Recommended Conservation Strategies for Three Little Known Conservation Corridors in Myanmar – Chin Hills Complex, Rakhine Yoma Range and Western Shan Yoma Range

Camera trapped Blyth's Tragopan (*Tragopan blythii*) in Natmataung National Park, Chin Hills Complex Conservation Corridor

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1. Introduction

In coordination with the Forest Department, Ministry of Natural Resources and Environmental Conservation, the Wildlife Conservation Society organized the Myanmar Biodiversity Conservation Investment Vision (MBCIV) process in 2012 with the support of the MacArthur Foundation. During this process, a series of key informant interviews, secondary information and literature reviews, and a multi-stakeholder consultation workshop were conducted to review and revise existing Key Biodiversity Areas (KBAs) across Myanmar. As a key result of that process, 132 KBAs, 8 terrestrial conservation corridors, 4 freshwater conservation corridors and 2 marine conservation corridors were identified as demonstrated in **Figure 1.1**. Despite this initial effort, there were still many information gaps on biodiversity, threats and management systems for many of the proposed KBAs and most of the conservation corridors.

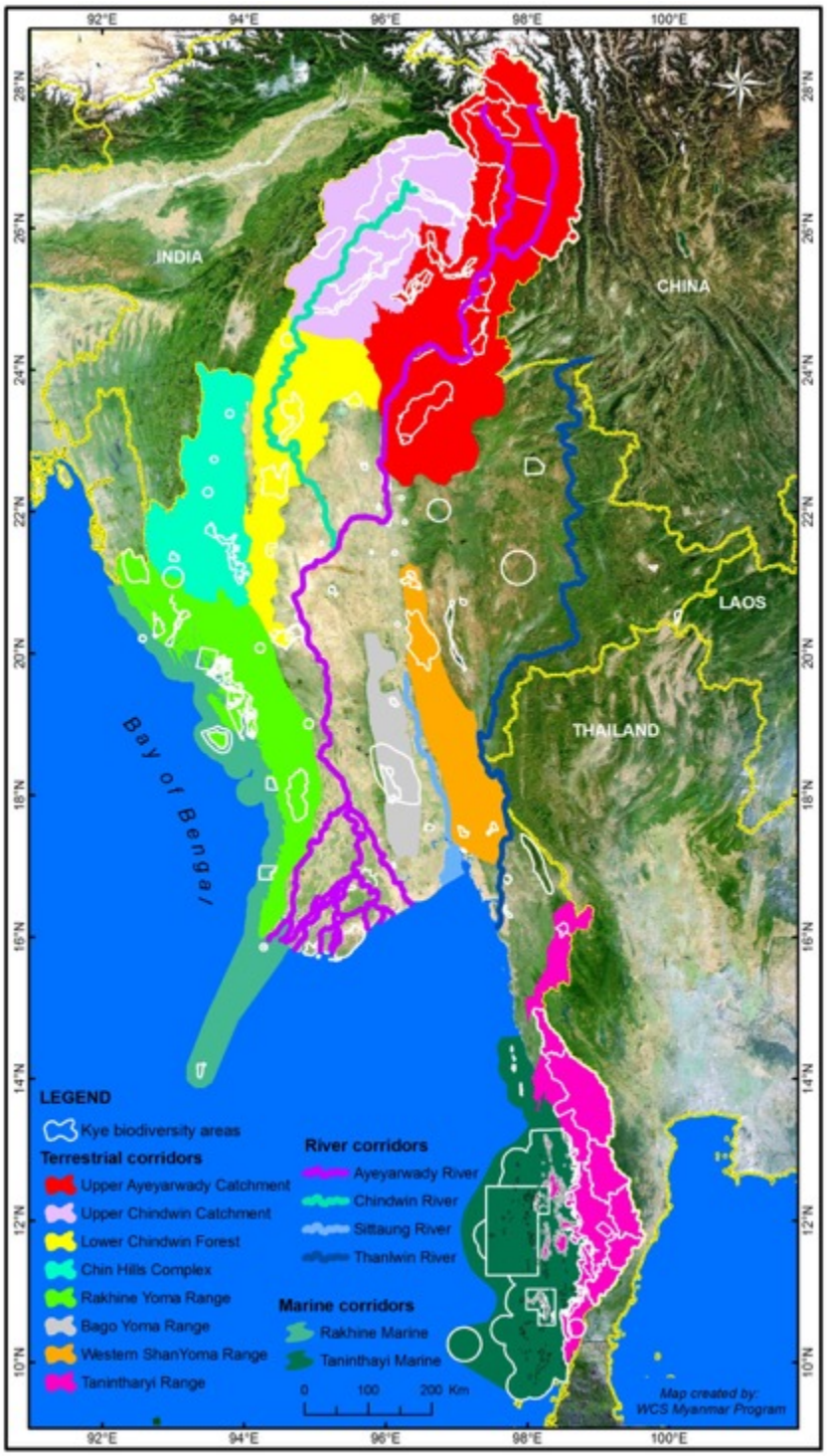
Among all terrestrial conservation corridors, three corridors - (1) Chin Hills Complex, (2) Rakhine Yoma Range and (3) Western Shan Yoma Range – were selected as little known corridors in terms of biological, threat and management information gaps. Therefore, the "Conducting a KBA Gap Analysis to Promote PA Expansion in Three Little Known Corridors in Myanmar" project was developed with the support of the Critical Ecosystem Partnership Fund to address the following objectives:

- Build a strong foundation for the expansion of the protected area network based on the best information available;
- Build a mechanism to involve civil society in the earliest stages of protected area development; and
- Build long-term local support for conservation experiences that can be used to understand other conservation corridors across Myanmar

In collaboration between Forest Department and WCS, field surveys were implemented from April 2015 to May 2016 across the three corridors. Findings from those field surveys were presented to stakeholders in Hakha, capital of Chin State on 17th-18th June 2016, in Sittwe, capital of Rakhine State on 22nd July 2016 and in Loikaw, capital of Kayah State on 29th August 2016. The final workshop was held in Nay Pyi Taw on 25th November 2016. In all

workshops, representatives from State/ Region Governments, State/ Region Parliaments, State/ Region, District and Township Governmental Departments, CSOs, NGOs and local communities participated and provided invaluable information, comments and recommendations for conservation of KBAs and three conservation corridors. Incorporating information from field surveys, key informant interviews and focus group discussions and verifying those information through multi-stakeholder workshop, this report is prepared and presented.

Figure 1.1: Updated KBAs and Conservation Corridors for Myanmar



2. Methodology

For this project and to develop this report, the following methods were applied.

Secondary information collection and literature review

All available secondary information such as PA management plans, socioeconomic assessments, and published papers related to the three little known conservation corridors were collected and reviewed.

Key informant interviews

Key informants from government departments, NGOs, CSOs, CBOs and local communities were identified and interviewed using semi-structured questionnaires including species, habitats and threat information.

Focus Group Discussions

Focus Group Discussions with different organizations, departments and communities were conducted and management, threats and other issues within each proposed KBAs were discussed.

Identification of land categories of KBAs

Land categories of each KBA were defined using the definitions of land categories in the Forest Law (1992), Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law (1994), and the Vacant, Fallow and Virgin Land Management Law (2012).

- **Protected Areas (PAs):** PAs means a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives under Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law (1994).

- **Forest Land (FL):** FL means land including reserved forest and protected public forest notified under the Forest Law (1992).

- **Reserved Forest (RF):** RF means land constituted as a reserved forest under Forest Law (1992).

- **Protected Public Forest (PPF):** PPF means land declared to be protected public forest under Forest Law (1992).

- **Vacant and Fallow land (VFL):** VFL means land which was occupied by a tenant before, and then that land was abandoned by the tenant for any reason, not only the State designated land but also land for agriculture or livestock breeding purposes under the Vacant, Fallow and Virgin Land Law (2012).

- **Virgin land (VL):** VL means land, which may be new land or other woodland in which cultivation was never occurred before. It may have or not have forest, bamboo or bushes, even though the ground feature may be plane or not and it includes the land which has been cancelled legally from Reserved Forest, Grazing ground, and Fishery pond land respectively for Agriculture, Livestock Poultry Farming and Aquaculture, Mining, and Government can allow for other purposes in line with Vacant, Fallow and Virgin Land Management Law (2012).

Ecological gap analysis

Ecological gaps of the three little known conservation corridors were identified using WWF Global Ecoregion information. This is based on an Ecoregion gap analysis conducted for 36 protected areas by WCS, those results were used for the ecological gap analysis for the three conservation corridors. The protected area gap analysis in relation to the Global Ecoregions was conduced for 39 protected areas of Myanmar. Those 39 protected areas represent 5.6% of the country's total land area. The minimum representation, within the PA system, threshold is considered 10% for each ecoregion. Apart from the Northern triangle subtropical forests and the Eastern Himalayan alpine shrub and meadow, the remaining ecoregions are still under represented in the existing protected area system of Myanmar. This is shown in **Table 2.1**.

Table 2.1: Ecoregion gap percentage analysis for 36 PAs in Myanmar

Ecoregion	Area coverage by existing PAs
Nujiang Langcang Gorge alpine conifer and mixed forest	0.00%
Irrawaddy fresh water swamp forest	0.04%
Myanmar coastal rain forest	0.44%
Irrawaddy dry Forest	0.45%
Kayah-Karen montane rain forest	0.60%
Northern Indochina subtropical forest	0.90%
Myanmar Coast mangrove	0.92%
Irrawaddy moist deciduous forest	1.82%
Chin Hills-Arakan Yoma montane forest	3.60%
Tenasserim-south Thailand semi-evergreen rain forest	5.16%
Tropical and subtropical moist broadleaf forests	6.04%
Mizoram-Manipur- Kachin Rain forest	7.26%
Northern Triangle subtropical forest	35.56%
Eastern Himalayan alpine shrub and meadow	96.46%

Species-based vulnerability analysis

Once the occurrence of Globally Threatened species were identified and confirmed, the scoring of species for each KBA was conducted based on their Red list category - Critically Endangered (CR) = 4, Endangered (EN) = 3 and Vulnerable (VU) = 2, Nearly Threatened (NT) = 1. If there was no information on species occurrence, 0 score was given to indicate more information was needed for further assessment. The species occurrence was assessed using

the below categories.

- **Confirmed Occurrence (CO):** reliable records by a reliable observer, positive identifications of calls, or specimen records of known provenance, older records with insignificant threats
- **Suspected Occurrence (SO):** uncertain records by a reliable observer, anecdotal reports from local people, historical records with significant threats or model prediction
- **Absent (AB):** the site with insufficient habitat to support a population and exhaustive surveys have failed to record the species
- **In Question (?):** the status of the species is unknown although its occurrence was confirmed previously

Site-based vulnerability analysis

Based on threat assessments received from Key Informant Interviews and Focus Group Discussions, scoring threats for each KBA was conducted. The threat score was given using a scale of 5 = very high, 4 = high, 3 = medium, 2 = low and 1 = very low. If there was no information on threat, 0 score was given to indicate more information was needed for further assessment.

Multi-stakeholder workshops

All information collected through field surveys, key informant interviews and focus group discussions were presented and verified through Hakha, Sittwe and Loikaw multi-stakeholder workshops. The draft proposed conservation strategies for three corridors was presented and commented by all relevant stakeholders in the final workshop conducted in Nay Pyi Taw.

3. Survey Effort

All available secondary information for three little known conservation corridors was collected and reviewed during the project period.

In the Chin Hills Complex Conservation Corridor, four government organizations, eleven Civil Society Organizations and one village headman were interviewed and information on species, habitats and threats was collected through a series of Key Informant Interviews and Focus Group Discussions. Total 13 KBAs were reviewed and revised in the Chin Hills Complex Conservation Corridor. As part of the assessment, the team visited two existing KBAs and four proposed KBAs and conducted opportunistic assessments at each site.

In the Rakhine Yoma Range Conservation Corridor, Key Informant Interviews and Focus Group Discussions were conducted with 47 government staff, 22 persons from Civil Society Organizations and one villager to collect information on species, habitats and threats. Totally, 16 KBAs were reviewed and revised in the corridor. Because of ongoing security concerns the team was only able to visit two existing KBAs.

New information compiled for the Western Shan Yoma Range Corridor came from a total of

90 key informants; 55 government staff, two CSO staff, two representatives from Political Parties, two staff from ethnic armed force, two religious leaders and 35 villagers. In the Western Shan Yoma Range Corridor, total seven KBAs were identified, reviewed and revised.

4. Chin Hills Complex Conservation Corridor

4.1. Background

The area identified as the Chin Hills Complex Conservation Corridor (13,932 mile^2 / 36,083 km^2) is coincidently more or less the same area as Chin State (13,907 mile^2 / 36,019 km^2). Chin State is the second smallest state in Myanmar. Steep mountain ranges with an average elevation of 5000 feet to 8000 feet (1500 m to 2500 m) characterize the landscape of Chin State. The highest peak in the Chin Hills Complex is Natmataung or Mount Victoria reaching 10,500 feet (3,200 m). The terrain is extremely rugged and is a major barrier for development of the state. According to the population census in 2014, the total population in Chin State is 478,690 distributed through all nine townships. Chin State is one of the poorest states in the country. Most of the population is living in rural areas. The majority of the population is Chin, which can be divided into six subgroups called Asho, Cho, Khum, Laimi, Mizo and Zimo.

Accessibility

Chin State has poor road infrastructure and the road network is in constant need of repair and maintenance due to landslides especially during the rainy season. Therefore, it is difficult to provide health and education services to the remote communities. Communication networks in Chin State are also insufficient, as there is poor mobile phone network coverage. The current existing radio and television signals and internet access are also very poor resulting in the rural population having very limited access to information. In Kanpetlet Township, a CDMA mobile network functions sporadically. In Mindat town, two communication lines, MPT and Telenor are functioning well with internet access. It is also very difficult to get state newspapers and journals in the area except in the major towns. However, there is great potential for better communication as more telecommunication posts are being constructed.

Political landscape

The security situation in Chin state is relatively good compared to other ethnic minority areas in Myanmar. The security situation has stabilized following the ratification of a ceasefire agreement in 2012 between the Union Government and the Chin National Front. In the spirit of the ceasefire agreement, the Chin National Conference (CNC) was held in Hakha from 12th to 16th November 2013. It was the first conference held since 1948 and all the various Chin groups and parties came together to discuss issues related to the development of Chin State and its people. However, there are still occasional conflicts particularly in the remote areas and the security situation remains delicate during the current political transition period in Myanmar. Various organizations, including the

government institutions, are working in good faith trying to find lasting solutions to their numerous development challenges.

Cultures

The Chin people possess a strong sense of ethnic identity. The ethnic groups in Chin state are known internationally for unique women having tattoos on their whole face. There is no single common Chin language and about 50 different dialects are spoken in the state. It is not unusual that people in one village are often unable to understand the dialect spoken by people living in neighboring villages. The indigenous groups can be organized according to languages and dialects they speak. The three main religions in the area are animism, Christian and Buddhism.

Stakeholder engagement in conservation

Primary and middle school education are mandatory, so even the poorest villagers send their children to school with almost no exception. However, there are only a handful of students that proceed to high school or higher education levels. Most of the Chin people are subsistence farmers mainly conducting shifting cultivation, in addition to raising livestock (chickens, pigs, goats and mython). Due to poor soil quality, serious erosion, and very few flat lands, the main land use pattern is rotational agriculture and in some cases productivity is decreasing because of reduced fallow periods. This is not only a food security problem, there are also associated issues of land exhaustion from the practice of shifting cultivation and other threats to biodiversity. People who are living in this area are neither interested in large-scale extraction of resources from the forests nor show much interest in conservation work. Although local people heavily rely on the forest for medicinal resources, food, spices, construction materials and alternative income sources at times of low farming incomes, current consumption is mostly for subsistence. However, locals do show relatively high levels of cooperation in relation to environmental awareness campaigns, and this may become a potential method for increasing community involvement in conservation activities in the future. In addition, the following Civil Society Organizations (CSOs) have been actively involved in environmental and conservation related activities. Strengthening existing networks and partnerships will contribute to conservation of revised KBAs.

- K'CHO LAND Development Association
- Khonumzung Rural Development Organization
- Care for Natural Recourses Group
- Matupi Community Social Development Organization
- Green Kennedy Group
- Matupi Youth Association
- Tedim Youth Fellowship
- SIYIN Green Group
- Conservation on Hill Ecosystem Association
- Arr Yone Oo Social Development Association

Constraints and opportunities

The main constraint to working in the Chin Hills is the inaccessibility of many areas as the roads are in need of constant maintenance and are risky to travel in the rainy season. Another constraint is communication as mobile phones, radio, television and internet connection is poor outside the major towns. Language barrier is also a constraint since over 50 different dialects are spoken throughout the state. Despite these constraints Opportunities do exist, since Chin state possesses not only high conservation value biodiversity, but also significant cultural and historical assets. It has great potential to combine ecotourism and conservation together with environmental education and awareness programs to increase public participation and reduce the unsustainable impacts on the environment that currently threaten biodiversity as well as local livelihoods.

4.2. KBA assessment

Thirteen KBAs have been reviewed and updated in the Chin Hill Complex Conservation Corridor. There were totally 13 KBAs, identified, reviewed and revised by Myanmar Biodiversity Conservation Investment Vision process (2012) and this project. The largest proposed KBA is 421.7 km^2 and the smallest proposed KBA is 22.4 km^2 as shown in **Table 4.1**.

Table 4.1: The 13 revised KBAs and their areas in Chin Hills Complex Corridor

KBA	Land Category	Responsible Department	Area ($mile^2$)	Area (km^2)
Thuam Hum Range	Vacant & Fallow Land	GAD	220.7	571.7
Len Tlang Range	Proposed Protected Public Forest	FD	122.0	316.0
In Buk Taung	Vacant & Fallow Land	GAD	93.6	242.3
Zing Hmuh Taung	Vacant & Fallow Land	GAD	108.3	280.5
Bawi Pa Taung	Proposed Protected Area	FD	223.1	577.9
Bar Bu Taung	Vacant & Fallow Land	GAD	94.3	244.3
Aw Taraw Taung	Vacant & Fallow Land	GAD	24.6	63.7
Natmataung NP	Protected Area	FD	421.7	1092.2
Kyaukpantaung WS	Protected Area	FD	49.4	127.9
Awi Cici Lake	Vacant & Fallow Land	GAD	61.4	159.1
Maung Taw Nama Taw Taung	Vacant & Fallow Land	GAD	22.4	58.1
Mahweyar Taung	Vacant & Fallow Land	GAD	247.0	639.7
Yin Kwe Taung	Proposed Reserve Forest	FD	85.1	220.4

Existing management system

Based on land categories as defined in the Forest Law (1992), Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law (1994), and Vacant, Fallow and Virgin Land Management Law (2012), land categories of all 13 KBAs in Chin Hills Complex are shown in **Figure 4.1**. Vacant & Fallow Lands comprise 49% of those areas recommended for protection, existing Protected Areas represent 26%, Proposed Reserve Forest Lands are 5%, Proposed Protected Public Forests are 7%, and Proposed Protected Aras area 13% respectively. In terms of the government department responsible for the management of

these lands, 51% of KBA areas are the responsibility of the Forest Department and the other 49% are the responsibility of the General Administration Department (Chair of Land Administration Committee) as shown in **Figure 4.2**.

Figure 4.1: The proportion of different land categories of 13 revised KBAs in Chin Hills Complex

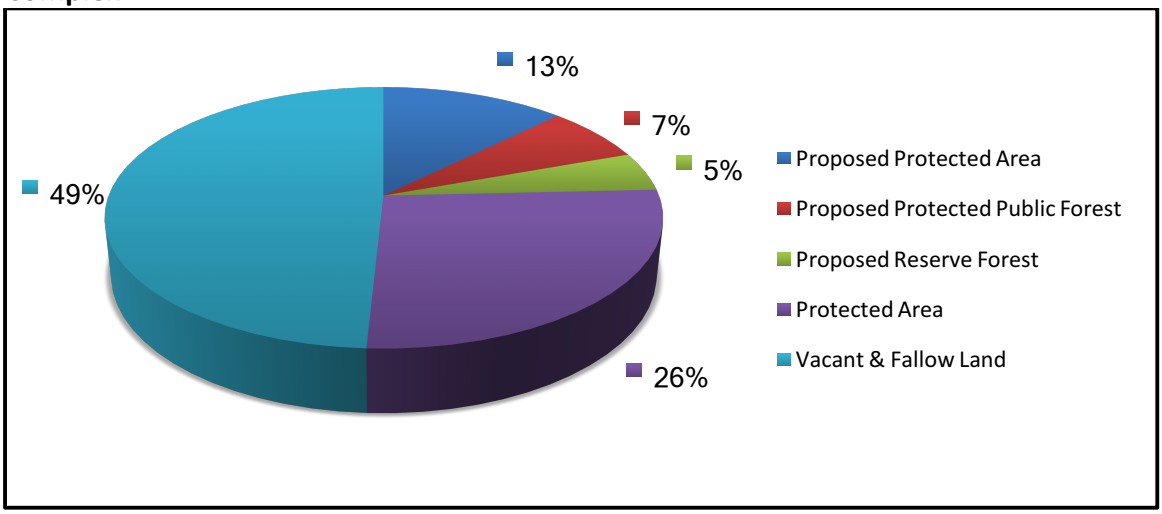
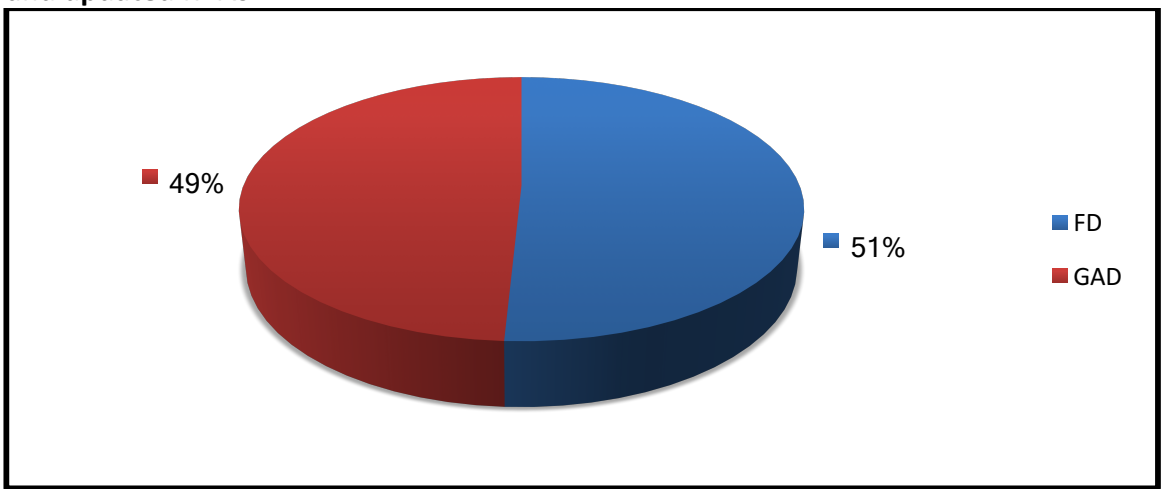


Figure 4.2: Government Departments with primary management responsibility for 16 new and updated KBAs



Biodiversity

The Chin Hills Complex possesses a great diversity of flora and fauna, including globally threatened mammal and bird species as shown in **Table 4.2**. Different types of habitats and forests can be observed along a wide altitudinal gradient. The occurrence of around 50 different species of wildlife was recorded through key informant interviews and focus group discussions. Chin state is well known for its beautiful natural landscape, diverse ecosystems and forest types. With Great Hornbills and Rhododendrons being seen as the jewels of Chin fauna and flora.

Table 4.2: List of globally threatened species in 13 revised KBAs

Critical (CR)	Endangered (EN)	Vulnerable (VU)
White-rumped Vulture	Dhole	Asiatic Black Bear
	White-browed Nuthatch	Bengal Slow Loris
	Asian Elephant	Binturong
		Blyth's Tragopan
		Burmese Goral
		Clouded Leopard
		Gaur
		Golden Cat
		Malayan Sun Bear
		Pig-tailed Macaque
		Rufous-necked Hornbill
		Sambar Deer
		Stump-tailed Macaque

Ecological gap analysis

The Chin Hills Complex Corridor's contribution to national ecoregion representation for three ecoregions are 81.9% for Chin Hills-Arakan Yoma montane forest, 11.4% for Mizoram-Manipur- Kachin Rain forest and 2.2% for Irrawaddy moist deciduous forest. As shown in **Figure 4.3** and **Figure 4.4,** the contribution of ecoregions of the revised 13 KBAs to Chin Hills Complex Corridors is not that significant. However, all three ecoregions in 13 KBAs are underrepresented, it is important to protect and conserve all proposed KBAs to increase representation. The areas of three ecoregions covered by the 13 revised KBAs are shown in **Figure 4.5**.

Figure 4.3: Map showing ecoregion distribution in 13 revised KBAs in Chin Hills Complex

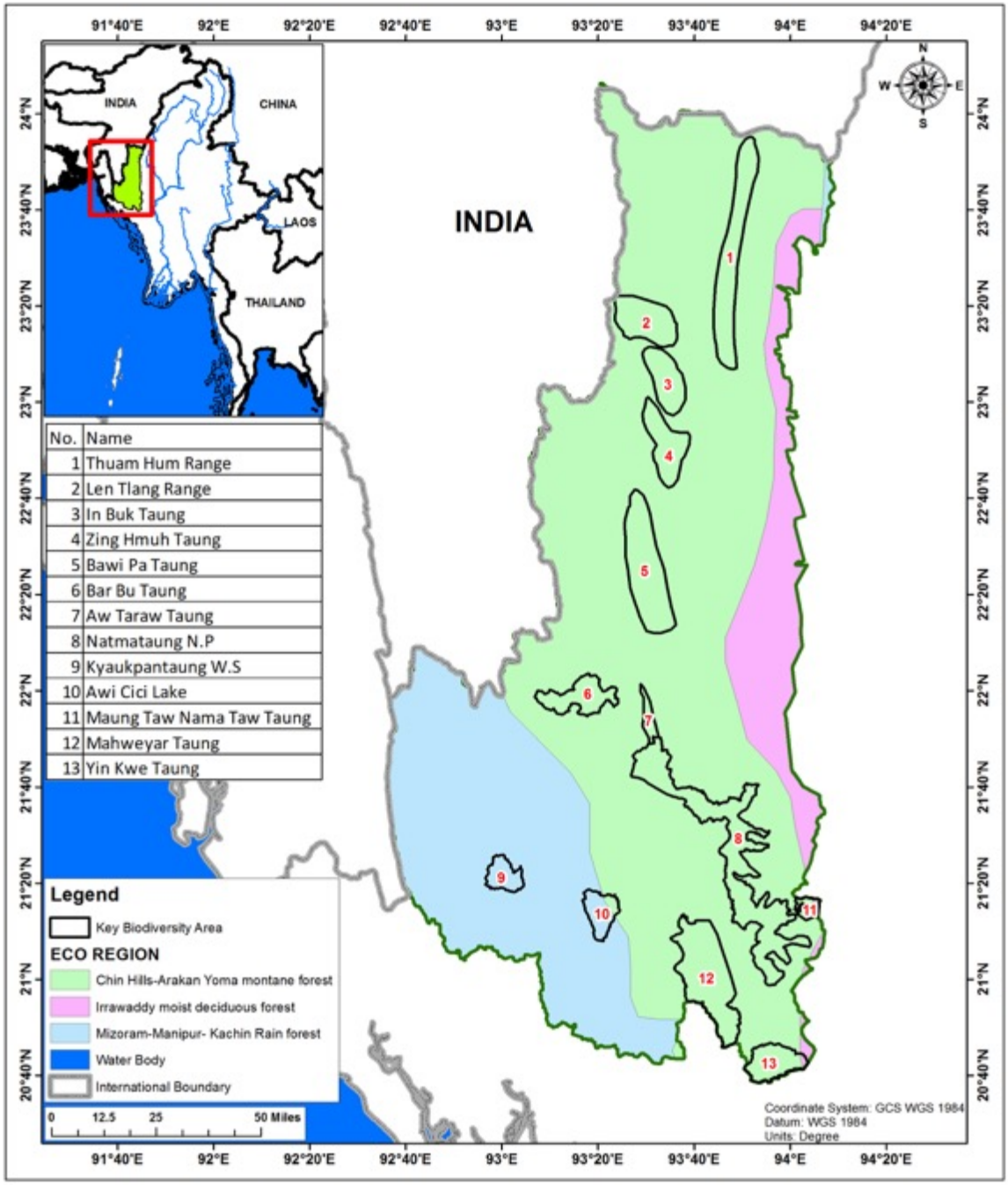


Figure 4.4: The contribution of ecoregions of the 13 revised KBAs to Chin Hills Complex Corridors

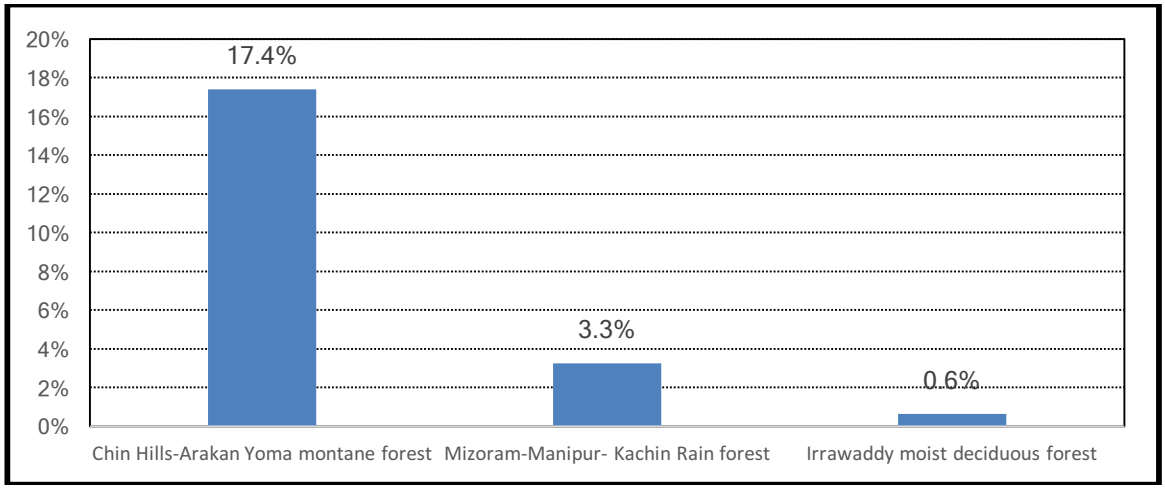
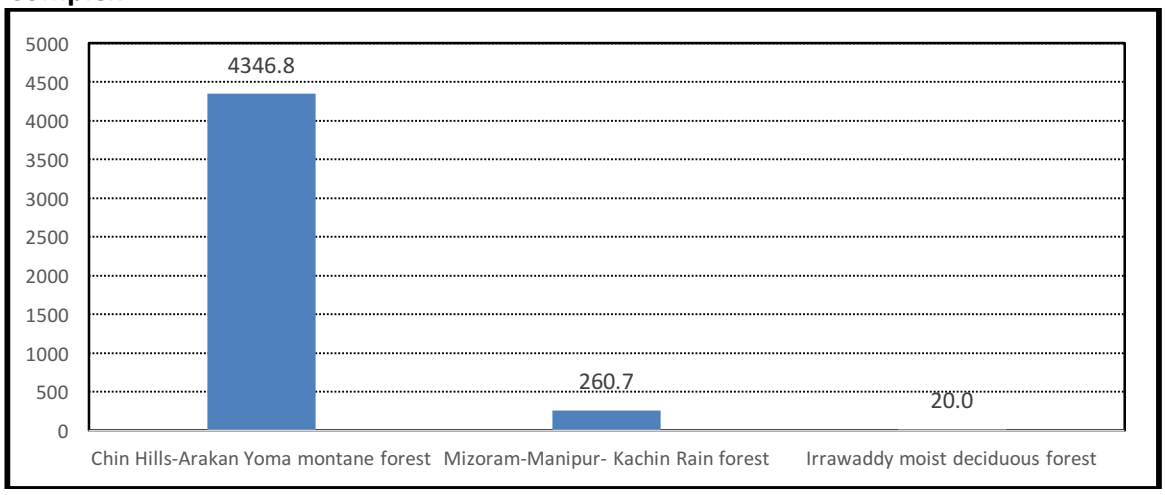


Figure 4.5: Area (km^2) of three ecoregions covered by 13 revised KBAs in Chin Hills Complex



Species-based vulnerability

One of the main criteria for defining KBAs is the regular occurrence of Globally Threatened species. As shown in Table 4.3, the occurrence of globally threatened species (CR, EN and VU) were assessed and given a score for species occurrence in each KBA. As the occurrence of globally threatened species cannot be confirmed in some proposed areas, those areas were removed from the KBA list.

Table 4.3: Records of globally threatened species in 13 revised KBAs from key informant interviews and focus group discussions

KBA Name	Key spp. (Mammals)	Key spp. (Birds)	Key spp. (Turtles)	Species score
Thuam Hum Range	**Asiatic Black bear (VU) (CO),** Malayan Sun Bear (VU)			2

	(CO)			
Len Tlang Range	**Dhole (EN) (CO),** Sambar Deer (VU) (CO)			3
In Buk Taung	**Dhole (EN) (CO)**			3
Zing Hmuh Taung	**Dhole (EN) (CO),** Sambar Deer (VU) (SO)			3
Bawi Pa Taung	**Dhole (EN) (CO),** Asiatic Black Bear (VU) (SO), Golden Cat (VU) (SO), Malayan Sun Bear (VU) (SO), Sambar Deer (VU) (SO), Clouded Leopard (VU) (CO)	White-rumped Vulture (CR) (?), Blyth's Tragopan (VU) (?)		3
Bar Bu Taung	**Dhole (EN) (CO),** Asiatic Black Bear (VU) (CO), Malayan Sun Bear (VU) (CO),			3
Aw Taraw Taung		**Blyth's Tragopan (VU) (CO)**		2
Natmataung NP	Dhole (EN) (CO), Asiatic Black Bear (VU) (CO), Burmese Goral (VU) (?), Golden Cat (VU) (CO), Malayan Sun Bear (VU) (CO), Sambar Deer (VU) (?)	**White-browed Nuthatch (EN) (CO),** Blyth's Tragopan (VU) (CO)		3
Kyaukpantaung WS	Asiatic Black Bear (VU) (?), Burmese Goral (VU) (?), Gaur (VU) (?), Sambar Deer (VU) (?)	Rufous-necked Hornbill (VU) (?)	**Arkan Forest Turtle (CR) (CO)**	4
Awi Cici Lake	**Dhole (EN) (CO)**			3
Maung Taw Nama Taw Taung	**Sambar Deer (VU) (CO)**			2
Mahweyar Taung	**Dhole (EN) (CO),** Clouded Leopard (VU) (?), Asiatic Black Bear (VU) (?), Malayan Sun Bear (VU) (?), Burmese Goral (VU) (?), Pig-tailed Macaque (VU) (?), Stump-tailed Macaque (VU) (?)	Blyth's Tragopan (VU) (?), Rufous-necked Hornbill (?)		3
Yin Kwe Taung	**Dhole (EN) (CO),** Asiatic Black Bear (VU) (SO)			3

Site-based vulnerability

The main threats frequently occurring in the KBAs of Chin Hills Complex Conservation Corridor are illegal hunting, shifting cultivation, encroachment and uncoordinated development activities such as road expansion. The score of threats from different stakeholders were averaged and presented in Table 4.4. As threats are very dynamic overtime, it is important to reassess these threats periodically.

Table 4.4: Average threat scores of 13 revised KBAs

KBA Name	Threat Score
Thuam Hum Range (Kennedy Peak)	2.3
Len Tlang Range	0.2
In Buk Taung	1.0
Zing Hmug Taung	0.4
Bawi Pa Taung	1.2
Barbu Taung	0.0
Aw Taraw Taung	2.0
Natmataung NP	2.1
Kyaukpantaung WS	1.3
Awi Cici Lake	0.0
Maung Taw Nama Taw Taung	1.9
Mahweyar Taung	1.4
Yin Kwe Taung	0.0

4.3. Proposed Conservation Strategies

The topography of the Chin Hills Complex is mostly steep ridges and the geological formation are very fragile. Soil erosion and landslides cause major natural disasters in the wet season. To reduce the risk of these disasters, it is important to ensure permanent vegetation cover to protect and reduce soil erosion and slippage that can cause substantial damage. Elevation is also a contributing factor to the cultural, biological and human livelihood values of this area. Within the Chin Hill Complex, a conservation strategy can be divided broadly as (1) an Individual KBA conservation approach and (2) a Landscape conservation approach. We recommend consideration of an individual KBA conservation approach in the short-term and strongly recommend a landscape conservation approach to be taken in the medium to long-term.

Individual KBA conservation approach

As each individual KBA has unique values for biodiversity conservation, it is worthwhile to develop independent conservation plans for each KBA. Since each area is under different administrative systems and socioeconomic settings different conservation management arrangements should be considered based on the conservation priorities and cultural values of each KBA. For example, Len Tlang Range KBA has been respected and conserved by local communities for many years as a sacred site and source of fresh water. Those existing traditional conservation practices should be recognized and encouraged. The Union government should provide an enabling policy and legal framework as soon as possible to

recognize these traditionally conserved areas. Following the amendments of Schedule One and Two of the Union constitution, State and Regional Government now have the authority to develop legislation that will establish and manage protected areas. This provides a fantastic opportunity for Chin State to recognize Indigenous Peoples and Community Conserved Areas and Territories (ICCA) and ensure collaborative management mechanisms are developed with communities.

Landscape conservation approach

When planning at a landscape scale, elevation becomes the main attribute to characterize conservation strategies in the Chin Hills Complex Corridor. The corridor can be divided into three elevation categories - (1) areas above 6000 ft. (1,800m) elevation (2) areas between 3000 ft. (900m) and 6000 ft. (1,800m) elevation and (3) areas below 3000 ft. (900m) elevation should be considered as integral parts of a landscape conservation approach as demonstrated on **Figure 4.6**.

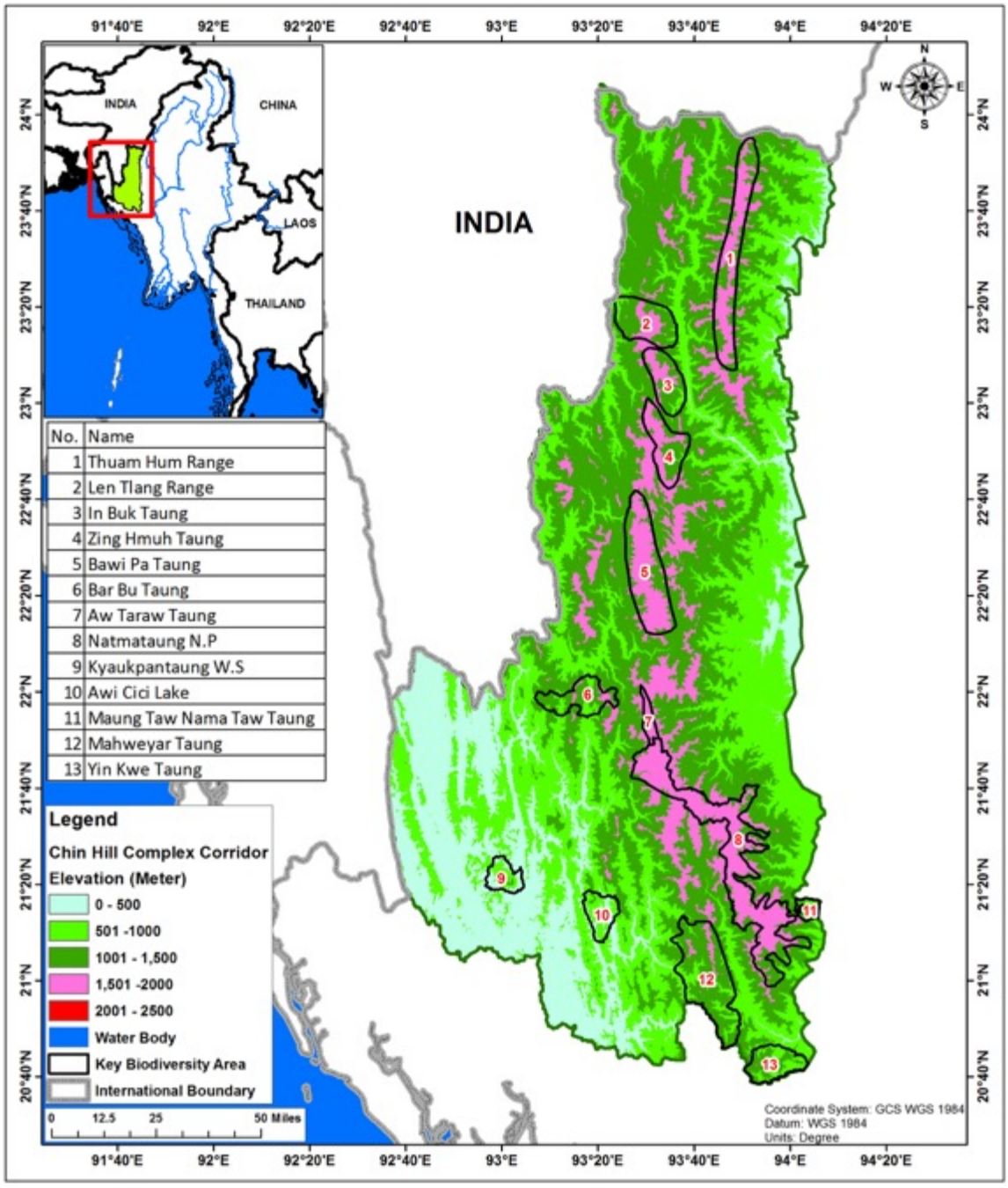
- **Areas above 6000 ft elevation:** Stakeholders emphasized that maintaining connectivity across the landscape should conserve forests above 6000 ft. altitude. The values of the area above 6000 ft. are: (1) protecting globally endangered and Myanmar endemic species such as White-browed Nuthatch and Blyth's Tragopan and their habitats, (2) conserving cultural and sacred sites, and (3) protecting sources of clean and reliable water for villages and towns. Since most areas of high elevation are far from communities, stakeholders thought those areas should be conserved as strict conservation areas.

- **Area between 3000 ft. and 6000 ft. elevation:** The area between 3000 ft. and 6000 ft. elevation is the primary area for shifting cultivation. Chin people have practiced shifting cultivation as a cultural agricultural system for centuries. In the past, shifting cultivation can be seen as an integral part of the ecological process when population was low and there was enough land to allow a long fallow period. In areas of low intensity shifting cultivation the forest ecosystem is resilient enough to maintain its ecological functions. However, stakeholders report that shifting cultivation is intensifying and forest blocks are not as ecologically resilient as in the past due to population growth and the conversion of large track of lands for other land uses. In the area between 3000 ft. and 6000 ft. elevation, KBAs, are composed of degraded forests, and intensifying shifting cultivation areas. The remaining forest can be seen as mosaic of varying ages of regeneration and increasing areas of shrubs and grassland. In the landscape conservation approach, KBAs and the remaining forests in the area should be management and conserved by identifying community-conserved areas and developing effective co-management agreements with communities. All the KBAs and remaining forests in the Chin Hills Complex are necessary to support the livelihood needs of dependent local communities. In addition to locally managed KBAs and forested areas, improved agricultural practices, community forestry and agroforestry should all be developed where appropriate.

It is also essential to secure land tenure for indigenous peoples and communities. This will play an important role in enhancing conservation management in areas between 3000 ft. and 6000 ft. elevation. Customary and traditional land management associated with shifting cultivation is heavily reliant on communal ownership. We support the Land Core Group's recommendation that "government's legal recognition on shifting cultivation lands as one communal ownership" will enhance the customary communal tenure of a specific community or village. Domestic rules for internal land management in the Chin Hills Complex vary from place to place. Any conservation intervention should recognize these internal rules and where possible support strengthening those rules to contribute to biodiversity conservation.

- **Areas under 3000 ft. elevation:** The areas under 3000 ft. elevation are primarily developed for agricultural lands and human settlement areas already. However, lowland forests and important wetland areas should be assessed as KBAs and protected and conserved whenever possible. These areas are also suitable as community managed conservation areas. Further impact to these areas should be reduced through the development of sustainable agricultural systems, Community Forestry, and Agroforestry. Agricultural intensification and cash crop cultivation may provide alternative livelihoods for local communities where appropriate.

Figure 4.6: Revised 13 KBAs in different altitudinal ranges



5. Rakhine Yoma Range Conservation Corridor

5.1. Background

Rakhine State in western Myanmar covers 14,200 mi^2 (36,778 $km^{2)}$ with Sittwe as its capital city. The state borders Bangladesh and the Bay of Bengal on its western edge and the state is bordering with Chin State, Magway Region, Bago Region and Ayarwaddy Region to the east. The off shore continental shelf is narrow, with a few inlets. The state is home to rich terrestrial biodiversity as well as marine resources. Rakhine is one of the most rugged and

sparsely populated regions in mainland South-east Asia. According to the population census in 2014, the state population was 2,098,807. Out of total population, 1,744,519 were living in the rural areas.

Accessibility

The state can be reached by car, flight and along several waterways. Most of people rely on waterways due to the poor road network linkage within the state. The communication network is fair in urban areas but most of the rural areas still have poor mobile phone network and internet access. It is also difficult to access most of proposed KBAs because of security concerns.

Security

Access to much of the area is limited because of high levels of social conflict, the area along the Bangladesh border and northern Rakhine State are particularly concerned.

Culture

Since Rakhine State was once a monarchical state it holds many of Myanmar's cultural assets and many memorable stories about them. There are 7 ethnic groups, most of the populations are Rakhine and others are Kamein, Kwe Myi, Dainet, Maramagyi, Mro (Wakim) and Thet. Mrauk-U is the ancient capital of Rakhine and is famous for its ancient pagodas, palace and traditional culture. There are innumerable pagodas and Buddha images around the old city and the surrounding hills. While some are still being used as places of homage today, others are in ruins, some of which are now being renovated to their original splendor. The May-Yu range is the historical place for Ramayana troupe.

Stakeholders engagement in conservation

Community involvement is very important for conservation and management of KBAs. The role of community in conserving wildlife and wild lands is the foundation of successful conservation. Most of the rural people are living in and around conservation areas and depend on natural resources for their livelihood. So it is needed to access their attitudes on conservation and promote conservation awareness. We need to highlight the linkage between their socioeconomic situation and their reliance on natural resources. Rakhine people have their own traditional conservation sense such as the belief that bad luck will follow them if they kill a Sarus Crane. Kamein and Mro ethnic people are very strong in conservation awareness since they are conserving natural resources with their own traditional knowledge. The following CSOs and University have formed an alliance for conservation and they can contribute significantly for the conservation of revised KBAs.

- Rakhine Region Coastal Environmental Conservation Association
- Zoology Department, Sittwe University
- Sittwe Nature Conservation Association
- Myauk-U Environmental Conservation Group

5.2. KBA assessment

Totally, 16 KBAs were reviewed and revised through key informant interviews and focus group discussions. Most of the proposed KBAs have complex management systems as Forest Department manage some while others are managed jointly by GAD, FD, and communities. These areas have limited law enforcement and staff. The largest proposed KBA is 1713.50 km^2 and the smallest proposed KBA is 14.3 km^2 as shown in Table 5.1.

Table 5.1: The 16 revised KBAs and their land categories, responsible departments and areas

KBA	Land Category	Responsible Department	Area ($mile^2$)	Area (km^2)
Saing Din Area	Protected Public Forest	FD	289.6	750.0
May Yu Area	Reserved Forest	FD	108.1	280.1
Taw Bya Chaung Watershed Area	Vacant & Fallow Land	GAD	59.9	155.1
Da Let Chaung Area	Reserved Forest	FD	385.3	998.0
Ann Chaung Watershed Area	Vacant & Fallow Land	GAD	57.6	149.2
Kyet Ye San Area	Vacant & Fallow Land	GAD	87.8	227.5
Ruu Ma-E Area	Reserved Forest	FD	322.5	835.2
La Mu Area	Reserved Forest	FD	17.9	46.5
Sa Byin Area	Reserved Forest	FD	69.6	180.2
Khu Area	Protected Public Forest	FD	27.8	71.9
Tha Htay (Tha De) Area	Reserved Forest	FD	125.0	323.8
Than Dwe Area	Reserved Forest	FD	118.1	305.8
Rakhine Yoma Elephant Range	Protected Area	FD	658.9	1706.4
Kyein Ta Li Chaung Area	Vacant & Fallow Land	GAD	33.1	85.6
Taung Nyo Area	Vacant & Fallow Land	GAD	221.1	572.6
Gwa Chaung Area	Protected Public Forest	FD	66.3	171.7

Existing management system

Referring to land categories defined in the Forest Law (1992), Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law (1994), and Vacant, Fallow and Virgin Land Management Law (2012), land categories of all 16 KBAs in Rakhine Yoma Range are shown in **Figure 5.1** Representation of different land categories was Reserved Forest 43%, Protected Area 25%, Protected Public Forest 15% and Vacant & Fallow Land 17% respectively. In terms of the government department responsible for the management of these lands, 83% of KBA areas are the responsibility of the Forest Department and the other 17% are the responsibility of the General Administration Department (Head of Land Administration Committee) as shown in **Figure 5.2**.

Figure 5.1: The proportion of different land categories of 16 revised KBAs in Rakhine Yoma Range

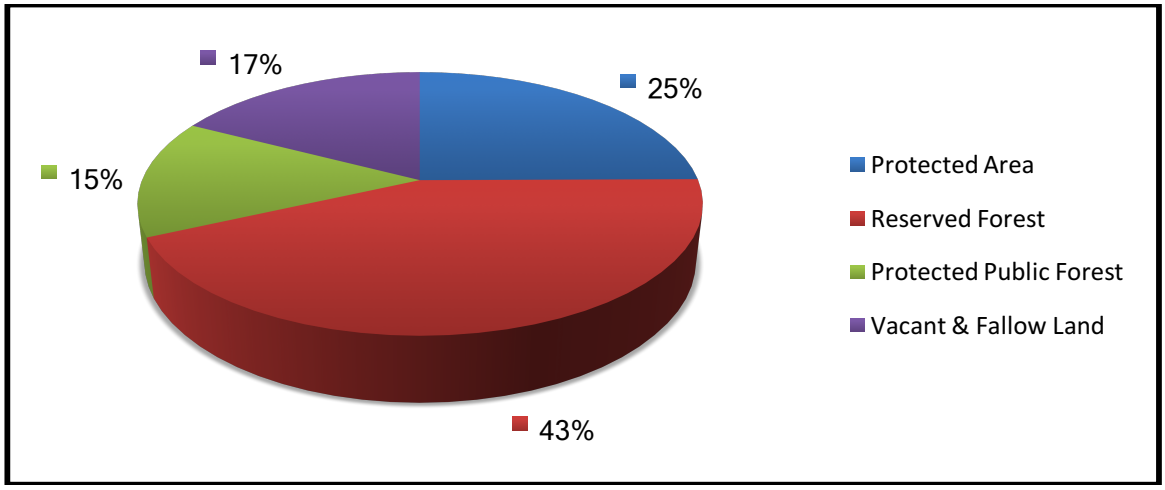
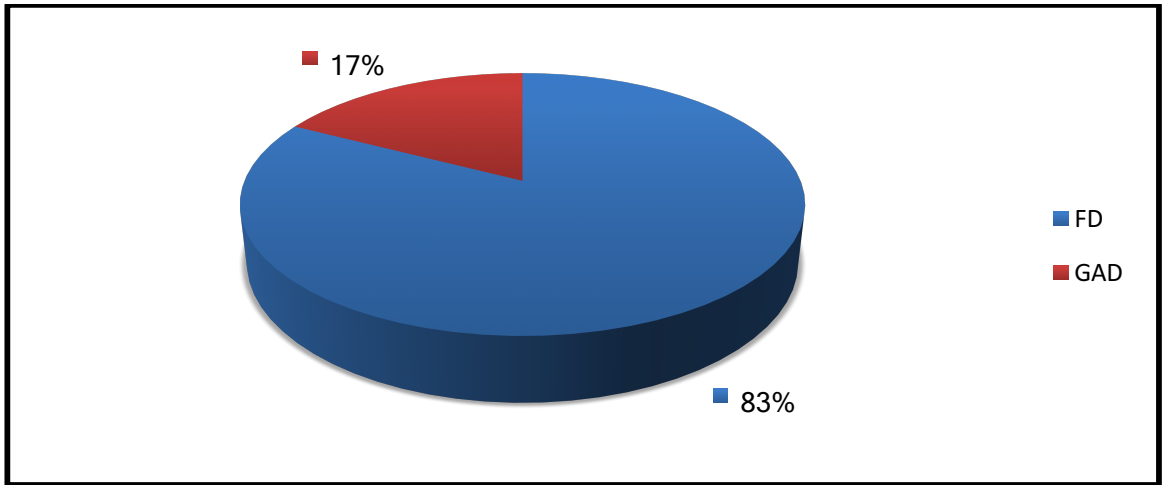


Figure 5.2: Government Departments with primary management responsibility for 16 revised KBAs in Rakhine Yoma Range



Constraints and Opportunities

In the 30 Year Forestry Master Plan the Government's target is to have 5% expansion of protected areas from 2001-02 to 2005-06 and 10% from 2007-08 to 2016-17 to fulfill the 1995 Forest Policy (MOF 2001). Proposing new KBAs to identify areas of high importance to biodiversity can support this planned expansion of protected areas. While natural assets range from marine and coastal to montane ecosystems, there are also rich cultural assets in each KBA,

There are still great risks of unexpected impacts and changes in some KBAs. State/National planning for management of KBAs is limited. Poor accessibility in and around many KBAs, lack of community participation in most of the KBAs and insufficient coordination among public and government sectors are all challenges for effective conservation management. There are many opportunities in proposed KBAs, such as conserving watershed areas to enhance hydropower systems, ecotourism opportunities, and providing opportunities for

research. For all KBAs engagement between local people and government should be promoted especially to provide job opportunities, and planning for the development of rural economy in and around KBAs. Many of the proposed KBAs suffer from conflicts and instability and community interest in KBAs is poor. New conservation areas may also produce conflict of land use between government and rural communities.

Biodiversity

The occurrence of Globally Threatened Species as shown in **Table 5.2** were assessed for each KBA. Information from previous survey results within the Rakhine Yoma Range show there are many species present that are considered at risk across the Indo-Burma Hotspot and are considered as conservation priorities for Myanmar. In particular Asian Elephant *Elephas maximus* is still wide spread within the corridor, but the population is decreasing due to increased conflict with local people and illegal trade for ivory, skin and other body parts. Asian Elephants also pose a challenge to local people because elephants are losing their habitat and feeding areas due to deforestation and is being displaced into areas of cultivation resulting in growing rates of Human Elephant Conflict (HEC). Special consideration of elephant needs should be taken account of as development progresses to limit HEC in the future. Tiger *Panthera tigris* once occurred within the Rakhine Yoma Range but has been seriously reduced due to poaching, prey depletion and habitat loss and it's continued occurrence can not be confirmed within the corridor. Populations of Dhole *Cuon alpinus* and Leopard *Panthera pardus* have suffered the same fate as Tigers but still persist in the corridor. Populations are declining due to several main threats, which include depletion of prey base, habitat loss, persecution due to livestock predation, and possibly interspecific competition. Asiatic Black Bear *Ursus thibetanus* in Rakhine Yoma Range are widely hunted for the purpose of trade in parts (skins, paws and especially gall bladders). The Arakan Forest Turtle *Heosemys depressa* is endemic to the Rakhine Hills of Western Myanmar where it inhabits a variety of habitats including dense bamboo breaks, and deciduous and evergreen forest. The species is heavily exploited for food by indigenous hill people, and confiscations from wildlife traders suggest some demand by markets in southern China. However, despite being considered Critically Endangered, *H. depressa* seems secure in remote areas of this sparsely populated region. There are three main forest types within the Rakhine Yoma Range; Evergreen Forest, Upper Mixed Deciduous Forest, and Mangrove Forest. Rakhine also has a diversity of costal habitats, especially extensive mangrove.

Table 5.2: Records of globally threatened species in 16 revised KBAs from key informant interviews and focus group discussions

Critical (CR)	Endangered (EN)	Vulnerable (VU)
Arakan Forest Turtle	Green Peafowl	Asiatic Black Bear
Spoon-billed sandpiper	Dhole	Bengal Slow Loris
White-rumped Vulture	Yellow Tortoise	Binturong
	Asian Elephant	Burmese Goral
	Great Knot	Clouded Leopard
	Nordmann's Greenshank	Gaur
		Golden Cat

		Malayan Sun Bear
		Pig-tailed Macaque
		Rufous-necked Hornbill
		Sambar Deer
		Sarus Crane
		Stump-tailed Macaque
		Fishing Cat

Ecological gap analysis

The Rakhine Yoma Range Corridor contributes to national ecoregion representing four ecoregions - 33.6% of Myanmar coastal rain forest, 31.8% of Myanmar Coast mangrove, 17.3% of Chin Hills-Arakan Yoma montane forest 17.0% of Mizoram-Manipur- Kachin Rain Forest, and. As shown in **Figure 5.3** and **Figure 5.4** The contribution of ecoregions of 16 revised KBAs to Rakhine Yoma Range ecoregion coverage is not that significant. However, all ecoregions in Rakhine Yoma Range are underrepresented, it is important to protect and conserve all proposed KBAs to increase representation. The respective area of four ecoregions covered by the 16 revised KBAs is shown in **Figure 5.5.**

Figure 5.3: Map showing ecoregion distribution in 16 revised KBAs in Rakhine Yoma Range Corridor

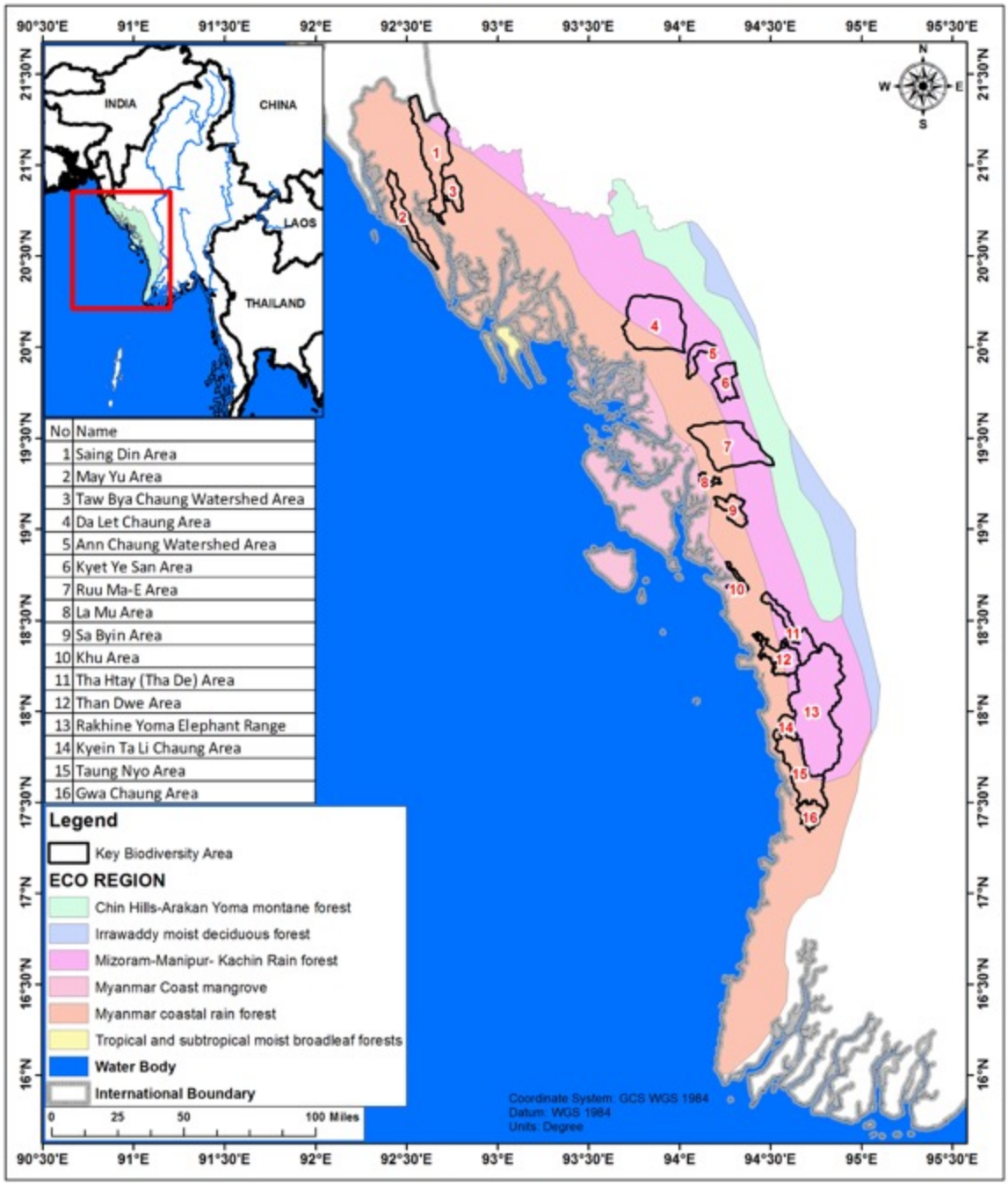


Figure 5.4: The contribution of ecoregions of the 16 revised KBAs to Rakhine Yoma Range Corridor

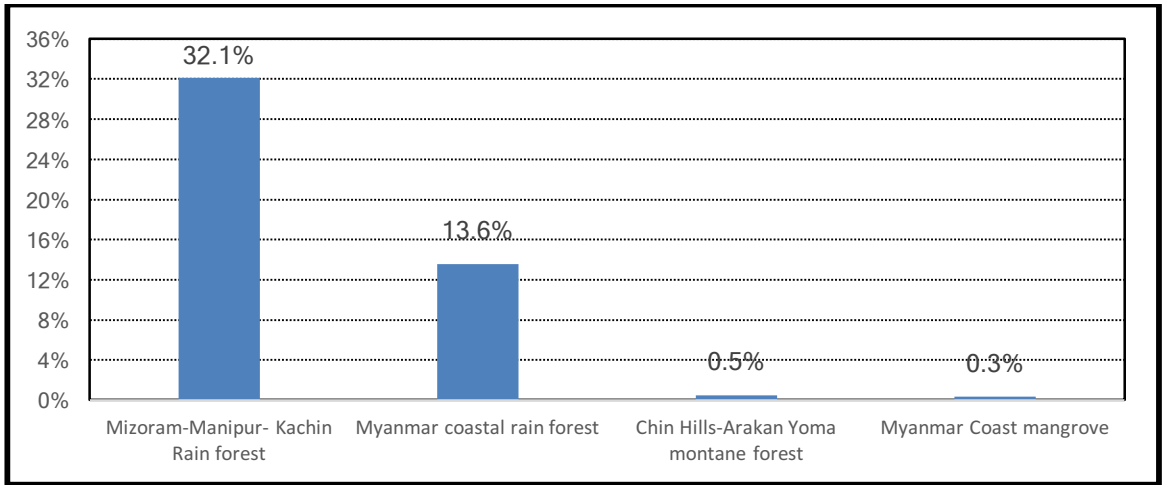
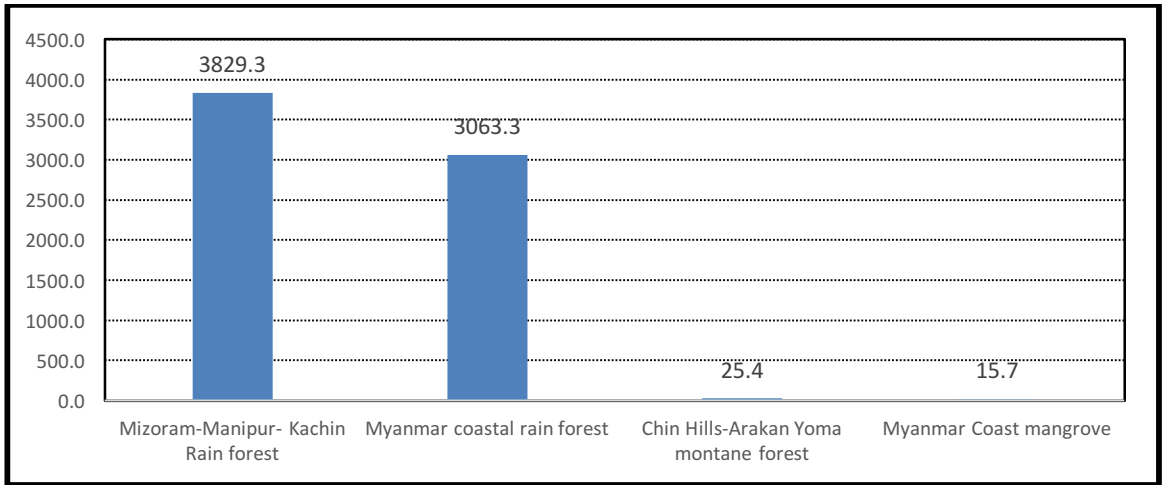


Figure 5.5: Area (km^2) of four ecoregion covered by 16 revised KBAs in Rakhine Yoma Range Corridor



Species-based vulnerability

One of the main criteria for defining KBAs is the regular occurrence of Globally Threatened species. As shown in **Table 5.3,** the occurrence of globally threatened species (CR, EN and VU) were assessed and given a score for species occurrence in each KBA. As the occurrence of globally threatened species cannot be confirmed in some proposed areas, those areas were removed from the KBA list through a verification process with all stakeholders.

Table 5.3: Occurrence of globally threatened species in 16 revised KBAs

KBA Name	Key spp (Mammals)	Key spp (Birds)	Species Score
Saing Din Area	**Asian Elephant (EN) (CO),** Malayan Sun Bear (VU) (CO), Dhole (EN) (CO), Gaur (VU) (CO), Sambar Deer (VU) (CO),		3
May Yu Area	**Asian Elephant (EN) (CO),** Malayan Sun Bear (VU) (CO), Dhole (EN) (CO), Gaur (VU) (CO), Sambar Deer (VU) (CO),		3
Taw Bya Chaung Watershed Area	**Asian Elephant (EN) (CO),** Malayan Sun Bear (VU) (CO), Gaur (VU) (CO), Sambar Deer (VU) (CO),	Rufous Necked Hornbill (VU) (?)	3
Da Let Chaung Area	**Dhole (EN) (CO),** Gaur (VU) (CO), Sambar Deer (VU) (CO), Bengal Slow Loris (VU) (CO),		3
Ann Chaung Watershed Area	**Dhole (EN) (CO),** Gaur (VU) (CO), Sambar Deer (VU) (CO), Bengal Slow Loris (VU) (CO),		3
Kyet Ye San Area	**Dhole (EN) (CO),** Sambar Deer (VU) (CO),		3
Ruu Ma-E Area	**Asian Elephant (EN) (CO),** Malayan Sun Bear (VU) (CO), Gaur (VU) (CO), Sambar Deer (VU) (CO), Bengal Slow Loris (VU) (CO),		3
La Mu Area	**Gaur (VU) (CO),** Sambar Deer (VU) (CO), Bengal Slow Loris (VU) (CO),		2
Sa Byin Area	**Malayan Sun Bear (VU) (CO),** Gaur (VU) (CO), Sambar Deer (VU) (CO),		2
Khu Area	**Dhole (EN)(CO),** Sambar Deer (VU) (CO),		3
Tha Htay (Tha De) Area	**Asian Elephant (EN)(CO),** Asiatic Black Bear (VU) (CO), Malayan Sun Bear (VU) (CO), Gaur (VU) (CO),		3

Than Dwe Area	**Asian Elephant (EN)(CO),** Asiatic Black Bear (VU) (CO), Malayan Sun Bear (VU) (CO), Gaur (VU) (CO), Sambar Deer (VU) (CO),		3
Rakhine Yoma Elephant Range	**Asian Elephant (EN) (CO),** Asiatic Black Bear (VU) (CO), Malayan Sun Bear (VU) (CO), Dhole (EN) (CO), Gaur (VU) (CO), Sambar Deer (VU) (CO),		3
Kyein Ta Li Chaung Area	**Asian Elephant (EN) (CO),** Asiatic Black Bear (VU) (CO), Malayan Sun Bear (VU) (CO), Dhole (EN) (CO), Gaur (VU) (CO), Sambar Deer (VU) (CO), Fishing Cat (EN) (CO),	Rufous Necked Hornbill (VU) (?)	3
Taung Nyo Area	**Asian Elephant (EN) (CO),** Sambar Deer (VU) (CO), Burmese Goral (VU) (CO),		3
Gwa Chaung Area	**Asian Elephant (EN) (CO),** Dhole (EN), (CO), Gaur (VU) (CO), Sambar Deer (VU) (CO),		3

Site-based vulnerability

The main threats frequently occurring in the KBAs of Rakhin Yoma Range Conservation Corridor were scored based on the results of Key Informant Interviews with different stakeholders. Then they were averaged and presented in Table 5. The threat scores seemed to be very low compared to prevailing threats. As threats are very dynamic overtime, it is important to reassess these threats periodically.

Table 5.4: Average threat scores of 16 revised KBAs

KBA Name	Threat Score
Saing Din Area	2.0
May Yu Area	1.3
Taw Bya Chaung Watershed Area	1.3
Da Let Chaung Area	1.7
Ann Chaung Watershed Area	2.0
Kyet Ye San Area	1.6
Ruu Ma-E Area	1.6
La Mu Area	1.6
Sa Byin Area	1.6
Khu Area	1.3
Tha Htay (Tha De) Area	1.9
Than Dwe Area	1.9
Rakhine Yoma Elephant Range	1.7

Kyein Ta Li Chaung Area	1.7
Taung Nyo Area	1.6
Gwa Chaung Area	1.6

5.3. Proposed Conservation Strategies

As Rakhine Yoma Range holds significant population of elephants and their contiguous habitats across the range, in terms of conservation strategies (1) an Individual KBA conservation approach is needed urgently in the short term and (2) Landscape species conservation approach should be considered in the medium to long-term.

Individual KBA conservation approach

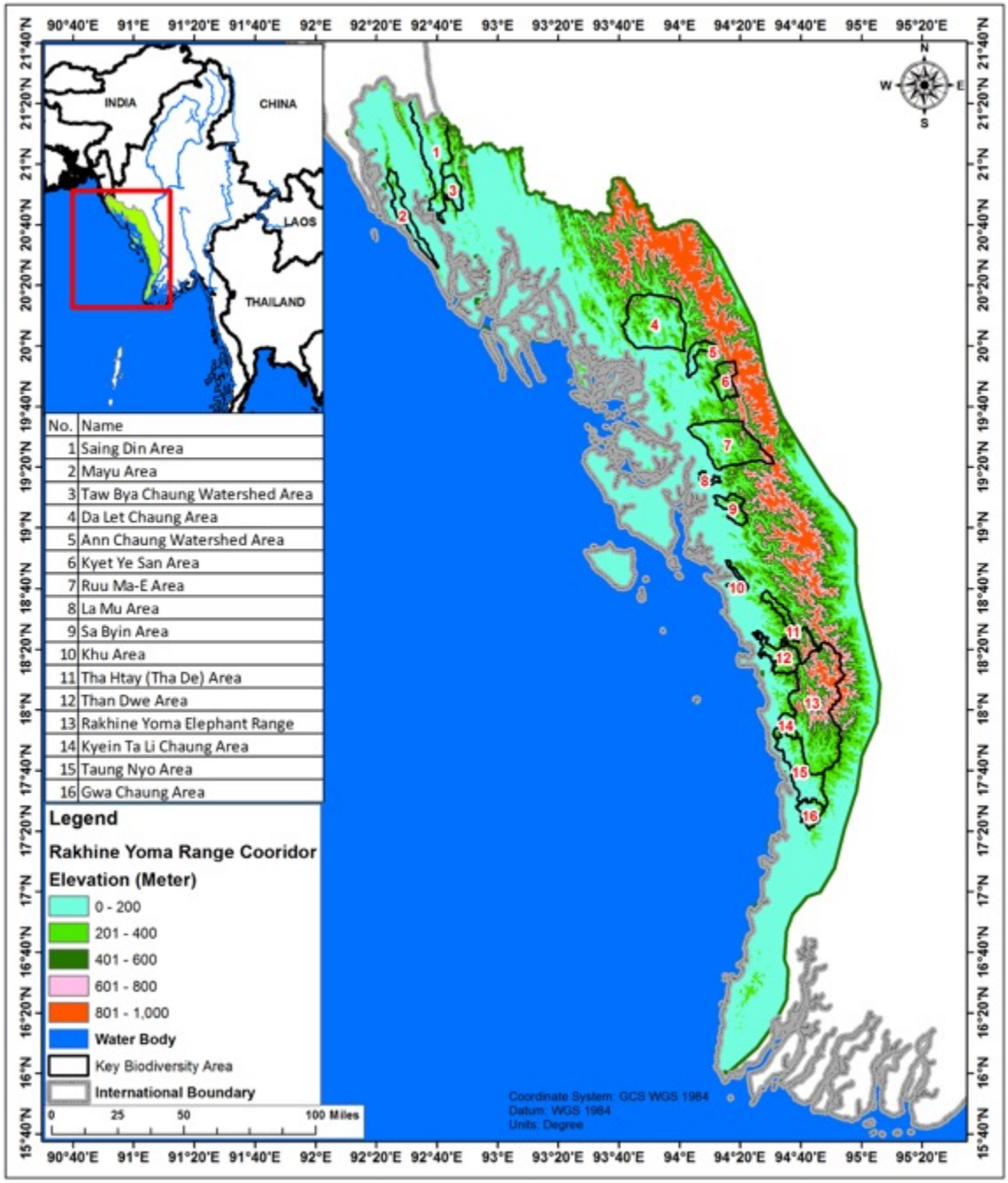
As some Civil Society Organization such as Rakhine Coastal Conservation Association (RCA) has been actively engaged in the conservation in Rakhin Yoma Range, collaborative conservation and management of KBAs with communities through facilitation of active CSOs should be encouraged as a key approach to conserving KBAs. Following the amendments of Schedule 1 and 2 in the Union constitution, Rakhine State Government now have the authority to develop legislation and execute collaborative conservation and management of areas where communities have traditionally conserved and managed resources for many years. The state government needs to follow up directly on this to ensure communities do not lose their access and management rights and that critical ecosystem functions are not lost.

Landscape species conservation approach

A range-wide assessment of elephant habitat indicated that Myanmar has more potential elephant habitat remaining than any other range country. Many of these areas, especially Rakhine State, are considered priorities for survey due to lack of information on status. The largest elephant ranges, which can support more than 100 individuals, are Kachin State (northern forest complex), Sagaing Division (Homalin and Phaungpyin Townships), Rakhine State (Mayyu, Gwa, Thaboung, Pathein and Naguputaw Townships), and Tanintharyi Division (Lenya-Mandaing-Manolon area). Due to large tracts of connected habitat, the Rakhine Yoma Range is a critical conservation corridor for Elephant conservation. It is also critically important that suitable habitat is maintained for this species to ensure that level of Human Elephant conflict do not increase, like they have in other areas of the country following large scale habitat clearance.

As 83% of 16 revised KBAs are currently managed by the Forest Department, it is highly possible to apply conservation planning for a landscape species such as Asian Elephant in the Rakhine Yoma Range. Further connectivity between KBAs in central and southern Rakhine Yoma Range needs to be investigated. Collaborative management with communities and coordination with all relevant stakeholders is needed to strengthen connectivity of habitats for elephants as well as other globally threatened species.

Figure 5.6: Revised 16 KBAs in different altitudinal ranges



6. Western Shan Yoma Range Conservation Corridor

6.1. Background

The Western Shan Yoma Range is located between 17° 01′ 05.75′′ & 21° 17′ 04.47′′ N and 96° 53′ 21.06′′& 97° 39′ 06.73′′ E. It is one of the most politically complicated corridors since it is comprised of six regions including Bago Region, Nay Pyi Taw Union Territory, Shan State, Kayin State and Mon State. It also includes the Danu self-administered zone

particularly Ywangan Township and Pa'O self-administered zone particularly Pinlaung Township in the area administered by Shan State. The estimated area is about 27,742 km^2 and it was identified as a conservation corridor, during the MBCIV process in January 2012 (WCS 2013), with limited biological and threat information currently known. Since it is a mountain range, it is comprised of several ridges of mountains with an elevation ranging from a minimum of 100 ft. (30 m) to a maximum of 9000 ft. (2800 m). Vegetation cover is quite extensive especially at higher elevations. Forest types occurring in the area are dry forest, Indaing forest, mixed-deciduous forest, semi-evergreen forest and pine forest. The range acts as a watershed for the Paung Laung River flowing into the Sittaung River and the Pan Laung River flowing into the Ayeyarwady River. The main threat to the biodiversity of Western Shan Yoma corridor is conversion of forested lands into infrastructure development including large hydropower dams and military infrastructure particularly on the western side of the range.

Accessibility

All major towns and villages located on the western side of the Shan Yoma corridor are accessible by motor vehicles except some areas controlled by ethnic armed groups. There are no waterways for public transportation but some areas, especially in Pan Laung and Pyadalin Cave wildlife sanctuary, can be accessed by boat in the Kinda dam reservoir area and along the Pan Laung River. There are two airports: Heho in Shan State and Loikaw in Kayah State to travel into the corridor.

Political landscape

Most of the forested areas in the corridor are controlled by ethnic armed groups especially Pa'O National Organization (PNO) in Shan State, Karen National Union (KNU) in Kayin State and Karenni National Progressive Party (KNPP) in Kayah State. Negotiation is needed in advance to travel and work in their controlled areas. Apart from these areas, all activities can be carried out safely with the cooperation of related government partners and local administrative authorities.

Culture

In terms of cultural assets, the famous Golden Rock (Kyeikhityo Pagoda) is located in Kyeikhtiyo WS, Nawbubaw Prayer Mountain in Thandaung Gyi area, Pyadalin Cave with 10,000 year old ancient paintings in Ywangan township, there are only some of the unique cultural assets to be conserved in the corridor. The different states and regions in the corridor host many different ethnic groups. The main ethnic groups are Bamar, Shan, Kayah, Karen and their respective sub-tribes. Different and unique cultural livelihoods can be found in the corridor especially long neck Karen women wearing bronze rings around their necks and legs for their whole life. Since the Western Shan Yoma Corridor still has good forest, many natural areas can be explored in the area including four notified protected areas (Pan Laung & Pyadalin Cave Wildlife Sanctuary in Shan State, Kyaikhtiyo and Kelatha Wildlife Sanctuary in Mon State and Kahilu Wildlife Sanctuary in Kayin State). Many endangered and threatened wildlife species such as tiger, elephant, leopard, bears, gaur, banteng, gibbons, serow, pangolin, etc. can be found in the corridor.

Stakeholders engagement in conservation

Community involvement in conservation activities are remarkably high in the Western Shan Yoma Corridor. Many small watershed forests are found around the villages of Shan and Kayah States with high levels of protection through their internal regulations. Private sector involvement was also noted for conservation, one hotel owner in Kalaw Township already hires community guards to protect the watershed forests for half of the population in Kalaw town. Moreover, ethnic armed groups are also actively involved in conservation in the corridor especially in the areas under their control. These groups have very strict regulations, which no one dares to break since the punishments are so serious. On the other hand, many illegal hunting, logging, and settlements are happening in the corridor due to a lack of conservation knowledge and immediate resource needs for local livelihoods.

Constraints and opportunities

There are many constraints for conservation implementation in the Western Shan Yoma Corridor due to political administrative issues particularly in and around forested areas. Around Shwe Gyin and Kyauk Gyi area in Bago Region, No. 3 Brigade of KNU is taking administrative authority for accessing natural resources. The same thing is happening in Thandaung Gyi area controlled by No.1 Brigade of KNU. Respective KNU's brigades also control most forested lands in Kayin State. In Kayah State, KNPP is controlling most forested areas and all activities related with conserving wildlife and habitats need to be negotiated with such ethnic armed groups. Although the vegetation cover is still good in the corridor, there are several human threats to biodiversity. Large scale human settlements can be found in the Paung Laung Watershed KBA particularly the military base camp in Yezin Reserved Forest and also displacement of many villages displaced by the Kinda Dam to a new town called Paung Laung inside the Paung Laung Reserved Forest. Moreover, large scale mining activities for gold and lead are also found in the corridor. Illegal logging and hunting are also threatening the existence of threatened wildlife species in the corridor. Most of the local people living in the corridor have low awareness for wildlife conservation although they have good knowledge on forest conservation, especially for watershed protection.

Western Shan Yoma Corridor comprises rich biodiversity and many endangered species such as elephant, gaur, bears, gibbon, serow are still found. Forested areas with highly valuable tree species including teak, iron wood, rose wood can be found in the corridor and these forests are the major home for many endangered species. Most of the KBAs in the corridor are assessable all year round following negotiation with local ethnic armed groups for entry into their controlled areas. Since local ethnic groups, especially KNU are highly concerned with the conservation of natural resources, there is a good opportunity to cooperate with them for biological conservation. The local communities also have traditional conservation knowledge particularly for protection of watershed forests, making it easy to collaborate with them for forest conservation. There is relatively little information about biodiversity conservation in the corridor, concerned authorities and policy makers currently do not pay attention to this matter and that will become a key input for efficient conservation activities in the area for the future. There is high potential for tourism based on both natural and

cultural assets such as scenery of the layers of high mountain ridges along the corridor, the diverse wildlife and unique cultural assets including long neck Padaung women, Naw Bu Baw Prayer Mountain and the Golden Rock Pagoda.

6.2. KBA assessment

A total of seven KBAs were assessed, reviewed and revised. Three of them are already notified as protected areas by law under the full management of the Forest Department. Implementation of protected area management activities is still limited due to insufficient infrastructure and resources including low numbers of PA management staff. Three of seven proposed KBAs are being managed by the General Administration Department. Some areas are influenced by Karen National Union. Consequently, management of those KBAs is quite complicated for proper land use planning and conservation. The largest proposed KBA is 2553.9 km^2 and the smallest proposed KBA is 127.8 km^2 as shown in Table 6.1.

Table 6.1: The seven revised KBAs and their land categories, responsible departments and areas

KBA	Land Category	Department	Area (km^2)	Area (mi^2)
Panlaung Pyadalin Cave WS	Protected Area	FD	133.0	344.5
Paung Laung Watershed Area	Reserved Forest	FD	986.1	2553.9
Pan The Taung Area	Vacant & Fallow Land	GAD	82.2	213.0
Than Daung Gyi Area	Vacant & Fallow Land	GAD	162.8	421.5
Shwe Gyin and Kyauk Gyi Area	Vacant & Fallow Land	GAD	616.4	1596.4
Kahilu WS	Protected Area	FD	49.3	127.8
Kyaikhtiyoe WS	Protected Area	FD	53.2	137.8

Existing management system

Based on land categories as defined in the Forest Law (1992), Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law (1994), and Vacant, Fallow and Virgin Land Management Law (2012), land categories of all nine KBAs in Western Shan Yoma Range are shown in Figure 6.1. Different land categories in seven KBAs are 42% of Vacant & Fallow Lands, 47% of Reserved Forest and 11% of Protected Area. In terms of the government department responsible for the management of these lands, 59% of KBA areas are the responsibility of the Forest Department and the other 41% are the responsibility of the General Administration Department.

Figure 6.1: The proportion of different land categories of seven revised KBAs in Western Shan Yoma Range

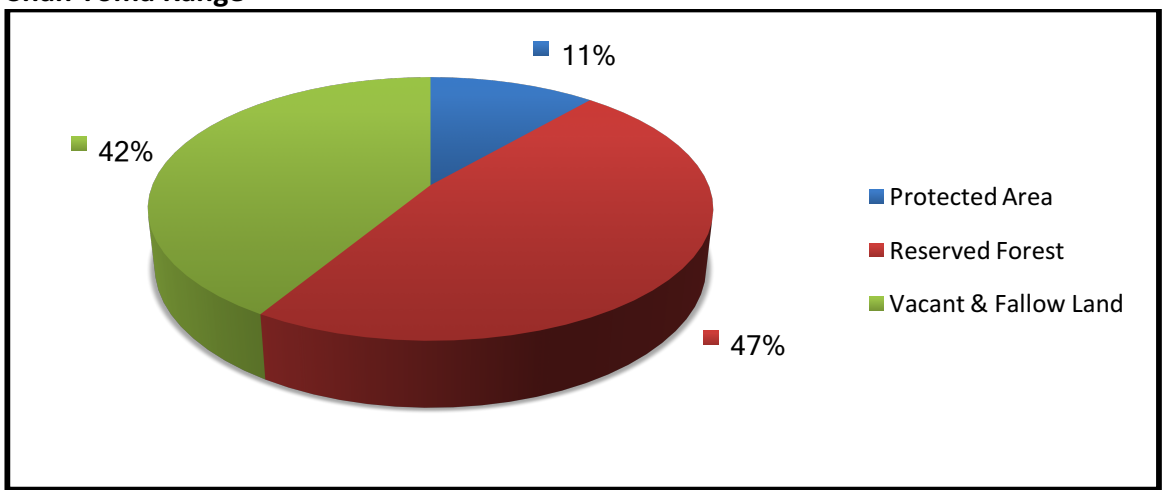
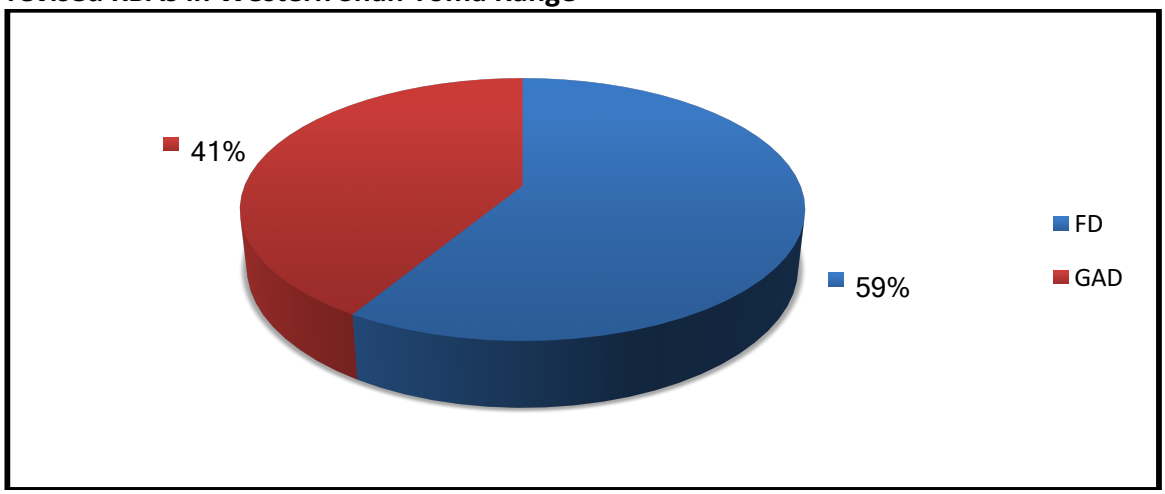


Figure 6.2: Government Departments with primary management responsibility for seven revised KBAs in Western Shan Yoma Range



Biodiversity

Western Shan Yoma Corridor is noted as good habitat for many endangered species and the following species were recorded as shown in **Table 6.2** through key informant interviews and focus group discussions.

Table 6.2: Records of globally threatened species in seven revised KBAs from key informant interviews and focus group discussions

Critical (CR)	Endangered (EN)	Vulnerable (VU)
Rhinoceros (???)	Tiger (???)	Asiatic Black Bear
	Fishing Cat	Malayan Porcupine
	Chinese Pangolin	Marbled Cat

	Sunda Pangolin	Clouded Leopard
	Banteng	Golden Cat
	Dhole	Binturong
	White-handed Gibbon	Large-spotted Civet
	Dusky Langur	Sambar Deer
	Green Peafowl	Asiatic Black Bear
	Big-headed Turtle	Malayan Sun Bear
		Oriental Small-clawed Otter
		Stump-tailed Macaque
		Gaur
		Indochinese Serow
		Bengal Slow Loris
		Northern Pig-tailed Macaque

Common forest types occurring in the range are dry forest, Indaing forest, mixed-deciduous forest, semi-evergreen forest and pine forest. Many valuable tree species have been recorded through interview surveys these include kyun (*Tectona grandis*), pyinkado (*Xylia xylocarpa*), padauk (*Pterocarpus macrocarpus*), thingan (*Shorea farinosa*) and tamalan (*Delbergia oliveri*). As there has been high demand for rosewoods – tamalan and Paduk – in the neighbouring countries, extensive illegal logging is occurring in the corridor.

Ecological gap analysis

The contribution of ecoregion of Western Shan Yoma Range to national ecoregion through four ecoregions are: 31.5% of Kayah-Karen montane rain forest, 6.5% of Myanmar coastal rain forest, 2.5 % of Irrawaddy moist deciduous forest and 1.1% Northern Indochina subtropical forest. As shown in **Figure 6.4** and **Figure 6.5,** the contribution of ecoregions of seven revised KBAs to Western Shan Yoma Range is not very much significant. However, all four ecoregions in Western Shan Yoma Range are underrepresent in national Protected Area System, it is important to protect and conserve all proposed KBAs to increase ecoregion representation. Respective areas of four ecoregions covered by seven revised KBAs is shown in **Figure 6.6**.

Figure 6.4: Map showing ecoregion distribution in seven revised KBAs in Western Shan Yoma Range

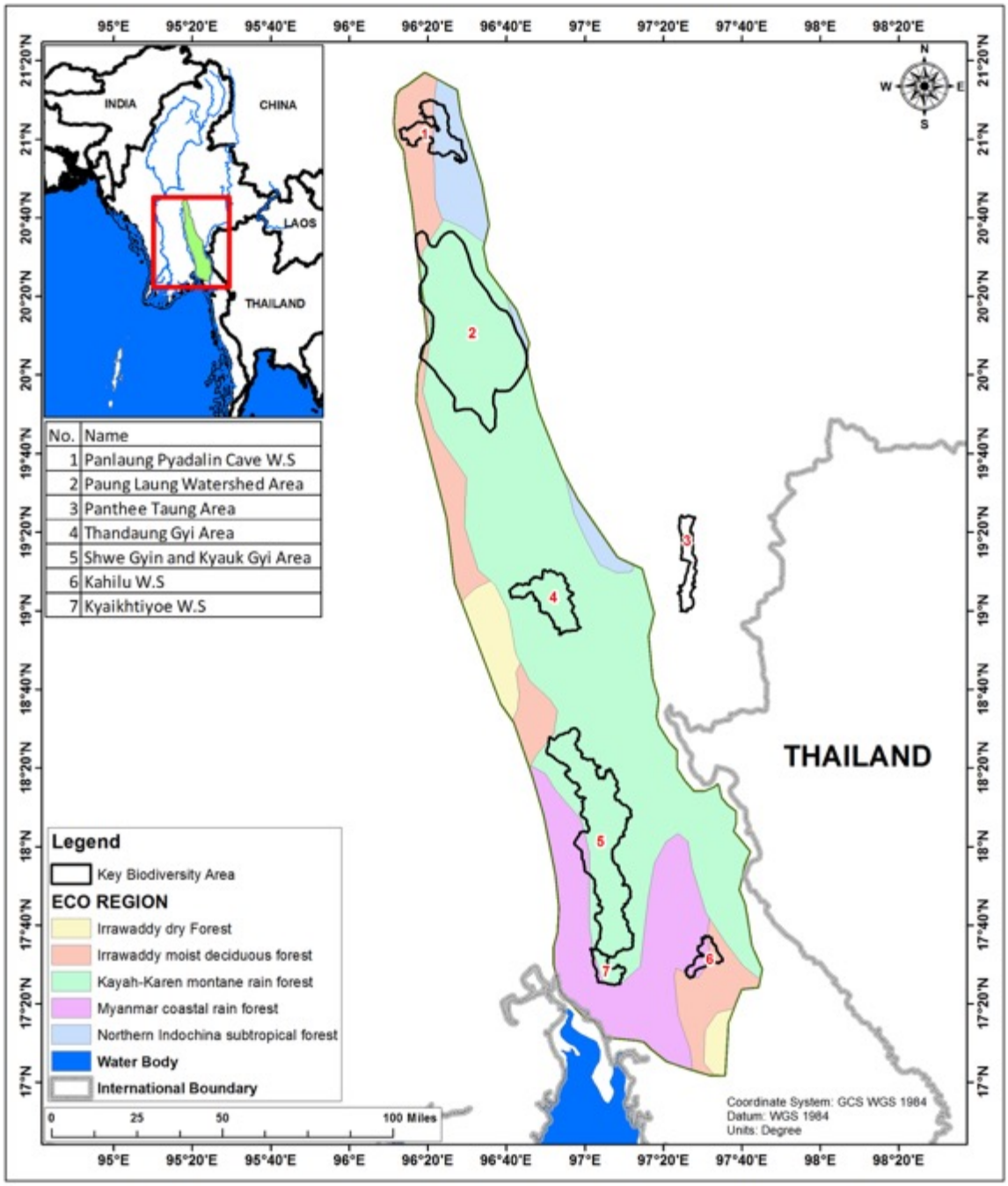


Figure 6.5: The contribution of ecoregions of the seven revised KBAs to Western Shan Yoma Range Corridor

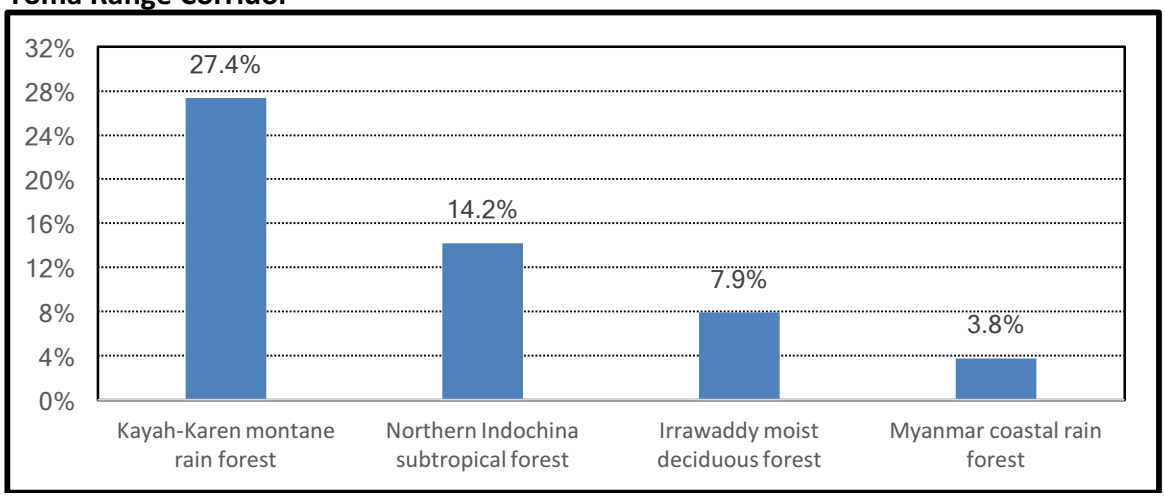
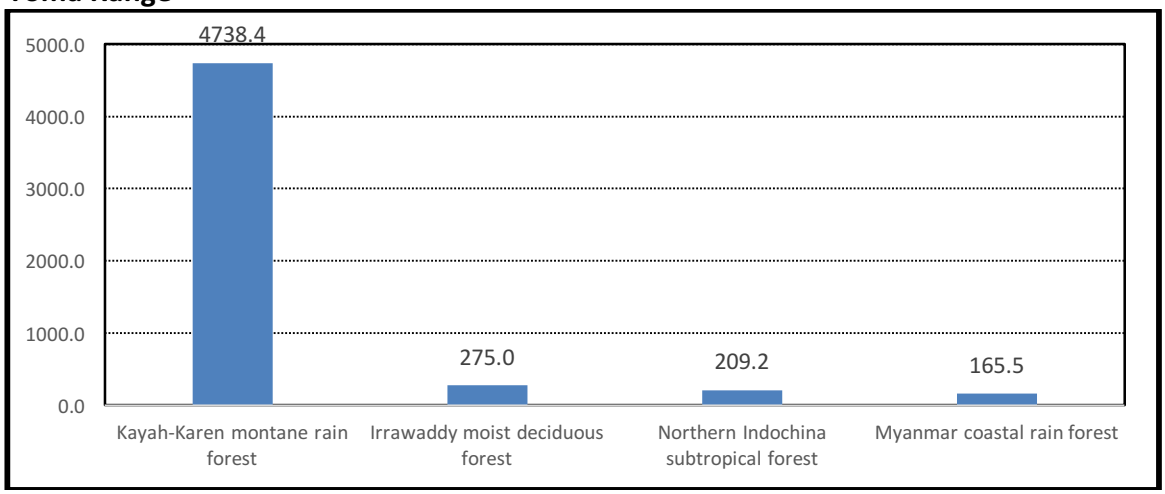


Figure 6.6: Area (km2) of four ecoregion covered by seven revised KBAs in Western Shan Yoma Range



Species-based vulnerability

One of the main triggering criteria to qualify as KBAs is the confirmed occurrence of Globally Threatened species. As shown in **Table 6.3**, the occurrence of globally threatened species (CR, EN and VU) were assessed and species scoring was conducted for each KBA. If the occurrence of globally threatened species cannot be confirmed, those areas should be removed from the KBA list and considered for alternative conservation management system.

Table 6.3: Occurrence of globally threatened species in seven revised KBAs

KBA Name	Key spp. (Mammals)	Key spp. (Birds)	Species Score
Pan Laung & Pyadalin Cave	Banteng (EN) (SO), Chinese Pangolin (EN)(CO), Dhole (EN) (SO), Dusky Langur (EN) (SO), **Sunda Pangolin (EN) (CO),** Tiger (EN) (?), White-handed Gibbon (EN) (SO), Asiatic Black Bear (VU) (CO), Bengal Slow Loris(VU) (CO), Binturong (VU) (CO),Clouded Leopard	Green Peafowl (EN) (???)	3

	(VU) (CO), Gaur (VU) (SO), Malayan Porcupine (VU)(CO), Malayan Sun Bear (VU) (CO), Marbled Cat (VU) (CO), Indochinese Serow (VU) (SO)		
Paung Laung Watershed Area	Big-Headed Turtle (EN) (SO), **Chinese Pangolin (EN) (CO),** Dhole (EN) (SO), Dusky Langur (EN) (SO), Sunda Pangolin (EN) (CO), White-handed Gibbon (EN) (SO), Asiatic Black Bear (VU) (CO), Banded Palm Civet (VU) (SO), Bengal Slow Loris(VU) (CO), Binturong (VU) (CO), Capped Langur (VU) (?), Clouded Leopard (VU) (CO), Gaur (VU) (SO), Golden Cat (VU) (SO), Malayan Porcupine (VU) (CO), Malayan Sun Bear (VU) (CO), Marbled Cat (VU) (CO), Northern Pig-tailed Macaque (VU) (CO), Oriental Small-clawed Otter (VU) (SO), Sambar Deer (VU) (CO), Indochinese Serow (VU) (CO), Stump-tailed Macaque(VU) (CO)	Green Peafowl (EN) (???)	3
Panthee Taung Area	**Chinese Pangolin (EN) (CO),** Dhole (EN) (SO), Sunda Pangolin (EN) (CO), White-handed Gibbon (EN) (SO), Asiatic Black Bear (EN) (CO), Bengal Slow Loris (VU) (CO), Binturong (VU) (CO), Clouded Leopard (VU) (CO), Gaur (VU) (CO), Malayan Porcupine (VU) (CO), Malayan Sun Bear (VU) (CO), Marbled Cat (VU) (CO), Northern Pig-tailed Macaque (VU) (CO), Oriental Small-clawed Otter (VU) (SO), Sambar Deer (VU) (CO), Indochinese Serow (VU) (CO)		3
Thandaung Gyi Area	**Dhole (EN) (CO),** Sambar Deer (VU) (CO)	Green Peafowl (EN) (???)	3
Shwe Gyin- Kyauk Gyi Area	**Asiatic Black bear (VU) (CO)**	Green Peafowl (EN) (???)	2
Kahilu WS	**Chinese Pangolin (EN) (CO),** Sunda Pangolin (EN)(CO),		3
Kyaikhtiyo WS	**Chinese Pangolin (EN) (CO),** Dhole (EN) (CO), Dusky Langur (EN) (?), Tiger (EN) (SO), White-handed Gibbon (EN) (SO), Asiatic Black Bear (VU) (CO), Banded Palm Civet (VU) (SO), Bengal Slow Loris (VU) (CO), Binturong (VU) (CO), Clouded Leopard (VU) (CO), Fishing Cat (VU) (CO), Gaur (VU) (SO), Golden Cat (VU) (Co), Malayan Porcupine (VU) (CO), Malayan Sun Bear (VU) (CO), Marbled Cat (VU) (CO), Northern Pig-tailed Macaque (VU) (CO), Oriental Small-clawed Otter (VU) (CO), Smooth-coated Otter (VU) (CO), Sambar Deer (VU) (CO), Indochinese Serow (VU) (CO), Stump-tailed Macaque (VU) (CO)	Green Peafowl (EN) (???)	3

Site-based vulnerability

Main threats occurring in KBAs of Western Shan Yoma Corridor are illegal hunting, shifting cultivation, encroachment and uncoordinated development activities such as road expansion. The score of threats from different stakeholders were averaged and presented in Table 6.4. As threats are very dynamic overtime, it is important to reassess these threats periodically.

Table 4.4: Average threat scores of seven revised KBAs

KBA Name	Threat Score
Pan Laung & Pyadalin Cave	1.0
Paung Laung Watershed Area	1.0
Panthee Taung Area	1.5
Thandaung Gyi Area	1.9
Shwe Gyin-Kyauk Gyi Area	1.5
Kahilu WS	1.2
Kyaikhtiyo WS	3.3

6.3. Proposed Conservation Strategies

Western Shan Yoma Range covers land from Mandalay Region, Shan State, Bago Region, Kayah State, Karen State and Mon State. Some areas are controlled by Karen National Union and other ethnic armed forces. So it is administratively extremely complex to consider practical conservation strategies for the seven revised KBAs. Theoretically, 59% of the KBAs are the responsibility of the Forest Department and 41% the responsibility of the General Administration Department. However, this is not what is reflect in on the ground management. The following should be taken into account when developing conservation strategies within the corridor.

Identifying relevant State and Regional Government's conservation priorities: As there are six States and Regions in the conservation corridors, conservation priority of each State and Region will play a very important role in the development of a conservation strategy. Under the current decentralization process, different State and Regional Government may have different conservation priorities. Those conservation priorities should be identified and integrated with other conservation activities across State/Region boundaries. It is also important that States and Regions work together across boundaries to harmonize their conservation strategies to maximize the benefits to conservation and limit the creation of new threats.

Recognition of KNU's established protected areas: KNU has a long established protected area system. The KNU's protected areas should be formally recognized and continue to be managed by the KNU. The KNU PA system should be recognized as an integral part of the Union PA system.

Collaborative management with communities: The future of Myanmar's biodiversity rests in the hands of its citizens. The role of local communities needs to be strengthened to

recognize existing traditional systems of conservation management and promote benefit sharing from Myanmar's rich natural resource base. Both the Union Government Ministries and the Ethnic Armed Forces should support management systems such as Community Forestry and Indigenous Community Conservation Areas.

Establishment of State, District and Township KBA Management Committee: Stakeholders from Shan State recommended to establish State, District and Township KBA management committees to be able to conserve and manage KBAs effectively. The Article 4 and 6 from 1994 The Protection of Wildlife and Conservation of Natural Area Law were referred to be applied for the establishment of those committees as shown in Box 1.

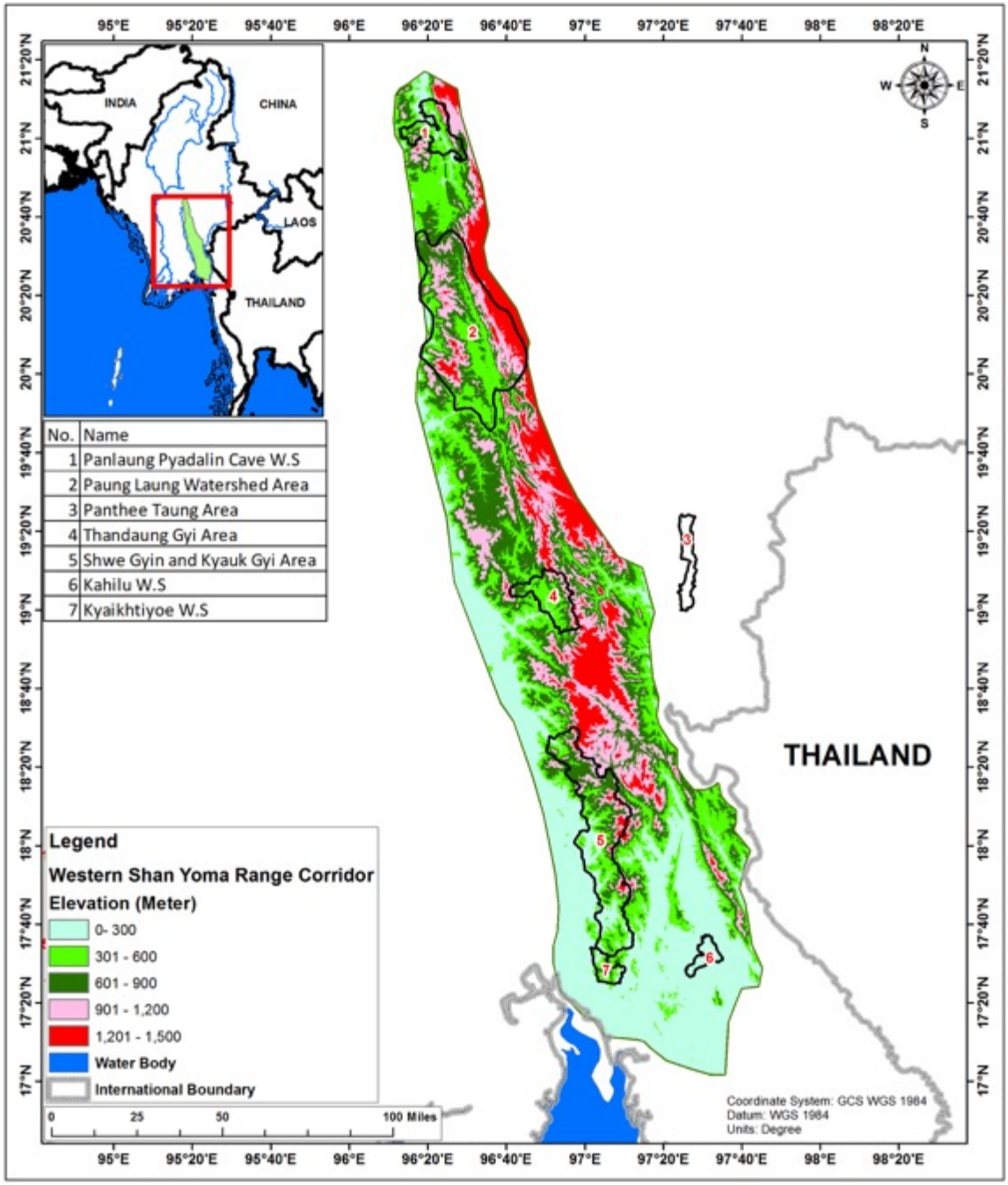
Box 1: Legal provision for proposed State, District and Township KBA Management Committees

1994 The Protection of Wildlife and Conservation of Natural Area Law

Article 4. The Government: -
(a) shall form the Committee for Protection of Wildlife and of Natural Areas consisting of the following persons:
(i) Chairman: Minister, Ministry of Forestry;
(ii) Members: Representatives from the relevant Government departments and Government organizations;
(iii) Members: Relevant luminaries and experts;
(iv) Secretary: A person assigned responsibility by the Chairman;
(b) The Government may determine the Vice-Chairman and Joint Secretary when necessary.

Article 6. The duties and functions of the Committee are as follows:-
(a) giving guidance to enable implementation of the objectives of this Law;
(b) submitting suggestions to enable the Government to lay down policies relating to protection of wildlife;
(c) submitting suggestions to enable the Government to lay down policies relating to the conservation of natural areas;
(d) coordinating with the relevant Government departments and Government organizations for determination of natural areas and establishment of the Zoological garden and Botanical garden;
(e) supervising the performance of functions relating to protection of wildlife and conservation of natural areas;
(f) giving guidance for the protection of endangered species of both flora and fauna;
(g) giving guidance in respect of conducting research on natural science;
(h) communicating and co-operating with foreign countries, international organizations and regional organizations.

Figure 6.7: Seven revised KBAs in different altitudinal ranges



7. Conclusions

As KBAs are seen stepping stones for protected area establishment, this process of reviewing, assessing and revising of total 36 KBAs in three little known conservation corridors - Chin Hills Complex, Rakhine Yoma Range and Western Shan Yoma Range - have contributed to conservation commitments of Myanmar - to increase the protected areas up to 10% of total land area. Assessment on current management status, species vulnerability, site vulnerability provides information to consider effective management for future protected areas. Results from gap analysis enhance the representativeness of protected

areas against ecoregions. Finally recommended conservation strategies at site and landscape scales from this report will lead to effective biodiversity conservation and protected area management in Myanmar.

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