

# CONSERVATION OF MALAYAN TAPIR

————— *Tapirus indicus* —————

A Joint Effort Among  
Southeast Asian Countries



A Report Published for the  
Malayan Tapir Conservation Regional Workshop 2022

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*Editors:*

Evelyn Lim Ai Lin  
Mohd Sanusi Mohamed

Chong Leong Puan  
David Magintan

Mark W. H. Hiew  
Donny Yawah





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*For more information, please contact:*

**Evelyn Lim Ai Lin**

Department of Recreation and Ecotourism

Universiti Putra Malaysia

43400 UPM, Serdang Selangor Darul Ehsan

✉ [limailinevelyn@upm.edu.my](mailto:limailinevelyn@upm.edu.my)

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# FOREWORD



# Faculty of Forestry and Environment, Universiti Putra Malaysia (UPM)

The Faculty of Forestry and Environment, Universiti Putra Malaysia is honoured to collaborate with Copenhagen Zoo, the Department of Wildlife and National Parks, Peninsular Malaysia, and the Malaysia Nature Society in the organizing of the Malayan Tapir Conservation Regional Workshop 2022. The Faculty of Forestry and Environment is dedicated to supporting the country's initiatives in wildlife conservation as aspired in the United Nations Sustainable Development Goals, specifically SDG Goal 15 - Life on Land, which focuses on managing terrestrial forests sustainably, working to reverse land and natural habitat degradation to prevent biodiversity loss.

As one of the founding faculties during the formation of Universiti Putra Malaysia, formerly known as Universiti Pertanian Malaysia, subjects in agriculture and forestry are ranked first in Malaysia and among the top 80 by QS World University Rankings 2022. As an academic entity, it focuses on teaching, conducting research, and providing professional services to produce students who are competent, resilient, far-sighted, and with high moral values. Realizing its essential role in moulding a generation that embraces sustainability in the management of its natural resources and environment, it offers five undergraduate programmes, namely, Bachelor of Forestry Science with Honours, Bachelor of Wood Science and Technology with Honours, Bachelor of Parks and Recreation Science with Honours, Bachelor of Environmental Management with Honours, and Bachelor of Environmental Science and Technology with Honours. In fact, the Bachelor of Forestry Science with Honours offers wildlife ecology and conservation as one of its elective packages. Wildlife courses are also offered in its other programmes from the perspective of wildlife management in recreation and ecotourism and environmental management. To enhance and support the country's wildlife conservation initiatives, research groups that focus on wildlife conservation from technical and

human sciences have also been established covering behavioural and ecological studies, human-wildlife conflicts, and education. These initiatives are established through long-term collaboration with various agencies, institutions, and organizations in the field of wildlife management and conservation. From the context of the Malayan tapir, the faculty is one of the members of the Technical Working Committee in the development of the Malayan Tapir Conservation Action Plan.

The ultimate aim of scientific research is the sharing of information, be it among the research community or the public at large. This is because the conservation of a wildlife species is not the sole responsibility of a single institution or a single country. We strongly believe that wildlife conservation efforts are stronger and more effective through collaborative efforts, including the local communities. With that in mind, the Malayan Tapir Conservation Regional Workshop Report is published to share information on the conservation initiatives for the Malayan tapir in the region (Malaysia, Myanmar and Thailand), as well as the outcome of the discussion sessions as a reference document.

I would like to thank all that have participated in the virtual workshop. We hope the workshop had enriched our knowledge, experiences, and expertise to better manage our wildlife, in particular the Malayan tapir. We also hope by reconnecting the regional countries in the workshop, it would spur the sharing of information and initiate more collaborative efforts between the countries.

Our appreciation also to the co-organizers - the Copenhagen Zoo for providing financial support in the organizing of the workshop and publication of this e-book, the Department of Wildlife and National Parks of Peninsular Malaysia, and the Malaysia Nature Society. May we work towards more concerted efforts in the conservation of the Malayan tapir.

**Prof. Dr. Hazandy Abdul Hamid**

*Dean, Faculty of Forestry and Environment, Universiti Putra Malaysia (UPM)*



# Department of Wildlife and National Parks, Peninsular Malaysia (PERHILITAN)

First and foremost, I would like to express my appreciation and gratitude to the organisers for organising the Malayan Tapir Conservation Regional Workshop 2022. The Department of Wildlife and National Parks, Peninsular Malaysia, or PERHILITAN is a governmental organisation that is responsible for the conservation of wildlife and national parks in Peninsular Malaysia. The department is placed under the purview of the Ministry of Energy and Natural Resources (KeTSA). As we know, Peninsular Malaysia is home to the Malayan tapir, which is the largest tapir species in the world. It differs from other tapirs because this is the only species that has a distinctive black and white colouration once they grow older. The Malayan tapir is a totally protected species under the Wildlife Conservation Act 2010 [Act 716] and categorised as Appendix I under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Under IUCN Red List of Threatened Species, it is categorised as endangered species. Conservation efforts are critical, because the Malayan tapir populations have undergone a steep decline over the past century. Declining populations of our Malayan

tapir could be due to several contributing factors such as habitat loss and forest fragmentation, roadkill and also victims of snares deployed by illegal hunters. The government is currently looking into both in-situ and ex-situ conservation of the Malayan tapirs. Among the actions already undertaken include increasing the protection of habitats and ecological corridors, conducting wildlife inventories, managing conflicts through rescue and relocation operations as well as putting up yellow transverse bars, solar amber light and wildlife crossing signages and also by building viaducts along major roads. Besides conservation in the wild, we have also conducted the Malayan tapir breeding programme at the Wildlife Conservation Centre in Sungai Dusun, Selangor which has produced 18 tapirs in captivity.

I would like to take this opportunity and urge all parties to play their part in conserving the Malayan tapir by protecting its habitat and slowing down their vehicles while crossing areas marked with wildlife crossing signages.

**YABhg. Dato' Abdul Kadir Bin Abu Hashim**

*Director General, Department of Wildlife and National Parks,  
Peninsular Malaysia (PERHILITAN)*



# Malaysian Nature Society (MNS)

During the age of enlightenment from our early natural history discovery, young William Farquhar's manuscript about his encounter with the tapir in Sumatra is believed to be one of the earliest recorded notes about the species. But because of the race for competing claims and personal rivalry on this subject, his findings were kept aside. This allowed Georges Cuvier and other French naturalists to claim the official entry in 1819, naming the species *Tapirus indicus*. Up till today, this species is still being rigorously studied and deliberated of its origin - from its population status, and taxonomy to genetic studies. The tapir's evolution in Asia and that in America it is thought to be distinctive. In some instances, mammal taxonomists have even recognised that the genus *Tapirus* is confined to South America, and consequently, the Asiatic (Malayan) Tapir falls under the genus *Acrocodia*; with the species name being *Acrocodia indica*.

The logo used for the Malaysian Nature Society is of a Malayan tapir which was introduced as the Society's symbol in the early 1950s by our founding members. This was mostly attributed to its black and white markings, as well as its crucial role in determining the health of the forest. MNS's inception in Malaysia, since it started in 1940, has featured various observation notes and research articles about the Malayan tapir via our flagship publication - Malayan Nature Journal.

Through our published articles and recent national news, what seems to be a continuing trend is the dwindling number of Malayan tapirs found in isolated fragmented forests, wandering into human settlements and lost through roadkills. Their decreasing numbers along with many other species in this Anthropocene age are a cause of concern. This is often a highlighted issue to the public but a less proactive stance was given to safeguard this species. Currently at this juncture, it has been listed by IUCN as 'threatened'. If we are to define ourselves to be nature conservationists and wildlife experts in this field, there is a greater need for conservation awareness and continuity of this species, especially towards the protection of its crucial habitat for this most sentient being of the forest. We at the MNS, welcome this Malayan Tapir Regional Workshop 2022 with full of hope and promise.

## **Prof. Ahmad Ismail**

*President, Malaysian Nature Society (MNS) (Term 2020 – 2022)*



# INTRODUCTION

The Malayan Tapir Conservation Regional Workshop 2022 was organized by the Faculty of Forestry and Environment, Universiti Putra Malaysia. It is a collaborative effort between the members of the Technical Working Group (TWG) Committee for the Malayan Tapir Conservation Action Plan comprising the Department of Wildlife and National Parks, Universiti Putra Malaysia, Copenhagen Zoo, and the Malaysian Nature Society.

The Technical Working Group (TWG) was formalized in 2020 to see through the development of the Malayan Tapir Conservation Action Plan. The group had worked on developing the plan since 2016 through a series of consultative discussions and series of workshops. The Malayan Tapir Conservation Action Plan was approved on 13 June 2022 by the Ministry of Energy and Natural Resources, Malaysia and this workshop is one of its early initiatives under the plan. The workshop was

held virtually on 15 June 2022 to gather participants from various government agencies, zoos, higher learning institutions, non-governmental institutions, and interested individuals in the field of Malayan tapir conservation. The workshop provided a platform for the sharing of the Malayan tapir conservation efforts in the regional countries (Malaysia, Thailand, and Myanmar) and also provides cooperative opportunities among the participants.

With this being the second workshop for the Malayan tapir in the region, the reports from representatives of the regional countries provided an overview of the various conservation, research, and education efforts in these countries.

The country reports in the region have shown that:

- (a) *regional countries face similar threats specifically habitat loss and fragmentation, human-tapir conflict, and the threat of snares by illegal poachers. An emerging issue of concern is the poaching and trade of the Malayan tapir which still lacks critical information.*
- (b) *despite the many field research conducted over the years, there are still gaps in most countries especially pertaining to having continuous and more recent data and information such as the Malayan tapir population, distribution, biology, and ecological information.*
- (c) *the Malayan tapir conservation efforts in the region have mainly been country-based and there is a lack of cooperative efforts among the regional countries, to date.*
- (d) *due to the lack of information and cooperative efforts, future management plans in the country and region are needed.*



Two breakout discussions were held to discuss the challenges, and conservation priorities for the conservation of the Malayan tapir through the in-situ and ex-situ approaches:

The ultimate aim of the in-situ approach is the protection of the habitat of the Malayan tapir and the possible creation of new ones. In lieu of it being a long-term strategy, an immediate effort should focus on three issues which are (a) Malayan tapir becoming victim to roadkill, (b) the threat of snares, and (c) poaching. Reviews of driving laws, road construction design, understanding of drivers' behaviour, and increased engagement with the private sectors and local communities are some of the activities to focus on.

In the ex-situ approach, creating a database of experts from different institutions and organizations is important to facilitate the identification and engagement of an expert in a needed field. Research and data sharing among the experts in the regional countries and zoos were emphasized to better understand the Malayan tapir and improve its management strategies and actions.

Both in-situ and ex-situ approaches stated the need for more research on the Malayan tapir such as population distribution and viability, genetic differentiation, or similarities between the Malayan tapir from the regional countries, reproduction, and pathology studies. Conventional research methods must also include more advanced and improved methods for better data collection.

CEPA (Communication, Education and Public Awareness) initiatives for the Malayan tapir should also be intensified to increase public awareness of the Malayan tapir, encourage community support and involvement in its conservation. Ultimately, in conflict and hotspot areas, co-existence of human and wildlife should be promoted.



# KEYNOTE SPEECH



# THE MALAYAN TAPIR: RECENT HISTORY – MANAGING ITS FUTURE?

The Malayan tapir (*Tapirus indicus*) is the only Asian tapir species. It is also the largest with the most spectacular colouration. The black-white colour pattern makes it stand out among its three Latin American conspecifics. The species was commonly known to local residents in the Malay Archipelago for thousands of years. In the early 1800, the French naturalist Pierre-Médard Diardin collected several skeletons and skins from South East Asia, including samples of the Malayan tapir. It was later described by another French

naturalist, Anselme Gaëtan Desmarest, in 1819 who proposed its current Latin name. There is no way to predict the tapir population density in the 1800s, but in the early 1900s it was commonly known to Europeans, where several individuals were kept in zoos. The first description of a melanistic individual was in 1926 and kept in Rotterdam Zoo. During the 1900s, several narratives from various British game hunters suggest that tapir was very common. While it was never sought after to the same extent as tiger, elephant, and gaur it was considered a significant trophy due to its shy nature and nocturnal behaviour.

It was only in the late 1970s the first dedicated ecological study of the Malayan tapir took place in Taman Negara National Park by the American, Keith Williams. He received dedicated support from the then Chief Game Warden (eds: now Director General), Mohd Khan Momin Khan, whom himself worked tirelessly to protect all Malaysia's wildlife species. Apart from Mohd Khan's regular publications and updates to the IUCN Red List, no other long-term ecological studies of the Malayan tapirs were undertaken until 2001. This was when the Department of Wildlife and National Parks, Peninsular Malaysia (PERHILITAN) together with Copenhagen Zoo, Denmark, began research into the population densities as well as the ecology of the species in Krau Wildlife Reserve. The results revealed a much smaller population size in Malaysia than anticipated. The estimate of 1500-1800 individuals was originally met with skepticism until two unrelated later studies in Royal Belum and Taman Negara National Park corroborated this.

In 2003, the IUCN Tapir Specialist Group was alarmed by the small population density of the Malayan tapir and with the support of the PERHILITAN and Copenhagen Zoo, hosted the first Malayan Tapir Population and Habitat Viability Assessment (PHVA) Workshop in Krau Wildlife Reserve. In the meantime, more studies about the ecology of Malayan tapirs in the region started in earnest, and in 2008, when the 1st Regional Malayan Tapir Workshop was hosted by PERHILITAN, a total of 13 publications were presented. Since then, dozens more have been produced from the region and as of today, there exists adequate knowledge about the species' ecological needs to develop and implement conservation action plans. Despite the existing knowledge, the Malayan tapir population appears to be in decline across its range. Peninsular Malaysia remains the species stronghold, yet the number of displaced and/or roadkill tapirs is on the rise. Although this negative trend has been recorded since 2006, it has not been possible to reverse the primary cause of its displacement. In 2021, Malaysia lost another 72,000 ha of forest to industrial agriculture, urban development, and infrastructure. While reliable population estimates are not available for Sumatra and Thailand, the degree of habitat loss and fragmentation as well as illegal snaring suggest that this trend will be similar in the rest of its range.

**Carl Traeholt\***

*Research and Conservation  
Division, Copenhagen Zoo,  
Roskildevej 38, 2000 Frederiksberg,  
Denmark*

*\*Corresponding author:  
cat@zoo.dk / ctraeholt@gmail.com*

Habitat loss and growing fragmentation are already known to cause unintended consequences. Populations are split up into ever small units making these increasingly vulnerable to stochastic variables (e.g. lack of mates, inbreeding, dispersal issues, and diseases). Without active intervention, the species may face a similar fate as the Sumatran rhino, where poor fertility rates became the main reason for its demise in Malaysia. It is therefore imperative that the regional authorities responsible for the management and conservation of Malayan tapirs will finally take charge and commence a coordinated effort to save the species from further decline. Apart from national conservation action plans that are implemented, this also includes consideration for a Global Species Management Plan (GSMP). In effect, a GSMP considers all individuals as part of a global meta-population vis-à-vis wild individuals as well as ex-situ holdings all contribute to the genetic database. The easiest and cheapest practical solution is to ensure the existence of sufficient safe habitats; however, this is likely also the most politically difficult. A far more financially expensive and management intensive solution is to implement and practice meta-population management. Despite the enormous financial incentives for nations to invest in carbon-stock post COVID-19, it appears that the current loss of tapir habitat will not cease any time soon.

The next 20 years will likely become humanity's greatest and most important two decades. A transition from fossil fuel energy to renewable ditto starts with protecting biodiversity. It has been more than 14 years since the last Regional Malayan Tapir Workshop was held. It is timely that conserving the charismatic Malayan tapir begins in earnest with this 2nd Regional Malayan Tapir Workshop.

## BIOGRAPHY OF SPEAKER

Dr. Carl Traeholt completed his M.Sc. in Ecology and Ph.D. in Behavioural Ecology and Population Ecology at Copenhagen University in 1989 and 1993 respectively. He then worked as a senior scientist at the same university from 1990-1997. He was a visiting researcher at University of British Columbia in 1990 and University of Malaya between 1990 to 1992. Since 1990, he has worked in many different countries as a consultant to bi- and multi-lateral organisations including UNDP, Danida, World Bank and NORAD. Since 2001, Dr. Traeholt has joined Copenhagen Zoo as the Southeast Asia Programme Director. He is also an active member of six IUCN Specialist Groups and is a member of the EAZA Conservation Committee as well as the SEAZA Conservation Committee. He chairs EAZA's Wildlife Trade Working Group as well as assistant to EAZA's Imported Deforestation Working Group. He also serves as a founding steering committee member of PONGO Alliance. Dr. Traeholt does research in Behavioural Ecology, Conservation Biology, and Population Management.



# **COUNTRY REPORT: MALAYSIA**

# CURRENT CONSERVATION STATUS OF THE MALAYAN TAPIR IN PENINSULAR MALAYSIA

**Mohd Samsudin Mohd Suri<sup>1\*</sup>, David Magintan<sup>1</sup>,  
Donny Yawah<sup>1</sup>, Mohd Noor Ismail<sup>1</sup>,  
Evelyn Lim Ai Lin<sup>2</sup>, Mohd Sanusi Mohamed<sup>3</sup> &  
Raffi Ismail<sup>4</sup>**

<sup>1</sup>*Department of Wildlife and National Parks  
(PERHILITAN), Peninsular Malaysia  
KM 10 Jalan Cheras, 56100 Kuala Lumpur,  
Malaysia*

<sup>2</sup>*Department of Recreation and Ecotourism,  
Faculty of Forestry and Environment,  
Universiti Putra Malaysia, 43400 Serdang  
Selangor*

<sup>3</sup>*Copenhagen Zoo, Kuala Lumpur, Malaysia*

<sup>4</sup>*Conservation Division, Malaysia Nature Society,  
Kuala Lumpur, Malaysia*

*\*Corresponding email:  
msamsudin@wildlife.gov.my*

## ABSTRACT

In Peninsular Malaysia, the Malayan tapir (*Tapirus indicus*) is one of the endangered large mammals and is a fully protected species under the Wildlife Conservation Act 2020 [Act 716]. It is also listed in Appendix I under the International Trade in Endangered Species Act 2008 [Act 686]. The present distribution of the Malayan tapir occurs largely in the protected areas that extend within the four major forest complexes of the Central Forest Spine

(CFS) while the remaining population occurs in isolated and fragmented forests outside the CFS. The Malayan tapir is mostly nocturnal, often using tracks and forest trails, spending most of its time moving, and feeding through the forest at great distances. Its diet covers a wide variety of foliage and fruits. In Malaysia, they feed on at least 380 species of plants. Though Malayan tapirs are found in both primary and secondary tropical rainforests, they have also been recorded in various forest fringes, agricultural areas, roadsides, logging concessions, oil palm, and rubber plantations. Despite becoming one of the country's iconic large mammals and one of the 'big five' species in the country, the species is gaining a lot of public attention due to the many cases of it roaming outside its natural habitat, causing tapir and human conflicts, and being victims of roadkill, each year. Habitat loss and fragmentation due to land use changes are the two main threats to the survival of the Malayan tapir in Peninsular Malaysia. The government through the Department of Wildlife and National Parks, Peninsular Malaysia (PERHILITAN) has implemented various conservation actions including in-situ and ex-situ management, law enforcement, science communication, education and public awareness (CEPA), and research. Given the ongoing pressures on the Malayan tapir in Peninsular Malaysia, the government deems it timely to prepare a Malayan Tapir Conservation Action Plan (MATCAP) for the species. This paper will report the status as well as the current and future conservation plan for this species in Peninsular Malaysia.





# INTRODUCTION

The Malayan tapir (*Tapirus indicus*) is one of the extant species belonging to the family of Tapiridae. The species is the only surviving member of Perissodactyla (Order) after the rhinoceros. The Malayan tapir, one of Malaysia's iconic large mammals and one of the 'big five' species in the country, is currently gaining a lot of public attention due to many cases of it leaving its natural habitat, causing human-tapir conflicts and exposing it to road accidents. PERHILITAN, the agency responsible for wildlife conservation in the country, has been implementing various management programmes for the Malayan tapir. PERHILITAN has also collaborated with other government agencies, research institutions, universities and NGOs to formulate strategic action plans for the species in the country. This paper reports the latest on the status of the current conservation work for the Malayan tapir in Peninsular Malaysia.

## PROTECTION AND CONSERVATION STATUS

The Malayan tapir has been listed as a "Totally Protected" species since 1955, initially under the Wild Animals and Birds Ordinance No. 2 of 1955, then under the Protection of Wildlife Act 1972, and currently under the Wildlife Conservation Act 2010 [Act 716]. The current Act imposes punishment for any person who commits an offense involving hunting or keeping of any part or derivative of totally protected wildlife without a special permit. In the early 2022, an amendment of the existing Act [Act 716] was approved by the Parliament of Malaysia, whereby increased penalties and harsher punishments are sentenced onto guilty offender.

In addition, Malaysia protects the Malayan tapir through the International Trade in Endangered Species Act 2008 [Act 686]. The Malayan tapir is listed under Appendix I of the Act, i.e. prohibiting any trade of the species or species derivative. Under the International Union for Conservation of Nature (IUCN) Red List, the Malayan tapir is listed as an endangered species (Traeholt et al., 2016). The government also has drawn up a Red List of Mammals for Peninsular Malaysia (ver 2.0) which classifies the Malayan tapir as endangered (DWNP, 2017). The Red List aims to increase the conservation efforts of threatened species in the country.

# POPULATION

## AND DISTRIBUTION

The estimation of the Malayan tapir population in Peninsular Malaysia has been challenging due to the lack of a comprehensive population study in this region. Khan (1997) and Zainal et al. (2001) had estimated the population of Malayan tapir to be about 3500 individuals in the country but this number seems to be overestimated. In 2013, PERHILITAN estimated the population of Malayan tapir between 1100 and 1500 (PERHILITAN, 2013) heads, based on the data available from various wildlife inventories, wildlife surveys, conflict data and public complaints. The current estimated population by PERHILITAN considering the dwindling population trend in the past ten years due to roadkills, by-catch of wire snares set by hunters,

habitat fragmentation and isolated population is 700 - 800 individuals (PERHILITAN, 2020). The current distribution of the Malayan tapir occurs largely in the protected areas extending within the four major forest complexes namely the Titiwangsa (main range) - Bintang Range - Nakawan Range, National Park - Eastern Range, South East Pahang - Tasek Chini and Bera Wetlands, and Endau Rompin State Park - Kluang Wildlife Reserve. These ranges are called the Central Forest Spine (CFS) and are not as restricted as the range map generated and proposed by the IUCN Red List (Clements et al., 2012). The remaining tapir population occurs in isolated and fragmented forests outside the CFS and protected areas (Figure 1). From 2016 to 2020, the first nationwide and large-scale survey of the Malayan tiger using camera traps, the 1st National Tiger Survey (NTS), carried out by the department within the CFS contributed vital data and information on the Malayan tapir in the survey sites. The surveys were carried out within the CFS areas in cooperation with several NGOs.

The result of the surveys showed that the Malayan tapirs were detected in almost all parts of the CFS. A total of 52% of all the camera trap locations in the 40,000 km<sup>2</sup> land area contained images of the Malayan tapir. The Malaysian government is in the stage of planning further surveys in 2023 focusing on areas outside the CFS. The results of the surveys are crucial for the department in developing or revising the existing management plan for wildlife, particularly the Malayan tapir. The data also provides important information for generating new Malayan tapir population estimates in the future.

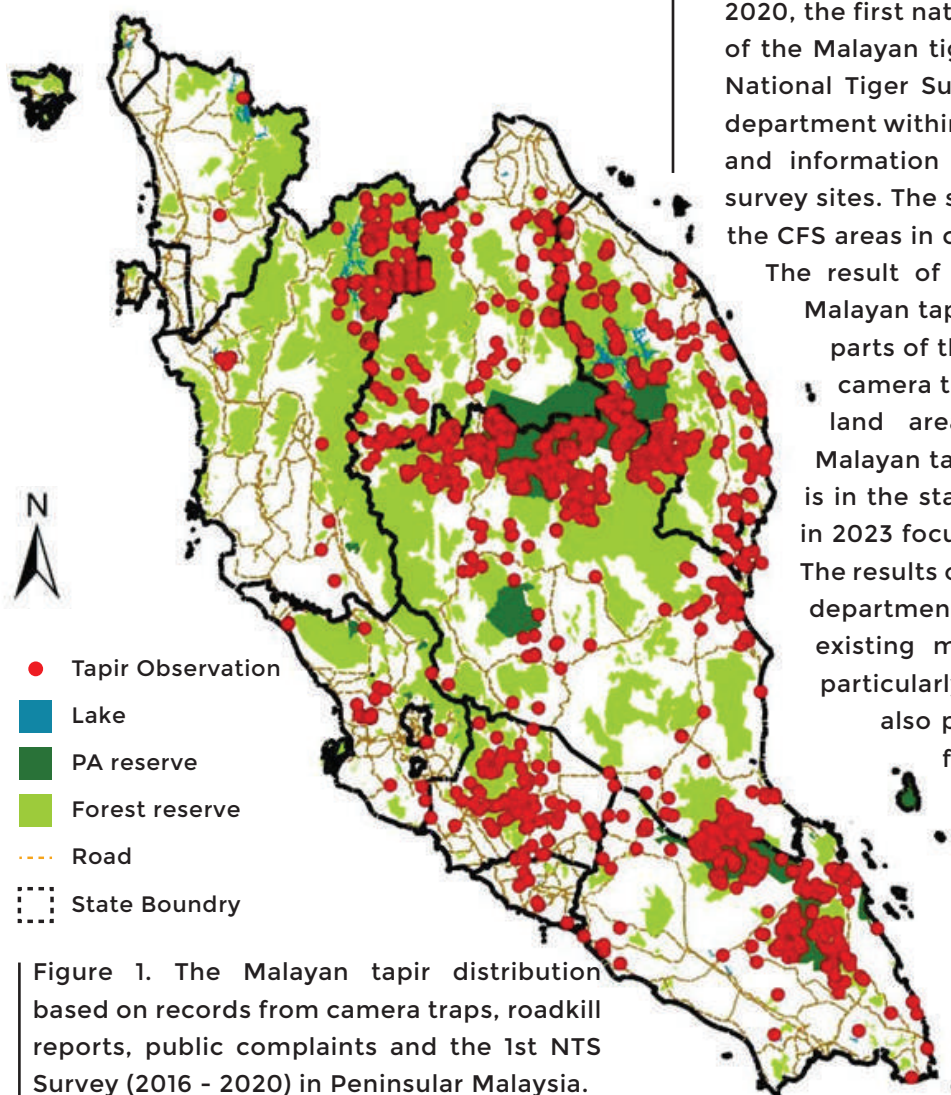


Figure 1. The Malayan tapir distribution based on records from camera traps, roadkill reports, public complaints and the 1st NTS Survey (2016 - 2020) in Peninsular Malaysia.





## HABITAT, ECOLOGY REPRODUCTION

The Malayan tapirs can be found in both primary and secondary forests. Their habitats include peat swamp, lowland, hill, submontane, and montane forests (Williams, 1978). Khan (1997) reported that the Malayan tapir is also found in forest edges, agricultural areas, roadsides, logging concessions, oil palm, and rubber plantations (Khan, 1997). A study by Mahathir et al. (2019) on habitat utilization of a translocated Malayan tapir in Senaling Inas Forest Reserve, in the state of Negeri Sembilan, revealed that the most visited place by the Malayan tapir was the rubber plantation, followed by forest and oil palm plantation. Malayan tapirs are frugivorous browsers and feed on a wide variety of foliage - at least 380 species of plants and fruits (Simpson et al., 2013). They are mostly nocturnal and solitary with minimum activity during the daytime (Magintan et al., 2009-2010), using tracks and forest trails, spending most of their time moving and feeding through the forest at great distances (William and Partridge, 1980). In terms of breeding, Malayan tapirs have a low reproductive rate. The females of captive Malayan tapir at Sungai Dusun Wildlife Conservation Centre (SDWCC) become sexually mature at approximately three years of age. A female is able to produce a young every two to three years after 13 months of gestation (Donny et al., 2019). The calf stripes and spots will gradually fade by six months of age (Barongi, 1993). However, observation of calf coloration at the SDWCC showed that adult coloration can be attained in less than four months (Donny et al., 2019).

## USE AND TRADE

There were no reports or available documentation on the use and trade involving the Malayan tapir in Peninsular Malaysia. Unlike tigers and rhinos, Malayan tapir parts are not perceived to be valuable as medicine or for other purposes (Medicini et al., 2003). The major communities in East Malaysia, the Malay,

Chinese, and Indian are not keen to treat this species as a meat source due to their religious beliefs and superstition (Kawanishi et al., 2002). Although photos of a dead Malayan tapir with no skin was found in the Kelantan state several years ago, there was no report or arrests relating to the incident.

# THREATS

Habitat loss and fragmentation as a result of land-use changes are threatening the survival of the Malayan tapir in Peninsular Malaysia (Clements et al., 2012; Magintan et al., 2012; Rayan et al., 2012; Medicini et al., 2003). For more than 60 years, the forested land has been greatly lost mainly due to rapid conversion into agricultural land or other large-scale developments such as housing, dams, roadways, and highways causing more forest fragmentation. The current Peninsular Malaysia forested area covers 43.62% of the country's land area (KeTSA, 2021) as compared to 74% in 1957 (Myers, 1980). Forest fragmentation has caused incidences of Malayan tapirs being displaced from their natural habitat. Such displacements often led to conflicts with humans and being victims of roadkill (Magintan et al., 2012, 2021; Zainal et al., 2001).

In terms of hunting, the Malayan tapirs are not under threat of hunting in many parts of their range country (Medicini et al., 2003) including Peninsular Malaysia. The human-tapir conflicts and Malayan tapir roadkill incidences show an increasing trend in the past ten years. Based on PERHILITAN's data from 2011 to 2021, a total of 410 public complaints on the Malayan tapirs have been received involving animals wandering into human settlements and plantations, causing emotional disturbances or damages to properties and crops (Figure 2). On the other hand, 142 Malayan tapirs were killed due to road accidents between 2011 and 2021 (Figure 2). Among the highways with high frequency of roadkills were the highways connecting Pekan, Kuantan in Pahang and Kuala Terengganu in Terengganu (Magintan et al., 2021).

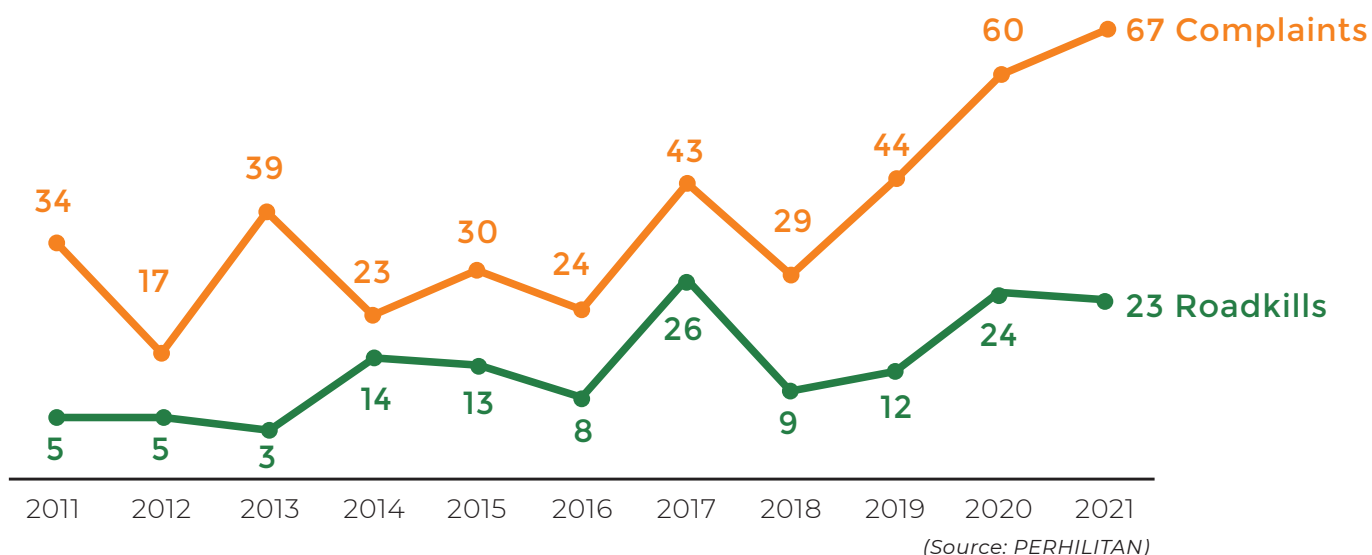


Figure 2. Number of public complaints on the Malayan tapir & Malayan tapir roadkill in Peninsular Malaysia (2011- 2021)

The construction of roads and highways which are dissecting the Malayan tapir's habitat is one of the factors causing Malayan tapir roadkill incidences. The road systems in Peninsular Malaysia, which has more than 160,000 km of paved roads in 2016 (JKR, 2016) have caused physical barriers preventing wildlife from crossing the road. Up till now, articles related to roadkill of the Malayan tapir in Peninsular Malaysia are not many, among others are the articles by Jamhuri et al. (2020) and Magintan et al. (2012, 2021). The perimeter fences built along the expressways were occasionally damaged due to animals, human vandalism, or soil erosion. Animals take advantage to pass through the fences to cross the roads to the other side of the forest or habitat, which often lead to vehicle collisions. There is a higher chance that Malayan tapir and other wildlife species will not cross the expressways if the fence barriers are intact. In a recent roadkill case, a female Malayan tapir wandering along a chain link fence died due to collision with a vehicle while passing through a gap in the fence. Since 2014, the death of Malayan tapirs due to roadkill has surpassed more than ten individuals a year.

One of the reasons was the opening of new expressways, such as the East Coast Expressway Phase 2 (Magintan et al., 2021). It was reported that most deaths from roadkill occurred at night which is indicative that they are active at night and are a nocturnal species. Habitat fragmentation increases the accessibility of the forest for illegal hunting activities. It is easier for hunters to encroach on wildlife habitats to perform activities such as setting up wire snares to catch wildlife. There were cases of Malayan tapirs trapped in wire snares but left to die by illegal hunters. This shows that Malayan tapirs can be a by-catch species of hunting activity in Peninsular Malaysia. The National Wildlife Rescue Centre in Sungkai, Perak, has rescued 21 individuals from 2018 to June 2022 with moderate to severe injuries as a result of being trapped in wire snares. There were also observations of Malayan tapirs residing in isolated forests implying that there is a high chance of inbreeding occurring among closely related individuals. This could lead to lower genetic variations. These non-viable populations would not be able to survive in the long run.



# CONSERVATION

The government, through PERHILITAN, has been implementing management activities related to Malayan tapir conservation via both ex-situ and in-situ approaches. These include mitigating human-tapir conflicts and roadkill, law enforcement, research, and awareness.

## Human-tapir Conflict Mitigation

### i) Translocation

At the initial stage, the PERHILITAN team will respond to public complaints on the Malayan tapir by investigating and consulting the affected people. Subsequently, monitoring will be carried out to avoid any negative impact on people and/or the tapir. Most times, such conflicts are resolved once the tapir involved is moved back into the larger forest area. Nevertheless, there have been incidences where tapirs remain in the small and fragmented forests and are unlikely to move out from the areas. Capturing the individual tapirs and translocating them to a larger forest is the last mitigation option to prevent conflict from arising.

The decision to remove these animals is made based on the assessment that they are likely to become non-viable in the long run, as the fragmented forest is most likely to be cleared for other development. When a translocation is to be carried out, a number of surface cage traps and/or pitfall traps will be set up in the vicinity. However, the trapping operations need to be ceased in the event of no positive outcome and the targeted Malayan tapir is no longer in the vicinity. Since 2014, PERHILITAN has handled 387 complaints pertaining to the Malayan tapir which include the removal of 33 individuals from the conflict areas (Table 1).

Table 1. Human-tapir conflict cases handled by PERHILITAN in Peninsular Malaysia (2014-2021).

	Year								
	2014	2015	2016	2017	2018	2019	2020	2021	Total
Investigation, consultation, & monitoring	26	39	28	42	41	35	55	39	305
Trap set up	2	5	10	10	8	4	5	5	49
Translocation	2*	5	6	4	5	2	5	4	33
	30	49	44	56	54	41	65	48	387

*\*Not included are nine tapirs that were instantly rescued due to being trapped in snares, drainage, pond, etc.  
(Source: PERHILITAN)*

Translocation is one of the mitigation strategies which aims to secure the isolated populations of tapir in the new habitat. However, the release technique and the release site would determine the success of the translocation. PERHILITAN mostly practices 'soft' release where the animal will be temporarily placed for conditioning as

compared to 'hard' release, in which animals are released immediately after capture. The 'soft' release, which includes supportive measures to help animals adapt to the new environment, considerably increases the success of a translocation (Fischer and Linden Mayer, 2000).

## ii) Rehabilitation

Despite direct release into the forest, a number of injured Malayan tapirs were translocated to the National Wildlife Rescue Centre (NWRC) in Sungkai, Perak to be given immediate treatment. Translocated animals often exhibit erratic movements and suffer high mortality rates, at least in the short-term (Massei et al., 2010). Upon recovery, they were taken to a breeding centre at SDWCC to undergo rehabilitation and the rewilding process prior to being released into the wild. Animals that are potentially good breeders are kept for breeding purposes. In some cases, a few Malayan tapirs were sent to zoos under a memorandum of understanding. Figure 3 shows the movement of captured tapirs in the past ten years.

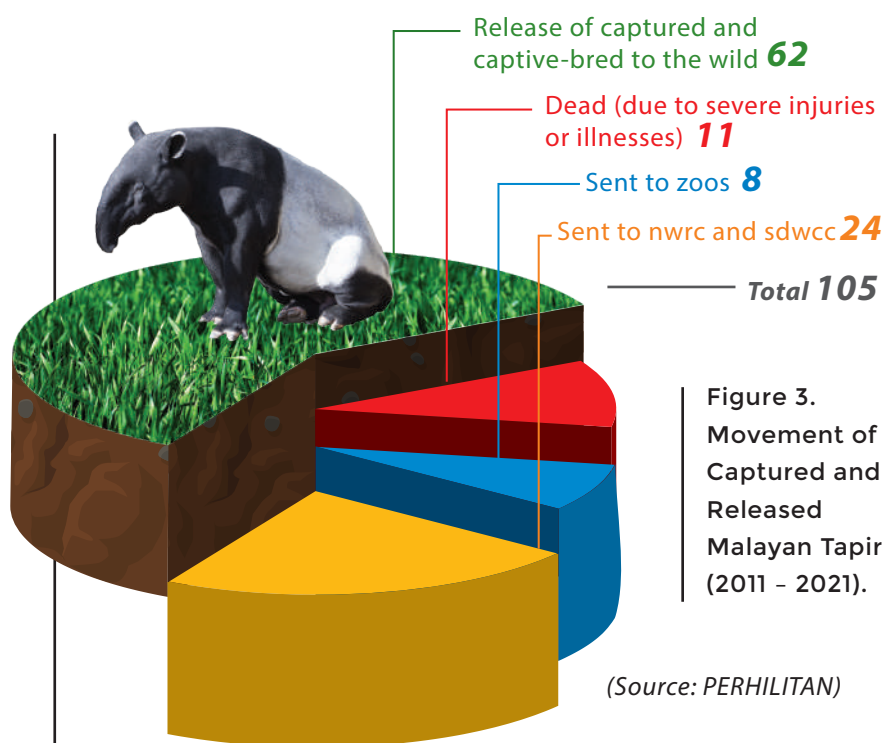


Figure 3.  
Movement of  
Captured and  
Released  
Malayan Tapir  
(2011 – 2021).

Along with rehabilitation, the 'rewilding' (a process of conditioning individual captive or wild caught Malayan tapir prior to release), is implemented to acclimatise the tapir to a new site. Its movement is monitored through a satellite tracking collar.

## iii) Release

Onsite release plays an important role in determining the success of the release. To date, PERHILITAN has released a total of 62 individuals comprising both captured and captive-bred Malayan tapirs into CFS areas. The CFS is an important national land-use master plan implemented by the government for maintaining wildlife habitat connectivity across major forest blocks in Peninsular Malaysia (DTCP, 2009). The connectivity and wildlife corridors within the CFS can serve as harbours for individual Malayan tapirs that are being rescued from fragmented habitats. The Habitat Enrichment Programme undertaken by PERHILITAN attempts to improve

habitat quality and increase the presence of wildlife species by providing the necessary food and minerals. Initially, the programme involved building and managing artificial saltlicks and pasture maintenance in protected areas including wildlife reserves and national parks managed by PERHILITAN. The programme has been expanded to each viaduct built as part of the CFS initiative to encourage and attract wildlife. The PERHILITAN is also assisting the Forestry Department of Peninsular Malaysia in identifying plants to be replanted in specific areas within the CFS to increase wildlife food sources and to resolve forest degradation issues.

# Tapir-roadkill Mitigation

## i) Wildlife crossing structure

The Malaysian Public Works Department (JKR), which develops and maintains the majority of the federal road projects in Peninsular Malaysia, has constructed elevated roads (underpass viaducts) and extended bridges (underpass crossing) that would facilitate the movement of wildlife to underpass roads in order to avoid collision with vehicles. Although the road mitigations are somewhat aimed at reducing accidents for all species of wildlife, it has significantly benefited the Malayan tapir, the most susceptible of endangered large mammal species to be involved in roadkills. Magintan et al. (2012) reported that large mammal species such as the

sunbear (*Helarctos malayanus*), gaur (*Bos gaurus*), Asian elephant (*Elephas maximus*), Malayan tiger (*Panthera tigris*), and the Malayan tapir used the viaducts. At present, there are three viaducts located in three states in Peninsular Malaysia that is Sungai Deka (Aring-Kuala Berang highway) in Terengganu, Sungai Yu (Lipis-Gua Musang Highway) in Pahang, and Grik (Gerik-Jeli Highway) in Perak while underpass crossings are located mainly in Perak (Table 2). The implementation of the CFS plan involved the construction of several viaducts under those three roads (Kasmuri et al., 2020).

Table 2. Crossing structure in Peninsular Malaysia.

Type	Number	Location	State	Total length
Underpass viaduct	3	Sungai Deka, Hulu Terengganu	Terengganu	630 m
Underpass viaduct	3	Sungai Yu, Kuala Lipis	Pahang	1230 m
Underpass viaduct	1	Belum, Gerik	Perak	200 m
Underpass crossing	12	Hulu Perak	Perak	2500 m

(Source: PERHILITAN)



To date, the department has identified 94 tapir crossing hotspots nationwide. However, less than half of the hotspots have Tapir Crossing Signage (TCS). Increasing the number of TCS at the hotspot is one of the measures to gain more motorists' awareness in an effort to reduce tapir-roadkill incidences. The department has collaborated with the Malaysia Palms Oil Group (MPOG) to install an additional 310 units of TCS at these hotspots that have been identified as potential accidents sites involving tapirs and other wildlife (Table 3).

## ii) Tapir crossing signage

**Table 3. Proposed additional tapir crossing signage (TCS) in Peninsular Malaysia's roads.**

State	No. of tapir road hotspots	No. of roadkill cases	No. of existing signage	Proposed additional signage
Johor	12	21	38	14
Kelantan	7	10	34	6
Melaka	2	2	2	0
Negeri Sembilan	10	13	24	22
Pahang	13	13	14	16
Selangor	6	6	16	8
Terengganu	13	13	10	18
Kedah	0	0	8	0
Perak	0	0	4	6
<b>Total</b>	<b>63</b>	<b>78</b>	<b>150</b>	<b>90</b>

\*Excluded LPT1: No. of roadkill = 4

\*\*Excluded LPT2: No. of roadkill = 12

## iii) Wildlife deterrence fencing

East Coast Expressway (LPT2) has shown the highest mortality rate for the Malayan tapir compared to other highways in the country. In order to reduce roadkill on the expressway, the LPT2 authorities have taken a number of measures to increase the effectiveness of perimeter row fences along the highway to prevent animals from trespassing. This includes the installation of piles below fences, installation of "concertina wire", creating "trenching" in areas that are frequently encroached, installing "cattle trap" and "maintenance gate", installing "Double Layer Fencing", installing the Compound Trap, reusing old pavement (Milling Waste) to strengthen fence site, and installing "BRC" on the fence. PERHILITAN and LPT are also looking at the possibility of planting specific tree species along the hotspots to reinforce the row fence that has been exposed to damage by animals.

Increasing the food availability and abundance would ensure the survival of tapirs in their natural habitat. The Malayan tapir consumes over 200 species of food plants and this has been identified based on a food preference study in the Sungai Dusun Wildlife Reserve (SDWR) under semi-wild conditions (Simpson et al., 2013). A long-term initiative to replant plant species is being projected by PERHILITAN to increase the Malayan tapir's feed source. A small plant nursery has been established at the SDWCC to collect and grow seedlings for replanting purposes. The initiative aims to provide sufficient varieties of food plants for captive tapirs and tapirs undergoing the rewilding process prior to release. The SDWR has been known to be home to the Malayan tapir and would ideally become a tapir sanctuary with habitat for many released tapirs in the future. Replanting is also one of the strategies to prevent the released tapirs from being displaced from natural habitat while searching for food as this will potentially cause conflict with humans or become victims of roadkill.

#### iv) Replanting tapir's food plants



## LAW ENFORCEMENT

The protection of the Malayan tapir in the country is through various programmes undertaken by PERHILITAN to protect wildlife and its habitat. The department conducts eight enforcement operations to prevent illegal hunting of wildlife as well as to eradicate activities that violate the Wildlife Conservation Act 2010 and CITES International Trade in Endangered Species Act 2008. The Biodiversity Protection and Patrol Programme (BP3), a joint patrolling initiative undertaken between the PERHILITAN and other enforcement agencies (e.g. Malaysian Army, Police Force), has been implemented regularly to combat wildlife poaching. An integrated operation programme namely Operasi Bersepadu Khazanah (OBK) and the Veteran Army - Orang Asli (VetOA) programme support the BP3 initiatives. Snare operations, which is also one of the enforcement activities under BP3, are conducted on a monthly basis to search for and destroy snares. Since the inception of the operation in 2013, a total of 1,088 snare operations have been conducted. These programmes indirectly protect the Malayan tapir species.

The Institute for Biodiversity (IBD), an institute established under PERHILITAN, conducts awareness programmes such as exhibitions, biodiversity education programmes, and public lectures every year. These programmes are conducted to encourage a positive attitude towards biodiversity. While SDWCC has hosted the World Tapir Day annually, PERHILITAN has collaborated with the Malayan Nature Society (MNS) to conduct awareness activities for the public, school children, university students, and local communities.

## COMMUNICATION, EDUCATION AND PUBLIC AWARENESS (CEPA)



# RESEARCH

To date a total of 57 scientific articles on the Malayan tapir in Peninsular Malaysia have been published in journals, books, theses, technical reports, and proceedings. The focus of these research has been on the behavioural and ecological aspects of the Malayan tapir covering both wild and captive individuals. PERHILITAN has collaborated with the Copenhagen Zoo in conducting research on the population, distribution, and feeding of tapir in a selected habitat (i.e. Krau Wildlife Reserve) in Peninsular Malaysia. The research of the Malayan tapir has extended to include genetic and microbial aspects in collaboration with Universiti Putra Malaysia (UPM). Currently, research on wildlife roadkill is being conducted to identify hotspots and the best mitigation approach to reduce the high incidence in Malayan tapirs.

Given the ongoing pressures on the Malayan tapir in Peninsular Malaysia, the government deems it timely to prepare a Malayan Tapir Conservation Action Plan (MATCAP) for the species. MATCAP has been prepared by PERHILITAN and was assisted by the technical working committee which comprises of UPM, Copenhagen Zoo, and MNS. The plan serves to guide Malaysian politicians, civil servants, NGOs, biologists, academicians, and civil society in creating ecological and social conditions that will allow the Malayan tapir to thrive in its natural habitat in Peninsular Malaysia. The MATCAP provides a vision and goals through four strategies specifically: (1) habitat management, (2) ex-situ conservation management, (3) Communication, Education and Public Awareness (CEPA), and (4) research on the Malayan tapir. The action plan has identified and prioritised 16 outcomes and 57 activities to achieve the goals in the next ten years. Detailed outcome of the strategies are summarised below:

# FUTURE CONSERVATION ACTION PLAN

1.

**Habitat management aims to have:**

- (a) viable Malayan tapir areas identified
- (b) Malayan tapir areas secured and well managed
- (c) new Malayan tapir conservation areas established

2.

**Ex-situ management aims to have:**

- (a) Sungai Dusun Wildlife Conservation Centre facilities and amenities for captive Malayan tapirs improved and upgraded
- (b) new tapir conservation centre established
- (c) the management of the conservation breeding programme improved
- (d) Subject Matter Expert (SME) for Malayan tapir

3.

**Communication, Education, Participation and Awareness (CEPA) aims to have:**

- (a) finance mechanisms to support the Malayan tapir conservation initiatives established
- (b) public awareness of the importance to conserve the Malayan tapir
- (c) various individuals and stakeholders are involved; they are capacity build and empowered to support the conservation efforts of the Malayan tapir
- (d) human-wildlife conflicts reduced through human-tapir conflicts management

4.

**Research on the Malayan tapir leading to:**

- (a) biology and ecology of the Malayan tapir being well studied
- (b) threats to the welfare and population of Malayan tapir reduced
- (c) effective awareness programmes are designed, implemented and monitored

Based on the adaptive management processes, the action plan will be evaluated and adapted to provide a dynamic and holistic approach to the implementation of the plan and the conservation of Malayan tapirs in Malaysia.

# ACKNOWLEDGEMENTS

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## Biography of the first author

Dr. David Magintan received his PhD in Zoology from Universiti Kebangsaan Malaysia and a M.Sc degree in Conservation and Ecology from Universiti Malaysia Sabah after completing his B.Sc. degree in Conservation and Ecology from Universiti Kebangsaan Malaysia. He has worked in PERHILITAN since 2004 as a Wildlife Officer. In past years, Dr. Magintan has been positioned at the Wildlife Conservation Division, Endangered Species Section, Protected Area Division and is currently in charge of the National Wildlife Rescue Centre (NWRC) in Sungkai, Perak. He has extensive experience in field surveys of mammals and has published numerous papers on wildlife in Malaysia.

# **COUNTRY REPORT: THAILAND**

**Wanlaya Tipkantha<sup>1\*</sup>, Saritvich Panyaboriban<sup>2</sup>,  
Manita Wittayarat<sup>2</sup>, Naparat Suttidate<sup>3</sup> &  
Boripat Siriaroonrat<sup>4</sup>**

<sup>1</sup>The Zoological Park Organization of Thailand,  
267, 267 / 1 and 267/8 Pracha Rat 1 Road, Bang  
Sue Subdistrict, Bang Sue District, Bangkok  
10800, Thailand

<sup>2</sup>Faculty of Veterinary Science, Prince of Songkla  
University, Chulabhorn Karoonraksa Building,  
Hatyai, Songkhla 90110, Thailand

<sup>3</sup>Akkhraratchakumari Veterinary College,  
JWV7+6JW, Pho Thong, Tha Sala District,  
Nakhon Si Thammarat 80160, Thailand

<sup>4</sup>Faculty of Environment and Resource studies,  
Mahidol University, 999 Phuttamonthon 4 Road,  
Salaya, Nakhon Pathom 73170, Thailand

\*Corresponding email:  
wanlayav62@gmail.com

## ABSTRACT

The Malayan tapir (*Tapirus indicus*) is one of 19 species that are highly protected by law in Thailand. The efforts to protect this species in Thailand are through both in-situ and ex-situ conservation programmes. To date, the data on the wild population status and ecology of this species has been gained from a research project or monitoring programme. However, knowledge of the current wild population size is still limited whereas a total of 46 captive animals are recorded from three institutions, namely the Zoological Park Organization of Thailand or ZPOT (n = 27), Safari World (n = 14), and Chiangmai Night Safari (n = 5). These captive animals are valuable as breeding stock as well as for conservation, research, and

educational purposes. The ZPOT population of 27 tapirs (11 males and 16 females) is kept in three different zoos. In the past, the breeding of the Malayan tapir has been reported to be successful in many zoos in Thailand. Nevertheless, the small population size is a major challenge to sustain this species. Animal exchange for genetic management will facilitate long-term sustainable population management. Since 2015, ZPOT has attempted to establish a systematic research study on the captive Malayan tapir in various aspects to increase the success of the ex-situ conservation of this species. Basic information on the management of captive individuals including husbandry, behaviour, and nutrition has been recorded. Health assessments of these individuals were performed by physical restraint technique or general anaesthesia. The results of disease surveillance were developed for the proper management of suspected cases (e.g. tuberculosis) including quarantine and treatment protocols. In breeding adults, reproductive hormone assessment for both sexes is used to assess their fertility. The non-invasive endocrinology study using faeces has been performed in females whereas semen collection using electro-ejaculation has been performed on adult males with limited success. The average semen quality in this study was low (sperm motility =  $30.0 \pm 22.9\%$ ) and we found the associations of some reproductive protein biomarkers such as CRISP2 and CRISP3 protein expression in the seminal plasma and spermatozoa with reproductive traits in male Malayan tapir. For genetic diversity studies, we developed primers and assessed for maternal and paternal lineage. For mtDNA diversity, 17 intraspecific single nucleotide polymorphisms (SNPs) spanning the complete Cytochrome B gene and Control Region defined eight haplotypes. Compared to the mtDNA diversity, we detected lower Y-linked diversity (two haplotypes) based on DBY intron 7. These novel data provided useful information for suitable management of the captive Malayan tapir populations. The ZPOT also collaborates with the Department of National Park, Wildlife, and Plants (DNP), and universities to assess habitat connectivity patterns which is crucial for the survival of the species. This is because habitat connectivity facilitates species movement and gene flow in the seven forest complexes in southern Thailand. The results will provide a better understanding of the current pattern of habitat connectivity networks and a guideline for priority areas for conservation planning. We highlight that an assessment of habitat connectivity patterns can be applied as a wildlife management tool to assist conservation efforts of the Malayan tapir and other endangered mammals in the region.



# DISTRIBUTION



The Malayan tapir (*Tapirus indicus*) is one of the reserved species of Thailand. There are 19 species classified as reserved species that are highly protected by Thai law. The distribution of Malayan tapir in Thailand, from the latest report by Busabong Kanchanasaka in 2015 on the mammal population survey throughout the protected areas in Thailand, is found to be along the western to the southern part of the country.

It seems that nowadays there is more data on the wild tapir population, however, the data on their biology, ecology, and reproduction is still limited. There is a lack of information for their future management plan and therefore, further studies or monitoring programmes are still needed.

# POPULATION

**Wild population:** The report by Kanchanasaka (2015) has estimated 538-720 Malayan tapir individual living in the protected areas and national parks of Thailand.

**Captive population:** There are 46 animals in captivity under three agencies which includes three zoos (namely Songkhla Zoo, Khao Kheow Open Zoo, and Nakhon Ratchasima Zoo) under the Zoological Park Organization of Thailand (ZPOT), Safari World Zoo, and Chiangmai Night Safari Zoo.



**HABITAT AND ECOLOGY :** Not available

**USE AND TRADE :** Not available

**THREATS :** Not available

# CONSERVATION ACTIONS

The captive tapirs are valuable for breeding stock, conservation, research, and education. However, working with a small number of captive animals is quite challenging. Information concerning the breeding efficiency, genetics or inbreeding status, and health status of the species would be necessary and beneficial for ex-situ conservation programmes for the regional and global populations of the Malayan tapir.

The systematic research for ex-situ conservation in Thailand was started in 2015. There has been collaboration with universities and private zoos to develop a systematic study on the captive Malayan tapir in various aspects to support the success of ex-situ conservation. Initially, the focus was only on the captive population to learn and collect the data on captive management,

captive breeding, genetic variation assessment, health and reproductive assessment, and to assess the possibility to develop assisted reproductive techniques such as semen collection, semen cryopreservation, or artificial insemination.

For the captive breeding programme, the Malayan tapir seems to be quite easy to breed in captivity with the provision of a suitable area that meets their requirements. Based on the records in the past 20 years (2002 - 2022) in the ZPOT derived from the Species360 programme, there has been success in producing tapir calves (Figure 4). New-born tapirs were recorded almost every year. However, there was also a high number of dead animals during these years implying our current captive population of tapir is quite stable (Figure 5).

## Acquisition (A) and Dispositions (D) by Year

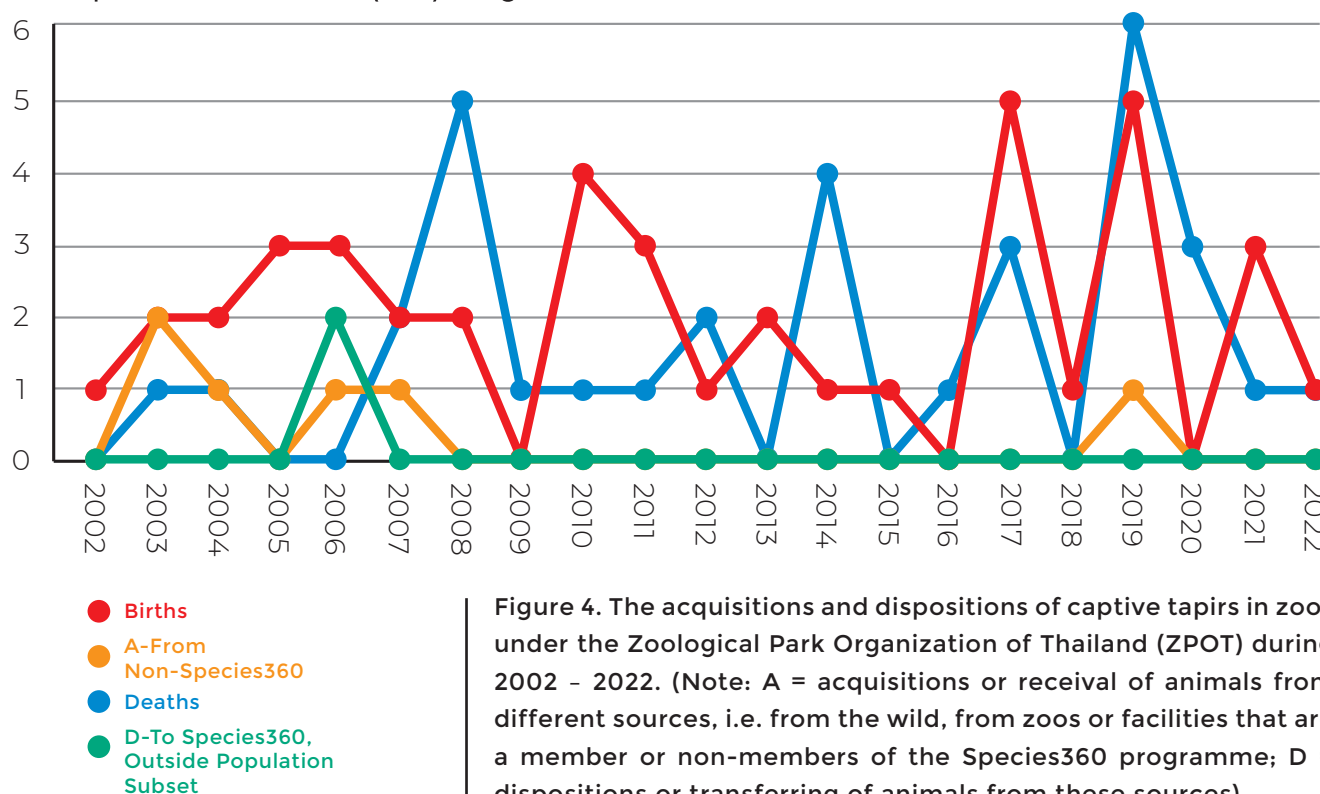
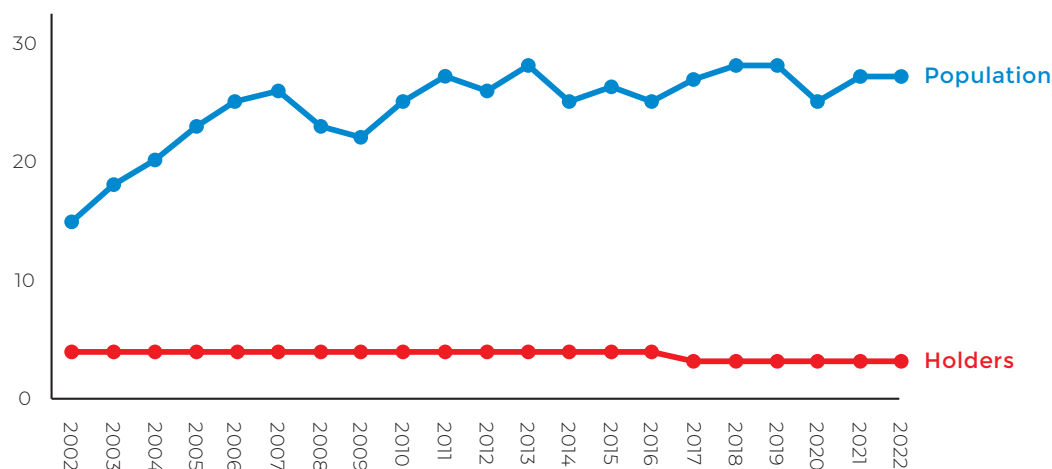


Figure 4. The acquisitions and dispositions of captive tapirs in zoos under the Zoological Park Organization of Thailand (ZPOT) during 2002 - 2022. (Note: A = acquisitions or receipt of animals from different sources, i.e. from the wild, from zoos or facilities that are a member or non-members of the Species360 programme; D = dispositions or transferring of animals from these sources).

## Population and Holders by Year



**Disclaimer:**  
These tables and figures are based on institutional data submitted to Species360, not studbook data

Figure 5. Numbers of captive tapir and holders in the ZPOT by year.

## Animal Age Graph / Live Animals

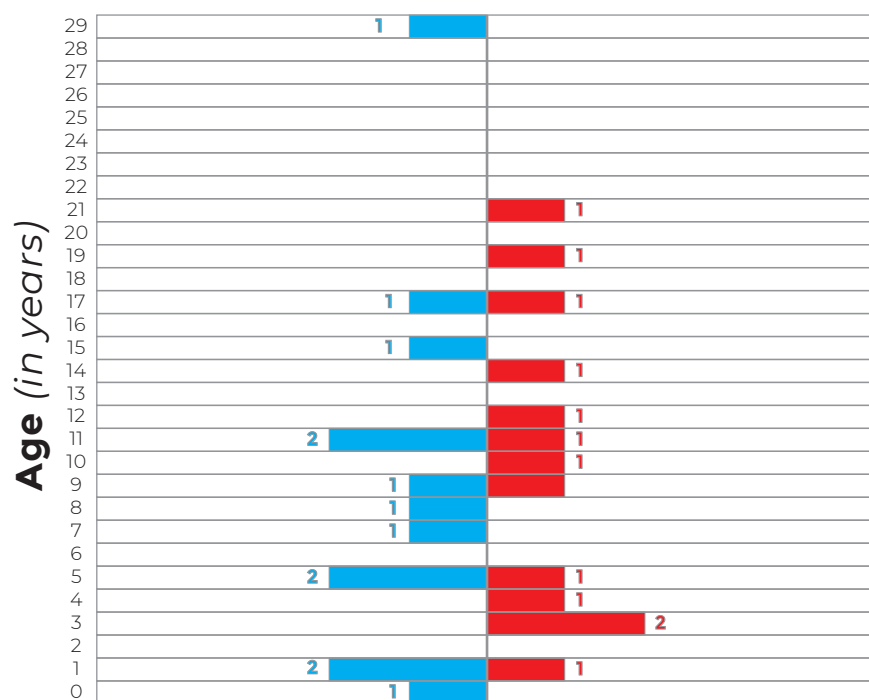


Figure 6 shows animal age group demography. Most of our captive tapirs on average belong to the adult and subadult groups. Our oldest animal is now aged 29 years and is still active and able to reproduce at present. It seems that potential breeders in our facility are still in good numbers. However, since there is no need for the addition of a new gene bloodline in this population, animal exchange with other facilities for genetic management is required to help facilitate long-term sustainable population management.

Figure 6. The current distribution of individual captive tapirs in the ZPOT by age.

**Count (Animals)**

Male  
Female



In 2019, research projects on the Malayan tapir conservation have been continuously granted, supported, and developed through the collaboration between ZPOT, Department of National Park, Wildlife and Plants (DNP), Prince of Songkla University (PSU) and Walailak University (WU) on the topic of “An Integrative Approach to Conservation of the Endangered Malayan tapir (*Tapirus indicus*) in Thailand”. This project aims at having a holistic research and development of Malayan tapir conservation in Thailand with multidisciplinary knowledge and it comprises four subprojects as follows:

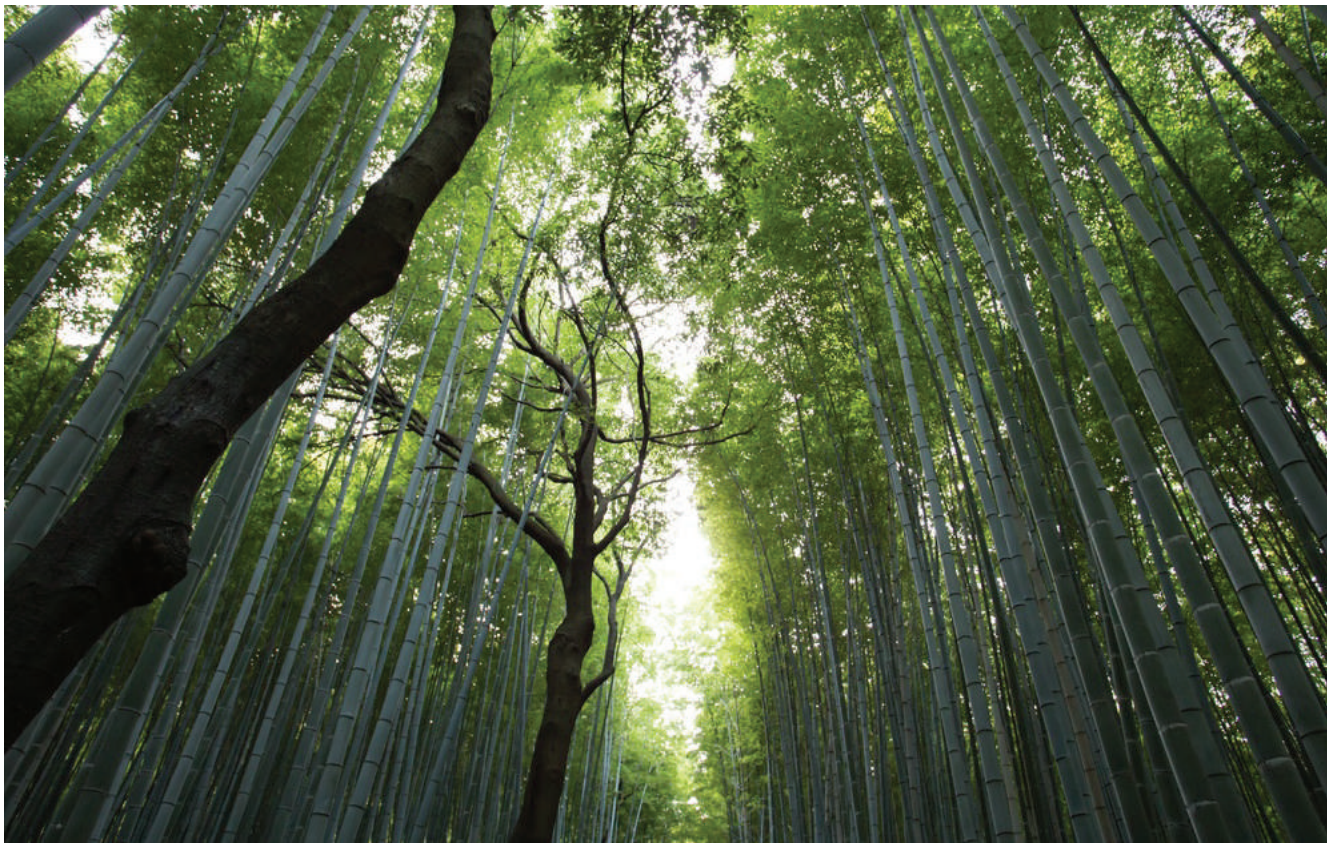
- Sub-project I:**

Genetic diversity and kinships among the populations of the endangered Malayan tapir (*Tapirus indicus*) in Thailand.
- Sub-project II:**

Semen collection, semen cryopreservation, reproductive endocrinology, and estrus synchronization for genetic preservation in captive Malayan tapir (*Tapirus indicus*).
- Sub-project III:**

Health assessment of captive Malayan tapir (*Tapirus indicus*) and transboundary livestock for development of disease control and prevention protocol at wildlife-livestock-human interface.
- Sub-project IV:**

Assessing habitat connectivity of the endangered Malayan tapir (*Tapirus indicus*) in Thailand.



## Genetic Diversity and Kinships Among the Populations of the Endangered Malayan Tapir (*Tapirus indicus*) in Thailand

Habitat loss and fragmentation have resulted in a decline in mammalian numbers and range across Southeast Asia. Species identification and intraspecific genetic assessment are crucial components of genetic management with the goal of population recovery and maintenance of genetic diversity. Molecular markers with high phylogeographic resolution serve as an important tool to achieve reliable species identification, robust biodiversity assessment, and effective captive management. However, the lack of information about the negative impacts of random genetic drift and inbreeding on maternal and paternal diversity in the Malayan tapir in the captive breeding center in Thailand could hamper conservation efforts to promote species persistence. In this study, we have developed primers and assessed mtDNA (1677bp) and Y-link diversity (863bp) in ten captive Malayan tapirs (nine males, one female) from Thailand (Korat Zoo, Songkla Zoo, and Khao Kheow Zoo). For mtDNA diversity, 17 intraspecific single nucleotide polymorphisms (SNPs)

spanning the complete Cytochrome B gene and Control Region defined eight haplotypes (TPTH01-TPTH08). Compared to the mtDNA diversity, we detected lower Y-linked diversity (two haplotypes) based on DBY intron 7 (TPYTH01 and TPYTH02). The screening of DBY intron 4 and Zinc Finger protein Y-linked (ZFY) found no variation. We are in the process of screening additional Y-link genes including Sex-Determining Region Y (SRY) and other introns of ZFY. For autosomal diversity based on neutral variation, we selected and validated six microsatellite primers on the criteria of high PCR success and high polymorphic level. These primers have the characteristics of cross-species amplification among the Malayan tapir, South American tapir (*Tapirus terrestris*), and Baird's tapir (*Tapirus bairdii*) (Gonçalves da Silva et al., 2009; Sanches et al., 2009). Such population-level genetic diversity will be useful for the conservation planning of the Malayan tapir in Thailand and Southeast Asia.

## Sub-project II:

# Semen Collection, Semen Cryopreservation, Reproductive Endocrinology and Estrus Synchronization for Genetic Preservation in Captive Malayan Tapir (*Tapirus indicus*)

The first- and second-year goals of this subproject are 1) to determine the associations between reproductive protein biomarkers of seminal plasma and/or serum and reproductive characteristics, and 2) to develop the semen cryopreservation protocol in the endangered Malayan tapirs. Samples have been collected from captive male Malayan tapirs (3 – 20-years-old) in three zoos under the Zoological Park Organization of Thailand and evaluated for reproductive traits (testicular assessment, semen volume, pH, sperm motility, forward progressive status, concentration, osmolality, viability, morphology, and acrosome integrity). We confirmed that semen collection by electroejaculation can be safely performed in Malayan tapirs under anesthesia using a combination of medetomidine HCl, butorphanol tartrate, and ketamine HCl. However, the overall semen quality in this study was still low (sperm motility =  $30.0 \pm 22.9\%$ ) but better than that of our previous report (Tipkantha et al., 2011) ( $24.0 \pm 15.4\%$ ). We need to further investigate semen

collection techniques and semen preservation in the following year. For semen protein biomarkers, all samples have been analyzed for protein expression by immunoblotting technique. We found the associations of some reproductive protein biomarkers such as CRISP2 and CRISP3 protein expression in the seminal plasma and spermatozoa with reproductive traits in male Malayan tapirs. Semen characteristics, especially ejaculate volume, a number of motile sperm, and acrosomal integrity were positively correlated with CRISPs protein expression. The expected values of this project will be to support and improve the breeding and genetic management of endangered tapirs and other closely related species. Specifically, new knowledge generated will assist with future breeding and reintroduction programmes of the Malayan tapir. Another goal of the proposed project is to provide information that can serve as a resource for students, scientists, animal managers, veterinarians, and conservation organizations involved in tapir conservation.

### *Publications of this sub-project and related work:*

1. Mabut, W., Juntautsa, S., Panyaboriban, S., Srisuwatanasagul, S., & Srisuwatanasagul, K. (2019). Plastinated male reproductive tract of the Malayan tapir: A durable anatomical specimen for a long-term study. *Thai Journal of Veterinary Medicine*, 49, 265 – 266.
2. Srisuwatanasagul, K., Kongsonthana, K., Sangvirun, J., Panyaboriban, S., Tipkantha, W., & Srisuwatanasagul, S. (2019). Histomorphology and morphometric data of the male reproductive organs from the Malayan tapir with infertility problem. *Thai Journal of Veterinary Medicine*, 49, 267 – 269.
3. Wittayarat, M., Pukazhenth, B. S., Tipkantha, W., Techakumphu, M., Srisuwatanasagul, S., & Panyaboriban, S. (2021). CRISP protein expression in semen of the endangered Malayan tapir (*Tapirus indicus*). *Theriogenology*, 172, 106 – 115.



## Health Assessment of Captive Malayan Tapir (*Tapirus indicus*) and Transboundary Livestock for Development of Disease Control and Prevention Protocol at Wildlife-Livestock-Human Interface

Health assessments of the captive individual tapirs were performed by physical restraint technique or general anesthesia. Well-trained tapirs were volunteered for blood collection by scratching them or feeding them while collecting the sample. The biological samples were analyzed for the health status from blood profile, disease surveillance from serology, or antigen test. Occasionally, we performed general anesthesia due to animals showing severe clinical signs or suspected animals with infectious diseases. This animal would need to do a full health check for disease diagnoses such as radiography or tracheal wash for tuberculosis diagnosis. The results of disease surveillance in

our captive population found that most animals are in good health and some have eye and dental problems. Interestingly, we found that 25% of the population was suspected of TB. These results were developed for the proper management of suspected animals (e.g. tuberculosis) including quarantine or treatment protocols for them. The study in transboundary livestock for the development of disease control and prevention protocol at the wildlife-livestock-human interface is an ongoing project. This project was interrupted by the COVID-19 situation in Thailand which has not allowed transportation within the wildlife protected area.

## Assessing Habitat Connectivity of The Endangered Malayan Tapir (*Tapirus indicus*) in Thailand

The Malayan tapir is threatened by habitat loss and fragmentation, causing its population to become smaller and isolated. An assessment of habitat connectivity patterns is crucial for the survival of the species because habitat connectivity facilitates its movement and gene flow. Our goal was to evaluate habitat connectivity networks for the Malayan tapir in Thailand. We first identified suitable habitat for the Malayan tapir in seven forest complexes of Thailand (Western Forest Complex, Kaeng Krachan, Chumphon, Khlong Saeng-Khao Sok, Khao Luang, Khao Banthad, and Hala Bala forest complexes) using satellite data, i.e. evergreen and deciduous forest patches with the minimum patch size of 13 km<sup>2</sup> (average home range size), elevation, slope, and mean annual precipitation. We then applied circuit theory analysis to assess potential dispersal corridors using Circuitscape software. We identified 38 suitable habitat patches and 13 potential dispersal corridors for

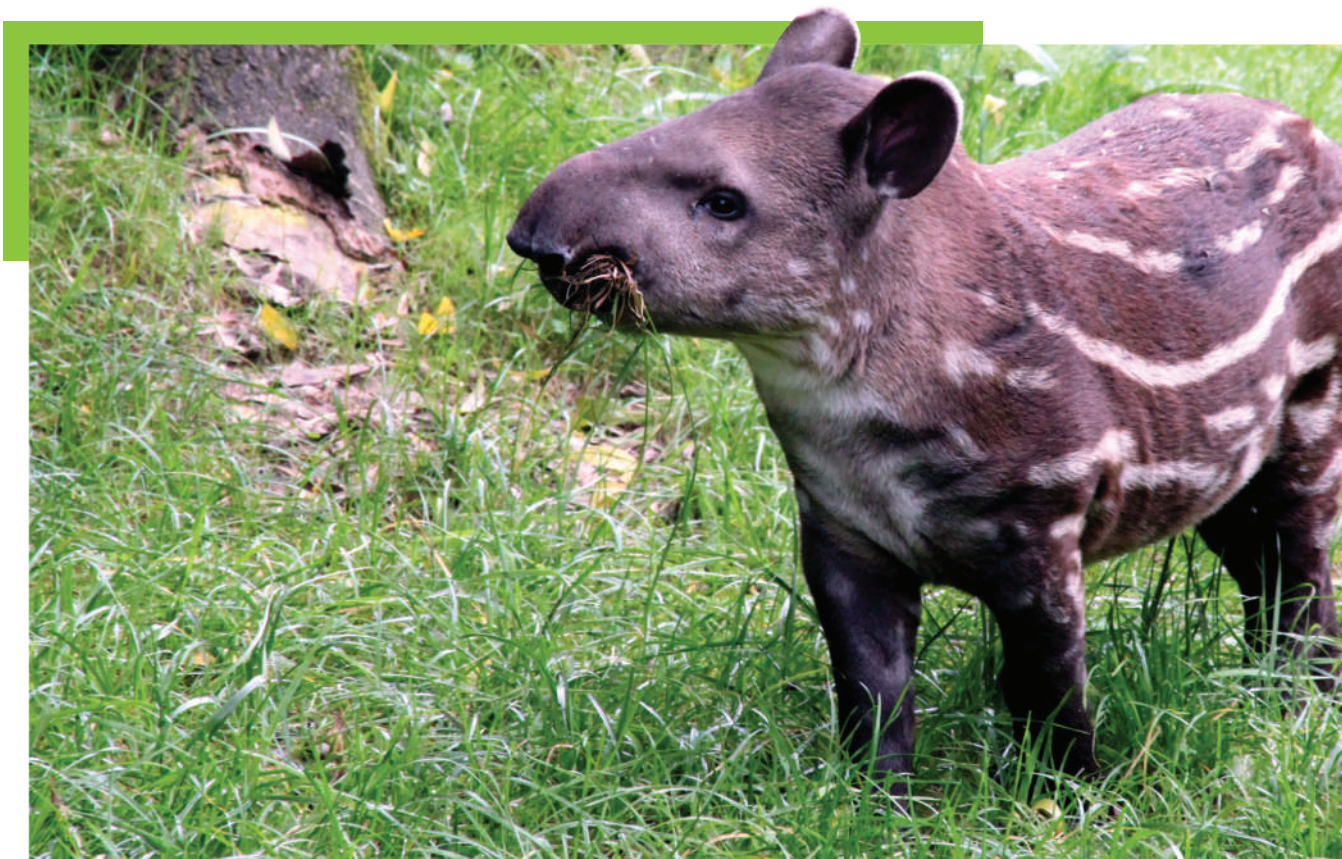
the Malayan tapirs in Thailand. We found that Khlong Saeng-Khao Sok forest complex is well connected with an average habitat patch size of 2,247.78 km<sup>2</sup>. In contrast, Chumphon forest complex was the most fragmented forest complex with the highest number of suitable habitat patches and potential dispersal corridors. In addition, we found ten potential dispersal corridors within the forest complexes, while there were three potential dispersal corridors between Western - Kaeng Kra Chan, Kaeng Kra Chan - Chumphon, and Chumphon - Khlong Saeng - Khao Sok. The results provide better understanding of the current pattern of habitat connectivity networks and a guideline for priority areas for conservation planning. We highlight that an assessment of habitat connectivity patterns can be applied as a wildlife management tool to assist conservation efforts for the Malayan tapir and other endangered mammals in the region.

### *Publications of this sub-project and related work:*

1. Suwannaphong, T., Limmun, W., Panyaboriban, S., Wittayarat, M., & Suttidate, N. (2018). Daytime behavior of captive Malayan tapirs at Songkhla Zoo. *Walailak Procedia*, 2, 120 - 126.

For a long-term and sustaining population, we are seeking to add a new gene bloodline and require an animal exchange programme with other facilities for genetic management that will help facilitate long-term sustainable population management of the species. The ZPOT also welcomes collaboration with other facilities to develop ex-situ conservation programmes and research initiatives for the Malayan tapir.

# FUTURE PLAN



# REFERENCES

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## Biography of first author

Dr. Wanlaya Tipkantha obtained her degree in Veterinary Medicine at Chiangmai University in 2004 before pursuing her Master's degree in Agricultural Biotechnology and a Ph.D. in Obstetrics, Gynaecology and Reproduction at Kasetsart University and Chulalongkorn University respectively. She is currently working as a zoo veterinarian at the Zoological Park Organisation of Thailand and is the Head of Animal Health Centre, Animal Conservation and Research Institute. Her work experiences include veterinary medicine, conservation biology, molecular genetics, assisted-reproductive biotechnologies, and captive breeding management.



# **COUNTRY REPORT: MYANMAR**

# MALAYAN TAPIR CONSERVATION IN MYANMAR

**Nay Myo Shwe<sup>1\*</sup>, Saw Soe Aung<sup>2</sup>, Win Ko Ko Naing Htun<sup>3</sup>, Saw Hay Nay<sup>1</sup> & Grant Connette<sup>4</sup>**

*<sup>1</sup>World Wild Fund for Nature, Myanmar, 15 C, Than Ta Man Street, Dagon Township, Yangon, Myanmar*

*<sup>2</sup>Fauna & Flora International, San Chaung Township, Yangon, Myanmar*

*<sup>3</sup>Friends of Wildlife, Yan-Aung Street (1), Building 296, Room 15, Quarter No. (2), Yankin Township, Yangon, Myanmar*

*<sup>4</sup>Smithsonian Conservation Biology Institute, Front Royal, VA 22360, USA*

*\*Corresponding email:  
naymyo.shwe@wwf.org.mm*

## ABSTRACT

The Malayan tapir's present range in Myanmar is restricted to the Dawna Tenasserim Landscape and the species is most commonly detected in the forested areas of the Tanintharyi Region and some parts of Karen State. Based on camera trap records, the northern limit of its known range is in the Mekatha Wildlife Sanctuary of Karen State. Countrywide population estimates of the species are still lacking. However, habitat loss, fragmentation, and increasing hunting pressure throughout its range could be causing the tapir population in Myanmar to experience declines. Based on camera trap detections,

lowland evergreen forest is an important habitat type for the species, which is frequently detected near water sources. Further study of the ecology of this species is crucial. The species is not targeted for trade in wildlife products, but there are records on Facebook indicating people selling live individual tapirs. Additional information is needed to explore the species use in wildlife trade. Snares, especially those made of steel wire, are major threats not only to the Malayan tapirs but also to all other wildlife species in the landscape. Snares are more often detected near main roads, such as 4-mile village - Ywahilu road, Mandai - Yadaporn road, Tanintharyi - Mawtaung road and Dawei - Htee Khee road. Four observations of injured tapir were recorded by camera traps and direct sightings from 2018 - 2020. The species is opportunistically hunted in the Tanintharyi area and is rarely documented in trade. Urgent actions that need to be taken include snare removal in the major impact areas, awareness raising, and improved protection from hunting and snaring. Alternative livelihood, income, and food supply options may alleviate hunting pressure. Only a small portion of the tapir's range in Myanmar is formally protected, either by the central government and local ethnic organizations, or as community conservation areas. As a result, more comprehensive coverage of conservation efforts is necessary to avoid losses in biodiversity and ecosystem services. As for the longer term measures, legal protection under either community-based conservation areas or the protected area system is urgently needed. Increasing species conservation awareness, developing population estimates, performing habitat suitability mapping, using GPS collaring to understand the tapir's ranging behaviour, and developing a national level species plan is also needed. The species action plan should be incorporated into the National Biodiversity Strategy and Action Plan of Myanmar.

# DISTRIBUTION

The Malayan tapir (*Tapirus indicus*) is only distributed in the southern part of Myanmar, especially the Dawna Tenasserim Landscape. All local communities know tapir by different names; in Burmese it is called Kyant Thu Taw, in Karen it is called Tar kaw, in the Dawei area it is called Tarla shu or Shu Sin MOUNG and in Mon it is called Sut. Thus, the species is fairly widely distributed across a socio-politically diverse landscape in which most of local communities know about the species and their characteristics (Shwe et al., 2012). Several camera trap surveys have been conducted within the species' range (i.e. Lenya, Nga Wun, Tanintharyi corridor, Lar Mu Lar, Kaserdo, Tanintharyi Nature Reserve and

surrounding areas in Tanintharyi) by different organizations. In the beginning, the tapir was mainly recorded in Tanintharyi but it is now detected by camera trap in some parts of Karen State (Greenspan., 2020). In the present report, we developed a habitat suitability model in Google Earth Engine that incorporated the related presence locations of the tapir obtained from several camera trap surveys with the potential predictor variables, such as elevation, slope, unclassified satellite imagery (Sentinel-2), and bioclimatic variables (WorldClim) (Crego et al., 2022). We produced both a continuous habitat suitability map and a predicted distribution map (Figure 7a & 7b).



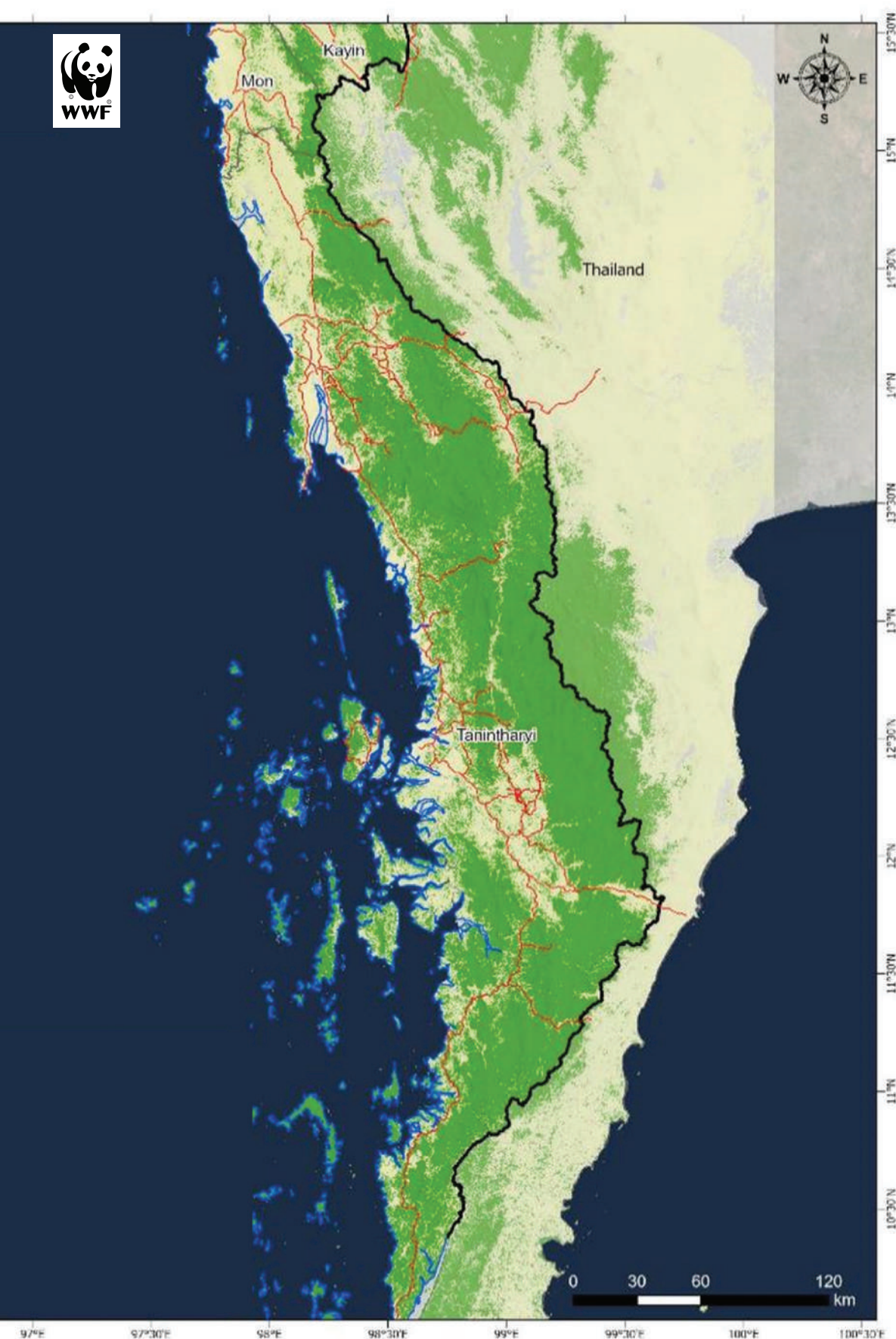
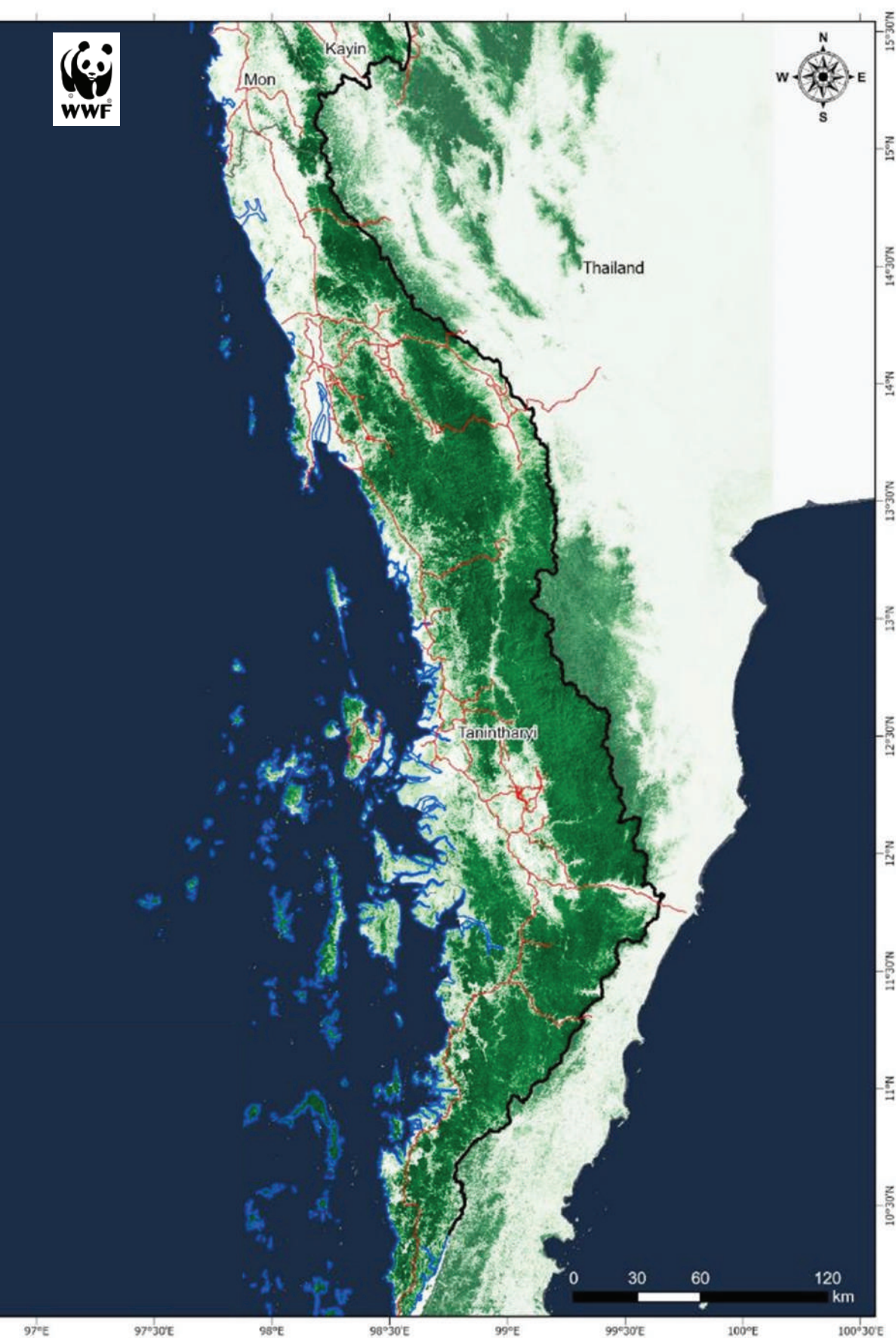
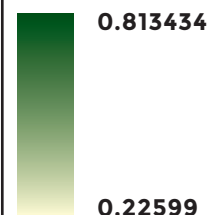


Figure 7a.  
A predicted  
distribution map  
derived for the  
Malayan tapir in  
Myanmar.






Highest possible  
suitability



Lowest possible  
suitability

Figure 7b.  
A predicted  
continuous habitat  
suitability map  
derived for the  
Malayan tapir in  
Myanmar.



# HABITAT AND ECOLOGY

The Malayan tapir in Myanmar is mainly detected in lowland forest areas and near water sources and saltlick areas. However, the species is sometimes detected near plantation areas (Grindley et al., 2019). The ecology of the species in Myanmar is poorly understood and should be the subject of further study.

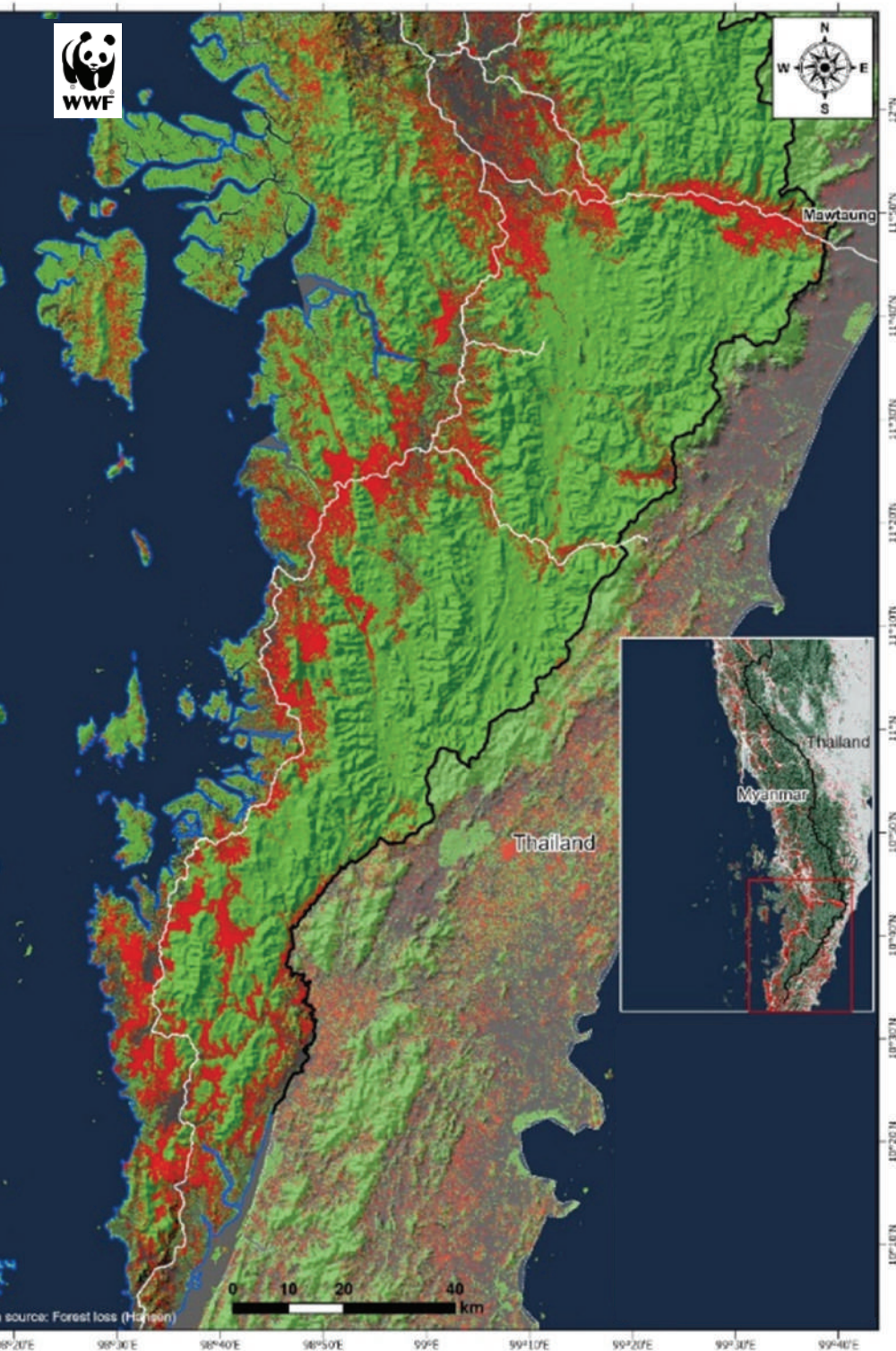
The Malayan tapir is not a target species in wildlife trade, but opportunistic hunters do hunt tapir in some areas. We have no evidence of the trade in tapir parts. However, we have recorded on social media that one live Malayan tapir was announced for sale.

## USE AND TRADE



# T H R E A T S

Due to the habitat loss and fragmentation in the landscape (Connette et al., 2017; Leimgruber et al., 2005), the Malayan tapir habitats are shrinking in its current range in Myanmar (Figure 8). Its habitats have often been converted to plantations, such as for planting of oil palm, betel nut, and rubber (Savini et al., 2022; Aung et al., 2017; Baskett, 2015; Donald et al., 2015).



- Tree cover
- Non forest
- Forest loss

Figure 8. Forest cover loss in the southern Tanintharyi between 2001 and 2021.



A major threat to the Malayan tapir in Myanmar is the steel-wired snares, particularly deployed in and around plantations and near major roads (Savini et al., 2022). Snares, especially those made of steel wire, are a major threat not only to the Malayan tapirs but also other terrestrial wildlife, such as elephants, tigers, and other ungulates in the landscape (Figure 9). Snares are more often detected near main roads, such as 4-mile village - Ywahilu road, Mandai - Yadaporn road, Tanintharyi - Mawtaung road and Dawei - Htee Khee road. Four observations of injured tapir were recorded by camera traps and direct sightings from 2018 - 2020.



Figure 9. A female Malayan tapir caught in steel wire snare in Tanintharyi (photo by Nay Myo Shwe) (top) and steel wire snares removed by communities in southern Dawna Tenasserim Landscape (photo by FFI-Myanmar) (bottom).





# CONSERVATION ACTIONS

We have to take action to remove snares, which are likely to highly impact the Malayan tapir in Myanmar. We have to implement community awareness programmes and to promote the Malayan tapir conservation. To reduce reliance on natural resources of the local communities, alternative livelihood, and sustainable income generation are needed. More collaborations with the government at the ground level are needed, as federal regulations related to hunting and trade are often not effective in preventing overhunting and locally-led grassroots efforts could fill an important gap in the species conservation. The local authorities also need to initiate community-based conservation efforts to protect the diversity of species and their habitats in Myanmar. A national level species conservation plan as well as improved transboundary conservation action between Myanmar and Thailand could also lead to more effective management of tapirs in the Dawna Tenasserim Landscape.

## FUTURE PLAN

Myanmar has previously adopted the National Biodiversity Strategy and Action Plan (NBSAP 2015-2020) under the guidelines of the Convention on Biological Diversity (CBD). It still needs to be updated with the help of the NGOs and civil society to organize and lead a revision of the NBSAP. GPS collaring and the study of tapir's ranging behaviour could be an opportunity for research students to study the tapir's ranging behaviour, habitat use, and the potential connectivity within Myanmar's tapir population. Improving estimates of population density and habitat suitability in the Malayan tapir's range would also improve understanding of the status of this species in Myanmar. Finally, we have to conduct increasing awareness programmes in collaboration with the ground level authorities and local communities.

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## Biography of the first author

Dr. Nay Myo Shwe has more than 25 years of valuable wildlife conservation knowledge and experiences from Myanmar and other Southeast Asian countries. He obtained his Ph.D. in Conservation Ecology from King Mongkut University of Technology, Thonburi, Thailand. Dr. Nay's academic background and experiences lie in conservation ecology, natural resource management, wildlife and protected area management. He has also published many peer-reviewed papers on species, ecology and landscape conservation. He currently works for WWF Myanmar as Head of Wildlife.

# DISCUSSION NOTES

The following are the main points gathered during the discussion at the end of the Malayan Tapir Conservation Regional Workshop 2022 on actions that should be taken.

## IN-SITU CONSERVATION OF MALAYAN TAPIR

1. Roadkill (requires immediate – moderate attention)
  - Mitigation through road design and detailed study on the hotspot areas
  - Reviewing of driving law to ensure drivers be more careful when driving on the road
  - Study on the effectiveness of mitigation measures on driving behaviour (e.g. signboards, bumps, etc.)
  - Looking into possibility of having insurance companies collaborating with the private sector on dealing with compensation of wildlife-vehicle accidents
2. Poaching through snares (requires immediate – moderate attention)
  - Intensifying the operation to remove snares, expanding outside protected areas by engaging with local communities
  - For snaring, as tapir is not specifically targeted, the protection strategy is covered by other initiatives (such as those for tigers), including intelligence gathering outside of forested landscape to crack down on poaching syndicates/individual poachers, improving prosecution, etc.
3. Population study (requires immediate – long-term attention)
  - Study on the main range (for Peninsular Malaysia) and outside the protected area
  - Continuous population viability analysis
4. Human-wildlife co-existence (requires medium – long-term attention)
  - Assessing information gaps on the consequences and impact of tapir-human conflict on both human and the tapir
  - Working with the large landowners/agricultural industry (e.g. palm oil, rubber, etc.)
5. Protection of habitat (requires immediate – long-term attention)
  - Gazettement of government forest lands into permanent forest reserves (protected areas)
6. Research (requires immediate – long-term attention)
  - More studies into the biology and ecology of the Malayan tapir
  - Working with NGOs, local researchers, local universities with more people coming together to contribute their expertise to save the Malayan tapir

# EX-SITU CONSERVATION OF MALAYAN TAPIR

1. Specialist group (requires medium – long-term attention)
  - Forming a working group of expertise in the future such as that in Malaysia
2. Captive management (requires medium – long-term attention)
  - Looking into placement of excessive captive bred animals
  - Studying rewilding of captive animals
  - Assessing genetic differentiation and profile of animals between regions for pairing
3. Captive breeding (requires medium – long-term attention)
  - Cryobanking with collaboration of related agencies with zoos for collection of sperm and oocyte
  - Issue dealing with semen collection via electroejaculation or pharmacologically induced (PIE) is of poor quality and post-thaw also shows poor quality
  - SOP for tissue collection (gametes) is required
  - Considering pathology of reproductive tracts that happens for prolonged non-breeding animals
  - Making use of post-mortem findings from roadkill to aid in assisted reproductive techniques (ART) work and collection of ovary, semen, gut microbiomes, fruit decomposition which provide more information to tackle the problem
4. Awareness and public participation (requires immediate – long-term attention)
  - Funding for such programmes
  - Capacity building and empowerment of local communities with a focus on communities within Malayan tapir hotspots/habitat (especially non-protected habitat)
  - Cooperation with various parties in managing the issue and awareness programmes should be conducted primarily by NGOs which has established and ready to get public support
  - Focusing on multiple species rather than one specific species approach
  - Celebrating “Year of Tapir” instead of just “World Tapir Day”



Advisor	<b>Prof. Dr. Hazandy Abdul Hamid</b> <i>Dean, Faculty of Forestry and Environment, UPM</i>
Chair	<b>Dr. Evelyn Lim Ai Lin</b> <i>Faculty of Forestry and Environment, UPM</i>
Deputy Chair	<b>Assoc. Prof. Dr. Manohar Mariapan</b> <i>Faculty of Forestry and Environment, UPM</i>
Secretary	<b>Dr. Noor Jalilah Jumaat</b> <i>Faculty of Forestry and Environment, UPM</i>  <b>Ms. Nur'izzati binti Mohd Fadzli</b> <i>Faculty of Forestry and Environment, UPM</i>
Treasurer	<b>Dr. Sheena Bidin</b> <i>Faculty of Forestry and Environment, UPM</i>
Program committee	<b>Dr. David Magintan</b> <i>Department of Wildlife and National Park Peninsular Malaysia</i>  <b>Mr. Mohd Sanusi Mohamad</b> <i>Copenhagen Zoo Southeast Asia Program (Malaysia)</i>
Technical and Protocol committee	<b>Dr. Diana Emang</b> <i>Faculty of Forestry and Environment, UPM</i>  <b>Dr. Donny Yawah</b> <i>Faculty of Veterinary Medicine, UPM</i>
Publication committee	<b>Assoc. Prof. Dr. Puan Chong Leong</b> <i>Faculty of Forestry and Environment, UPM</i>  <b>Dr. Mark Hiew Wen Wan</b> <i>Faculty of Veterinary Medicine, UPM</i>  <b>Ms. Amara Natasha Mah binti Muhammad Adam Mah</b> <i>Faculty of Forestry and Environment, UPM</i>
Publicity committee	<b>Dr. Zulkhairi Azizi Zainal Abidin</b> <i>Faculty of Forestry and Environment, UPM</i>  <b>Mr. Mohd. Samsudin Suri</b> <i>Department of Wildlife and National Park Peninsular Malaysia</i>  <b>Mr. Mohd Noor Ismail</b> <i>Department of Wildlife and National Park Peninsular Malaysia</i>  <b>Mr. Raffi Ismail</b> <i>Malaysian Nature Society</i>

# LIST OF PARTICIPANTS

# MALAYAN TAPIR CONSERVATION REGIONAL WORKSHOP 2022

No.	Name	Email address	Name of Agency/Association/Club/Company/University
<b>Organizing Committee</b>			
1	Mohd Sanusi Mohamed	sanusimohamed@oum.edu.my	Copenhagen Zoo Southeast Asia Program (Malaysia)
2	Mohd Noor Ismail	mnoor@wildlife.gov.my	Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN)
3	Evelyn Lim Ai Lin	limailinevelyn@upm.edu.my	Faculty of Forestry and Environment, UPM
4	Manohar Mariapan	mano@upm.edu.my	Faculty of Forestry and Environment, UPM
5	Noor Jalilah Jumaat	n_jjalilah@upm.edu.my	Faculty of Forestry and Environment, UPM
6	Sheena Bidin	sheena@upm.edu.my	Faculty of Forestry and Environment, UPM
7	Puan Chong Leong	chongleong@upm.edu.my	Faculty of Forestry and Environment, UPM
8	Diana Emang	dianaemang@upm.edu.my	Faculty of Forestry and Environment, UPM
9	Zulkhairi Azizi Zainal Abidim	zulkhairi.zainal@upm.edu.my	Faculty of Forestry and Environment, UPM
10	Mark Hiew Wen Han	mark@upm.edu.my	Faculty of Veterinary Medicine, UPM
11	Donny Yawah	donny.yawah@gmail.com	Faculty of Veterinary Medicine, UPM
12	Amera Natasha Mah binti Muhammad Adam Mah	ameranataashamah@gmail.com	Faculty of Forestry and Environment, UPM
13	Raffi Ismail	partnerships@mns.org.my	Malaysian Nature Society
14	Nur'Izzati binti Mohd Fadzli	nurizzatimfs@gmail.com	Faculty of Forestry and Environment, UPM
<b>Speakers</b>			
15	Carl Traeholt	ctraeholt@gmail.com	Copenhagen Zoo
16	David Magintan	davidm@wildlife.gov.my	Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN)
17	Wanlaya Tipkantha	wanlayav62@gmail.com	The Zoological Park Organization of Thailand,
18	Nay Myo Shwe	naymyo.shwe@wwf.org.mm	World Wild Fund for Nature, Myanmar
<b>Participants</b>			
19	Chong Ju Lian	julian@umt.edu.my	Universiti Malaysia Terengganu
20	Ahmad Syakir Bin Jasni	201146@student.upm.edu.my	UPM
21	Aiman Solihin Bin Mohd Taib	solpro1999@gmail.com	UPM
22	Ain Mardiyah Binti Muhammad	ainmardiyah99@gmail.com	UITM Pahang Kampus Jengka
23	Ain Nabilah Husna Binti Mohd Malian	ainnabilahmalian@gmail.com	UITM Pahang Kampus Jengka
24	Ajagbe Charles Adesola	adesolacharles@gmail.com	Faculty of Forestry and Environment, UPM
25	Al-Kautsar Hidayanto Bin Abdul Rahim	alkautsarleon@gmail.com	UPM
26	Amirul Asyraf Bin Mazlan	education@zoonegaramalaysia.my	Zoo Negara Malaysia
27	Anthony David	anthony199811@gmail.com	UPM
28	Ardika Dani Irawan	ardikadani2018@gmail.com	Tokyo Metropolitan University
29	Assoc. Prof. Dr. Geetha Annavi	geetha@upm.edu.my	UPM
30	Aya Sofea Binti Mohd Ridzuan	ayasofeaaaa@gmail.com	UiTM Pahang
31	Beatrice Aren Ajeng Laing	beatrice@ketsa.gov.my	Ministry of Energy and Natural Resources (KeTSA)
32	Bong Ai Yin	bong.ai.yin@gmail.com	Pet First Veterinary Centre
33	Chan Yao Wen	205183@student.upm.edu.my	UPM
34	Che Ku Mohd Zamzuri Bin Chik Wan Ab Rahman	zamzuri@wildlife.gov.my	Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN)

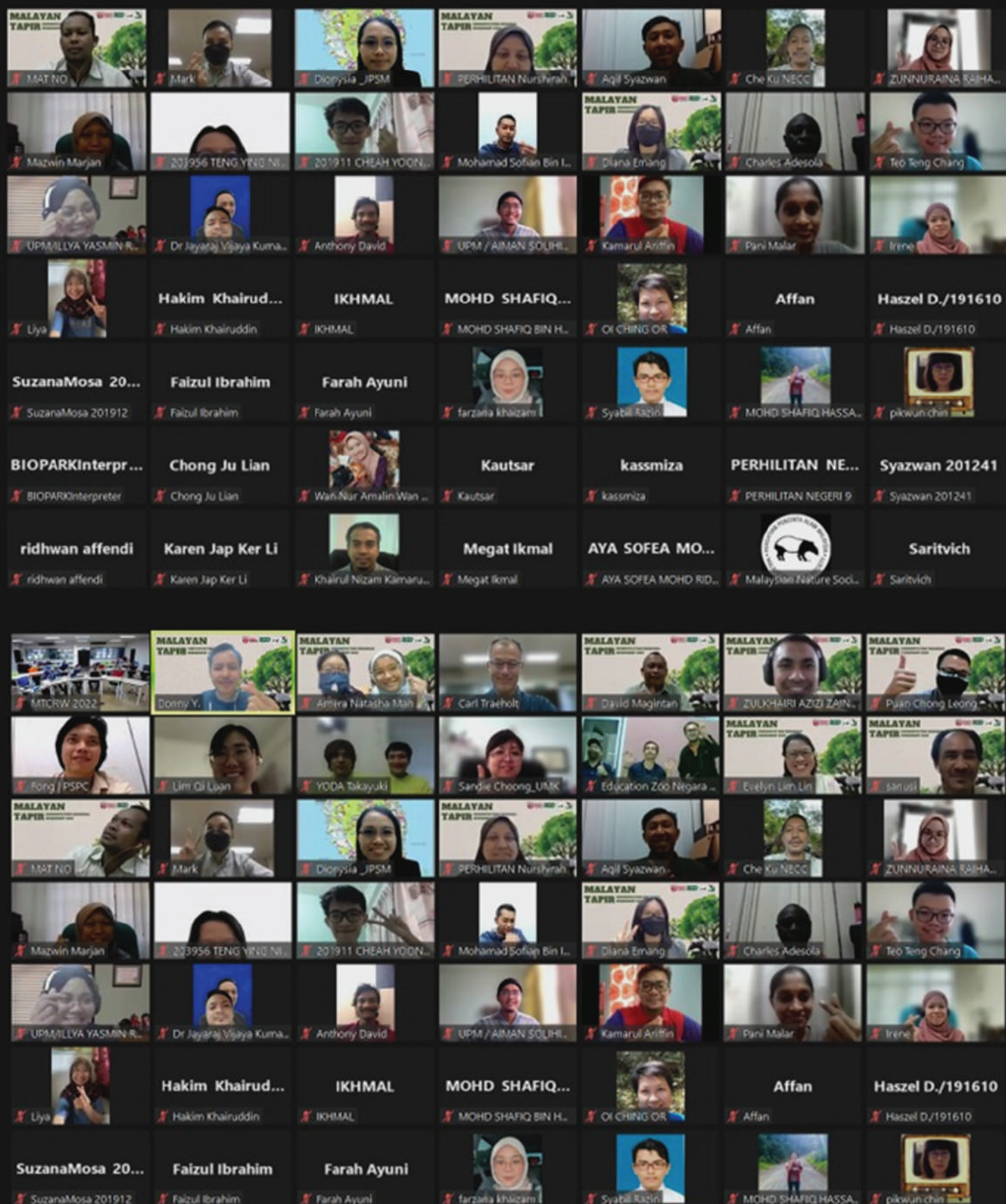
35	Cheah Yoong Xin	yxxin1027@gmail.com	UPM
36	Choong Siew Shean	shean.cs@umk.edu.my	Fakulti Perubatan Veterinar, Universiti Malaysia Kelantan
37	Christopher Wong	christopher.wong@wwf.org.my	WWF-Malaysia
38	Dionysia Binti Modingin	dionysia@forestry.gov.my	Forestry Department Peninsular Malaysia (FDPM)
39	Farah Ayuni Farinordin	farahayuni2506@uitm.edu.my	UiTM Pahang
40	Farzana Binti Not Khaizam Shabadi	201336@student.upm.edu.my	UPM
41	Felicity Oram	orangjuga1@gmail.com	UMS
42	Geetha Annavi	geetha@upm.edu.my	Faculty Science, UPM
43	Haidar Khan Mokbolhassan	haidar@wildlife.gov.my	Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN)
44	Hasmahzaiti Omar	zaiti_1978@um.edu.my	Universiti Malaya
45	Haszel Ding Anyi	191610@students.upm.my	UPM
46	Illya Yasmin Binti Rosli	illyayasminrosli@gmail.com	Faculty of Forestry and Environment, UPM
47	Ismail Bin Abdullah	ismailabdullah@wildlife.gov.my	Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN)
48	Jayaraj Vijaya Kumaran	jayaraj@umk.edu.my	Universiti Malaysia Kelantan
49	Jigdreel Dorji	jdorji.cnr@rub.edu.bt	Faculty of Veterinary Clinical Studies, UPM
50	Juliyana Binti Mirus	209109@student.upm.edu.my	UPM
51	Junaidi Bin Omar	education@zoonegaramalaysia.my	Zoo Negara Malaysia
52	Kamarul Ariffin Bin Kambali @ Hambali	kamarul@umk.edu.my	Universiti Malaysia Kelantan
53	Karen Jap Ker Li	karen_jkl@live.com.my	PM Veterinary Clinic
54	Lau Ching Fong	lauchingfong@gmail.com	Perak State Parks Corporation
55	Maisarah Eleena Binti Ramzi	201230@student.upm.edu.my	UPM
56	Mazwin Binti Marjan	mazwin@zootaiping.gov.my	Zoo Taiping & Night Safari
57	Mohammad Kamaruddin Bin Zainul Abidin	kamaruddinzainul@uitm.edu.my	Universiti Teknologi Mara (UiTM)
58	Mohammad Rusdimursid Bin Jamrin	203975@student.upm.edu.my	UPM
59	Mohammad Shahfiz Bin Azman	shahfiz@frim.gov.my	FRIM
60	Mohd Shafiq Bin Hassan	208483@student.upm.edu.my	UPM
61	Muhamad Affan Bin Ab Aziz	mhdaffan9500@gmail.com	Ministry of Energy and Natural Resources (KeTSA)
62	Muhamad Aqil Syazwan Bin Sa'aidan	aqiltif@gmail.com	Perbadanan Taman Negeri Perak
63	Muhammad Aminurashid Bin Ahmad	education@zoonegaramalaysia.my	Zoo Negara Malaysia
64	Muhammad Rusydi Bin Ismail	203099@student.upm.edu.my	UPM
65	Muhammad Syabil Razin Bin Ramlan	209107@student.upm.edu.my	UPM
66	Muzailinah Binti Moidin	E21g0816@siswa.umk.edu.my	Universiti Malaysia Kelantan
67	Ng Irene	207134@student.upm.edu.my	UPM
68	Noor Atikah Binti Mohd Zulkafli	atikah_mohd@upm.edu.my	Faculty of Veterinary Medicine, UPM
69	Nor Asyurah Binti Kafi	asyurah.kafi@gmail.com	PTNJ
70	Nor Eizrien Eriyanie Binti Hamidun	201349@student.upm.edu.my	UPM
71	Nor Shasalbila Binti Fauzi	nor.shasalbila@gmail.com	UiTM Jengka, Pahang
73	Nur Aimuni Iwana Binti Jamil	e21g0817@siswa.umk.edu.my	Universiti Malaysia Kelantan
73	Nur Amalina Binti Noralidin	Amalinanoralidin@gmail.com	Universiti Malaysia Kelantan
74	Nur Azimah Binti Abdul Rahim	201326@student.upm.edu.my	UPM
75	Nur Fatihah Binti Ibrahim	201267@student.upm.edu.my	UPM
76	Nurshirah Binti Mustapha	nurshirah@wildlife.gov.my	Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN)
77	Nursyazwani Binti Dehrroraji	nssyazwani94@gmail.com	UPM
78	Nurul Aimie Binti Shamsuri	203976@student.upm.edu.my	UPM
79	Nurul Aliya Imra Asyikin Binti Abd Murad	200555@student.upm.edu.my	UPM

80	Nurul Azza Binti Ismail	azzaismail98@gmail.com	UPM
81	Nurul Ermi Binti Ramli	nurulermi@wildlife.gov.my	Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN)
82	Nurul Fatin Binti Musa	nfatinmusa@gmail.com	Management and Ecology of Malaysian Elephant (MEME), University of Nottingham Malaysia
83	Nurul Irene Hanie	irene.c@umk.edu.my	Universiti Malaysia Kelantan
84	Or Oi Ching	oroiching@gmail.com	University of Nottingham Malaysia
85	Panimalar A/P Batumale	pani_89_malar@yahoo.com	UPM
86	Putri Syahmina Damia Binti Mohamad Nazli	203954@student.upm.edu.my	UPM
87	Raden Nur Idzlan Bin Raden Budiman	radennuridzlan@gmail.com	UPM
88	Saat Bin Yaakob	saat@wildlife.gov.my	Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN)
89	Saiful Mansor	msaifulmansor@ukm.edu.my	UKM
90	Shariff Bin Wan Mohamad	smohamad@wcs.org	WCS Malaysia
91	Siti Khadijah Binti Abd Gani	khadijah.gani@ketsa.gov.my	Ministry of Energy and Natural Resources (KeTSA)
92	Su Su Yamin	susu.yamin@wwf.org.mm	WWF-Myanmar
93	Suzana Binti Mosa	suzana99mosa@gmail.com	UPM
94	Teng Ying Ning	203956@student.upm.edu.my	UPM
95	Teo Teng Chang	tengchangteo936@gmail.com	Xiamen University Malaysia
96	Wan Nur Amalin Binti Wan Zamani	200994@student.upm.edu.my	UPM
97	Wardina Syafiah Binti Ismail	207485@student.upm.edu.my	UPM
98	Yoda Takayuki	yoda@biopark.jp	Nagasaki Biopark
99	Zunnuraina Raihama Mohamad Ramlee	201389@student.upm.edu.my	UPM

\*\*\* The list is derived based on those who registered their attendance

















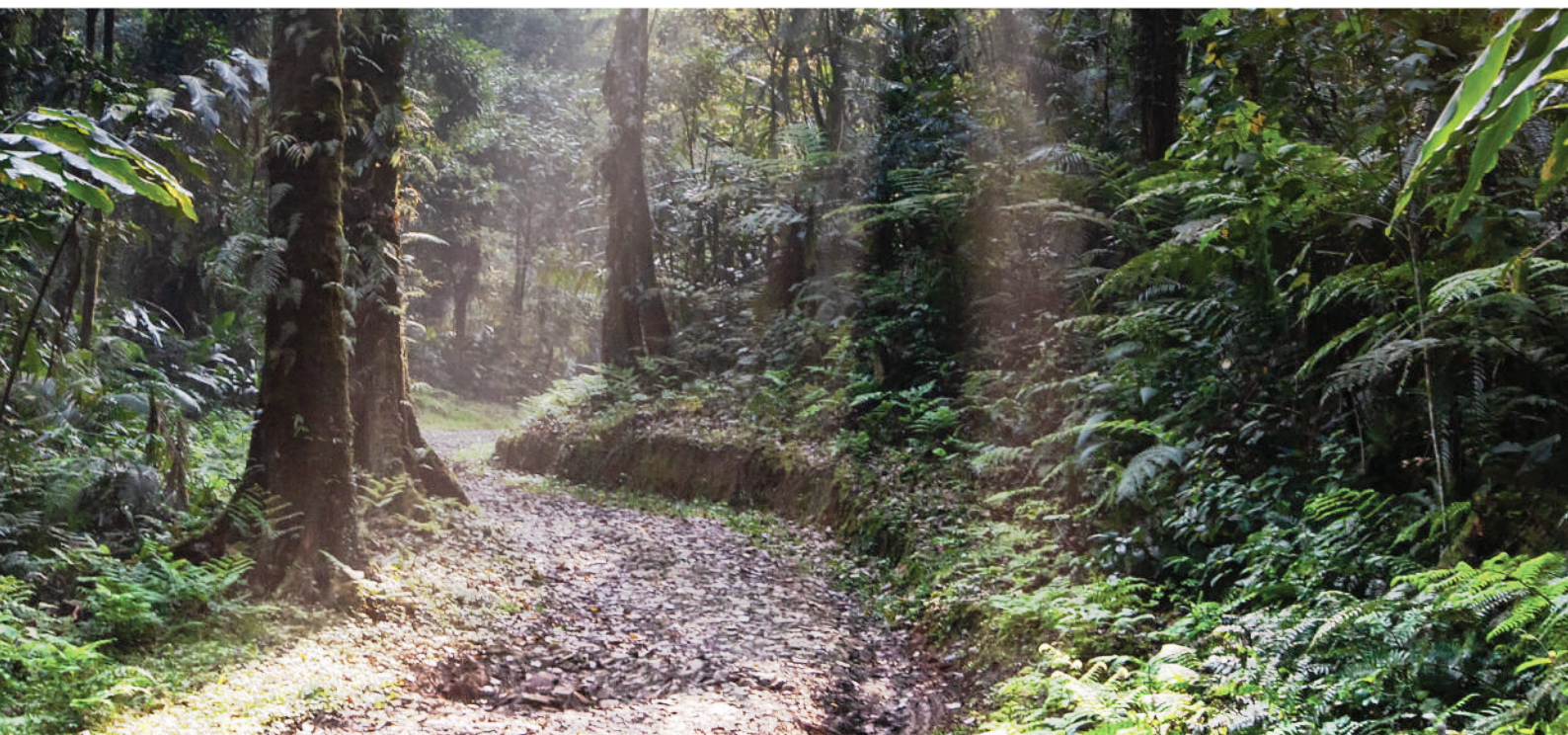








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