Management Effectiveness of Protected Areas in Bhutan 2022-2023

"Managing Bhutan's Natural Heritage"

Nature Conservation Division

Department of Forests and Park Services

Ministry of Energy and Natural Resources

Royal Government of Bhutan

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In collaboration with:

Protected Area offices of five National Parks, four Wildlife Sanctuaries, one Strict Nature Reserve and eight Biological Corridors

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Overall Guidance

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Citation:

NCD 2023, Management Effectiveness of Protected Areas in Bhutan 2022-2023, Nature Conservation Division, Department of Forests and Park Services, Ministry of Energy and Natural Resources, Royal Government of Bhutan, Thimphu, Bhutan

Photographs:

Rangers of the Department of Forests and Park Services, and DoFPS archives

Supported by:

Bhutan For Life, Royal Government of Bhutan and GEF LDCF NAPA III project

FOREWORD

Bhutan is known to the rest of the world for its rich and intact state of biodiversity that has been steered into this century by the visionary leadership of our monarchs. Today, close to 70% of the country is covered with natural forests, that supports healthy ecosystem and wildlife habitats. This vast extent of forest cover and its management through the different management regimes ensures our national commitment of remaining carbon neutral for perpetuity. The constitutional mandate to maintain 60% of forest cover for all times to come ensures that the present and future generations will continue to have access to fresh water, clean air and abundant natural resources.

The protected area system in Bhutan started in the 1960s, and was revised in the early 1990s to align our park system with that of IUCN international standards. In 1999, nine biological corridors were added, and in 2008, Bhutan's largest national park, the Wangchuck Centennial National Park, was established. Today, the country's protected area system consists of five national parks, four wildlife sanctuaries, eight biological corridors and a botanical park, covering more than 50% of the country.

The area covered is vast, and how well it is protected will depend upon how well it is managed. That is where the assessment of management effectiveness is important. It shows our strengths and weaknesses, and opportunities. There are still plenty of challenges in the field: lack of equipment, expertise, financing, human resources and so on. The first report on the status and effectiveness of protected areas in Bhutan stated that we were on the right track and the recent report on an increase in tiger and snow leopard numbers is one of the many pieces of evidence which shows our inputs are yielding positive impacts on the ground. After almost 7 years from the initial assessment of METT, the current assessment will be an indication of how we are faring in comparison to the earlier assessment in managing our protected areas. The findings are expected to guide us towards a better understanding of our management success, limitations, and future management priorities.

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 the protected area management for willing to undergo the self-assessment to improve management effectiveness. I welcome this publication and am confident that the results will go a long way in informing future plans and interventions.

Thank you and Tashi Delek

(Lobzang Dorji)
Director

ACKNOWLEDGEMENT

The Nature Conservation Division is pleased to present the second report on the "Management Effectiveness of Protected Areas" in the country after the first report of its kind was published in 2016 since the inception of protected area management systems in the country. Such assessment report of the protected areas in the country is essential for the protected areas to assess themselves of their strengths and weaknesses thereby guiding the managers for future interventions as per the assessment needs and priorities. This 2022-2023 assessment report is for the whole of protected area system including the biological corridors which was not undertaken in the initial report of 2016.

The Nature Conservation Division would like to congratulate and extend sincere gratitude to all the protected area managements for undergoing self-assessment and for providing fair scores for their respective protected areas. The Division is also indebted to the external assessment team led by DoFPS advisor and representatives from functional divisions for taking their time for conducting the external assessment of the protected areas to ensure that the scores are valid and justifiable. Further I also congratulate all my colleagues in Nature Conservation Division for working tirelessly towards finalizing this important report.

This report would not have been possible without the guidance and advise of the Director, DoFPS. Further the division would like to extend our sincere gratitude and appreciation for the continued financial support and assistance bestowed by the Royal Government of Bhutan (RGoB), Bhutan Trust Fund and all the donors financing through the Bhutan for Life (BFL) project.

Thank you,

(Sonam Wangdi)

Chief Forestry Officer

LIST OF ACRONYMS

B2C2:	Bhutan Biological Conservation Complex
BC:	Biological Corridor
BFL:	Bhutan for Life
BWS:	Bumdeling Wildlife Sanctuary
CA | TS:	Conservation Assured Tiger Standards
CBD:	Convention on Biological Diversity
CF:	Community Forests
CFO:	Chief Forestry Officer
CITES:	Convention on International Trade in Endangered Species of Wild Flora and Fauna
DFO:	Divisional Forest Office
DoFPS:	Department of Forests and Park Services
FNCA:	Forest and Nature Conservation Act
FNCRR:	Forests and Nature Conservation Rules and Regulations
HKH:	Hindu-Kush Himalayan region
HWC:	Human-wildlife conflict
IUCN:	International Union for Conservation of Nature
JDNP:	Jigme Dorji National Park
JKSNR:	Jigme Khesar Strict Nature Reserve
JSWNP:	Jigme Singye Wangchuck National Park
JWS:	Jomotshangkha Wildlife Sanctuary
LFMP:	Local Forest Management Plan
m.a.s.l:	Meters above sea level
METT+:	Management Effectiveness Tracking Tool PLUS
NCD:	Nature Conservation Division
NWFP:	Non-wood forest products
PAs:	Protected Areas
PAME:	Protected Area Management Effectiveness
PNP:	Phrumsengla National Park
PWS:	Phibsoo Wildlife Sanctuary
REDD:	Reducing Emissions from Deforestation and Forest Degradation
RMNP:	Royal Manas National Park
RGoB:	Royal Government of Bhutan
SMART:	Spatial Monitoring and Reporting Tool
SWS:	Sakteng Wildlife Sanctuary
TraMCA:	Transboundary Manas Conservation Area
UNFCCC:	United Nations Framework Convention on Climate Change
UWIFoRT:	Ugyen Wangchuck Institute for Forestry Research and Training
WWF:	World Wildlife Fund

EXECUTIVE SUMMARY

The Bhutan Management Effectiveness Tracking Tool Plus (Bhutan METT +) was developed in 2014 and implemented between 2014 and 2016 to assess the management effectiveness of the protected area network of Bhutan. After five years, we started the second assessment in 2021 to track the progress and identify gaps in management effectiveness and has been recently completed. An extra mile added to the current assessment is that we included the eight biological corridors, which were previously not assessed in the 2014-2016 assessment.

The results indicate that protected areas are well managed, and compared to 2016, the management effectiveness has improved overall.

The main findings of the assessment are as follows:

- *The overall management effectiveness score for protected areas is 78.13%. This is an increase of 17.19% from 2016 assessment.*
- *The individual scores of the six elements of the IUCN WCPA framework for all protected areas are as follows:*
    - **Context – 100%**
    - **Planning – 80%**
    - **Inputs – 66.08 %**
    - **Process – 71%**
    - **Outputs – 56%**
    - **Outcome – 76%**

- *Among the national parks and wildlife sanctuaries, Royal Manas National Park has the highest Management Effectiveness (ME) score at 88.66% and Royal Botanical Park (RBP) with the lowest at 73.89%. Among the biological corridors, BC5 has the highest score at 78.63% and BC2 with the lowest at 68.46%.*
- *All parks and wildlife sanctuaries exceeded the average ME score (78.13%), except RBP and all BCs scored less than the national average.*
- *On average, national parks and wildlife sanctuaries are doing better than biological corridors, as indicated by the ME score. This is mainly due to the late operationalization of the BCs, the first conservation management plan of which was approved only in 2020 for BC 5.*

- *The overall score for the output element is recorded to be lower than the input and can be attributed to the lower scores from biological corridors. This is expected as the conservation management for biological corridors began as recent as 2020 when the first conservation management plan for BC5 was approved for implementation. Having said this, it is expected that gradually the output scores for BCs will improve over the coming years.*

The findings are promising and indicate that protected areas are performing well in management. However, a lot needs to be done in biological corridors to bring it at par with national parks and wildlife sanctuaries. In many protected areas, especially biological corridors, outputs are well below input which calls for additional efforts that needs to be implemented to address this.

Mezhi Landscape - Nubtshonapata, JKSNR

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CHAPTER 1~ INTRODUCTION

1.1. Bhutan's protected area system

The importance of nature and its component is engrained in the country's unique socio-cultural and religious settings. For centuries, a strong religious, traditional and cultural ethos associated with Buddhism played an important role in the lives and culture of the Bhutanese, thus providing a safe refuge for Bhutan's extraordinary biological diversity (Tharchen, 2013). Buddhist values emphasizes a respectful attitude towards all living beings and their protection. As Bhutan embraced the modern socio-economic developments, the Royal Government of Bhutan under the leadership of farsighted and visionary monarchs has prioritized the conservation of nature and biodiversity, building on a strong tradition of respect for nature. The scientific management of forests and wildlife conservation in Bhutan can be traced back to 1952 when Department of Forestry was established as the first official agency within the government system (DoFPS, 2011). The Bhutan Forests Act of 1969 which is one of the forerunners of all modern legislations brought all forest resources under state management with the intent to curb exploitation and rationalize utilization, indicating the importance that royal government place on the conservation of forests. In 1974, the first National Forest Policy was approved that set a goal of maintaining 60% of the land under forest cover in perpetuity (MoTIF, 1974).

The protected area development in Bhutan is also as old as its conservation story. During the 1960s, the concept of protected areas was felt necessary for safeguarding the wildlife such as the Bengal tiger (*Panthera tigris*), common leopard (*Panthera pardus*), Asian elephant (*Elephas maximus*), one horned rhinoceros (*Rhinoceros unicornis*), and spotted deer (*Axis axis*). The game reserves then became the first protected areas in Bhutan and Manas Wildlife Sanctuary was first of its kind established in 1966 (Mahat, 1985). However, it was in 1974 that the protected areas were further expanded through the establishment of eight other demarcated protected areas that helped harmonize the provisions of conservation reflected in the national forest policy 1974 (Seeland, 1998). In 1976, the Northern Wildlife Circle and Southern Wildlife Circle were established in Thimphu and Samtse to oversee the management of protected areas in the north and south respectively (DoFPS, 2011).

Table 1 Protected areas of Bhutan in 1974

Sl. No.	Wildlife Sanctuaries/ Parks/Forests Reserves	Administrative Jurisdiction	Forest Divisions	Area in Sq.km
1.	Laya Wildlife Sanctuary	Thimphu, Haa, Paro and Gasa	Thimphu	1477
2.	Gasa Wildlife Sanctuary	Gasa and Trongsa	Thimphu	2718
3.	Jigme Dorji Wildlife Sanctuary	Wangdue, Trongsa, Lhuentse, Trashigang	Thimphu, Sarpang, Samdrup Jongkhar	3710
4.	Golay Game Reserve	Sarpang	Sarpang	195
5.	Doga National Park	Paro	Thimphu	21
6.	Mochu Reserved Forests	Sarpang	Sarpang	278
7.	Pachu Reserved Forests	Samtse	Samtse	140
8.	Khaling Reserved Forests	Sarpang	Sarpang	233
	Total area			**8772.00 km^2**

In 1984, the protected area systems were upgraded to rank them according to the assigned national and international importance. The former Laya, Gasa and Jigme Dorji Wildlife Sanctuaries were merged to Jigme Dorji Wildlife Sanctuary, and Goley Game Reserve became Namgyal Wangchuck Reserve and five new reserves namely Zoshing Reserved Forest, Sinchula Reserved Forest, Shumar Wildlife Reserve, Dungsam Wildlife Reserve and Neoli Wildlife Reserve (Figure 1) were also established. However, without adequate resources and due to non-availability of a national nature conservation strategy, none of those protected areas were operationalized with formal management team and programmes put in place.

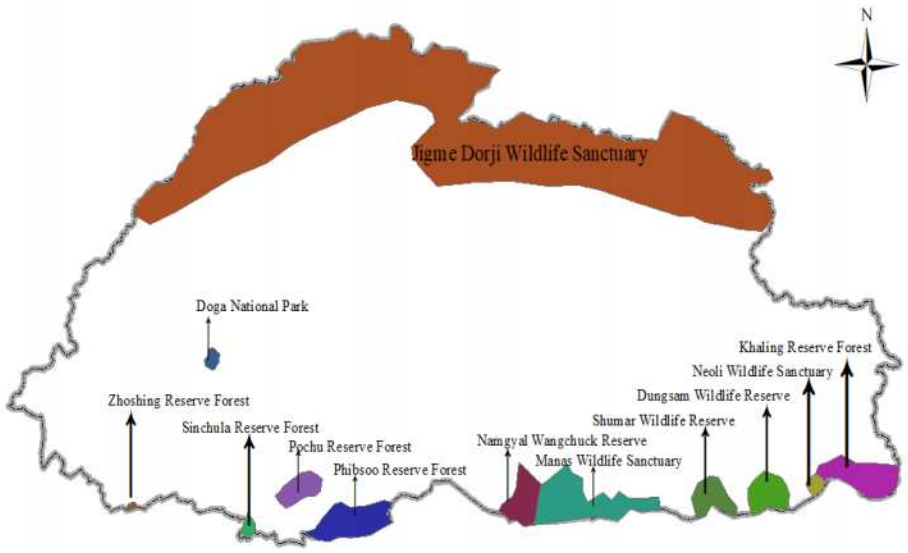


Figure 1: Protected areas established between 1966-1984 (Map not to scale)

In 1993, the Nature Conservation Division (NCD) was established under the Department of Forestry to oversee the conservation programmes and protected area managements and subsequently in the same year, protected area gazettement notification was issued by RGoB for the nine protected areas covering 26% of the country (MoA, 1993) after thorough revision of the earlier protected areas to achieve better ecological representation and realistic management opportunities (Figure 2). These protected areas were also aligned to international standards of protected areas set by International Union for Conservation of Nature (IUCN) and the revised system included a strict nature reserve (IUCN category I), four national parks (IUCN category II) and four wildlife sanctuaries (IUCN category IV).

Jigme Dorji National Park (JDNP), Black Mountains National Park (currently Jigme Singye Wangchuck National Park (JSWNP)), and Royal Manas National Park (RMNP) were identified as priority areas for scientific management to conserve the major ecosystems of the country ranging from the lowland tropical grasslands and forests in the south to permanent snow fields in the north. In 1994, NCD came up with the first Nature Conservation Action Plan with clear direction towards conservation and protected area management. In 1995, the Bhutan Forest Act of 1969 was repealed by Forests and Nature Conservation Act (FNCA) of 1995 (RGoB, 1995) and the new Act besides others, was meticulously enacted to address evolving conservation needs including community participation and protected area management.

Figure 2: Protected areas gazetted in 1993

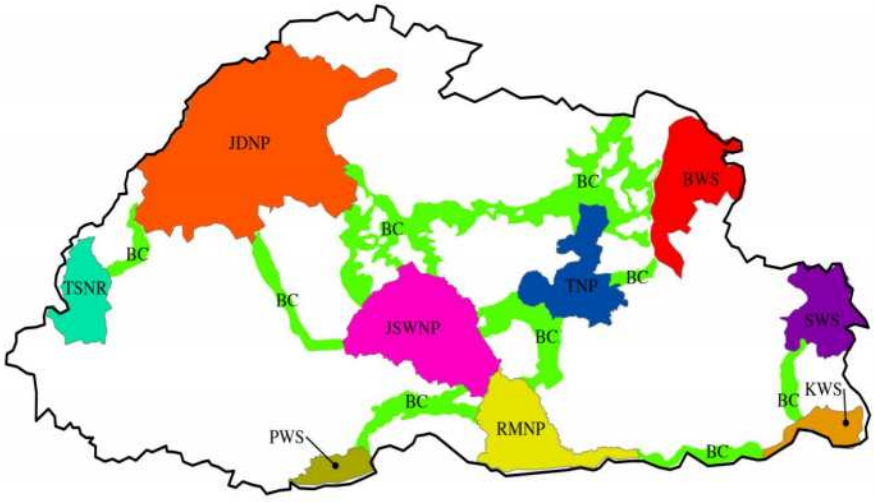


Figure 3: Protected areas with the establishment of biological corridors in 1999

(BC: Biological Corridors; TSNR: Toorsa Strict Nature Reserve; JDNP: Jigme Dorji National Park; JSWNP: Jigme Singye Wangchuck National Park (Black Mountain National Park in 1993); RMNP: Royal Manas National Park; TNP: Thrumshingla National Park; PWS: Phibsoo Wildlife Sanctuary; KWS: Khaling Wildlife Sanctuary; SWS: Sakteng Wildlife Sanctuary)

By 1995, these protected areas started operationalization based on the availability of funding support, which further helped in certain modification in their extant based on practicability. Bhutan also initiated ratification of major international conventions related to

environmental conservation some of which are Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES), Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC) and in keeping with the requirements of the CBD, the country produced its first Biodiversity Action Plan in 1998, which set more ambitious targets towards protected area management and biodiversity conservation (NCD, 2004).

In 1999, Bhutan established 12 biological corridors covering a total area of 3,660 km^2 and bestowed it as the Gift to the Earth from the people of Bhutan (Figure 3). These biological corridors were set aside to connect the nine protected areas of Bhutan to enable habitat linkages and facilitate wildlife movement and population dispersal. The biological corridors and the nine protected areas formed a complex conservation area known as Bhutan Biological Conservation Complex covering 36% of the total land area (NCD, 2004).

The latest addition to the network of protected areas of Bhutan was the Wangchuck Centennial Park gazetted in 2008 later renamed as Wangchuck Centennial National Park (WCNP) (Figure 4). It is the largest national park amongst 10 protected areas in the country with an area of 4914.63 km^2. WCNP was established as a centenary tribute by the Government and people of Bhutan to the Wangchuck Dynasty for selflessly leading Bhutan to the 100^{th} year of sovereignty, stability and tranquility with environmental conservation as one of the four pillars of the Bhutan's economic development. The 2008 also marked the dawn of "Democratic, Constitutional Monarchy" in Bhutan with the nation adopting the Constitution of the Kingdom of Bhutan, which was a gift to the people from the golden throne. In establishing the WCNP, major part of the northern biological corridor became a part of WCNP, and subsequently the number of biological corridors decreased to eight.

Today, the protected areas have a total area of 19750.80 km^2 which in total accounts 51.44% of the total geographic area of Bhutan (Figure 5; DoFPS, 2020). Moving forward, conservation and management of protected area is guided by the newly enacted conservation law, the Forests and Nature Conservation Act 2023 (RGoB 2023), which places equal importance to conservation with that of sustainable management of forest resources through community and individual participation.

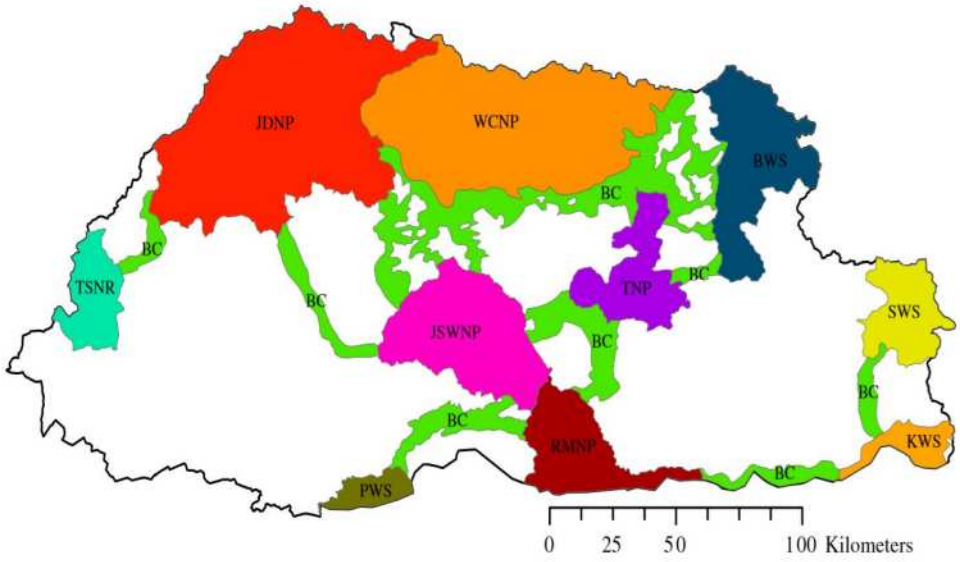


Figure 4: Protected area after establishment of Wangchuck Centennial Park in 2008

(BC: Biological Corridors; TSNR: Toorsa Strict Nature Reserve; JDNP: Jigme Dorji National Park; JSWNP: Jigme Singye Wangchuck National Park; RMNP: Royal Manas National Park; TNP: Thrumshingla National Park; WCNP: Wangchuck Centennial National Park; PWS: Phibsoo Wildlife Sanctuary; KWS: Khaling Wildlife Sanctuary; SWS: Sakteng Wildlife Sanctuary)

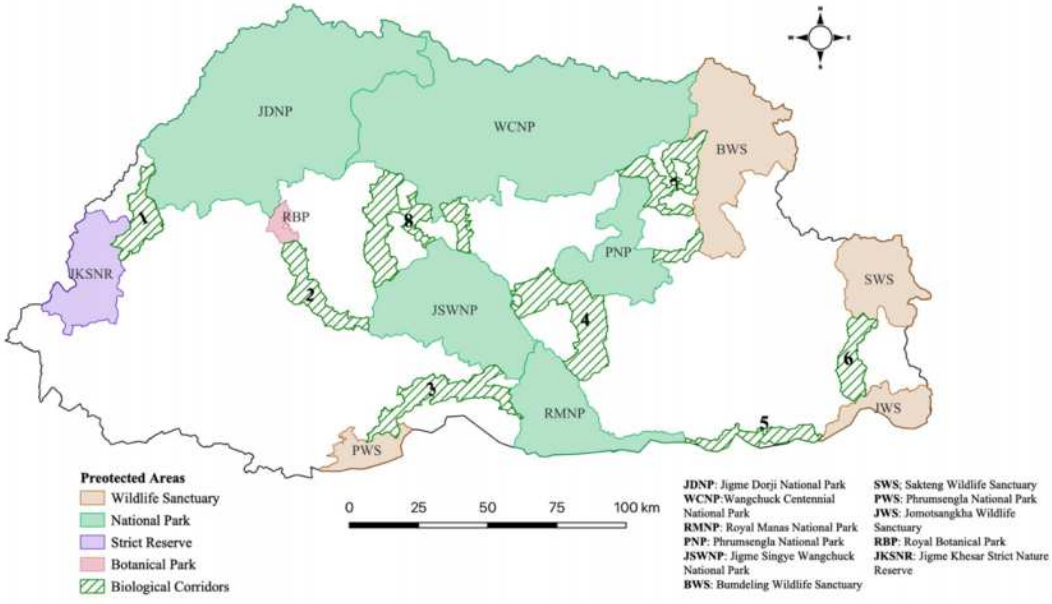


Figure 5: Protected area network today

1.2. Bhutan Management Effectiveness Tracking Tool PLUS (Bhutan METT+)

Bhutan METT+ is a comprehensive framework/Protected Area Management Effectiveness (PAME) system adopted by the RGoB through adaption of METT as the basis of Bhutan's protected area management assessment (MoAF, 2016). The Bhutan METT+ adapted through a series of consultations, meetings and piloting processes includes the following data and assessment sheets, i.e.,

1. **Data Sheet 1:** This introductory sheet records details of the assessor(s), and information about the site being assessed.
2. **Assessment Sheet 1:** This sheet provides an assessment of the threats (*from the pre-identified list*) and their impact (*based on the guidance available for interpretation of the categories*) on the site being assessed.
3. **Assessment Sheet 2:** This sheet is unique for Bhutan METT+ as it has been designed specifically for the Bhutan METT +, and it provides a more detailed assessment of threats considered of medium or high significance (current or potential) in Assessment Sheet 1.
4. **Assessment Sheet 3:** This sheet highlights the two most important management activities undertaken at the site drawn and is prioritized from the generic list available.
5. **Assessment Sheet 4:** The sheet is the main assessment form and is structured around 35 questions presented in table format (*and used for calculation of the effectiveness score*), which includes three columns for recording details of the assessment, all of which should be completed.
6. **Assessment Sheet 5:** This sheet is also unique for Bhutan METT+ as it was developed to aid in collating baseline data to be recorded for the protected area, which would eventually form a list of core indicators to be monitored in repeat uses of the assessment.

Bhutan METT+ is a protected area management effectiveness (PAME) process instituted for the protected areas of Bhutan in 2016 to help protected area managers and others to understand the successes and limitations in the management of their site(s) and to assess gaps (in funding or activities), understand strengths and weaknesses, capacity, training and infrastructure needs, and future management priorities. The Bhutan METT+ adapts to the

METT which has been built upon the IUCN WCPA PAME framework reflecting upon the three management themes and six elements of assessment (Figure 6).

Figure 6: The IUCN WCPA PAME framework (Hockings *et al*., 2006)

1.3. Implementation of Bhutan METT+

For the second round of PAME assessment using the Bhutan METT+, all eight biological corridors were also included in the assessment. All management(s) of the 19 sites (*5 National Parks, 4 Wildlife Sanctuaries, 1 Strict Nature Reserve, 1 Botanical Park and 8 Biological Corridors*) were provided with refresher/hands on training for conduction of the assessment for uniformity and synergy. The field offices completed the internal assessment while teams formed from the Department Headquarters and Nature Conservation Division reviewed and conducted the external assessment to ensure check and balance.

Information from the assessment has been organized and evaluated to understand the management effectiveness of the sites, and to help understand in managing the sites better. While more than 850 individuals were involved for the internal assessment, around 10 individuals mainly from functional divisions led by the Advisor to the Department were engaged for conduct of the external review and assessment.

CHAPTER 2 ~ RESULTS

2.1. Overview of the assessment scores

2.1.1. Assessment results of all the 19 sites

The overall averaged results from the assessment conducted using the Bhutan METT+ for the 19 sites (5 National Parks, 4 Wildlife Sanctuaries, 1 Strict Nature Reserve, 1 Botanical Park and 8 Biological Corridors (BC)) showed that the protected areas in Bhutan are well managed at an average effectiveness score of 78.13%. The maximum and minimum effectiveness score were 88.66% and 68.46% for RMNP and BC2 respectively (Figure 7).

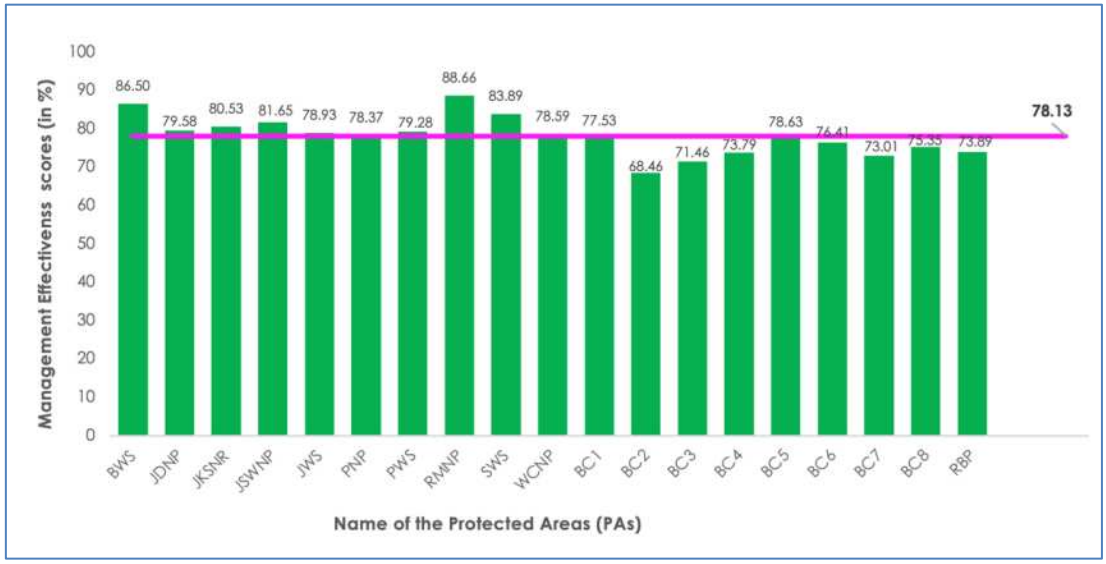


Figure 7: Bhutan METT+ scores of the individual PAs and the average management effectiveness score

The assessment showed that the individual effectiveness of the National Parks, Wildlife Sanctuaries and Strict Nature Reserve were much above the average score while for the Biological Corridors and the Royal Botanical Park, were below the average score.

The average effectiveness score of 78.13% for the 19 PAs is an increase by 17.19% from the 2016 Bhutan METT+ assessment baseline, which reported 66.67% effectiveness. This is a modest increase given the fact that only 10 PAs were assessed in 2016, (5NPs. 4 WS, 1 SNR).

The increase in the overall effectiveness is attributed to multiple conditions such as:

- Improved planning through preparation and implementation of conservation management plans with the sustained finances made available mainly through Bhutan for Life Project and other funding sources made available viz. Bhutan Trust Fund, WWF Bhutan Program, RSPN and Bhutan Foundation. These financial resources contributed towards enhancing the following outs:
  - Enhanced staff capacity and skills
  - Improved facilitates and infrastructures
  - Adequate information to manage the protected area generated through researches and surveys

The overall averaged score of the management effectiveness of protected areas when broken down into the individual scores of each of the six elements, indicated that the overall management effectiveness score has been slightly affected by output (67.54%) and input (69.40%) scores. Across the six broad elements, considerable improvement was observed in context, planning, inputs and processes elements (Figure 8).

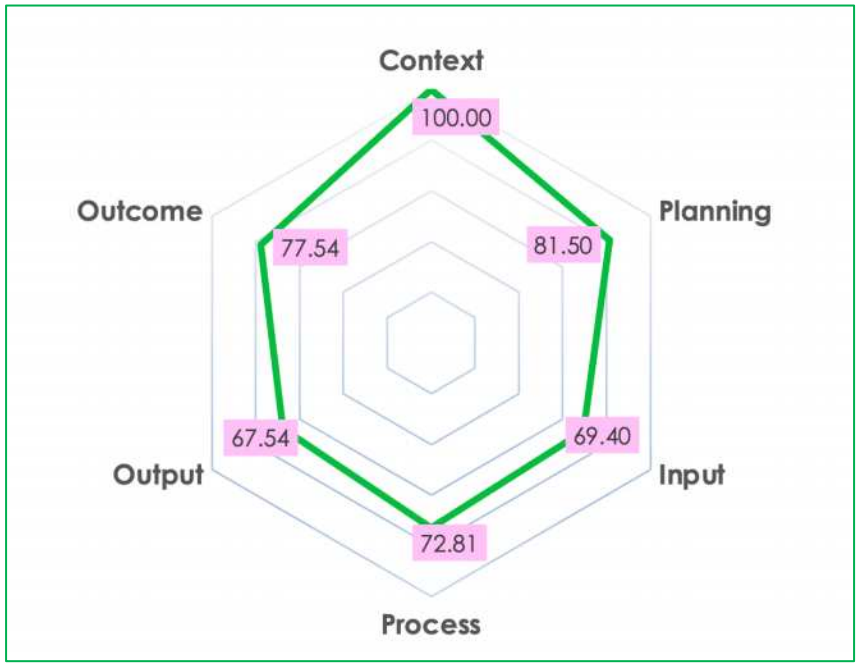


Figure 8: Averaged Bhutan METT+ scores of the 19 PAs against the 6 management elements

2.1.2. Assessment results of the 19 sites into 2 separate categories

Given that the BCs started its full operationalization by development of management plans quite recently, the results from the assessment have been segregated into two broad categories to provide better understanding of these sites' management. This would aid in enhancing their management effectiveness and ultimately help conserve and manage the area better.

The two broad groups for the analysis purposes are Group I totaling to 11 sites (5NPs. 4 WS, 1 SNR and RBP), and Group II totaling 8 BCs for the purpose of ease in its' comparative analysis now and in the future.

Amongst the 11 sites, RMNP had the highest effectiveness score at 88.66%, followed by BWS and JSWNP. On the contrary, score was lowest for RBP followed by PNP and WCNP (Figure 10). Amongst the 8 BCs, the score was highest for BC5 at 78.63% and lowest for BC2 68.46% (Figure 11). The scores were hindered by poor deliverables in output, processes and input with score not exceeding 68.52% (Figure 12)

Figure 9: Comparison of the averaged Bhutan METT+ scores of the Group I sites (11 PAs) - earlier and current assessment

A. *Assessment of group I – 11 sites (5NPs, 3WSs, 1SNR and 1RBP)*

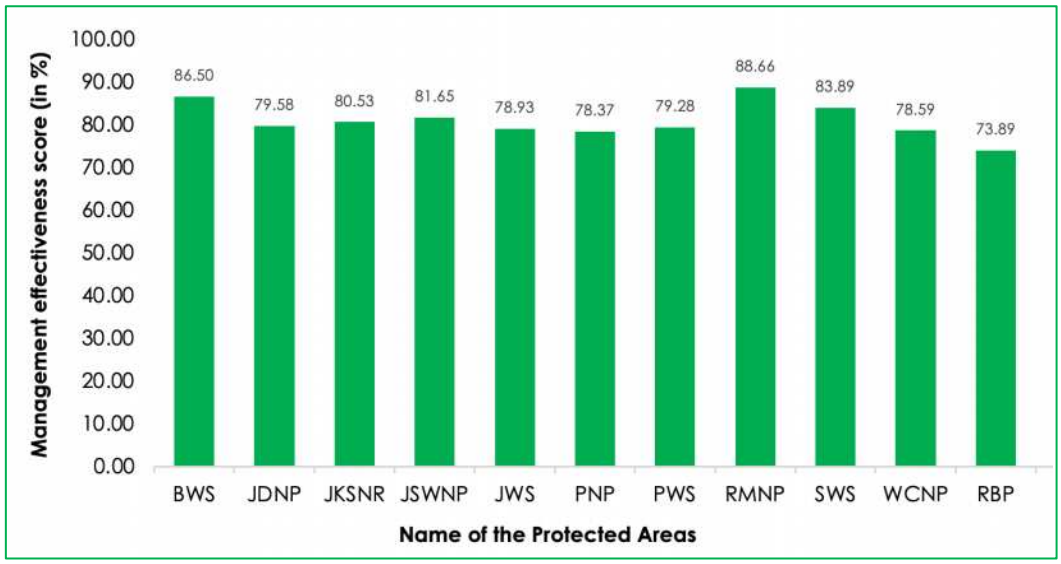


Figure 10: Bhutan PAME Scores (in %) of the 11 sites using Bhutan METT+

B. *Assessment of group II – 8 sites (BCs)*

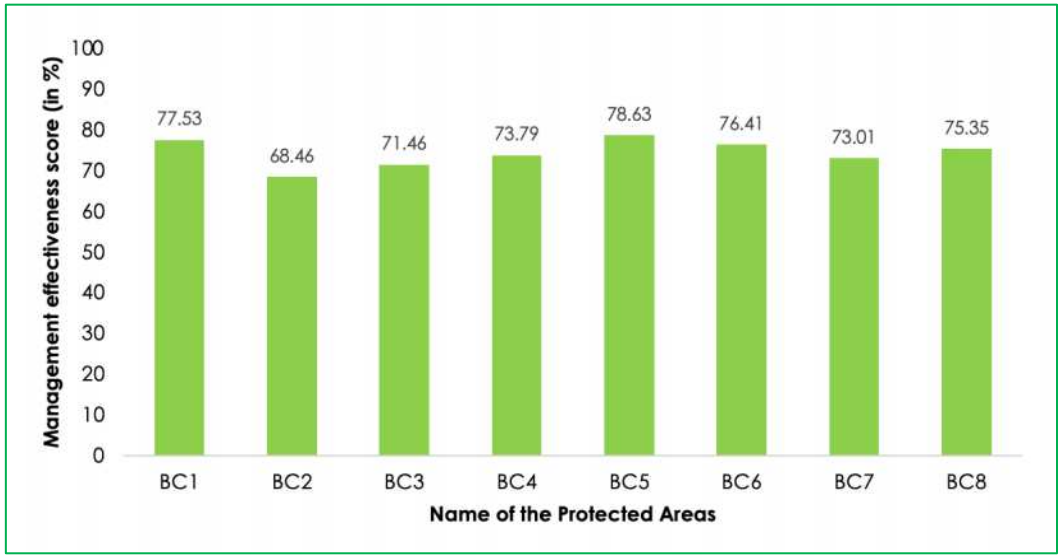


Figure 11: PAME Scores (in %) of the 8 Biological Corridors (BCs) using Bhutan METT+

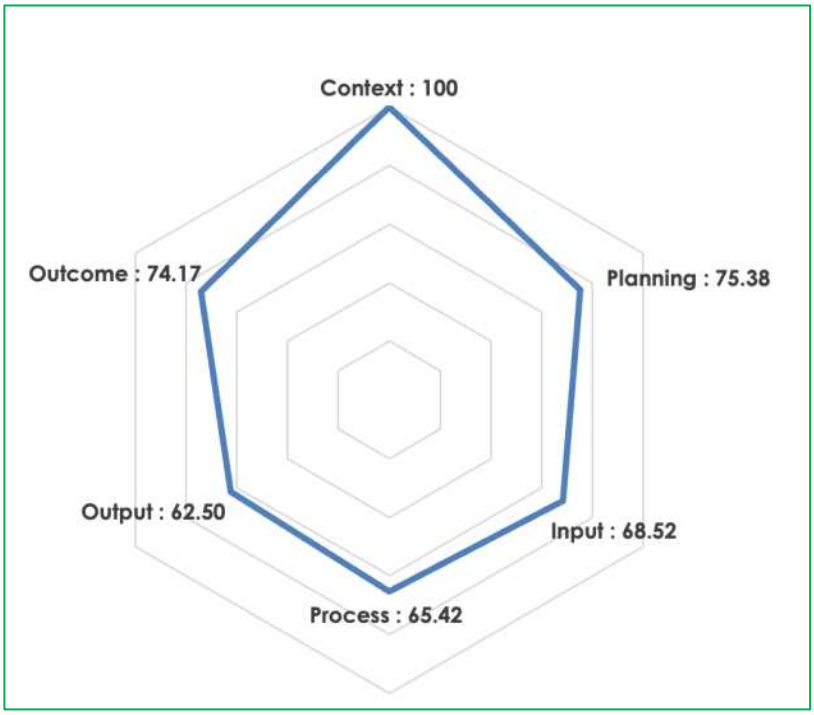
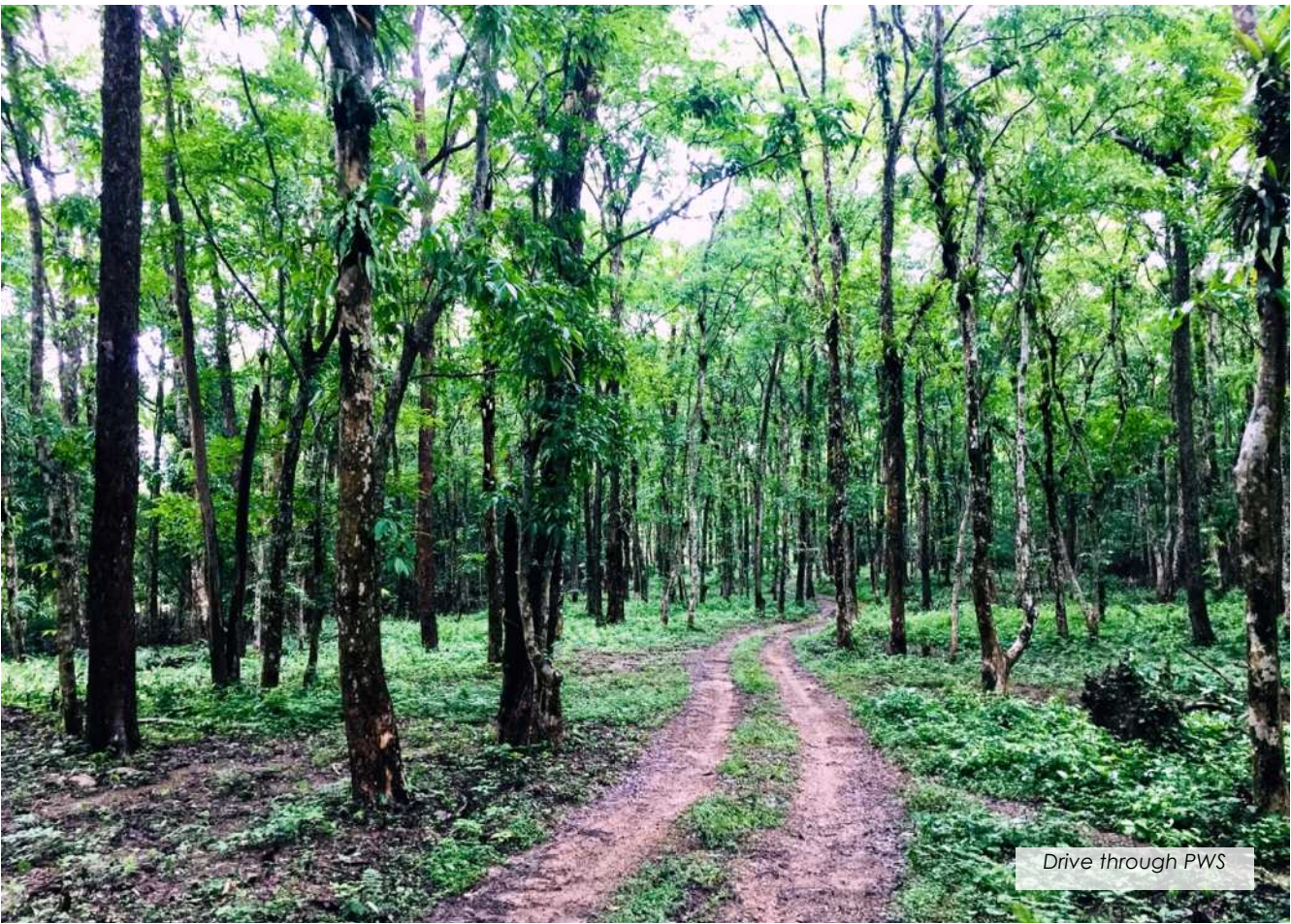


Figure 12: Averaged Bhutan METT+ scores of the 8 s against the 6 management elements



2.2. Summary of the assessment for each protected area

2.2.1. JIGME DORJI NATIONAL PARK

A. Introduction

Jigme Dorji National Park is one of the oldest and largest protected areas in Bhutan, second only to RMNP and WCNP respectively. The park covers an area of 4374.06 km^2 with altitude ranging from as low as 1400 m.a.s.l in lower south to over 7000 m.a.s.l to its north in north-western Bhutan. Owing to its huge altitudinal range the park encompasses five major ecosystem type viz. subtropical, warm temperate, cool temperate, subarctic/cold temperate forests and rhododendron scrub. The Park caters services to 10 Gewogs that includes entire Gasa and parts of Punakha, Thimphu and Paro Dzongkhags.

There are 975 households with a population of 5026, majority of the population are without formal education (52.7%). There is a mosaic of communities inside the park, in alpine regions; people mostly live a semi-nomadic lifestyle, herding yaks (with distinct culture) while in lower temperate regions people do subsistence farming. The main sources of livelihood for the communities are livestock products and Non-wood forest products (NWFP).

JDNP has an incredible wealth of biodiversity comprised of 1,434 species of vascular plants (with more than 200 species of medicinal plants), 50 mammals, 406 birds, 4 wild bees, 184 butterflies, 15 amphibians, 22 reptiles and 17 dragonflies and damselfly. It is also a home to threatened species of fauna such as Alpine musk deer (*Moschus chrysogaster*), Himalayan musk deer (*M. leucogaster*), Bhutan Takin (*Budorcas taxicolor whitei*), Red panda (*Ailurus fulgens*), White-bellied heron (*Ardea insignis*), Pallas's fish eagle (*Haliaeetus leucoryphus*), Bearded vulture (*Gypaetus barbatus*), Himalayan vulture (*Gyps himalayensis*) etc.

One of the salient feature of JDNP is the presence of 3 out of 4 national symbols viz. the national animal – Takin, the national bird - Northern raven (*Corvex corex*), and the national tree - cypress (*Cupressus corneyana*). JDNP also has a thriving populations of the endangered Royal Bengal tiger, Asiatic wild dog (*Cuon alpinus*) and the vulnerable snow leopard (*Panthera uncia*) sharing their habitats. Further, it is laudable to note that we captured and confirmed the presence of Wolly Flying Squirrel (*Eupetaurus species*) (Jamtsho *et al.,* 2022) and captured photos of the Palla's Cat (*Octocolobus manul*) and Tibetan/Himalayan Wolf (*Canis lupus chanco*) from the recent camera trap surveys. All these charismatic mammals inhabit the rugged mountains above tree line. Thus, JDNP is the conservation jewel in the eastern Himalayas, for sure.

Bhutan takin, *Budorcas taxicolor*

Four major river basins namely the Phochu, Mochu, Pachu and Wangchu originates from the snow-capped mountains of the park. It can therefore be considered as the water tower of western Bhutan. Hydro-electricity from hydropower plants built along these river basins, downstream generates enormous revenue for the country. The Park also contributes significantly to the national tourism industry, especially to nature tourism. Large number of international tourists' trek through the paradisiacal alpine meadows and snow-capped mountains in the park, particularly along Jomolhari Trek and the Snowmen Trek.

The presences of majestic snow-capped mountains such as Jomolhari, Jichu Drakey, Tsherim Gang, Matsang Gang, Gangchen Tag, and Gangchen Singye (aka Table Mountain) that are internationally popular, magnificent landscapes, spectacular sceneries of serene alpine meadows adorned with fragrance of flowers, cascading rivers originating from lakes of varying colours, and lush green forests hidden in clouds and mists, harmonious herds of blue sheep grazing amongst yaks ascribe JDNP to be the centre of attraction for international tourist.

The recent Snowmen Race (*the Ultimate Race for Climate Action*), 2022 JDNP is once again brought into the spotlight of nature tourist worldwide and climate action in tandem. Further, JDNP has many culturally significant sites such as Gasa Dzong, Zabsel Goenpa, Choeten Goenpa, Tshechhu Dra, Tshephu Nye, to name few. There are also natural hot springs and mineral springs (Mennchhus) that attracts local visitors from all nooks and corners of the country.

Mount Jichu Drake, JDNP

B. Assessment score for Jigme Dorji National Park

The management effectiveness score of Jigme Dorji National Park is 79.58%. The score for six management elements is as below;

- **Context – 100%:** The park has been formally gazetted/covenanted. In 1993 the park was notified as National Park and got operationalized in 1995. Its legally protected by Forests and Nature Conservation Act, rules and regulations.

- **Planning - 78.79%:** In terms of planning the park has approved management plan and the management is undertaken according to the agreed Goals and objectives of the plan. However, some activities had to be either dropped or adjusted due to lack of secured fund.

- **Input - 70.37%:** There are adequate number of staffs to manage the area and also reasonably secure core budget for regular operation but many innovations and initiatives are reliant on outside funding. The Staff training and skills are adequate, but it could be further improved to enhanced to fulfil the management goals and objectives.

- **Process - 75%:** The boundary of the protected area is known by the management authority and local residents/neighboring land users and is appropriately demarcated. However, there is need for establish institutional mechanism to discuss and address issues related to PA management with adjoining protected areas and others institutions.

- **Output - 66.67%:** JDNP is one of the Parks that is most visited by tourists through Jomolhari Trek, Snowmen Trek, Laya-Gasa trek, etc. Although there are some facilities along the trek route it is inadequate for visitors. There is need for development of new facilities and also enhancement of the existing ones.

- **Outcome - 88.67%:** The residents within the park are benefited from NWFP collection, Community Forest, cordyceps collection and tourism services. There is need for product diversification in order to enhance economic contribution to the local communities. Ecological values are still intact but few disturbances from developmental activities.

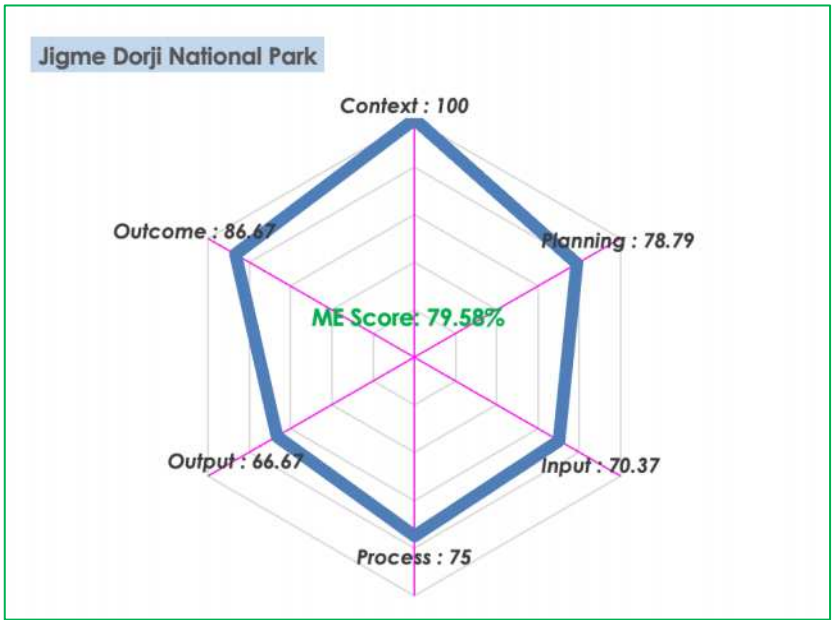
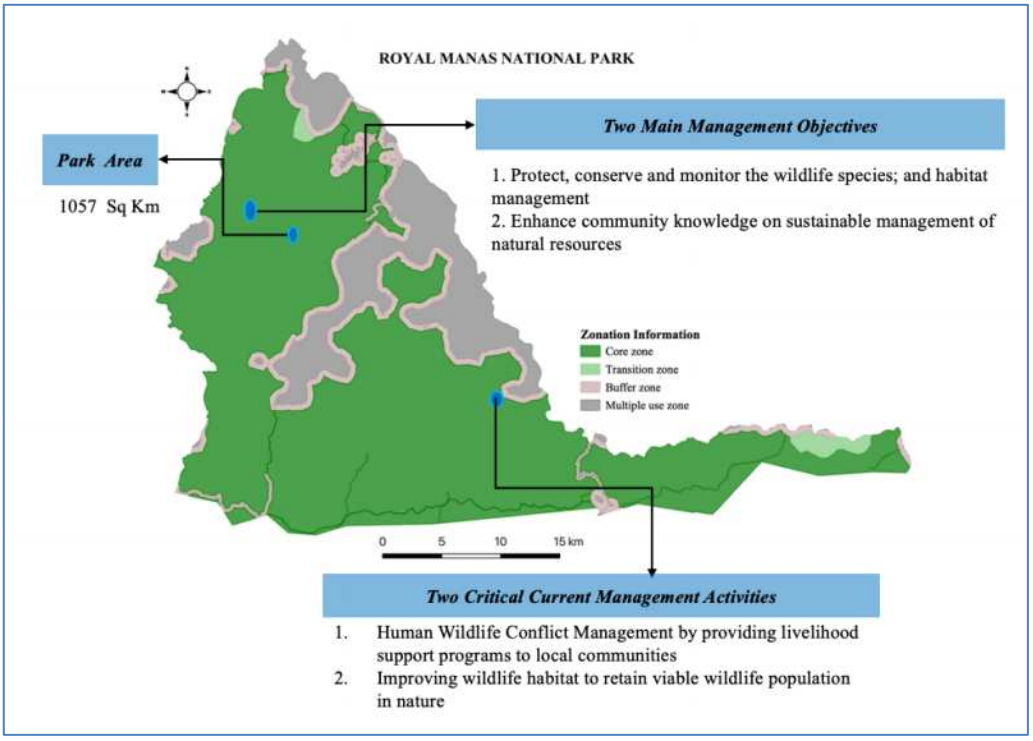


Figure 13: Bhutan METT+ scores for JDNP against the 6 management elements

C. Recommendations for improving management effectiveness

- Explore additional funds for implementing prioritized activities
- Explore revenue plough back from ecosystem services
- Built capacity of the staffs at various level
- Conduct awareness and education programs to the local communities
- Conduct feasibility study for development of local enterprise
- Development and improvement of visitor facilities in the park
- Carryout habitat enrichment activities for important biodiversity values of the park

2.2.2. ROYAL MANAS NATIONAL PARK



A. Introduction

Royal Manas National Park is situated in the south-central foothills of Bhutan (90°35' E to 91°13' E and 26° 46' N to 27° 08' N). Spanning an area of 1057 km^2, the national park falls within the political jurisdiction of three Dzongkhags, viz. Zhemgang, Sarpang and Pemagatshel. It forms the cornerstone of protected area network in Bhutan and further adjoins with the World Heritage Site (Manas National Park) in India forming an integral part of Transboundary Manas Conservation Area (TraMCA).

It provides a safe refuge for charismatic species, which are endangered such as Royal Bengal tiger, golden langur *(Trachypithecus geei)*, clouded leopard (*Neofelis nebulosa*), Asian elephant, Asiatic water buffalo, Asiatic wild dog and gaur (*Bos gaurus)*. Having met the highest global standards for effective site-based management for wild tigers, the park has been accredited as Conservation Assured Tiger Standards (CA | TS) sites in 2019 and won the TX2 "Conservation Excellence Award" for 2020 from Global Tiger Forum along with

Manas National Park, India. The crowning glory of RMNP is the incredible bird diversity, currently accounting to 63% of total bird species of Bhutan.

Two sub-adult tigers captured during National Tiger Survey 2021

The forest types of the national park consist of sub-tropical, warm broad-leaved and cool broad-leaved forest. The park is also home to globally rare and endangered floral species such as *Dalbergia oleveri* (IUCN endangered species), *Aquilaria malaccensis* (IUCN vulnerable) species) and *Taxus baccata* (Scheduled 1 species in FNCA 1995) and *Podocarpus neriifolia,* the only conifer broadleaved tree found rarely distributed in the park area.

Sub-tropical Manas

B. *Assessment score for Royal Manas National Park*

The management effectiveness score of Royal Manas National Park is 88.66%. The score for six management elements is as below;

- **Context - 100%:** The Royal Manas National Park is formally gazetted in 1993.
- **Planning - 87.88%:** The protected area has agreed objectives and is managed to meet these objectives, Protected area design helps achievement of objectives; it is appropriate for species and habitat conservation; and maintains ecological processes such as surface and groundwater flows at a catchment scale, natural disturbance patterns etc., A management plan exists but it is only being partially implemented because of funding constraints or other problems
- **Input - 74.07%:** The staff have acceptable capacity/resources to enforce protected area legislation and regulations but some deficiencies remain, Since RMNP is the oldest park in the country, the park is explored and the information on the habitats, species and values are all well. Staff training and skills are adequate, but could be further improved. The available budget is acceptable but could be further improved to fully achieve effective management in the park
- **Process - 83.33 %**: The boundary of the protected area is known by the management authority and local residents/neighboring land users and is appropriately demarcated, there is a comprehensive, integrated programme of survey and research work, most of the activities are prioritized when fund/budget is inadequate, there is regular contact between managers and neighboring official or corporate land and water users, and substantial co-operation on management, the local communities are consulted whenever the park management plan some activities which could impact them.
- **Output - 100%**: The park has three ecolodges, one each at Gomphu, Panbang and Pantang. Park also has a guest house at Manas and transit camp at Panbang & Manas for the visitor's convenience.
- **Outcome – 86.67%:** Protection systems are largely or wholly effective in controlling access/ resource use, there is a major flow of economic benefits to local communities from activities associated with the protected area, Biodiversity and ecological values are predominantly intact in the park.

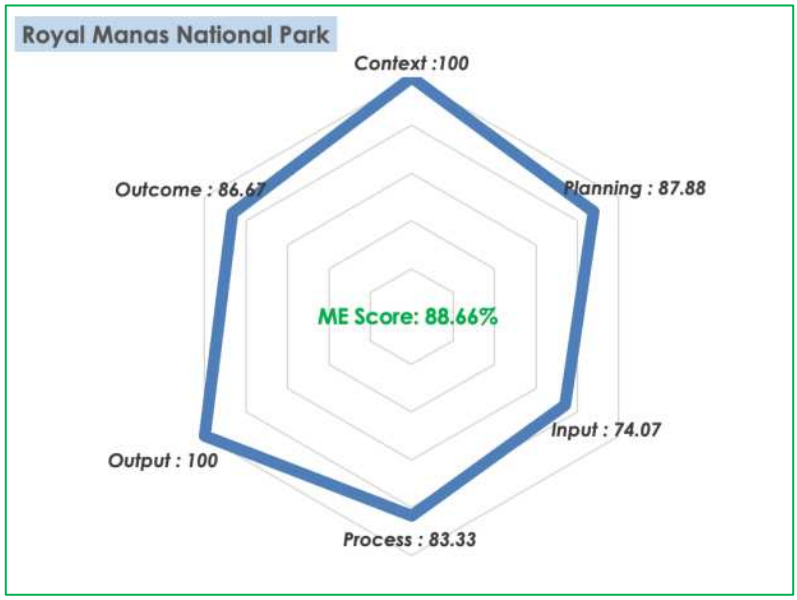
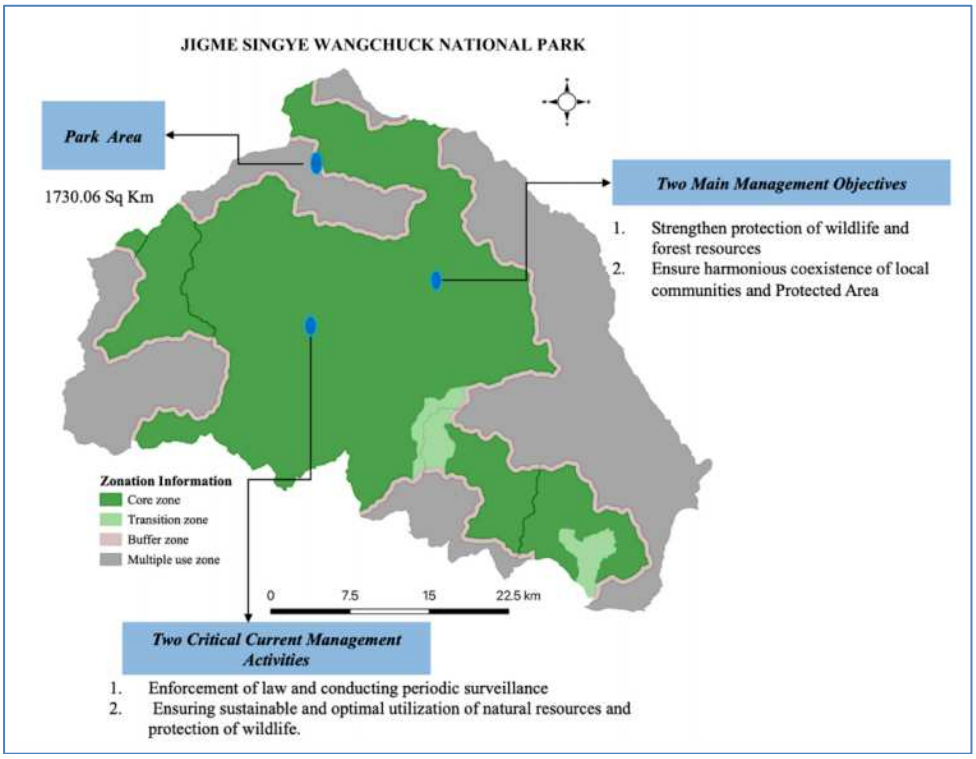


Figure 14 : Bhutan METT+ scores for RMNP against the 6 management elements

C. Recommendations for improving management effectiveness

- Built capacity of the staffs on the new technology and methods of protected area management especially for the new recruits.
- Secure budget for effective management of the protected area through developing proposals aligned with the theme funded by donors
- Procure Additional equipment for proper data collection
- Conduct awareness and educational programs for the local communities
- Carry out habitat management activities (grassland management, water hole improvement works) for species persistence
- Fees and fines collected by the park needs to be properly recorded and reported

2.2.3. JIGME SINGYE WANGCHUCK NATIONAL PARK



A. Introduction

Jigme Singye Wangchuck National Park was formally known as Black Mountain National Park, attributed to the Black Mountain ranges, which form the core of the national park. The national park is also very significant in providing structural and functional linkages between different protected areas of the country due to its strategic location, at the centre. It functions as a crucial linkage between the southern and the northern conservation landscapes by enabling the smooth movement of wildlife, especially the tiger and migratory bird species between these landscapes. The high mountains in the central regions of the national park are important water sources that drain into the Mangdechhu river in the east and Punatshangchhu river in the west. The Nikachhu joins the Mangdechhu from the north. All of these rivers are important in terms of hydroelectricity production.

The national park is significant as the park has a diversity of communities living inside, which includes two of Bhutan's first settlers, the Monpa communities and Olep community. Further some of the sacred sites (Nyes) blessed by Guru Rinpoche are also found in the park.

The national park supports a wide range of habitat types and great species diversity due to the wide range of altitude and variation in climatic conditions. The national park is home to over 55 species of mammals, 353 species of birds, 376 species of butterflies, 16 species of fishes, and more than 42 species of herpeto-fauna. Many of these species are globally threatened and of great conservation significance such as the tiger, musk deer, red panda, golden langur, gaur, Asian elephant, Chinese Pangolin (*Manis pantadactyla*), critically endangered white-bellied heron (*Ardea insignis*), rufous-necked hornbill (*Aceros nepalensis*), Himalayan monal (*Lophophorus impejanus*) and satyr tragopan (*Trogopan satyra*). The important floral species include; *Paphioppedilum fairrieanum, Cypripedium himalaicum, Gastrochilus calceolaris, Primula chasmophila, Nardostachys jatamansi, Paris polyphylla, Panax pseudo-gensing, Allium rhabdotum* (endemic), and *Taxus baccata*.

Musk deer

Golden langur

Alpine scree of the Black mountains

B. *Assessment score for Jigme Singye Wangchuck National Park*

The overall effectiveness score (81.65%) shows that the Park is managed well. The score is slightly higher than the average score of all 19 sites (78.13%) and the individual *score are as below;*

- **Context - 100%:** Jigme Singye Wangchuck National Park was notified as a National Park in 1993 and operationalized in 1995. It was formally known as Black Mountain National Park, attributing to the Black Mountain ranges, which forms the core of the national park.

- **Planning - 87.88%:** In terms of planning the park has approved management plan (2022-2031) and activities are undertaken goals and objectives of the plan. The protection and conservation are in line with existing rules and regulations. Community Forests (CF) management, Local Forest Management Plan (LFMP), and promoting community based Non-Wood Forest Products Management (NWFP) are also existing.

- **Input - 70.37%:** The park has insufficient technical and skilled staff to manage the area. The budget constraints are also another factors that limits the achievements of management goals.

- **Process - 75%:** The boundary of the protected area well demarcated and the management authority and local residents/neighboring are aware the jurisdiction. However, due to existence of large communities within the park, the conservation plans and actions should focus on mitigating human-wildlife conflict, poaching and ecotourism activities.
- **Output - 83.33%:** The park is strengthening the protection of wildlife and forest resources through adopting zero poaching strategies, carrying out HWC mitigation measures, promoting ecotourism however, due to lack of funds these activities are still underway. The park has visitor facility at headquarter office and some campsite which require maintenance.

- **Outcome - 73.33%:** The residents within the park are benefited from NWFP collection, Community-forest and tourism services. There is need for product diversification in order to enhance economic contribution to the local communities. Ecological values are still intact but few disturbances from developmental activities.

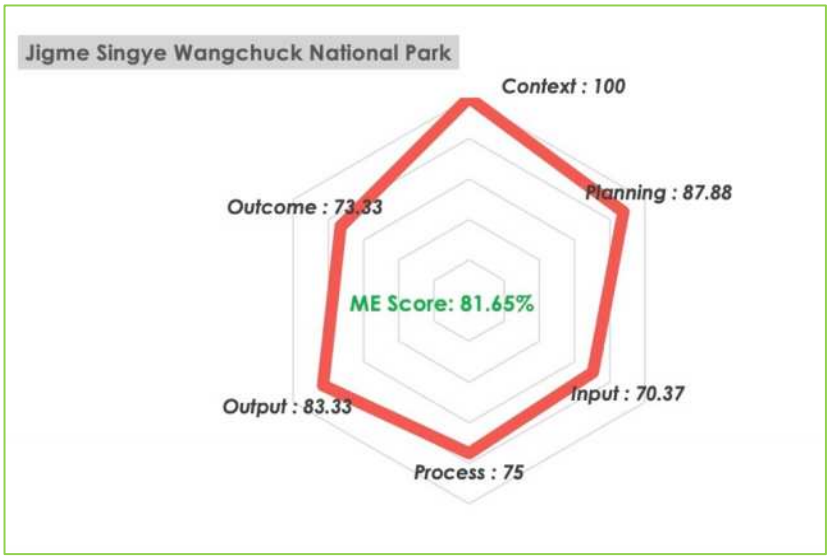


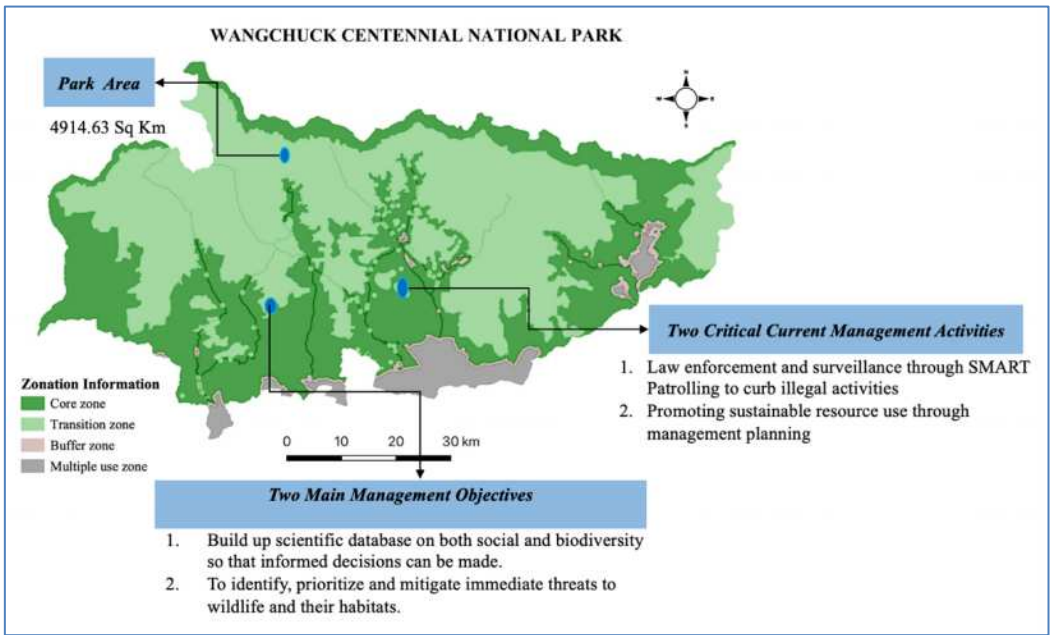
Figure 15: Bhutan METT+ scores for JSWNP against the 6 management elements

C. Recommendations for improving management effectiveness

- Upscale education and awareness of staffs in modern technologies and increase their capacity in diverse field of forestry
- Strengthen patrolling techniques in the park and increase awareness for local communities
- Secure funds for development of infrastructure and implementing priority activities in the park
- Enhance livelihood opportunities for the local community to improve their economic benefits from ecological values.
- Improvement and maintenance of visitor facilities in the park
- Facilitate in preserving the culture of local communities in black mountain area.
- Mitigation of human wildlife conflicts and curb poaching in the park

White-bellied heron

2.2.4. WANGCHUCK CENTENNIAL NATIONAL PARK



A. Introduction

Wangchuck Centennial National Park is the largest and the newest protected area among the ten protected areas in Bhutan. The park falls within the political jurisdictions of the five Dzongkhags covering over nine gewogs. WCNP was formally gazette in 2008 as attribute to the Wangchuck dynasty for selflessly leading the country for 100 years.

The vegetation ranges from warm broadleaf forest to alpine meadows, spanning an altitudinal range from 1350 to above 5100 m.a.s.l. The park has recorded 44 species of mammals, 693 species of vascular plants, 251 species of birds, 246 species of butterflies and 54 species of fish. The mammal fauna includes several iconic species such as the tiger, snow leopard, Tibetan wolf, Bhutan takin, Himalayan black bear, red panda and musk deer.

Mount Gangkar Puensum in WCNP

The park is also one of the most important water towers in the country, which feeds four major river systems namely Punatsangchhu, Mangdechhu, Chamkharchhu and Kurichhu, which are vital for the hydropower generation in the country. There are several mountains- Gangkar Puensum, Rinchen Zoegila, Jazayla and Moenlakharchung- that are under permanent snow cover, which result in 85% of the park remains under snow cover for about four months during the winter.

The park headquarter is located at Nasiphel, Chokhor gewog, Bumthang. There are functional sections at the head office followed by four range offices and three guard post office in the field which cater the services to around 6640 people (783 households) residing inside the national park.

Blue sheep and Snow leopard captured during National Snow Leopard Survey 2022

Blood pheasant

B. *Assessment score for Wangchuck Centennial National Park*

The management effectiveness score of Wangchuck Centennial National Park is 78.59%. The score for six management elements is as below;

- **Context - 100%:** The park has score 100 in this element as the park was formally gazette in 2008 as a tribute to the Wangchuck dynasty for selflessly leading the country for 100 years and its legal protection under the Forests and nature Conservation Acts, rule and regulations.

- **Planning - 84.85%:** The park has approved a management plan for the period of 10 years (2023-2032). The activities in the park are carried out as per the objectives and prescription of the management plan. The staff have acceptable capacity/resources to enforce protected area legislation and regulations and which can be further strengthened through capacity building programs.

- **Input - 66.67%:** In terms of input there is an acceptable amount of budget to carry out management activities but could be further improved to fully achieve effective management. The park has required information to manage the area but there is need for more information on the other less known species in the park.

- **Process - 80%:** The park boundary is demarcated and people are aware of it. There is a need for a comprehensive, integrated programme of survey and research work, which is relevant to management needs.

- **Output - 66.67%:** The park has adequate visitor facilities and services for current levels of visitation but it could be improved.

- **Outcome - 73.33%:** The park provides economic benefits to the local communities through ecotourism services and from the sale of non-wood forests produce specially Cordyceps. Further there is a need for creation of more avenues for economic activities to enhance the livelihood of the communities living in the park.

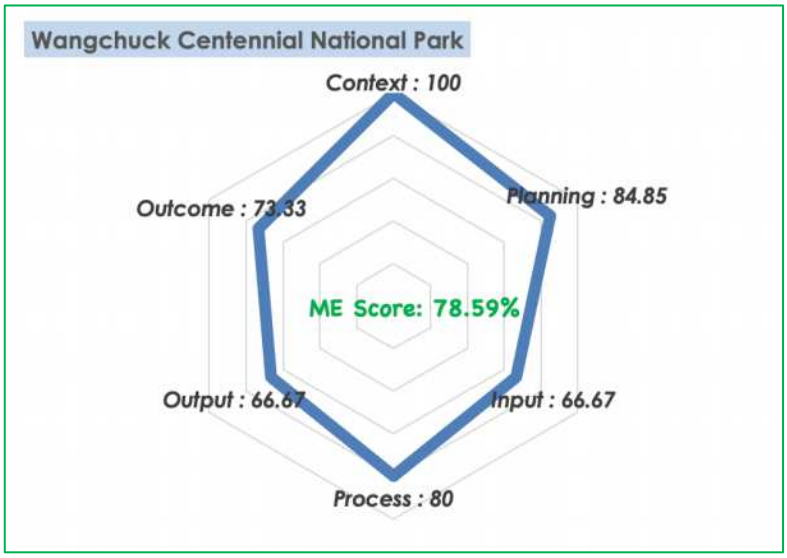


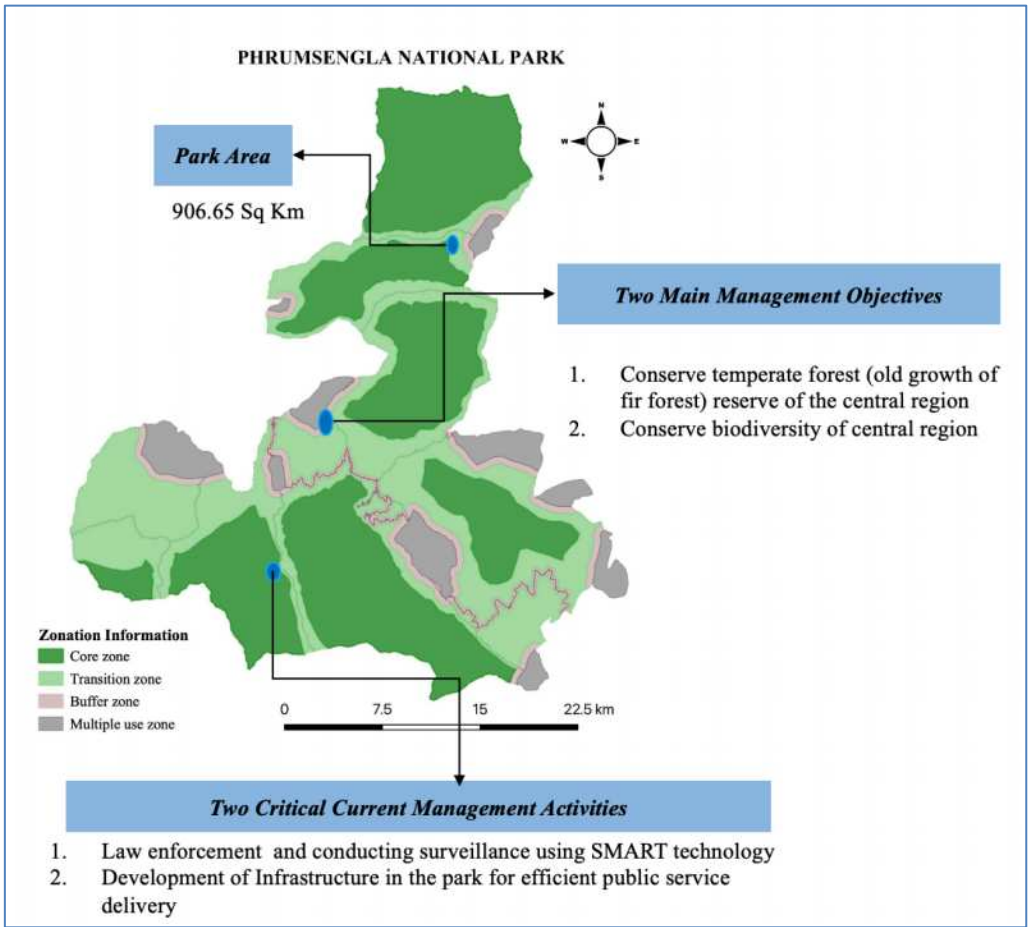
Figure 16: Bhutan METT+ scores for WCNP against the 6 management elements

C. Recommendations for improving management effectiveness

- Improve staff strength and strengthen their capacity on emerging techniques and methods of conservation
- Enhance information on lesser-known species in the park
- Secure funds to meet the management needs
- Improve collaboration with the tourism service providers to enhance visitor experience
- Use technological support for management of inaccessible areas in the park
- Improve visitor facilities in the park

Camps of the Cordyceps collectors

2.2.5. PHRUMSENGLA NATIONAL PARK



A. Introduction

Phrumsengla National Park (PNP, area 906.654 km^2) was established in 1993 for the conservation of biodiversity of central region of the country and it stretches from subtropical broadleaved to the alpine ecosystem. The park is fundamentally significant for conservation of large tracts of old East Himalayan Silver Fir Forest and extensive cover of cool broadleaved forests. It falls within the administrative boundaries of Bumthang, Lhuentse, Mongar and Zhemgang districts. Nearly 6000 people live in and around the park. Sengor and Bim-Tharpaling villages are enclaved settlements in the park. PNP provides forestry services to six blocks of Bumthang, Lhuentse and Mongar districts through three Range Offices and three

Sub-range Offices. State Reserved Forest Land around PNP are brought under LFMP, CF, and NWFP groups for scientific management.

PNP is a unique combination of all vegetation zones of the country. Elevation ranges from 900 m.a.s.l in the south to more than 4500 m.a.s.l in the north. The Park experiences varied temperatures and climatic conditions. The vegetation ranges from subtropical broadleaf forest to alpine meadows. The park is home to some of the world's most endangered flora and fauna, it is a significant repository of floral diversity. More than 1000 species of vascular plants comprising of 154 medicinal plants and 21 species endemic to Bhutan occur in the park. The park is home to 68 species of mammals including the Royal Bengal tiger. The red pandas are frequently sighted along the national highway. Other mammal species such as Himalayan black bear, common Leopard, clouded leopard, musk deer, and Asiatic golden cats can also be sighted in the park.

PNP offers one of the best bird watching destinations in Asia. Of the 378 bird species recorded, three are vulnerable, six near-threatened and eight are restricted range species. Significant avifauna species of conservation interest in the park are Chestnut-breasted partridge, Rufous-necked hornbill and beautiful nuthatch. PNP also records herpetofauna, fish and butterfly species. There are 3 species of amphibians, 12 reptile species, 4 species of lizards, 10 fish species and 179 species of butterflies. PNP offers some of the country's fascinating landscapes. Thrumsengla pass on the highway overlooks Bhutan's highest peak Gangkar Phuensum on a clear day. The mountains of Bribdungla are well known for hundred alpine lakes. The rocky cliffs and wild waterfalls form unique features of Phrumsengla's pristine landscapes.

Alpine wetlands of Bribdungla, PNP

B. *Assessment score for Phrumsengla National Park*

The overall effectiveness score of the park is (78.37%). The score for six management elements is as below;

- **Context – 100%:** The park has score 100 in this element as it is notified in 1993, gazzetted in 1998 and operationalized since 2002 with legal protection under the Forests and nature Conservation Acts, rule and regulations.

- **Planning - 84.85%:** Although the park has approved management plan for the period of 10 years (2019-2029). There are 151 activities under 10 broad programs with budget estimate of Nu.500.01 but there is no committed budget for majority of the activities reflected in the management plan.

- **Input - 70.37%:** In term of input there are acceptable amount of budget to carry out management activities but could be further improved to fully achieve effective management and few gaps in term of equipment's and facilities. There is also need for maintaining proper record of the studies carried out in order to support all areas of planning and decision making for enhance management.

- **Process – 75%:** The park boundary is demarcated and people are aware of it. There is a need for a comprehensive, integrated programme of survey and research work, which is relevant to management needs.

- **Output - 66.67%:** The park has adequate visitor facilities and services for current levels of visitation but it could be improved.

- **Outcome - 73.33%:** The park provides economic benefits to the local communities through ecotourism services and from the sale of non-wood forests produce. Further there is need for creation of more avenues for economic activities.

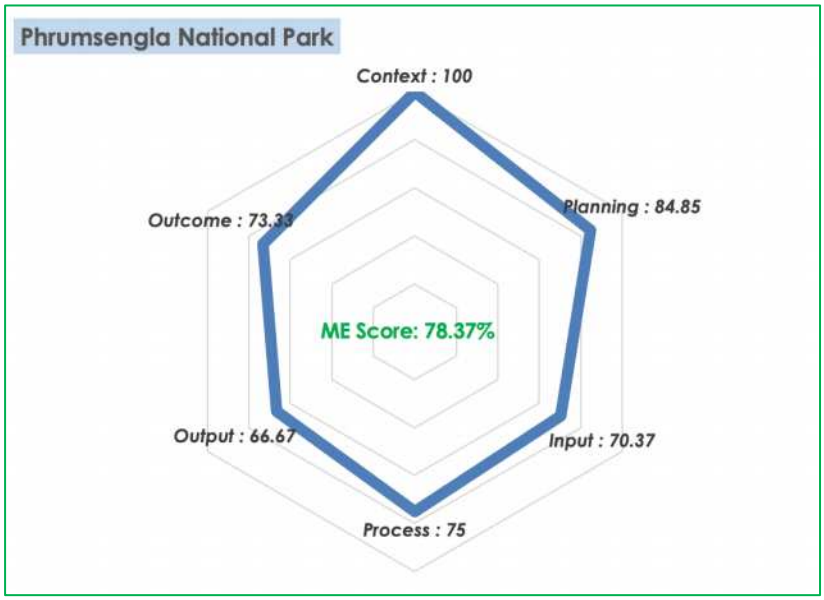


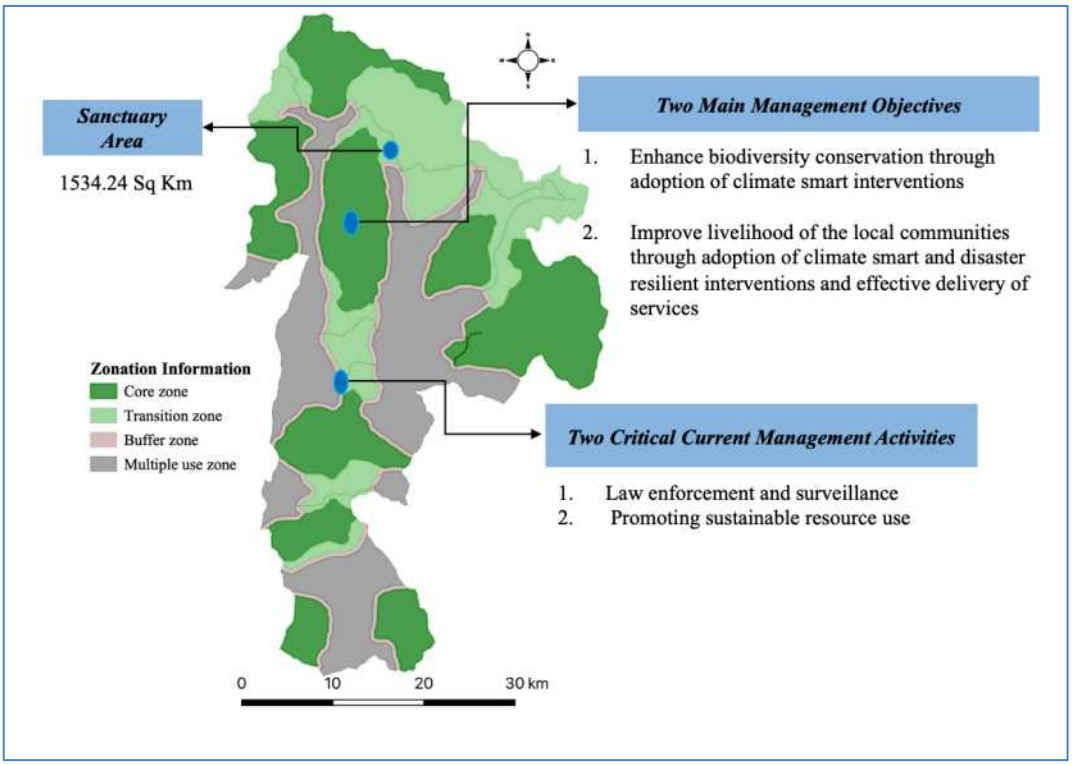
Figure 17: Bhutan METT+ scores for PNP against the 6 management elements

C. Recommendations for improving management effectiveness

- Secure fund for implementation of activities prescribed in the management plan
- Coordinate need-based training for the staffs to enhance their capacity
- Provide timely maintenance of equipment and facilities in the park
- Initiate income generating avenues for local communities through nature-based solutions

Red panda

2.2.6. BUMDELING WILDLIFE SANCTUARY



A. Introduction

The Bumdeling Wildlife Sanctuary (BWS), erstwhile known as Kulongchhu Wildlife Sanctuary was officially established in the year 1995 to protect ecological zones of the mid and high-altitude ecosystems of the eastern parts of Bhutan, to support and strengthen the important religious sites, and to cater socio-economic needs to the local people residing inside the Sanctuary. With an area of 1534.24 km^2, the landscape of BWS encompasses diverse habitats, ranging from warm broadleaved forest to Alpine scrubs and lakes. Large areas of these habitats provide home for many endangered and vulnerable species such as snow leopard, tiger, red panda, musk deer, and Ludlow's Bhutan Glory (*Bhutanitis ludlowi*). Some of the important floral species in BWS are Bbue poppy (*Meconopsis gakyidiana*), Chinese Caterpillar *(Cordyceps sinensis),* Himalayan yew and endemic *Primula xanthopa.*

The sanctuary has recorded 966 species of plants, 52 species of mammals, 356 species of birds, 200 species of butterflies and 18 species of snakes (BWS, 2018). Culturally, BWS is blessed

with many important religious sites such as Singye Dzong, Roelmatheng, Gonpakarp, Pemaling, Rigsumgoenpa, Pelritse, Dechenphordang, Kharchendra and Aja Ney. The Bumdeling flood plain, which includes roosting and feeding sites of Black-necked Crane, was declared as RAMSAR site, a wetland of international importance in the year 2012. BWS caters services to three gewogs of Khoma, Sherimuhung and Bumdeling totaling up to 1,119 households with 8,782 from three gewogs.

BWS wilderness landscapes

B. *Assessment score for Bumdeling Wildlife Sanctuary*

The overall management effectiveness score of Bumdeling Wildlife Sanctuary is 86.5% which is second highest score among protected areas assessed. The score for six management elements is as below;

- **Context - 100%:** Effective in terms of understanding the context of protection, the sanctuary was gazetted since 1995 and demarcated with all zonation. New conservation management plan 2020-2030 is in place and threats are understood, and stakeholder relationships are well developed.
- **Planning - 96.97%:** Well-connected with the largest national park of the nation (WCNP) towards the West and new corridor being proposed to connect with SWS in the South east. Major threats and challenges are mitigated with proper conservation operational (annual) planning and implementation with guidance of conservation management plan and FNCRR.

- **Inputs - 70.37%:** Budget, human resources and equipment managed and utilized sustainably to meet management requirements through prioritization of activities. However, with advancement of technology, there is need for updating the skills of the staffs and also budget is limited.

- **Process - 81.67%**: The boundary of the protected area is well demarcated and the management authority and local residents/neighboring are aware of the jurisdiction.

- **Outputs - 83.33%**: Outputs were generated as per the annual conservation operation work plan guided by management plan; sufficient amenities for visitors are developed at different locations however maintenance of those infrastructure and upscaling of visitor centers need to be done.

- **Outcome - 86.67%:** The sanctuary supports local communities with formation of NWFP groups and ecotourism facilities for economic benefit; consistent number of black-necked cranes visiting the area is one important outcome of conservation effort.

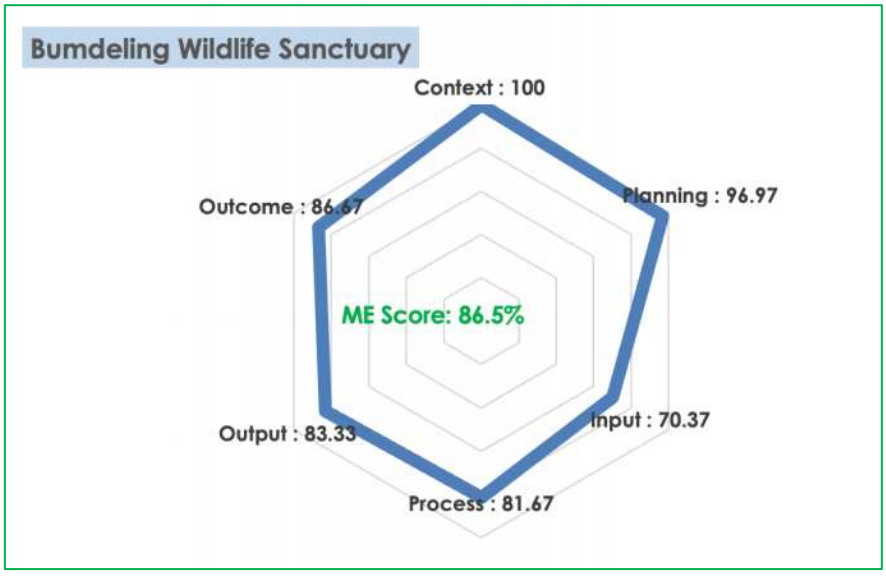


Figure 18 : Bhutan METT+ scores for BWS against the 6 management elements

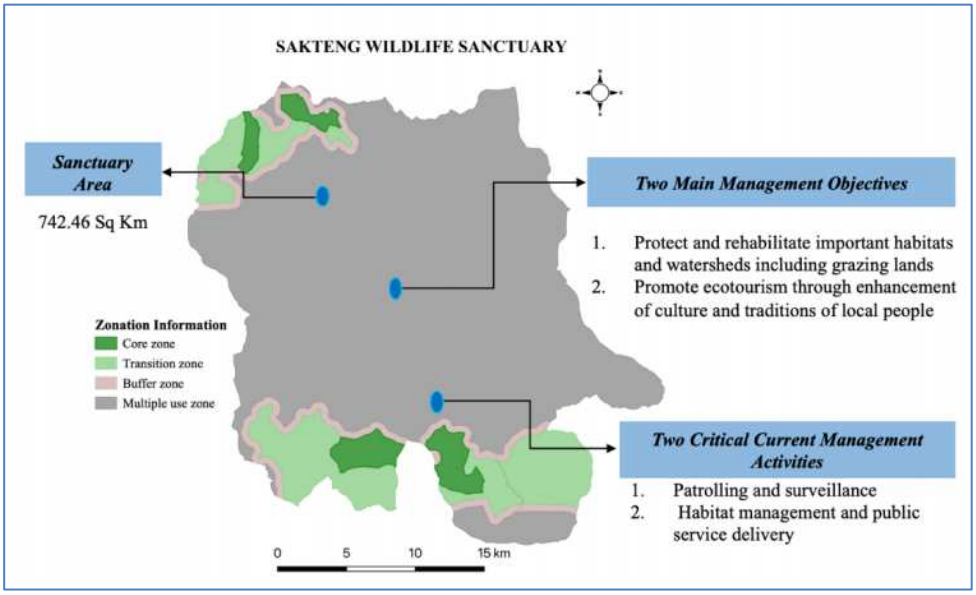
C. *Recommendations for improving management effectiveness*

- Update skills and capacity of the staffs based on the requirement in the field
- Secure budget for surveillance and patrolling in the sanctuary
- Explore plough back mechanism from ecotourism for sustainable financing
- Maintenance and improvement of visitor facilities

Valley of the black-necked crane

Ludlow's Bhutan Glory

2.2.7. SAKTENG WILDLIFE SANCTUARY



A. Introduction

Sakteng Wildlife Sanctuary (SWS) with an area of 742.46 km^2 was established in 2003 to represent the easternmost temperate and alpine ecosystems of Bhutan. It is home to some of the rarest and globally threatened wildlife species like red panda, tiger, musk deer and harbors the maximum number of rhododendron species with 41 species out of 46 rhododendron species recorded in the country. "Brokpas" the semi-nomadic highlanders with unique culture and traditions are the inhabitants of the sanctuary.

Fir forests of the far east

The Sanctuary is adorned with diverse ecosystems ranging from warm broadleaved forests to alpine meadows. SWS is home to 858 plant species, 39 mammal species, 283 bird species, 104 butterfly species, 5 reptile species, 3 amphibian species, and 2 fish species. The Sanctuary also hosts the national flowers of Bhutan, the blue poppy (*Meconopsis gakyidiana*), and the recent introduction of takin, the national animals of Bhutan in the Sanctuary is expected to uplift the significance of the Sanctuary. The Sanctuary has numerous streams and alpine lakes feeding a constant supply of water into the downstream rivers. It provides livelihood sustenance to around 5000 semi-nomads depending on livestock farming as a source of economic mainstay. Culturally, the Brokpa tradition is unique not only to Bhutan but also to the world and it calls for greater attention to preservation as economic development and modernization enter into remote corners of the country.

Women and youth in SWS

Rhododendron

B. Assessment score for Sakteng Wildlife Sanctuary

The management effectiveness score of Sakteng Wildlife Sanctuary is 83.89%. The score for six management elements is as below;

- **Context - 100%**: *SWS* was established in 2003 to represent the easternmost temperate and alpine ecosystems of Bhutan. In 2013, the sanctuary was proposed to be designated as one of the four PAs to be included under World Heritage site.

- **Planning - 90.91%:** In terms of planning the park has approved management plan and the management is undertaken according to the agreed goals and objectives of the plan. However, some activities had to be either dropped or adjusted due to lack of secured fund.

- **Input - 74.07%:** There are adequate number of staffs to manage the area and also reasonably secure core budget for regular operation but many innovations and initiatives are reliant on outside funding. The staff training and skills are adequate, but could it could be further improved to enhanced to fulfil the management goals and objectives.

- **Process - 81.67%:** The boundary of the protected area is known by the management authority and local residents/neighboring land users and is appropriately demarcated.

- **Output - 83.33%:** The sanctuary inhibited ethnic group called "Brokpas" the semi-nomadic highlanders with unique culture and traditions are the inhabitants of the Sanctuary. These cultural and traditional uniqueness provides ecotourism scope and forest have initiated. The sanctuary is also known to home maximum number of Rhododendron species in Bhutan.

- **Outcome - 73.33%:** The residents within the park are benefited from NWFP and ecotourism services. There is need for product diversification in order to enhance economic contribution to the local communities.

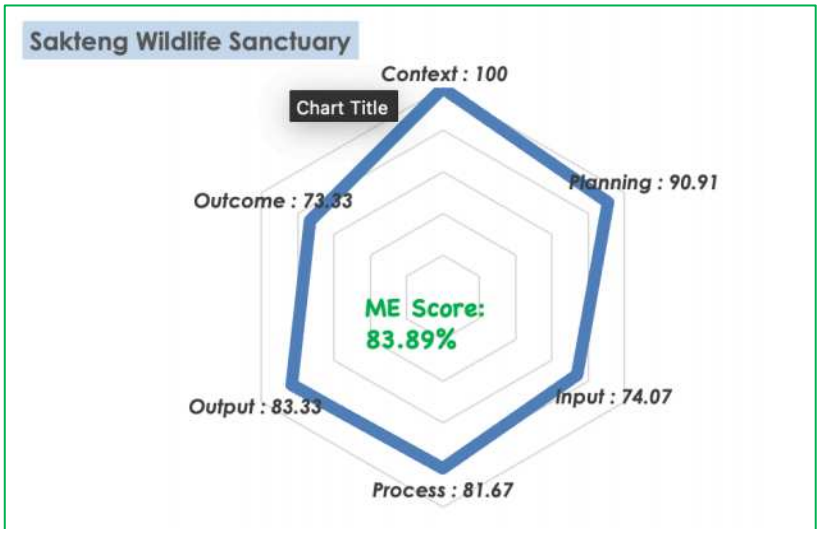


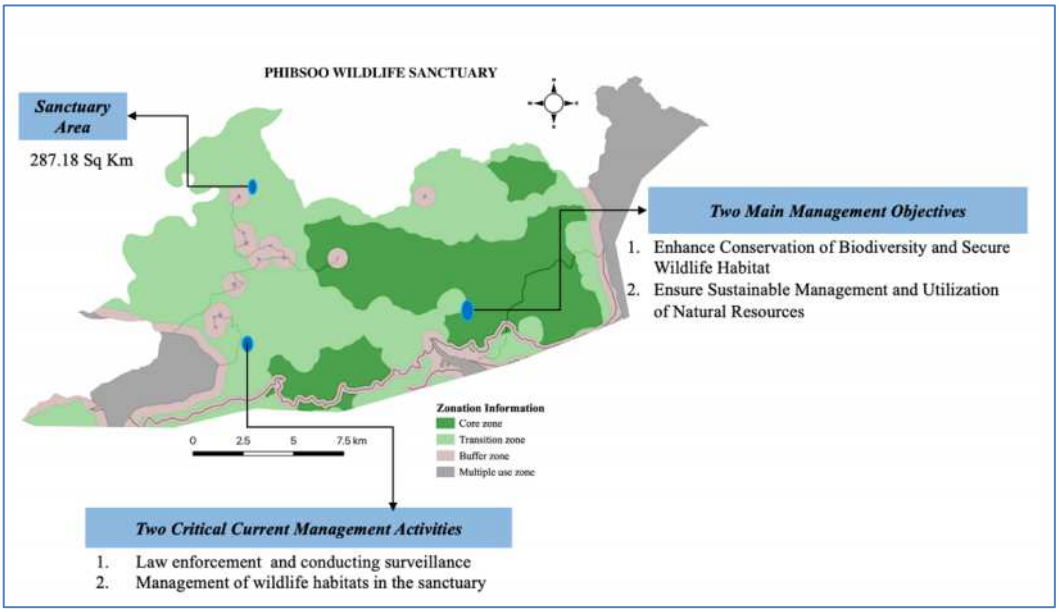
Figure 19: Bhutan METT+ scores for SWS against the 6 management elements

C. Recommendations for improving management effectiveness

- Improve coordination with relevant stakeholders to regulate land use and developmental activities
- Explore funding opportunities to achieve management goals and objectives
- Improve staff strength and build capacity of the staff
- Strengthen information and knowledge on critical habitats and important species
- Maintain and improve visitor facilities and services


Meconopsis gakyidiana

2.2.8. PHIBSOO WILDLIFE SANCTUARY



A. Introduction

Phibsoo Wildlife Sanctuary is the smallest wildlife sanctuaries in the country. Historically, PWS origination dates back to as 1974 when it was first designated as Phibsoo Reserved Forest; it was upgraded to Phibsoo Wildlife Sanctuary in 1993 following the nationwide revision of protected areas system. The management area boundary covers 286.83 km^2 spanning over two districts of Sarpang to the east and Dagana to the west. The northern part of wildlife sanctuary shares boundary with BC3 connecting the wildlife sanctuary on north eastern side. It is located in the Himalayan foothills of south-central Bhutan.

The sanctuary has great conservation significance for Bhutan, the region and the world at large. Not only does the sanctuary protects the country's southernmost variant of sub-tropical Himalayan Forest ecosystem but is also critical source of several seasonal and perennial water bodies which contribute to the fertility of the Assam Duars. The sanctuary indisputably serves as critical habitats in protecting some of the world's most endangered wildlife species. Divided into four important management zones, the wildlife sanctuary also happens to be the easternmost limit of spotted deer, common pea fowl (*Pavo cristatus*) and Sal (*Shorea robusta*) bearing forests. In-fact, PWS is the place where natural stand of Sal and Spotted

deer can be sighted the most. PWS is also the westernmost limits of the globally threatened golden langur and the rare and valuable agar tree (*Aquillaria malaccensis*). It also provides refuge to a number of charismatic and globally threatened species including the Asian elephant, tiger, Chinese pangolin, rufous-necked hornbill (*Aceros nipalensis*) and White-bellied Heron. Besides, lush alluvial grassland provides safe refuge to the prey species for keystone species.

Floral and faunal surveys in the Wildlife Sanctuary recorded 358 plants, 36 mammals, 418 birds, 23 fishes, 177 butterflies and 60 species of herpeto-fauna. Birds contribute highest to the faunal diversity with 59% followed by 25% butterflies, 8%, herpetofauna, 5% mammals and 3% fishes. With six additional new records of birds to Bhutan in last five years, the Wildlife Sanctuary happens to be the bird's paradise. It harbors more than 50% of country's recorded bird species. The demographic feature of sanctuary is represented by a total of 446 households with a total population of 2981 individuals (male: 1522 & female: 1544) in two gewogs (Nichula and Singye), whose primary source of livelihood is agriculture and livestock rearing.

Spotted deer (Axis axis)

B. Assessment score for Phibsoo Wildlife Sanctuary

The management effectiveness score of Phibsoo Wildlife Sanctuary is 79.28%. The score for six management elements is as below;

- **Context - 100%:** The protected area has been formally gazetted/covenanted, management objectives are in place, threats are identified and understood, management interventions put in place, new management plan in place and stakeholder relationships well developed.

- **Planning - 87.88%:** The protected area has agreed objectives and is managed to meet these objectives, regulations for controlling illegal activities in the protected area exist and provide an excellent basis for management. Management implementation is designated but implementation is lacking due to current resource constraints.

- **Input - 77.78%:** Although protected areas budgets are stable, the level of resources and capacity is insufficient for effective management. There are some equipment and facilities but these are inadequate for the protected area management needs.

- **Process - 80 %:** The processes of management are also fairly effective, although sometimes the lack of financial resources impedes implementation.

- **Output - 50%:** Activities implemented as per conservation management plan. However, the present trend of budget flow is insufficient to meet the conservation challenges. Visitor facilities are not available in PWS but there is plan to establish visitor facilities in the sanctuary.

- **Outcome - 80%**: All the field works are completed and focus on field activities as per management plan. The number of tigers in the protected area increased with increased anti-poaching activities and SMART patrolling.

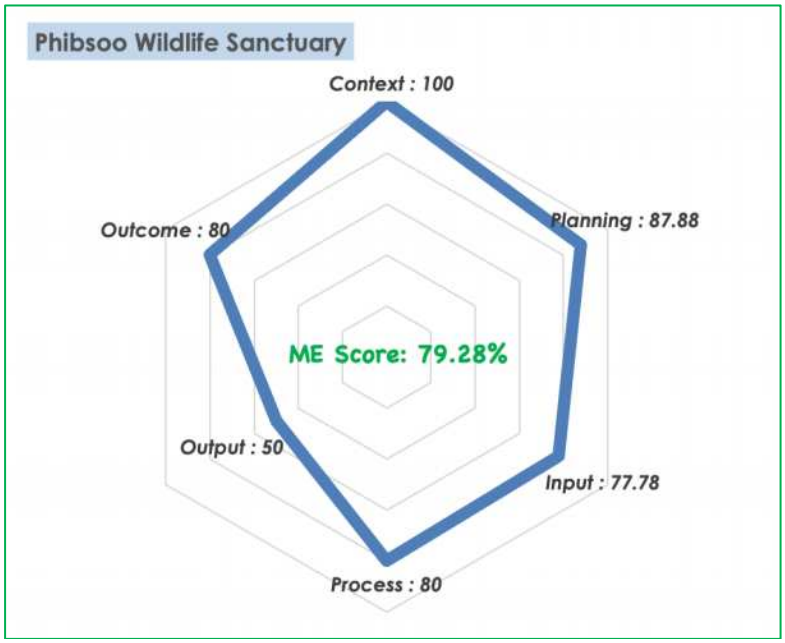


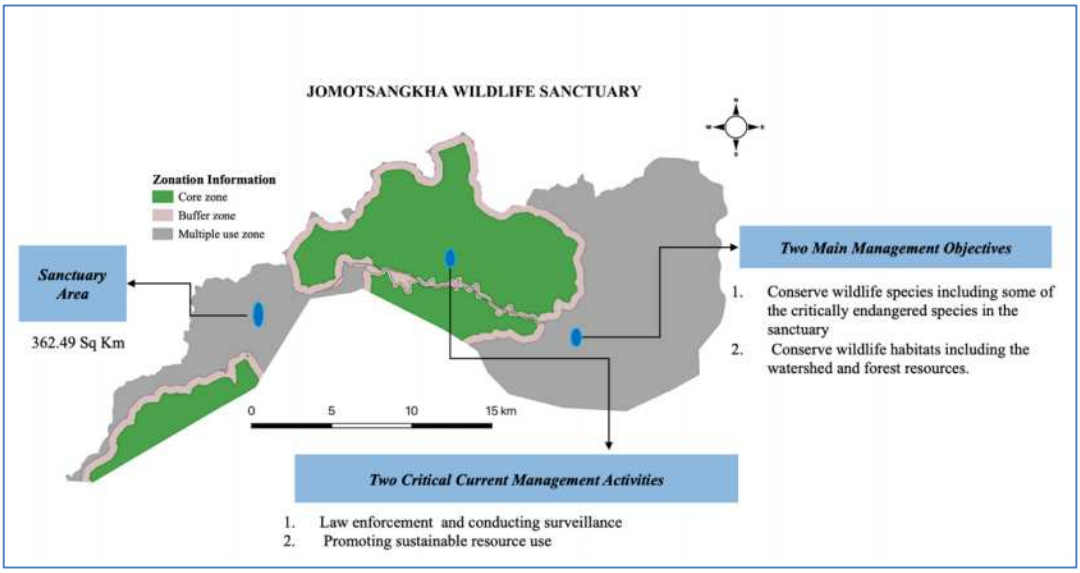
Figure 20: Bhutan METT+ scores for PWS against the 6 management elements

C. *Recommendations for improving management effectiveness*

- Upgrade and train staffs on protected area management
- Secure funds for implementation of management plans and further translating the management prescriptions into annual work plan and IWP respectively
- Explore ecotourism opportunities for income generation of local communities
- Improve accessibility of the park

A herd of elephants in PWS

2.2.9. JOMOTSANGKHA WILDLIFE SANCTUARY



A. Introduction

Jomotshangkha Wildlife Sanctuary (JWS) with an area of 362.49 km^2 is situated in south-eastern part of Bhutan and is the second smallest protected area in the country. This Protected area is mainly sub-tropical forest with high biological diversity. The elevation ranges from 133 to 2,300 m.a.s.l. JWS is an important habitat for elephant, gaur, tiger and other tropical wildlife species including the rare pygmy hog and hispid hare (both of which are known to occur in the adjacent Khaling Reserve in India, with which this park forms a trans-border reserve, but have not been recorded recently in JWS). It is also home to four species of hornbill viz. great hornbill, rufous-necked hornbill, wreathed hornbill and oriental pied hornbill. JWS harbors 559 plants, 34 mammals, 311 birds, 79 fishes, 82 herpetofauna, 331 butterflies and 128 dragonflies and damselflies.

The local community in JWS is composed of two major ethnic groups: the Tshanglas and the Lhotshampas. Both groups are predominately farmers growing rice or maize. The Sanctuary is administered by the Jomotshangkha and Samdrup Choling Range Office. JWS covers five gewogs under one dzongkhag.

B. *Assessment score for Jomotsangkha Wildlife Sanctuary*

The management effectiveness score of Jomotsangkha Wildlife Sanctuary is 78.93%. The score for six management elements is as below;

- **Context - *100%:*** *JWS,* earlier known as Khaling Wildlife Sanctuary was formed by merging Khaling Reserved Forest (notified in 1974) with Neoli Wildlife Reserve (notified in 1983) and actually came under one of the ten protected areas in 1993.

- **Planning - 84.85%:** Regulation for control land use activities is adequately covered; the protected area has agreed objectives, but is only partially managed according to these objectives; protected area design helps achievement of objectives. It is appropriate for species and habitat conservation; a management plan exists but it is only being partially implemented because of funding constraints.

- **Input - 70.37%:** Staffs are well versed with rules and regulations but they are exposed to threats from miscreant. Information on the critical habitats, species, ecological processes and cultural values of the protected area is sufficient for most key areas of planning and decision making; staff training and skills are adequate, but could be further improved. The available budget is acceptable but could be further improved.

- **Process - 88.33%:** The boundary of the protected area is known by the management authority and local residents/neighboring land users and is appropriately demarcated. Staff training and skills are aligned with the management needs of the protected area. Budget management is good and actions are prioritized when funds are inadequate to meet management needs. There is regular contact between managers and neighboring official or corporate land and water users.

- **Output - 50%:** A regular work plan exists and all activities are implemented like Annual work plan is prepared for all staff and annual performance target set for the park, there is no visitor facilities and services present as of now.

- **Outcome - 80%:** Biodiversity and ecological values are predominantly intact, some cultural values are being partially degraded but the most important values have not been significantly impacted, there is some flow of economic benefits to local communities particularly through sale of CF/NWFP from park.

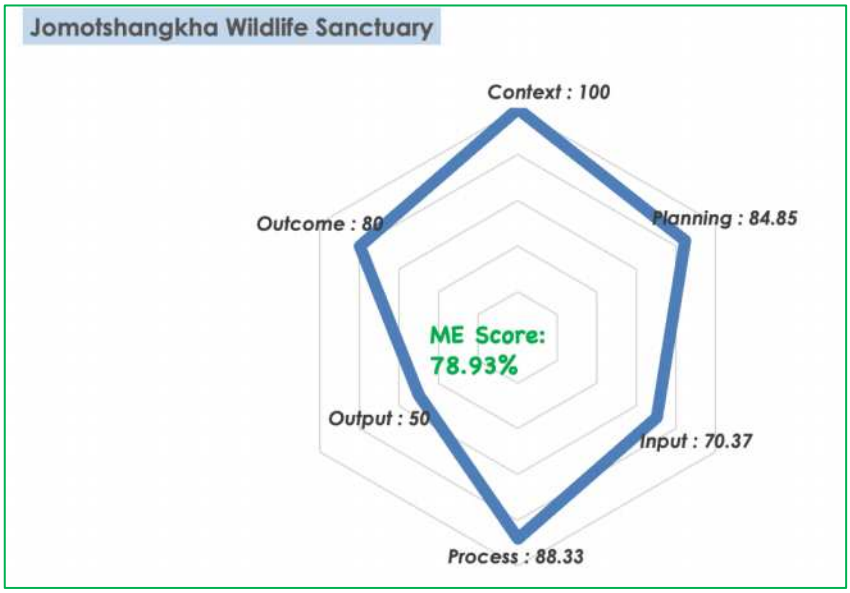


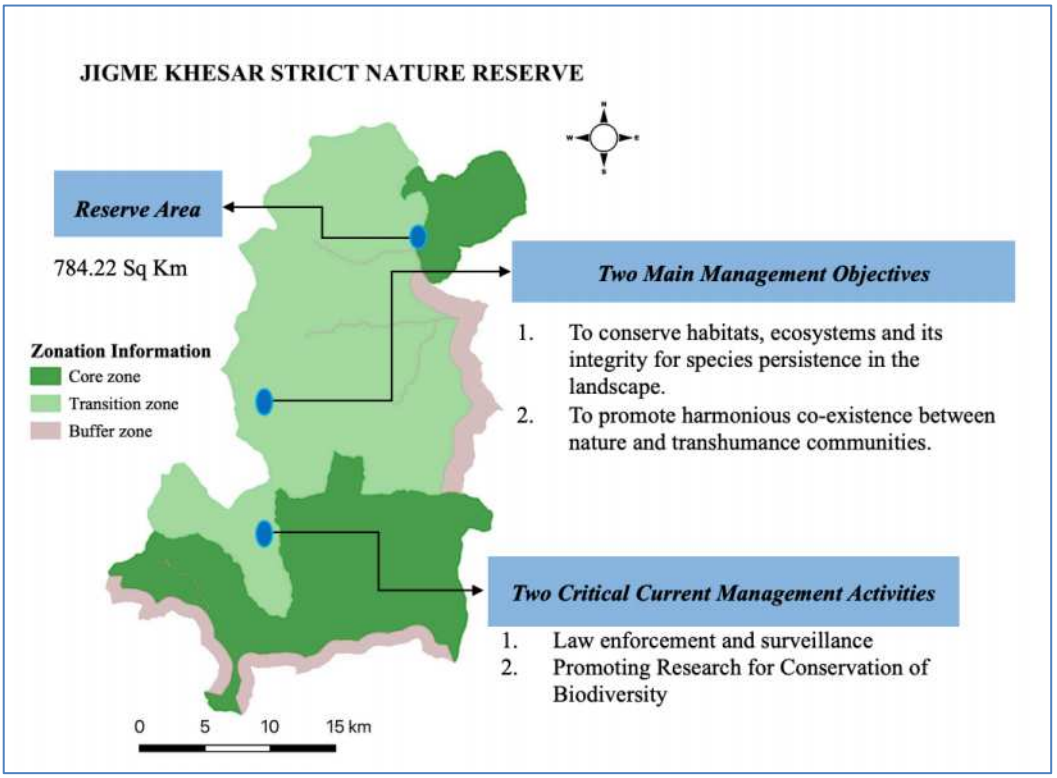
Figure 21: Bhutan METT+ scores for JWS against the 6 management elements

C. Recommendations for improving management effectiveness

- Secure funding resources for implementation of management activities
- Provide alternate livelihood opportunities for local communities for income generation
- Establish field offices to improve communication and mobility
- Strengthen antipoaching efforts and technology
- Enhance visitor facilities and services

A pair of Oriental pied hornbill

2.2.10. JIGME KHESAR STRICT NATURE RESERVE



A. *Introduction*

The Jigme Khesar Strict Nature Reserve (JKSNR) is the only Strict Nature Reserve in the country. JKSNR is renamed from Toorsa Strict Nature Reserve in October 2014 in reverence to the extraordinary contribution of our beloved 5th King, His Majesty Jigme Khesar Namgyal Wangchuck towards ensuring the conservation and protection of our pristine environment. It spreads across two dzongkhags of Haa and Samtse in western and south-western Bhutan. JKSNR is the only protected area in Bhutan without any permanent human settlements, except for a few migratory yak-herding communities from Bjee, Katsho and Eusu gewogs under Haa dzongkhag.


Temperate forests

The nature reserve protects the eastern most variant of the central temperate forests in the country ranging from broadleaf forests to alpine meadows in the north. Being virtually uninhabited, the nature reserve has one of the most pristine temperate and alpine ecosystems. Considered to be the conservation jewel in the Eastern Himalayas featured with astounding biodiversity composed of many globally endangered, rare and endemic species of fauna and flora including high value medicinal plants, spectacular sceneries and a unique culture endowed with many critical watersheds for two major rivers of Bhutan Amo Chhu and Haa Chhu-Wang Chhu.

It shares international borders with the Indian state of Sikkim to its west (Pangolakha Wildlife Sanctuary) and forms a contiguous natural habitat of pristine alpine meadows with the Tibetan Autonomous Region of China to its north. It is connected to JDNP to its north-east part of the JKSNR-JDNP Biological Corridor 01. The nature reserve is almost entirely inside Haa dzongkhag and slightly within Samtse dzongkhag; and is home to a good number of important flora and fauna including the elusive snow leopard, tiger, takin, red panda, musk deer, gaur, etc.

The significance of JKSNR is not only for Bhutan, but also for the entire Hindu-Kush Himalayan region (HKH), which is a significant reservoir of biodiversity, composed of extraordinarily varied eco-systems, assemblage of species of global importance, rich genetic diversity; and the only protected area in Bhutan making its connectivity with the Kanchenjunga trans-boundary conservation landscape.

Blue sheep

B. *Assessment score for Jigme Khesar Strict Nature Reserve*

The Management effectiveness score of JKSNR is 80.53%. The score for six management elements is as below;

- **Context - 100%**: The Jigme Khesar Strict Nature Reserve (JKSNR) was notified in 1993 together with other protected areas. Then from March 2010, it was operationalized as a separate functional division. JKSNR is the only Strict Nature Reserve in the country.

- **Planning - 84.85%:** The score reveals that effective planning exists in the Reserve and implements the activities as per the management plan was (2021-2031). However, there is need to address the existing issues of the part such as poaching and illegal trade of wildlife, degradation of Alpine Habitats, wastes, uncontrolled fires and capacity building programs through planning.

- **Input - 66.67%:** The input of the part is comparatively low then other scores. The input in terms of budget, capacity building of the staffs and adequate equipment support could improve the management goals and objectives.

- **Process - 75%:** The Reserve boundary was revised and realigned during the PA zonation However, the area extension and boundary is not physically demarcated. Parts of the reserve are inaccessible due to remoteness, harsh weather conditions and topography for few months in a year. Northern parts of the reserve are inaccessible throughout the year due to security reason. There is need for establish institutional mechanism to discuss and address issues related to PA management with adjoining protected areas and others institutions.

- **Output - 83.33%:** Research activities are done according to the priority of the management plan and based on budget availability. Resource assessment and quantification of *Nardostychus grandifora* was carried in the area to provide an alternative income generation opportunity to the seasonal herders. Few visitor facilities such as campsites with basic amenities exists in the protected area and there is room for improvement.

- **Outcome - 73.33%:** Being Strict Nature Reserve no human activities are allowed, so almost all the biodiversity values are intact but evidences of poaching exist.

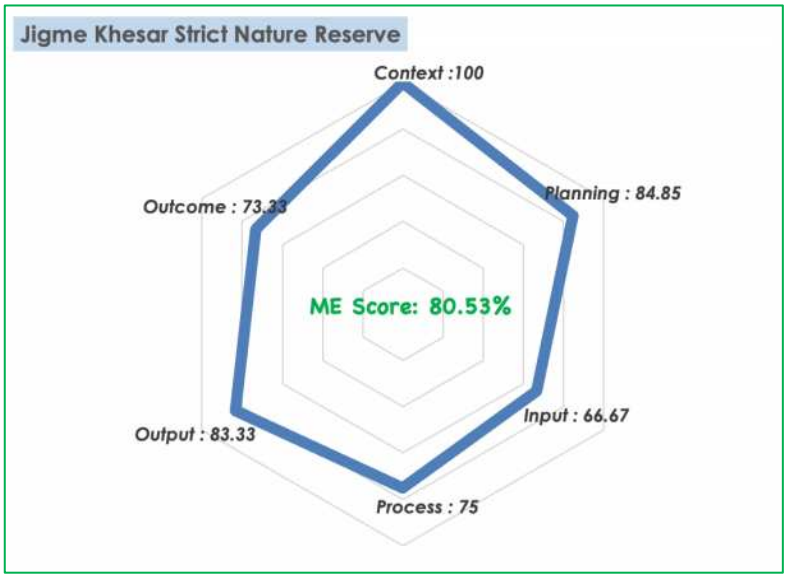


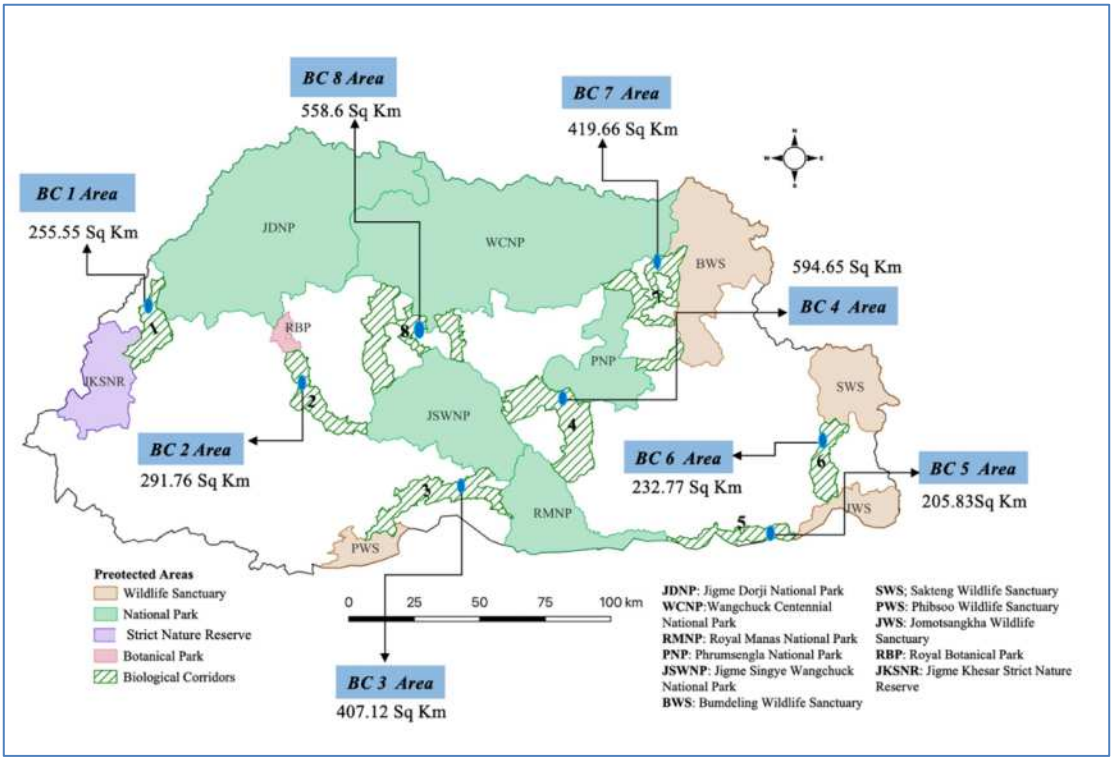
Figure 22: Bhutan METT+ scores for JKSNR against the 6 management elements

C. *Recommendations for improving management effectiveness*

- Initiate educational outreach programs to promote conservation education advocacy and training to gain support for conservation
- Protect, conserve and monitor the wildlife and plant species through research, monitoring, mapping and proper documentation
- Improvement of wildlife habitat particularly the alpine habitat
- Secure funds for implementation of management activities
- Building capacity of frontline staffs for intelligence networking and patrolling
- Physical demarcation of the protected area boundary
- Enhance livelihood options with special focus on migratory yak-herders through exploration, and adoption of alternative income generation activities

White poppy

BIOLOGICAL CORRIDORS (01-08)



Sl.No	BC Name	Two Main Management Objectives	Two Critical Current Management Activities
1	*BC 1*	1. Conservation of wildlife for continual ecosystem function and sustainable management of forest resources. 2. Effective management of trade-off between the economic utilization and conservation	1. Enforcement of law and surveillance through SMART patrolling 2. Promoting sustainable use of resources
2	*BC 2*	1. Ensure ecological connectivity between Jigme Dorji National Park and Jigme Singye Wangchuck National Park 2. Reduce direct and indirect threat to focal species and other biodiversity	1. Enforcement of law and surveillance through SMART patrolling to curb illigal activities 2. Promote sustainable resource use by management planning to monitor biodoversity
3	*BC 3*	1. Conservation and protection of flora and fauna 2. Sustainable management and utilization of Forest resources	1. Enforcement of law and surveillance through various patrolling using SMART technology 2. Promote sustainable resource use by implementing various scientific management regiments
4	*BC 4*	1. Conserve and protect natural biodiversity within the corridor in line with people's values and aspirations. 2. Facilitate safe movement of wildlife within Protected Areas	1. Conduct regular patrolling using SMART technology and enforcement of Laws. 2. Promotion of sustainable use of resources through conservation education programs.
5	*BC 5*	1. Secure and improve wildlife habitat 2. Reduce Human Wildlife Conflict and enhance community livelihoods in the BC	1. Improve wildlife habitat through habitat rehabilitation works 2. Promote sustainable use of resources
6	*BC 6*	1. Conserve wildlife habitat between JWS and SWS 2. Promote sustainable ecotourism to enhance local economy	1. Enforcement of law and conducting surveillance 2. Promoting sustainable use of resources through management planning, infrastructure development and capacity building
7	*BC 7*	1. Ensure safe ecological connectivity for wildlife 2. Sustainable management of natural resources	1. Conduct patrolling to curb illigal activities 2. Promotion of sustainable use of resources through community participation and education
8	*BC 8*	1. Provide enabled landscape to support wildlife movement 2. Conserve endangered fora and fauna with conventional management practices and build resilient communities	1. Conduct surveillance and enrichment fo wildife habitat 2. Mitigate human wildlife conflict and promote sustainable use of resource

2.2.11. BIOLOGICAL CORRIDOR 01- Connecting JDNP – JKSNR

A. Introduction

The Biological Corridor 01 (BC1) which lies in the north-western part of the country connecting JDNP and JKSNR is part of the Bhutan Biological Corridor Complex (B2C2) with an area of 255.55 km^2. Besides playing significant role in conservation and protection of the natural flora and fauna species, the BC1 also has identified major important sites due to its presence of endangered and vulnerable fauna species such as tiger, snow leopard, takin and Himalayan black bear

A total of 51 trees and shrubs belonging to 17 families, 21 mammals and 183 species of birds have been recorded within the BC-01. Among 21 species of mammal found in BC1, tiger, snow leopard, musk deer, and takin, are listed in Schedule I of Forest and Nature Conservation Act of Bhutan 2023.

BC1 is managed by Divisional Forest Office (DFO), Paro. It covers two gewogs namely Bje gewog under Haa dzongklhag and Tesnto gewog under Paro dzongkhag.

BC1 Landscape in Haa

B. Assessment score

The Management effectiveness score of BC1 is 77.53%. The score for six management elements is as below;

- **Context - 100%:** The BC system in Bhutan was declared in 1999 as a 'Gift to the Earth from the People of Bhutan' by Her Majesty Ashi Dorji Wangmo Wangchuck. Further its conservation status has been upgraded at par with National Parks, Wildlife Sanctuaries and Strict Nature Reverse since 2017 through the revision of FNCRR.

- **Planning - 81.82%:** The BC1 has approved management plan and the activities are carried out as per the objectives and prescriptions in the management plan. However, there is no secured fund for most of the activities in the management plan.

- **Input - 66.67%:** There is a reasonably secure core budget for regular operation of the BC from RGoB and BFL Project. However, the management have to look for additional funding support in order to fulfill all the management prescription in the management plan. There is sufficient information for most key areas of planning and decision making. The staff numbers are inadequate for critical management activities and no designated staffs for BC. There is a need for strengthening capacity of the staff in order to fulfil management need of the protected area.

- **Process - 63.33%:** The BC1 boundary is demarcated and people are aware of it. There is a need for a comprehensive, integrated programme of survey and research work, which is relevant to management needs. Many of the requirements for active management of critical habitats, species, ecological processes, cultural values and sustainable resource production (where relevant) are being implemented but some key issues are not being addressed. There is contact between managers and tourism operators but this is largely confined to administrative or regulatory matters. Need to strengthen the co-operation between managers and tourism operators to enhance visitor experiences, and maintain protected area values

- **Output - 66.67%:** While there is regular work plan and all activities are implemented as per the Annual work plan for all staff and annual performance target set for the BC. Visitor facilities and services are inappropriate for current levels of visitation. Need for additional products and facilities.

- **Outcome - 80.67%:** The BC provide some economic benefits to local communities from the sale of non-wood forests produce specially Cordyceps. Further there is

need for creation of more avenues for economic activities to enhance the livelihood of the communities.

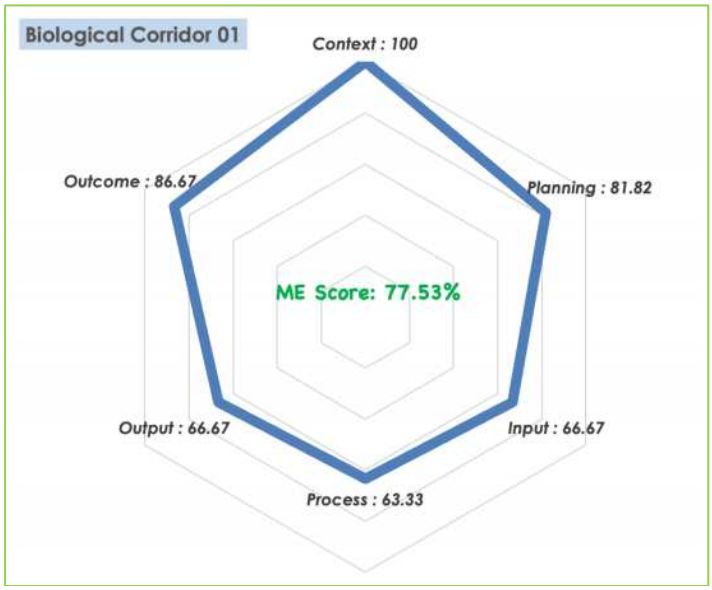


Figure 23: Bhutan METT+ scores for BC 01 against the 6 management elements

C. *Recommendations for improving management effectiveness*

- Need to secure fund for implementation of management activities though writing proposals to relevant donor agencies
- Require additional staffs for implementing the management works and build capacity of the existing staffs on modern technology and methods in the field of conservation
- Strengthen the co-operation between Protected Area managers and tourism operators to enhance visitor experiences, and maintain protected area values
- Improve and enhance visitor facilities in the protected area
- Creating avenues for income generation for local communities from ecological values

2.2.12. BIOLOGICAL CORRIDOR 02- Connecting JSWNP – RBP

A. Introduction

Biological Corridor 02 (BC2) was established in 1999 with a total geographical area of 275 km^2. Covering Thimphu and Wangdue Phodrang districts, the 60 km long BC2 links through RBP, Lampelri to JDNP to the north and with JSWNP to the south. In the north, close to JDNP, the corridor is about 6 to 7 km wide, but narrows to an average width of about 4 kms as it traverses southwards.

BC2 was designed to allow movement and/or occupancy of focal species like tiger, red panda, and musk deer. Camera trap surveys have confirmed the presence of tigers in several places of the corridor. Thus, tiger was included as a focal species for corridor management. Two other habitat specialist landscape species, clouded leopard and rufous-necked hornbill were also included in the suite of focal species because the corridor includes a large swathe of intact temperate broadleaf forests, which are preferred habitat for both species.

A total of 15 mammal species were recorded in BC2, out of which 2 species falls under Endangered (tiger and Asiatic wild dog), 3 species under Vulnerable (samber, clouded leopard, Himalayan black bear), 5 species under near threatened (goral, serow, Bhutan giant flying squirrel, common leopard, Asiatic golden cat) under the IUCN Red List. Sambar deer and Barking deer evidence frequency was recorded as the highest in BC2. A total of 145 bird species were recorded out of which 1 species fall under Vulnerable (*Wards tragon*), 1 Near Threatened (*Satyr tragopan*) and 1 species fall under Threatened (*Eurasian wryneck*). There are 140 plant species belonging to 49 families. There are 44 households with 169 population who permanently resides within BC2. The BC2 is managed by DFO, Wangdue.

A flowering of Osbeckia

B. *Assessment score*

The Management effectiveness score of Biological Corridor 02 is 68.46 %. The score for six management elements is as below;

- **Context - 100%:** The BC system in Bhutan was declared in 1999 as a 'Gift to the Earth from the People of Bhutan' by Her Majesty Ashi Dorji Wangmo Wangchuck. Further its conservation status has been upgraded at par with National Parks, Wildlife Sanctuaries and Strict Nature Reverse since 2017 through the revision of FNCRR.
- **Planning - 75.76%:** The BC2 has draft management plan which need to be finalized so that the activities can be carried out as per the objectives and prescriptions in the management plan.
- **Input - 66.67%:** There is a reasonably secure core budget for regular operation of the BC from RGoB and BFL Project. The staff have acceptable capacity/resources but need to strengthen particularly on protected area management and enforce protected area legislation and regulations. The staff numbers are inadequate and no designated staff for BC.
- **Process - 68.33%:** The park boundary is demarcated and people are aware of it. A very few requirements for active management of critical habitats, species, ecological processes, cultural values and sustainable resource production (where relevant) are being implemented need to work more on this.
- **Output - 33.33%:** The BC2 is not yet promoted for tourism purpose. In future there are plans to promote it to the visitor and there is also need for facilities development.
- **Outcome - 66.67%:** The BC provide some economic benefits to local communities from the sale of non-wood forests produce. Further there is need for creation of more avenues for economic activities to enhance the livelihood of the communities.

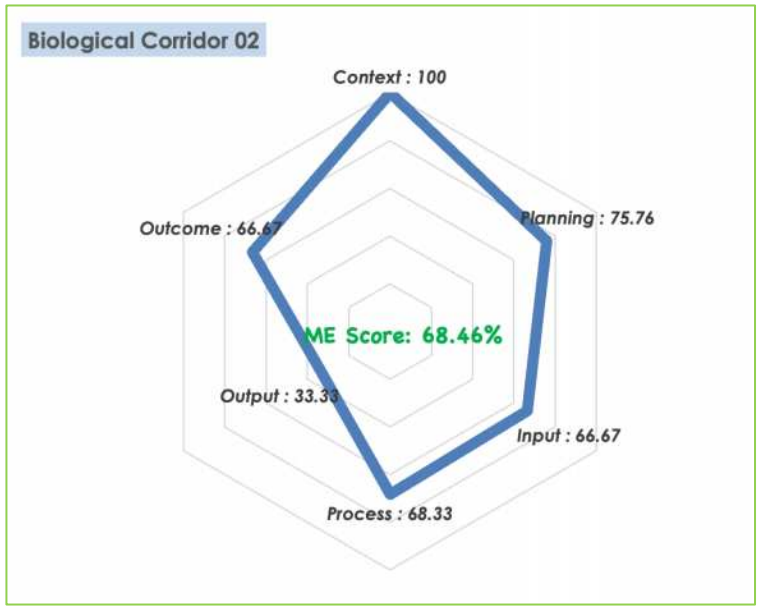


Figure 24: Bhutan METT+ scores for BC2 against the 6 management elements

C. Recommendations for improving management effectiveness

- Capacity building of the staffs on the protected area management
- Improved and develop visitor facilities and promote BC as ecotourism destination Designate staff for implementation of BC related activities
- creation of more avenues for economic activities to enhance the livelihood of the communities. Management of critical habitat and conservation of species in the BC
- Finalize the draft conservation management plan for the BC


Asiatic wild dog

2.2.13. BIOLOGICAL CORRIDOR 03- Connecting JSWNP-PWS-RMNP

A. Introduction

The Biological Corridor 03 (BC3) is located at the southernmost part of our country connecting three renown parks namely JSWNP, PWS and RMNP. BC3 lies within the jurisdiction of Sarpang and Tsirang dzongkhags. It covers an area of 407.69 km^2.

BC3 comprises of mostly subtropical forest (warm and cool broadleaf) and has diverse ecosystem and ecological complexity consisting of fauna, flora and avifauna. The BC3 houses habitat to keystone species such as tiger, Asian elephant, clouded leopard, golden langur, Asiatic wild dog, Himalayan black bear, red panda, and gaur. Critically endangered species such as Chinese pangolin is also found inside BC3. In the lower elevation, Duabanga *grandiflora, Terminalia myriocarpa, Toona ciliate, Altingia exelsa, Schima wallichii, Ailianthus grandis* are dominant timber species, Alnus and Mecaranga dominate in mid-level species composition while in higher elevation mostly cool broadleaf species Oak *(Quercus lamilossa), Castanopsis species, Persia fructifera, Belschiedia sikkimensis)* are key species.

BC3 encompasses total of 11 gewogs under DFO Sarpang and DFO Tsirang. Nine gewogs are under Sarpang and two gewogs are under Tsirang dzongkhag.

Traditional method of managing HWC

B. *Assessment score*

The management effectiveness score of Biological Corridor 03 is 71.46%. The score for six management elements is as below;

- **Context - 100%**: The BC3 was established in year 1999 with the other biological corridors and declared as a 'Gift to the Earth from the People of Bhutan' by Her Majesty Ashi Dorji Wangmo Wangchuck.
- **Planning - 78.79%:** BC3 has conservation objectives that are aligned to DoFPS objectives. The conservation management plan of BC 3 (2023-2032) is under review and the plan would guide the activities of BC 3 for the next 10 years. The BC management communicates with local stakeholder for activities involving the local people.
- **Input - 66.67%:** Currently the staff strength is not enough and among the existing number, only few are well trained and experienced for BC management. The budget constraints are impacting the conservation goals and objectives.
- **Process - 70%:** BC 3 shares boundaries with RMNP, JSWNP and PWS. Most of the BC3 area is accessible and only few are not due to the cliffs and other natural barriers. BC-3 has been prominent threats to ecosystems and had displaced many settlements let along the wildlife habitats, therefore there is need to explore long term mitigation in consultation with local communities.
- **Output - 33.33%:** SMART patrolling and monitoring of waterholes and salt-lick regularly conducted to allow safe passage and movement of wild animals between PWS, RMNP and JSWNP. Most of the biodiversity and ecological values are intact. Visitor facilities are not available but there are potential areas in the BC for birdwatching, recreational fishing and pilgrimage.
- **Outcome - 80%:** The residents within the park are benefited from NWFP collection There is no commercial ecotourism functioning there is scope for eco-tourism development to enhance economic contribution to the local communities.

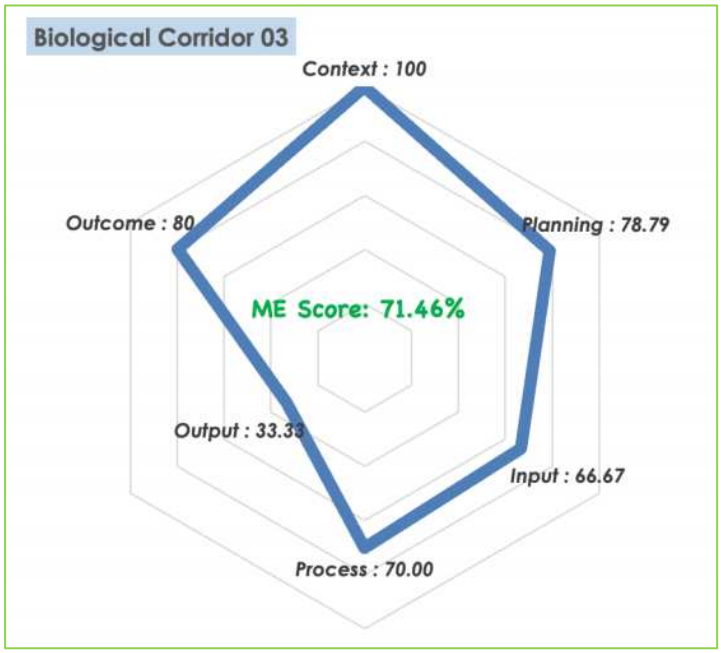


Figure 25: Bhutan METT+ scores for BC3 against the 6 management elements

C. *Recommendations for improving management effectiveness*

- Training of BC staffs on the protected area management and species conservation
- Develop visitor facilities in potential sites for ecotourism and pilgrimage opportunities to generate income for local communities
- Finalize the conservation management plan for the BC and secure budget for implementation of the activities in the plan by developing proposal to the potential donors
- Improve staff strength for efficient management of the BC
- Reduce Human wildlife conflict and enhance community livelihood
- Increase knowledge base on species and habitats
- Upscale conservation awareness and advocacy program

A pair of Wreathed hornbill

2.2.14. BIOLOGICAL CORRIDOR 04- Connecting RMNP-JSWNP-PNP

A. Introduction

Biological corridor 04 (BC4), with an area of 594.65 km^2, is the largest among the eight biological corridors in Bhutan. BC4 is mainly designed to provide a wildlife corridor between three national protected areas of RMNP in the south, PNP to the north, and JSWNP to the northwest. The corridor provides a breeding habitat and movement corridor for Royal Bengal tiger. In addition, it also hosts many threatened flora and fauna such as red panda, clouded leopard, takin, musk deer, Himalayan black bear, etc. The lowest elevation is 228 m.a.s.l, and the highest is 4570 m.a.s.l. As per the land use and land cover in 2016, most of the corridor area is dominated by broad-leaved forest.

BC4 recorded 485 flora species belonging to 301 genera and 128 families. Additionally, there are 37 species of mushrooms, 38 species of Ferns, and 129 species of orchids recorded in the BC4. Four species of plants and three species of orchids were discovered as new to the flora of Bhutan, and one species of Begonia as new to science from the corridor. The corridor is home to 40 mammals, which includes 18 species of threatened mammal species. A total of 305 species of birds belonging to 61 families were recorded in the corridor, of which nine species of birds are globally threatened, including the critically endangered white-bellied heron. A total of 65 species are migratory birds. The corridor also recorded 15 species of damselflies, eight species of dragonflies, 23 species of snakes, 150 species of butterflies, 36 species of moths, and three species of frogs. The corridor has local communities living inside and in the buffer of the corridor and their livelihood are dependent on agriculture and livestock supplemented by natural resources. Itinerant herders also herd their cattle inside the corridor pastures.

Buli lake, Zhemgang

There are major and minor rivers, as well as multiple seasonal streams flowing through the corridor catchment area. The corridor is prominently bordered by Mangdechu to the west and Chamkharchu to the east. The boundary starts from the Mangdechu and Chamkharchu confluence at Ringdibee and stretches to Bribdungla towards the north. The BC4 is managed by DFO, Zhemgang.

B. Assessment score

The management effectiveness score of Biological Corridor 04 is 73.39%. The score for six management elements is as below;

- **Context - 100%**: BC4, is the largest among the eight biological corridors in Bhutan and provides a wildlife corridor between three national protected areas of RMNP in the south, PNP to the north, and JSWNP to the northwest. BC4 was notified in 1999 as part of the BC systems.
- **Planning - 72.73%:** There is an active management plan for period of 2023-2032. The resource use and protection are guided by the existing forest rules, regulation and acts Bhutan. The management also do regular consultation with the adjoining parks and BCs for any conservation intervention matters.
- **Input - 66.67%:** There is no permanent staff designated for BC4 conservation and majority of staffs from division lacks technical skills. There is a need to address budget constraints, and inadequate equipment and office facilities for effective management of BC4.
- **Process - 63.33%:** BC4 boundaries were redefined there is clear demarcations of the boundary which is now known by the local communities and other stakeholders. Local communities are involved in decision making process but lack support during implementation.
- **Output - 66.67%:** People visiting Tsachu do pay rental charges for the room but it is collected by the Dzongkhag administration and there is no benefit from tourism in conservation of BC. Visitor facilities need to be developed and improved in the BC.
- **Outcome - 73.33%:** Religious sites and its cultural values are still intact and preserved but traditional management practices are degraded. However due to timely restoration carried by division, there is no major damage to the condition of biodiversity and ecological values in BC4.

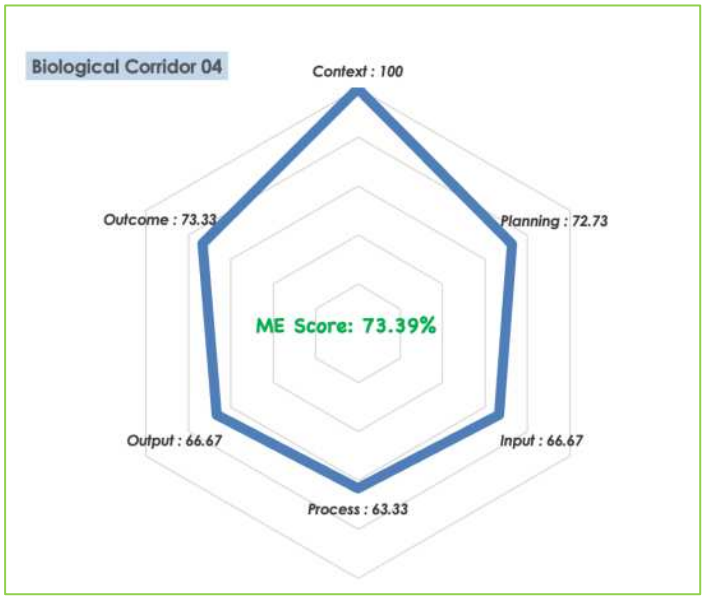


Figure 26: Bhutan METT+ scores for BC4 against the 6 management element

C. Recommendations for improving management effectiveness

- Enhance knowledge and awareness on conservation and wildlife through educational outreach programs with the local communities, forestry staff, and relevant stakeholders
- Strengthen institutional capacity for effective management and protection of the corridor
- Introduce effective and innovative HWC mitigation measures
- Promote nature-based solutions to supplement the livelihood of the local communities
- Develop and improve visitor facilities in the BC to promote ecotourism

A pair of great hornbill

2.2.15. BIOLOGICAL CORRIDOR 05- Connecting RMNP-JWS

A. Introduction

The Biological Corridor 05 (BC5) is located in the south eastern part of the country and it lies within the administrative jurisdiction of Pema Gatshel and Samdrup Jongkhar Dzongkhags. Covering an area of 203.58 km^2 and approximately 48 km in length, corridor connects the RMNP in the west and JWS in the east.

A total of 24 mammal 139 species of birds and total of 226 plant species including 174 species of trees and shrubs, 38 herbs and 14 climbers respectively are present in the BC. The BC5 is jointly managed by DFO Pema Gatshel and Samdrup Jongkhar.

The BC provides critical linkages between JWS and RMNP enabling free movement of key species such as elephants, hornbills, gaurs, dhole and pangolins. By providing landscape connections between these two protected areas, this corridor enable migration, colonization and interbreeding of plants and animals.

Sub-tropical mist

B. *Assessment score*

The management effectiveness score of Biological Corridor 05 is 78.63%. The score for six management elements is as below;

- **Context - 100%:** BC5 has been part of the overall BC systems first established in 1999 and BC5 is the first BC to have an active conservation management plan with plan current period till 2029.
- **Planning - 72.73%:** Regulations for controlling land use and activities in the protected area exist but there are some gaps, the protected area has agreed objectives, size and shape of BC5 is sufficient for meeting the BC objectives yet there are few since the narrow passage size may hinder long-range moving animals and result in conflict with nearby settlement, A management plan exists but it is only being partially implemented because of funding constraints or other problems.
- **Input – 74.07%:** The staff have capacity/resources to enforce protected area legislation and regulations, Information on the critical habitats, species, ecological processes and cultural values of the protected area is sufficient for most key areas of planning and decision making, Staff numbers are adequate, Due to limited training and exposure in protected area management, the capacity of the field staff are low, The available budget is inadequate for basic management needs and should be improved.
- **Process - 68.33%:** The boundary of the protected area is known by both the management authority and local residents/neighboring land users but is not appropriately demarcated, SMART patrolling, development of water holes, grassland, enrichment of salt lick areas and enrichment plantation are being implemented, Budget resources is poor and constrains effectiveness.
- **Output - 83.33%:** A regular work plan exists and all activities are implemented, visitor facilities are not available and should be improved and developed.
- **Outcome - 73.33%:** Protection systems are only partially effective in controlling access/resource use. There are rampant illegal activities due to the porous border, some biodiversity and ecological values are being partially degraded but the most important values have not been significantly impacted.

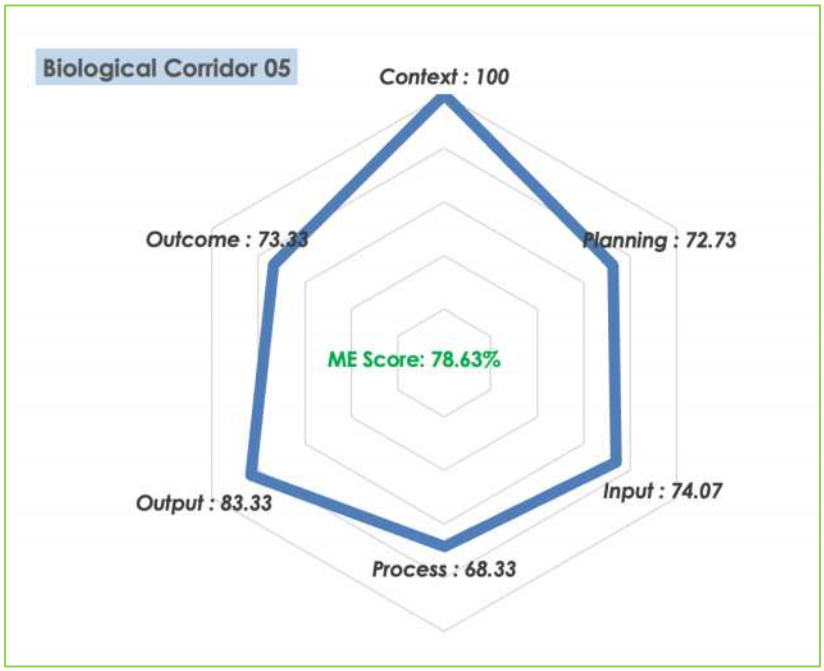


Figure 27: Bhutan METT+ scores for BC5 against the 6 management elements

C. Recommendations for improving management effectiveness

- Conservation and protection of wildlife species and their habitat for sustained ecosystem function and its services
- Adoption of mitigation and adaptation measures to address Human Wildlife Conflict
- Enhancement of community stewardship and participation in sustainable management of natural resources for socioeconomic benefits
- Enhancement of management capacity and support facilities for improved service delivery and sustainable resource management
- Develop visitor facilities to promote ecotourism and generate income for local communities
- Proper demarcation of the BC and awareness to the local communities on the demarcation
- Secure financial resources for funding the BC management activities

2.2.16. BIOLOGICAL CORRIDOR 06- Connecting JWS-SWS

A. Introduction

Biological Corridor 06 (BC6) located in eastern Bhutan was established in 1999. BC6 with total area of 232.77 km² connects JWS in the south to SWS in the north. Approximately, 73.3% of the BC6 area falls under the jurisdiction of Samdrup Jongkhar dzongkhag encompassing part of Serthig, Samrang, Martshala and Lauri gewog. Remaining 26.7% is spread across the part Kangpara and Merak gewog under Trashigang dzongkhag. Other than the seasonal herding communities, there is no permanent settlements and roads or linear infrastructures inside the landscape. The DFO, Trshigang and Samdrupjongkhar jointly manages the BC6.

The corridor is characterized by diverse ecological zones ranging from subtropical to temperate climate, hosting 38 mammal species, 188 bird species and 485 plant species. The landscape provides secure habitats for rare, charismatic and threatened species like red panda, Asiatic elephant, guar, musk deer, clouded leopard, blyth's tragopan, temminck's tragopan, satyr tragopan, rufous-necked hornbill and *Sapria himalayana*. The lower regions are inhabited by mega herbivores like elephants and gaurs, while the highest peaks are adorned with alpine meadows that hold significant local importance.

The corridor is haven of endemic and threatened species such as *Sapria himalayana, Bulbophyllum trongsaense, Illicium griffithii* and *Taxus wallichiana* and other vulnerable species like *Aristolochia griffithii, Rhododendron dalhousiae* and *Merrilliopanax alpinus*. The stretch of the track from Kangpara to Chenla has documented the presence of 33 species of Rhododendron, including two varieties: Rhododendron *arboreum var. roseum and Rhododendron kesangiae var. album.*

Chenla is sacred site associated with Guru Rinpoche discovered by siddha Drupwang Drakpa Gyeltshen alias Lama Khenjey. The site is believed to possess profound blessings from spiritual beings such as Paws, Pamos, and Khandroma. Thus, signifying ecotourism prospects in the locality.

Chenla, BC6

B. *Assessment score*

The management effectiveness score of Biological Corridor 06 is 76.41%. The score for six management elements is as below;

- **Context - 100%:** Biological corridor in the country has been gazetted since 1999 and BC6 has been part of the BC systems since then.
- **Planning - 72.73%:** Regulations for controlling land use and activities in the protected area exist, the protected area has agreed objectives; protected area design is not significantly constraining achievement of objectives, but could be improved. A draft management plan is being prepared and is under review; a regular work plan exists and all activities are implemented.
- **Input - 74.07%:** The staff have acceptable capacity/resources to enforce protected area legislation and regulations but some deficiencies remain; information on the critical habitats, species, ecological processes and cultural values of the protected area is not sufficient to support planning and decision making. Staff numbers are below optimum level for critical management activities, the available budget is acceptable but could be further improved to fully achieve effective management. There is a secure budget for the protected area and its management needs but can be improved.
- **Process - 68.33%:** The boundary of the protected area is known by the management authority but is not known by local residents/neighboring land users. There is some survey and research work which is at least partly directed towards the needs of protected area management. Staff training and skills are adequate, but could be further improved to fully achieve the objectives of management.
- **Output - 83.33%:** A regular work plan exists and all activities are implemented, visitor facilities can be improved.
- **Outcome - 73.33%:** Protection systems are only partially effective in controlling access/resource use. Some biodiversity and ecological values are being partially degraded but the most important values have not been significantly impacted.

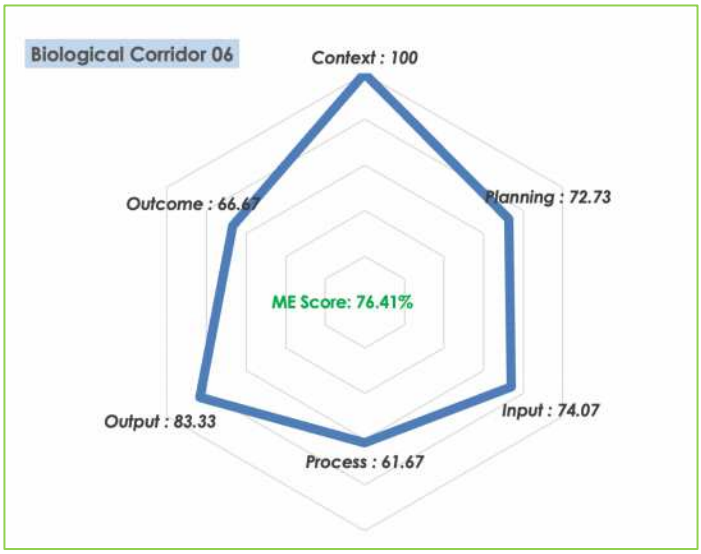


Figure 28: Bhutan METT+ scores for BC6 against the 6 management elements

C. Recommendations for improving management effectiveness

- Improve staff strength and build capacity of the staffs on emerging conservation techniques and methods
- Curb illegal poaching and mitigate Human Wildlife Conflict
- Develop and improve visitor facilities to promote ecotourism and pilgrimage for generation of income to local communities
- Finalize the conservation management plan for the BC and secure funding for implementing the activities in the plan
- Enhance knowledge on the information on the critical habitats, species and ecological processes in the BC
- Fulfill the equipment and facilities needs for the management of BC
- Provide awareness to the local communities and other stakeholders on BC related efforts.

Mountains of BC6 giving way to sub-tropical

2.2.17. BIOLOGICAL CORRIDOR 07- Connecting PNP-BWS-WCNP

A. Introduction

The Biological Corridor 07 (BC7) is one amongst eight BC's in the country. BC7 is located in the eastern part of the country and falls within the administrative jurisdiction of Lhuentse and Mongar Dzongkhag. It covers Gangzur, Khoma, Metsho, Menbi, Minjay and Tsenkhar gewogs under Lhuntse and Tsakaling and Tsamang gewogs under Mongar Dzongkhag. With an area of 419.66 km^2, it connects WCNP in northwest, PNP in southwest and west with two strands and BWS to the northeast.

BC7 has numerous streams and tributaries draining into Kurichhu. The Kurichhu is one of the sub-basin tributaries of Manas watershed in the country. The 15.26 km of Kurichu that is assessed as degraded catchment runs through BC7 forming an indispensable migratory route for avi-fauna and other lesser-known aquatic diversity. Due to the presence of several wetlands and seasonal ponds in the upper ridges of forest, it forms an important habitat for wildlife populations and important catchment areas for the downstream communities.

The floristic composition consists of 307 plant species belonging to 103 families with 104 tree species, 47 shrub species, 144 herb species including one endemic species (*Corallo discuscooperi*). The other interesting plant species such as *Tetracentron sinense*, considered as living fossil plants and *Sapria himalayana*, a rare holoparasitic under Rafflesia family are also recorded. As of now 276 species of birds have been documented. Of these, one is endangered (Pallas's fish eagle), three are vulnerable (black-necked crane, wood snipe, and rufous-necked hornbill), and six are near threatened (Himalayan vulture, satyr tragopan, great hornbill, ward's trogon, river lapwing and yellow-rumped honey-guide) as per the IUCN Red List of Threatened Species (IUCN 2014). The vulnerable species of otters are also recorded feeding along Kurichu making it one of the significant wetland habitats.

The camera trap studies and field surveys have revealed the presence of 28 species of mammals. The endangered mammals recorded include red panda, Asiatic wild dog, and tiger.

A total of 193 households resides within the BC7 area. Around 727 households that reside around the BC area also use the BC7 for natural resources particularly timber, firewood and non-wood forest products.

B. *Assessment score*

The management effectiveness score of Biological Corridor 07 is 73.01%. The score for six management elements is as below;

- **Context - 100%**: The BC7 is fully operationalized with conservation management plan with significant threat identified and management regimes well developed.
- **Planning - 69.70%:** The BC7 area has agreed objectives, threats identified and in order to scientifically manage the BC-07, a wide range of relevant activities are proposed in the conservation management plan. External funding assistance apart from government and BFL funding is required for effective management of the corridor.
- **Input - 66.67%:** Some survey has been conducted int the BC7 but more study needs to be done. The level of resources and capacity is insufficient for effective management, and staff training is not sufficient in terms of protected area management and can be improved.
- **Process - 61.67%:** The processes of management are also fairly effective, although sometimes the lack of financial resources impedes implementation. The exact location of the boundary of BC7 is not known by the local residents and awareness on this needs to be provided.
- **Output - 66.67%:** Activities implemented per conservation management plan. However, the present trend of budget flow is insufficient to meet the conservation challenges. No visitor facilities are available and few potential facilities need to be identified and developed.
- **Outcome - 73.33%:** Protection system is moderately effective in controlling resource use by developing by-Laws for sustainable use of NWFPs in the BC. Biodiversity and ecological values in the corridor are partially degraded and culture values in the BC is intact.

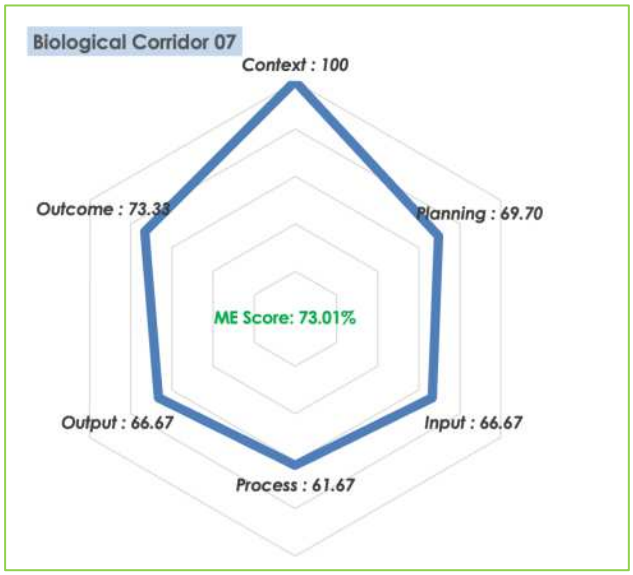


Figure 29: Bhutan METT+ scores for BC 07 against the 6 management elements

C. Recommendations for improving management effectiveness

- Mitigating conflicts between BC residents and wild animals
- Scientific management of key natural resources in participatory manner
- Strengthening the institutional capacity of the management in conservation of natural resources
- Improve the economic conditions of the local community by adopting nature-based solutions
- Secure budget for the implementation of the management activities
- Conduct scientific studies to gather information on critical habitats and species in the BC


Temperate forests

2.2.18. BIOLOGICAL CORRIDOR 08- Connecting JSWNP-WCNP

A. Introduction

Biological Corridor 08 (BC8) with an area of 558.6 km^2 is the largest among the eight BCs in the country and home to several flora and fauna given a wide altitudinal range and forest types. It was delineated primarily for conservation of tiger, takin, red panda and musk deer. Strategically located in central part of Bhutan, BC8 plays significant ecological functions in the Bhutan Biological Conservation Complex (B2C2). It connects WCNP in the north and JSWNP in the south by three distinct strands that traverses across the administrative jurisdiction of Wangdue Phodrang and Bumthang dzongkhags. BC8's connectivity with JSWNP, which shares its southeastern boundary with RMNP in the tropics, therefore, is expected to facilitate the movement of fauna and shift or dispersal of flora in response to changing pattern of climate.

BC8 is endowed with rich diversity of flora that is distributed across warm broadleaf through alpine scrub. A total of 297 species of plants are recorded from the forest of BC8 which comprises of 10 species of conifer evergreen trees, 30 species of broadleaf evergreen trees, 68 species of deciduous trees, 27 evergreen shrub species and 11 deciduous shrub species. The recent survey recorded at least 23 mammal species out of which four are endangered (tiger, wild dog, red panda and musk deer), three vulnerable species (takin, clouded leopard and sambar deer), and three near threatened species (Asiatic golden cat, marbled cat and Himalayan serow). Total number of avifauna species recorded was 264 species out of which four are globally threatened (Himalayan vulture, satyr tragopan, ward's trogon and yellow-rumped honeyguide).

BC8 landscape

BC8 inhabits more than 7900 people under Wangdue Phodrang and Trongsa dzongkhags. Out of which 423 households are under Trongsa dzongkhag, and 466 households under Wangdue Phodrang dzongkhag.

B. Assessment score

The management effectiveness score of Biological Corridor 08 is 75.35%. The score for six management elements is as below;

- **Context - 100%:** Biological corridor in the country has been gazetted since 1999 and BC8 has been part of the BC systems since then. Initially, the BC8 was part of the larger Northern-biological corridor prior to the establishment of WCNP in 2008.
- **Planning - 78.79%:** Regulations for controlling land use and activities in the protected area exist, the protected area has agreed objectives but often not able to fulfill all the objectives. A draft conservation management plan is in place and will be approved soon. A regular work plan exists and few activities are implemented.
- **Input - 66.67%:** There is deficiency in staff capacity and needs to be improved; staff numbers are below optimum level for management activities; skills and training of the staffs are low relative to the needs of the management. Information on critical habitats and species are limited and needs to be gathered; and available budget is inadequate for management needs.
- **Process - 66.67%:** The boundary of the protected area is known by the management authority but is not known by local residents/neighboring land users. Budget is prioritized when the funds are inadequate. There is contact between managers and neighboring land and water users while there is no contact with the tourism operators.
- **Output - 66.67%:** A regular work plan exists and few activities are implemented due to budget limitations, visitor facilities are not available.
- **Outcome - 73.33%:** Protection systems are only partially effective in controlling access/resource use. Some flows of economic benefits are there to the local communities. Some biodiversity and ecological values are being partially degraded but the most important values have not been significantly impacted.

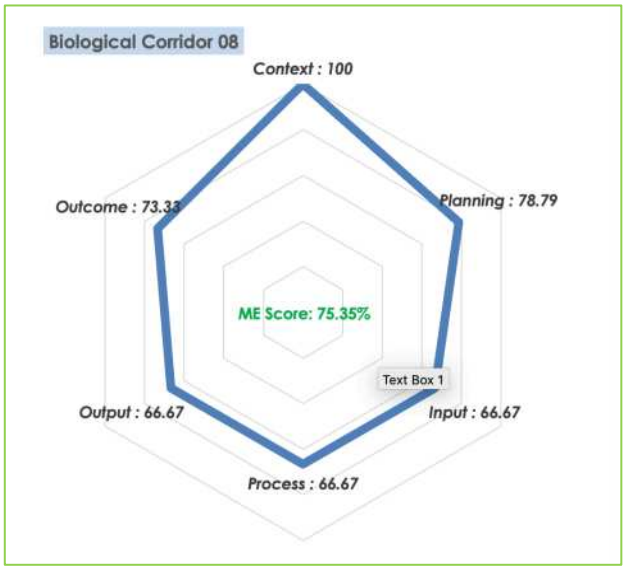


Figure 30: Bhutan METT+ scores for BC8 against the 6 management elements

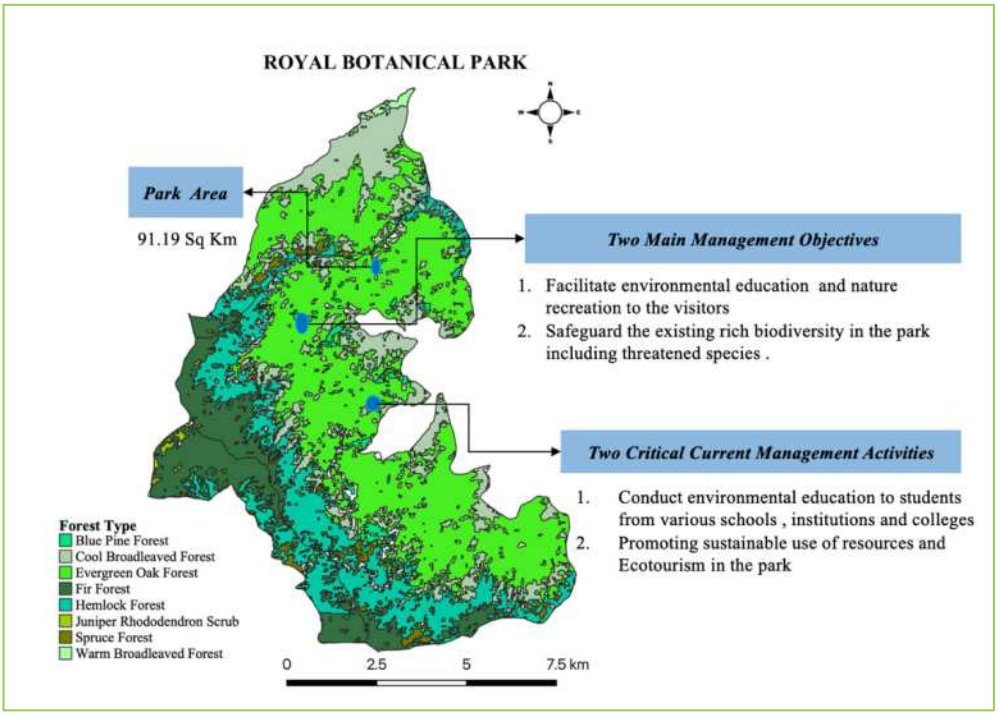
C. Recommendations for improving management effectiveness

- Strengthening capacity of the staff for efficient protected area management
- Conduct scientific study to gather information on critical habitat and species in the BC8
- Secure budget for funding management activities from the potential donor agencies
- Incorporate BC8 management activities in the overall divisional forest office output to provided importance to the BC8
- Conduct feasibility study for the development of visitor facility for providing income generation opportunity to the local communities

Himalayan black bear

2.2.19. ROYAL BOTANICAL PARK

A. Introduction



The Royal Botanical Park (RBP) forms the heart of the "tri-junction" of the hill ranges of Sinchula, Helela and Dochula. The park is at Lamperi ,30 km (around 20 minutes' drive) away from Thimphu. With a total area of 91.19 km^2, there are three areas falling under Lamperi Park which are Hongtsho in Thimphu, Begana and Menchuna in Punakha. The people of these communities depend on agriculture farming. RBP has one of the highest/richest biodiversity. It is home to some of the flagship species such as the endangered Royal Bengal tiger and the charismatic red panda. There are about 480 species of flowering plants, 26 species of mammals and 230 species of birds recorded as of now.

Geographically, majority of the RBP falls largely under Punakha dzongkhag sharing some of its areas with Thimphu dzongkhag. It is currently operating under the administration of DFO, Wangdue. It covers four gewogs of two dzongkhag namely Toeb of Punakha and Chang, Kawang and Dagala of Thimphu. It has 136 households and around 1,140 people residing adjacent to the park. Nomads of Dagala gewog is the only ethnic group of people. Dzongkha is a major spoken language within the local communities.

B. *Assessment score*

The Management effectiveness score of Royal Botanical Park is 73.89%. The score for six management elements is as below;

- **Context - 100%**: The RBP has been formally gazette as BC and was part of the BC2. It was established as a Botanical Park on 22nd October 2008.

- **Planning - 84.85%:** The activities of the park is undertaken according to the agreed goals and objectives of the department. However, some activities had to be either dropped or adjusted due to lack of secured fund. The conservation management plan is under development.

- **Input - 70.37%:** The current strength staffs at the park is insufficient for overall management. There is need to improve the technical capacity of existing staffs. The park is lacking sufficient amount of budget to carry out maintenance activities.

- **Process - 88.33%:** The park falls within the BC2 connecting JDNP and JSWNP. The boundary of the protected area is known by the management authority and local resident. There is no contact between mangers of adjoining protected areas due to difference in management strategies.

- **Output - 50%:** Large influx of visitors including national and international happen in the park; the park offers nature recreational and education avenue for visitors with a Lampelri recreational park as its component. The local communities provide preferential treatment for operating the visitor facility in the park and provided avenues to gain economic benefits from the ecological values of the park. No management plan is available for the park although work plan is available.

- **Outcome - 80%:** The local communities are benefited through tourism services. The biodiversity and cultural resource are intact as resource allocation is not allowed from the park. The Lampelri recreational park of the RBP has become a center for recreational avenue, education and awareness on forest conservation of Bhutan.

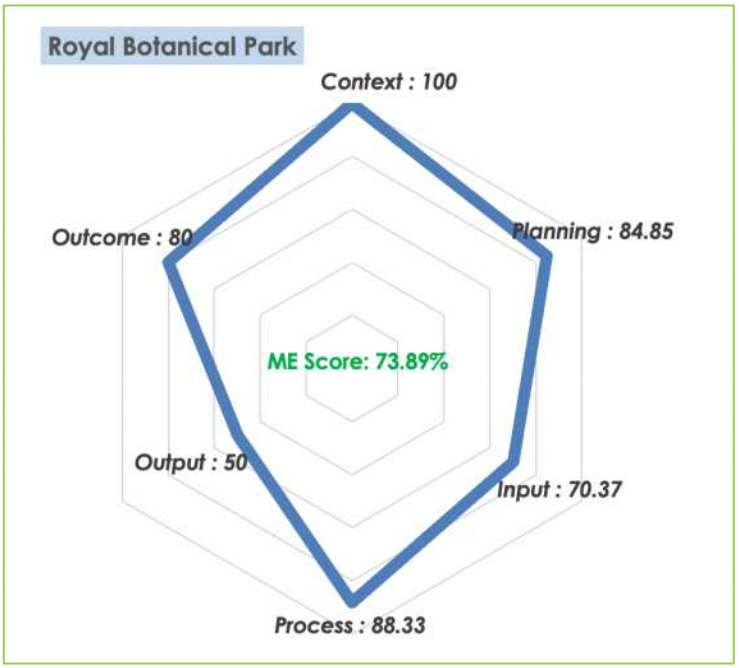


Figure 31: Bhutan METT+ scores for RBP against the 6 management elements

C. *Recommendations for improving management effectiveness*

- Develop conservation management plan for the park
- Improve visitor facilities for ecotourism and educational purposes
- Improve staff strength and their capacity for management of the park
- Secure budget for funding management priorities in the park

CHAPTER 3 ~ ANALYSIS OF THREATS AND OPPORTUNITIES

3.1. Threats

3.1.1. Human-wildlife conflict

Human-wildlife conflict is widespread across the country and is a growing challenge for conservation. Our unique conservation policies of allowing people to continue living in the protected area system results in an increased frequency of interaction between wildlife and people. Agricultural fields are raided by deer, wild pigs and primates, especially macaques. Livestock depredation in some parts of the country by species like tigers, snow leopards, wild dogs and common leopards negatively impact the livelihood of these farmers. Bears kill livestock, damage crops and also raid homes. In the south, elephants cause havoc to life and property. Although rare, retaliatory killings by people have also been reported, with deer, wild pigs, porcupines and bears getting killed. Threatened species like the tiger and bear often fall victim to inadvertent snaring.

The Department of Forests and Park Services is putting in many investments to address human-wildlife conflict. Farmers have been provided with electric fencing, and community-based insurance schemes such as the Gewog Tiger Conservation Tshogpa have been implemented. Innovative measures like developing pastures for domestic animals near the villages, protected by electric fencing, and taken care of by communities are proving effective for minimizing the impact of human wildlife conflict on to the livelihood of farmers as wells to the survival of wildlife species that should ultimately lead to human wildlife coexistence.

Herders hut amidst the meadows

3.1.2. Increasing developmental activities

The need for economic development for those communities living inside these protected areas forms a part of our integrated conservation and development programs, which is listed as a major program of any conservation management plans. Thus, it becomes critical of how we balance the economic development with that of conservation programs inside the protected areas. Across protected areas, major developmental activities such as the construction of roads and electric transmission lines are a common sight. Many protected areas have listed roads and service corridors as a current threat to their integrity, as large tracts of forests are cleared yearly. It destroys not only the habitats of wildlife but also creates disturbances, fragments habitats and often causes road-kills.

3.1.3. Gathering of NWFPs

Non-wood forest produce is an important source of livelihood as well as a source of supplementary nutrition for many residents of protected areas. Important NWFPs from protected areas include the high-valued Cordyceps (*Ophiocordyceps sinensis*), Matsutake mushroom (*Tricholoma matsutake*) and many other plants that are either consumed as vegetables or used in formulation of traditional medicines and other products.

In many protected areas, collection of NWFPs is a growing concern, most of which are done without a sustainable harvesting plan in place. People collect various non-timber resources from the forest, including edible fruits, vegetables, medicinal plants, mushrooms, canes, and bamboo. Some collect it in reasonable amounts for self-consumption, but most of the time, the quantity extracted is significant and is sold in the market. This is seen to be negatively impacting the food sources for wildlife and could be a probable reason for increased appearances of wildlife in human settlements and on the roads. The anthropogenic disturbances caused by people who go in search of these NWFPs could in the long run cause disturbance and damage to wildlife habitats.

3.1.4. Poaching

Poaching is a severe threat to wildlife, and rampant poaching can decimate wildlife populations. Poaching is reported across the country, and two commonly poached animals are musk deer and black bear. Due to perceived medicinal properties, the musk pod and bear bile are most commonly traded animal parts illegally. Every year, the Department of

Forests and Park Services makes dozens of seizures of musk pods, bear bile and bear paws. Forest officials report frequently encountering traps set up for birds and musk deer across ridges and mountains. Tiger skins occasionally enter the illegal wildlife trade, and those originating within the country are usually tigers killed due to inadvertent snaring.

3.1.5. Habitat degradation

Habitat degradation occurs as a result of several factors. The increased financial capacity of major section of the Bhutanese population increases the demand for timber and firewood for commercial and rural purposes. In 2021, more than 70,000 m^3 of timber and 40,000 m^3 of firewood were allotted by various forestry offices in the country. Similar quantities are extracted every year for the same purposes. In addition, people also resort to illegal logging, which has become rampant in many parts of the country. In 2021 alone, 670 incidences were recorded.

Settlement in a protected area

With increasing urban centers, the need for natural recreational spaces is also increasing and with these the associated issues of waste management and disturbances to wildlife habitat is becoming an emerging issue. Forest trails are often littered with garbage with increasing visitation into the natural space for recreation. There seem to a lot of push by both

tourism and environment sector to promote ecotourism, but without much capacity to sustainably plan, build and manage ecotourism products, it could lead to an unwanted situation of a lot of disturbances and destructions of wildlife habitat.

Invasive/non-native alien plants are noted as an emerging issue for the protected areas, although the threat is suspected to be low. The same concern has been expressed for areas outside protected areas. Invasive plant species are taking over native vegetation, especially along the southern borders and under climate change, the invasive plants are expected to spread further. The invasive plants can outcompete native palatable vegetation for wildlife and cause food shortages inside the forests.

Livestock grazing is also considered to be a threat to wildlife and the forest's health overall. They compete with wildlife inside the forest and, due to their large numbers, often lead to overgrazing.

3.1.6. *Pest and diseases*

Pests and diseases are one of the biggest threats to wildlife. In recent years, bark beetle infestations have led to the deaths of hundreds of trees, especially in Haa and Bumthang areas. Aphids are also known to cause dieback in blue pine.

Wildlife health management is an area that has been given the least attention of all mainly due to lack of capacity among foresters. This can easily become a devastating issue and more dangerous of the wildlife disease turns out to be zoonotic. Efforts are being made in close collaboration with Department of Livestock and the health authorities through the World Organization for Animal Health and One Health Initiative.

The recent case of Capripox disease affecting takins and gorals have shown the unpreparedness of our conservation sector in dealing with such problems. In 2018, a tiger also died due to a cyst formation in its brain, which could have been saved if wildlife health capacity were there. These are some small indications of the dire need of wildlife health experts along with the conservation champions.

Currently, we do not have an active disease surveillance and monitoring in the wild due to a lack of expertise and funds which poses a significant threat to wildlife populations, that could possibly lead to local extinctions.

3.2. Opportunities

3.2.1. Ecotourism

Bhutan's well managed and interconnected protected areas with its rich biodiversity and the fact that we have more than half of our country under protected areas goes very well with the Global Biodiversity Targets and is increasingly quoted as good examples to many. With this name and fame given to our protected area system has a huge potential to attract international as well as national visitors, that could contribute a greatly for conservation awareness creation as well be a good source of revenue as one of the sources of conservation financing for the protected areas. Although, considering our difficult terrain direct sighting of wildlife is difficult, innovative ecotourism products based on wildlife tourism could be one big revenue earner for the protected areas. For example, birding is a substantial economic opportunity worldwide, and in Bhutan, we are yet to tap its full potential. Bhutan is currently home to a recorded 770 species of bird, and some stunningly beautiful and some globally threatened species like the white-bellied heron, black-necked crane, hornbills, etc., are found in these rich forest habitats. These offers a great opportunity for our protected areas to become a popular ecotourism destination.

An ecotourism structure in JKSNR

3.2.2. Research and exploration

Protected areas, such as national parks, wildlife sanctuaries and strict nature reserves, , offer numerous opportunities for research and education. These areas play a crucial role in biodiversity conservation and ecosystem protection, making them ideal settings for scientific study and educational programs. Some opportunities our protected areas could offer in research and education are as follows:

A. ***Biodiversity studies:*** Protected areas are often home to diverse flora and fauna. Researchers can conduct studies on species diversity, population dynamics, and distribution patterns within these areas.

B. ***Ecological research:*** Studying ecosystems within protected areas can provide valuable insights into natural processes and interactions among species. Researchers can investigate topics like nutrient cycling, predator-prey relationships, and habitat dynamics.

C. ***Climate change research****:* Protected areas can serve as natural laboratories for studying the impacts of climate change. Researchers can monitor temperature changes, shifts in species distributions, and alterations in phenology that are perceived to be changing due to climate change.

D. ***Conservation Biology:*** Protected areas offer opportunities to study the effectiveness of conservation measures, such as habitat restoration, understanding behavior ecology through observation of wildlife in their natural habitat, environmental monitoring through observation of air and water quality from those undisturbed ecosystems within protected areas.

Yak herding is integral part of PAs

3.2.3. Environment education

A. ***Field Trips and Interpretive Programs:*** Protected areas provide excellent settings for environment educational field trips and guided tours. These programs can help students and the public learn about the environment, conservation, and local ecosystems.

B. ***Outdoor classrooms****:* Many protected areas offer opportunities for hands-on learning. Program could be developed where schools and educational institutions can use these areas as outdoor classrooms for environmental science, biology, and ecology classes.

C. ***Citizen science projects****:* Engaging the public in scientific research through citizen science projects can help raise awareness and collect valuable data. Protected areas can serve as sites for such initiatives.

D. ***Visitor centers and exhibits:*** Many protected areas have visitor centers with exhibits that provide educational materials about local ecosystems, conservation efforts, and the history of the area. This offers a great opportunity for our protected areas to be used for environmental education and experiential learning through responsible and sustainable practices to ensure long-term health of these ecosystem.

Overall, protected areas are invaluable resources for both research and education. They offer opportunities to study and appreciate the natural world, foster environmental awareness, and contribute to the conservation of biodiversity. Collaboration between scientists, educators, conservationists, and the public is essential to maximize the benefits of these areas.

3.2.4. Funding

Bhutan's protected areas serve as opportunities for innovative funding to support their conservation and management. Traditional funding sources like donor grants and government budgets may is seen to be insufficient in terms of funding all the programs that needed for an effective management of the protected areas. Innovative approaches, that our protected areas offer can help bridge funding gaps. Here are some innovative funding strategies for protected areas:

A. ***Eco-tourism and recreation fees*:** Many protected areas have the opportunity to generate revenue through visitor fees and permits. Innovative approaches may include tiered pricing for different types of activities, such as hiking, camping, and wildlife watching. Some parks like RMNP and PWS could offer premium experiences, like guided tours or glamping, at higher prices.

B. ***Public-private partnerships (PPPs):*** *Collaborations with private companies can provide funding for infrastructure development, maintenance, and visitor services. This can include concessions for restaurants, lodges, and adventure activities within the protected area.*

C. ***Donation and philanthropy:*** *Protected area could offer individuals, foundations, and corporations an opportunity to donate to specific conservation projects or adopt-a-park programs. Crowdfunding campaigns and partnerships with organizations that specializes in public fund raising could also provide an opportunity to raise substantial fund that could be used for sustaining the financing source for supporting the management of protected areas.*

D. ***Carbon offsetting programs:*** Our protected areas could explore opportunities for for carbon offset programs where individuals or companies can pay for the preservation of forests or wetlands to offset their carbon emissions. Carbon offsets along with the economic valuation of biodiversity and other ecosystem services provided by protected areas offer a huge and a sustained potential for attracting funds for financing conservation programs and other integrated conservation development programs.

E. ***Environmental impact bonds:*** Protected areas with endangered species like tigers have great opportunities for exploring the possibility of issuing wildlife conservation bonds tied to specific conservation projects within the protected area. Similar to the Rhino-bond issued for the South African National Parks for revival efforts of black rhino population, our protected areas with good tiger population could explore the opportunity for inviting investors to receive returns based on the success of these projects, that incentivizes conservation efforts.

F. ***Virtual experiences:*** Our protected areas could offer virtual tours, webinars, or online educational programs for a fee to a global audience interested in learning about and supporting Bhutan's protected areas.

To implement these funding strategies effectively, protected area managers should carefully consider the potential impacts on conservation goals, visitor experiences, and the local community. Collaboration with various stakeholders, including local communities, NGOs, and businesses, is essential to ensure the success of innovative funding initiatives while maintaining the protection and integrity of the natural environment.

Golden langur at a mineral lick

CONCLUSION

The assessment of Bhutan's Protected Areas using Bhutan METT Plus has provided critical insights into the management effectiveness of our protected area system. Today, with five national parks, four wildlife sanctuaries, one strict nature reserve, one botanical park, and eight biological corridors, Bhutan has a well-connected protected area network spanning over 51% of the country's geographical area. With national estimates of tigers and snow leopards increasing, and a forest cover maintained at significant levels, it only indicates that our conservation efforts are bearing fruits and that the system is headed in the right direction. However, in the overall scope of things, it is easy to miss small details which are important and instrumental in properly managing protected areas. That is where METT+ plays an important role; it assists with understanding our protected area management better. The current assessment shows that protected areas in Bhutan are being managed well and that the overall management has improved over the last five years. However, it is essential that efforts are consistent in areas that are working well, and we must immediately address issues which continue to affect PA management. Key understanding derived from the current assessment are:

1. **Context:** All protected areas are designated and are strong in terms of understanding the context of protection.

2. **Planning:** Many biological corridors still need management plans and implementation. There is some ad hoc monitoring and evaluation in BCs but no overall strategy and no regular collection of results. The likely impacts of climate change have yet to be translated into management plans for both national parks and BCs.

3. **Input**: National parks and wildlife sanctuaries can enforce PA rules and regulations, but deficiencies must be addressed. Therefore, staff training needs to be prioritized. BCs fall way below national parks and wildlife sanctuaries regarding resource inventory, staff numbers, training, current budget, and equipment. Fees and fines are collected across PAs but have yet to contribute to the protected area and its environs substantially.

4. **Process:** Boundaries of PAs should be demarcated and communicated to the residents. Local communities have also been observed to have some input in

decisions relating to management but no direct role in management. Therefore, their involvement needs to be improved. Research, especially in BC, should be directed towards management needs. There is also a need to establish cooperation between managers and tourism operators to enhance visitor experiences. Currently, it is mainly limited to administrative and regulatory matters.

5. **Outcome:** Although potential economic benefits are recognized and plans are being developed, there needs to be a flow of benefits to the local communities in BCs. However, on average, some flow is reported in national parks and wildlife sanctuaries. Protection systems should be strengthened across PAs to control resource access/resource use effectively.

6. **Output:** In national parks and wildlife sanctuaries, staff have regular work plans and implement most activities, while in BCs, only a few are carried out. The lack of visitor centres affects the overall output management effectiveness score significantly. Eight protected areas indicated having visitor facilities, but require improvement. Among BCs, only two indicated that their visitor centre facilities and services must be more appropriate for the current visitations.

Rangers patrolling in PWS

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Cethosia cyane (Male)

Published by:

Nature Conservation Division
Department of Forests and Park Services
Ministry of Energy and Natural Resources
Royal Government of Bhutan