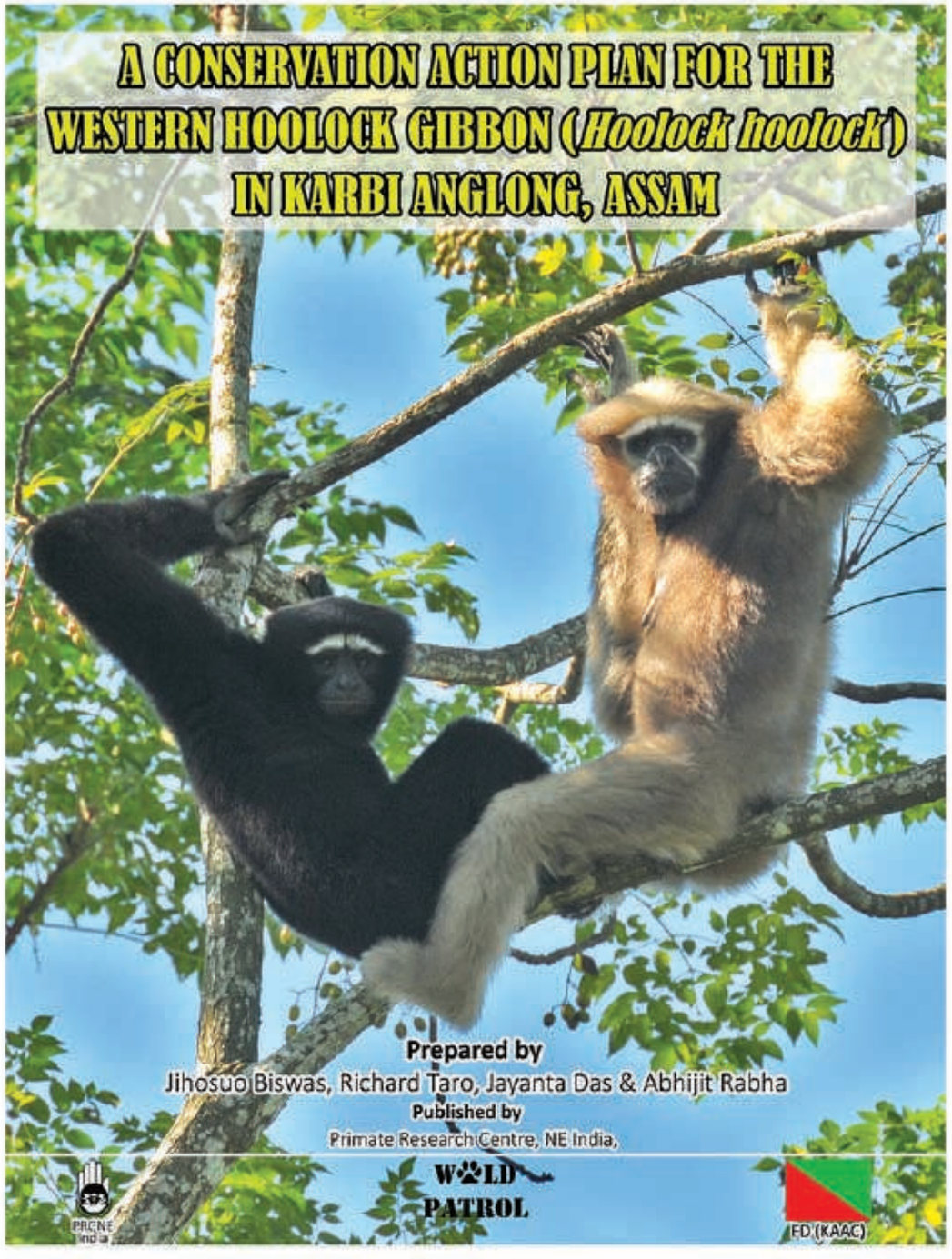
A CONSERVATION ACTION PLAN FOR THE WESTERN HOOLOCK GIBBON (*Hoolock hoolock*) IN KARBI ANGLONG, ASSAM



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Jihosuo Biswas, Richard Taro, Jayanta Das & Abhijit Rabha

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2016 - 2026

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D.O.KAAC/EM/Forest/16-17/
Date: 09/03/2016

FOREWARD

The Wildlife resource of India are natural heritage and are being protected generation to generations. There are few species unable to withstand without action based research. The threats increasing day by day. In Assam Western Hoolock Gibbon are found in district of Karbi Anglong, which is endangered and need to protect them. I am glad to know that 65% population of Gibbon were found in the Forest of Karbi Anglong District.

In this purpose the Karbi Anglong Autonomous Council also interested for the publication of, **"Action Plan for Conservation of Western Hoolock Gibbon in Karbi Anglong"** by Primate Research Centre North East India. Hope this document will be useful in various actions in the conservation of Hoolock Gibbon by Forest Deptt. and others NGOs in future.

9/3/2016

(Sri Prodip Singnar),
Executive Member, i/c Forest etc,
KAAC, DIPHU

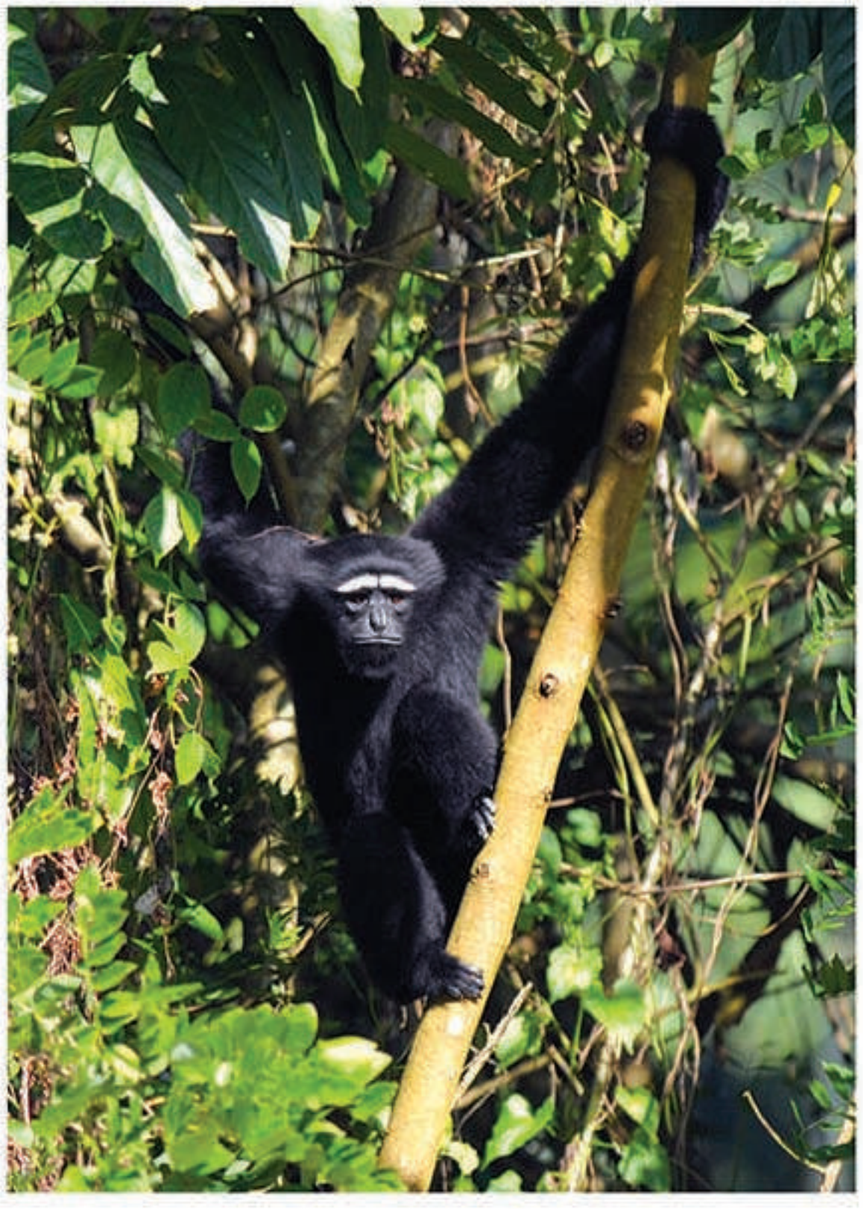
KARBI ANGLONG AUTONOMOUS COUNCIL
OFFICE OF THE PRINCIPAL CHIEF CONSERVATOR OF FORESTS::KARBI ANGLONG
D I P H U

FOREWARD

Conserving hoolock Gibbon in situ requires landscape approach. It is a mistake to impose geographical area imitation as that interfere seriously with the future survival of the species. However it takes long year of research to unlock the secret of conservation of a species in the wild; so that a comprehensive document airred at survival in the wild and in situ can be compiled and made ready for use.

However we are very fortunate that such as difficult job has been achieved by a small for preparing "Action plan for conservation of Western Hoolock Gibbon in Karbi Anglong" compiled by Dr. Jihosuo Biswas, myself (Dr. Abhijit Rabha, IFS) and Dr. Jayanta Das. Therefore my best wishes to the rest of the team to forge ahead and perfect the same.

(Dr. Abhijit Rabha, Ph.D. IFS)
Principal Chief Conservator of Forests
Karbi Anglong::Diphu



PREFACE

Lesser apes are amongst the most threatened primate taxa, skipped the desired attention at national and international level. Hoolock Gibbons are the two representatives of apes in India (Eastern and Western Hoolock Gibbon) also neglected and unattended despite being designated as **Endangered** by IUCN Red Data Book (2012), **Appendix** – I by CITES and **Schedule** – I by Indian Wildlife Protection Act, 1972. Having close genetical affiliation with great apes and humans, for last few decades the species is confronting with serious ecological threats of multifaceted nature, and almost pushed to the wall, both in terms of habitat quality, population size and demographic structure, primarily due to degradation and loss of habitat.

The state of Assam with an elaborated network of PA's and R.F.s covering both plains and hills, is the last stronghold of Western Hoolock Gibbon in India. Karbi Anglong district of central Assam, with 76.09% forest cover, comprises about >65% of the state's Gibbon population. It has huge conservation potential not only for Gibbon but also other charismatic species like Tiger, Elephant, Rhino etc. due to its geographic location, landscape integrity and biological importance. Being a canopy dependent species, – Hoolock Gibbon could be one of the best woodland habitat indicators, and its survival in the wild will have positive impact on the survival of number of other threatened species and could be rightly projected as 'flagship species' for overall protection of woodland habitat of Karbi Anglong.

The sincerity of the conservationist and administrators for the protection of the species were not adequate without the strong scientific inputs. The intensive survey and research activity undertaken by PRCNE India on Western Hoolock Gibbon (*Hoolock hoolock*) since last two years has generated base line data that could be reoriented to develop an action plan for conservation of the species and its habitat in Karbi Anglong.

The present **Conservation Action Plan on Western Hoolock Gibbon (*Hoolock hoolock*) in Karbi Anglong** is being developed with a hope that all future activities of Hoolock Gibbon conservation will be channelized through this guideline and the benefit of which will contribute in the survival of a host of endangered species in Karbi Anglong, Assam.

1 THE RATIONALE FOR CONSERVATION OF HOOLOCK GIBBONS

The Hoolock Gibbon clearly meet the criteria for a *flagship species*, and is a strong ambassador for the tropical and sub-tropical ecosystems in which it lives and the issues which threaten its survival.

1.1 THE ECOLOGICAL ROLE OF THE HOOLOCK GIBBON WITHIN THE HABITAT

Hoolock Gibbon is an integral part of the sub tropical rain forest habitats of Assam in which they live. They are basically frugivorous i.e. fruit eater and large proportion of their diet contains fruits ranging from soft fleshed fruits with small seeds like figs to hard shelled seeds of various vines and creepe By eating fruits and excreting or spitting out the seeds, Hoolock Gibbons help to disperse various plant species, and maintain diverse floristic composition. They also facilitate germination of certain species by swallowing the whole seeds that pass through their gut passage.

Apart from fruit, Gibbon also consumed considerable amount of flowers during different seasons and helping in forest pollination by visiting one flowering plant to other. It also helps to subsists other animals that could not climb the tree like deer's by dropping the uneaten fruits and plant parts. Thus they help in maintaining the dynamic equilibrium of the rain forest ecosystem in which they live.

Insects are a good source of protein for Gibbons and they consumed considerable amount of insect gall, caterpillars, termite and play a role in controlling the spread of insects which damage the young leaves of the forest trees.

Hoolock Gibbon helps to maintain the dynamic equilibrium of the rain forest ecosystem in which they live. For example, foraging behaviour of Gibbon like foliage consumption, consumption of buds and flowers can damage plants.

Left -Male Gibbon in hanging posture

1.2 CONSERVATION OF ASSOCIATED BIOLOGICAL DIVERSITY

Gibbons are brachiators, and to support this suspensory mode of locomotion, they required continuity of the forest canopy. Any disturbance of the Gibbon habitats in the form of canopy breakage, may lead to isolate the population in otherwise large contiguous habitat. Thus to ensure the survival of Hoolock Gibbon, to maintain a viable population, large areas of good quality habitat is prerequisite. Hence, Gibbon conservation could simultaneously protect vast array of other species and vital ecosystem services and could be projected as 'flagship species' to conserve rainforest ecosystem. There are extremely wide variety of associated biological diversity in the forests inhabited by Hoolock Gibbons, and many of the areas that contain significant populations of Gibbons also contain important population of other threatened species. For Karbi Anglong, Assam, this includes Tiger (*Panthera tigris*), Asian Elephant (*Elephus maximus*), Great Indian Rhinoceros (*Rhinoceros unicornis*), Clouded Leopard (*Neofelis nebulosa*) and other lesser cats and primates etc.

1.3 HOOLOCK GIBBON AND PRIORITY FOREST COMPLEXES OF ASSAM

Assam constitutes about >70% population of Western Hoolock Gibbon in India. Ten priority forest complexes have already been identified for long term conservation of Western Hoolock Gibbon in the state. A priority forest complex is defined as large unit of woodland forest having evergreen, semi evergreen and moist deciduous nature comprising assemblage / cluster of Reserved Forest (RF), Proposed Reserved Forest (PRF), Protected Areas (PA) and Un-Class State Forest (USF). These priority complexes have been identified on the basis of biological importance i.e. high primate diversity and landscape integrity. Spatial relationships between the areas of remaining forest, estimated Gibbon population; conservation gaps based on the viability and representation analysis, and remaining habitat blocks were used to identify larger conservation landscapes. These complexes have the greatest potential for long term conservation of Western Hoolock Gibbon in Assam.

1.4 OTHER MOTIVATORS FOR GIBBON CONSERVATION

Being the 'only apes' of Karbi Anglong, Gibbons are of great scientific and cultural interest. Karbi Anglong district of Assam represents the largest population of Western Hoolock Gibbon not only in Assam but in entire Northeast India, offering a great opportunity to conserve these lesser apes in India. It is locally known as 'Keng hoidu' in Karbi dialect and is associated with culture, particularly among local tribes. Gibbon also has significant potential to generate income in the region they inhabit through responsible and sustainable ecotourism, carbon economy etc.

They do not come into conflict with local people and are appealing, to the extent that in some areas villagers voluntarily try to protect their local Gibbon populations. Gibbon protection in the wild is only likely to work through concerted efforts and collaboration at the local level. Raising awareness and involving local stakeholders in protecting Gibbons is less challenging than other less immediately charismatic animals or animals which are perceived locally as troublesome like Elephant, Tiger etc. Gibbons thus serve as flagship species and a starting point to raise consciousness for biodiversity conservation and developing cooperation and understanding with local stakeholders. As flagship species they can also serve to raise funds from outside sources.

There are communities throughout Assam which provide cultural protection to Gibbons. The reasons local communities protect Gibbons may vary, but such local examples of local Gibbon conservation should be supported and the motivations of local communities is better understood.

Above and Right -Semi evergreen forest habitat with closed canopy

2 HOOLOCK GIBBON NATURAL HISTORY, ECOLOGY & BEHAVIOURS

2.1 TAXANOMY

The Gibbons belong to the family *Hylobatidae*. Initially *Hylobatidae* were grouped into two distinct genera *Symphalagus* and *Hylobates* (Napier & Napier, 1967), which later divided into four distinct groups mainly due to distinctive karyotype, the diploid number of chromosome. *Symphalagus* having 50 number of chromosome while *Nomuscus* having 52, *Bunopithecus* having 38 and *Hylobates* having 44 number of chromosome (Liu *et. al*., 1987; Poutry *et.al*., 1983). Building upojn the works of Groves (1972), it has been proposed that four groups should be referred as separate sub genera (Marshall & Sugaridjito, 1986; Nowak, 1999). Consequently Geissmann proposed to recognize the four groups of Gibbons as four genera of which *Bunopithecus* later on recognize as Hoolock by Mootnick & Groves (2005).

Systematic position of Gibbons (Hylobatidae) within the order - Primates.

Order	Primate
Sub Order	Strepsirhini
Infra Order	Catarrhini
Super Family	Hominoidea
Family	Hylobatidae
Genus	*Hoolock*
Species	*hoolock* (Harlan, 1834)

2.2 LOCAL NAMES

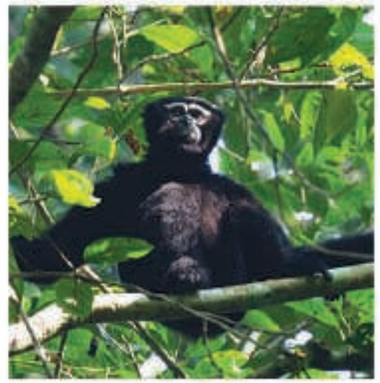
Hoolock Gibbons are unanimously called

Holou Bandar in Assamese,
Hulu makhra in Bodo,
Hulu in Khasi,
Hahuk in Mizo,
Bonmanush in Bilaspuri,
Yommu in Manipuri.
Keng hoidu in Karbi,
Heru in Garo,
Ulluk in Bengali,
Hoolau in Rukni and Riang,
Saha in Rankhol,

2.3 GIBBON CHARACTERISTICS

Morphologically and behaviorally Hoolock Gibbon differs from the other lesser apes. Few important characteristics were described by Harlan (1834), Geissmann (1995):

a. Only intermediate Gibbon (7 kg weight).
b. Absence of median raphe in m. mylohyoideus.
c. Shorter appendix than other species.
d. Presence of 4 taeniae coli rather than 3
e. Small intestine is the largest of all Gibbons (4.4 to 5 times the length of larger intestine).
f. The inferior vena cava tunnels the liver as in great apes.
g. Hair density 465 per cm^2 of skin (1226 – 2030 / cm^2 in *lar* group; 711 – 785 / cm^2 in *concolor*).
h. Presence of large 'baculum' in male and 4.2 mm long *os clitoridis* in female.
i. Distribution extends outside the tropical belt.
j. Male and female produce similar songs, and produce double solo rather than a duet.



Above - Adult male Western Hoolock Gibbon **and Right** - Adult female Western Hoolock Gibbon

2.4 COLOURATION

Male Western Hoolock Gibbons are black, with white eyebrows that turn up at the end. Females are copper tan in colour, with a whitish eyebrow band. Whitish hair encircles the face and contrasts with darker brown cheeks. The neonate coat colour is creamish white that changes to grey by 9 months. This colour is retained for 2 years to 2 and half years during the infant stage. The colour in both the male and female turns to black in juvenile stage (up to 5 years). In males the black remains but in females the black colour fades with pale brown, with puberty (6-7 years) and ultimately to copper tan in the adult stage.

2.5 WEIGHT

Most species of Gibbons weigh about 5 kg, but the Hoolock Gibbon weigh slightly more (6 - 8 kg), and the Siamang Gibbon is twice as large (10-12 kg). So Hoolock is the only intermediate sized Gibbon.

2.6 SPECIES OF GIBBONS

Until recently, only a single species of Hoolock Gibbon was recognized, known as *Hoolock hoolock*, with two subspecies, *H. h. leuconedys* in Myanmar and China and *H. h. hoolock* in India, Bangladesh, Myanmar and China (Karger, 1987). However consistent differences between the Hoolock from eastern side of the river Chindwin and western bank of the river Chindwin in characteristics such as mitochondrial DNA, karyotype, habitats and morphology suggest that the two are best treated as distinct species as Eastern Hoolock Gibbon (*Hoolock leuconedys*) and Western Hoolock Gibbon (*Hoolock hoolock*) (Mootnick & Groves, 2005). Adult males on the west side of the river Chindwin (*H. hoolock*) are pure black and have black tassel. On the other hand the adult males of the eastern species (*H. leuconedys*) are glossed with brown and the tassels are contrastingly non black and there is a white patch on the chin. Most recently, Eastern Hoolock was recorded from small parts of two provinces / states of India, in Arunachal Pradesh and Assam, which for long time thought to be the western species (Das *et.al*., 2009; Chetry *et. al*., 2011).

2.7 DISTRIBUTION

The distribution of Hoolock Gibbons are localized to northeast India, Bangladesh, and Myanmar, between 20° and 28° N and 90° to 98° E. Eastern Hoolock is distributed in the east bank of the river Chindwin, Myanmar and Nao Dehing-Dibang river complex of Eastern Arunachal Pradesh and Sadiya Sub-Division of Assam, India. Western Hoolock is distributed in west bank of the river Chindwin, Myanmar, seven Northeastern States of India and Bangladesh. In Assam, it is distributed in the south bank of the river Brahmaputra.

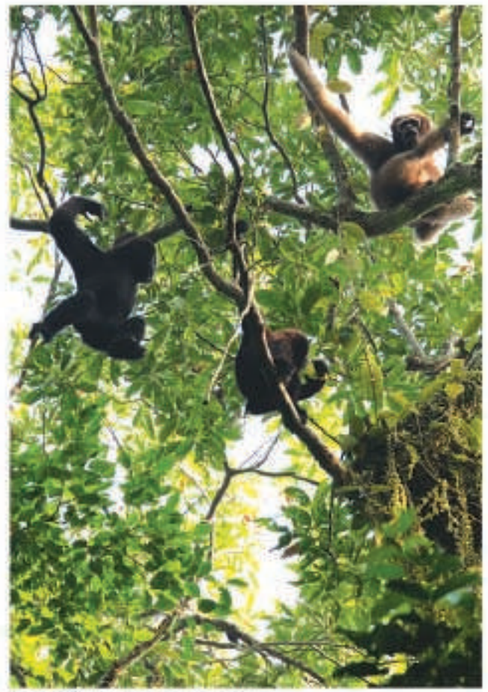
Map -Global distribution of Western Hoolock Gibbon

2.8 SOCIAL ORGANIZATION

Hoolock Gibbons are monogamous and territorial (Das, 2002). They live in small family group and maintain the social network within the group and social proximity with neighboring groups. The group usually consists of adult mated pairs and one or two immature individuals (juvenile or infant). Mean family size is normally 3, range 2 – 6 individuals (Das *et al*., 2004). Occasionally Hoolock family exceeds more than 4 individuals, but this phase persists only for short duration during new family formation. Solitary individuals are also seen where the individuals are in the process of group formation or where one of the mated pair die or being killed. Sub adult young are forced out of the family by the parents at maturity, to find a mate and new territory (Brockelman and Srikosamatara, 1984; Dunbar, 1988; Leighton, 1987; Tilson, 1979).

2.9 ECOLOGY

Like other lesser apes, Hoolock Gibbons are arboreal and obligate canopy dweller and their suspensory locomotion helps them to use the available habitats. They inhibits in tropical and sub-tropical ever green, semi ever green and mixed moist deciduous forests, which provide them with food, shelter and resting or lodging. They prefer close canopy forest with three tier vegetation (upper, middle and lower) – where they uses upper canopy for roosting, resting and sun basking while middle and lower canopy for food, locomotion and maintenance. The light body weight, long and strong arms helps them to exploit the terminal branches of the trees and climb.



2.10 LOCOMOTION

Hoolock Gibbons are brachiators and they move in acrobatic style. This suspensory mode of locomotion helps them to move faster in the close canopy forest and even help them to reach terminal branches of trees. Apart from brachiation, Gibbon also moves by leaping and jumping between the trees when the distance is not within the reach of brachiation. Sometime they climb and use bipedal walk on tree trunks or on ground.

Above - A typical Gibbon family

2.11 HOME RANGE AND TERRITORY

Hoolock Gibbons are food specialist and since food is not available throughout the forest, they maintain a definite home range and defend their resources. Average annual home range of Gibbon (group with 3 individuals) was found to be between 0.15 - 0.35 Km^2, while the day range or daily travel distance varies from 1 km to 2.5 km depending on the seasons (Bhattacharjee *et al.*, 2004 ; Das, 2002; Islam & Feeroz, 1992; Tilson, 1979). They are territorial and defend their territory by regular loud territorial songs and sometimes by territorial display. Singing announces the occupation of a specific area of the forest by a mated pair and function as a distance maintaining signal. Aggression and conflict between the groups generally take place in the overlapping zone of the home range for resources. Female generally lead the group during group progressions.

2.12 ACTIVITY

Hoolock Gibbon is a diurnal primate. They involve themselves in several activities throughout the day. Some of the activities are associated with the energy intake and hence for survival, some are for reproduction, whereas few activities are associated with the maintenance of social bonds between the group member. Allocation of time in these activities fluctuates with the availability and accessibility of resources (both food and mate) in different habitat conditions and in different seasons within their adaptive range of behaviour. They generally enter the lodging trees for sleep much earlier (2hr 30min) than the other sympatric primates. Hoolock feed and rest throughout the day and they do not have a distinct peak of activity in a particular period of the day. Hoolock Gibbon spends 54.96 % of time in feeding, 32.78 % in resting, 5.68 % in locomotion, 2.35 % in grooming, 2.18 % in monitoring, 1.62 % in song and rest 0.43% in other activities. Hoolock spends very less time in socializing (grooming). Like most other Gibbons, Hoolock do not sing daily. Out of the total observation days (180 days) song days was found to be 62.5 % (Das, 2002).

FACTS ABOUT HOOLOCK GIBBON

- Hoolock Gibbon sleeps and rests in emergent trees.
- Hoolock Gibbons are mainly frugivorous.
- Hoolock Gibbon exhibits suspensory mode of locomotion called brachiation.
- Hoolock Gibbon lives in small, pair bonded family groups.
- Hoolock Gibbons are territorial having small home range.
- They defend their territory by loud morning songs.

2.13 FOOD AND FEEDING

Hoolock Gibbons are mainly frugivorous. They rely on the ripe fruits with fleshy pulp. But they often take leaves and other parts of the plant body. The food of Hoolock consists of 61.9 % fruits, 15.18% mature leaves, 11.61 % new leaves, 4.23 % flower, 2.47 % tender shoots, 1.85 % seeds, 1.00 % petioles, 0.48 % twigs, 0.26 % roots, 0.87 % moss, and rest 0.15 % consists of other plant parts (Das, 2002). A total of 225 species of plants belonging to 63 families has been identified, consisting of trees, lianas, vines, mosses and lichens, which forms the dietary spectrum of the Hoolock Gibbon. Apart from plant part, Gibbon also consumed insects gall, caterpillar, termite and even egg of bird.

Local name	Scientific name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Amari	*Aglaia spectabilis*			▼									
Bandardima	*Dysoxylum sp*			🍃	🍃		🍃	🍃	🍃	🍃			▼
Bon Aam	*Mangifera sylvatica*		▼	▼	▼	▼	▼						
Borpat	*Ailanthus integrifolia*	🍃	🍃	🍃		🍃	🍃				🍃	🍃	🍃
Dewa Sam	*Artocarpus lacusha*				▼		▼	▼	▼				
Dimoru	*Ficus sp.*	🍃	🍃	▼	🍃▼	▼	🍃▼	▼	▼	▼			
Gamari	*Gmelia arborea*								🍃				
Himolu	*Bombax ceiba*				🌸	🌸							
Jamuk	*Syzygium sp*		🍃▼	🍃▼	🍃▼	🍃▼	🍃▼	🍃▼					🍃▼
Jari	*Ficus benzamina*	🍃	🍃	▼	▼	▼	▼	▼	▼	▼	▼		
Kadam	*Anthocephalus chinensis*	🌸	🌸	▼					🌸	🌸	🌸	🌸	🌸▼
Lali Poam	*Dysoxylum gobara*	🍃				▼		▼					
Letechu	*Baccaurea ramiflora*				▼		▼	🍃			🍃		
Modar	*Erythrina indica*			🍃	🍃		🍃	🍃	🍃		🍃	🍃	🍃🌸
Paroli	*Stereospermum chelonoides*		🌸🍃	🌸🍃▼	🌸🍃▼								
Phul Soap	*Magnolia hookeri*		▼		▼	▼				▼			
Sam Kothal	*Artocarpus chama*			▼	▼	▼	▼	▼					
Sationa	*Alstonia scholaris*				🍃	🍃		🍃	🍃	🍃		🍃	🍃
Selleng	*Sapium baccatum*						🍃	🍃	🍃	🍃	🍃		
Thekera	*Garcinia sp*					▼	▼		▼				
Urium	*Bischofia javanica*	🍃▼	🍃▼									🍃▼	🍃▼

Table - 1 List of major food plants and their parts consumed by Hoolock gibbon in different months in Assam (Das, 2002). (🍃- Leaf, ▼-Fruit, 🌸-Flower).

2.14 REPRODUCTION

Hoolock Gibbons are seasonal breeder as mating is restricted only during early rainy season when females are receptive to male. The duration of menstrual cycle is 28 days (Carpenter, 1941; Mathews, 1946). Male has single consort for certain duration once in a year. Gestation period is 186 days. Birth took place between Novembers to February (Choudhury, 1990; Das, 2002; Tilson, 1979).

Hoolock Gibbons are slow breeders too. Infants are weaned at the age of 2 and ½ years. The inter birth interval is of 3 years. A mated pair produces an average of 5-6 offspring in their reproductive life of 10-20 years.

Clockwise from Left - Fruit of Selleng consumed by Hoolock Gibbon **and Above Right and Bottom** - Vigilant female Gibbon with infant

3 PRIORITY AREAS, POPULATION & HABITAT STATUS

3.1 PRIORITY AREAS OF ASSAM

There are many crucial conservation problems, but there is neither enough time nor money to tackle them, hence prioritization. Studies have shown that small populations are more likely to go extinct than larger ones (Berger, 1990), so for the long-term survival of the species, large population in larger areas are to be protected first. The larger complexes are more viable in terms of supporting populations apart from ecological and evolutionary processes.

Based on a set of standard criteria viz. naturalness, diversity, rarity / uniqueness and size (Usher, 1986), ten priority areas or forest complexes for long term conservation of Western Hoolock Gibbon in Assam has been identified (fig-1 & table-2) in 'The Strategic Planning Workshop on Hoolock Gibbon Conservation in Assam' in 2009 (Das et.al., 2012). However, identification of the priority forest complex is only the first step towards the long-term conservation of the natural populations of the species along with the other primates and the total biodiversity of this state (Assam).

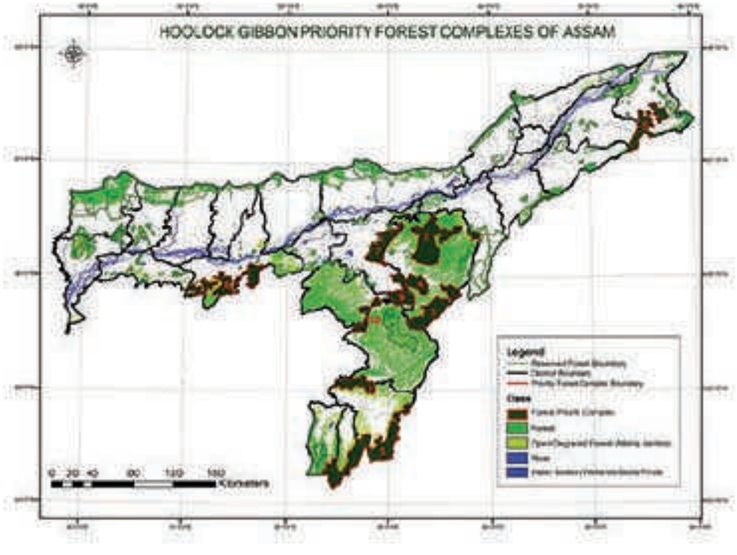


Fig -1 Map of Assam showing different priority forest complexes of western Hoolock Gibbon

S. No.	Districts	Priority Forest Complex	Area Km^2	Rank
1	Cachar & Karimganj	Innerline-Katakhal-Singla Complex	1291	II
2	Karbi Anglong	Langlakso-Mikir Hills-Kalyoni Complex	1104.5	I
3	Karbi Anglong	Dhansiri-Borlangfer Complex	984.0	II
4	Karbi Anglong	Marat Longri-Patradisa-Longnit Complex	802.0	II
5	Dibrugarh & Tinsukia	Joypur-Dirak-Upper Dehing-Dilli-Abhayapuri Complex	580.0	I
6	Cachar & Dima Hasao	Barail-North Cachar Complex	326.0	II
7	Karbi Anglong	Borjuri-Jungthung-West Mikir Hills Complex.	345.0	III
8	Kamrup	Rani-Garhbhanga Complex	281.0	II
9	Nawgaon	Lumding RF	252.9	
10	Karbi Anglong & Dima Hasao	Khurimming-Panimur-Amreng Complex	186.0	III

Table-2 List of priority forest complexes of Assam prioritized for long term conservation of Western Hoolock Gibbon.

3.2 CONSERVATION SCOPE OF HOOLOCK GIBBON IN KARBI ANGLONG, ASSAM

Karbi Anglong is the largest district of Assam, NE India, which lies between 25° 33' to 25° 35' latitude and 92° 10' to 93° 50' longitude. The district is an Autonomous Council (KAAC) under the 'VIth Schedule' of Indian Constitution. About 85% land area of the district is officially covered by forest (4290 sq. km) of which 792 sq. km costitutes the Protected Areas and 1962 sq. km constitutes the Reserved Forests.

The district comprises four wildlife sanctuaries (WLS) East Karbi Anglong WLS (221.8 km^2), Morat Longri WLS (451 km^2), Nambor WLS (37 km^2) and Garam Pani WLS (6 km^2) and one proposed wildlife sanctuaries viz. North Karbi Anglong WLS (76 km^2), two Elephant Reserves (ER) viz. Kaziranga Karbi Anglong ER and Dhansiri Lundling ER and one Tiger Reserve (TR) viz. Kaziranga TR. It has habitat contiguity with Kaziranga NP and Itanki NP of Nagaland, forming a larger conservation landscape known as Kaziranga-Karbi Anglong Landscape. This landscape has huge conservation potential, not only for Gibbons, but also for other threatened species like Tiger, Elephant, Rhino etc. These forest complexes also hold the largest population of Asian Elephants in Northeast India, as the complexes constitutes a part of Kaziranga-Karbi Anglong Elephant Reserve and Dhansiri-Lunding Elephant Reserve.

3.3 PRIORITY SITES AND JUSTIFICATION FOR CONSERVATION OF GIBBONS IN KARBI ANGLONG

Karbi Anglong district comprises five priority complexes (fig -2) out of ten in Assam, prioritized for long term conservation of Western Hoolock Gibbon, contributing about >65% Gibbon population of the State (Biswas *et. al*., 2015). Among these, Langlakso-Mikir Hills-Kalyoni (1104.5 km^2) is the highest ranking forest complex while Marat Longri-Patradisa-Longnit (802 km^2) is the second highest ranking forest complex prioritized for conservation of western Hoolock Gibbon in Assam.

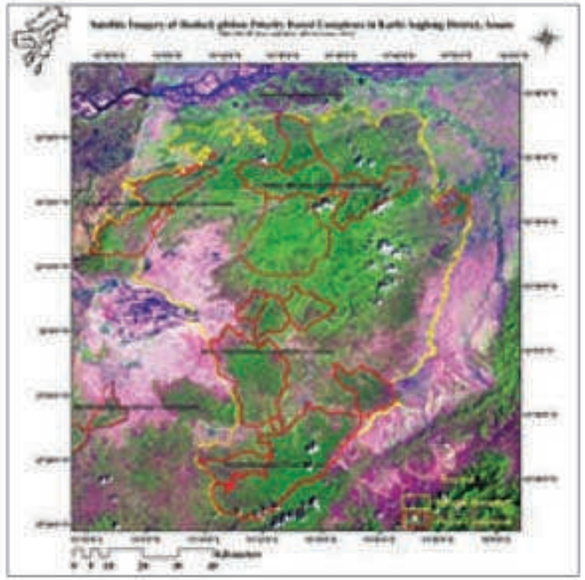


Fig-2 Map showing five different priority forest complexes of Hoolock Gibbon in Karbi Anglong and their forest cover.

3.3.1 LANGLAKSO-MIKIR HILLS-KALYONI FOREST COMPLEX

Langlakso-Mikir Hills-Kalyoni priority forest complex with an area of >1104.5 km^2 is the second largest and highest ranking forest complex prioritized for long term conservation of western Hoolock Gibbon in Assam. It comprises four wildlife sanctuaries viz. North Karbi Anglong (proposed) WLS (76 km^2), East Karbi Anglong WLS (221.8 km^2), Nambor WLS (37 km^2) and Garampani WLS (6 km^2); Koliyoni Reserved Forest (209 km^2) and Langlasksho Proposed Reserved Forest (534.7 km^2).

The priority complex has has huge conservation potential due to its habitat contiguity with the Kaziranga NP and Marat Longri-Longnit-Patradisa priority forest complex.

It could support >900 family groups and >2750 individuals of Hoolock Gibbon considered to be the largest single population of the state. The vegetation of the forest complex is mostly (i) Semi ever green forest, (ii) Moist mixed deciduous forest and (iii) Scrub forest or Degraded forest. Most of the semi evergreen forest lies in the East Karbi Anglong WLS, North Karbi Anglong WLS and Langlakso Hill PRF. Though the complex is under severe anthropogenic pressure in the form of encroachment and jhoom cultivation, it still have considerable Gibbon forest left (45%) calculated to be 507 km^2 of which 175 km^2 is primary forest habitat and 332 km^2 as secondary forest habitat (Biswas *et.al*., 2013).

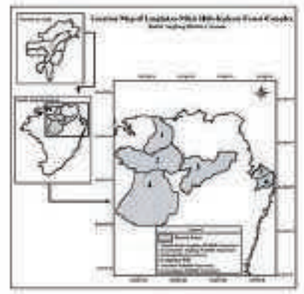


Fig - 3

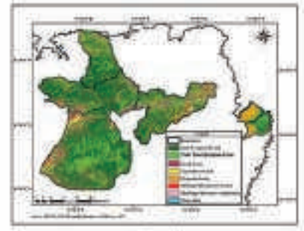


Fig - 4

Fig -3 Map of Marat Langlakso-Mikir Hills-Kalyoni priority complex showing different RF & PRFs
Fig -4 Types of forests in Langlakso-Mikir Hills-Kalyoni priority complex

3.3.2 MARAT LONGRI-PATRADISA-LONGNIT FOREST COMPLEX

Marat Longri-Patradisa-Longnit Forest Complex (802 km^2) is comprises Marat Longri WLS (451 km^2), Patradisa Reserved Forest (67 km^2), Longnit Reserved Forest (118 km^2) and Khonbamun District Council Reserved Forest (166 km^2). The forest complex has habitat contiguity with Langlakso-Mikir Hills-Kalyoni priority complex and Lumding priority complex of Nawgaon district and could support substantially good population of Western Hoolock Gibbon.

The forest complex also holds the largest population of Asian Elephants in Northeast India, as the complexes constitutes a part of Kaziranga-Karbi Anglong Elephant Reserve. The priority complex supports >450 family groups and >1200 individuals of Hoolock Gibbon considered to be the second largest population.

The vegetation of most part of the Marat Longri-Patradisa-Longnit forest complex is dominated by the mixed-moist deciduous forest except in Marat Longri WLS, where considerable area is covered with semi ever green forest (126.5 km^2) with more closed canopy compare to other forest areas within the complex. Due to anthropogenic pressure, only 52.8% of total vegetation cover is attributed to Gibbon habitat (424 km^2) and as per recent study, the complex comprises 172.3 km^2 as primary Gibbon habitat and 251.5 km^2 as secondary Gibbon habitat.

Fig - 5

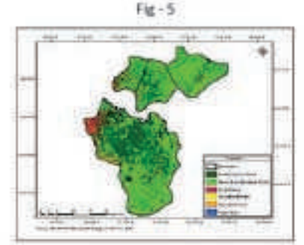


Fig - 6

Fig -5 Map of Marat Longri-Patradisa-Longnit priority complex showing different RF & PRFs
Fig -6 Types of forests in Marat Longri-Patradisa-Longnit priority complex

3.3.3 DHANSIRI-BORLANGFER COMPLEX

Dhansiri-Borlangfer priority forest complex (984 km^2) is the second largest priority forest complex in Karbi Anglong, prioritized for long term conservation of Western Hoolock Gibbon.

It comprises Dhansiri Reserved Forest (770 km^2), Borlangfer Reserved Forest (77 km^2) Daldali Reserved Forest (123.6 km^2) and Tamulbari Reserved Forest (13.4 km^2). The complex is contiguous with Intanki NP Nagaland and Lumding RF of Hojai district. It is an important Elephant corridor connecting Lumding RF of Hojai district and Itanki NP of Nagaland and constitutes a part of Dhansiri - Lungding Elephant Reserve.

Due to its proximity with Nagaland, the priority complex has huge anthropogenic pressure in the form of logging and encroachment. A part from habitat loss, despite having huge scope, this priority complex have huge poaching / hunting resulting small population, as it could support >550 family groups and >1500 individuals of Hoolock Gibbon.

Due to its proximity with Nagaland, the priority complex have huge anthropogenic pressure in the form of encroachment, felling of trees and poaching / hunting resulting small population size estimated to be 315 individuals in 112 family groups (Biswas *et.al.*, 2015).

Major forest types are (i) semi evergreen, (ii) moist mixed deciduous, (iii) scrub and (iv) degraded forest, of which most of the semi evergreen forest lies in the Dhansiri RF. The entire semi evergreen and deciduous forest in Borlangfer RF, Tamulbari RF, Daldali RF and Dhansiri RF under Dhansiri – Borlangfer complex is affected by human activities. This loss encompasses roughly = 65% of the Gibbon forest habitat and as per recent study only 35.1% forest of the complex is attributed to Gibbon habitat including 60.6 km^2 primary habitat and 285.2 km^2 secondary habitats (Biswas *et.al.*, 2015).

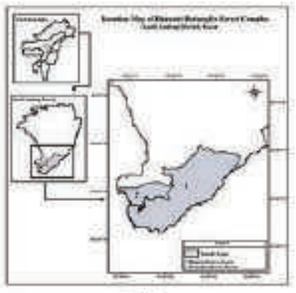


Fig - 7

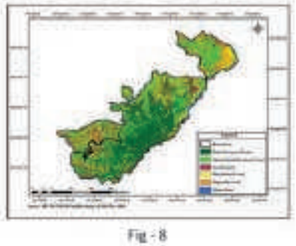


Fig - 8

Fig -7 Map of Dhanshiri-Borlangfer priority complex showing different RF & PRFs
Fig -8 Types of forests in Dhanshiri-Borlangfer priority complex

3.3.4 BORJURI-JUNGTHUNG-WEST MIKIR HILLS COMPLEX

Borjuri-Jungthung-Western Mikir Hills priority forest complex (345 km^2) is another important priority forest complex having cluster of reserved forest (RF) and proposed reserved forests (PRF). It comprises Jungthung RF (33 km^2), West Mikir Hills PRF (173 km^2), and Borjuri PRF (139 km^2). The general habitat type is semi evergreen and moist deciduous and sal dominated deciduous forest. The complex have habitat contiguity with Langlakso-Mikir Hills-Kalyoni priority forest complex and Kaziranga NP.

Most of the parts of Borjuri-Jungthung-West Mikir Hills forest complex are dominated by the mixed-moist deciduous type of forest dominated by *Sorea robusta*, where forest canopy is more open and density low.

The complex could also support substantial Gibbon population (>200 groups and > 500 individuals). As per recent habitat assessment only 40.1% of total vegetation cover of the complex is attributed to Gibbon habitat, of which only 43 km^2 is primary Gibbon habitat and 98 km^2 is the secondary Gibbon habitat (Biswas *et.al.*, 2015).

Fig - 9

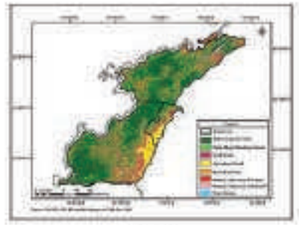


Fig - 10

Fig -9 Map of Borjuri-Jungthung-Western Mikir Hills priority complex showing different RF & PRFs
Fig -10 Types of forests in Borjuri-Jungthung-Western Mikir Hills priority complex

3.3.5 KHURIMING-PANIMUR-AMRENG COMPLEX

Khurimming-Panimur-Amreng Forest Complex (186 km^2) is another important forest complex which comes under Karbi Anglong district and Dima Hasao district.

The priority complex comprises cluster of reserved forest (RF) and proposed reserved forests (PRF) of which Amreng RF (62.8 km^2) comes under Hamren sub division of Karbi Anglong district while Khuriming RF (67.9 km^2) and Panimur PRF (55.3 km^2) comes under Dima Hasao district.

General habitat category is (i) semi evergreen, (ii) mixed deciduous and (iii) scrub / degraded forest and most of the semi evergreen forest lies in the Khuriming RF. The priority complex is under severe anthropogenic pressure in the form of tree felling, encroachment and settlement. Only 20.2% of total vegetation cover now have attributed to Gibbon habitat (48.72 km^2) of which 15.28 km^2 is the primary habitat and 33.44 km^2 is the secondary Gibbon habitat as per recent study which could support >150 individuals of Hoolock Gibbon in >55 family groups (Biswas *et.al.*, 2015).

Fig - 11

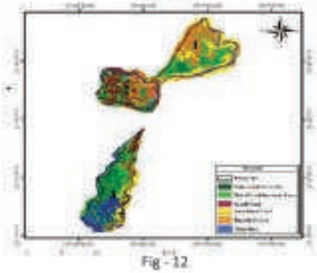


Fig - 12

Fig -11 Map of Khurimming-Panimur-Amreng priority complex showing different RF & PRFs
Fig -12 Types of forests in Khurimming-Panimur-Amreng priority complex

3.4 POPULATION STATUS OF HOOLOCK GIBBON IN ALL (N=5) THE PRIORITY COMPLEXES UNDER KARBI ANGLONG, ASSAM

During 2012 to 2014, Primate Research Centre NE India conducted extensive survey to estimate population status of Western Hoolock Gibbon in all priority forest complexes under Karbi Anglong district of Assam (Biswas, *et. al*., 2013; 2015). Auditory method (Brockelman & Ali, 1987; Brockelman & Srikosomatara, 1993) was used for population estimation in conjunction with conventional modified line transects method (Burnham *et al*., 1980; Mohnot *et. al*., 1998; NRC, 1981; Srivastava *et. al*., 2001).

During survey 169 individual Gibbons in 58 family groups were observed (average group size: 2.81± 046) and 629 duet calls from 64 listening posts were recorded. The average overall density of Gibbons in these priority complexes was 1.01 ± 0.63 groups per square kilometer. Based on these survey and habitat analysis, the estimated population of Hoolock Gibbon in five priority complexes of Karbi Anglong was estimated to be 1460 groups and 4232 individuals (Table -2), which represents >65% of state's population (Biswas *et. al*., 2013 & 2015).

Priority Forest Complex	Area	Estimated	
		Group	Population
Langlakso-Mikir Hills-Kalyoni	1104.5	777	2370
Marat Longri-Patradisa-Longnit	802.0	368	998
Borjuri-Jungthung-Western Mikir Hills	345.0	175	472
Dhansiri-Borlangfer	984.0	112	315
Khuriming-Panimur-Amren	186.0	28	77
Overall / Total	3421.5	1460	4232

Table-3 Population estimation and available habitat of Hoolock Gibbon in five priority forest complexes of Karbi Anglong, Assam.

3.5 HABITAT STATUS OF HOOLOCK GIBBON IN TWO PRIORITY COMPLEXES OF KARBI ANGLONG

Habitat of Hoolock Gibbon in Karbi Anglong on the other hand was much shrinked and degraded qualitatively. The anthropogenic pressures have resulted not only in an overall decrease in the amount of suitable habitat, but also in discontinuities in the distribution of the remaining intact habitats, which affects on the Gibbon density and group structure. This suggests that, widespread Gibbon population in the past are now cutoff in to small size and split in many small populations within a large area.

The qualitative degradation of habitat in terms of canopy cover conversion was evident in FSI report (2001 and 2011) where, changes of dense forest to open forest was dramatic in last 10 years. The report suggested that the total dense forest of Karbi Anglong in 2001 changes from 4935 km^2 to 4385 km^2 in 2011 – a 550 km^2 decrease in last 10 years. Similarly the open forest conversion rate is also similar, where in 2001 the total open forest cover was 3037 km^2 increased to 3554 km^2 in 2011 – a 517 km^2 increase in last 10 years (Forest Survey of India Report 2001 & 2011).

Forest Complex	Total area (km^2)	% of Available Habitat	Habitat (km^2)	
			Primary	Secondary
Langlakso-Mikir Hills-Kalyoni	1104.5	45.86%	174.9	331.7
Marat Longri-Patradisa-Longnit	802.0	52.84%	172.3	251.5
Borjuri-Jungthung-Western Mikir Hills	286.8	49.13%	43.1	97.8
Dhansiri-Borlangfer	984.0	33.10%	60.6	265.1
Khuriming-Panimur-Amreng	186.0	26.18%	15.28	33.44
Overall / Total	3363.3	42.98%	466.2	979.5

Table-4 Available habitat of Hoolock Gibbon in five priority forest complexes of Karbi Anglong, Assam.

PRCNE India's remote sensing data (fig – 2 & 4, 6, 8,10, 12, 13) on habitat also suggested that the available Gibbon habitats in all five priority forest complexes of Karbi Anglong, Assam is 1445.7 km^2 (Table - 3), which is just 42.98% of the total area (3363.3 km^2) of five priority complexes (Biswas *et. al*., 2013 & 2015). Of this only 466.18 km^2 constitute the primary habitat while 979.52 km^2 constitute the secondary habitat of Hoolock Gibbon in these priority complexes of Karbi Anglong.

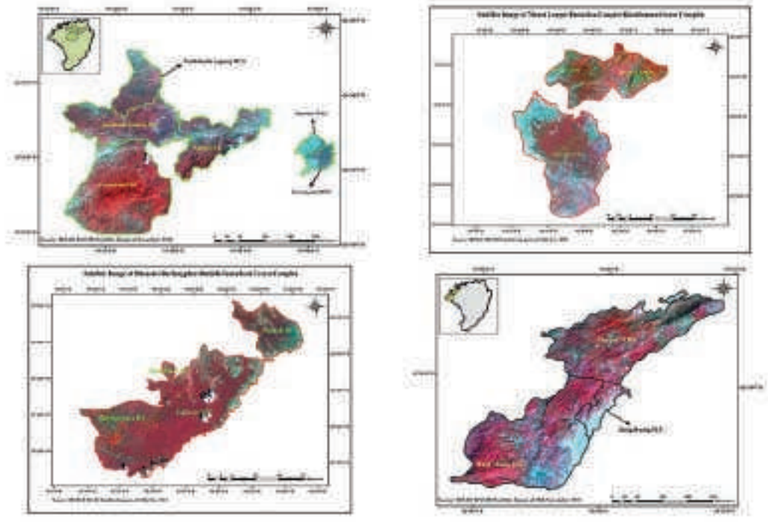
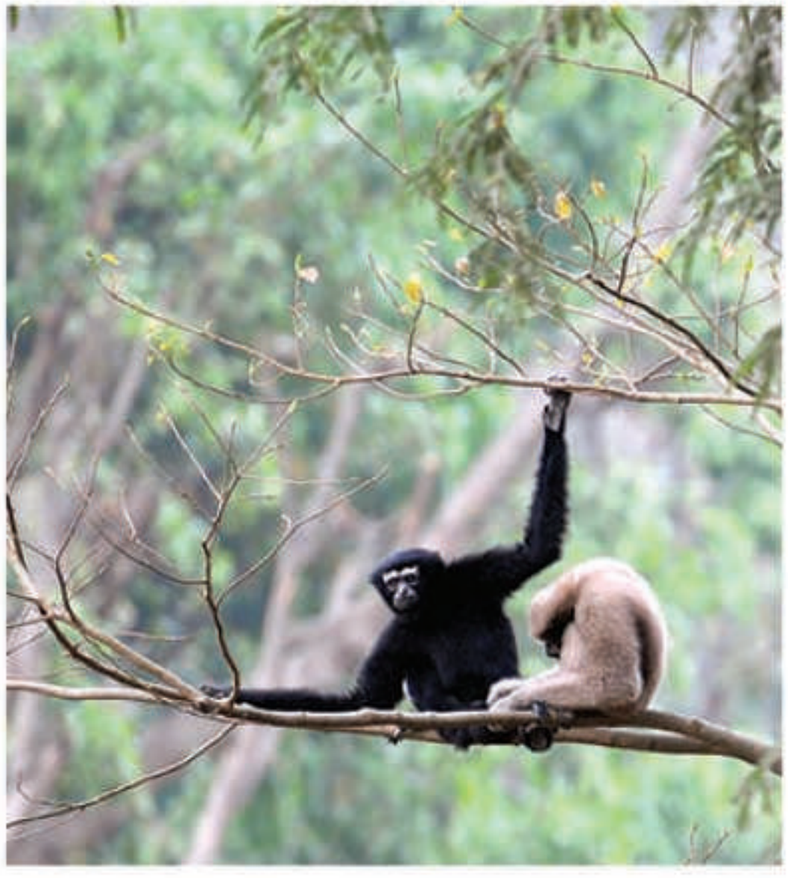


Fig 13 - Habitat status of Hoolock Gibbon in four major priority complexes of Karbi Anglong

3.3 CONSERVATION STATUS IN IUCN RED LIST, CITES & WILD LIFE PROTECT (ACT), 1972.

Western Hoolock Gibbon is threatened with extinction and is listed as **Endangered** by the IUCN Red List of Threatened Species (IUCN, 2015). Due to its endangered status, international trade in Hoolock Gibbon was prohibited and listed on **Appendix I** of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The species is well protected under the Indian Wildlife Protection Act, 1972 amended in 2006 and enlisted as **Schedule-I** species, where capturing, teasing or killing is totally prohibited.



4 PROBLEM STATEMENT RELATED TO HOOLOCK GIBBON CONSERVATION IN KARBI ANGLONG, ASSAM

4.1 HABITAT LOSS

Habitat destruction and deforestation are major issues of concern for Hoolock Gibbon conservation in Karbi Anglong. Gibbons are arboreal animals and needs continuity of forest canopy for their peculiar mode of transport called as a 'brachiator'. However Gibbons are adaptable and have been known to survive in secondary degraded forest if hunting and predator pressure is significantly low. Therefore, except for occasional site-specific circumstances, Gibbon conservation will always be more efficient, and indeed more likely to succeed in large forest landscapes.

Qualitative loss of habitat and fragmentation could break the continuity of the forest canopy, making Gibbons more accessible to predator as well as hunter. The qualitative habitat loss is assigned to selective logging, smuggling, *jhoom* cultivation, regeneration of scrub or bamboo in *jhoom* abandoned area, road and dam construction, high tension electric current transmission line and monoculture plantation, etc.

The quantitative loss is due to *jhoom* cultivation, large scale felling, illegal extraction of timber, mining, settlement, encroachment, development project and forest fragmentation (see section 3.5). While the Marat Longri-Patradisa-Longnit, Dhansiri-Borlanfer and Khuriming-Panimur-Amreng priority forest complexes suffered the most deforestation and fragmentation during recent decades, Gibbon habitat is now being lost by conversion of forest to plantations, particularly for commercial crops like rubber, teak, beetle nut leaf etc. Both the factors are the detrimental to Gibbon dispersal and survival. Within protected areas like Marat Longri WLS, East Karbi Anglong WLS and North Karbi Anglong WLS, peoples residing inside the PAs for long, pose real challenge for habitat protection and conservation.

4.2 POACHING AND HUNTING

Poaching and hunting are considered to be a major direct threat decimating the Gibbon population in Karbi Anglong specially bordering Nagaland. In absence of staff, anti poaching camp and regular patrolling mechanism, rampant hunting and poaching inside the PAs as well as in other forest areas which serves the important corridor for Gibbon is in place. The settlers inside the PAs are also posing challenge. Gibbons are generally hunted in Marat Longri-Patradisa-Longnit, Dhansiri-Borlanfer and Khuriming-Panimur-Amreng priority forest complexes. Due to hunting, these priority forest complexes have low population density and probably far below the natural carrying capacity and as a first measure preventing hunting would enable Gibbon populations to recover to natural population densities. Hunting of Gibbon not only kills an individual but that can lead to the loss of whole group, as Gibbons are monogamous and loss of either sex (male / female) leads to wipeout of the group. In addition to this, due to their monogamy (pair bond), low reproductive output and long parental care, any level of off take is far more damaging to overall Gibbon population than to

other faster breeding and faster maturing mammals of comparable size.

There are varying attitudes throughout Karbi Anglong towards the consumption of Gibbons for food. Some tribal communities have a taboo against consuming Gibbon meat while some hunt for medicine and cultural practices. They are also hunted for: (i) games and sports, (ii) medicine, (iii) ornamentation and (iv) and witchcraft which could significantly decline in a local Gibbon population as in the case of Nambor WLS. The reports on Gibbons body part trade is scarce in Karbi Anglong and adjoining Nagaland, indicating that hunting is not driven by a strong market demand.

4.3 SOCIO-ECONOMIC DEVELOPMENT

Karbi Anglong district of Assam enjoys a special status by way of provisions contained in the 'VIth Schedule' of Indian Constitution as 'Autonomous (District) Council', which vested upon the council some legislative, executive and judicial functions. Almost all the development departments of the Govt. of Assam functioning in the Karbi Anglong district have been placed under the administrative control of the Karbi Anglong Autonomous Council to ensure rapid socio-economic development. While socio-economic development is important, it can have negative impacts on sensitive natural resources, including biodiversity and wildlife, since 85% of the land area of the district is officially covered with forest. Projects that can cause major impacts on biodiversity include road construction, mining (lime stone, oil and stone quary), hydropower dams, high voltage power transmission lines and plantations. These activities often lead to habitat fragmentation and encroachment, increased man-animal conflict in those areas, in addition to a general degradation in natural resources and the environment.

Illegal logging and extraction of bamboo for paper mills in the past has not been well managed in a systematic and sustainable way. Illegal logging remains to be solved. Large scale conversion of forest land in to commercial plantation like rubber and *jhoom* cultivation, expansion of villages inside PAs remains major issues. The selective harvesting of specific tree species and destruction caused to the structure of the forest may reduce the ability for a local Gibbon population to recover. Of most relevance to Gibbons, logging not only destroys habitat and food sources for Gibbons, but also creates greater opportunities for settlement, by making forest areas more accessible and, often, enhancing market connectivity for forest products and timber. The beneficiaries of logging are mostly the private sector, individuals or business people.

4.4 INADEQUATE LEGISLATIVE SUPPORT

Insufficient legislation, redundant clauses, poor implementation of Indian Wildlife Protection Act (1972) and their rampant violations are the major area of concern in Karbi Anglong. Poor implementation of existing laws is due to lack of human resources and lack of coordination between governmental agencies. Insurgency is also a major issue that hinders conservation activities. The negative influence of political class upon law enforcing agencies is also a barrier.

4.5 LACK OF POLITICAL WILL

The importance of Hoolock Gibbon conservation as a species doesn't figure with among policy

makers, administrators and politicians. Poor allocation of funds for forestry and wildlife sector especially, for conservation activities is out of place compared to developmental activities, which have created more problems. Even in the developmental activities, implementation of Environmental Management Plan and mitigation measures are not properly executed.

4.6 LACK OF PROPER ADMINISTRATIVE SETUP

Karbi Anglong district of Assam is an Autonomous Council (KAC) under the 'VIth Schedule' of Indian Constitution. Forest and wildlife is a 'council' subject, and the State Forest Department cannot interfere in it. The administrative set up related to wildlife management is totally absent in Karbi Anglong. At present, the Karbi Anglong Council (KAC) have five wildlife sanctuaries covering about > 805 km^2 area, one Tiger Reserve and two Elephant Reserves, but the council doesn't have wildlife wing.

In absence of separate wildlife wing under forest department of Karbi Anglong, these protected areas are managed by territorial forest department staff without adequate funds, skilled staff, infrastructure (such as camp, barrack, water supply, electricity, communication network, etc.), gadgets (such as anti poaching and anti smuggling equipments, camping materials, etc.), poor training and lack of competence to undertake the required task.

4.7 ABSENCE OF PROPER CONSERVATION AND MANAGEMENT PROGRAM

Although Karbi Anglong comprises >60% of the total Indian population of Gibbon, the species does not get its due importance compared to other flagship species like Tiger, Elephant, Rhino etc. The protected area management of the existing wildlife sanctuaries in Karbi Anglong is either on ad hoc basis or based on crisis. Thus lack of species and area specific management plans inhibit the creation of resource, funding of viable program and their implementation.

4.8 LACK OF COORDINATION BETWEEN DIFFERENT DEPARTMENTS UNDER KAC

Various stakeholders under Karbi Anglong Autonomous Council have their own agenda to realize, without caring to develop and implement a common conservation goal of effective *in situ* management of Hoolock Gibbon.

4.9 LACK OF CENSUS AND POPULATION MONITORING

Periodical demographic surveys and population studies to learn the status and trend of population and their oscillation to extrapolate upcoming population status. This is possible only by exhaustive monitoring of the population.

4.10 LIVELIHOOD ISSUE

Lack of alternatives for meeting the subsistence needs of the local communities encourage *jhoom*

cultivation, illegal felling and encroachment. Need based assessment study is required to know the requirement of lively hood alternatives. Gibbon watches – an ecotourism initiative can be initiated to promote community ecotourism by the tourism department.

4.11 LACK OF AWARENESS AMONG COMMUNITIES

The socio-economic status of the communities living in and around Gibbon habitat in Karbi Anglong are reeling under poverty, low literacy and priority and awaits support for personal needs. They are economically and culturally dependent on forest, thus making the wildlife related management issue more challenging and difficulty to address. Since the major portion of forest under Karbi Anglong, which happened to be the prime Gibbon habitat, is either proposed as reserved forest (PRF) or un-classed state forest (USF) with no legal protection status whatsoever. Community practices like *jhoom* cultivation is in operation for ages and sudden up-gradation of certain areas to PAs do create problems and hostile relationship with the forest department and community. This results into lack of confidence towards forest department by the communities.

The society including media, different stakeholders and policy makers are not committed towards species conservation. Proper environmental education system at initial stages and transfer of species information to the society is lacking. The existing information on the species is not easily available due to unmanaged information dissemination.

Left -Female Gibbon in canopy

5 OBJECTIVE OF CONSERVATION ACTION PLAN IN KARBI ANGLONG 2016 - 2026

This section defines the vision, objectives and key actions for conservation of Gibbons in Karbi Anglong from 2016 to 2026. Priority actions are identified for each forest complexes as well as each objective of the action plan. Detailed activities of the action plan for achieving the goals and objectives set are presented in section 3.3.

5.1 VISION

A secure world in which the western Hoolock Gibbon thrives in natural habitats across Karbi Anglong, in harmony with people.

5.2 OBJECTIVE & GOALS

The overall objective of this Action Plan: to conserve western Hoolock Gibbon within the secure habitats of Karbi Anglong district of the state of Assam by promoting participatory conservation management, policies and legislation.
Short term and long-term goals have been identified towards achieving this objective:

5.2.1 SHORT-TERM GOALS

1. To secure adequate protection for the known populations of the Western Hoolock Gibbon and their habitats, to arrest any further decline in populations and degradation of the habitats within a period of 5 years.

2. To secure habitats of Western Hoolock Gibbon through improved management practice of existing protected areas in Karbi Anglong, primarily by establishing land corridors between protected areas and up gradation of existing Gibbon habitat other than PAs to community reserve or conservation reserves and establishing new protected areas.

3. Initiate meta-population management for stray and isolated population.

4. Promote local capacity, conservation education, awareness and sustainable eco-development.

5.2.2 LONG-TERM GOALS

To develop a administrative framework for wildlife conservation in Karbi Anglong focusing Gibbon as a flagship species in PAs and outside the PAs and promote ecologically responsible development.

1. To restore degraded habitats earlier used by Hoolock Gibbon populations of within next 10 years.

2. Promote scientific approach for conservation and an adaptive framework for wildlife management.

3. Promote intensive agricultural practice to reduce further expansion of *jhoom* land.

4. Involve communities in Gibbon conservation.

6 CONSERVATION ACTION PLAN OF HOOLOCK GIBBON IN KARBI ANGLONG 2016 - 2026

This section presents and justifies the priority activities needed for, or to assist in the protection, management and recovery of the Western Hoolock Gibbon population and their habitats in Karbi Anglong, Assam. These recommended activities were developed from a series of consultations with the Gibbon experts, SSA PSG Species Survival Commission, primary stakeholders like forest department, community members and outcome of the 'Strategic Planning Workshop for the Conservation of Western Hoolock Gibbon in Karbi Anglong' held at Diphu. Summary of the recommended activities and the budget are presented below.

6.1 ESTABLISHMENT OF GIBBON CONSERVATION COMMITTEE

Site: Karbi Anglong Autonomous Council (KAAC), Assam

Type of Action(s):
(i) Formation of a formal statutory body called Gibbon Advisory Committee to look after policy decision related to Hoolock Gibbon conservation in KA.
(ii) Formation of a executive body called Gibbon Working Committee for implementation of different management intervention related to Hoolock Gibbon conservation.

Duration: 1 -2 years.

Lead Agency: FD (KAAC).

Responsible Agencies: FD (KAAC), FDCC (Assam), PRCNE India, WWT, local NGO, CBOs.

Justification:

Advisory Committee: An advisory committee would be formed to look after the policy decision related to Hoolock Gibbon conservation and management issue in Karbi Anglong under the leadership of Addl. Principal Chief Conservator of Forest (Karbi Anglong) as Member Secretary and Honorable Executive Member, Forest (KAAC) as President. All Divisional Forest Officers under Karbi Anglong Autonomous Council would be the member The Principal Secretary (KAAC), Secretary, Forest (KAAC), Forest Board Chairman (KAAC), Primate Research Centre NE Coordinator, Assam University representative to serve on the Advisory Committee.

Working Committee: Apart from Advisory Committee, a working committee would also be formed to implement various management decision approved by the advisory committee. The member would include all Range in-charge under Karbi Anglong Autonomous Council, Assistant Conservator of Forest, Beat in-charge, sub Beat Officer, Gibbon Researchers and Honorary Wildlife Warden (Karbi Anglong Autonomous Council).

Grass root Committee: During execution of various management interventions, local community leaders and organizations shall be entrusted jobs for proper implementation. For that, another committee would be formed incorporating members of Gaon buras (KAAC), Village Defense Person (KAAC), Local NGOs, Self Help groups, Community leaders, representative of Religious institution of that respective locality, etc.

6.2 STRENGTHENING PROTECTED AREA MANAGEMENT & INFRASTRUCTURE DEVELOPMENT

Site: North Karbi Anglong WLS, East Karbi Anglong WLS, Marat Longri WLS, Nambor WLS & Garampani WLS.

Type of Action(s):
(i) Establishment of separate Wildlife Division in Karbi Anglong Autonomous Council.
(ii) Establishment of three wildlife Range to administer these PAs.
(iii) Infrastructure development including office building, barrack for front line forest staff, water and electricity supply, anti poaching camps.
(iv) Communication: Vehicles and fuel, patrolling road, communication network like wireless set & station.
(v) Supplies: Ration for staffs and incentives, field gears and equipments, regular fund flow for smooth running.
(vi) Management Plan for each PAs and an annual operation plan
(vii) Training and capacity building of front line forest staffs.

Duration: Phase I: 2 years, Phase II: 8 years.

Budget: Phase - I: ₹ 1,50,00,000.00 – ₹ 2,00,00,000.00

Budget: Phase - II: ₹ 21,00,00,000.00

Lead Agency: FD (KAAC).

Responsible Agencies: FD (KAAC), FDCC(Assam),Deptt. of Env., Forest & Climate Change, Govt. of Assam, MOEFCC (Govt. of India), PRCNE India, WWF, WWT, WTI, WP.

Justification:

In absence of separate wildlife division, the tasks for managing the PAs to date have been undertaken by the normal territorial forest department of KAAC. The infrastructure of the PAs were very poor and there is very weak capacity of protection. The forest staffs lack the necessary knowledge and skills in wildlife monitoring and management as most staffs were trained in traditional forestry. Therefore the foremost priority would be establishing one wildlife division and three wildlife ranges as none of them currently exist, recruitment of staff, infrastructure development and strengthening protected area management in all the five protected areas (PA).

Of equal importance is to have staff of the respective PAs with some competence. The staff will have to be equipped with proper equipment, field gears and skills relevant to their job description. Constant surveillance in and around the sanctuary is one of the major aspects of anti-poaching and conservation strategy. Mobility, monitoring, speedy response of foresters by using tough terrain vehicles and boosting the morale of the staff. There should be emphasis on the well being and high morale of the staff by erecting barracks for their stay as well as anti poaching camp in some strategic location to check poaching and hunting. The barrack and camp should incorporate with water supply, electricity or solar power batteries to charge the gadgets and equipments. Regular supply of ration and other supplies for field staff should be ensured for smooth execution of field duties.

Some of the equipments required to implement this program will include four wheel cabin crew vehicles, motorcycles, two-way radio communication, GPS units, fire-arms and accessories, other patrol equipment, and basic field gears. The protection program is estimated to cost between ₹1,50,00,000.00 to

₹2,00,000,000.00 for the first phase, and ₹21,00,000,000.00 for the second phase to cover infrastructure, equipment and operational costs.

6.3 ENFORCEMENT & SPECIES AND HABITAT PROTECTION PROGRAM

Site: Langlakso-Mikir Hill-Koliyoni, Marat Longri-Longnit-Patradisa, Borjuri-Jungthung-West Mikir Hills, Dhansiri-Barlangfer and Khuriming-Panimur-Amren priority forest complexes under Karbi Anglong.

Type of Action(s):
(i) Staff enrolment (frontline 50 numbers).
(ii) Training: for conservation managers on designing patrol, training patrol teams on basic field skills, use of equipment, reporting and responding to incidents on site.
(iii) Patrol management: prioritize patrolling zones in protected areas, based upon maximizing the potential impact from patrols on significantly reducing threats and understanding of the tactics of hunters and wildlife traders.
(iv) Monitoring and management responses to patrol reports, collaborating with relevant government agencies and communities.
(v) Relocation of villages inside the potential Gibbon habitats.

Duration: 10 years.
Budget: Phase - I: ₹ 16,50,00,000.00 – ₹ 18,00,00,000.00
Budget: Phase - II: ₹ 5,00,00,000.00
Lead Agency: FD (KAAC).
Responsible Agencies: FD (KAAC), FDCC (Assam), Civil Administration (KAAC), Assam Police, PRCNE India, NGOs, stakeholder communities.

Justification:

Although provincial and national laws legally protect the Hoolock Gibbon and its habitats, yet hunting and habitat loss have considered to be the main threat to Gibbons. On the other hand, hunting pressure has apparently increased over the last few years and has taken a significant toll on Hoolock Gibbon populations in its southern boundary. Almost invariably, much of the hunting is linked with general wildlife trade activity outside the protected areas, and this may often also be the case for Gibbons. The need to implement Wildlife Protection Act, 1972 amended in 2006 and also impose stricter laws and heavier penalties for the illegal possession of protected species or their body parts, and the illegal possession of firearms should be seriously dealt with. Priority for immediate conservation action to prevent further decline of habitat of this endangered species is to halt expansion of *jhoom* cultivation and encroachment as well as illegal felling of trees. This would require enrolment of front line staff preferably 50 numbers, establishing anti poaching camp, wireless stations, permanent and semi permanent shelters for staff, establishing checkpoints that would be manned 24 hours a day, and establishing patrolling routes and protocol. In addition, the staff would need to be trained in wildlife laws, protected area rules and regulations, fire-fighting techniques, and in law enforcement activities using non-confrontational methods.

The human resources for patrolling can be drawn from the fringe communities living in and around the protected areas. Such patrolling teams would help foster better relationships among the stakeholders. In addition, local people's knowledge of the area and of hunting techniques would be of immense use to the protection teams. Patrolling zones in protected areas should be prioritized, based upon maximizing the potential impact from patrols on significantly reducing threats and understanding of the tactics of hunters and wildlife traders. Networks and patrol teams in the protected areas should be well trained. Hiring local people would provide them a secure source of income, and they often become staunch advocates for the protection of species and their habitats. The protection program is estimated to cost between ₹1,50,00,000.00 to ₹1,00,00,000.00 for the first phase and ₹2,00,00,000.00 for the second phase to cover infrastructure, equipment, operational costs and salaries.

Training and capacity development programs will need to be part of professional development of patrol staff and managers for effective management of the PAs. In addition to capacity development, efforts should be made for capacity building at the individual and the institutional level. Furthermore, training should be imparted for conservation managers on designing patrol, training front line forest staffs and patrol taem on basic field skills, use of equipments, reporting and responding to incidents on site. Furthermore, the measurable standards could also be used for developing, delivering and assessing in-service training. Clear demarcation of the boundaries and management zones be developed as integral part of protected area management. The estimated costs for developing and conducting in-service training programs for staff of the three areas would require between ₹4,00,000.00 to ₹5,00,000.00 per two-week program for 25 persons. It is recommended that this activity be conducted at least twice a year for the first three years, and at least once a year for the following years.

In addition, a series of short-term expert input are needed to establish patrolling protocols and to train the personnel in effective patrolling and in recording and reporting human activities accurately. The international expert for the long-term monitoring program for SMART patrolling could be requested to provide additional input. Some of the equipment required to implement this program will include vehicles, two-way radio communication, GPS units, camera, binoculars and basic field gears, infrastructure, equipment, operational costs and salaries.

As per the Wildlife Protection Act 1972 amended in 2006 no settlement inside the park boundary is allowed. The villages inside North Karbi Anglong WLS, East Karbi Anglong WLS, Marat Longri WLS, mostly of which are in the core area creates threats to the wildlife population. The rampant hunting by the resident of these villages become a big management issue. Moreover poachers use these villages as transit and route to escape. Hence, as per the recommendation of 'Strategic Planning Workshop on Hoolock Gibbon Conservation' in Diphu, the fresh settlement areas should be vacated and the old settlements should be relocated with mutual understanding of communities residing in those areas and with proper compensation. Moreover, regular monitoring and patrolling was recommended to check and halt further clearing inside the PAs, which is the corridor for wild animals. In addition, it is recommended that all safeguards in relation to resettlement be fully satisfied before attempting to relocate the settlements as per Forest Act of 2013.

In other potential Gibbon habitat areas other than PAs, like Langlakso PRF, Borjuri PRF, West Mikir Hill RF, Koliyoni RF, Dhansiri RF, Barlanfer RF, Khonbamun DCRF, relocation be considered as the last option only if all attempts to involve the communities or to win their support fail. Because, uncertainty of relocation of a particular village may have resulted in a deterioration of community management systems and health.

6.4 UP-GRADATION AND EXPANSION OF POTENTIAL GIBBON HABITATS OUTSIDE THE PAS

Site: Langlakso PRF, Khonbamun DCRF, Longnit RF, Borjuri PRF, West Mikir Hill RF, Dhansiri RF, Barlangfer RF.

Type of Action(s): (i) Up gradation of the legal status of proposed North Karbi Anglong WLS to full fledged sanctuary and brought under protected areas management.
(ii) Pursuance and lobbying for formation of new PAs.
(iii) Expansion of PAs and land corridor establishment and zone demarcation.
(iv) Establishment of Community Reserve in consultation with communities for better protection.
(v) Co-Management.
(vi) Halting further deterioration of habitat by discouraging *jhoom* cultivation and by introducing alternative livelihood practice.
(vii) Reforestation and restoration of degraded habitat.
(viii) Establishment of rescue and rehabilitation centre for stray Gibbon.

Duration: 10 years.

Budget: ₹ 8, 00, 00,000.00 – ₹ 9,00,00,000.00

Lead Agency: FD (KAAC) and PRCNE India.

Responsible Agencies: FD (KAAC), WWF, WTI and community based organizations (CBOs).

Justification:

Up gradation of 'proposed' North Karbi Anglong Wildlife Sanctuary to legally designated full-fledged wildlife sanctuary is essential in ensuring long term conservation of Western Hoolock Gibbon and other flagship species like Tiger, Elephant, Rhino etc as the existing setup did not adequately address their protection and conservation needs. This enables manager to prepare management plan to target limited resources to priority locations based on conservation values and pressure on forest and wildlife.

Expansion of potential Gibbon habitats in to the PAs include: drawing up a proposal to legally designate the potential Gibbon habitat under PRF or USF (Un-classed State Forest) status viz Langlakso PRF, Dhansiri RF, Koliyoni RF, Borjuri RF, West Mikir Hill PRF in to WLS or Community Reserve, thereby establishing protected land corridors between existing protected areas with Gibbon populations. It has been established that conservation is best achieved through promoting the welfare and participation of local communities, and supporting one would favor the other. Thus in present day scenario protected area management emphasized on preservation of biodiversity values by responsible authority and encouraging community involvement, which is called co-management. In area like Karbi Anglong where the ethnic diversity is best flourished and practiced in and around the forest, this concept is very relevant to the wildlife conservation. Moreover, designate totally protected zones and controlled use zones with local stakeholders in protected areas to ensure that Gibbon habitats are systematically protected from *jhoom* cultivation and encroachment under the management plan and regulations of protected areas. As Gibbons would be projected as flagship species, totally protected zones should ensure that they cover substantial proportions of Gibbon populations in the PAs.

Establishment of new protected areas and the extension of existing ones are essential in ensuring the long-term survival of Gibbon populations, particularly if existing protected areas do not adequately address their protection and conservation needs. However, establishing new protected areas or extending existing ones must be based upon sound scientific information obtained through long-term field research, ensuring that areas are well demarcated and biodiversity needs are addressed.

Fig 14 - Map showing different PAs, RFs, PRFs and DCRF under Karbi Anglong, Assam (after A. Choudhury).

Linking protected areas or community reserve should closely be linked to recommended conservation action by establishing protected land corridors between existing protected areas with Hoolock Gibbon populations and reforestation and restoration of degraded habitat within protected areas with Hoolock Gibbon populations. Reforestation and restoration activities should avoid the conventional plantation forestry comprising single and/or introduced species approach. Instead, the correct approach to forest restoration is to accelerate natural forest regeneration by increasing tree density and species diversity, and by encouraging the dispersal of seeds. This can be brought about by carefully planting selected species to the already existing seedling community. The selected species should be those that grow rapidly, shade out weeds, attract seed-dispersing wildlife, and are known food plant species of Hoolock Gibbons. Reforestation would require collection of seedlings, establishing and maintaining nurseries, and planting saplings. Members of the local communities should be employed to fulfill these activities.

Rescue and rehabilitation program for the isolated groups in villages and stray Gibbon or pets will have to be taken up with urgency. This initiative will help to formulate the strategies and methods for the future rehabilitation program for Hoolock Gibbon, being a higher order primate (Hylobatidae), has strong social bonds. Before rehabilitation they must undergo pre-release training, acclimatization, socialization and post-release monitoring is essential. Nambor WLS could be a potential release site for stray Gibbons, if hunting could control. Establishment of rehabilitation centre for all animals including Gibbon after rescue is also recommended.

6.5 CENSUS & MONITORING OF HOOLOCK GIBBON POPULATION & HABITAT

Site:	Langlakso-Mikir Hill-Koliyoni, Marat Longri-Longnit-Patradisa, Borjuri-Jungthung-West Mikir Hills, Dhansiri-Barlangfer and Khuriming-Panimur-Amren priority forest complexes under Karbi Anglong.
Type of Action(s):	(i) Training and capacity building. (ii) Develop sensus manual. (iii) Censur survey in every three years interval. (iv) Population monitoring and research. (v) Management. (vi) Central database.
Duration:	5 years.
Budget:	₹ 1,25,00,000.00 – ₹ 1,50,00,000.00
Lead Agency:	FD (KAAC).
Responsible Agencies:	FD (KAAC), PRCNE India, WWT, Assam Forest School, Assam University (Diphu Campus), NGOs.

Justification:

While considerable survey work has been carried out on Western Hoolock Gibbon in other parts of the state as well as in Northeast India and Bangladesh (Gittins, 1984; Gittins & Tilson, 1984; Choudhury, 1990; Das *et. al.*, 2003; 2005; 2009; Molur, *et. al.*, 2005), but almost nothing has been done for Karbi Anglong district of Assam except one report, which was published based on preliminary observations (Choudhury, 2009) and long term study by Biswas *et.al* (2013, 2015).Owing to the fact that there is a gap of information of the species status and habitat quality, while having huge conservation potential there is a need to determine its status in these priority complexes in Karbi Anglong.

It is recommended that, the survey should be conducted in every three years of interval as in case of Tiger census, Elephant census. In addition, qualified surveys based on sound scientific methodologies will yield better information about their population and group sizes, age-sex composition and habitat use. Thus, the capacity building of the stakeholders to use precise and modern field methodologies for data collection is essential to assess the population structure and density of Gibbons. To introduce the stakeholders with the latest methodology on Gibbon census techniques, training and capacity building programs should be organized. For that a permanent training centre would be established in Diphu to conduct such type of capacity building program.

In this context, this Action Plan is the outcome of the recently concluded survey in five forest complexes and its adjacent areas of Karbi Anglong under the aegis of PRC, FD (KAAC), PTES and USFWS, which is the base line information for this Action Plan (see section 3.3. & 3.4).

For survey, a census manual should be prepared by experienced Gibbon experts and should be published in local language. Depending on access and size of the areas, the surveys are expected to take between one to three months in each area. The estimated costs for conducting a professional survey for the Hoolock Gibbon would require between ₹3,00,000.00 to ₹4,00,000.00 per month per site to cover transport, supplies, fees, and local guides.

To date, there is no established mechanism to monitor changes to the Hoolock Gibbon populations and their habitats. Hence, monitoring is needed to identify major patterns of abundance, distribution and movements of key species; to evaluate effectiveness of protection; to identify areas of conservation concern (e.g., zones of high human impact or faunal concentrations); and to provide a basis for monitoring ecological changes and patterns of human use. Monitoring provides essential data for making wise management decisions – allowing quick identification of, and appropriate response to management problems. Hence, a long-term monitoring program covering all PAs and Langlakso PRF, Borjuri PRF, Koliyoni RF, Dhansiri RF, Barlanfer RF and Amren PRF is a high priority recommendation for conservation action in this Action Plan. The monitoring teams should collaborate with Gibbon Working Committee (6.1) and Primate Research Centre.

As the required level of competence to fulfill the ascribed tasks are lacking, therefore the services of an internationally accredited Gibbon expert should be acquired. The expert's tasks would include training and developing capacities of all personnel; establishing monitoring routes and protocols; developing data recording and entry formats; supervise data management, analysis and interpretation; and provide overall leadership to the program. In the fifth year, the expert is expected to review the program, identify its strengths and weaknesses; make recommendations to address those weaknesses, and develop a proposal for its continuation.

Monitoring teams would need to be fully trained and well equipped to ensure accurate data are gathered and should include individuals from the communities living in and around the protected areas. Local people will add value to the program with their local ecological knowledge. In addition, the monitoring program can be carried out alongside routine protection activities by local people, or the same human resource can be used for both activities. Thus, the proposed budget of this activity will need to be increased by about 30% to cover both protection and monitoring activities and related infrastructure and equipment. An expert must also be recruited whose main tasks are to oversee the program's activities, train and develop the capacity of monitoring teams and officers, manage and interpret data, make appropriate advise to the protected area managers and district/provincial FDs.

A centralized database effort to collate information on Hoolock Gibbon distribution densities and abundance will be initiated. By compiling information that can be used to create dynamic spatial models of environmental and human variables, which influence Gibbon abundance, this database would be an invaluable resource for strategic conservation planning and immediate threat detection. Potential data sources include geo-referenced auditory survey data, satellite imagery, and information collected by forestry prospectors during inventories for management plans. Collaborations will need to be established among local governments, research institutions and conservation organizations and individuals to synthesize information for this database.

Some of the infrastructure and equipment required to implement this program will include a central coordinating office, computers (and peripherals), transport, GPS units, and basic field gear. The first five years of the monitoring program is estimated to cost between ₹1,25,00,000.00 – ₹1,50,00,000.00 to cover infrastructure, equipment, operational costs and salaries.

6.6 LONG-TERM FIELD STUDIES ON BEHAVIORAL ECOLOGY

Site:	Langlakso-Mikir Hill-Koliyoni, Marat Longri-Longnit-Patradisa, Borjuri-Jungthung-West Mikir Hills, Dhansiri-Barlangfer and Khuriming-Panimur-Amren priority forest complexes under Karbi Anglong.
Type of Action(s):	(i) Research & monitoring. (ii) Capacity building. (iii) Management.
Duration:	5 years.
Budget:	₹ 75,00,000.00
Lead Agency:	FD (KAAC), PRCNE India.
Responsible Agencies:	FD (KAAC), PRCNE India, WWT, Assam Forest School, Assam University and other University.

Justification:

Long-term studies provide data on various life history strategy and adaptation of species to a particular habitat. In addition, they provide data for evaluating trends, for predicting behavioral strategies, and for testing hypotheses on behavioral adaptations. Importantly, information obtained will assist in formulating management plans for species conservation, and in strengthening management plans for protected areas. Long-term studies of Gibbon demography and behavior are needed to understand how these lesser apes specifically respond to changing social and ecological environments. For example, determining the immediate and long-term responses of Gibbon in changed habitat conditions remains unresolved, while the behavioral adaptation of Hoolock Gibbon and the climate change issue is totally untouched. Furthermore, it has been shown that long-term studies and scientific presence have had significant impact on protected area establishment and/or extension, and have frequently deterred poaching and habitat encroachment. For example, preliminary study by Choudhury (2009) yielded creation of two wildlife sanctuaries in Karbi Anglong viz. East Karbi Anglong WLS and Marat Longri WLS and one sanctuary was proposed viz. North Karbi Anglong WLS.

Thus, efforts must be made to encourage a continuous supply of primate researchers at all known Hoolock Gibbon sites under Karbi Anglong. The major thrust area would be eco-behavioral study, food and feeding, threat assessment, population dynamics and parasitological and genetic study. Apart from animal centric study, effort will also be made to study the habitat quality, change detection and its impact on Gibbon population as well as mapping available habitat and detection of relative gap for restoration program. Mapping is also essential for management intervention like – resource diagram, patrol route map, animal corridor and route etc. FD (KAAC) should consider appointing full-time Research officer, who will ensure better co-ordination and integration of management and research activities, and help the management authorities to refine research priorities. In addition, the Research officer should assist in co-ordinating visiting researchers, encouraging study on topics important for management, and ensuring that biodiversity values are not compromised. The cost for conducting a long-term scientific study on the behavioral ecology of the Hoolock Gibbon at each site is estimated to cost ₹15,00,000.00 for each year of field activities.

6.7 CONSERVATION EDUCATION AND AWARENESS

Site:	Karbi Anglong Autonomous Council, Assam.
Type of Action(s):	(i) Mass awareness program. (ii) Target oriented conservation education program. (iii) Media awareness program. (iv) Management.
Duration: Phase I:	5 years.
Duration: Phase II:	5 years.
Budget: Phase I:	₹ 50,00,000.00
Budget: Phase I:	₹ 50,00,000.00
Lead Agency:	PRCNE India, FD (KAAC).
Responsible Agencies:	FD (KAAC), PRCNE India, ZOO/WILD, GC, CEE, WWF, Assam University (Diphu), NGOs.

Justification:

Conservation education and community outreach could play an important role in raising awareness of the natural world of Hoolock Gibbon and provides a strong base for the need for its conservation. Given in an effective manner, it has an active and direct impact upon people's attitude and behavior. Increasing awareness and educating the community on wildlife laws, protected area rules and regulations, and conservation issues will be, in the long-term, an essential step towards bringing about community understanding and support.

When awareness about Gibbon is converted in to action by the communities, its results in positive benefits for Hoolock Gibbon population, people and conservation. Outreach conservation education on issues of man-animal conflict, habitat loss and Hoolock Gibbon population conservation helps to achieve sustainable development by engaging a variety of communities at the local level. Conservation education also enables communities to develop a sense of appreciation, love, wonder, respect, care and concern for nature.

In order to increase understanding and awareness about community-wildlife relationship, it is important to involve all sections of the communities in an integrated wildlife conservation education network. However, awareness campaigns and education programs must be carefully tailored to suit the target audiences, which can comprise urban to rural to ethnic communities. Furthermore, the materials and programs should be culturally sensitive, relevant, and simple to comprehend. Hence highlighting the values of maintaining biodiversity and the ecological services they provide, and the wise management of natural resources toward sustaining and enhancing their livelihoods is likely be more relevant and achieve the desired effect.

Awareness materials should include the use of local media. The use of participatory education campaign should be adopted from WCS/ZOO's 'Hoolock Gibbon: Hang On' manual enacting plays based on conservation themes would likely be a popular and effective tool for conservation education and awareness, especially for schools and communities in or close to the Hoolock Gibbon's habitats. The services of public figures – successful entrepreneurs, athletes, singers, actors and actresses known to local communities – should be engaged to convey conservation messages. The cost involves conducting conservation education, awareness activities (transport, DVD players, projectors, etc.), and producing relevant materials is estimated to be ₹50,00,000.00 in first phase and ₹50,00,000.00 in second phase.

6.8 PARTICIPATION OF STAKEHOLDER COMMUNITIES & THEIR LIVELIHOOD SUPPORT

Site:	North Karbi Anglong WLS, East Karbi Anglong WLS, Marat Longri WLS, Langlakso PRF, Longnit DCRF, Dhansiri RF, Barlangfer RF, Borjuri PRF.
Type of Action(s):	(i) Socio-economic survey. (ii) Training & capacity building. (iii) Management.
Duration: Phase I:	2 years.
Duration: Phase II:	8 years.
Budget: Phase I:	₹ 50,00,000.00 – ₹ 1,00,00,000.00
Budget: Phase I:	₹ 5,00,00,000.00 – ₹ 6,00,00,000.00
Lead Agency:	FD (KAAC), PRCNE India.
Responsible Agencies:	FD (KAAC), PRCNE India, WWT, Grass root Committee, CBOs, NGOs.
Justification:	

Conservation awareness and education activities may allow the public and communities to better appreciate the values of biodiversity conservation and natural resource management, but it is important to understand that awareness and education programs will be of little value if socioeconomic standards remain low. This is particularly the case for a large majority of the human population throughout the Hoolock Gibbon's range. Their limited options to generate income other than *jhoom* cultivation and illegal felling of trees, and low, declining agricultural productivity have resulted in an unsustainable exploitation of forest resources.

Hence, conservation programs or development projects throughout the Hoolock Gibbon potential habitats should benefit local communities through their participation, and/or through economic incentives. Prior to implement any such program, a socio economic status survey and identification of potential income generating scheme fit for the area should be conducted to get the overall scenario. Local rules and regulations with respect to the protection and sustainable use of natural resources could be developed for the participating communities in exchange for employment, or for development and livelihood improvement benefits.

Developing and/or integrating conservation into development programs or vice-versa usually require time, effort and resources. However, a quicker and effective way is to provide training in different alternative income generating scheme like bee culture, mushroom culture, piggery, alternate cropping system etc. which is sustainable for the area and facilitate local people with various government supporting scheme to get started. Moreover, employment to members of the stakeholder communities as members of the protection teams, as members of the monitoring teams, as field assistants on long-term studies, and as employees of the PAs also helpful.

Thus, the recommended activities 5.3 to 5.6 above should benefit local communities through their participation, and likewise the recommended activities would benefit from the local communities knowledge and skills. There are numerous examples globally of local communities becoming strongest supporters of biodiversity conservation through their active participation in conservation activities. Participation of stakeholder communities to the recommended activities would require additional budget of ₹50,00,000.00 – ₹1,00,00,000.00 for phase-I and ₹5,00,00,000.00 – ₹6,00,00,000.00 in phase II.

6.9 SITE-BASED GIBBON ECO-TOURISM

Site:	North Karbi Anglong WLS, East Karbi Anglong WLS, Marat Longri WLS and Langlaksho - Kolyoni areas..
Type of Action(s):	(i) Feasibility study on potentials for ecotourism development. (ii) Promote community-based ecotourism development. (iii) Training & capacity building. (iv) Management.
Duration:	5 years
Budget:	₹ 1,00,00,000.00 – ₹ 1,50,00,000.00
Lead Agency:	FD (KAAC), PRCNE, Tourism Department (KAAC)
Responsible Agencies:	FD (KAAC), PRCNE, WWT, GC, Grass root Committee, CBOs, NGOs.
Justification:	

There are people living in and around all priority forest complexes as well as in the designated protected areas in Karbi Anglong and their livelihoods depend heavily on local natural resources. Species conservation planning in and around these areas should include carefully targeted support for livelihood development that links the needs of local villagers to conservation objectives.

Ecotourism represents a means of directly tying increased incomes for local communities to the presence of the local Gibbon population, as gibbons in themselves can be a major tourist attraction. Ecotourism projects should give high priority for communities who fully participate in Gibbon conservation. For that, a feasibility study to assess potentials for community-based tourism investment in relation to Gibbon conservation, as well as looking at additional tourism values in the area, such as the landscape, culture, food production and handicraft development, and assess community capabilities at the selected sites is required. However, project design and planning to implementation this project should be carefully considered in order to avoid direct and indirect adverse impacts, both short-term and long-term, on other biodiversity as well as gibbon populations.

6.10 FUNDING

Besides external funding Project Hoolock Gibbon has been proposed for constant support for the conservation of Western Hoolock Gibbon from Government of India in the lines of Project Tiger, Project Elephant and Project Snow Leopard. For that, a formal proposal should be drafted to Ministry of Environment and Forest & Biodiversity, Govt of India for final approval. Other than this fund should be sorted from various sources like-

6.10.1. GOs & NGOs.
6.10.2. Overseas donor like FWS, CI, British Petroleum, David Shepherd Foundation etc.
6.10.3. Corporate Houses.
6.10.4. MOEFCC- Conserving species outside PAs.
6.10.5. Biodiversity Heritage site.
6.10.6. International Donor Agency.

7 TARGET WISE MILESTONE, INDICATOR, BUDGET & IMPLEMENTING ORGANIZATION

Target (goal)	Milestones (Outputs)	Indicators	Comments &Budget	Implementing Organization
T1 – Gibbon Conservation Committee.	1.1. Formation of statutory body to look after Gibbon conservation issue by 2016.	1.1.1. Formation of Gibbon Advisory Committee in KAAC by 2016. 1.1.2. Formation of Gibbon Working Committee in KAAC by 2016. 1.1.3. Formation of Gibbon Grass root Committee by 2016.	Advisory Committee is a statutory body who will look after policy related issues, Working Committee execute the policy decision and Grass root committee helps on execution of the recommendations made by above committee. Budget - Nil.	FD (KAAC), PRCNE India, WWT, Universities, Other Department (KAAC), NGOs, CBOs.
T2 – Strengthening PA managemet & Infrastructure development.	2.1. Effective management of existing protected areas across KAAC by 2026.	2.1.1. Existing administrative setup of the PAs under Karbi Anglong changed by 2018. 2.1.2. Separate Wildlife Division and 3 ranges established by 2018. 2.1.3. Infrastructure, staff enrollment, training, communication including vehicle, other gadgets for patrolling of 5 PAs put in place by 2026. 2.1.4. Staff amenities like ration, water, supplies look after by 2026.	Protected area management must include communities within and around protected areas. Budget: Phase - I: ₹ 1,50,00,000.00 – ₹ 2,00,00,000.00 Budget: Phase - II: ₹ 21,00,00,000.00	FD (KAAC), DFCC (ASSAM), PRCNE India, WWT, WWF, NGOs, CBOs.
	2.2. Secure and well managed Hoolock Gibbon habitat in PAs and priority complexes under Karbi Anglong Autonomous Council by 2026.	2.2.1. All threats itemized and relative importance assessed by 2017. 2.2.2. Management plans for each PAs written or revised and implemented. 2.2.3. Community stakeholders identified, consulted and involved in protected area management by 2017. 2.2.4. Relocation of settler from PAs by 2026.		FD (KAAC), PRCNE India, WWT, WWF, NGOs, CBOs.

T3 – Enforcement & Species & Habitat Protection.	3.1.Secure habitat of Hoolock gibbon by establishing anti poaching units with active participation of local communities by 2021.	3.1.1. Number of patrol unit established by 2017. 3.1.2. Number of equipments distributed. 3.1.3. Number of patrol days increased. 3.1.4. Number of anti-poaching camp established. 3.1.5. Number of families relocate. 3.1.6. Illegal logging stopped and concessions on NTFP collection checked or a moratorium on NTFP collection. 3.1.7. Area under selective logging and fresh *jhoom* cultivation stopped.	Budget: Phase –I: ₹ 15,00,00,000.00 – ₹ 16,00,00,000.00 Phase-II: ₹ 3,00,00,000.00	FD (KAAC), DFCC (Assam), PRCNE India, WWT, WTI.
	3.2. Law enforcement against logging, *jhoom* cultivation and hunting inproved.	3.2.1. Number of staff trained and equipped. 3.2.2. Number of confiscations increased. 3.2.3. Number of prosecutions increased. 3.2.4. Increased penalties.	Budget: ₹ 1,50,00,000.00 - ₹ 2,00,00,000.00 Phase II: ₹ 2,00,00,000.00	FD (KAAC), DFCC (Assam), PRCNE India, TRAFFIC (India), WWT, NGOs, CBOs.
T4 – Up-gradation & Expansion of potential Gibbon Habitats outside PAs	4.1. Legal status of potential Gibbon Habitats upgraded.	4.1.1. North Karbi Anglong WLS legally upgraded and brought under protected area management by 2017.	Protected area management must include communities within and around protected areas. Budget: ₹ 8,00,00,000.00 – ₹ 9,00,00,000.00	FD (KAAC), FDCC (Assam), PRCNE India, WWT, WWF, GC, NGOs, CBOs.
	4.2. Effective co-management of potential gibbon habitat outside PAs across all forest complexes by 2026.	4.2.1. Review important Hoolock gibbon habitats under each forest complexes in to protected area network through up grading its status as Community Reserve or Community managed Protected Areas by 2021. 4.2.2. Consultation of relevant stakeholders undertaken by 2021. 4.2.3. List of recommended Community managed protected areas or community reserves produced and proposed to government by 2021.		FD (KAAC), FDCC (Assam), PRCNE India, WWT, WWF, WTI, NGOs, CBOs.

	4.3. Connectivity is achieved between core habitats in all 5 priority forest complexes by2026.	4.2.4. Community managed Protected areas or community reserves established through official decree by 2026. 4.3.1. Land corridor between PAs established and zone demarcated by 2021. 4.3.2. Land-use pattern of the community revised to ensure forest integrity in the corridors between core habitats by 2018 4.3.3. Restoration programs in degraded areas of corridors between core habitats started by 2016 4.3.4. Forest cover stable or increased against baseline data.		FD (KAAC), FDCC (Assam), PRCNE India, WWT, WWF, WTI, NGOs, CBOs.
	4.4. Gibbon Rescue & rehabilitation centre established in KA by 2021.	4.4.1. Number of Gibbon rescued and rehabilitate.		PRCNE India, FD (KAAC), FDCC (Assam), WWT, WTI.
T5 – Census monitoring of Hoolock Gibbon population & Habitat.	5.1 Updated Hoolock Gibbon population and habitat status, demographic details for all of the priority complexes under KAAC by 2017.	5.1.1.Standardized methodology for survey work have already agreed by 2013. 5.1.2. Number of persons trained by 2021. 5.1.3. Census manual developed and published by 2017. 5.1.4. Distribution maps of Hoolock Gibbon with high, medium and low density areas obtained by 2017. 5.1.5. Baseline information on status and distribution in adjacent areas (crowding effects) obtained by 2018. 5.1.6. Demographic and population monitoring data for selected areas within the landscapes (e.g. female infant ratios) obtained by 2017. 5.1.7. Central data based centre established by 2017.	Budget: ₹ 1,25,00,000.00 – ₹ 1,50,00,000.00	PRCNE India, FD (KAAC), WWT, GC, NGOs, CBOs.

T6 – Long term field studies on behavioral ecology.	6.1. Identify gap areas and initiation of management oriented need based study by 2021.	6.1.1. Number of researcher trained and recruited by 2021. 6.1.2. Research officer for KAAC recruited by 2021. 6.1.3. Eco behavioral study initiated by 2017. 6.1.4. Parasitological study and disease prevalence study initiated by 2017. 6.1.5. Long term study on population dynamics and impact of habitat change on socio-ecology initiated by 2021. 6.1.6. Genetic study initiated by 2021.	Budget: ₹ 75,00,000.00	PRCNE India, WWT, GC, FD (KAAC).
T7 – Conservation Education and Awareness.	7.1. Sensitization among communities, develop pride and ownership to foster Hoolock gibbon conservation by 2026.	7.1.1. Number of program conducted & number of community members/students attended. 7.1.2. Gross attitudinal change and conducive relationship with the local communities that will provide an enabling environment for an engagement in favor of wildlife conservation. 7.1.3. Network of local communities for a community based conservation program.	Budget: Phase –I: ₹ 50,00,000.00 Phase-II: ₹ 50,00,000.00	PRCNE India, FD (KAAC), WWT, GC, Universities, Colleges, Schools, Sacred grooves, NGOs, CBOs.
T8 – Participation of Stakeholder Communities & their Livelihood support.	8.1. Hoolock Gibbon habitats outside protected areas within the 5 priority forest complexes secured by 2026.	8.1.1. Forest cover stable or increased against baseline data. 8.1.2. Number of local agreements with communities on wise use of forest and ban on fresh jhoom practice.	Actions under this milestone will centre around land use policy.	FD (KAAC), PRCNE India, WWT, WWF, GC, WTI, NGOs, CBOs.
	8.2. *Jhoom* cultivation minimize to 75% by 2026 and pressure reduced on Hoolock gibbon habitats through sustainable livelihood projects by 2026.	8.2.1. Pressure points identified and alternative livelihood options introduced. 8.2.2. Biotic pressure measurably reduced in 'pressure point' areas.	Budget: Phase-I: ₹ 50,00,000.00 – ₹ 1,00,00,000.00 Phase-II: ₹ 5,00,00,000.00 – ₹ 6,00,00,000.00	FD (KAAC), PRCNE India, WWT, WWF, WTI, NGOs, CBOs.
T9 - Site-based gibbon eco-tourism.	9.1. Gibbon focused eco-tourism and local entrepreneurship development by 2021.	9.1.1. Local capacity and tourism developed. 9.1.2. Community engaged and benefited. 9.1.3. Revenues generated for protected areas.	Budget: ₹ 1,00,00,000.00 – ₹ 1,50,00,000.00	FD (KAAC), PRCNE, Tourism Department (KAAC), NGOs, CBOs.

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APPENDIX - I

STRATEGIC PLANNING WORKSHOP

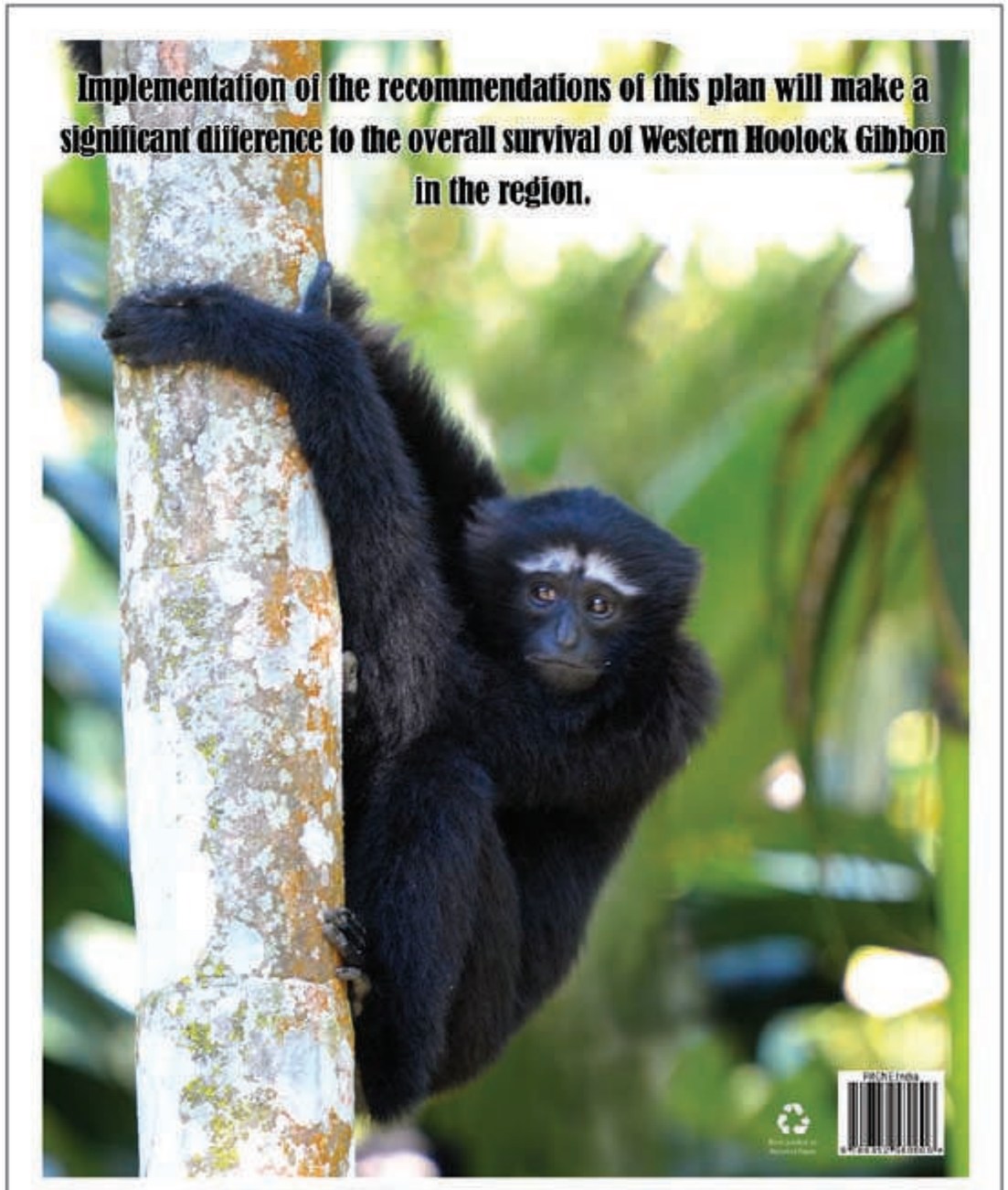
A multi stakeholder workshop on Strategic Planning for Conservation of Western Hoolock Gibbon in Karbi Anglong' was organized at Diphu on 26th February 2013. The workshop was attended by 20 participants including members of species specialist group, concerned Divisional Forest Officers, Assistant Conservator of Forest, Range Officer of gibbon distribution range, NGO workers, representatives from Diphu Govt. College and Assam University. Present Conservation Action Plan is the outcome of the workshop recommendations.

LIST OF PARTICIPANTS OF THE WORKSHOP

Sl	Name	Designation	Jurisdiction & Address
01	Mohan Singh Tokbi	Range Officer	Protection Range, Diphu, K/A, East Division.
02	Langtuk Ingti	Range Officer	WPO (Hills), Diphu.
03	Rupak Kr Royiv	Range Officer	WPO (Hills), Diphu.
04	Monsing Tisso	Range Officer	Hamren Div. (on Deputation).
05	Bibison Tokbi	Range Officer	NE Range, Silonijan, K/A East Division.
06	H.N. Ronghang	ACF/Range Officer	Dokmoka Range Office, K/A East Division.
07	Mohan Chandra Bora	Range Officer	WPO (Hills), Diphu.
08	Durlav Jyoti Bhuyan	Range Officer	WPO (Hills), Diphu.
09	Poban Bey	Forester 1	NE Range, Silonijan, K/A East Division.
10	Pani Ram Hanse	Forester	Protection Branch, K/A West Division, Diphu.
11	L. Rongpi	Range Officer	WPO Hills, Diphu.
12	P. Terang	ACF/Range Officer	Central Range, Manja, K/A East Division.
13	Mondal Engleng	Range Officer	Central Range, Diphu, K/A West Division.
14	H. Pator	Range Officer	Silvi Range, Sarchari, Diphu, Silvi Cultural Division.
15	R.S. Ingti	DFO	Silvi Cultural Division (Hills) Diphu, Karbi Anglong.
16	Borbi Teron	Range Officer	Silvi Range, Botanical Garden, 5 km, Diphu, Silvi Cultural Division.
17	Dr. Dilip Chetry	Exe. Director	Gibbon Conservation Centre, Hollogopara Gibbon WLS, Melleng, Jorhat, Assam.
18	Dr. Jihosuo Biswas	Coordinator	Primate Research Centre NE India, Anianada Nagar, Pandu, Guwahati, Assam.
19	Richard Taro	Researcher	Primate Research Centre.
20	Prohalad Kro	Range Officer	Western Range, Dolomara.

LIST OF ABBREVIATION

CEE:	Centre for Environment Education
CI:	Conservation International
CBO:	Community Based Organization
FD (KAAC):	Forest Department (Karbi Anglong Autonomous Council)
FDCC(Assam):	Department of Environment, Forest & Climate Change, Assam
GC:	Gibbon Conservation Centre
GO:	Governmental Organization
KAAC:	Karbi Anglong Autonomous Council
MOEFCC:	Ministry of Environment, Forest & Climate Change, Govt. of India
NGO:	Non Governmental Organization
PRC:	Primate Research Centre
WTI:	Wildlife Trust of India
WWF:	World Wide Fund for Nature
WWT:	Wildlife Areas Development and Welfare Trust
USFWS:	US Fish & Wildlife Services


Implementation of the recommendations of this plan will make a significant difference to the overall survival of Western Hoolock Gibbon in the region.