situ and ex-situ conservation of WBH in Bhutan and beyond for the next ten years. I am happy that this Action Plan will bring everyone on board, while enhancing proper planning and coordination, and collective implementation of the conservation and Communities' livelihood initiatives.

The Royal Society for Protection of Nature would like to thank all our donors, advisors, partners, collaborators and stakeholders for their highest degree of stewardship and leadership displayed for the conservation of White-bellied Heron in Bhutan and beyond. Through this action plan, we hope to also further strengthen partnership and collaborative efforts with our partners especially with the Department of Forests and Park Services, Royal Government of Bhutan. Let's save WBH from extinction and together we can.

Kinley Tenzin (Ph.D)  
Executive Director

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## ACKNOWLEDGEMENTS

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This Conservation Action Plan to conserve the critically endangered White-bellied Heron is a product of multi-institutional collaboration and support of many individuals. Each participant has graciously contributed, considering the urgent need for restoring and preserving the low population size of the White-bellied Heron in the world. Every idea that was integrated as actions in this plan was filtered with scientific justifications and targeted in achieving the shared goal of conserving the White-bellied Heron and other associated species.

As this plan becomes effective from the year 2022, every action that is framed with SMART goals and objectives is expected to bring on board various conservation partners, government agencies, academic institutions, communities, NGOs, and international partners driving all towards the common goal of saving the last remaining WBHs from extinction. There is no doubt that everyone will put forward the best measures to save the White-bellied Heron and our biodiversity.

This action plan was developed through funding support from the Bhutan Trust Fund for Environmental Conservation (BT FEC).

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## ACRONYMS

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<b>BPC</b>	Bhutan Power Corporation
<b>BT FEC</b>	Bhutan Trust Fund for Environmental Conservation
<b>DoA</b>	Department of Agriculture
<b>DoL</b>	Department of Livestock
<b>DoPFS</b>	Department of Forests and Park Services
<b>ESRAM</b>	Ecosystem and Socio-economic Resilience Analysis and Mapping
<b>IEC</b>	Information, Education and Communication Materials
<b>IKI</b>	International Climate Initiative
<b>LCSG</b>	Local Conservation Support Group
<b>LG</b>	Local Government
<b>MoAF</b>	Ministry of Agriculture and Forests
<b>MoE</b>	Ministry of Education
<b>MoU</b>	Memorandum of Understanding
<b>NCD</b>	Nature Conservation Division
<b>NEC</b>	National Environment Commission
<b>RSPN</b>	Royal Society for Protection of Nature
<b>FRG</b>	Forest Resource Group
<b>RGoB</b>	Royal Government of Bhutan
<b>RUB</b>	Royal University of Bhutan
<b>TCB</b>	Tourism Council of Bhutan
<b>UWICER</b>	Ugyen Wangchuck Institute for Conservation and Environmental Research
<b>WBH</b>	White-bellied Heron

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## EXECUTIVE SUMMARY

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One of the rarest bird species in the world, the White-bellied Heron has a small thriving population of fewer than 60 individuals remaining in the world. The species is sparsely distributed in the foothills of the Eastern Himalayas. Due to low population size and restricted distribution range, the species faces a serious risk of extinction. Therefore, this document outlines the strategic actions in protecting and recovering the population of White-bellied Heron in Bhutan.

To save WBH from the verge of extinction, it is compelling for any institution and steward of this species to pursue measures in conserving and revitalizing the wild population. There is a significant need to streamline the conservation measures that would address threats to the species; improve the breeding success rate; enhance ecological knowledge; and use advanced options in conservation breeding, and captive population management. The measures as enshrined in this action plan will significantly contribute to protecting and restoring the last remaining White-bellied Heron populations and their habitats.

This action plan highlights various approaches for proper protection, preservation, and management of population and habitats. It also includes regular population monitoring and surveys of the wild herons to the conservation breeding & management in restoring the population. Considering the nature of threats which are mostly anthropogenic, the activities are focused in community mobilization and engagement, education and advocacy programs, and means to enhance the livelihood of local communities residing in White-bellied Heron landscape.

This action plan further complements the past conservation efforts as well as sets clear direction through the mechanism of rigorous interventions in saving the bird. The DoFPS and RSPN will collaboratively arrange funding and implement the action plan. There is also scope of collaboration with various stakeholders who can directly or indirectly contribute towards conserving the White-bellied Heron.

The plan was developed following a recommended scientific process of Open Standards for the Practice of Conservation. It outlines in detail the conservation target, viability of conservation target, threats to conservation target, conservation actions and the process of implementation and monitoring the actions. All the activities indicated in this action plan are also most feasible and achievable within the 10 years period, 2022-2031, within the capacity of relevant stakeholders working towards the shared conservation goal.



01

Background

## 1.1 Introduction

Globally, White-bellied Heron (WBH) is classified as Critically Endangered for having an extremely small and rapidly declining population. The global population size is as low as fewer than sixty individuals remaining in the wild as confirmed by the WBH conference held in Bhutan in 2015. However, a further decline is projected in the near future as a result of the loss and degradation of lowland forest and wetlands, and through direct exploitation and disturbance. Many of the range countries where the species occurs are undergoing a rapid development that involves the exploitation of wetlands or riverine landscapes and forested areas. These activities will further aggravate the low population size. So, proper mitigation measures are highly solicited in minimizing the threats to WBH and their habitats.

The WBH is currently distributed in isolated places of Bhutan, northeast India, and northwest Myanmar. These ranges are also important biodiversity sites having a high diversity of both flora and fauna in the region. The cultural diversity of many indigenous practices that depicts a close association with nature is still in practice in the area. Saving the WBH in the region has therefore added global value.

In Bhutan, White-bellied Heron is a rare resident species that is found mostly in major fast-flowing rivers. Its preference for riverine habitat is mainly because of its foraging nature and piscivorous diet. For nesting, it prefers forested areas near the rivers where the nests are usually built on an open branch of tall trees. Based on the annual population surveys over the last two decades, 20 - 30 individuals of WBH are known to occur in Bhutan, which is an equivalent 45 – 50 percent of the global population. However, with the change in the riverine landscape induced by rapid developmental activities and global climatic events, WBH is at equal risk in Bhutan as it is in the range countries.

RSPN, as a leading conservation NGO for WBH conservation in the region, has been playing a significant role in managing and advocating conservation needs. Since 2003, RSPN in collaboration with the nodal government agencies has been working for the conservation of WBH. Today, the species is also protected under schedule I in Forest and Nature Conservation Act 1995 which ensures the highest legal protection in the country.

## 1.2 Conservation Action Planning

This Action Plan development was conceived using the Open Standards for the Practice of Conservation, a framework of version 4 developed by the Conservation Measures Partnership (CMP, 2020). This standard helps to set an adaptive management framework for conservation through the systematic planning, implementation, and monitoring of conservation initiatives in a five-step project management cycle (Fig.1).

The content development and flow in this action plan are guided by the components outlined under each step of the project management cycle. For this action plan, key areas of descriptions were made on the steps, assess, plan, and implement.

The Miradi software was adapted to visualize and document the key threats and opportunities, priority strategies and specific actions, expected results, associated goals and objectives, and progress toward conserving WBH.



Figure 1: Open Standards for the Practice of Conservation (CMP, 2020)

02

## Species Information



## 2.1 Taxonomy

The White-bellied Heron (*Ardea insignis* Hume, 1878) belongs to the family Ardeidae, order Pelecaniformes, and is found in freshwater ecosystems of the Himalayas. As described in the conservation strategy of WBH(2015), the species has had a rather chequered nomenclatural history, having been linked with the specific names *fusca*, *insignis* and *nobilis* (Blyth 1844, Gray 1844, Gray and Gray 1846, Stray Feathers 6 [1878]: 470–472) as well as *imperialis*. Although *insignis* gained general acceptance, E. C. S. Baker (Bull. Brit. Orn. Club 49 [1928]: 40) later argued that its use was invalid (a nomen nudum) and renamed the species *Ardea imperialis*. However, it was later described by A. O. Hume in 1878 (Stray Feathers 6:470) as *Ardea insignis* (Sibley & Monroe 1990) and the accepted name now is *Ardea insignis*, the White-bellied Heron.

### Scientific Classification

<b>KINGDOM</b>	Animalia
<b>PHYLUM</b>	Chordata
<b>CLASS</b>	Aves
<b>ORDER</b>	Pelecaniformes
<b>FAMILY</b>	Ardeidae
<b>GENUS</b>	Ardea
<b>SCIENTIFIC NAME</b>	<i>Ardea insignis</i>
<b>AUTHORITY SYNONYMS</b>	Hume, 1878 <i>Ardea imperialis</i> ssp. <i>imperialis</i> Hume, 1878-Collar and Andrew (1988)

### Common Names

<b>ENGLISH</b>	White-bellied Heron
<b>DZONGKHA</b>	Chubja Phowkarp/Bja Eako Raem
<b>LHOTSHAMKHA</b>	Saray Haas, Raja Haas
<b>KHENGKHA</b>	Woong Rila
<b>SHARCHOPKHA</b>	Ngangkha (not confirmed)
<b>YANGTSEPAKHA/DZALAKHA</b>	Ngäp Bja

## 2.2 Physical Description

The White-bellied Heron is a large, long-necked, and long-legged water bird found along the open banks of freshwater river systems in the inner Himalayas. Its body is dark greyish with contrasting white throat, belly and vent, and white-streaked scapulars, fore neck and upper breast. Both males and females have two lace-like white plumes: crest on the nape. During breeding seasons, plumage turns light grey with a whitish neck and crest. Juveniles appear darker than adults with more streaked on the neck, browner-tinged vent and smaller plume. It has a large and sharply pointed black bill with a slightly serrated lower mandible at the tip. The chin and lower mandible are whitish undersides while the upper mandible is black.

## 2.3 Distribution

### Global Distribution

The WBH global distribution has shrunk by more than 60% in the last one century. Historical ornithological literature shows that the bird occupied a large area of the Himalayan foothills, from the plains of Nepal, across northeast India including Sikkim, Darjeeling, West Bengal, Assam, Arunachal, and Nagaland, and Bhutan to southern Myanmar bordering with Thailand, during the first quarter of the 20<sup>th</sup> century (Baker 1928; Ali 1993; Hancock & Kushlan 2005). During the second and third quarters of the 20<sup>th</sup> century, the species was extirpated from most of its historical range, restricting itself to Bhutan, northern Assam, Arunachal, and northern Myanmar. The bird has been declared extinct from Nepal, and there are no recent records from West Bengal, southern Myanmar, and Bangladesh, suggesting that the overall range has contracted substantially. Figure 1.1 below shows the current global distribution of WBH.

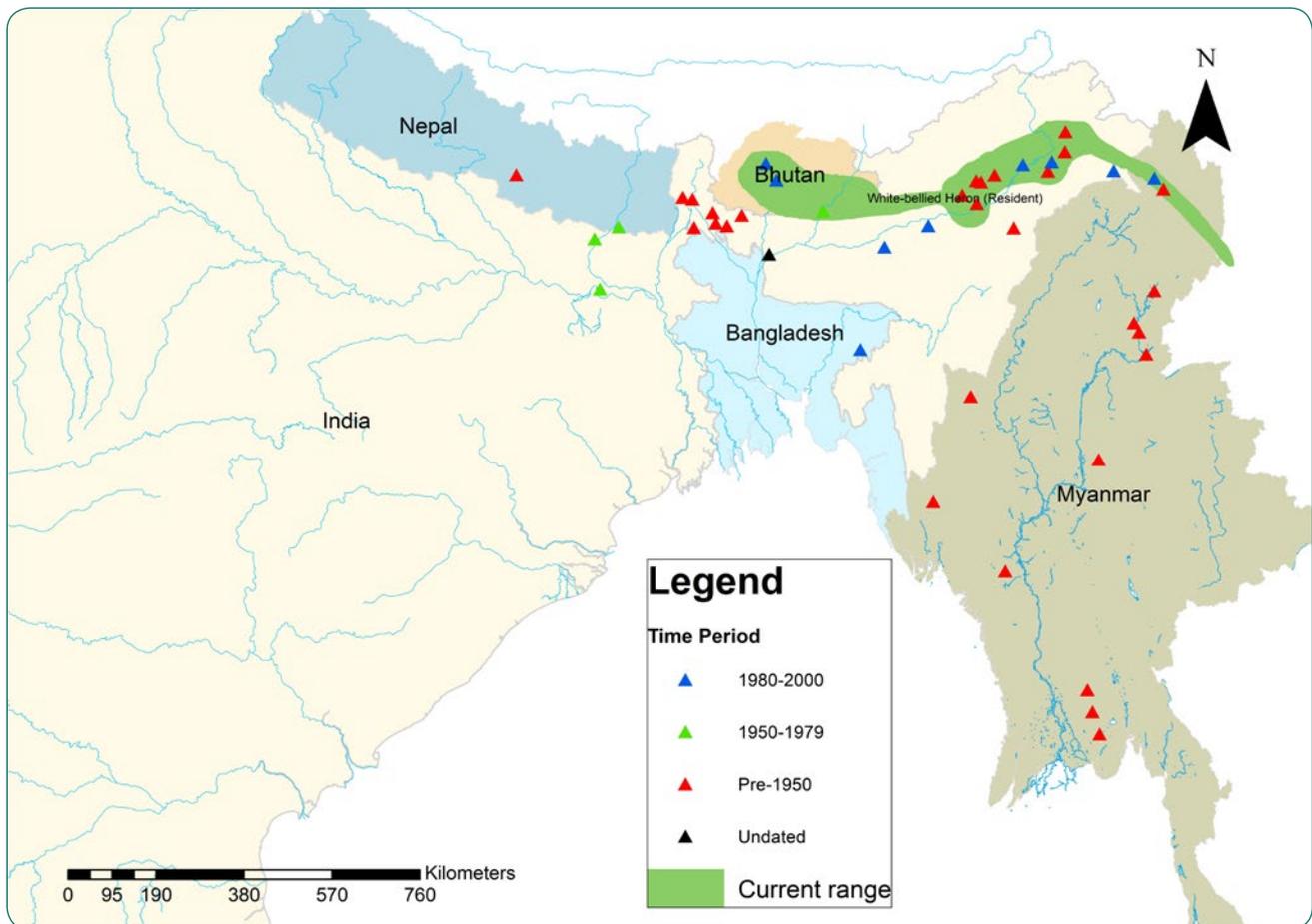


Figure 1.1: The distribution range of White-bellied Heron

### Distribution in Bhutan

In Bhutan, WBH is distributed in temperate and mixed-broadleaf forests of three major river basins: Punatsangchhu, Mangdechhu and Kurigongri, at an altitudinal range of 100–1800 m. Today, it has been observed in more than 14 locales that are regularly occupied and used.

An optimistic habitat suitability model (Fig.1.2) predicts that only 3891.06 km<sup>2</sup> (10.13%) of total area in Bhutan is highly suitable for WBH, an additional 5747.97 km<sup>2</sup> (14.97%) is suitable, and 93.83 km<sup>2</sup> (0.24%) is least suitable. The remaining 74.65% (28661.12 km<sup>2</sup>) is not suitable, which comprises areas that fall above an altitude of 2000 m, near the settlement, built-ups, agricultural land and rocky outcrops.

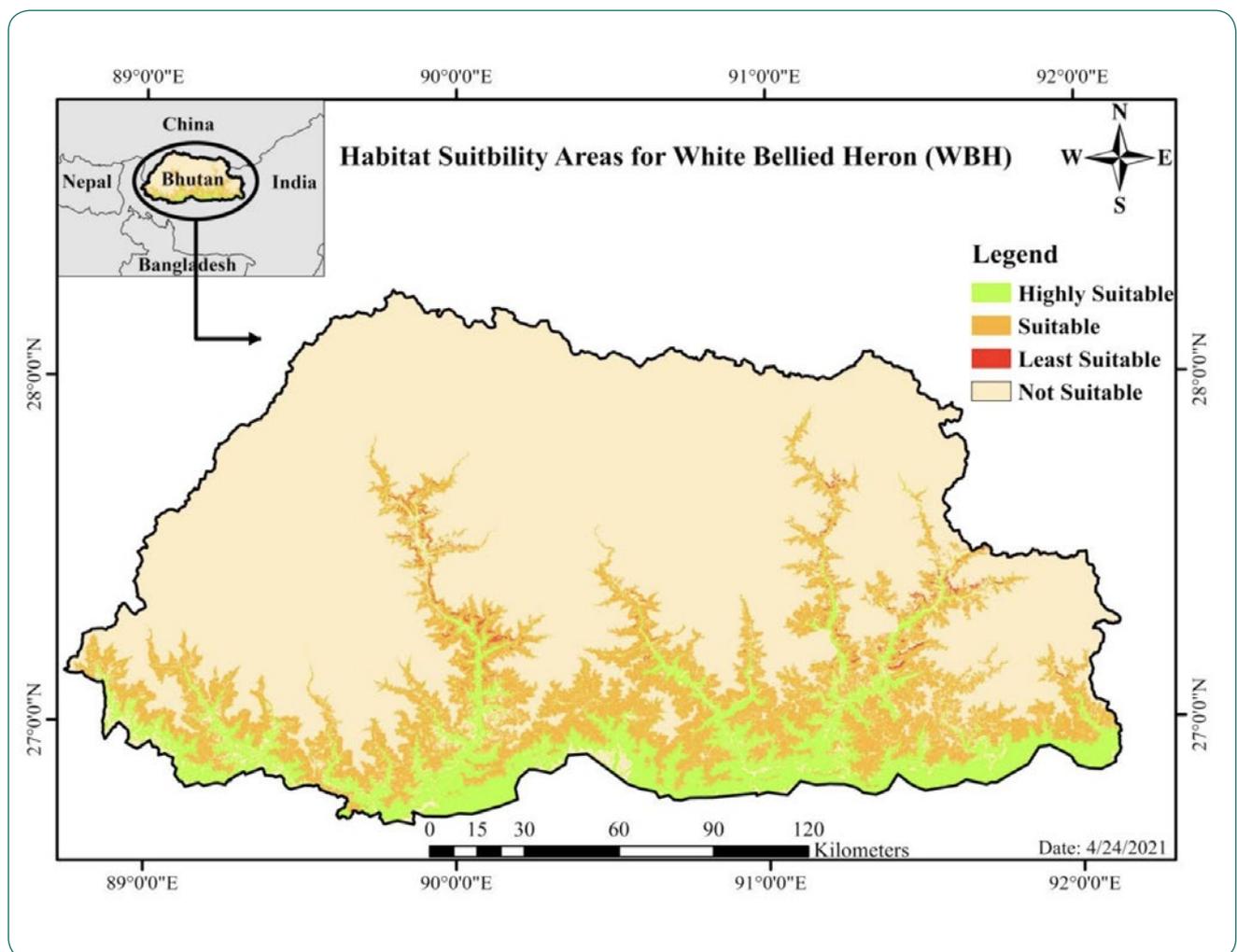


Figure 1.2: White-bellied Heron habitat suitability map

The total population in Bhutan has remained between 14 to 30 individuals based on annual simultaneous surveys from 2003 to 2021. Based on the monitoring, one to five active nests have also been recorded from 2003 to 2021, perhaps fewer than 5 breeding pairs are known to occur in Bhutan. Bhutan probably has only known and successful breeding populations in the world. Map Fig 1.3 below shows the nesting sites in Bhutan.

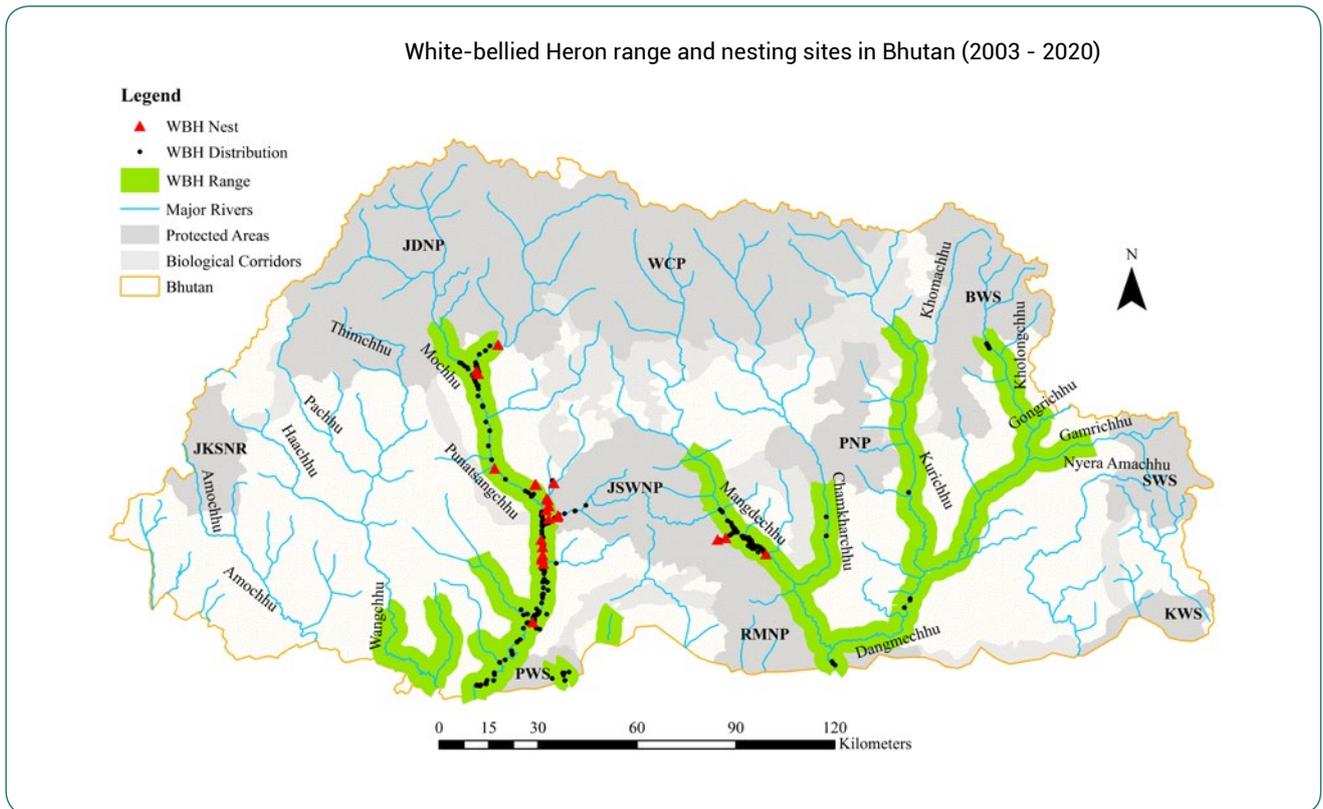


Figure 1.3: White-bellied Heron range and nesting sites

## 2.4 Conservation Efforts

In Bhutan, RSPN's engagement in the study and conservation of White-bellied Heron started from the year 2003. In the same year, the first active nest was sighted at Zawa in Wangdue Phodrang district by a local resident. Since then, consistent research and surveys of nesting sites, feeding, threats, distribution, movement and habitat needs have been conducted along with documentation of socio-cultural information. Besides research, RSPN has also been making some major efforts to recover the WBH population through habitat protection and restoration. In 2011, RSPN in collaboration with San Diego Zoo undertook the first-ever captive rearing of WBH with eggs collected from wild nests. The team managed to artificially incubate and rear the chick in the lab for the first time. The chick was carefully reared and released back to the wild after hand-rearing in captivity for 134 days.

In 2016, two juveniles from a nest in Burichu were tagged with satellite transmitters - T1 and T2, with the help of Synchronicity Earth, United Kingdom, to monitor their movement. However, the information from the transmitter could be received only for a short period of time, (both in the case of 2011 and 2016) as the type of satellite transmitter used was not appropriate for WBH. RSPN plans to attempt another tagging using a more advanced technology that is most suitable for WBH.

To garner community support and engagement in WBH conservation, activities offering alternative livelihood opportunities for the communities in the WBH range were also

implemented. Awareness, education and advocacy have been carried out consistently as an integral part of WBH conservation.

RSPN in collaboration with various stakeholders, both national and international, have been putting in efforts to conserve the population and habitats. From the in-situ conservation mainly focused on restoration and conservation of the wild herons and habitats, to now RSPN is equally taking up the ex-situ conservation initiative to save the species from extinction with the establishment of the Conservation center at Chachey Dovan, Tsirang which was funded by PHPA- I & II.

Currently, with funding support through International Climate Initiative (IKI), German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), RSPN is upscaling the conservation efforts. Through this project, some of the key degraded WBH habitats will be restored, and the community's livelihood will be enhanced and streamline the conservation of other biodiversity in the WBH landscape.

To further enhance the species knowledge, RSPN in collaboration with academic institutions in the country has been conducting numerous studies on the behaviour, diet, habitat preferences, and threats to WBH in the country.



**Figure 1.4:** Captive Breeding Center for WBH at Chachey Dovan, Tsirang

# 03

## Action Plan Vision & Context



### 3.1 Vision

A viable population of White-bellied Heron thriving in the healthy riverine ecosystems of Bhutan.

### 3.2 Scope

This action plan is outlined to enhance the conservation of WBH within Bhutan for the next ten years. Currently, WBH is distributed in Punatsangchhu, Mangdechhu and Kurigoingri basins, mostly occupying the undisturbed stretches of these major rivers. The scope of this action plan ranges from protecting and preserving the currently known habitats and populations to assessing and identifying potential habitats across the country. The plan covers both the conservation of wild herons and their habitats as well as supplementing the existing population through conservation breeding and release initiative.

### 3.3 Conservation Target

White-bellied Heron is the target and the species of concern. It has an extremely low and declining population of fewer than 60 individuals spread within 165,000 sq km of the global range. It is critically endangered and on verge of extinction

**Table 3.1:** Global and National status of species

Status	White-bellied Heron
Global Status	CR
National Status	Schedule I

Our ecosystem is an intricate form of all living things. Therefore, threat to any species threatens our own survival. Ecosystems of terrestrial and aquatic environments provide us with varied materials for our survival. They also regulate climate and biodiversity. As biotic components, birds play important role in the effective functioning of these systems. They are predators, they are prey, and they are players in a food chain indicating the general state of our biodiversity. The decrease in the population of birds indicates the deteriorating condition of biodiversity. So, the conservation of WBH can significantly contribute to sustaining socio-economic, ecological, and cultural ecosystem services.

#### *Socio-economic significance*

Under the panorama of WBH conservation, hundreds of local communities are supported with livelihood, ecotourism, and business opportunities. Local communities are engaged, trained, and provided incentives for supporting WBH conservation. WBH is thriving in the unique habitat that demands a healthy watershed area. The conserved watershed will contribute to maintaining healthy water flow to run the hydropower and support the agriculture activities. At present revenue generation through hydropower is the main contributor to the socio-economic development of the country. Moreover, many Bhutanese are engaged in an agrarian economy. The healthy watershed area can be also an important source of income where people harvest wild vegetables and other NWFPs with economical values.

### *Cultural significance*

Animals, in general, are considered sacred from the perspective of Bhutanese culture. Many of the places having giant trees, rocks and lakes are considered sacred and worshipped by the people. Historically, the significance of animals is depicted in various wall paintings of fortresses and important religious sites. The traditional folktales and songs are also revered with the lyrics of birds and other animals. There are many myths and beliefs associated with birds still embedded and prevalent in the Bhutanese community. Unfortunately, locals often associate WBH with negative myths and believes. In some of the sites in Bhutan, sighting of WBH is often considered as an bad omen. However, the rarity and magnificence of WBH have always garnered its importance for conservation. Therefore, the conservation of WBH and associated habitats has a significant role in helping to preserve and promote valued historical cultures.

### *Ecological significance*

The distribution of WBH to undisturbed freshwater river systems and its piscivorous feeding behaviour can be easily associated with the health of the ecosystem and pristine environment. They are predators, they are prey, and they are players in a food chain indicating the general state of our biodiversity. The decrease in the population of birds indicates the deteriorating condition of biodiversity. Their presence in our rivers indicates the health of the rivers, the fish population, water quality, the health of associated freshwater biodiversity, level of disturbances, pollution, and above all, the intactness of our nature.

WBH is closely associated with rivers and forests. By protecting them and their habitats, we protect our rivers, waters, landscapes, biodiversity, food, and the livelihoods of the local communities.

## **3.4 Threats to Conservation Target**

Due to emerging threats, natural and anthropogenic, there are serious risks of losing the ground of conservation effort for WBH. The major threats to WBH conservation in Bhutan were identified through systematic threat mapping in two major river basins of Punatsangchhu and Mangdechhu, there are multiple threats directly or indirectly impacting WBH which can be categorized as anthropogenic and natural factors.

### **3.4.1 Anthropogenic factors**

The threats from anthropogenic factors include activities resulting from the following:

- » Natural resource extraction
- » Hydropower development
- » Tourism/recreation and livelihood activities, and
- » Pollution

### *Natural Resource Extraction*

Harvesting of natural resources from the critical habitats, such as sand and stone extraction, collection of driftwoods and NWFPs, herding of cattle, fishing, and carrying out other anthropogenic activities pose serious threats to WBH. Since WBH mainly forage along the freshwater river system, the activities that happen along riverine ecosystems are very sensitive. The disturbance through these activities involves flushing away of WBH during their foraging and nesting period. Activities like stone quarry and sand extraction degrade the feeding sites that exacerbate pressures on the existence of the species.

### *Hydropower Development*

The development of hydropower in large rivers modifies the prime habitat of WBH and poses threat due to dams, power lines and hydropower infrastructure. Dams permanently change riverine ecosystems that alter foraging ground and also restrict the movement of fish which is the main diet to WBH. Power lines and electricity pylons across rivers and along with the migratory route threaten the movement of WBH and often lead to collision and electrocution.

### *Tourism and Recreation Activities*

Tourism and recreational activities include rafting, camping, picnicking, and trekking in the critical habitats that bring threats to WBH. Unregulated timing and conduct of these activities in WBH habitat disturb the bird usually during the feeding periods which are mostly morning and evening hours.

### *Pollution*

The development of new infrastructure facilities along river basins modifies the landscape and increases the generation of different types of waste that pollute both land and water bodies. The discharge of these wastes especially into the water may cause serious aquatic ecological disturbances that will impact the foraging behaviour of WBH.

### *Other Anthropogenic Threats*

Other anthropogenic factors that pose threats to WBH include deforestation and human-induced forest fire. Increased agricultural expansion and infrastructure development increase the rate of deforestation and forest degradation that deteriorate the habitat and cause disturbances to WBH. Since WBH nests on trees, the occurrence of forest fires has serious implications during the nesting season.

## **3.4.2 Natural Factors**

The threats from natural factors are a natural phenomenon that occurs in an ecosystem. However, when these natural factors are enhanced by the intervention of anthropogenic activities, it threatens the survival of certain species. Some of the natural factors that are observable in the current environmental condition and foreseeable threats to WBH are listed below:

- » Climate Change
- » Competitor species and predation

### Climate Change

Climate change is considered as one of the major threats to freshwater biodiversity as rivers fed with glaciers are more sensitive to climate change. In Bhutan, most of the rivers are fed by glaciers and glacier lakes. With the increase in temperature, these glaciers are retreating at a faster rate causing the floods downstream that change river courses and fish diversity which is the prime habitat and main food source to WBH.

### Competitor Species and Predation

The presence of other piscivorous species like Great cormorants, Otters and Grey heron that shares the WBH habitats also have an impact on WBH. Great cormorants, Grey Heron and all Otters species found in Bhutan have a similar ecological niche as WBH. The competition for food resources can exacerbate in declining WBH population in its habitat range.

Heron hatchlings are also susceptible to predation by various natural predators like Pallas's fish Eagle (*Haliaeetus leucoryphus*), Serpent Eagle (*Spilornis cheela*), Osprey (*Pandion haliaetus*), Yellow-throated marten (*Martes flavigula*) and other small cats. The predation risk increases when the parent herons are away from the nest for a longer duration of foraging.

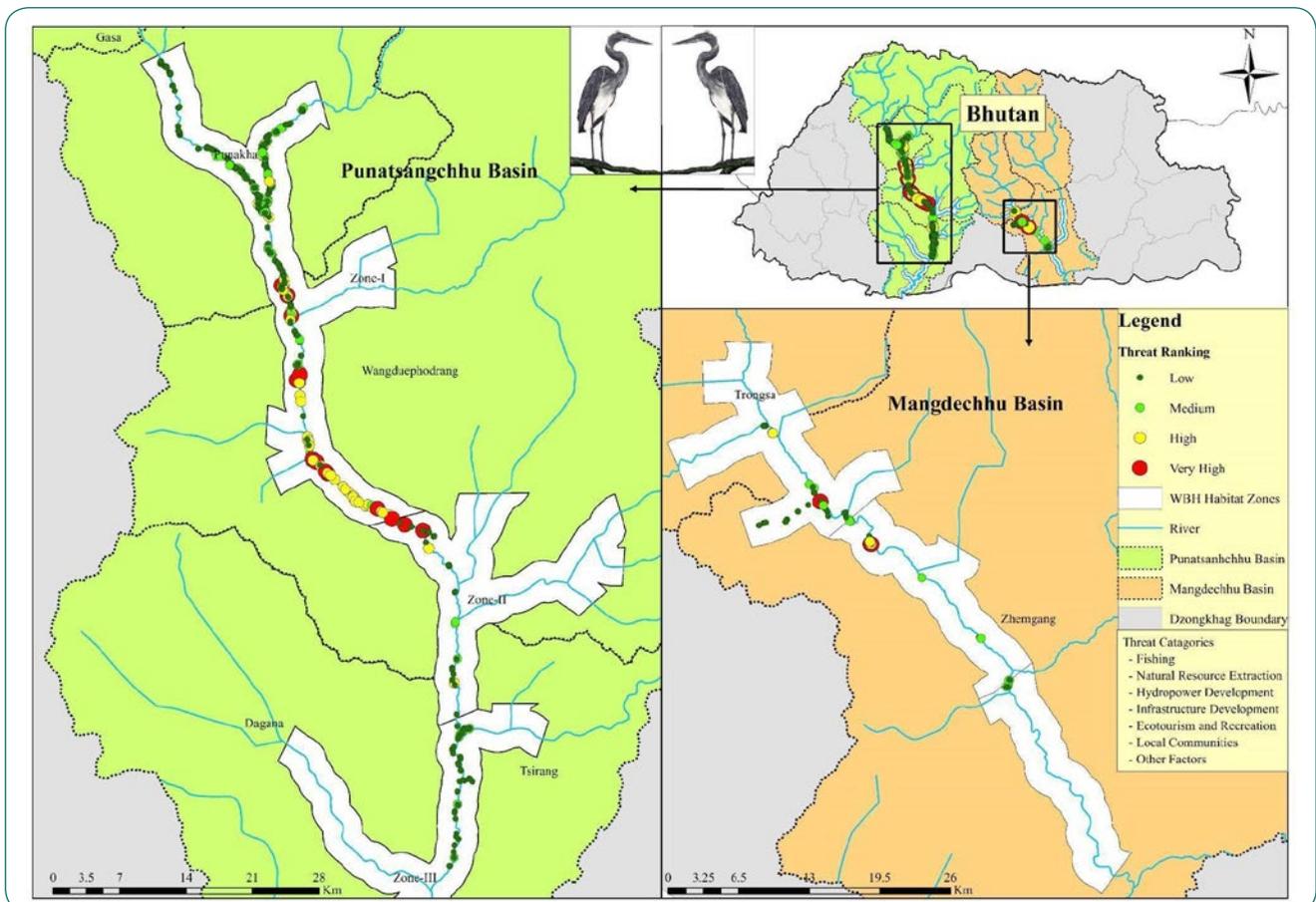
### 3.4.3 Threats mapping and Distribution within WBH Habitat Zones in Bhutan

The threat ranking was done following the nature conservancy threat ranking system (Salzer, 2007). Based on severity and scope ranking, the threat magnitude ranking was calculated. The overall threat rank and score for a particular threat category was calculated following the 3-5-7 rule (Threat rank 1 very high = 3 High/15 medium/105 low, 1 high = 5 medium/35 low and 1 medium = 7 low rank). The overall project threat rank and score to WBH was calculated by summation of all similar rank and conversion of low rank to higher rank following 3-5-7 rule. Table 4.2 is the threat ranking analysis done as per the threat category perceived for the WBH. Red colour indicates very high, yellow colour of high, light green of medium, and dark green of low impacts of the threat.

Similarly, Figure 4.1 is of the mapping done for the threats. The map shows that there is a high concentration of threats to WBH and its habitats in Punatsangchhu river basin. This is due to the presence of ongoing hydropower projects PHPA-I and II, and settlements that are having close proximity to the Punatsangchhu river.

**Table 3.2:** Ranking of major threats to WBH in Bhutan.

Threat Category	Specific Threats Rank with Score within a Threat Category						Overall Threat Rank with Score
<b>Fishing</b>	Loss of Prey (1.6)						1.6
<b>Natural Resource Extraction (Commercial)</b>	Sand Extraction (4.3)	Stone quarry (1.4)					4.4
<b>Hydropower Development</b>	Dam (1.3)	Water Diversion (1.3)	Powerline (11.2)	Hydropower Infrastructure (13.6)			27.4
<b>Infrastructure Development</b>	Road (3.9)	Bridge (5.0)	Building (2.1)	Construction work (4.0)	Other Factors (2.1)		10.6
<b>Ecotourism and Recreation</b>	Rafting (1.0)	Camping (2.2)	Trekking (1.0)	Picnicking (2.6)	Other Factors (1.4)		1.3
<b>Local Communities</b>	Cattle Grazing (2.6)	NWFPs Collection (1.3)	Firewood and Logging (2.7)	Driftwood collection (1.1)	Water Pump (2.1)	Other Factors (1.2)	4.1
<b>Other Threats</b>	Forest Fire (2.3)	Forest Degradation (1.4)	Deforestation (1.2)	Waste Pollution (2.3)			1.4
						<b>Overall Project Threat Rank (49.7)</b>	
<b>Color Coding Legends</b>	<b>Very High</b>		<b>High</b>		<b>Medium</b>		<b>Low</b>



**Figure 3.1:** Distribution of major threats to WBH in Punatsangchhu and Mangdechhu basin

### 3.4.4 Conceptual Model for White-bellied Heron

The conceptual model for WBH conservation is provided in Figure 4.2. The model was developed considering the common ground of the biological environment WBH requires and the threats that affect the conservation of WBH. To conserve the WBH as a holistic approach, the diverse views of social, economic, political, community perspectives and institutional systems are also considered.

The visual conceptual model representation includes the targets, critical threats, contributing factors, and strategies. The targets are located in green circles, with the entire project's scope listed at the top. The direct threats are shown in the pink boxes, and the contributing factors are shown in orange boxes. The strategies are placed in the yellow hexagons and are discussed in the following section of the plan with activities. Table 3.3 summarizes the direct threats and contributing factors related to WBH conservation.

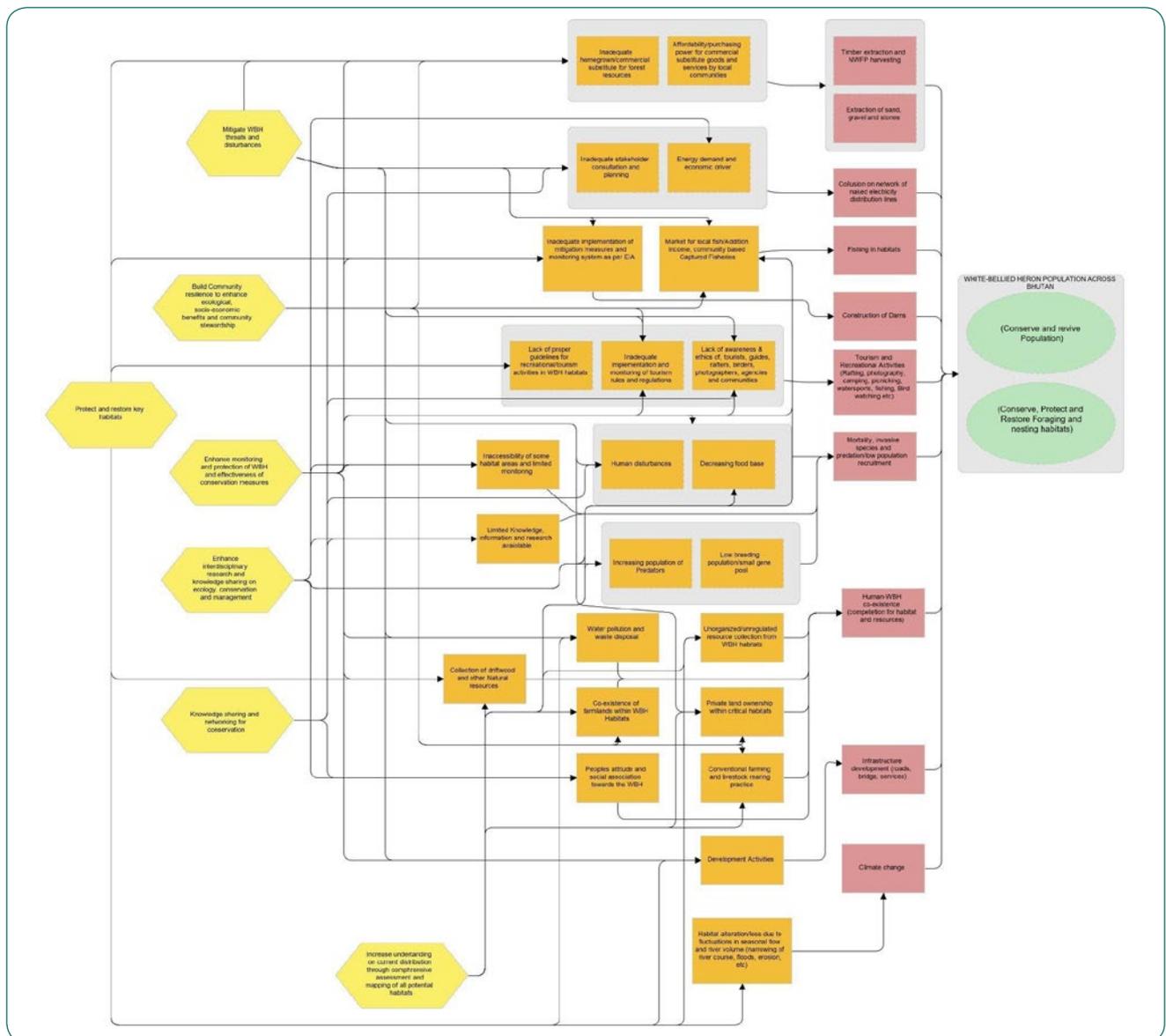


Figure 3.2: Conceptual Model for WBH conservation

**Table 3.3:** Conceptual Model for WBH conservation

Direct threats	Contributing factors
Timber extraction and NWFP harvesting	Inadequate homegrown/commercial substitute for forest resources
	Affordability/purchasing power for commercial substitute goods and services by local communities
Extraction of sand, gravel and stones	Inadequate homegrown/commercial substitute for forest resources
	Affordability/purchasing power for commercial substitute goods and services by local communities
Fishing in habitats	Market for local fish/Additional income, Community based Capture Fisheries
Construction of Dams	Inadequate implementation of mitigation measures and monitoring system as per EIA
Collusion on network of naked electricity distribution lines	Inadequate stakeholder consultation and planning
	Energy demand & economic driver
Tourism & Recreational Activities (Rafting, photography, camping, picnicking, watersports, fishing, Bird watching etc.)	Inadequate implementation and monitoring of tourism rules and regulations
	Lack of awareness & ethics of, tourists, guides, rafters, birders, photographers, agencies and communities
	Lack of proper guidelines for recreational/tourism activities in WBH habitats
Human-WBH co-existence (competition for habitat and resources)	Private land ownership within critical habitats
	Conventional farming & livestock rearing practice
	Collection of driftwood and other NR
	Unorganized/unregulated resource collection from WBH habitats
	People's attitude and social association towards the WBH
	Co-existence of farmlands within WBH Habitats
	Water pollution and waste disposal
Infrastructure development (roads, bridges, services)	Development Activities
Mortality, invasive species and predation/low population recruitment	Inaccessibility of some habitat areas and limited monitoring
	Human disturbances
	Decreasing food base
	Increasing population of Predators
	Low breeding population/small gene pool
	Limited knowledge, information and research available
Climate Change	Habitat alteration/loss due to fluctuations in seasonal flow and river volume (narrowing of river course, floods, erosion, etc.)



04

## Conservation Strategies & Actions

This section describes the holistic strategy formulated for the conservation of White-bellied Heron. It incorporates interventions and actions for preserving the key habitats, protecting the bird, and mitigating or at least minimizing impacts of major threats to WBH and the habitats. The strategies and actions here outlines the theme for conservation, goals, objectives, outputs and specific actions or activities to enhance the conservation of WBH. The strategies and actions are grouped under two themes.

**Theme I:** Conservation of wild population and their habitat, and

**Theme II:** Conservation of White-bellied Heron through Ex-situ population management, conservation breeding, and preservation of gene pool.

The overall conservation strategy and actions outlined here reflects the holistic approach to achieve a milestone in the conservation of WBH within the period of the next 10 years, 2022 - 2031.

#### **4.1 Theme I (In-situ Conservation)**

Conservation of wild population and their habitats.

#### **4.2 Goal 1**

Enhance in-situ conservation of WBH: Address major threats and maintain key habitats ensuring development and livelihood activities are consistent with the species' conservation strategies.

#### **4.3 Objectives**

##### *Objective A1*

*To increase understanding of WBH ecology, conservation and management in Bhutan through comprehensive assessment and mapping of all potential habitats; interdisciplinary research and knowledge sharing on WBH ecology, conservation and management.*

##### *Objective A2.*

*To create suitable habitats for WBH through protection and restoration, mitigation of threats and disturbances, and effective monitoring.*

##### *Objective A3.*

*Build Community resilience to enhance ecological, socio-economic benefits and community stewardship.*

##### *Objective A4.*

*To provide a platform for knowledge sharing and networking for WBH conservation.*

### 4.3.1 Objective A1

*To increase understanding of WBH ecology, conservation and management in Bhutan through comprehensive assessment and mapping of all potential habitats; interdisciplinary research and knowledge sharing on WBH ecology, conservation and management.*

This objective is outlined in understanding the existing population of WBH and identifying both the current and potential habitats of WBH. The objective also focuses on the importance of future-oriented conservation research and strategies for the species. The study on the biology of WBH and their dependence on the environment will guide in initiating proper long term conservation actions.

#### **Output A1.1**      ***Existing and potential WBH habitats identified, assessed and mapped.***

- Action A1.1.1      Conduct species distribution and habitat suitability modelling
- Action A1.1.2      Survey (presence-absence) and assessment of potential habitats based on A1.1.1.
- Action A1.1.3      Detailed site assessment of potential habitats and key sites for a future release of captive-bred heron.
- Action A1.1.4      Mapping and analysis degraded habitats.
- Action A1.1.5      Conduct a comprehensive survey and site assessment of current and new habitats, and establish baseline information on the ecosystem, biodiversity, socio-economic and climate vulnerability.
- Action A1.1.6      Develop Specific Habitat Management Interventions for key WBH sites (Integrate into respective Division/Park Conservation Management Plans).

#### **Output A1.2**      ***Understanding of ecology, biology, behaviour including dispersal and habitat use strengthened.***

- Action A1.2.1      Study on diversity of food-based and associated aquatic biodiversity in key habitats.
- Action A1.2.2      Study diversity and interaction of associated, competitors and predators to WBHs and nests.
- Action A1.2.3      Study post-fledging dispersal, movement, migration, habitat use, seasonal site occupancy and philopatry.

- Action A1.2.4** Study wild breeding ecology, population dynamics and developmental behaviour to facilitate and enhance ex-situ breeding programs.
- Action A1.2.5** Conduct studies on genetics & diversity
- Action A1.2.6** Undertake studies to understand anthropogenic pressures/threats to the WBH population and its habitats within its range.
- Action A1.2.7** Research on the impact of climate change on WBH and their habitats including river morphology, discharge and aquatic ecosystem.
- Action A1.2.8** Study on people's perception and socio-cultural association of WBH.
- Action A1.2.9** Documentation of community's engagement and citizen science approach in conservation of threatened species.

### **4.3.2 Objective A2**

*To create suitable habitats for WBH through protection and restoration, mitigation of threats and disturbances, and effective monitoring.*

Some of the critical habitats of WBH are on the verge of losing due to both anthropogenic activities and natural causes. This objective is to mainly revive and restore key habitats of WBH, and ensure mitigation measures. It covers the importance of constant monitoring of WBH through the means of an annual population survey, and regular monitoring through the engagement of Local Conservation Support Groups (LCSGs) and using the provision of technologies that can enhance monitoring.

#### **Output A2.1      *Key habitats protected, degraded habitats restored and conserved.***

- Action A2.1.1** Develop WBH habitat protection, restoration and maintenance guidelines.
- Action A2.1.2** Develop feeding sites through the creation of feeding ponds.
- Action A2.1.3** Carry out climate-smart habitat restoration through plantations and maintenance.
- Action A2.1.4** Identify, assess and map key roosting, feeding, flight routes and breeding locales and demarcate key sites as KBA/IBA

**Output A2.2**      ***Monitoring and surveillance improved.***

- Action A2.2.1      Install remote monitoring cameras (Camera traps/CCTV surveillance cameras) and UAVs to monitor threats in nests and priority feeding sites.
- Action A2.2.2      Conduct regular monitoring of nest and habitat, and gather the data.
- Action A2.2.3      Conduct annual nationwide population and nest surveys.
- Action A2.2.4      Strengthen SMART Patrolling in WBH habitats.
- Output A2.3      Major threats and disturbances to WBH and their habitats mitigated/reduced.
- Action A2.3.1      Install flight diverters/deflectors on high-risk transmission lines and infrastructures.
- Action A2.3.2      Management of forest fires in WBH nest sites.
- Action A2.3.3      Regulation of visitors to WBH nests during breeding seasons.
- Action A2.3.4      Regulate timing of rafting in key WBH sites.
- Action A2.3.5      Install DOs & DON'Ts information boards and signages in strategic locations/share in pamphlets with guides and relevant agencies.
- Action A2.3.6      Build capacity of field staff to provide first aid and rescue operations.
- Action A2.3.7      Establish and capacitate Rescue and Rehabilitation Facilities & services to reduce mortality in the wild.
- Action A2.3.8      Revival of abandoned nests (creating artificial nests at old nest sites).

**4.3.3 Objective A3**

*Build Community resilience to enhance ecological, socio-economic benefits and community stewardship*

This objective recognizes the efforts to support sustainable livelihood opportunities in the communities along the WBH landscapes. This will help to garner community support and stewardship for the conservation of WBH. It also highlights the importance of establishing a network of LCSGs for collaborative approach to conserving WBH.

**Output A3.1**      **Network of LCSGs and citizen scientists established.**

- Action A3.1.1      Establish a network of LCSGs and citizen scientists in new and existing WBH sites.
- Action A3.1.2      Build capacity of LCSGs and citizen scientists
- Action A3.1.3      Provide necessary equipment to monitor and gather data to LCSGs and citizen scientists.

**Output A3.2**      **Enhanced community resilience through diversification of livelihood activities.**

- Action A3.2.1      Promote community-based tourism in appropriate sites.
- Action A3.2.2      Support and promote climate-smart agriculture practices (integrated forestry, agriculture and livestock rearing), (private fisheries, piggery, poultry, horticulture, organic agriculture, etc.)
- Action A3.2.3      Support plantation of high value timber species in community forests and private farmlands.
- Action A3.2.4      Support establishment of Nature-based enterprises for local communities.

**4.3.4 Objective A4**

*To provide a platform for knowledge sharing and networking for WBH conservation.*

This objective considers the importance of public awareness in conservation. It also focuses on concrete actions that actively involve community partners and creating regional networks for collaborative approaches of bringing effective conservation actions.

**Output A4.1**      **Capacity and public awareness on WBH Conservation improved.**

- Action A4.1.1      Develop Information, education and communication materials on WBH.
- Action A4.1.2      Conduct awareness, advocacy and education programs at all levels engaging monastic institutions, schools, youths and the general public in WBH monitoring and conservation.
- Action A4.1.3      Conduct training workshops on bird watching and wildlife photography techniques.

- Action A4.1.4** Professional development of researchers/staff.
- Output A4.2** Inter-agency Coordination and collaboration strengthened.
- Action A4.2.1** Strengthen monitoring and compliance of eco-tourism guidelines.
- Action A4.2.2** Hold dialogues with relevant agencies to streamline planning and implementation of developmental activities within WBH sites.
- Action A4.2.3** Hold biennial WBH National Coordination, planning and review meetings with relevant agencies.
- Output A4.3** ***Regional and global network, coordination, collaboration on WBH conservation strengthened.***
- Action A4.3.1** Conduct/participate in the International Conference on WBH Conservation.
- Action A4.3.2** Participate in CBD-COP events.
- Action A4.3.3** Conduct knowledge-sharing workshops and exchange visits to WBH range countries (India & Myanmar).

#### **4.4 Theme II (Ex-situ Conservation)**

Conservation of White-bellied Heron through Ex-situ population management, conservation breeding, and preservation of gene pool.

#### **4.5 Goal**

Establish a secure ex-situ gene pool, breed and recover wild population through conservation breeding and release ensuring highest possible genetic diversity.

#### **4.6 Objectives**

##### ***Objective B1.***

*Establish a conservation breeding center with adequate facility and technical capacity to manage, raise, breed and release herons.*

##### ***Objective B2.***

*Supplement wild population by releasing captive-bred herons into safer wild habitats*

##### ***Objective B3.***

*Enhance scientific understanding of biology, behaviour and public awareness on White-bellied Heron*

#### 4.6.1 Objective B1

*Establish a conservation breeding center with adequate facility and technical capacity to manage, raise, breed and release herons.*

This objective describes securing the population of WBH and ex-situ population management for conservation breeding. The conservation breeding center aims to preserve the gene pool of WBH that is at risk of extinction in the wild.

##### **Output B1.1**      ***Conservation breeding center with the capacity to raise and breed up to 50 herons established.***

**Action B1.1.1**      Establish and preserve a secure ex-situ gene pool for White-bellied Heron.

**Action B1.1.2**      Construct aviaries to accommodate up to 50 herons.

**Action B1.1.3**      Construct veterinary and quarantine center to isolate and care for new/diseased/sick herons.

**Action B1.1.4**      Construct a large training aviary to train (harden) fledglings to release into wilds.

**Action B1.1.5**      Construct fishponds (food base) with an annual production capacity of 10,000 kgs

**Action B1.1.6**      Train and build the capacity of breeders and biologists to care, breed and raise WBH in captivity.

**Action B1.1.7**      Construct facilities to accommodate up to 8 staff at the center.

##### **Output B1.2**      ***Strengthened professional capacity of staff to collect, transfer and manage population at the center.***

**Action B1.2.1**      Develop guidelines to harvest and maintain the genetic diversity of WBH at center.

**Action B1.2.2**      Collect eggs/chicks or rescue wild herons and transfer them to WBHCC as the founder population.

**Action B1.2.3**      Develop WBH husbandry and care manual.

**Action B1.2.4**      Develop WBH breeding and management strategy.

- Action B1.2.5 Conduct a genetic assessment of founders and establish breeding pairs.
- Action B1.2.6 Maintain WBH studbook (Breed registry).
- Action B1.2.7 Breed and mass-produce WBHs in the center.

#### 4.6.2 Objective B2

*Supplement wild population by releasing captive-bred herons into safer wild habitats.*

This objective highlights the proper measures in releasing the captive-bred WBH into the wild. It focuses on the development of strategies that cover assessing suitable habitat and procedures to release.

**Output B2.1** *Releasing strategy developed and sites identified to release captive-bred herons into the wild.*

- Action B2.1.2 Develop releasing strategy for captive breed herons.
- Action B2.1.3 Identify, map and assess suitable sites for releasing captive-bred herons.
- Action B2.1.4 Identify, train (harden) and release captive-bred herons.

#### 4.6.3 Objective B3

*Enhance scientific understanding of biology, behaviour and public awareness on White-bellied Heron.*

Adding value to the WBH Conservation Center, the objective focuses on establishing the WBH center as a pioneer knowledge hub and global information center. The information center will disseminate scientific information on WBH conservation, biology and its ecology.

**Output B3.1** *Literature on ecology and biology of WBH published.*

- Action B3.1.1 Conduct research on the biology and behaviour of WBH.

**Output B3.2** *WBH information database established with improved public awareness.*

- Action B3.2.1 Establish center for public education, awareness and information (WBH global data center).



**05**

## Implementation & Monitoring Plan

## 5.1 National policies, plans and regulations

Bhutan has always been accorded top priority for the conservation of the environment, and it constitutes under one of the four pillars in the pursuit of development philosophy of Gross National Happiness (GNH). The Constitution of Bhutan mandates the maintenance of 60% of the country's geographical area under forest cover for all times. More than 50% of the country's area is declared as a protected area, and sustainable forest management plans ensure cautious extraction and use of natural resources. Protection of the forest and the rich biodiversity of the country is guided by Forest & Nature Conservation Act of Bhutan 1995, the Forest and Nature Conservation Rules and Regulations 2017, National Environment Protection Act (NEPA) 2007, Biodiversity Act of Bhutan 2003 and many more.

## 5.2 Institutional arrangement

The DoFPS under the Ministry of Agriculture and Forests (MoAF) is mandated and is the nodal agency for the protection and conservation of biodiversity. The DoFPS will coordinate the implementation of this conservation action plan. RSPN, as a leading NGO in the conservation of WBH, in partnership with other relevant agencies will support DoFPS in implementing in-situ activities and take a lead in ex-situ conservation work.

The Nature Conservation Division, under DoFPS in collaboration with the functional divisions, field offices and other relevant agencies will take lead in ensuring that every action in this plan is effectively implemented. The field divisions and protected area management in which the WBH habitats fall will plan and coordinate the implementation of actions within their jurisdiction in consultation and collaboration with NCD.

Technical and institutional support from stakeholders such as the Department of Agriculture (DoA) and Department of Livestock (DoL) under MoAF, Tourism Council of Bhutan (TCB), National Environment Commission (NEC), Bhutan Power Corporation (BPC) and respective Local Government (LG) offices will be sought for effective implementation of the actions as prescribed in this conservation action plan.

The development of this conservation action plan, besides taking into account the national requirements, also took inspiration from the International Union for Conservation of Nature's White-bellied Heron Conservation Strategy in identifying the key actions. The lead agencies, if required, may seek technical assistance from international institutions and experts in effectively executing the key actions, if the national expertise is not available. With many international organizations and institutions contributing immensely toward WBH conservation and knowledge generation, experience sharing with international organizations will be done when necessary and required.

### **5.3 Budget and funding strategy**

The estimated cost for implementation of this action plan is Nu. 370 million. Action specific costs are reflected in the log frame (ref). RSPN will continue to seek funding from international organizations and donors, especially to fund actions outside the protected areas and carry out ex-situ conservation and breeding activities. RSPN and NCD will also develop proposals in collaboration and explore funds through national & international fund windows.

NCD, with support from DoFPS, will raise funds through various national and international organizations to meet the funding gap. NCD will also coordinate with BFL to arrange funding to implement actions, particularly inside the protected areas.

The NCD, field divisions, and protected areas management will also, wherever possible integrate WBH conservation actions under respective management plans and take integrated approach to collectively implement conservation actions that would address not only conservation of WBH but the biodiversity, as a whole.

### **5.4 Monitoring and evaluation**

The progress in the implementation of this action plan will be monitored during the biannual WBH National Coordination, planning and review meetings with relevant agencies. The NCD and RSPN may adapt logical frameworks as a basis for monitoring and evaluation. The team will also carry out a mid-term review of the plan at the end of the 5th year.

NCD and RSPN may also jointly evaluate the implementation of the action plan and provide recommendations for adoption during the biannual coordination and planning meeting.

Table 5.1: The logical framework of the action plan

Columns: Activities, LO = Lead Organization, Site, Pri.= Priority, Target, Budget (Required) in Millions Nu., Timeline (Year 1 – Year 10)

Vision/ Goal/ Objective/ Output/ Activities	LO	Site	Pri	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
<b>Vision: A viable population of WBH thriving in the healthy riverine ecosystems of Bhutan</b>															
<b>Theme-I Conservation of the wild population and their habitats</b>															
<b>Goal I. Enhance in-situ conservation of WBH; address major threats and maintain key habitats ensuring development and livelihood activities are consistent with the species' conservation strategies</b>															
<b>Objective A1. To increase understanding of WBH ecology, conservation and management in Bhutan through comprehensive assessment and mapping of all potential habitats; interdisciplinary research and knowledge sharing</b>															
<b>Output A1.1. Existing and potential WBH habitats identified, assessed and mapped</b>															
A1.1.1 Conduct species distribution and habitat suitability modelling	RSPN	Nationwide	H	Report and map by 2022	1.10										
A1.1.2 Survey (presence-absence) and assessment of potential habitats based on A1.1.1	DoFPS/ RSPN	Wangchhu, Amochhu, Ada-Kisonachhu, Nichula-Homa Sama, Gelephu Landscape, Mangdichhu-Chamkharchhu, Manas Landscape, JSWNP Landscape, Kurichhu basin, Dangchhu (Wangdue), Gamrichhu, Drangmechhu-Telung/Yangbari, Daneshey chu(Tsirang), Phuwentenchu chu(Tsirang),Changchaychhu(Tsirang) and Kalikholachu (Tsirang), JomoTsongkha WS Landscape, Jomori basin, Ngera Ama ri basin, Drangmechhu-Sherichhu-Tributaries, Kholongchu basin, Chhuserbu (Kewana - JDNP), Yuri and Demri(Pemagatshel), Merak Amarii	H	Survey Report produced. 2022 -2031	7.50										

Vision/ Goal/ Objective/ Output/ Activities	L0	Site	Pri	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
A1.1.3 Detailed site assessment of potential habitats and key sites for future release of captive-bred heron	DoFPS/ RSPN	2 Sites	H	Survey carried out from 2023 - 2030. Map produced by 2030	1.00										
A1.1.4 Mapping and analysis of degraded habitats	DoFPS/ RSPN	Current WBH sites	H	Report produced by 2022	0.87										
A1.1.5 Conduct a comprehensive survey and site assessment of current and new habitats, and establish baseline information on the ecosystem, biodiversity, socio-economic and climate vulnerability.	RSPN	Punatsangchhu & Mangdichhu basins	H	Baseline information report available by 2022	12.61										
A1.1.6 Develop Specific Habitat Management Interventions for key WBH sites( Integrate into respective Division and Park Conservation Management Plans)	DoFPS/ RSPN	Nationwide (WBH sites)	M	Management plans developed by 2026	0.5										

Vision/ Goal/ Objective/ Output/ Activities	LO	Site	Pri	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
<b>Output A1.2 Understanding of ecology, biology, behaviour including dispersal and habitat use strengthened.</b>															
1.2.1 Study on diversity of food base and associated aquatic biodiversity in key habitats	RSPN/ DoFPS	Nationwide	M	Ongoing. 2022-2031	1.00										
1.2.2 Study diversity and interaction of associated, competitor and predators to WBHs and nests	DoFPS/ RSPN	Nationwide	M	Reports available by 2025	1.00										
1.2.3 Study post fledging dispersal, movement, migration, habitat use, seasonal site occupancy and philopatry	RSPN/ DoFPS	Nationwide	M	Reports available by 2028	0.60										
1.2.4 Study wild breeding ecology, population dynamics and developmental behaviour to facilitate and enhance ex-situ breeding program	RSPN/ DoFPS	Nest sites	M	Reports available by 2025	0.30										
1.2.5 Conduct studies on genetics & diversity	RSPN/ DoFPS	Nationwide	H	Ongoing	0.50										

Vision/ Goal/ Objective/ Output/ Activities	LO	Site	Pri	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
1.2.6 Undertake studies to understand anthropogenic pressures/threats to WBH population and its habitats within its range	DoFPS/ RSPN	Nationwide	M	Reports available by 2028	0.50										
1.2.7 Research on impact of climate change on WBH and thier habitats including river morphology, discharge and aquatic ecosystem	RSPN/ DoFPS	Nationwide (Priority sites)	M	Reports available by 2031	2.00										
1.2.8 Study on people's perception and socio-cultural association of WBH	RSPN/ DoFPS	Nationwide	M	Reports available by 2024	0.10										
1.2.9 Documentation of community's engagement and citizen science approach in conservation of threatened species	RSPN	Nationwide	M	Video documentary available by 2024	0.30										

Vision/ Goal/ Objective/ Output/ Activities	LO	Site	Pri	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
<b>Objective A2: To create suitable habitats for WBH through protection and restoration, mitigation of threats and disturbances, and effective monitoring.</b>				10 threat-free habitats conserved for WBH											
<b>Output A2.1 Key habitats protected, degraded habitats restored and conserved.</b>				5 feeding sites; 50 hectares of habitat restoration											
A2.1.1 Develop WBH habitat protection, restoration and maintenance guidelines.	RSPN	Nationwide	M	Guidelines available by 2023	1.59										
A2.1.2 Develop feeding sites through creation of feeding ponds	RSPN	Nationwide (key sites)	H	At least 5 Feeding sites were created by 2031.	1.50										
A2.1.3 Carryout climate smart habitat restoration through plantations and maintenance	DoFPS	Punatsangchhu and Mangdichhu	H	Plantation done by 2031	20.97										
A2.1.4 Identify, assess and map key roosting, feeding, flight routes and breeding locales and demarcate key sites as KBA/IBA	DoFPS	Punatsangchhu, Mangdichhu, Drangmechhu, Wangchu basins	H	Key WBH habitats identified as KBA by 2031	1.00										

Vision/ Goal/ Objective/ Output/ Activities	LO	Site	Pri	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
<b>Output A2.2 Monitoring and surveillance improved</b>															
				Twice the frequency of the baseline for monitoring; SMART patrolling instituted											
A2.2.1 Install remote monitoring cameras (Camera traps/ CCTV surveillance cameras) and UAVs to monitor threats in nests and priority feeding sites	RSPN	Punatshangchu, Mangdichhu.	M	Cameras and UAVs used for monitoring from year 2022	2.90										
A2.2.2 Conduct regular monitoring of nest and habitat, and gather the data	RSPN	Nationwide	M	Data available of population and monitoring report in epicollect 5	8.00										
A2.2.3 Conduct annual nationwide population and nest surveys	RSPN	Nationwide	M	Report available annually.	7.50										
A2.2.4 Strengthen SMART Patrolling in WBH habitats	DoFPS/ RSPN	Nationwide	M	Indicated in annual work plan from 2031	6.50										

Vision/ Goal/ Objective/ Output/ Activities	LO	Site	Pri	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
<b>Output A2.3 Major threats and disturbances to WBH and their habitats mitigated/reduced.</b>															
A2.3.1 Install flight diverters/deflectors on high risk transmission lines and infrastructures/ insulated cables in key areas (nesting and regular feeding sites)	BPC/ RSPN	Punatsangchhu, Mangdichhu & Drangmechhu basins (10 high risk sites)	H	Flight diverters installed by 2031	2.60										
A2.3.2 Management of forest fires in WBH nest sites	DoFPS/ RSPN	Nest sites	H	Forest fire management equipment supported to existing fire management group by 2031.	1.00										
A2.3.3 Regulation of visitors to WBH nests during breeding seasons	DoFPS	Nest sites	H	FRG/LCSG conducts monitoring and initiates sensitization	1.00										
A2.3.4 Regulate timing of rafting in key WBH sites	DoFPS	Key WBH sites	H	At least four times of sensitization to be held during the period of 10 years.	0.20										

Vision/ Goal/ Objective/ Output/ Activities	L0	Site	Pri	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
A2.3.5 Install DOs & DON'Ts information boards and signages in strategic locations/share in pamphlets with guides and relevant agencies	DoFPS	Nationwide (10 sites)	L	Signages installed in all the strategic locations( at least 10) by 2031 and distributed pamphlets to relevant agencies annually.	0.50										
A2.3.6 Build capacity of field staff to provide first aid and rescue operations	DoFPS	Nationwide	H	Training completed of staff by 2031	2.00										
A2.3.7 Establish and capacitate Rescue and Rehabilitation Facilities & services to reduce mortality in the wild	RSPN/ DoFPS	Nationwide	H	Materials procured and facilities set up by 2031. Operational.	12.00										
A2.3.8 Revival of abandoned nests (creating artificial nests at old nest sites)	RSPN/ DoFPS	Abandoned Nest sites	H	Annually construct 1-2 nests.	0.20										

Vision/ Goal/ Objective/ Output/ Activities	LO	Site	Pri	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
<b>Objective A3: Build Community resilience to enhance ecological, socio-economic benefits and community stewardship</b>				100 individuals or hhs or 10 communities willing to engage in WBH conservation											
<b>Output A3.1 Network of LCSGs and citizen scientists established</b>				Capacity development (training, equipping, and networking)											
A3.1.1 Establish network of LCSGs and citizen scientist in new and existing WBH sites	RSPN	A3.1.2	M	Network created from WBH landscapes(LCSGs) and across Bhutan (Citizen scientist) by 2031	0.25										
A3.1.2 Build capacity of LCSGs and citizen scientist	RSPN	New sites (5 trainings)	M	Train at least 30 LCSG and citizen scientists annually.	2.00										
A3.1.3 Provide necessary equipment to monitor and gather data to LCSGs and citizen scientist	RSPN	New sites/Existing habitats	L	Supply relevant materials by 2031	2.10										
<b>Output A3.2 Enhanced community resilience through diversification of livelihood activities</b>				50 HHs benefitted with livelihood options											
A3.2.1 Promote community-based tourism in appropriate sites	RSPN	Nationwide	M	Identify and implement CBT in at least 8 districts by 2031	16.00										

Vision/ Goal/ Objective/ Output/ Activities	L0	Site	Pri	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
A3.2.2 Support and promote climate-smart agriculture practices (integrated forestry, agriculture and livestock rearing), (private fisheries, piggy, poultry, horticulture, organic agriculture, etc.)	RSPN	Nationwide	M	Identify and support the communities in WBH landscape by 2031	40.00										
A3.2.3 Support plantation of high-value timber species in community forests and private farmlands	RSPN	Punatsangchhu, Mangdichhu, Drangmechhu basin	M	Support communities of eight districts by 2031	30.00										
A3.2.4 Support establishment of Nature-based enterprises for local communities	RSPN	Nationwide	M	Support communities of at least 8 districts by 2031	10.00										

Vision/ Goal/ Objective/ Output/ Activities	LO	Site	Pri	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
<b>Objective A4. To provide a platform of knowledge sharing and networking for WBH conservation</b>				15 programs or events; 20 agencies engaged in WBH conservation; 80 % of the evaluated agencies and individuals aware of WBH, its habitats and importance of conservation											
				10 programs											
<b>Output A4.1 Capacity and public awareness on WBH Conservation improved.</b>															
A4.1.1 Develop Information, education and communication materials on WBH	RSPN		M	Annually develop IEC materials and distribute them to relevant agencies.	0.50										
A4.1.2 Conduct awareness, advocacy and education programs at all levels engaging monastic institutions, schools, youths and general public in WBH monitoring and conservation	DoFPS/ RSPN	Nationwide	M	Annually conduct awareness programs.	4.50										
A4.1.3 Conduct training workshops on bird watching and wildlife photography techniques	DoFPS/ RSPN	Nationwide (3 trainings)	M	Conduct four times of training to cover at least 200 bird watchers and photographers.	4.00										
A4.1.4 Professional development of researchers/staff	RSPN/ DoFPS			Support as and when required.	5.00										

Vision/ Goal/ Objective/ Output/ Activities	L0	Site	Pri	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
<b>Output A4.2 Inter-agency Coordination and collaboration strengthened</b>															
A4.2.1 Strengthen monitoring and compliance of eco-tourism guidelines	DoFPS	Related to A3.1.2	M	Guidelines strengthened and implemented by 2031.	0.30										
A4.2.2 Hold dialogues with relevant agencies to streamline planning and implementation of developmental activities within WBH sites	RSPN/ DoFPS	Nationwide	M	Meetings are regularly held as and when required.	0.50										
A4.2.3 Hold biennial WBH National Coordination, planning and review meetings with relevant agencies	RSPN	Nation wide	M	At least 5 meetings held by 2031.	3.00										
<b>Output A4.3 Regional and global network, coordination, collaboration on WBH conservation strengthened.</b>															
A4.3.1 Conduct/ participate in International Conference on WBH Conservation	RSPN/ DoFPS	Global	M	Organize at least two international WBH conference by 2031	19.10										
A4.3.2 Participate in CBD-COP events	RSPN	Global (2 times)	M	Participate at least three times in COP by 2031	2.27										
A4.3.3 Conduct knowledge sharing workshops and ex-change visits to WBH range countries (India & Myanmar)	RSPN	Range countries	M	Organized exchange programme to WBH range countries from 2024 to 2031	5.25										
<b>Sub-total</b>					<b>244.11</b>										

Activities	LO	Site	Priority	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
<b>Theme II: Conservation of White-bellied Heron through Ex-situ population management, conservation breeding, and preservation of gene pool.</b>															
<b>Goal II: Establish a secure exsitu gene pool, breed and recover wild population through conservation breeding and release ensuring highest possible genetic diversity.</b>															
<b>Objective B1 Establish conservation breeding center with adequate facility and technical capacity to manage, raise, breed and release herons</b>															
<b>Output B.1.1 Conservation breeding center established with capacity to raise and breed upto 50 herons</b>															
Action B.1.1.1 Construct aviaries to accommodate up to 50 herons	RSPN	Captive breeding center, Changchey.		Aviaries constructed by 2028	20.00										
Action B.1.1.2 Construct veterinary and quarantine center to isolate and care new/diseased/sick herons	RSPN	Captive breeding center, Changchey.		Operational by 2022	6.00										
Action B.1.1.3 Construct large training aviary to train (hardern) fledgelings to release into wilds	RSPN	Captive breeding center, Changchey.		Aviary operational by 2028	20.00										

Activities	LO	Site	Priority	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Action B.1.1.4 Construct fishponds (foodbase) with annual capacity of 30,000 kgs production	RSPN	Captive breeding center, Changchey.		Fishpond operational by 2024	6.00										
Action B.1.1.5 Train and build capacity of breeders and biologists to care, breed and raise WBH in captivity	RSPN	Captive breeding center, Changchey.		Training completed by 2024											
Action B.1.1.6 Construct facilities to accommodate upto 8 staff at the center	RSPN	Captive breeding center, Changchey.		Construction Completed by 2025	7.00										
<b>Output B. 1.2 Strengthened professional capacity of staff to collect, transfer and manage population at the center.</b>															
Action B.1.2.1 Develop guidelines to harvest and maintain genetic diversity of WBH at center	RSPN	Captive breeding center, Changchey.		Established guidelines development by 2022	0.20										
Action B.1.2.2 Collect eggs/ chicks or rescue wild herons and transfer to WBHCC as founder population	RSPN	Captive breeding center, Changchey.		Collect the founder population from two different basins by 2022.	1.00										

Activities	L0	Site	Priority	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Action B.1.2.3 Develop WBH husbandry and care manual.	RSPN	Captive breeding center, Changchey.		Manual available by 2022	0.00										
Action B.1.2.4 Develop WBH breeding and management strategy	RSPN	Captive breeding center, Changchey.		Strategy available by 2022	0.00										
Action B.1.2.5 Conduct genetic assessment of founders and establish breeding pairs	RSPN	Captive breeding center, Changchey.		Conduct genetic assessment as and when required during collection of the founder population.	1.00										
Action B.1.2.6 Maintain WBH studbook (Breed registry)	RSPN	Captive breeding center, Changchey.		Breed registry maintenance with establishment of founder population.	0.00										
Action B.1.2.7 Breed and mass produce WBHs in the center	RSPN	Captive breeding center, Changchey.		Produce at least 30 WBH by 2031	2.00										
Center operations cost	RSPN	Captive breeding center, Changchey.			62.00										
<b>Objective B 2 Supplement wild population by releasing captive bred herons into safer wild habitats upon acquainting with biology, behaviour and related scientific knowledge.</b>				Restock with captive bred herons											
<b>Output B.2 Releasing strategy developed and sites identified to release captive bred herons into the wild</b>				10 individual herons released into the wild											
Action B.2.1.1 Develop releasing strategy for captive bred herons	RSPN	Captive breeding center, Changchey.		Strategies developed by 2022	0.50										

Activities	LO	Site	Priority	Target	Budget Req. (Mil. Nu)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Action B.2.1.2 Identify, map and assess suitable sites for releasing captive bred herons	RSPN	Captive breeding center, Changchey.		Identified and mapped potential habitat by 2022.	0.00										
Action B.2.1.3 Identify, train (harden) and release captive bred herons	RSPN	Captive breeding center, Changchey.		Train and release to wild by 2030	0.50										
<b>Enhance scientific understanding on biology, behaviour and public awareness on White-bellied Heron</b>				Publication of at least five scientific papers by 2031											
<b>Output B.3.1 Literature on ecology and biology of WBH published</b>				5 research findings published											
Action B.3.1.1 Conduct research on biology and behaviour of WBH	RSPN	Captive breeding center, Changchey.		Publish minimum of 5 papers by 2031	0.00										
<b>Output B.3.2 WBH information database established with improved public awareness</b>				Operational by 2023											
Action B.3.2.1 Establish center for public education, awareness and information (WBH global data center)	RSPN	Captive breeding center, Changchey.		Operation of center by 2023.	10.00										
<b>Sub-total</b>					<b>136.20</b>										
<b>Total</b>					<b>380.31</b>										

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## Supported by:

Bhutan Trust Fund for  
Environmental Conservation  
through Up-scaling WBH  
recovery plan project



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