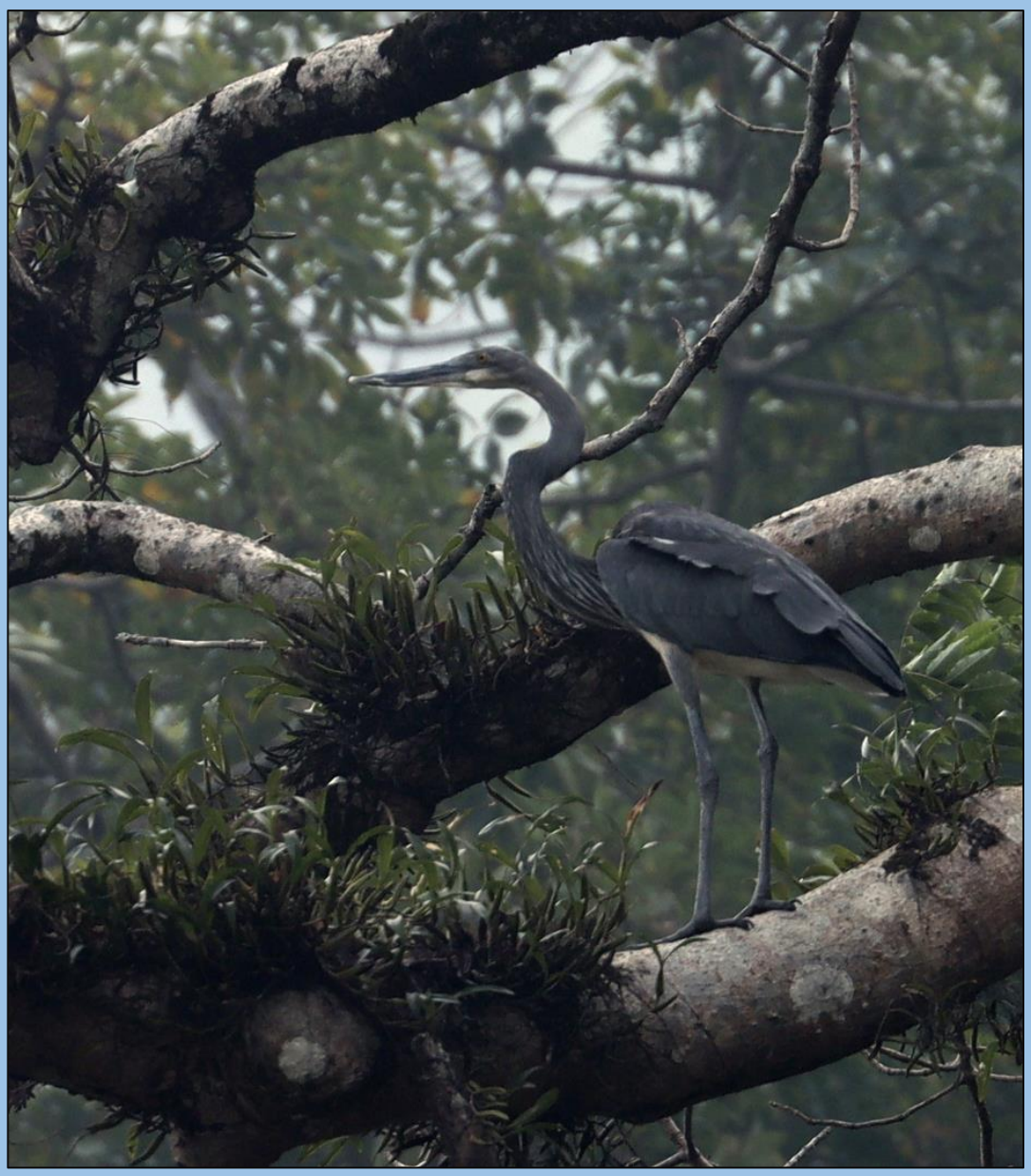
Key Biodiversity Area Conservation Action Plan
Dagachhu, Dagana
(July 2023 – June 2033)



Divisional Forest Office, Dagana
Department of Forests and Park Services
Ministry of Energy and Natural Resources
Royal Government of Bhutan

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Ministry of Energy and Natural Resources
Department of Forests and Park Services

Royal Government Endorsement and Approval

Dagachhu Key Biodiversity Area Conservation Action Plan
1st July 2023 – 30th June 2033.

"In accordance with and as per the provisions of the Forest and Nature Conservation Act of Bhutan, 1995"

Submitted for Approval

Chief Forestry Officer
Divisional Forest Office, Dagana

Forwarded for Approval

Chief Forestry Officer
Nature Conservation Division

Approved by

DIRECTOR
Department of Forests and Park Services

Abbreviations and acronyms

BPC	Bhutan Power Corporation
DHPC	Dagachhu Hydro Power Cooperation Limited
DoA	Department of Agriculture
DoFPS	Department of Forests and Park Services
DoL	Department of Livestock
FMCL	Farm Machinery Corporation Limited
IKI	International Climate Initiative
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
Km	Kilometer
LCSG	Local conservation support group
LG	Local Government
m	Million
masl	Meters above sea level
MoAL	Ministry of Agriculture and Livestock
NCD	Nature Conservation Division
NGO	Non-governmental organization
Nu	Ngultrum
RBM	River bed materials
RSPN	Royal Society for Protection of Nature
TCB	Tourism Council of Bhutan
WBH	White-bellied Heron

FOREWORD

Bhutan's rich biodiversity has been secured by the network of protected areas for the past many decades. However, the state of forests and biodiversity are equally rich beyond the protected areas in Bhutan. On the contrary, the areas beyond protected areas faces considerable threats from anthropogenic disturbances and economic development, and this poses risk to many globally threatened habitats and species found therein. Across the globe, such areas of conservation significance have been addressed by the "other effective area-based conservation measures" or OECMs, an area set aside towards achieving the long term and effective in-situ conservation of biodiversity outside of protected areas. OECMs complement protected areas through sustained, positive conservation outcomes, even though they may be managed primarily for other reasons.

The Key Biodiversity Areas (KBA) in Bhutan, at a global scale is part of the OECMs and is, therefore, adopted towards securing conservation of areas and species that are of conservation significance in Bhutan. Of the many potential KBA sites in the country, the Department has identified and prioritized 11 sites in various Divisional Forest Offices, that requires urgent conservation interventions. For these 11 sites, key interventions have been identified, and has been and is being presented in this conservation action plan as per the guidelines on KBA. The KBA sites classified will serve as in-situ conservation of biodiversity beyond the protected areas.

These classified KBAs are expected to bring in improved conservation outcomes, that are crucial for the functioning of the environment through the provision of essential ecosystem services. It is essential for the processes that support all life on Earth, including humans. These KBAs are expected to address the issues of biodiversity loss and ecosystem degradation due to threats such as pollution, overexploitation of natural resources, introduction of invasive species and habitat loss.

I am happy to note that we continue to prioritize conserving our natural resources, while balancing ourselves with the need to economically develop the nation. I applaud all concerned officials from the Department for coming up with this conservation action for the first set of KBAs classified in the country and wish you all success in implementing the actions.

(Lobzang Dorji)
Director

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Chapter 1

Introduction

The Key Biodiversity Area (KBA) as defined by the International Union for Conservation of Nature (IUCN) are "sites contributing significantly to the global persistence of biodiversity". In the context of Bhutan, KBAs are "sites outside protected area (PA) networks, contributing significantly to the global and/or national persistence of biodiversity" (Nature Conservation Division, [NCD], 2020). The identification of KBAs outside the PA is expected to help protect and conserve biodiversity and ecosystems of great conservation significance that are facing higher degree of anthropogenic threats and have greater risk of losing the species.

Dagachhu KBA is located towards the east of the Dagana Dzongkhag (Figure 1). It has an area of 9.18km^2 spread across seven gewogs. The boundary for the KBA starts from Dagachhu-Sunkosh confluence (26°55'40.01"N; 90° 2'27.98"E) in the south to Darachhu-Lognachhu confluence (27°3'54.89"N; 89°53'48.96"E) in the upper side of the catchment area. It has elevation ranging from 221 masl to 1090 masl and falls under warm broad-leaved forest with *Duabanga grandiflora, Ostedes paniculata, Mallotus philippinensis* and *Lagerstroemia parviflora* as most abundant species.

Dagachhu river is an important tributary of Punatsangchhu basin. In recent years, Dagachhu is seen as a promising habitat for the White-bellied Heron (WBH) with declining population in the upper Punatsangchu basin. WBH was first sighted along Dagachhu river in 2019. Since then, it was observed foraging mostly along the river at two sites. The annual population survey, 2020 recorded two individuals (Acharja, 2020). While it is restricted to undisturbed freshwater river systems, WBH is observed foraging within Dagachhu Hydropower dam where there are daily human interferences.

The KBA is also an important spawning area of the Golden Masheer. According to the IUCN Red List of threatened species, Golden Masheer is listed under the category of endangered species while WBH falls under critically endangered category. The co-occurring of WBH along with other endangered species has been critical in declaring the area as KBA.

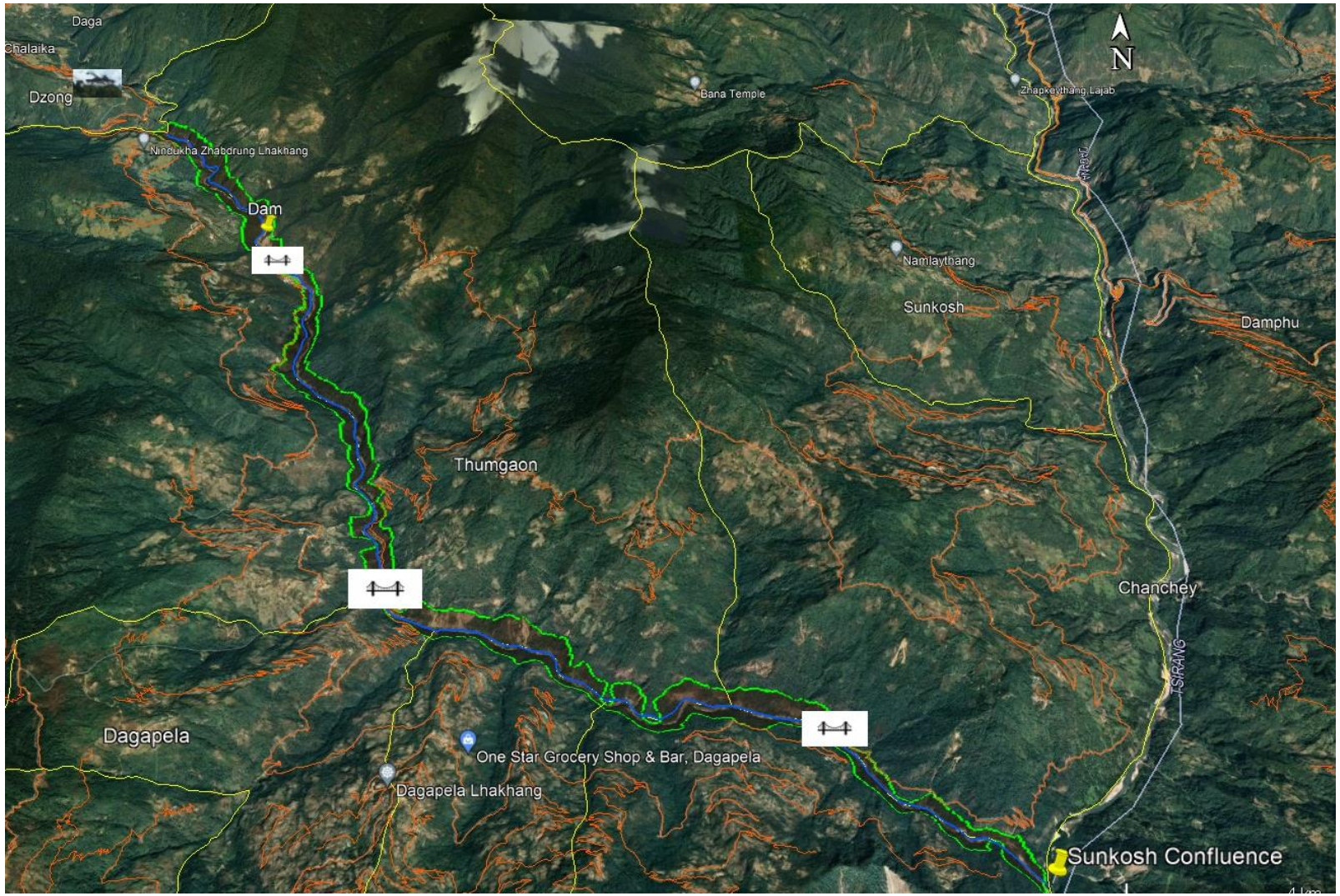

Figure 1: *Dagachhu KBA boundary map*

Chapter 2

Threat and Challenges

WBHs are elusive and mostly inhabit the undisturbed rivers, ponds and lakes (Wangdi, 2014). It is found to feed in both running water as well as in lakes (RSPN [Royal Society for Protection of Nature], 2011). In Dagachhu KBA, WBHs are found foraging mostly at Hydropower dam and confluence area that are highly vulnerable to anthropogenic activities. Some of the threats within the KBA are listed as follow;

2.1. Expansion of farmland and farming activities

Increased agricultural expansion and human settlements near the river increase the rate of forest degradation and deforestation. It also causes disturbances to WBHs since they are sensitive to human presence.

2.2. Natural Resource Extraction

Harvesting of natural resources such as extraction of sand, timber and firewood poses a serious threat to WBH. Sand extraction within KBA is done sporadically across the area with maximum extraction from dam. Timber and firewood extraction is also done within the KBA. The disturbances through these activities involve flushing away of WBHs during their foraging and nesting period (RSPN & Department of Forests and Park Services [DoFPS], 2022). Activities like sand extraction degrade the feeding sites that exacerbate pressures on the existence of the species.

2.3. Infrastructure Development

Dagachhu KBA has three bridges across the river. Dagachhu bridge connecting Dagana-Tsirang secondary national highway and Baleygang bridge connecting Goshi Gewog with Khepisa Gewog are regularly plied bridges. The KBA also has highway and farm roads across and near the river. Such infrastructures deteriorate the habitat causing disturbances to WBH. The development of new infrastructures along river modifies the landscape. The activity also generates debris and different types of wastes 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 behavior of WBH (RSPN & DoFPS, 2022).

Table 1. Threat ranking of the KBA

2.4. **Forest Fire**

WBH nests on standing trees and uses canopy for resting and cover. The occurrence of forest fires during the nesting season increases the chances of wiping out the total population (RSPN & DoFPS, 2022). The habitat inventory conducted in 2019 recorded *Pinus roxburghii* and *Terminalia myriocarpa* inside KBA which are preferred nesting species in Bhutan (RSPN, 2011) and India (Maheswaran, 2014). The trees were recorded towards the upper side of the KBA where fire incidences were reported in the same year.

2.5.**Hydropower infrastructure and activities**

Dagachhu KBA has approximately 26km linear length. Around 10km in the middle stretch has low volume free flowing river due to water diversion. The development of hydropower dam has modified and fragmented the prime habitat of WBH. Dam has permanently changed the riverine ecosystems altering the foraging ground. The structure also restricts the movement of fish which is the main diet of WBH (RSPN & DoFPS, 2022). The regular activities at the dam disturb feeding period of WBH. High transmission lines (33kv) and electricity pylons across rivers also threaten the movement of WBH and increase the risk of collision and electrocution.

2.6.**Fishing**

Illegal fishing is rampant in both upper and lower confluence areas. While human presence disturbs the WBH, the harvesting of fish creates competition between humans and WBH, disrupting the food base of the WBH in the area.

2.7.**Natural Threats**

The threat from natural factors is a natural phenomenon that occurs in an ecosystem. However, when these natural factors are enhanced by the intervention of anthropogenic activity, it threatens the survival and disturbs the habitat of certain species.

2.7.1. Climate change

Climate change is considered as one of the major threats to freshwater biodiversity as glacier fed rivers are more sensitive to climate change. With the increase in temperature, the 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 of WBH.

2.7.2. Competitor species

The presence of competitor species like cormorants, kingfishers and smooth-coated otter within the KBA also have an impact on WBH since they have a similar ecological niche. The competition for food resources can exacerbate the declining WBH population in its habitat range.

2.7.3. Erosion and landslides

Erosion and landslides are other factors that tigger the alteration of WBH feeding habitat. WBH usually forages in clear and shallow waters with stone beds and sand bars (Stanley Price & Goodman, 2015; King *et al.*, 2001). The sediments from the erosion and landslide alter freshwater ecology affecting the feeding habitat of the WBH.

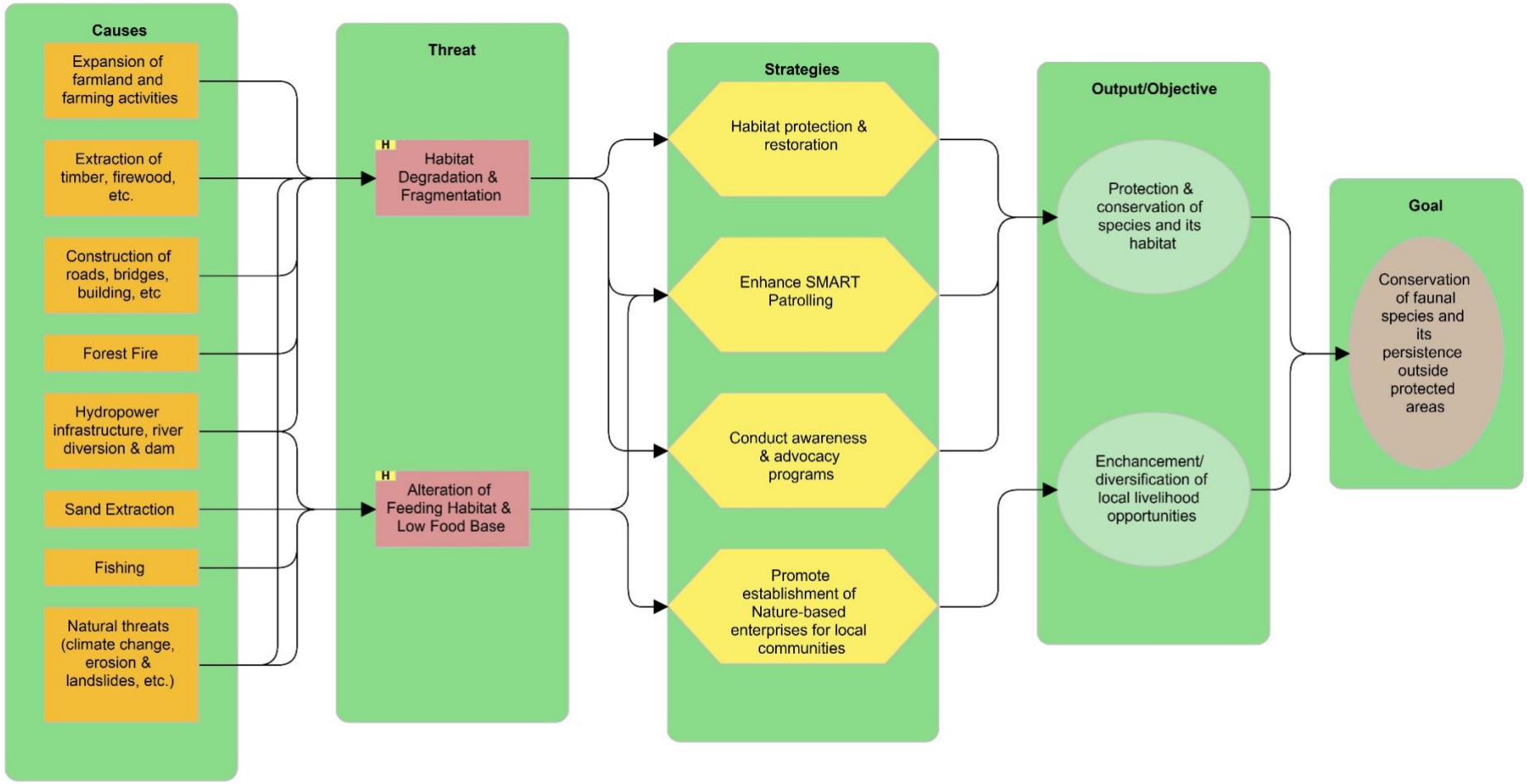

Figure 2: Conceptual model for implementation of the action plan

Chapter 3

Interventions/Plans

3.1. Vision:

Ensuring the protection of White Bellied Heron and Golden Masheer and their habitat.

3.2. Objective(s)

I. Protection & conservation of species & its habitat

II. Enhancement/ diversification of local livelihood opportunities

Table 2. Implementation framework

Objectives	Strategies	Action	Year along with the budget in million (Nu.)										Remark
			Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	
1. Protection & conservation of species & its habitat	1.1. Habitat protection & restoration	1.1.1. Carryout plantation in degraded habitat	0.45	0.45	0.45	0.45							Catchment area
		1.1.2. Develop suitable feeding sites			0.3								KBA

	1.2. Enhance SMART Patrolling	1.2.1. Conduct SMART patrolling on quarterly basis	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	KBA
		1.2.2. Conduct monitoring of the species & its habitat on quarterly basis	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	KBA
	1.3. Conduct awareness & advocacy programs	1.3.1. Conduct awareness & advocacy programs	0.1	0.1	0.1	0.1	0.1				0.1	0.1	Public/ institutions

2. Enhancement/ diversification of local livelihood opportunities	2.1. Promote establishment of Nature-based enterprises for local communities	2.1.1. Establish & strengthen the capacity of LCSG/ citizen scientist		0.1	0.1	0.1	0.1	0.1					Public/ institutions
		2.1.2. Plantation of high value timber species in community forests & private farmlands		0.2	0.2	0.2	0.2						Catchment area
		2.1.3. Promote & support private fisheries		0.2	0.2	0.2	0.2						Catchment area
		2.1.4. Promote & support private nurseries	0.2		0.2		0.2						Catchment area
	Total Amount (Nu.): 7.3 m												

Chapter 4

Monitoring and Evaluation

4.1. Monitoring and evaluation

Divisional Forest Office in collaboration with the NCD and other stakeholder will coordinate and monitor the implementation of this conservation action plan. A mid-tern review of the plan will be carried out towards the end of the fifth year of plan implementation period. Progress will be monitored from periodic reports submitted by the field offices. The monitoring framework (Table 3) will be used for monitoring and evaluation.

4.2. Funding & timeline

This conservation action plan is developed for a plan period of ten years from July 2023-June 2033. Over the next ten years, DoFPS and the conservation partners will implement eight key actions which is estimated to cost Nu.7.3m (Table 2). The funding for this ten-year conservation action plan will be from the Royal Government of Bhutan (RGoB), the International Climate Initiative (IKI) project, RSPN and the various national and international donors and organizations.

4.3. Implementation time line

This conservation action plan will be implemented from July 2023. It is a living document and the activities prescribed above are dynamic and should change as per the change of policy, priorities or field situations. The annual monitoring and mid-term review should consider any addition or deletion of actions wherever necessary and relevant. The DoFPS will be the lead agency for the implementation of this conservation action plan. RSPN, as a leading non-governmental organization (NGO) in the conservation of WBH in partnership with other relevant agencies will support DoFPS in implementing conservation work. Technical and institutional support from stakeholders such as the Department of Agriculture (DoA) and Department of Livestock (DoL) under Ministry of Agriculture and Livestock (MoAL), Tourism Council of Bhutan (TCB), DHPC, 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.

Table 3: Monitoring framework

Objectives	Action	Output indicator	Baseline	Unit	Target										Remark
					Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	
1. Protection & conservation of species and its habitat	1.1.1. Carryout plantation in degraded habitat	Plantation journal maintained for each plantation sites and plantation completion report submitted	0	Ha	1	1	1	1							
	1.1.2. Develop suitable feeding sites	Suitable feeding sites developed towards the upper side of the catchment area	0	No			1								
	1.2.1. Conduct SMART patrolling on quarterly basis	SMART patrolling conducted & report generated on quarterly basis	0	No	4	4	4	4	4	4	4	4	4	4	
	1.2.2. Conduct monitoring of the species & its habitat on quarterly basis	Monitoring conducted and data collected quarterly	0	No	4	4	4	4	4	4	4	4	4	4	
	1.3.1. Conduct awareness & advocacy programs	No. of awareness and advocacy programs conducted at all levels and report submitted	2	No	1	1	1	1	1				1	1	
2. Enhancement/ diversification of local	2.1.1. Establish & strengthen the capacity of LCSG/ citizen scientist	Train at least 10 LCSG and citizen scientists annually.	0	No		10	10	10	10	10					

livelihood opportunities	2.1.2. Plantation of high value timber species in community forests & private farmlands	High value timber species planted in community forests and private farmlands and plantation report submitted	0.5	Ha	0.5	0.5	0.5	0.5							
	2.1.3. Promote & support private fisheries	No of private fisheries established in the local communities	0	No	2	2	2	2							
	2.1.4. Promote & support private nurseries	No of private nurseries established in the local communities	1	No	1		1		1						

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