State of Nature Conservation in Malaysia 2025, 525–532
doi: 10.62613/sonc2025.v2fnc16

CHAPTER 16

The conservation status of Malayan tapir (*Tapirus indicus*) in Peninsular Malaysia

DAVID MAGINTAN*, DONNY YAWAH, MOHD ADLI AHMAD, PAZIL ABDUL PATAH and ABDUL KADIR ABU HASHIM

Abstract: The Malayan tapir (*Tapirus indicus*), the only tapir species in Asia, is an iconic large mammal of Southeast Asian forests and an important indicator of ecosystem health. In Peninsular Malaysia, the species has experienced a substantial population decline over the past three decades and is currently classified as Endangered. This article reviews the conservation status of the Malayan tapir in Peninsular Malaysia by synthesising available information on population trends, habitat use, threats, governance frameworks, and conservation interventions. Current estimates suggest that only 700 – 800 individuals remain, primarily due to habitat loss and fragmentation driven by agricultural expansion, infrastructure development, and urbanisation. Additional threats include road mortality, human-tapir conflict, and incidental capture in illegal hunting activities. The review highlights the role of national legislation, international agreements, and policy instruments such as the Malayan Tapir Conservation Action Plan (2021–2030) in addressing these challenges. Ongoing conservation efforts encompass habitat connectivity initiatives, law enforcement, *ex-situ* management, research, and community engagement. Strengthening inter-agency coordination, improving roadkill mitigation, and expanding long-term research and public awareness are essential to ensure the long-term survival of the Malayan tapir in Peninsular Malaysia.

INTRODUCTION

The Malayan tapir (*Tapirus indicus*) is the only tapir species found in Asia and one of the four extant species within the family Tapiridae, of which it is the largest in size. In Peninsular Malaysia, it is recognised as one of the five largest terrestrial mammals (PERHILITAN 2017). The species is easily identifiable by its distinctive black-and-white coloration and inhabits tropical rainforests across Southeast Asia, including Peninsular Malaysia, southern Thailand, and Sumatra.

In Peninsular Malaysia, the Malayan tapir occupies a range of forest ecosystems, including lowland dipterocarp, peat swamp, and montane forests. Its presence across these habitats highlights its ecological adaptability and its role as an important indicator of forest health (Lim *et al.* 2022). Despite this adaptability, extensive habitat destruction and fragmentation resulting from agricultural expansion, deforestation, and urbanisation have significantly reduced suitable habitats for the species (Rayan *et al*. 2012; Clements *et al.* 2012; Mohd Samsudin *et al.* 2022; Magintan *et al*. 2024).

[a] Following Groves and Grubb (2011), the Malayan tapir has been reclassified as *Acrocordia indica*, reflecting its placement within a distinct Asian tapir lineage separate from the American tapirs. However, *Tapirus indicus* is retained as the scientific name used throughout this article. This is consistent with its designation under the Wildlife Conservation Act 2010 (Act 716), as well as the nomenclature used in official PERHILITAN records, conservation documents and national reporting. *Tapirus indicus* also continues to be used by the IUCN SSC Tapir Specialist Group in its conservation work and materials. Retaining *Tapirus indicus* therefore ensures continuity with existing legal, administrative and conservation records and the scientific literature cited in this article.

Department of Wildlife and National Parks, Peninsular Malaysia (PERHILITAN), KM10, Jalan Cheras, 56100 Kuala Lumpur
***Corresponding author: davidm@wildlife.gov.my**

The Malayan tapir is a highly selective browser, primarily feeding on immature leaves and young shoots (Williams and Petrides 1980; Khan 1997). Dietary studies conducted in Peninsular Malaysia have recorded more than 115 plant species consumed in natural habitats (Khan 1997). Additional research on tapirs maintained within a semi-wild 30-hectare enclosure documented browsing on 217 plant species, particularly from the families Phyllanthaceae, Myristicaceae, and Sapindaceae (Simpson *et al.* 2013). Collectively, these studies indicate that the Malayan tapir depends on a highly diverse diet comprising at least 380 plant species.

Among the species' range countries, the Malayan tapir population in Peninsular Malaysia and southern Thailand is considered the most stable and extensively studied (Traeholt *et al.* 2016). Early population estimates in Peninsular Malaysia varied widely, ranging from approximately 1,300 – 1,700 individuals (Traeholt *et al.* 2016) to as many as 3,500 individuals (Khan 1997; Zainal *et al*. 2001). However, subsequent evaluations suggest that these figures were likely overestimated. More recent assessments by PERHILITAN, based on camera trap surveys, wildlife inventories, road mortality records, public sightings, and data from the First National Tiger Survey (2016 – 2020), indicate a substantially smaller remaining population of approximately 700 – 800 individuals (PERHILITAN 2020; Lim *et al.* 2022; Magintan *et al*. 2024).

Over the past three decades, the Malayan tapir has undergone a significant population decline and is now classified as globally threatened (PERHILITAN 2021). In Peninsular Malaysia, ongoing land-use changes driven by agricultural development and infrastructure expansion have intensified habitat degradation and fragmentation. Additional threats include increased human-wildlife conflict, vehicle collisions, and unintended capture associated with illegal poaching activities. In light of these challenges, this article provides a comprehensive review of the historical and current conservation issues affecting the Malayan tapir in Peninsular Malaysia.

LEGAL AND POLICY FRAMEWORK

Strong legal and institutional mechanisms underpin protection of the Malayan tapir in Peninsular Malaysia. The Wildlife Conservation Act 2010 (Act 716) and Wildlife Conservation (Amendment) Act 2022 [Act A1646], enforced by PERHILITAN, serve as the main legislation regulating wildlife protection and management. It designates the Malayan tapir as a Totally Protected Species, prohibiting its hunting, trade, or possession, while strengthening penalties for wildlife-related offences. Complementing this national legislation is the International Trade in Endangered Species Act 2008 [Act 686], which was enacted to regulate and control the international commercial trade of wildlife in accordance with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As the Malayan Tapir is listed under CITES Appendix I, all forms of international trade involving the species are prohibited except under exceptional, non-commercial circumstances such as scientific research. The Act ensures that Malaysia meets its international obligations to curb wildlife trafficking and prevent exploitation of endangered species.

At the policy level, the National Policy on Biological Diversity (NPBD) 2022–2030 outlines Malaysia's strategic direction for biodiversity conservation, integrating it into national development planning (NRECC 2023). Complementing this, Malayan Tapir Conservation Action Plan (MATCAP) 2021–2030 provides species-specific strategies focused on habitat connectivity, roadkill mitigation, and population monitoring (PERHILITAN 2021). Malaysia's participation in the Convention on International Trade in Endangered Species (CITES) further regulates international trade of endangered species and promotes compliance with global standards. Together, these instruments form a comprehensive governance framework

aimed at protecting the Malayan tapir and maintaining ecological balance. However, implementation challenges persist. Limited enforcement resources, overlapping jurisdictions, and continued land-use conflicts reduce policy effectiveness. Although legislation provides protection, the success of conservation efforts depends on coordinated land-use planning and collaboration among government agencies, NGOs, and local communities (Magintan *et al.* 2024). Enhancing habitat connectivity through ecological corridors, strengthening data-sharing systems, and improving public engagement are critical next steps to ensure the species' survival in Peninsular Malaysia.

THREATS

Malaysia's pursuit of high-income nation status has driven rapid economic development and a shift from agriculture and mining to manufacturing and services. This transition has placed significant pressure on natural resources, especially biodiversity, resulting in habitat loss, degradation, and fragmentation (KATS 2019). The Malayan tapir is among the species most affected, with numerous studies highlighting threats from habitat loss and forest fragmentation (Kinnaird *et al.* 2003; Rayan *et al*. 2012; Clements *et al.* 2012; Magintan *et al.* 2012, 2024; PERHILITAN 2021; Lim *et al.* 2022).

Population growth remains one of the main drivers of biodiversity loss in Malaysia, increasing demand for land, housing, infrastructure, and urban development (NRECC 2023). In Peninsular Malaysia, forest cover accounts for 43.4% of the land area (FDPM 2021). Deforestation is mainly driven by agriculture, industry, mining, road construction, dam development, and settlement expansion. These activities fragment tapir habitat, a challenge shared across its range (Lim *et al.* 2022). Increased forest clearing and expanding road networks have been linked to higher roadkill rates (Magintan *et al.* 2021, 2024), similar to threats observed in Thailand (Tipkantha *et al.* 2022). As of 2021, 5.73 million ha of forest remain, divided among permanent reserves, government land, and wildlife reserves, with 778,433 ha managed by PERHILITAN (2020). The Malayan Tapir Conservation Action Plan (2021–2030) focuses on identifying viable habitats. Studies show a weak but present relationship between forest loss (2006 – 2019) and roadkill trends (Magintan *et al.* 2021).

Illegal hunting also contributes to wildlife decline. PERHILITAN recorded 61 illegal hunting cases from 2013 to 2019 (PERHILITAN 2020). Snare traps, illegal in Malaysia, pose a severe risk. From 2013 to 2018, encounters rose from 44 to 2,890 snares, killing at least 52 animals, including eight tapirs (Nur-Hazwani and Salman 2018). Although tapirs are not targeted species due to cultural beliefs (Kawanishi *et al*. 2002), they are frequent non-target victims. Indigenous hunting persists on a limited scale, with tapirs taken occasionally (Loke *et al.* 2020). To reduce snaring, PERHILITAN conducts continuous anti-snare patrols (KATS 2019).

Roadkill remains one of the most significant threats to tapirs. Since 2014, roadkill incidents have doubled or tripled, correlating with rising road density from rapid urbanisation (KATS 2019). Highway expansion often cuts through tapir habitats (PERHILITAN 2021), and cumulative forest loss further increases vulnerability (Magintan *et al.* 2021). Between 2006 and 2019, 115 cases of tapir roadkills were reported, with a peak in 2017. In certain locations, as many as 67 mammal roadkills were recorded along an 8 km stretch of highway within a six-month period (Hui *et al.* 2021). Although the Central Forest Spine (CFS) Master Plan includes ecological corridors and viaducts to reduce roadkill (PlanMalaysia 2022), incidents remain consistently high, exceeding ten cases annually since 2014 (Magintan *et al.* 2021).

Human-tapir conflict is another rising issue. The first displaced tapir case was reported in 1991 (Zainal *et al*. 2001). Increasing land-use change and habitat degradation bring tapirs into closer contact with people (Wong *et al*. 2024), contributing to conflicts involving property damage, crop loss, and public safety concerns (PERHILITAN 2021). Amirul *et al.* (2024) reported that there were 78 human-tapir conflict cases in Negeri Sembilan from 2013 to 2018. Between 2011 and 2021, 410 conflict complaints were recorded (PERHILITAN 2021). Another report by Siti Nurnajihah Zuber *et al.* (2024) mentioned that the total number of cases involving human-tapir conflict complaints in Peninsular Malaysia was 244 spanning the years 2013 to 2019. Most reports involve tapirs straying into settlements, orchards, and plantations (Magintan *et al.* 2012), reflecting growing pressures from population expansion and development (NRECC 2023).

CONSERVATION EFFORTS

Enforcement

Malaysia has long enforced the protection of large mammals under the Wildlife Protection Act 1972 [Act 76]. This was replaced by the Wildlife Conservation Act 2010 [Act 716] and its 2022 amendment [Act A1646], under which the Malayan tapir is classified as a "Totally Protected" species. Offenses involving hunting, possession, or trade of tapirs without a special permit carry strict penalties. The Malayan tapir is also listed as Endangered by the IUCN (Traeholt *et al*. 2016) and by the PERHILITAN (2017a) under the Red List for mammals of Peninsular Malaysia, based on historical and current data on its distribution and population size.

To address illegal wildlife activities, PERHILITAN has implemented *Operasi Bersepadu Khazanah*, an integrated operation targeting encroachment, illegal logging, harvesting of forest products, and wildlife hunting. In its six years of implementation, the initiative has recorded significant success. Between 2019 and 2022, it recorded 291 cases with confiscations valued at RM224.08 million (PERHILITAN 2022). In the year 2023 alone, 105 cases were recorded, with confiscations valued at RM32.2 million (PERHILITAN 2023a).

Additionally, PERHILITAN established the Community Rangers programme, involving Malaysian Armed Forces veterans, police veterans, Indigenous communities, and local residents to curb encroachment and illegal hunting across national parks, reserves, forest reserves, and Ramsar sites — all key tapir habitats. By 2022, 901 individuals had been appointed (PERHILITAN 2022).

Conflict prevention efforts

To improve wildlife conservation and reconnect fragmented forest landscapes, the Malaysian government introduced the Central Forest Spine (CFS) Masterplan, which includes constructing viaducts to reduce wildlife vehicle collisions. The first viaduct projects were built along the Kuala Berang Chiku highway (Magintan *et al*. 2012). Studies show Malayan tapirs and multiple mammal species have used these structures (Clements *et al*. 2012; Magintan *et al.* 2022). However, continued management such as habitat restoration, artificial salt licks, and long-term monitoring is required to increase effectiveness (Tan *et al*. 2015; Magintan *et al*. 2021).

The Public Works Department has built ten viaducts nationwide to support wildlife movement (KATS 2019). In 2020, PERHILITAN introduced the Smart Green Linear Infrastructure (SGI) guideline, standardising crossing designs for large mammals (Wan-Nordin *et al.* 2020). The Forestry Department further supports forest connectivity through its policy framework, emphasising wildlife ecological corridors and designating Wildlife Protection Forests to preserve habitats (FDPM 2021).

PERHILITAN is also finalising a new Malayan Tiger Conservation Plan, replacing the National Tiger Conservation Action Plan (NTCAP) 2008–2020. This plan, while focused on tigers, will benefit other species including the tapir. The National Elephant Conservation Action Plan 2023–2030 (NECAP 2.0) similarly supports habitat and corridor conservation that indirectly protects tapirs (PERHILITAN 2023b). Additionally, PERHILITAN installs wildlife crossing signage at hotspot areas to reduce roadkill incidents involving species such as the Malayan tapir (Magintan *et al.* 2012, 2021).

REINFORCING *EX-SITU* CONSERVATION STRATEGIES

Ex-situ conservation serves as an essential complement to *in-situ* protection efforts for the Malayan tapir. Under the Malayan Tapir Conservation Action Plan (MaTCAP 2021–2030), *ex-situ* efforts are recognised as one of the four strategic pillars alongside habitat management, research, and communication, education, and public awareness (CEPA) (PERHILITAN 2022). These initiatives play interconnected roles maintaining an insurance population, enhancing husbandry and reproductive knowledge, supporting education and outreach, and providing potential donor animals for future supplementation or reintroduction when ecological conditions allow.

Captive management and breeding efforts

Captive breeding is a key strategy to support the Malayan tapir population. Malaysia's *ex-situ* tapir management involves a coordinated network of institutions led by the Department of Wildlife and National Parks (PERHILITAN). The Sungai Dusun Wildlife Conservation Centre (SDWCC), established in 2004, remains the cornerstone of the national breeding and rehabilitation programme (Mohd-Adib *et al*. 2024), successfully maintaining tapirs under semi-wild conditions (Donny *et al.* 2022). Complementing this are Zoo Negara Malaysia, Zoo Taiping, Zoo Melaka, A'Famosa Safari and other zoological institutions across Peninsular Malaysia that contribute to breeding and long-term care. To enhance breeding capacity, a new Malayan tapir centre is planned in Kenaboi, Negeri Sembilan.

Reproductive research and technological advances

Significant research advances have deepened understanding of tapir reproduction. Semen collection via electroejaculation, semen evaluation, and hormonal profiling have been successfully demonstrated in Malaysian facilities (Donny and Hiew 2024). These studies provide a foundation for the development of assisted reproductive technologies (ART) such as artificial insemination and cryopreservation. Ongoing research at National Wildlife Rescue Centre (NWRC) and SDWCC on estrous cycle monitoring has refined breeding timing and improved reproductive success. However, practical application of ART faces operational limitations, including under-developed cryobank infrastructure, limited technical expertise, and funding constraints. Addressing these barriers will be essential for ART to progress from experimental studies to applied conservation tools.

Rehabilitation and rescue

Rescue and rehabilitation are vital *ex-situ* activities, particularly as road development and forest fragmentation continue to threaten wild tapirs. PERHILITAN is responsible for responding to incidents involving Malayan tapirs, such as road accidents or animals trapped in hazardous situations. Injured tapirs are assessed by veterinarians to determine whether treatment or immediate release is appropriate (Mohd-Samsudin *et al.* 2022). Rescue and rehabilitation operations are coordinated through the NWRC in Sungkai, Perak. Severely injured, sick, or orphaned tapirs undergo rehabilitation involving medical care, conditioning, and behavioral training before release (Magintan *et al.* 2023). Once deemed fit, rehabilitated individuals are released back into suitable habitats and monitored to ensure successful adaptation.

AWARENESS AND COMMUNITY ENGAGEMENT

Public awareness is an essential component of tapir conservation. PERHILITAN conducts education and outreach programmes for schools, universities, indigenous groups, local communities, NGOs, and other stakeholders. These programmes cover wildlife legislation, management practices, protected areas, and human-wildlife conflict, including appropriate actions when encountering Malayan tapirs.

Local and indigenous communities are actively involved in conflict mitigation initiatives, particularly the use of electric fencing systems (e.g., *Sistem Pager Elektrik Gajah,* SPEG) to deter large mammals such as elephants and tapirs. Educational programmes in schools aim to foster long-term awareness of biodiversity conservation. Although not species-specific, these initiatives indirectly promote tapir conservation (PERHILITAN 2021).

Under the MATCAP, partners such as Universiti Putra Malaysia (UPM) and the Malaysian Nature Society (MNS) conduct awareness and research activities. MNS supports conservation education through school-based nature clubs, while UPM encourages student research on various aspects of tapir biology and conservation.

RESEARCH

Despite being documented for over 200 years, research on the Malayan tapir remains limited, with only 57 scientific publications recorded as of 2023 (PERHILITAN 2021). Existing studies are often small-scale and fragmented. Key research gaps include human dimensions and roadkill mitigation, although recent studies have begun addressing tapir-vehicle collisions (Lim *et al.* 2022). Research priorities identified since the 2003 Malayan Tapir Conservation Workshop include population status, ecology, distribution, habitat use, threat reduction, and effective awareness programmes. These priorities continue to guide current and future conservation efforts (PERHILITAN 2021).

CONCLUSIONS

In 2016, the Malaysian government introduced the National Policy on Biological Diversity (NPBD) 2016–2025 to strengthen the country's efforts in conserving biodiversity (KATS 2019). This policy has since been updated to align with the Kunming-Montreal Global Biodiversity Framework 2030, which replaced the Aichi Biodiversity Targets 2010–2020. Under the revised NPBD 2022–2030, Malaysia is committed to achieving its biodiversity conservation targets by 2030. A key initiative in this effort is the Malayan Tapir Conservation Action Plan (MATCAP) 2021–2030, designed to guide and support the protection of the Malayan tapir in Peninsular Malaysia. MATCAP aims to create ecological and social conditions that allow the species to thrive in its natural habitat, while aligning with international and national policies, laws, and regulations. The plan emphasises habitat management, *ex-situ* management, communication, education, public awareness, and research, outlining 16 outcomes and 49 activities to be implemented through 2030. Progress will be continuously evaluated and adapted to ensure the successful conservation of the Malayan tapir in Peninsular Malaysia.

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