SUN BEAR

Conservation Action Plan

2020-2029

RYER and Htamanthi WS

OIKOS

For further information about this initiative and project Conservation of "*Sun Bear in Myanmar*", please contact Istituto Oikos: info@istituto-oikos.org

FOREWORD

Nyi Nyi Kyaw, Ph.D
Director General
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Myanmar is one of the richest country in the world for biodiversity and possesses large numbers of globally threatened species such as tiger, elephant, blue sheep, takin, leopard, etc. It has the largest sun bear potential distribution range in mainland.

Myanmar has formulated National Biodiversity Strategy and Action Plan (NBSAP) which is a comprehensive framework for biodiversity conservation. The NBSAP drives development and implementation of species conservation action plans to sustain ecosystems. These are fundamental tools to achieve sustainable development goals and combat the negative impact of global climate change as well.

Two bear species are found in Myanmar: Malayan Sun Bear (*Helarctos malayanus*) and Asiatic Black Bear (*Ursus thibetanus*). Both species are threatened mainly by hunting for illegal trade and habitat loss.

However, effective conservation measures for bear species have not been implemented yet in Myanmar. Fortunately, the "Sun Bear Conservation Project", implemented by Forest Department, Istituto Oikos, and Wildlife Conservation Society, fulfills this gap with the development of "Sun Bear Conservation Action Plan".

This Action Plan is set for the next 10 years with 12 objectives and various actions, including reduction in species exploitation, enforcement effectiveness, livelihood improvement for hunters, collaboration among relevant agencies in Rakhine Yoma Elephant Range and Htamanthi Wildlife Sanctuary, creation of standardized monitoring protocol, detection of species population change, and raising public awareness and local community participation in conservation.

I do believe that this Action Plan will be fully implemented in collaboration with all relevant stakeholders, especially with local communities living in and around the natural habitats of sun bears.

Time for action is short, but we owe to history and to the future generations to show that we took responsibility for our bears and other wildlife through carrying out the actions and recommendations of this Action Plan.

I offer my sincere gratitude to Istituto Oikos and the WCS Myanmar Programme for their diligence and scientific rigor in producing this "Sun Bear Conservation Action Plan" and for their efforts to understanding and conserve Myanmar's incomparable biodiversity. It is my hope that the FD, Istituto Oikos, and WCS can produce more publications from long and continuous scientific cooperation and research on the biodiversity of Myanmar.

Prof. Luigi Boitani

Head of the Department of Animal and Human Biology

Sapienza, University of Rome

Sun bears are among the most iconic animal species on earth, true flagships for the biodiversity of one of the most diverse region of the world. They are well known by rural and urban people in South East Asia but also well known by the general public all around the world. All bears are among the most beloved species and sun bears are among the best of the small lot of species. They are also good umbrella species as they live in forest habitats that contain a huge number of other species in need of conservation. Ensuring the conservation of such a species would appear a simple endeavour as we would expect the majority of the public opinion supporting the protection of the species. However, it is not so simple because sun bears are also the target of traditional and more modern uses that are threatening their survival.

Conserving sun bears requires working on a variety of scales and issues in a concerted effort from the enforcement of the legal constraints to the support of local communities to the change of traditional unsustainable uses of parts of the sun bears for food or medicine. Success on any of the issues is necessary but not sufficient to reach the goal of a long term conservation. Therefore, the need for a comprehensive plan bringing together all aspects and challenges of conservation under one vision and few well defined goals within one document. This Plan focuses the vision on two critical areas for the survival of sun bears and for these areas it lays out the strategic plan and the actions needed to reach the conservation goals. The Plan is the outcome of a long term commitment of the authors and the organizations they belong to for the conservation of the bears and their forest. Deep knowledge of the field conditions, trust by the local communities, understanding of the key challenges and pragmatism in designing the possible solutions are all necessary ingredients in a recipe for a successful plan.

However, an Action Plan is just the beginning of a conservation programme. It must be implemented to make things happening in the field and the goals to be reached. I hope this will be the case for this Action Plan and I look forward reading of its gradual and successful implementation.

Rossella Rossi

President

Istituto Oikos

Protecting biodiversity and habitats means protecting ourselves and making possible the transition to a more sustainable and equitable society. With the commitment to improve local communities and authorities' capacities to manage and preserve their lands for livelihood and income generation Oikos since 2007 is working in two coastal areas of Myanmar: the Thandwe District in Southern Rakhine and the Mergui Archipelago in the Tanintharyi Region, both recognised worldwide for their unique environmental and cultural values.

In this framework the "Conservation of the sun bear project (2016 - 2020)" promoted by Istituto Oikos in partnership with the Forest Department and WCS, focused on an iconic vulnerable species that is rapidly declining due to deforestation, habitat degradation and poaching. During the four years project we addressed all the key challenges of sun bear conservation in the two project areas: Rakhine Yoma Elephant Range and Htamanthi Wildlife Sanctuary. We strengthened the capacities to patrol the territory against poaching and other illicit activities, established community forests, trained forest users, collected baseline wildlife data, increased environmental awareness, restored forest habitats and supported small business.

The 10-year conservation Action Plan came as a final product of the project. It is built with an integrated and ecosystem approach on the scientific evidence acquired, the best practices experimented and an intensive work of consultation with all stakeholders. It gives recommendations and suggestions to improve the protection of sun bear in the project areas detailing 12 objectives and 49 actions aimed at attaining 5 overarching goals. With the aim that the actions can be scaled up to the whole country in the near future.

As a next step, aware that deforestation and illegal bear trade are likely to continue in the next years and that the Sun bear can recover if the causes of decline are reduced, we hope that the Action Plan will be implemented.

I would like to express my sincere gratitude to all the project partners: MONREC, WCS Myanmar, the Rakhine communities and authorities. Working together has been a great honour for Oikos. We built a spirit of collaboration and mutual trust that enabled us to integrate successfully the local, national and international dimensions. I hope that we can continue to join forces to preserve the sun bear, a vulnerable species and a symbol of Myanmar' environmental and cultural heritage. We owe this commitment to the future generations.

CONTENTS

ABBREVIATIONS

BSG	Bear Specialist Group
CF	Community Forest
CFE	Community Forestry Enterprise
CFUG	Community Forestry Users Groups
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CGG	Community Guardian Group
FD	Forest Department
HWS	Htamanthi Wildlife Sanctuary
GAD	General Administration Department
INGO	International Non-governmental Organization
IUCN	International Union for the Conservation of Nature
IWT	Illegal Wildlife Trade
MONREC	Ministry of Natural Resources and Environmental Conservation
NGO	Non-governmental Organization
NP	National Park
NWCD	Nature and Wildlife Conservation Division
PA	Protected Area
PDR	People's Democratic Republic
PWCNAL	Protection of Wildlife and Conservation of Natural Areas Law
REDD	Reducing Emissions from Deforestation and forest Degradation
RYER	Rakhine Yoma Elephant Range
SE	South East
SMART	Spatial Monitoring And Reporting Tool
SSC	Species Survival Commission
WCS	Wildlife Conservation Society
WS	Wildlife Sanctuary

EXECUTIVE SUMMARY

In mainland SEA, Myanmar has the largest sun bear potential distribution range: 49% of the globally suitable area (islands excluded) for this species occurs within the country.

The presence of sun bear was confirmed in 13 sites between 1999 and 2002 through camera trap surveys aimed at studying the tiger population of Myanmar. Current distribution maps show, in particular, that the species is present across the regions with highest tropical forest coverage. It is possible to identify two large macro areas where the species occurs: one in the almost continuous forest complex in western-northern Myanmar, including Rakhine, Chin, Sagaing, Kachin, and a distinct one in southern Myanmar, including Bago, Kayah, Kayin, Mon and Tanintharyi.

Despite this wide distribution in the country, sun bears are declining across their range in Myanmar, as well as in all SEA. Country experts from the IUCN SSC Bear Specialist Group made subjective estimates of rates of population loss over 3 generations based on dwindling geographic ranges, loss and degradation of habitat, and high levels of exploitation: an overall estimated decline of ~35% for the past 30 years, and ~40% or more for 30 years into the future was predicted, so the species meets the A criterion threshold for Vulnerable (Scotson *et al.*, 2017).

Deforestation and poaching are the two main reasons for the species decline. SEA has reported the highest relative rate of forest loss over the past 30 years in the world and, according to the IUCN Red List assessment, the extent of occurrence of sun bear appears to be decreasing, with some patches in southern Myanmar completely isolated, thus increasing the risk of local extinctions (Scotson *et al.*, 2017). Myanmar is classified as the 3rd highest deforestation rate in the world mostly because of expansion of agricultural plantations and timber extraction, the substantial forest loss occurred in the last 30 years has likely caused a significant decline of sun bear population countrywide.

More precisely, it is estimated that during the time span between 2000 and 2010 Rakhine State had the 2nd highest deforestation rate among the regions and states of the country, and between 2000 and 2018 5.9% of its forest cover has been lost. From 2001 to 2018, Sagaing Region lost 5.7% of its forest cover (Global Forest Watch, 2020).

Illegal hunting represents the first direct cause of the declining number of sun bear reported by members of local communities. Although it is a "Completely Protected Species" under the "Conservation of Biodiversity and Protected Areas Law, 2018", sun bear is commonly poached in the rural areas of Myanmar. The main reason for hunting this animal is its gall bladder, highly appreciated on the Chinese market for its alleged medicinal properties, and its paws, which are considered a delicacy. Other bear parts like claws, skulls and teeth are sold as souvenirs and trophies. Trade in live animals occurs as well, threatening mainly cubs and young individuals to be kept as pets or raised in bear bile farms. Poaching is also carried out by members of rural villages for subsistence and as pest control because the species is traditionally considered aggressive and dangerous for people who meet it in the wild. Local authorities do not usually have enough resources to patrol the territory against poaching and other illicit activities such as illegal logging.

Need for a Conservation Action Plan for sun bears in RYER WS and HWS

Recently, the comprehensive "Sun bears: Global Status Review & Conservation Action Plan 2019-2028" was compiled for the whole species range. This is the first global conservation action plan for a bear species: its implementation will necessarily require adoption by range countries, and some range countries may develop companion country specific plans.

In this context, the present "Sun Bear Conservation Action Plan: 2020 - 2029 - RYER and Htamanthi WS" derives from the scientific evidence acquired and the best practices experimented through the "Conservation of the sun bear in Myanmar" project, an initiative promoted by Istituto Oikos together with WCS, and conducted in collaboration with NWCD and many other important stakeholders. It focuses on Htamanthi WS, Rakhine Yoma Elephant Range WS and surrounding areas, giving recommendations and suggestions to improve the protection of sun bear in such areas for the period 2020-2029, with the aim that actions identified for these specific protected areas can be scaled up to the whole country in the near future.

Process of Plan Development

Between 2016 and 2020, in Rakhine State and Sagaing Region, the first specific initiative for the conservation of sun bear was carried out. The project was implemented under the guidance and with the support of the NWCD, who was involved in the organization of the first "Stakeholders Consultation Meeting on Bears Conservation in Myanmar", held in March 2018 in Nay Pyi Taw, gathering representatives from all NGOs and INGOs involved in bears and wildlife management in Myanmar and SEA. Several other consultation meetings with the local authorities (NWCD, FD, Police), local communities and NGOs were carried out throughout the whole duration of the programme (2016 and 2020).

Building on the work of these meetings and benefiting from the outcomes of the 4-year project, this document presents a 10-year conservation action plan, specifically targeting the study area but widely inspired by the "Sun bears: Global Status Review & Conservation Action Plan 2019-2028". It is meant to inform MONREC in order to provide the Government with the necessary tools to scale up actions and ensure sustainability.

Components of the Plan

This 10-year plan details 12 objectives and 49 actions aimed at attaining 5 overarching goals:

1. reduce illegal exploitation of sun bear Obj. 1 - understand reasons for hunting sun bear and monitor local demand of bear products; Obj. 2. improve enforcement effectiveness for laws pertaining to hunting, trade and use of sun bear and their parts; Obj. 3. assess the conservation impact of alternative livelihoods schemes for hunters and develop community-based initiatives for micro-enterprises and ecotourism
2. protect and restore sun bear habitat Obj. 4. review data and continue monitoring forest cover and ecosystem services to prioritise areas and galvanise support for conservation interventions; Obj. 5. improve enforcement of existing logging regulations; Obj. 6. promote community-based initiatives for the management and protection of sun bear habitat and natural resources; Obj. 7. improve understanding of what constitutes high quality sun bear habitat, and how various habitat components affect sun bear populations; Obj. 8. identify and reconnect small isolated sun bear populations with habitat corridors
3. devise and implement methods to effectively monitor trends in sun bear population Obj. 9. create a standardized monitoring protocol to detect population changes and share it with relevant stakeholders; Obj.10. implement monitoring programmes and assess the conservation outcomes of these initiatives
4. increase the synergies and collaboration between government and other stakeholders Obj. 11. promote collaboration among different governmental agencies, conservation groups and local communities
5. increase public awareness and participation Obj. 12. disseminate information on sun bear and biodiversity conservation among all relevant stakeholders in order to provide knowledge for a conscious decision-making framework.

Each action in the plan has a general timeline, an associated list of organizations responsible for carrying it out, indicators of progress, a list of what we already have to aid in performing the action and what we need.

Implementation of the Plan

As stated above, this document is meant to guide and direct initiatives for sun bear conservation in the next 10 years in Htamanthi WS, Rakhine Yoma Elephant Range WS and surrounding areas. Its implementation requires an executive supervision and management by MONREC, who has to directly carry out many of the listed actions and to coordinate the different initiatives that will eventually take place in the cited areas. In this context, it is highly recommended that the Government appoints an Action Plan Implementation Task Force, working in close collaboration with IUCN SSC Bear Specialist Group, as well as an Action Plan Coordinator, to ensure the realization of the actions. Alternatively, the commission which is being established to follow the implementation of the tiger and elephant action plans could be expanded to include the sun bear. NGOs and INGOs will have the fundamental duty of promoting initiatives which fall within the present . Universities and research centres of Myanmar and from foreign countries will have the role of carrying on applied studies for better understanding sun bear status, for finding adequate solutions to conservation problems and for monitoring the implementation of the Plan.

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1. INTRODUCTION

The Malayan Sun bear, *Helarctos malayanus*, is one of the least known species among bears and studies on population trends are scarce (Augeri, 2005; Ngoprasert *et al.*, 2011; Steinmetz *et al.*, 2011, 2013; Fredriksson, 2012), or were carried out with incomparable methodologies (Linkie *et al.*, 2007; Wong *et al.*, 2013; Wong and Linkie, 2012; Guharajan *et al.*, 2018). Sun bears are considered as Vulnerable by IUCN, but robust data on the presence of this species across its distribution range are few, and a standardized methodology to assess species occurrence, distribution and abundance is needed (Scotson *et al.*, 2017).

Historically present within Southeast Asia from Borneo and Sumatra to Southern China and Assam (India), sun bears today are sparsely distributed in India, Bangladesh, Myanmar, Thailand, Lao PDR, Cambodia, Vietnam, Malaysia, Brunei and Indonesia while their presence in China remains uncertain (Scotson *et al.*, 2017). Myanmar is probably the country with the second greatest range area of the species after Indonesia.

The area occupied by the species is decreasing everywhere in its former range and becoming increasingly fragmented, with some patches being completely isolated. Sun bears are,

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in fact, severely threatened by deforestation, which is taking place with high rates in SEA (Sodhi *et al.*, 2004, 2010; Miettinen *et al.*, 2011) and in particular in Myanmar (classified at the 3rd greatest deforestation rate in the world), mostly because of the expansion of agricultural plantations and timber extraction. The species is also poached for consumption and commercial use in many SEA countries: gall bladders, bile, paws, meat and pet trade are still highly valued in illegal markets and, in Myanmar, illegal routes leading to China's border are well known (Nijman, 2017). Although the analysis of the patterns of interactions between people and bears suggests that bears tend to escape in the great majority of encounters (Cremonesi *et al.*, 2018), an additional frequent threat in Myanmar is human-bear conflict, due to alleged attacks on people and sporadic crop raiding.

In this framework, the urgent need to take action for sun bear conservation is undeniable, as expressed by the recent "Sun Bear: Global Status Review & Conservation Action Plan 2019-2028" (Crudge et al., 2019).

The present document is the first Action Plan for Sun Bear Conservation developed in Myanmar, where the species is listed as a "Completely Protected Species" under the "Conservation of Biodiversity and Protected Areas Law, 2018". It focuses on the Htamanthi WS, Rakhine Yoma Elephant Range WS and surrounding areas, giving recommendations and suggestions to improve the protection of sun bear in such areas for the period 2020-2029. The Action Plan represents the most updated and comprehensive assessment of sun bear and its conservation status, based on both direct field experience and scientific literature. In particular, this document is inspired by the already cited "Sun Bear: Global Status Review & Conservation Action Plan 2019-2028", which provides the structure upon which specific actions

for the project sites were developed. It also derives from the scientific evidences acquired and the best practices experimented through the "Conservation of the sun bear in Myanmar" project, an initiative promoted by Istituto Oikos together with Wildlife Conservation Society, Rakhine Coastal Region Conservation Association, University of Insubria, University of Milano Bicocca, Nature and Wildlife Conservation Division, Forest Department – Ministry of Natural Resource and Environmental Conservation of Myanmar, and made possible thanks to Fondation Segré and the contribution of Fondation Ensamble, World Animal Protection, Keidanren Nature Conservation Fund.

The final goal of this Action Plan is to ensure the long-term viability of sun bear in the target areas cited above, through the provision of a tool for decision makers, for the identification of specific conservation actions. The plan includes measurable targets and clear objectives for NGOs, research organizations and institutional entities of Myanmar at different levels.

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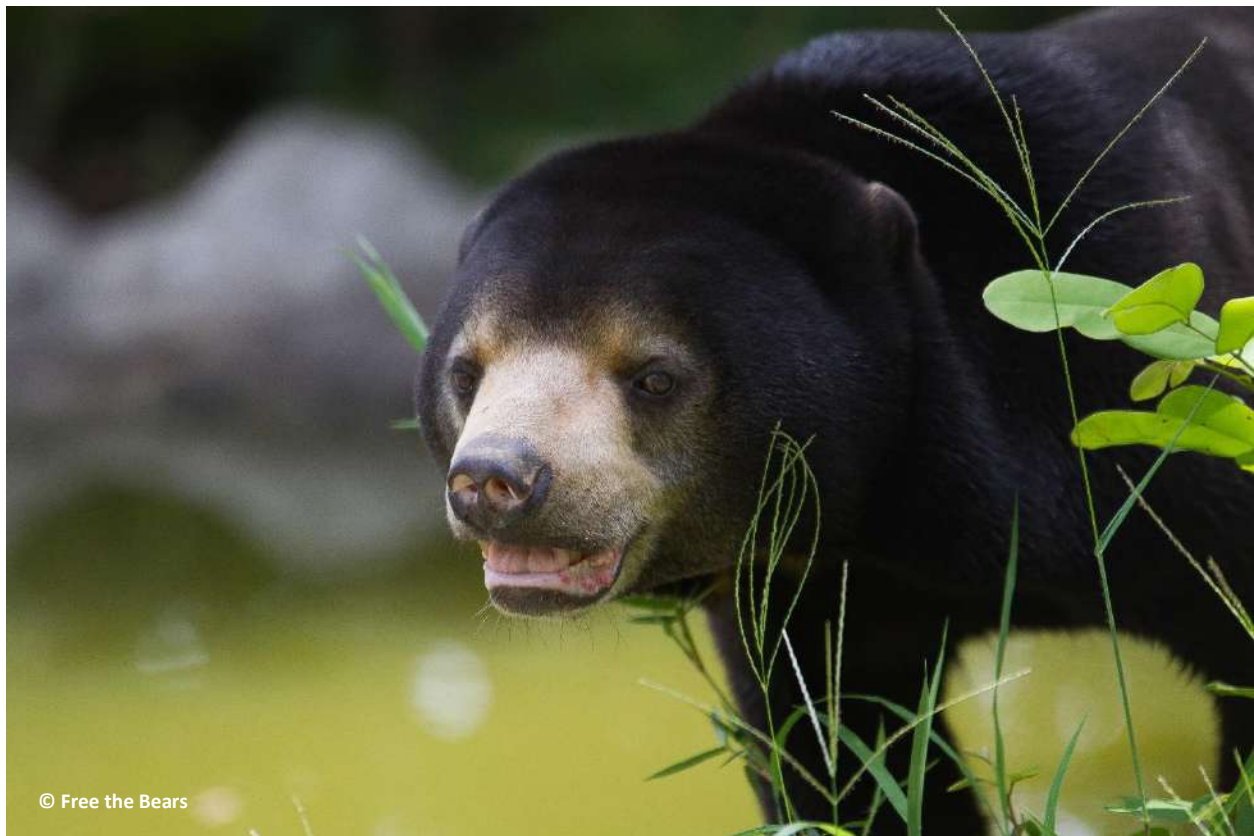
2. STATUS REVIEW

2.1. HISTORICAL DATA AND DISTRIBUTION

The historical distribution of sun bear ranged from Borneo and Sumatra to Southern China (Yunnan Province) and Assam (India) (Higgins, 1932). Fossil records have documented its presence further north in China (Erdbrink, 1953) and in the island of Java during Pleistocene era (Erdbrink, 1953). Today the species occurs in India, Bangladesh, Myanmar, Thailand, Lao PDR, Cambodia, Vietnam, Malaysia, Brunei and Indonesia. The current existence of this species in China is still doubtful. Recent surveys in Yunnan Province failed to detect its presence although a small area (<600 km²) could not be surveyed (Wen and Wang, 2013). In 2016, video footage of a sun bear was obtained from a camera trap in Yunnan, indicating the presence of at least one bear, <1 km from the Myanmar border (Li *et al.*, 2017). It is unknown whether there is a transboundary population, or just a few individuals living near the border. Nevertheless, this represents the first confirmed record of the species in China in 45 years (Scotson *et al.*, 2017). Sun bears were thought to be extirpated in Bangladesh until recent confirmed records in 2014 and 2015 (Crudge *et al.*, 2019). It is possible that a population in southern Bangladesh is maintained through immigration from core areas in western Myanmar (Scotson *et al.*, 2017).

In mainland SE Asia, Myanmar has the largest sun bear potential distribution range: in fact, 49% of the globally suitable area (islands excluded) for this species occurs within the country. The presence of sun bear was confirmed in 13 sites between 1999 and 2002 through camera trap surveys aimed at studying the tiger population of Myanmar (Tab.1). Current distribution maps show that the species is present in the regions with the highest tropical forest coverage. It is possible to identify two large macro areas where the species occurs: one in the almost continuous forest complex in western-northern Myanmar, including Rakhine, Chin, Sagaing, Kachin, and a separate one in southern Myanmar, including Bago, Kayah, Kayin, Mon and Tanintharyi. Limited information is available from eastern Myanmar, where the armed conflict in Shan State prevents the implementation of wildlife monitoring programmes. Anecdotal reports from hunters and local communities seem to confirm sun bear is extant in Shan, although further investigations are needed. In depth studies are necessary to assess the presence and vitality of sun bear populations in the country and design accurate maps of distribution at the national level.

No.	Protected Area	Location	No. of Records	
			Sun Bear	Black Bear
1	Alaungdaw Kathapa NP	Sagaing	2	7
2	Htamanthi WS	Sagaing	2	4
3	Mahamyaing WS	Sagaing	3	0
4	Paunglaung Catchment (PLG)	Mandalay	7	4

No.	Protected Area	Location	No. of Records	
			Sun Bear	Black Bear
5	Bago Yoma	Bago	1	0
6	Rakhine North	Rakhine	29	0
7	Rakhine Yoma Elephant Range	Rakhine	10	0
8	Hukaung Valley WS	Kachin	5	0
9	Kaunglaungpu (KLP)	Kachin	1	0
10	Sumpra Bum	Kachin	8	0
11	Mabein	Shan	1	0
12	Myintmoletkat	Tanintharyi	2	0
13	S. Tanintharyi	Tanintharyi	1	0
	TOTAL		**72**	**15**

Tab.1 - Sun bear and asiatic black bear records in Myanmar. National Tiger Survey (1999-2002).

2.2 STATUS AND POPULATION TREND

Sun bear is declining everywhere within its range. Although there are only a few direct empirical estimates of population trends, the IUCN SSC Bear Specialist Group made subjective estimates of rates of population loss over three generations (30 years in the past, a 30-year window overlapping the present, and 30 years into the future) based on dwindling geographic ranges, loss and degradation of habitats, and high levels of exploitation for each country. Weighting each country's estimate of population change by the country's real proportion of geographic range yielded an overall estimated decline of ~35% for the past 30 years, and ~40% or more for 30 years into the future. Thus, the species meets the criterion A threshold for Vulnerable (Scotson *et al.*, 2017).

Deforestation and poaching are the two main reasons for the species decline. Southeast Asia has reported the highest relative rate of forest loss in the world, over the past 30 years (Sodhi *et al.*, 2004, 2010; Miettinen *et al.*, 2011; Margono *et al.*, 2012, 2014; Dong *et al.*, 2014). According to the IUCN Red List assessment (Scotson *et al.*, 2017) the extent of occurrence (area containing all the known sites of occurrence of the species) appears to be decreasing, with just a few individuals left in China and Bangladesh, and rapid decline in Vietnam (50–80% decline estimated in the next 30 years). Area of occupancy (area occupied by the species) is declining and becoming increasingly fragmented, in particular in Borneo and Sumatra. In the mainland, some populations in southern Myanmar, central Thailand, southern Cambodia, and southern Vietnam appear to be completely isolated (Scotson *et al.*, 2017), thus increasing the risk of local extinctions.

In Myanmar the substantial forest loss occurred in the last 30 years (Leimgruber *et al.*, 2005; Myat Su Mon *et al.*, 2012) has likely caused a significant decline of sun bear countrywide. Interviews with local communities documented a reduction of the numbers of sun bears over the last 10 years. Villagers in Rakhine reported that spotting sun bears in
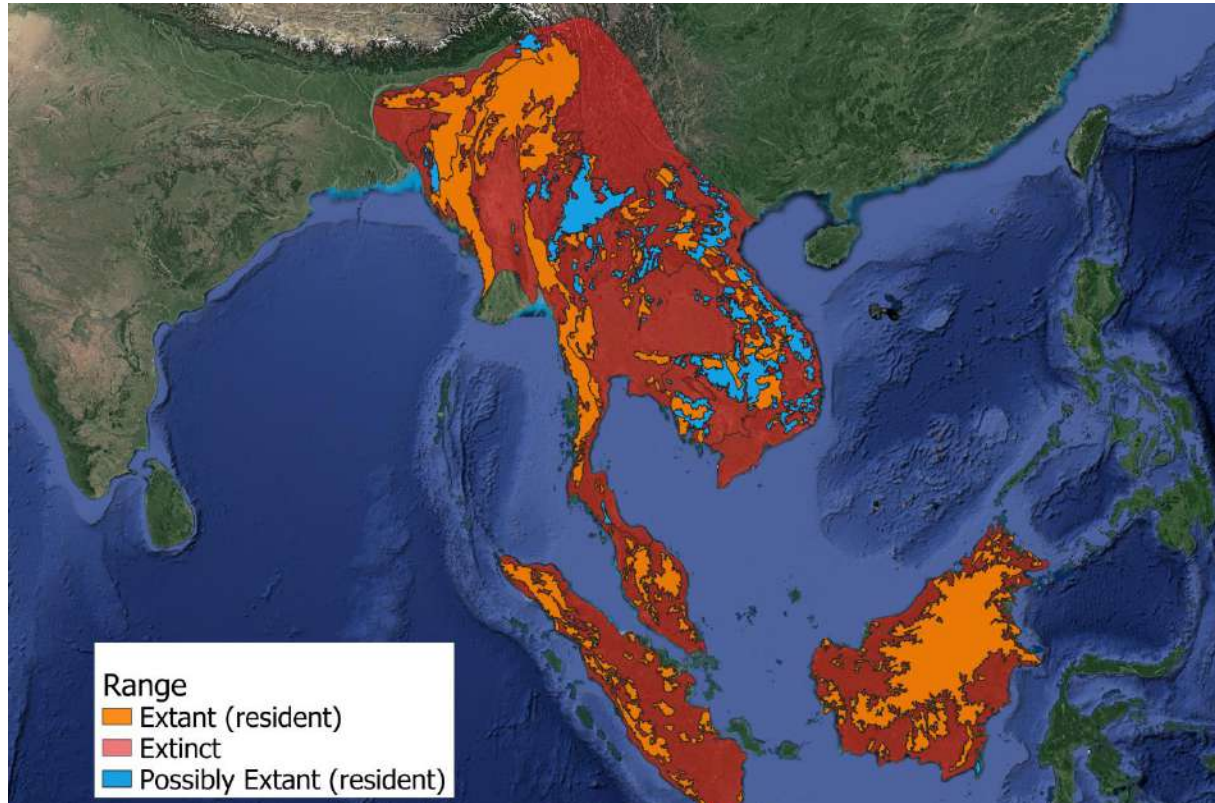

Figure 1 - Distribution range of sun bear (*Helarctos malayanus*) according to IUCN (Scotson *et al.,* 2017).

the forest has become a rare event compared to 10-15 years ago. Deforestation and habitat degradation are expected to continue into the next years as well as illegal bear trade, thus leading to a further decline of sun bear in the future.

Sun bear can recover in areas where it was previously extirpated, given a nearby source population. In Indonesian Borneo (Kalimantan), sign transects were used to monitor relative abundance of sun bears in forest affected by fires and adjacent unburnt forest from 2000 to 2010. In the unburnt forest, sun bear density remained stable. In the recently burned forest, sun bear sign density was close to zero post fires, but in 10 years reached 65% of the sign densities in adjacent unburnt forest (Fredriksson, 2012).

2.3. ABUNDANCE AND OCCUPANCY STUDIES

The sun bear population density and abundance show a natural population gradient from north to south, with the southern part of the distribution range (Sundaic region including Borneo and Sumatra) being the most populated (Steinmetz, 2011). This fact, also confirmed by historical data (Higgins, 1932) and fossil records (Tougard, 2001; Meijaard, 2004), could be a consequence of the competition with the Asiatic black bear in the northern part of the distribution range, where the two species coexist. Few studies have tried to estimate the abundance of sun bear populations worldwide. The absence of easy detectable individual features (e.g. the chest mark) makes camera trap mark- recapture studies inapplicable to this species; therefore, occupancy studies (probability of presence of a species at a particular site knowing if the species has been detected or not, MacKenzie *et al.*, 2002), which provide a relative index of the abundance, have been preferred by scientists. This approach has been used recently in some of the range countries: in the Sundaic region, where Wong e*t al.* (2013) in the period 2004/2006 found occupancy values (with the top ranked model) of 0.68 ± 0.07 and in the period 2009/2011 of 0.44 ± 0.09, suggesting an overall decrease of sun bear over the years; in Sabah (Malaysian Borneo) values of 0.74 ± 0.12 were reported for the period 2013/2014 (Guharajan, 2016); in peninsular Malaysia, Sasidhran *et al.* (2016) occupancy values of 0.47 ± 0.10 in the period 2013/2014 were calculated. A detail of the studies conducted in Myanmar is provided in the following section.

Occupancy studies in Myanmar

The first study on sun bear populations in Myanmar was carried out between 2016 and 2019 in two areas: the western border of Rakhine Yoma Elephant Range WS, Thandwe and Gwa township, southern Rakhine State, and the Htamanthi WS, Hkamti and Homalin township, northern Sagaing Region. In each study area four sites were selected in order to include a variety of environments, forest types and human presence. Camera trap and sign surveys were carried out for three years during the dry season, between November and March. At each site, 30 camera traps were set up according to a 2x1 km rectangular grid-cells pattern and operated continuously for 45 days. Transect surveys were carried out walking and actively looking for sun bear tracks as claw marks on trees, footprints, feeding sites, nests and scats. The occurrence of tracks was recorded on datasheets and the position marked with GPS receivers. The claw marks were analysed according to the protocol of Steinmetz and Garshelis (2010), which considers the distance between the signs, the sharpness and degree of bark regrowth to identify the bear species and to assess the age of the sign (old, recent, fresh). A substantial amount of data on the presence of sun bear in the two study areas was collected. For data analysis, a methodological approach has been applied in order to understand which monitoring method - camera trap or transect survey - provides the most suitable information to build the model for sun bear population. The area of Rakhine was selected to test the two methods and the occupancy was calculated for different sampling methods in order to find the best model: occupancy from camera traps was calculated with 1, 2, 5 and 7 days of temporal sampling occasions and transects with 100, 200, 500 and 1000 m of spatial sampling occasions. The

results showed that camera trap occupancy is more stable compared to transect occupancy, which remained more dependent on sampling occasions (see Bisi *et al.*, 2019). The results obtained from camera trap data over the three years of the project showed occupancy of 0.18 ± 0.04 in Rakhine and 0.99 ± 0.06 in Sagaing during 2016/2017 (Bisi *et al.*, 2019). During the next years, occupancy in Rakhine increased (2017/2018: 0.38 ± 0.07 and in 2018/2019: 0.30 ± 0.06) and decreased in Sagaing (2017/2018: 0.87 ± 0.81 and in 2018/2019: 0.12 ± 0.05).

The results of this study suggest the occurrence of fluctuations in the sun bear population during the project period. It is important to remark that the great variation of the values of occupancy between years (e.g. from 0.9 to 0.1 in Sagaing) can be explained by the scarce detectability of the species which could be dependent on the seasonal alteration and other environmental factors. Deeper analysis is needed in order to study sun bear occupancy in relation with covariates such as water availability, human disturbance and habitat categories, and understand how these factors affect the presence and the detectability of sun bear. Long term studies are needed to build reliable models which are explanatory of actual sun bear population dynamics.
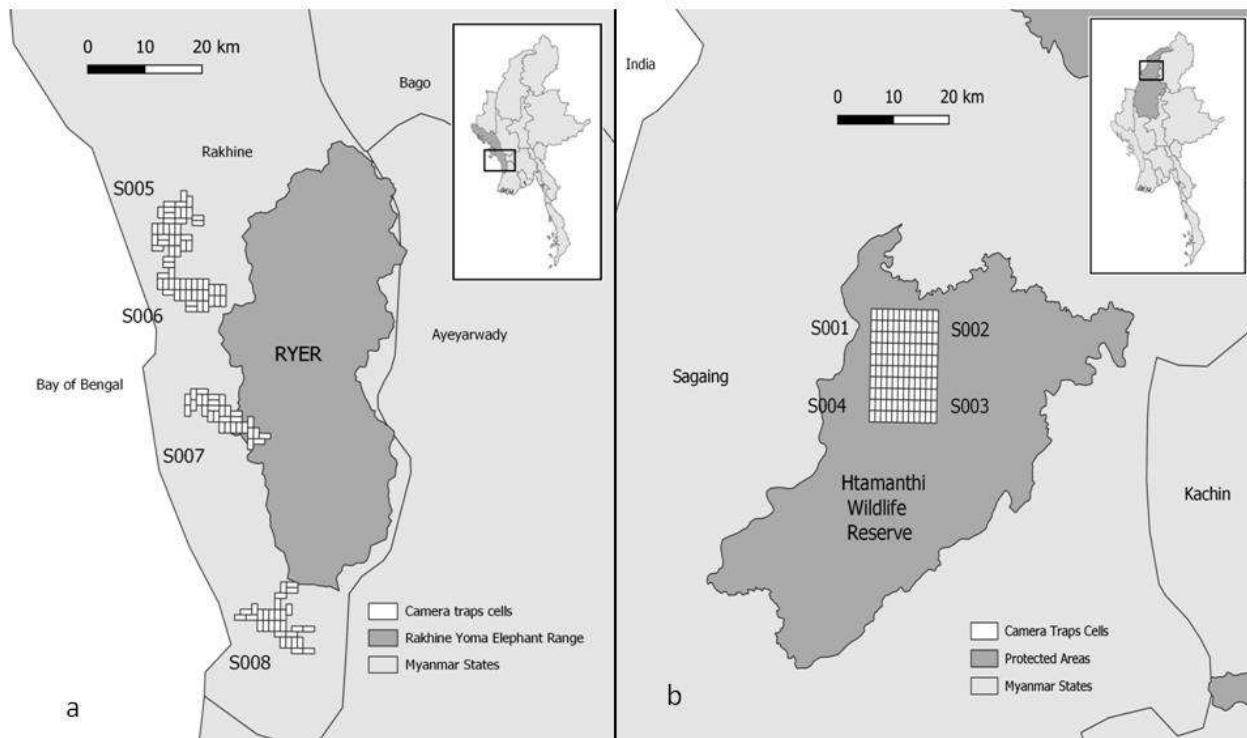

Figure 2 - Study area locations in Myanmar: a. Survey sites in Rakhine (S005, S006, S007 and S008); b. Survey sites in Sagaing (S001, S002, S003 and S004).

2.4. ECOLOGY OF THE SPECIES

Habitat use

Sun bear is a forest-dependent species which is mostly found in interior mature and/or heterogeneously structured primary forests (Augeri, 2005). There are two ecologically distinct categories of tropical forests that occur within its natural range: seasonal evergreen and deciduous forest in the asiatic mainland (north of the Isthmus of Kra) and seasonal evergreen rainforest in Malaysia, Sumatra and Borneo. North to the Isthmus of Kra, sun bears are usually found in seasonal semi-evergreen forests, mixed deciduous forest, dry dipterocarp and mountain evergreen forests with an alternation of dry and rainy seasons. In Myanmar sun bears are found in a wide variety of environments, ranging from evergreen to degraded forests and bamboo brakes, thus showing an adaptive behaviour towards habitat selection.

In the mainland sun bear occurs in sympatry with the black bear, which occupies a similar ecological niche, feeding on the same fruits (Steinmetz *et al.*, 2013). The two species seem to displace in different territories and avoid each other by occupying different altitudes, with the asiatic black bears reaching the higher elevations in order to reduce the interspecific competition. Sun bears presence was confirmed up to 2000m of altitude in India and Myanmar, however in surveys conducted in Rakhine and Sagaing (western and northern Myanmar), the species was only recorded below 400m of altitude.

It is not yet clear how sun bear uses different habitat types as degraded forest, bamboo brakes or anthropogenic environments. Initially, studies in Borneo and Sumatra indicated that sun bears avoided secondary forests of any age (Augeri, 2005), even after twenty years of regeneration, also their occurrence seemed to be strictly related to the presence of primary forests and to the increasing distance to roads and human settlements (Linkie *et al.*, 2007; Nazeri *et al.*, 2012; Wong and Linkie, 2012). Later studies showed that the species is adaptive to a different range of habitats and is resilient to forests changes: sun bears were found to use logged areas (Wong *et al.,* 2004; Meijaard *et al.*, 2005; Linkie *et al.*, 2007) but their occurrence in newly logged forest (<10 years) is much lower compared to forests that were logged more distantly in the past (Brodie *et al.*, 2015).

The species seems to positively react to the conversion of exploited forests towards sustainable management and reduced logging. This was confirmed by Imai *et al.* (2009) and Jati *et al.* (2018), who demonstrated that camera trapping rates of sun bears are higher in areas where logging had been stopped and restoration programmes started, compared with normally logged forests. Brodie *et al.* (2015) remarked that the species abundance in Malaysian Borneo has grown after ten years of regeneration of a logged forest.

In highly disturbed landscapes, the species was observed in agricultural lands, plantations (especially oil palm) and orchards near forest edges (Nomura *et al.*, 2004; Augeri, 2005; Fredriksson, 2005; Cheah, 2013; Sethy and Chauhan, 2013; Yaap *et al.*, 2016; Guharajan *et al.*, 2017). It was hypothesized that sun bears might find valid supplements to their diet in some types of plantations, especially during inter-mast periods (Nomura *et al.*, 2004; Cheah 2013). Guharajan *et al.* (2017, 2018) highlighted that sun bears can persist in small forest patches surrounded by plantation if human-caused mortality remains low. In Myanmar, especially in Rakhine State, large numbers of sun bears were recorded in areas with high human densities and environmental degrading activities including illegal logging, agriculture and forest fires, thus suggesting once again a great adaptability to several environmental contexts.

Home range and activity patterns

According to Wong *et al.* (2004), Fredriksson (2012) and Cheah (2013), the home range of sun bears spans from 7 to 27 km^2 and the extent of daily movements is mostly affected by food availability.

The species is considered to be "cathemeral": it is, in fact, neither strictly nocturnal, nor diurnal, nor crepuscular, but irregularly active at any time of the day and night, according to prevailing circumstances. Wong *et al.* (2004) registered a prevalent daily activity pattern with peaks during early morning (5-7 am) and late afternoon (16-18 pm), with almost null activity during the night (after 21 pm). Guharajan *et al.* (2017) found instead a principal nocturnal activity, with a peak after sunset. Fredriksson (2012) found both a diurnal activity, inside a protected area, and a more nocturnal activity, near forest edges. In Myanmar the cathemeral nature of the animal is confirmed by both diurnal and nocturnal records. In Rakhine State, in a highly disturbed habitat, the species was active mainly during sunrise (between 5 – 7 am) and sunset (17 - 20); in Sagaing a similar activity pattern was found: sun bears were mostly active during sunrise-sunset but also during the day, between 11 am - 13 pm. It is noticeable that the species appears not to change the daily activity pattern in relation to different human pressure (high in Rakhine and low in Sagaing). Daily activity patterns indeed seem to be stable and comparable among the two different circumstances and not substantially affected by human presence (Fig. 3 and Fig. 4) (Cremonesi *et al.*, unpublished).
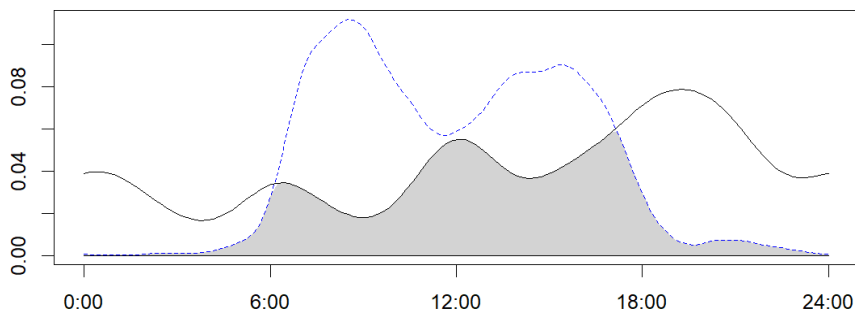

Figure 3 - Overlap (in grey) between daily activity density pattern of sun bear (continuous line) and humans (dotted lines) in Rakhine.
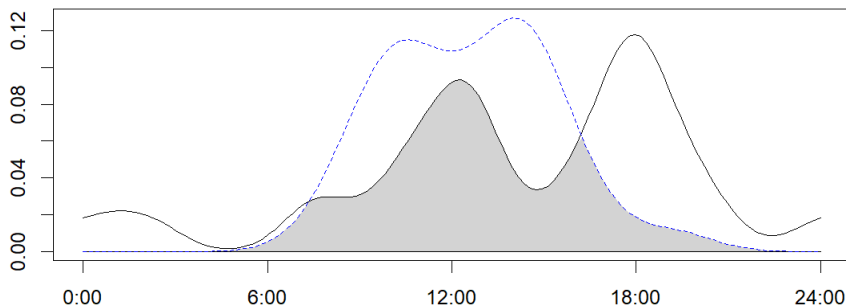

Figure 4 - Overlap (in grey) between daily activity density pattern of sun bear (continuous line) and humans (dotted lines) in Sagaing.

2.5. MAJOR THREATS

Habitat loss

Southeast Asia has the highest rate of forest loss worldwide (Sodhi *et al.*, 2004, 2010; Miettinen *et al.*, 2011) and Myanmar is classified at the 3rd greatest deforestation rate in the world, mostly caused by expansion of agricultural plantations and timber extraction.

It is estimated that during the time span between 2000 and 2010 Rakhine had the 2nd highest deforestation rate among the regions and states of the country, following Ayeyarwady (Wang and Myint, 2016), and between 2000 and 2018, 5.9% of its forest cover has been lost. The regions of Maungtaw, Buthidaung, Sittwe, Kyauk Phyu and Thandwe are responsible for 76% of the tree cover loss between 2001 and 2018. Maungtaw had the most relative tree cover loss at 9.7% compared to an average of 7.0% (Global Forest Watch, 2020). From 2001 to 2018, Sagaing lost 5.7% of its forest cover, although the district of Hkamti registered a positive gain of this index approximately during the same time (Global Forest Watch, 2020).

The areas of Rakhine Yoma Elephant Range WS and Htamanthi WS are protected under the "Conservation of Biodiversity and Protected Areas Law, 2018 (Union Parliament Law No. 12)" which prevent any type of exploitation as logging, establishment of plantations and mining within their boundaries. The protected areas formally lack a buffer zone, and the use of the surrounding areas is regulated by the administration of the Forest Department and General Administration Department. The establishment of governmental and private plantations is allowed in compliance with the National legal framework and the zoning system defined by the Forest Department for the land under its jurisdiction.

 In Rakhine State, where the environmental conditions are not favourable for the cultivation of palm oil, most plantations are constituted of rubber trees and timber species like Teak (*Tectona grandis*). Several governmental and private plantations are present around RYER and are likely to expand in the coming years. Legal logging was reduced during the temporary ban of 2014-17, after the ban the extraction of timber, in particular teak, padauk and rosewood, resumed in agreement with the plans of the Myanmar Timber Enterprise. In the last three years the extraction was particularly intense in the area of Gwa township, where a new logging road was opened in 2017 to facilitate logging operations. One of the greatest drivers of deforestation in Rakhine is the illegal logging practiced by the majority of village members located between the protected area and the coast. Almost all households in this area own at least a chainsaw, used on a daily basis to cut trees for timber and fuelwood. Illegal logging is one the main sources of income for several local communities in Rakhine and for seasonal workers from Ayeyarwady Region. The wood industry is severely impacting the environment of southern Rakhine through the destruction of forest and the involvement of local communities in illegal and dangerous activities. External logging companies are known to operate in the area and to hire low-income village people and seasonal workers from the poorest regions of the country to illegally collect timber. These scattered workers in the forest often rely on wildlife for their sustenance, thus aggravating their negative impact on the environment.

The situation is different in Sagaing, where the topography of the area and the lack of easily accessible roads to enter Htamanthi WS, prevented severe environmental degradation. During the years of the military government, a plan to build a dam in the area of the upper Chindwin River was developed. Logging companies have been permitted to carry out clearance operation in the areas located below 180m, which were supposed to be flooded. At the same time, illegal gold mines spread throughout the protected area, causing a consequential increase of illegal hunting and logging to sustain the workers and build facilities. In order to transport mining products and timber, several roads were constructed and accessibility to the park for local loggers and hunters increased. The situation changed in 2010, when the

Government cancelled the construction operations of the dam, due to issues related with geology. Since then, a program to improve the protection of the park was started and illegal logging progressively diminished. Nowadays the NWCD regularly patrols the protected area and extraction of timber is no longer occurring. There is still a small number of illegal gold mines in the northern part of the protected area, which are causing environmental degradation and will lead to habitat loss for sun bear if no actions are taken. The forest area surrounding the protected area is currently affected by clear-cutting for the expansion of plantations, shifting cultivation and illegal logging, thus suitable sun bear habitat outside the sanctuary is being lost due to unsustainable practices.

Poaching

Although it is a "Completely Protected Species" under the "Conservation of Biodiversity and Protected Areas Law, 2018", sun bear is commonly poached in the rural areas of Myanmar. The main reason for hunting this animal is its gall bladder, highly appreciated on the Chinese market for its alleged medicinal properties, and its paws, which are considered a delicacy. Other bear parts like claws, skulls and teeth are sold as souvenirs and trophies. Trade in live animals occurs as well, threatening mainly cubs and young individuals for the pet market or to be raised in bear bile farms.

Illegal hunting represents the first direct cause of the declining number of sun bear reported by members of local communities throughout the whole study area. Interviews and direct observations conducted by Istituto Oikos between 2017 and 2020 revealed that sun bear is the 4th most hunted species by rural communities in Rakhine and Sagaing, following wild boars and deer species. Two distinct poaching patterns were identified: a "subsistence" hunting, mostly practiced by local communities and seasonal workers, and a professional poaching system, constituted by a network of hunters from ethnic groups and traders. Snaring is the most used hunting technique among local farmers, which protect their crop fields surrounding their perimeter with traps. Homemade guns, hunting dogs and spears are also widely used as confirmed by camera trap photos and interviews. In Sagaing, members of the Lisu ethnic group have been reported to consistently use steel traps, iron fetter traps, and poisoned arrows. There is a clear connection between poaching and logging. Routes opened to reach timber extraction areas and left accessible are used by illegal loggers who set up temporary camps and often integrate their food rations with wildlife caught nearby. The most valuable part of their catch is sold together with timber. Chainsaws as well as crossbows and hunting equipment were often observed in these camps in Rakhine.

A particular issue is the trade of bear cubs. At least 4 bear cubs raised in private houses have been identified in the last 4 years (2016-2020) in Rakhine. All the cases reported were characterized by a similar pattern: villagers reported that they had received the animal as a gift or had purchased it for a small amount of money from hunters who killed its mother. Villagers stated not to be aware of the illegal actions they carried out and were willing to handover the animal for what they claimed, was the reimbursement for the bear's food cost. Despite the declaration of the villagers involved in the cases, it is clear how bear cubs are seen as a valuable item with a great market potential. Law enforcement in these cases is challenging for several reasons, including the fact that there are no proper facilities or technical skills to take care of seized animals in captivity.

Adult sun bears are killed directly in traps and body parts are separated for different purposes. The flesh is consumed locally or sold to local restaurants, while paws, claws and the most valuable part, the gall bladder, are sold to middlemen. From the western part of RYER, bears and other wildlife products are transported to Yangon, the first hub for the distribution towards the buyers, while from the eastern part, some items are sent to Mandalay and likely towards the border with China (Nijman, 2017).

The survey conducted in northern Myanmar revealed that the main illegal wildlife markets near Htamanthi WS are in Hopen and Namlit in Sagaing, and Hopin, in Kachin State. In these areas hunters are paid in advance by the brokers in order to catch specific targets, including bears, tigers and pangolins. Illegal wildlife products are then sold in Mandalay and Myitkyina, before being smuggled abroad (Oikos, 2019).

It is unclear how illegal wildlife products are transported through the numerous security checkpoints that separate the study area from the main cities (Yangon, Mandalay, Myitkyina). Improving awareness on wildlife conservation and skills of the police officers on duty at the check points, could help in reducing this illegal market. The study of Oikos (2019) highlighted that illegal wildlife traders and transporters might be using camouflage and religious symbols on their vehicles to guarantee a strategic cover and avoid searches and seizures.

Human bear conflict

Sun bear is traditionally considered an aggressive and dangerous animal for people. Sporadic encounters, which resulted in simulated or real attacks by the bear, raised concern among the locals on the alleged fierceness of this species. The analysis of the pattern of the interactions between people and bears in Rakhine revealed that bears tend to escape in the great majority of cases (Cremonesi *et al.*, 2018). An aggressive response could be triggered by a sudden, short distance encounter between a bear and people. A surprised sun bear could feel under threat and attack the human. Obviously, it is not possible to estimate how many of the reported attempted attacks by bears, ended with the escape of the people, would have actually resulted in a physical attack. The fact that the recognized cases of people being assaulted and bitten/scratched by bears are extremely rare suggests that most of the attacks were "simulations" to push away the perceived threat. Besides the intention of the animals, a mistaken perception of the behavioural patterns could generate a hostile attitude towards bears and their presence in the forest. Cases of bears killed in retaliation on attacks or village raids were often reported in Myanmar. A different type of negative interaction occurs when bears feed in crop fields causing damages and losses to local farmers, a phenomenon commonly known as crop raiding. Farmers in Rakhine appear not to be too concerned about the impact of bears on the agriculture activity, because, as they stated, the events are rare and have scarce impact. A much greater concern for farmers is wild boars and monkeys which can cause extensive raids and losses.

2.6. PROTECTION STATUS AND CONSERVATION INITIATIVES IN MYANMAR

In Myanmar, sun bear is a "completely protected species" since 1994, under the "Protection of Wildlife and Conservation of Natural Areas Law, 1994" (PWCNAL) and the Forest Rules of 2002, successively updated by the "Conservation of Biodiversity and Protected Areas Law, 2018". Killing, capturing, possessing or transporting sun bears is strictly prohibited and punished with a fine and/or imprisonment up to seven years. Myanmar is part of CITES since 1997, although it was highlighted that the country needs to improve effectiveness of the law and its enforcement, mainly because of lack of resources and funding (DLA Piper, 2015). Several wildlife conservation projects are being implemented throughout Myanmar thanks to the collaboration of MONREC with NGOs and INGOs. Between 2016 and 2020, in Rakhine State and Sagaing Region, the first specific initiative for the conservation of sun bear was carried out. The project included extensive biological monitoring using camera traps and transect surveys, habitat protection and restoration, anti-poaching interventions and an education campaign. A large area of sun bear habitat was protected thanks to the establishment of community forests, regularly patrolled by Community Guardian Groups. The initiative was implemented under the guidance and with the support of NWCD, which participated in the camera trapping campaign and collaborated with international organizations throughout the implementation of the activities. The project

experimented with innovative conservation actions with a holistic approach, addressing at the same time habitat issues, direct exploitation of the species, awareness and alternative livelihoods. The outputs of the programme informed MONREC in order to provide the Government with the necessary tools to scale up actions and ensure sustainability.

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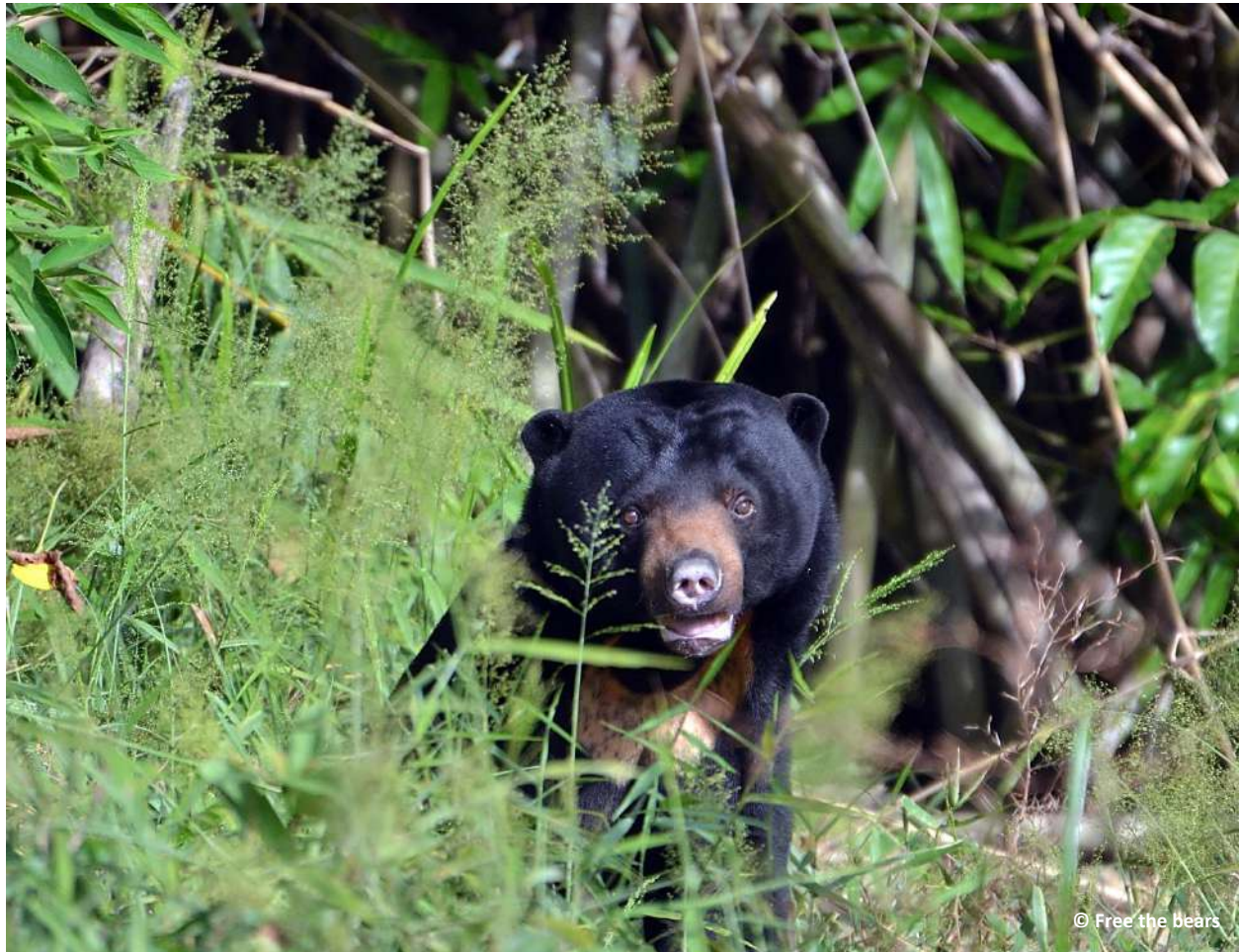
3. ACTION PLAN

Overview

The following section contains recommendations and suggestions to improve the protection of sun bear in Htamanthi WS, Rakhine Yoma Elephant Range WS and surrounding areas, for the period 2020-2029. The two protected areas constitute the core for the implementation of the conservation actions and the wildlife monitoring programme. The activities involving the participation of local communities are planned to be implemented in the forest land surrounding the PAs, where most of the villages are located.

The proposed actions were elaborated following consultation meetings with the local authorities (NWCD, FD, Police), local communities and NGOs carried out between 2016 and 2020. The "Sun Bear: Global Status Review & Conservation Action Plan 2019-2028"(Crudge *et al.*, 2019) provides the structure upon which specific actions for the project sites were identified.

The structure of the current Action Plan is designed as follows:

No: action code.
Action: description of the action suggested.
Timing: suggested timing for the implementation of the action, where yr 1, yr 2 = year 1 & year 2; yr 1 - yr 2 = from year 1 to year 2.
Responsibility: parties involved (FD, NWCD, Police, INGOs, NGOs, Universities, Etc.).
Indicators of progress: indicators to measure the accomplishment of the action.
What we have: resources already available (2020).
What we need: resources to recruit in order to implement the action.

Goals
- o **Goal 1 - Reduce illegal exploitation of sun bear**
- o **Goal 2 - Protect and restore sun bear habitat**
- o **Goal 3 - Devise and implement methods to effectively monitor trends in sun bear population**
- o **Goal 4 - Increase the synergies and collaboration between government and other stakeholders**
- o **Goal 5 - Increase public awareness and participation**

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Goals, Objectives and Actions

GOAL 1. REDUCE ILLEGAL EXPLOITATION OF SUN BEAR

Ensuring that:
- mechanisms and reasons for sun bear hunting and trading are well understood
- illegal hunting and trade are prevented
- government and local communities are empowered to protect sun bear from illegal activities

OBJECTIVE 1 - UNDERSTAND REASONS FOR HUNTING SUN BEAR AND MONITOR LOCAL DEMAND OF BEAR PRODUCTS	

Rationale:

Reasons to hunt sun bear vary according to the local context and social environment. The surveys conducted in 2017 and 2019 suggest the existence of different hunting approaches between stable members of the local communities and seasonal workers on one side and professional poaching teams on the other. Understanding the motives and characteristics of each group will help to develop a strategy aimed at reducing bear hunting. Although the demand for bear products at local level is thought to be low, it is necessary to continue the survey started in 2019 in Rakhine, and expand the study area to Sagaing, also including different ethnic groups in the survey. Monitoring the use of bear products over time will help the design of behavioural change campaigns where needed. Also, a better understanding of illegal bear and wildlife trade will allow designing actions that effectively address such issues.

No	Action	Timing	Responsibility	Indicators of progress	What we have	What we need
1.1	Expand the investigation of the drivers behind sun bear hunting and continue the investigation on the local demand for bear products among different ethnic groups in the surroundings of the PAs in Rakhine and Sagaing.	Yr 3	INGOs, NGOs	Survey reports on the drivers behind sun bear hunting and local demand for bear products compiled	Survey on IWT in Rakhine and Sagaing (2017 & 2019), Exploratory study on the use of bear bile in Rakhine, expertise, methods, trained teams, trusted local hunters to facilitate the data collection	Surveyors, trainings to expand the survey team, social scientist to analyse collected information
1.2	Continue monitoring and investigating availability of sun bear parts and products along the trade chain, identifying and mapping hunting "hotspots" and trading routes.	Yr 3, yr 6, yr 9	NWCD, INGOs, NGOs	Reports on availability of sun bear products compiled, maps of hotspots of sun bear poaching and transportation routes prepared	Reports on the surveys of IWT in Rakhine and Sagaing in 2017 & 2019, survey protocols	Experts on IWT, informers, incognito investigators, SMART patrolling
1.3	Continue investigating the trade of sun bear cubs, their buyers and their utilization.	Yr 3, yr 6, yr 9	NWCD, Police, INGOs, NGOs	Reports on trade of sun bear cubs compiled	Reports on the surveys of IWT in Rakhine and Sagaing (2017-2019),	Experts on IWT, informers, incognito investigators

OBJECTIVE 2. IMPROVE ENFORCEMENT EFFECTIVENESS FOR LAWS PERTAINING TO HUNTING, TRADE AND USE OF SUN BEARS AND THEIR PARTS

Rationale:

According to Myanmar law, sun bear is a "completely protected species", but law enforcement is generally weak due to lack of human and economic resources. Local communities can support law enforcement by participating in patrolling missions and providing information to NWCD and Police. Successful prosecution of poachers and bear traders will likely disincentivize further illegal exploitation of sun bears, thus contributing to the species conservation.

No	Action	Timing	Responsibility	Indicators of progress	What we have	What we need
2.1	Create a network of informers in the field, aimed at collecting information on IWT in collaboration with NWCD and Police.	Yr 1-yr 3	NWCD, Police, INGOs, NGOs	Informers network created	Community Guardian Groups actively operating in the field, connections with local communities	Trainings for local informers, compensation system for collaborators in conservation
2.2	Promote community-based initiatives aimed at increasing the human resources involved in anti-poaching and anti-IWT operations.	Yr 1-Yr 5	NWCD, INGOs, NGOs	Number of patrolling staff increased	Community guardian groups operating in the field, procedures, patrolling protocols	Trainings for local communities and NWCD, salaries, allowances, equipment
2.3	Support the creation of new patrolling outposts to be used by the PA staff during patrolling operations in remote areas.	Yr 6-yr 10	NWCD, INGOs, NGOs	Patrolling outposts built and used by the NWCD and CGGs	Workforce, position of new patrolling outposts	Funds for building new facilities, increased park staff to be employed at the new outposts
2.4	Promote collaboration of the park staff with armed police forces (e.g. Forest Police) during the patrolling missions.	Yr 2	INGOs, NGOs, NWCD, Police	Joint anti-poaching operations NWCD-Police implemented	Patrolling calendars, patrolling area	Increased cross-agency collaboration, results of 11.1, coordination at State level
2.5	Train and engage police officers at security checkpoints to identify and report on illegal bear trade to the correct enforcement agency.	Yr 2	NWCD, Police, INGOs, NGOs	Security checkpoint staff engaged	Map of security checkpoints, training expertise	Increased cross-agency collaboration, results of 11.1, coordination at the State level
2.6	Monitor and evaluate the effectiveness of the actions implemented by assessing the trend of bears poached, arrests of poachers/traders and successful prosecutions.	Yr 5, yr 10	INGOs, NGOs	Information and report on bears poached, arrests and prosecutions compiled	Baseline data on bears poached (2017-2020), bear parts seized (2000-2018)	Result of 2.1, information on legal actions against bear poachers and traders

OBJECTIVE 3. ASSESS THE CONSERVATION IMPACT OF ALTERNATIVE LIVELIHOODS SCHEMES FOR HUNTERS AND DEVELOP COMMUNITY BASED INITIATIVES FOR MICRO-ENTERPRISES AND ECOTOURISM

Rationale:

There is not universal agreement whether providing alternative livelihoods to illegal hunters can actually reduce hunting pressure on threatened species. Context specific features can determine the success of the implemented actions. Understanding the relation between economic development of rural communities and intensity/efficacy of poaching in Myanmar will help to define a strategy for the correct creation of alternative livelihood schemes.

The illegal wildlife trade surveys conducted in Rakhine and Sagaing highlighted a reduction of poaching among the local communities which experienced legal actions due to illegal hunting and were provided with alternative livelihoods. It is believed that a combination of law enforcement and incentives to shift towards sustainable economic activities provides the motivation to reduce/stop poaching for local communities.

Responsible ecotourism in Myanmar has a huge potential to empower local communities and promote environmental conservation. Sun bear is a powerful flagship species which could attract outdoor enthusiasts and fuel a sustainable economy based on wildlife experiences. Eventually local communities will acknowledge that sun bears and other wildlife can have a major economic value when they are alive and thrive in the wild.

No	Action	Timing	Responsibility	Indicators of progress	What we have	What we need
3.1	Evaluate the effectiveness of development initiatives, aimed at providing alternative livelihoods to poachers, in halting sun bear hunting, through literature review and interviews to local communities.	Yr 1	INGOs, NGOs, research institutes, Universities	Number of studies on effective alternative livelihoods systems carried out	Baseline information on bear poaching in Rakhine and Sagaing, pilot initiatives for the provision of alternative livelihoods and revolving funds in Rakhine, literature	MSc/PhD students in social science/conservation ecology or similar to compile the information
3.2	Assess successful green business initiatives/ecotourism programmes and explore their applicability in Rakhine and Sagaing through community consultations and market analysis.	Yr 1-yr 2	INGOs, NGOs	Number of studies on potential green business initiatives compiled	Several development projects implemented countrywide, experience in conducting market analysis for small businesses in Rakhine	market analysts, field surveys
3.3	Implement pilot projects to promote the development of community-based businesses aimed at providing alternative sustainable livelihoods to former poachers, including ecotourism and bear/wildlife watching activities	Yr 3- yr 5	FD, Small-Scale Industries Department, Department of Tourism, INGOs, NGOs	Community based businesses started	Experience in establishing micro-enterprises in Rakhine, expertise in ecotourism	Result of 3.1, 3.2, initial capital for micro-enterprises, technical trainings
3.4	Upscale the successful initiatives implemented under Action 3.3 on a large scale in order to involve most hunting communities.	Yr 6 - yr 10	FD, Small-Scale Industries Department, Department of Tourism, INGOs, NGOs	Community based businesses started	Experience in establishing micro-enterprises in Rakhine, expertise in ecotourism	Result of 3.1, 3.2, 3.3, initial capital for micro-enterprises, technical trainings
3.5	Monitor and evaluate the expected reduction of poaching among local communities involved in alternative business activities.	Yr 10	NWCD, INGOs, NGOs	Reports on the trend of bear poaching among the local communities involved in alternative business activities compiled	Baseline data on bear poaching (2017-2020), survey methods	Results of 3.3, 3.4, field survey

GOAL 2. PROTECT AND RESTORE SUN BEAR HABITAT

Ensuring that:
- habitat patches are large enough and sufficiently in good condition to ensure long-term viability of wild sun bear populations
- sun bears thrive both inside and outside protected areas
- habitat protection is effective, sustained and long-term.

OBJECTIVE 4. REVIEW DATA AND CONTINUE MONITORING ON FOREST COVER AND ECOSYSTEM SERVICES TO GALVANISE SUPPORT FOR CONSERVATION INTERVENTIONS IN TARGET AREAS

Rationale:

Myanmar is classified at the 3rd greatest deforestation rate in the world. Rakhine lost 6% of its forest cover between 2000 and 2018. This trend has an obvious negative impact on sun bear, which is a forest dependent species. Monitoring forest losses and land cover change will help define priority areas for conservation actions as well as habitat protection and restoration programmes.

Local communities may derive benefits from saving rather than cutting forests. Identification of such benefits may increase political and public will, as well as financial resources through payment for ecosystem services, for protecting sun bear habitat.

No	Action	Timing	Responsibility	Indicators of progress	What we have	What we need
4.1	Review and map existing development, timber extraction and land use planning at local level.	Yr 1	FD, INGOs, NGOs	Number of reports on planning review and analyses compiled	FD working cycles planning	Consultations with Governments and land use planners to compile the information
4.2	Continue to monitor landcover changes over time and hotspots of deforestation.	Yr 3, yr 6, yr 9	FD, INGOs, NGOs, Universities	Landcover change maps prepared	Land cover change maps 2000-2018, Expertise, Global Forest Watch	Remote sensing specialists, satellite images
4.3	Identify and map ecosystem services beneficial to people derived from the conservation of sun bear habitat, including opportunities for REDD+ and carbon credit system.	Yr 1 - yr 2	FD, INGOs, NGOs, Universities	List and map priority sites with assessment of ecosystem services and carbon credit opportunities prepared	Data on forest conservation initiatives, basic methods, community-based conservation areas (CFs) as potential study areas for the evaluation of ecosystem services	Experts on ecosystem services and REDD+, result of 4.1
4.4	Disseminate information about forest loss and ecosystem service losses to authorities and the public in order to stimulate interest in maintaining intact forest.	Yr 1 - yr 10	NGOs, INGOs, Universities	Recommendations and solutions proposed to relevant decision-makers, stakeholders informed	Existing studies on forest loss	Results from action 4.1, 4.2 and 4.3, influential communicators, consultation meetings

	OBJECTIVE 5. IMPROVE ENFORCEMENT OF EXISTING LOGGING REGULATIONS					
\multicolumn{7}{	l	}{Rationale:}
\multicolumn{7}{	l	}{Legal and illegal logging have both direct and indirect impacts on sun bear populations, through habitat loss and degradation, as well as increased accessibility, leading to incremental poaching and disturbance. A better understanding of the mechanism of illegal timber trade, including who is violating logging regulations, how the network is structured and how illegal logging companies operate will aid to take action against the offenders. Logging regulations are often not fully enforced due to the lack of resources and staff. By supporting the enforcement agencies and empowering local communities to protect the forest, new resources will be added in order to expand the patrolled area and number of patrolling missions per year.}
No	Action	Timing	Responsibility	Indicators of progress	What we have	What we need
5.1	Review existing regulations and penalties related to illegal logging and identify responsible enforcement agencies.	Yr 1	FD, NWCD, NGOs, INGOs	List of regulations, penalties and enforcement responsibilities compiled	National logging regulation under the "Protection of Biodiversity and Protected Area Law 2018", experts on forest regulations	Reports on new Forest Rules, communication with enforcement agencies
5.2	Conduct an extensive investigation on the illegal logging network and its mechanisms, including the role of local communities, connection with traders and logging companies, transportation routes.	Yr 1 - yr 2	FD, NWCD, INGOs, NGOs	Reports of the investigation on illegal logging in Rakhine and Sagaing compiled	Connections with local communities and small-scale loggers, knowledge of the territory, field staff trusted by local communities	Experts on illegal timber trade, connections with timber companies, survey teams
5.3	Identify and map areas within sun bear range where illegal logging is having the greatest negative impact.	Yr 2 - yr 3	FD, NWCD, INGOs, NGOs	Maps of hotspots for illegal logging within the sun bear range prepared	Landcover change maps 2000-2018, CGGs collecting data in the field	Results of 4.2, 5.2, data collectors in the field, SMART trainings for CGG and park staff, data analysts
5.4	Reinforce patrolling in the main logging areas, supporting the FD and NWCD with community-based initiatives.	Yr 3 - yr 10	FD, NWCD, NGOs, INGOs, local communities	Number of patrolling missions carried out per year; area patrolled per year increased	CGGs, patrolling protocols, reporting procedures	Human resources, technical trainings, equipment
	Train and engage police officers at security checkpoints to identify and report illegal transportation of timber and charcoal to the correct enforcement agency.	Yr 3	Police, FD, INGOs, NGOs	Security checkpoint staff engaged	Map of security checkpoints, training expertise	Increased cross-agency collaboration, results of 10.1, coordination at the State level

OBJECTIVE 6. PROMOTE COMMUNITY BASED INITIATIVES FOR THE MANAGEMENT AND PROTECTION OF SUN BEAR HABITAT AND NATURAL RESOURCES

Rationale:

The vital role of local communities in the conservation process is globally recognized. Protection of sun bear habitat in the long term can only be achieved through the active involvement of the people living in and using the forest surrounding the PAs in Rakhine and Sagaing. It is proven that the establishment of community management systems increases the sense of ownership and the willingness to invest resources and efforts for the protection of the environment. By supporting the creation of new Community Forests in the areas around the PAs, over exploitation of sun bear habitat by the local communities will be prevented. Also, the establishment of semi-voluntary patrolling groups will create a deterrent against environmental crimes such as illegal logging, forest fires and poaching.

No	Action	Timing	Responsibility	Indicators of progress	What we have	What we need
6.1	Inform and provide trainings on community forests to local communities and relevant authorities	Yr 1 - yr 3	FD, INGOs, NGOs	Local communities and Government staff informed	Expertise on CF and trainings	Trainers, field staff
6.2	Investigate the opportunities to establish new CFs, assessing the land availability, interest and participation of the local communities and conservation outputs.	Yr 1 - yr 3	FD, INGOs, NGOs	Information on the opportunity to establish new CFs compiled, maps of future CF areas prepared	Expertise on CF, knowledge of the territory and local communities	Result of 3.1, field staff, field surveys
6.3	Support local communities in establishing new CFs in the buffer zone of the PA and surrounding area by providing technical trainings and assistance.	Yr 1 - yr 10	FD, INGOs, NGOs	CFs established around the PAs	Expertise on CF, connections with local communities, methods	Initial capital for CF user groups, result of 6.2
6.4	Promote the establishment of new CGGs which will support the FD and NWCD in patrolling operations to prevent illegal logging, forest fires, illegal mining and poaching.	Yr 1 - yr 10	FD, NWCD, INGOs, NGOs	CGG established and actively patrolling the PAs, CFs and surrounding areas	Expertise on community patrolling and SMART, pilot projects with CGG	Trainings, salaries, field equipment, transport
6.5	Support initiatives to link community forest management with micro business opportunities (CFE) in order to provide economic benefits on the short and long term to communities who commit to environment conservation.	Yr 3 - yr 10	INGOs, NGOs	CFE and sustainable small business initiatives started	Expertise on sustainable micro business, knowledge of local market, forest experts	Instructions on CFE, initial capital for CFE, market analysts

OBJECTIVE 7. IMPROVE UNDERSTANDING OF WHAT CONSTITUTES HIGH QUALITY SUN BEAR HABITAT, AND HOW VARIOUS HABITAT COMPONENTS AFFECT SUN BEAR POPULATIONS

Rationale:
Factors affecting the quality of forests for sun bear are not well understood (e.g. forest age and density, forest type, understory, patch size and shape, disturbance, human access). It is also not clear how various configurations of forest and crop fields, or forest and plantations, affect sun bear occurrence, density, survival and reproduction. Answering these questions will help to conserve bears by (1) revealing the extent to which different types of land use change can be expected to impact bear populations, and (2) informing land use plans or agricultural development plans to protect and improve habitat for sun bears.

No	Action	Timing	Responsibility	Indicators of progress	What we have	What we need
7.1	Gather existing relevant information from published and unpublished sources regarding sun bear's use of various natural and altered habitats.	Yr 1	INGOs, NGOs, research institutes, Universities	Number of papers on sun bear habitat quality in different parts of the range reviewed and reports compiled	Studies about sun bear habitat use, behaviour, and feeding ecology, within different types of forests and at forest plantation edges	Biology/ecology/zoology or similar BSc, MSc, students to review the available literature and compile reports
7.2	Conduct research to fill gaps in information about assessing the quality of sun bear habitat and defining highest quality sun bear habitats.	Yr 1 - yr 7	INGOs, NGOs, research institutes, universities	Long term field projects implemented, papers on sun bear habitat use published, recommendations for highest quality sun bear habitats delivered	Baseline information on sun bear habitat use, on-going studies, few field-tested techniques for assessing habitat quality	Biology/ecology/zoology PhD students, long term field projects to understand demographic effects of different habitats and habitat components.
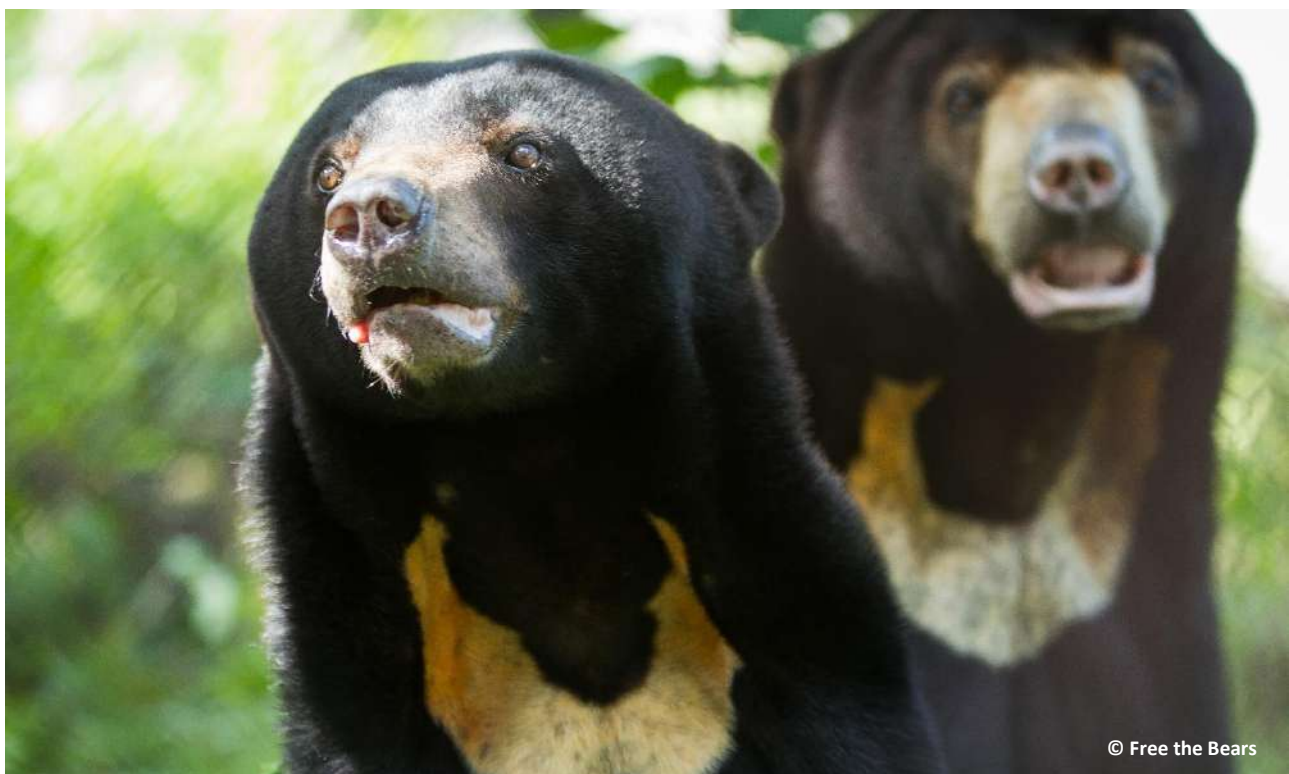
OBJECTIVE 8. IDENTIFY AND RECONNECT SMALL ISOLATED SUN BEAR POPULATIONS WITH HABITAT CORRIDORS

Rationale:

Small populations are more likely to be extirpated, either due to over-hunting or to stochastic events; keeping them connected increases likelihood of persistence, allows for rescue of declining populations through immigration, and promotes long-term genetic interchange.

Identifying sun bear distribution (OBJECTIVE 10) and corridors connecting core areas will promote persistence of sun bears in regions where their forested habitat is fragmented. Currently the location of such potential corridors used by sun bears is unknown.

The efficacy and feasibility of corridors connecting core sun bear populations varies across the range in relation to habitat, land use, human density in the corridor, size and distance between core areas, threats to the core areas, political will to protect and possibly enhance the corridor. Prioritizing the need for corridors based on threats, presence of roads, human settlements, plantations, sun bear population size, likelihood of success, etc., will inform the allocation of resources.

No	Action	Priority	Responsibility	Indicators of progress	What we have	What we need
8.1	Identify where habitat corridors are needed in order to connect small isolated sun bear populations.	Yr 1 - yr 2	INGOs, NGOs, research institutes, universities	Priority corridors identified	Conservation corridors in northern Myanmar (Sagaing and Kachin) pre identified, sun bear potential distribution maps	Expansion of the research on sun bear conservation status, data analyst, results of 7.2 and 10.5
8.2	Examine sun bear use of already existing/potential corridors or degraded habitats between forest patches and PAs.	Yr 2 - yr 5	INGOs, NGOs, research institutes, universities	Sun bear use of pre-identified corridors proved	Forest cover maps, sun bear potential distribution maps	Ad hoc studies on the presence of sun bear in the conservation corridors, assessment of the habitat quality of conservation corridors, result of 10.5
8.3	Consult with stakeholders to implement small-scale corridor development and monitor sun bear use to inform recommendations for larger-scale implementation.	Yr 5 - yr 10	FD, NWCD, INGOs, NGOs, local communities	Consultation with stakeholders for the protection of priority corridors carried out	Network of CFUGs, forest cover maps, sun bear potential distribution maps	Results of 4.1 and 4.2, consultations with Government and land planners

GOAL 3. DEVISE AND IMPLEMENT METHODS TO EFFECTIVELY MONITOR TRENDS IN SUN BEAR POPULATION

Ensuring that:
- standardized protocols for sun bear monitoring are used in all study areas
- population declines are detected in order to rapidly implement conservation measures
- the effectiveness of conservation programmes is assessed in relation with population dynamics.

OBJECTIVE 9. CREATE A STANDARDIZED MONITORING PROTOCOL TO DETECT POPULATION CHANGES AND SHARE IT WITH THE RELEVANT STAKEHOLDERS						
Rationale: Camera trap and sign surveys are regularly implemented in Rakhine and Sagaing but due to different survey designs, results are not comparable in different study areas over time; therefore the creation of a standardized protocol will ensure that data collection and analysis are consistent in all study areas in order to effectively monitor sun bear population trend. Sharing and disseminate the standardized monitoring protocol will ensure that objectives, key actions and work plan are properly understood by all relevant stakeholders.						
No	Action	Timing	Responsibility	Indicators of progress	What we have	What we need
9.1	Develop a standardized sun bear monitoring protocol which envisages the periodical implementation of camera trap and sign surveys inside HWS, RYER and surrounding areas.	Yr 1	INGOs, NGOs, Universities	Standardized monitoring protocol for sun bear developed	Expertise in wildlife monitoring, sun bear survey protocol, publications (e.g. Bisi *et al.*, 2019), Global Status review & Conservation action plan (Crudge *et al.*, 2019)	Team of local and international scientists
9.2	Share and disseminate the objectives, key actions, workplan of the monitoring protocol through workshops with all the relevant stakeholders and future protocol implementors.	Yr 1	NWCD, NGOs, NGOs, Universities	Workshops organized	Expertise in wildlife monitoring, experience in the organization of informative workshops	Result of 9.1

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OBJECTIVE 10. IMPLEMENT MONITORING PROGRAMMES AND ASSESS THE CONSERVATION OUTCOMES OF THE INITIATIVES CARRIED OUT						

Rationale:

Understanding size and distribution of wild populations of sun bear is a determining factor to design and implement conservation measures. The only available information on sun bear populations in Myanmar were obtained in the framework of the survey implemented between 2016 and 2019 in eight study sites in the area of HWS in Sagaing and RYER in Rakhine. Monitoring sun bear over time and expanding the survey area will provide information on the population trend at the local level, thus supporting the identification of successful conservation initiatives.

| No	Action	Timing	Responsibility	Indicators of progress	What we have	What we need
10.1	Increase capacity of field teams for monitoring and data collection, including use of camera traps and identification of bear tracks, through provision of technical trainings.	Yr 2	INGOs, NGOs	Number of staff trained	Expertise in wildlife monitoring and delivery of technical training	Result of 9.1, field teams
10.2	Increase capacity for data analysis, including use of statistical models and software through provision of technical trainings.	Yr 2	INGOs	Number of staff trained	Expertise in wildlife monitoring, data analysis and delivery of technical training	Result of 9.1, biologists/ecologists with basic statistical skills to be trained
10.3	Implement a sun bear monitoring programme through camera trap and sign surveys inside HWS, RYER and surrounding areas.	Yr 2 - yr 10	NWCD, INGOs, NGOs	Camera trap and sign surveys periodically implemented	Survey protocol for 8 study areas in Rakhine and Sagaing, camera traps, trained staff	Result 9.1, 10.1, increased number of field staff, field equipment, transport
10.4	Collect camera trap by-catch data on sun bear throughout Myanmar in order to identify the presence of isolated sun bear populations outside of HWS and RYER.	Yr 1 - yr 10	NWCD, INGOs, NGOs	Number of camera trap by-catch data collected	Several wildlife monitoring programmes implemented throughout Myanmar	Result of 11.2, 11.3
10.5	Analyse data collected in the field to produce potential distribution maps and models for the identification of population trends.	Yr 5 - yr 10	NWCD, INGOs, NGOs, Universities	Distribution and population models produced	Expertise in data analysis, analysis protocol for sun bear survey (2016-2019), collaboration with international Universities	Result of 9.1, 10.2
10.6	Assess whether population dynamics are affected by the conservation actions implemented.	Yr 10	INGOs, NGOs, Universities	Information on population trend and successful conservation actions compiled	Expertise in data analysis	Result of 9.1, 10.2, 10.3, 10.4, conservation actions for sun bear implemented

GOAL 4. INCREASE SYNERGIES AND COLLABORATION BETWEEN GOVERNMENT AND OTHER STAKEHOLDERS

Ensuring that:
- mechanisms for inter-agency collaboration and data sharing are in place
- Governmental Agencies, INGOs, NGOs and research institutes collaborate in sharing data on the presence of the species, threats and opportunities to improve its conservation
- Governmental Agencies quickly receive updated information and are able to coordinate actions involving multiple departments.

OBJECTIVE 11. PROMOTE COLLABORATION AMONG DIFFERENT GOVERNMENTAL AGENCIES, CONSERVATION GROUPS AND LOCAL COMMUNITIES					
Rationale: Efficient coordination among Governmental Agencies, and effective collaboration between all stakeholders involved in sun bear conservation is a prerequisite for the species long term protection. The process of conserving sun bears passes through knowledge and best practice sharing between Governmental Agencies, INGOs, NGOs and research institutes. Moreover, an alliance between local administrations, FD and NWCD is essential for strengthening the trustful relationship between local villagers and formal institutions, increasing the long-term sustainability of the actions of this plan. The IWT Task Force in Myanmar will be established to reunite enforcement agencies, local administrators and experts to better coordinate actions against wildlife trafficking at national, state and regional level. Strengthening the impact of the Task Force at local level in Rakhine and Sagaing will provide a powerful tool to foster the collaboration of the formal institutions and reduce wildlife crimes, including bear poaching and trading. The creation of a platform to deposit data on the presence of wildlife, threats and conservation opportunities, managed by the park staff, will facilitate collaboration and data sharing between research institutes, NGOs and Governmental Agencies. This tool will also make information on sun bear easily accessible upon request of accredited institutions.					
No	Action	Timing	Responsibility	Indicators of progress	What we have	What we need
11.1	Strengthen the local impact of the Myanmar Illegal Wildlife Trade Task Force, promoting the collaboration and data sharing between FD, GAD and Police for coordinating anti-poaching interventions in Sagaing and Rakhine.	Yr 1-yr 5	IWT Task Force, INGOs, NGOs	Number of cross-agency Anti-poaching operations successfully implemented	IWT Task Force periodical meetings	IWT Task Force Action Plan, coordination of IWT Task Force at local level, inter-agency consultation meetings
11.2	Share knowledge, data and best practices between all stakeholders involved in sun bear conservation, organize periodical thematic meetings among Government Agencies, INGOs, NGOs and research institutes	Yr 1-yr 10	FD, NWCD, INGOs, NGOs, Universities	Thematic meetings and workshops organized	Project related workshops and events for the presentations and dissemination of results	Periodic update meetings on ongoing activities and findings, upcoming opportunities and needs assessments

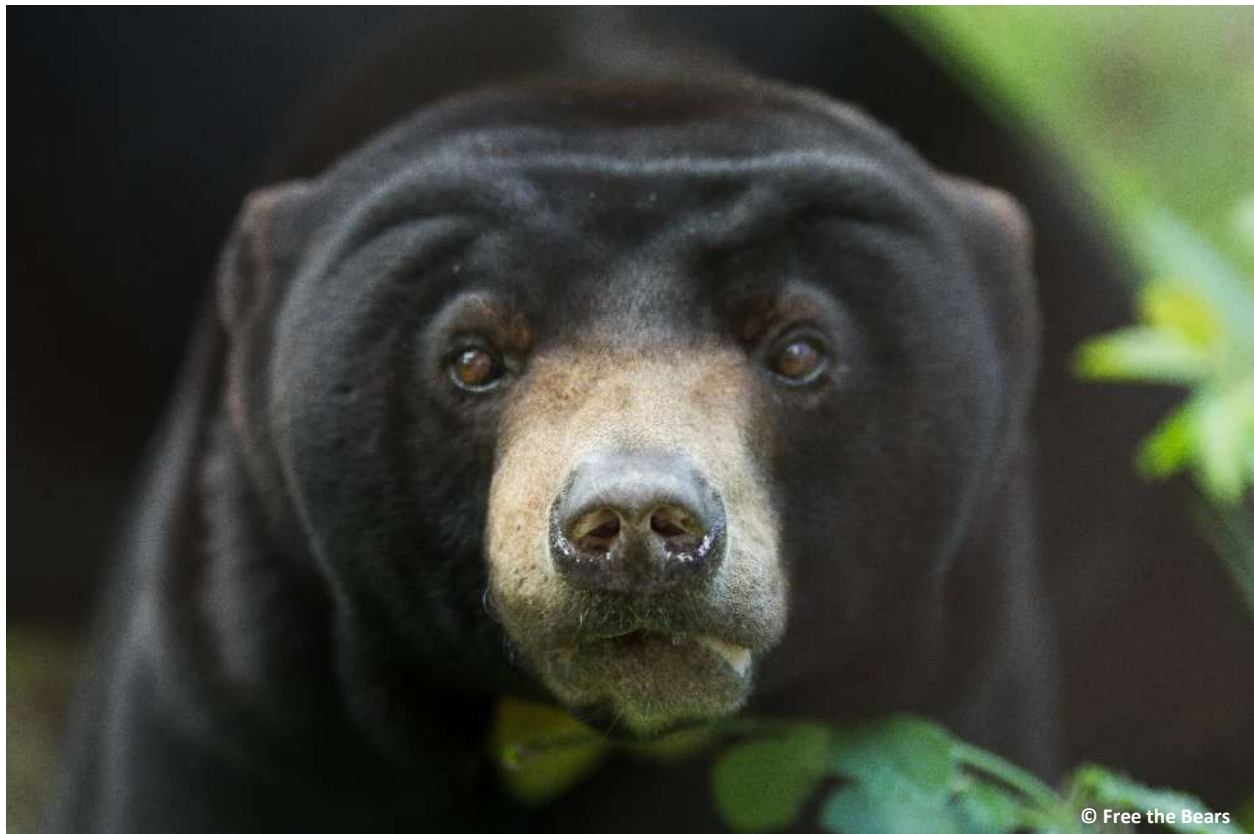| 11.3	Create a data sharing platform to be used as a repository of all information regarding sun bear (and possibly other species) deriving from research and monitoring conducted in RYER and HWS	Yr 2	NWCD, with the help and data of Universities, research centres, INGOs, NGOs	Data sharing platform created and implemented, used by Governmental Agencies for applied research	Similar data sharing platforms already existing	Funds for platform creation and implementation
11.4	Improve the effectiveness of the Management Committee of RYER and HWS	Yr 3-yr 10	NWCD, INGOs, NGOs	Management Committees meeting on a regular basis and making relevant decisions	Already existing Management Committees of RYER and HWS	Consultation meetings with local administrators and Management Committees
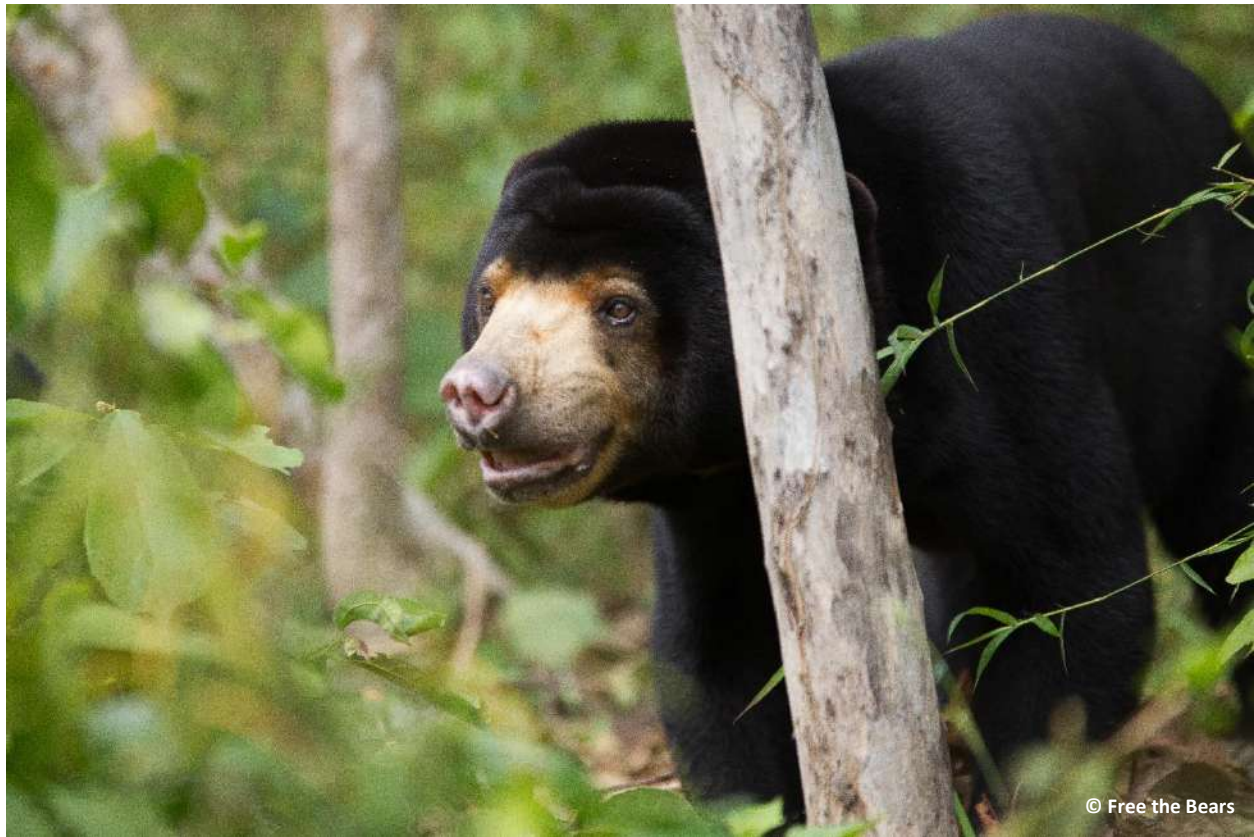
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GOAL 5. INCREASE PUBLIC AWARENESS AND PARTICIPATION

Ensuring that:

- sun bear population status, habitat needs, biology and threats are well understood by all relevant stakeholders
- rural village communities become aware of the importance of sun bear and biodiversity conservation
- local communities gain knowledge about sun bear and biodiversity conservation and this empowers them to effectively participate in decision making.

OBJECTIVE 12. DISSEMINATE INFORMATION ON SUN BEAR AND BIODIVERSITY CONSERVATION AMONG ALL RELEVANT STAKEHOLDERS IN ORDER TO PROVIDE KNOWLEDGE FOR A CONSCIOUS DECISION-MAKING FRAMEWORK

Rationale:

Understanding the importance of biodiversity and its functioning is the first step to develop an environmental conservation-oriented mindset at multiple levels.

Local communities often have poor awareness of the ecological relationships between wildlife and habitat, thus underestimating the impact of unsustainable activities and risk of species extinction. Due to the alleged fierceness and dangerousness, sun bear killing is usually regarded as pest removal. Another risk factor for the survival of bears and wildlife in Myanmar is that hunting, even threatened species, is considered part of "local tradition", and for this reason widely accepted, despite being against the law.

Disseminating information on biodiversity and educating all stakeholders is fundamental alongside implementing active conservation actions (e. g. law enforcement and habitat protection). Young students are relatively easy to engage, and their early participation will constitute an investment for the future of wildlife and habitat; adults will receive information on biodiversity and environment in order to better understand ecological functions and the impact on their lives in rural areas. This will empower local communities to consciously participate in the process of decision making by receiving fundamental knowledge.

By engaging with social influencers, media and religious leaders, the concept of "traditionally accepted hunting" will undergo a process of modernization overtime, and no longer be tolerated.

By providing information on the necessity to protect wildlife to law enforcement agencies and judiciary, motivation to take action against environmental crimes, including bear poaching, will be raised among formal institutions.

No	Action	Timing	Responsibility	Indicators of progress	What we have	What we need
12.1	Organize awareness-raising campaigns (including but not limited to education programmes in schools) communicating to local communities the role of the sun bear within the whole forest ecosystem, and its importance in the conservation of local forests and the wellbeing of village communities, promoting a positive image of the sun bear in terms of territorial identity.	Yr 1-yr 10	INGOs, NGOs	Number of local communities informed	Expertise in educational and awareness raising initiatives with local communities, professional educators	Funds to organize and carry out periodic educational initiatives
12.2	Engage with social influencers, lobby stakeholders and religious leaders to ensure the use of sun bears, their parts and products is	Yr 1-yr 10	FD, NWCD, INGOs, NGOs	Number of social influencers, lobby stakeholders and	Expertise in educational and awareness raising initiatives with local communities	Funds to organize and carry out periodic initiatives, connections

	no longer considered socially, personally, or culturally acceptable.			religious leaders actively engaged		with social influencers and religious leaders
12.3	Engage with media to raise the profile of sun bear conservation.	Yr 1-yr 10	INGOs, NGOs	Increased press and media coverage of sun bears in local and national media, Increased conservation positive values, attitudes, and behaviours in the public for sun bears	Engaging stories, few baseline data on values, attitudes, and behaviours	Funds to organize and carry out periodic initiatives, connections with social influencers and religious leaders
12.4	Raise awareness with law enforcement authorities and judiciary through trainings with target audience.	Yr 1-yr 10	FD, NWCD, NGOs	Number of trainings and outreach efforts with judiciary and law enforcement agencies carried out	A collection of case studies where this has been effectively implemented in some states of SEA. Regional platforms between law enforcement agencies and judiciary	Human resources, better inter-agency collaboration, funds to carry out trainings

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