Dawna Tenasserim: Species on the Brink
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Coverpage Photo: Dhole © David Lawson / WWF-UK
**GLOSSARY**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>CR</td>
<td>Critically Endangered</td>
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<td>DD</td>
<td>Data Deficient</td>
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<td>DNP</td>
<td>Department of National Parks, Wildlife and Plant Conservation (Thailand)</td>
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<td>DTL</td>
<td>Dawna Tenasserim Landscape</td>
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<td>EN</td>
<td>Endangered</td>
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<td>HEC</td>
<td>Human-Elephant Conflict</td>
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<tr>
<td>IUCN</td>
<td>International Union for the Conservation of Nature</td>
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<td>NEDA</td>
<td>Neighbouring Countries Economic Development Cooperation Agency (Thailand)</td>
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<tr>
<td>SMART</td>
<td>Spatial Monitoring and Reporting Tool</td>
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<td>VU</td>
<td>Vulnerable</td>
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<td>WCS</td>
<td>Wildlife Conservation Society</td>
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<td>WEFCOM</td>
<td>Western Forest Complex (Thailand)</td>
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<td>WWF</td>
<td>World Wide Fund for Nature (formerly World Wildlife Fund)</td>
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<td>ZSL</td>
<td>Zoological Society of London</td>
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Information from the IUCN Red List assessments, including the status of the featured species, was accessed in September 2021.
Preface

The Dawna Tenasserim, a transboundary landscape stretching across the mountain range at the border between Myanmar and Thailand, is one of the most impressive landscapes in Southeast Asia. It contains undulating mountain ranges, deep dark rainforests with huge dipterocarp trees, local communities and Indigenous peoples who still pursue centuries-old ways of life, and hills that continue to harbour some of the most iconic animals on earth, including tigers and elephants, but also the world’s smallest mammal, Kitti’s hog-nosed bat. This landscape is home to over 160 mammal and 560 bird species. Other notable species found here include gaur, banteng, tapir, dhole, clouded leopard and great hornbill. However, not all is fine, and the landscape continues to undergo rapid changes and large-scale demographic shifts, largely due to conflict. Conflict has shielded wildlife habitats to some degree, but it has also been a driver for the unsustainable exploitation of timber and other natural resources.

For the landscape’s wildlife species, the threat of habitat loss due to governance and management challenges is further exacerbated by market demand for live wildlife, as well as their parts and products. The demand ranges from primates and songbirds for possession as live, caged “pets” to pangolin and tiger parts for consumption as meat or traditional medicine. The poverty of people in this border region and unclear land tenure, in addition to the global appetite for certain commodities such as oil palm, rubber, and maize, fuel deforestation and habitat loss. Recent publications have flagged the urgent need for action in response to the extinction crisis the world is facing. A globally significant reservoir of biodiversity still exists in the Dawna Tenasserim but will continue to diminish if effective action is not taken. Now is the time to determine strategies for both state and non-state actors and develop a comprehensive conservation action plan for this landscape.
Summary

This report draws attention to threatened wildlife species at risk of further population decline and extinction in one of the world’s most remarkable landscapes, the transboundary Dawna Tenasserim. It highlights the conservation status, threats, ongoing actions and opportunities for 16 threatened species occurring in this landscape. Some of these are charismatic species, such as the tiger, while others like the roughback whipray are scarcely known even in conservation circles. Yet others, such as the Fea’s muntjac and the Tenasserim lutung, are endemic, existing nowhere else. This report is intended to shine a spotlight on some of the lesser-known, iconic, endemic and threatened (including some critically endangered) species that call the Dawna Tenasserim home. This report also highlights their conservation potential by describing some of the ongoing conservation measures, including those aimed at wildlife protection, reducing loss of natural habitat, and enhancing conservation benefits to local communities and enabling them to be stewards of conservation. However, these actions need to be further strengthened and urgently scaled up across the landscape.
The Dawna Tenasserim landscape stretches across the Myanmar-Thailand border and contains the largest contiguous forested area (8 million hectares) in mainland Southeast Asia. Encompassing the Dawna and Tenasserim mountain ranges and the Kayah-Karen Montane Forests ecoregion, this landscape is almost the size of Cambodia. It contains 30,539 square kilometres of protected area, including the Western Forest Complex (WEFCOM) in Thailand, Southeast Asia’s most extensive protected area network. This landscape is the source for many of the region’s major rivers and watershed systems, including the Tenasserim in Myanmar’s Tanintharyi Region, and the Mae Khlong, Chao Phraya, and Phetchaburi watersheds in Thailand.

The Myanmar portion of the Dawna Tenasserim receives high rainfall and supports some of the last remaining lowland evergreen forests in the Indo-Burma biodiversity hotspot. The Thailand side is dryer and is covered by a mosaic of evergreen and deciduous forests. The forests of the Dawna Tenasserim Landscape, estimated at 81.6 per cent in 2019 based on Global Forest Watch’s tree cover data, serve as critical habitat for many wildlife, including endangered and endemic species. These values make the Dawna Tenasserim critical for biodiversity conservation. Ethnic minorities and Indigenous peoples are an important part of the Dawna Tenasserim, serving in some cases as stewards of the landscape, which is one of WWF-Greater Mekong’s six priority landscapes for conservation.

Much of the forested areas in the southern Dawna Tenasserim are underlain by limestone, which over time has eroded into fissures and gullies, creating isolated microhabitats that are ideal for the evolution of unique species. In 2015 and 2016, researchers discovered two new species of bent-toed gecko (genus *Cyrtodactylus*) in this area. In 2019, another group of researchers found yet another new gecko, the Tanintharyi rock gecko (*Cnemaspis tanintharyi*). The study co-author Grant Connette stated in 2020, “A key take-home message from our research is that scientists still have a lot to learn about the biodiversity of southern Tanintharyi.” This also applies to the Dawna Tenasserim landscape in general, which continues to yield new species discoveries.

A lack of protection means that many species could become extinct even before the world gets to know about them.
Species on the Brink
Indochinese leopard

(*Panthera pardus* ssp. delacouri): Status CR (as a subspecies)

Leopards occupy the widest range of habitats among all the old-world large cats. They have been known to occupy habitats as diverse as deserts, rainforests, montane forests and swamps. Their range stretches from Africa to Southeast Asia and the Russian far east. However, many geographically isolated subspecies have been classified and future genetic studies may elevate some of them as full species. The distinctive spots on the leopard’s coat are called rosettes and they help leopards hide among tree canopies. WWF surveys in many sites within the Dawna Tenasserim found the proportion of melanistic leopards, those that look black, to be close to 30 per cent. Further south, in Malaysia, the melanistic coat variants predominate. Despite their adaptability and widespread occurrence, all subpopulations of the Indochinese leopard are on the decline, primarily due to targeted hunting for illegal trade, over-hunting of their prey species and habitat conversion. Having gone extinct or severely diminished in population in neighbouring countries, the Dawna Tenasserim serves as a stronghold for this species across the Greater Mekong region.

A 2016 study reported a “range collapse of the Indochinese leopard (*Panthera pardus delacouri*) in Southeast Asia,” finding that the species historically occurred throughout mainland Southeast Asia but now occurs only in 6.2 per cent of its historical range. The leopard is extinct in Singapore, Laos and Viet Nam, nearly extirpated in Cambodia and China, and has much reduced populations in Malaysia, Myanmar and Thailand. The study found that the survival of the subspecies now depends on only two stronghold populations, in Peninsular Malaysia and the Dawna Tenasserim (specifically the WEFCOM). It estimated the total remaining population to be 973–2,503 individuals, with only 409–1,051 breeding adults.
The Sunda pangolin has been assessed to have declined by 80 per cent over the past two decades. This species was listed as Critically Endangered, partly as a precautionary measure based on very high levels of trafficking of live and dead pangolins and their scales. Controlling poaching is dependent on strong law enforcement measures in the pangolin’s natural habitat. Furthermore, demand reduction efforts in key consumer countries for Asian pangolin products seem to be ineffective. Meanwhile, the price and consequently the incentives for the illegal hunting and trading of Sunda pangolins continue to remain high.

The Sunda pangolin historically occurred throughout most of Thailand, including the Dawna Tenasserim, but has reportedly been lost from most lowland areas. However, there are camera-trap images of Sunda pangolins from several protected areas in the Dawna Tenasserim of Thailand, including Kaeng Krachan National Park and those in the southeastern WEFCOM in Kanchanaburi Province. The species has also been frequently captured by camera traps in Tanintharyi region and Kayin (Karen) state in Myanmar.

The cross-border trafficking of Sunda pangolin from areas of Tanintharyi near the Thai border crossing of Dan Singkhon has been reported frequently. Over the past two decades, the illegal hunting and sale of pangolin to Thailand, with likely subsequent export, has become a major source of income for local communities. A villager interviewed by The Irrawaddy said, “Until around 15 years ago, we had no idea that we could make money out of them,” adding that a pangolin weighing a viss (around 1.6 kilograms) could earn him between MMK80,000 and MMK90,000 (about US$60-67), a relatively large amount of money for local villagers.

The Zoological Society of London (ZSL) is working on a global pangolin conservation project, with one of the project sites located in the southern WEFCOM in Thailand’s Kanchanaburi province. Using camera traps, researchers are learning about the Sunda pangolin population that lives in this part of the Dawna Tenasserim, while also working with rangers from Thailand’s Department of National Parks, Wildlife and Conservation (DNP) across four protected areas to better understand the threats they face. In parallel, the ZSL is working with local communities to conduct patrols and raise awareness of the pangolin and its conservation, disseminating information through youth groups, students and villagers.
COVID-19 connection

Several viruses, including coronaviruses, have been associated with pangolins, possibly as intermediate hosts. The transmission of coronaviruses between bats and pangolins in the wild have been suspected in some cases, while in others, viruses may have been transmitted during wildlife trafficking. When pangolins are trafficked, they are often transported with other animals in cramped, unsanitary conditions, allowing viruses to be transmitted between species and potentially to humans. In particular, viruses closely related to SARS-CoV-2, the virus responsible for the Covid-19 pandemic, have previously been identified in several Sunda pangolins seized in Guangdong and Guangxi provinces of China. However, Sunda pangolin samples trafficked from Indonesia and Malaysia and tested in Malaysia were found not to have had the same viruses during past decades. So, it remains unclear where the trafficked pangolins confiscated in China got their viruses from. Sunda pangolins trafficked from Myanmar to Viet Nam and China could be a source, but are yet to be investigated.
Asian elephant

(*Elephas maximus*): Status EN

The Asian elephant is one of the last few mega-herbivores (plant-eating mammals that reach an adult body weight over 1,000 kg) still roaming the Earth. Elephants range over large areas, dispersing seeds over great distances and thereby structuring and maintaining a mosaic of habitat patches. Elephants are thought to be a climate vulnerable species due to their dependence on water and the variability in rainfall driven by climate-change.\(^4\)

Globally, Asian elephants are on the decline. Their numbers have roughly halved in the last 60 to 75 years,\(^5\) resulting in their classification as Endangered. Once they roamed across most of the Asian continent but are now restricted to less than 10 per cent of their historic range. At present, Asian elephants survive as several fragmented and isolated populations in South and Southeast Asia. Similar to other flagship species like the leopard, the Dawna Tenasserim remains a vital habitat for elephants. About a quarter of the more than 3,000 wild elephants estimated to live in Thailand inhabit the WEFCOM. Also, some fragmented elephant populations occur in the Myanmar part of the Dawna Tenasserim.

One of the challenges of elephant conservation in the Dawna Tenasserim is human-elephant conflict (HEC) resulting from expanding agriculture and habitat fragmentation, both in Thailand and Myanmar.\(^6\) HEC is a topic of national priority in Thailand, where the species seems to be recovering. Furthermore, considerable numbers of wild elephants occur outside protected areas and in stressful human-modified landscapes, including community forests and orchards. As water resources become scarce and variable under climate change, competition for water between elephants and humans is a growing concern fuelling HEC.\(^7\) HEC is exacerbated by the change from traditional crops to water-demanding fruit orchards, such as for durian and pineapple, that are attractive to elephants as food.

The illegal wildlife trade has impacted elephant populations in Dawna Tenasserim due to the capture of elephant calves for the tourism industry.\(^8\) In addition, in 2014, a disturbing trend of elephants being killed for the illegal trade in their skin was observed in Myanmar and by 2017-2018, it had become a serious conservation concern.\(^9\) To combat this disturbing trend, WWF-Myanmar launched the Voices for Momos\(^20\) (an affectionate local word for elephant) campaign in 2018. This campaign included public outreach in the form of placing life-sized papier-mâché elephants outside Yangon’s City Hall, a Voices for Wildlife music festival, and policy advocacy with foreign missions and the Yangon city government. This campaign resulted in the Yangon region authorities banning wildlife sales. Elephant poaching also decreased significantly, with only four elephants being killed in 2019 compared to 44 in 2017,\(^21\) due to increased protection efforts in the elephant habitats of Ayeyarwady and Bago regions. However, the elephants in the Myanmar part of the Dawna Tenasserim in Tanintharyi region seem to have experienced less poaching pressure than in the Bago Yoma and Ayeyarwady.\(^22\)

WWF works in Thailand’s Kuiburi National Park to reduce conflict between wild elephants and surrounding farming communities. WWF’s work includes an initiative that began in 2017, in collaboration with Thailand’s DNP and a mobile service provider, the True Corporation, to set up an early warning system to alert rangers and communities about elephant movements into farmland. Camera traps installed around the national park’s borders automatically send images to rangers whenever elephants are identified, helping them prevent wild elephants from damaging crops. The early warning system helped reduce crop damage by wild elephants from 25 per cent of the times elephants were identified in 2018 to 4 per cent in 2019.
The banteng is a species of wild cattle found in Southeast Asia. A 2016 assessment, using population data that is more than a decade-old, estimated that between 4,500 and 8,000 banteng remained in the wild in their native range. However, populations have steeply declined since then, making this species as endangered as the tiger. However, unlike the tiger, very few people know about the banteng, despite its once-widespread occurrence in Southeast Asia’s dry forest biome. The banteng’s range historically extended from southern China’s Yunnan province across mainland Southeast Asia to Peninsular Malaysia, Borneo, Java and possibly Bali.

The largest banteng population occurs in eastern Cambodia. In the Dawna Tenasserim of Thailand a few significant banteng populations are found, primarily in Huai Kha Khaeng Wildlife Sanctuary, but with small remnant populations in Kuiburi National Park and possibly Kaeng Krachan National Park. In Myanmar, banteng have been detected in the southern Tenasserim hills, with camera traps capturing images in the proposed Lenya National Park extension area and the Nga Wun Reserve Forest.

WWF-Thailand has supported a pioneering effort at banteng reintroduction to re-establish a population in Salakpra Wildlife Sanctuary in the southern WEFCOM, which is part of the Dawna Tenasserim. Salakpra lost the banteng some 35 years ago due to intensive poaching, primarily for heads and horns to keep as trophies. WWF has been involved in this project since 2015 and has supported radio-collaring and camera trapping, and conducted ecological research and population monitoring to understand the survival, movement ecology, home range analysis and habitat use of the reintroduced banteng. Since 2016, three groups of banteng (comprising 10 individuals) have been released into the sanctuary. In addition, the Khao Nam Phu Wildlife Conservation Promotion and Development Center is engaged in community outreach to enlist the participation of local villages and ensure the safety of the released banteng near human settlements.

Hunting is the primary threat to the banteng throughout its range, but it is also threatened by diseases and parasites spilling over from domestic cattle. In 2021, some banteng in Huai Kha Khaeng were observed with nodules on their skin, a symptom of a viral disease called lumpy skin disease. They likely contracted the disease from domestic cattle via blood-sucking flies. As agriculture moves closer to banteng habitats, there is an increased likelihood of these already small populations of wild cattle catching diseases that their immune systems are ill-prepared to combat, further threatening their survival.
The Malayan tapir is the largest of the tapir species and the only one native to Asia. Presently, its range is limited to southern Thailand, Peninsular Malaysia and the Indonesian island of Sumatra, in addition to the Dawna Tenasserim. In the Dawna Tenasserim, they are thought to inhabit the tropical moist primary and secondary forests south of and including Huai Kha Khaeng Wildlife Sanctuary in Thailand and the contiguous forests on the Myanmar side of the border. In a camera-trap survey conducted in 2011, tapirs were recorded in the Tanintharyi Nature Reserve in Myanmar, with at least three individual tapirs recorded in the reserve’s core zone.

The tapir population in the Dawna Tenasserim is fragmented, with many subpopulations having fewer than 15 individuals, and the total estimated at fewer than 250 adults according to the International Union for the Conservation of Nature’s (IUCN) Red List of Threatened Species. However, recent camera-trap surveys suggest this may be an underestimate. To ensure sufficient genetic diversity, moving individuals between subpopulations is recommended but has yet to be undertaken.

Local partners and WWF have camera-trapped the Malayan tapir and
identified it as one of the 23 mammal species to be affected by a planned two-lane highway connecting the Tanintharyi region’s capital Dawei with the Thai border at Htee Khee. While surveys have regularly recorded tapirs in the Tanintharyi Nature Reserve on the Myanmar side of the landscape, land conversion for rubber and oil palm, and political instability, threaten this population in Myanmar. In addition, forest fragmentation across the Dawna Tenasserim threatens the long-term survival of the species. Since tapir meat is not in demand in Myanmar and Thailand, this species is not widely targeted by hunters, either for subsistence or commercial trade. However, they do get caught in the deadly snares set in their habitat for other animals. Lower demand and the robust protection of forests on the Thai side make the survival of Malayan tapirs more likely, so long as genetic diversity can be maintained and snaring effectively combated in this landscape. In Myanmar, increased wildlife protection, including through community conservation efforts, is crucial for tapir conservation.
The Dawei-Htee Khee Road

The highway will connect Bangkok to a planned deep-water port near Dawei via Kanchanaburi. While this controversial project has been delayed by the current political situation in Myanmar, it is expected to proceed in future given the advanced stage of approvals and the investment available for road construction. The road will be funded with a soft loan from Thailand’s Neighbouring Countries Economic Development Cooperation Agency (NEDA), approved in early 2018 by Myanmar’s parliament.

A 2018 Environmental Impact Assessment claimed that the area to be traversed by the paved two-lane highway had little wildlife and that most of the species found were common species that could easily adapt to the disturbance of the road. Contrary to this claim, this area is within one of five tiger heartlands identified by WWF within the Dawna Tenasserim landscape. A 2018 wildlife survey conducted over six months along the route yielded photos of a surprising array of wildlife species, including top-level predators such as leopard and dhole.32 In addition, the survey camera-trapped 23 mammal species moving within 2km of the road, including three endangered wild cat species, the Malayan tapir, two species of bears and ungulates such as gaur and sambar deer.

While the Dawei-Htee Khee Road threatens to sever the landscape, fragment habitats and increase access for poachers supplying the wildlife trade, there are reasons for hope. Thailand, the source of the soft loan for the road construction, has experience in constructing world-class highway crossing structures for wildlife, such as overpasses and underpasses. These structures are evident along Highway 304, running between Khao Yai and Thap Lan National Parks, and the Thai government has expressed a strong commitment to making the Dawei-Htee Khee Road another example of best practice. The Myanmar government also has previously expressed a strong interest in seeing the Dawei-Htee Khee Road become a landmark example of sustainable road design in Myanmar.

It is essential that developments on this important regional infrastructure project are tracked and pressure maintained to mitigate any adverse impacts on wildlife and local communities.
Tiger
(Panthera tigris): Status EN

Tigers used to roam across most of Asia. However, presently they are restricted to just 7 per cent of their original range, in isolated forests and grasslands across 10 range countries, having gone extinct in three others. Tigers need vast territories to survive, but their habitats have been destroyed, degraded and fragmented by human activities. These habitat changes have resulted in tiger populations in some areas either being lost entirely or becoming isolated on islands of habitat from which they cannot safely travel to mate and find food. In addition to their cultural significance throughout Asia, tigers are essential for their role as apex predators. As the largest feline, the tiger is a so-called umbrella species, whose conservation also secures habitat for many other species.

At present, the Dawna Tenasserim remains a largely intact landscape where contiguous stretches of habitat are available for tigers. While there are no accurate numbers for tigers in the Dawna Tenasserim, it is likely to have fewer than 150 individuals. In 2021, Thailand’s DNP estimated there were 89 tigers in Thung Yai and Huai Kha Khaeng wildlife sanctuaries and some more tigers in other parts of Thailand’s WEFCOM. The WEFCOM harbours the largest population of tigers in mainland Southeast Asia, making the Dawna Tenasserim the last stronghold of viable tiger populations in the Greater Mekong, offering one of the best prospects for their survival in the region.

The tiger is a species for which transboundary conservation efforts are most needed, given that their movement and habitats traverse the international border in the Dawna Tenasserim. Tiger conservation has galvanised different conservation groups and NGOs across the transboundary landscape to unite through the informal Dawna Tenasserim Tiger Alliance.

The hope for tiger conservation in the Dawna Tenasserim, particularly for Myanmar’s precarious population, estimated in 2019 to be in the low tens, comes from the source population in the WEFCOM. The recent detection of a breeding tiger in southern Tanintharyi region also shows some hope for recovery, if stronger protection can be provided. In Thailand, there is growing interest in increasing the population of tigers in the Kaeng Krachan Forest Complex by translocating tigers from the WEFCOM.

WWF-Thailand has been working with Thailand’s DNP since 2012 to monitor and conserve tiger populations in the north of the WEFCOM, particularly in the Mae Wong and Khlong Lan national parks. To improve the availability of prey species for tigers, and speed up tiger population recovery, WWF has supported the release of captive-bred sambar deer in Mae Wong National Park, collaring some individuals to track their movements and survival. As of August 2021, 32 deer have been released into the wild.

“Although Mae Wong is home to breeding tigers, cubs struggle to survive here because prey is scarce due to commercial poaching in the past. Our main focus to save tigers here is recovery of the ungulate prey that tigers rely on.”

Rob Steinmetz, Wildlife Biologist, WWF-Thailand
Historically, dholes occurred throughout South, Southeast and East Asia, but they have disappeared from most of their historic range, and the remaining populations are fragmented. Dhole populations continue to decline in most areas due to the depletion of prey species, habitat loss, persecution due to livestock predation, and disease transmission from domestic dogs. The recent IUCN Red List assessment estimated a total population of 4,500 to 10,500 individuals, of which only 949 to 2,215 are mature individuals. Dholes have been recorded within the Dawna Tenasserim in Myanmar’s Tanintharyi region, and in the WEFCOM and Kaeng Krachan Forest Complex of Thailand. However, these populations are fragmented and declining.

Dholes are susceptible to diseases common among domesticated dogs. These include rabies, canine distemper, canine parvovirus and sarcoptic mange. Although they are not seen as a profitable species in the wildlife trade, due to their large home-ranges and small populations, dholes are highly susceptible to and severely threatened by the Southeast Asian snaring crisis. An interesting observation from a study published in 2013 involving WWF-Thailand staff regarding the co-occurrence of dholes with tigers reported the tendency for leopards and dholes to have low rates of co-occurrence with tigers. Dholes and leopards were detected approximately 50 per cent less in tiger-occupied habitat, despite the availability of suitable prey. Tigers occur where prey is abundant, whereas dholes tend to concentrate in prey-poor zones where tigers are fewer. This inter-relationship and the near extirpation of tigers from the Kaeng Krachan Forest Complex may explain the relatively higher abundance of dholes there.

WWF-Thailand is involved in monitoring species, including the dhole, in the Kaeng Krachan Forest Complex, which includes the Mae Nam Phachi Wildlife Sanctuary and the Kaeng Krachan, Kuiburi and Chaloem Phrakiat Thai Prachan national parks.
Lar gibbon

*(Hylobates lar)*: Status EN

With a range that includes the northern part of Sumatra and Peninsular Malaysia and extends along the Dawna Tenasserim mountain range between Myanmar and Thailand, the lar gibbon has the most extensive north-south range of any gibbon. It is an iconic primate of the Dawna Tenasserim. They are commonly found in Thailand’s WEFCOM, where about 10,000 individuals are estimated to occur. Thought to have declined by more than 50 per cent in the last 45 years, the main threats to this species are forest loss and hunting for meat and the pet trade. Some of this hunting is opportunistic, being carried out by those whose main intent is to harvest a high-value aromatic resin, produced in the heartwood of agarwood trees, that is used for perfumes, incense and carvings.

The Wildlife Conservation Society (WCS) is working closely with Thailand’s DNP to protect lar gibbons in the WEFCOM by maintaining the SMART patrol system in Huai Kha Khaeng, supporting patrol teams and establishing a baseline population estimate in the southern part of the protected area. The Wildlife Friends Foundation Thailand (WFFT) has established a Gibbon Release & Research Centre in Mae Hong Son province, where lar gibbons that are rescued from the entertainment industry or the wildlife trade are rehabilitated in order to release them into the Lum Nam Pai Wildlife Sanctuary. In cooperation with the DNP and Mahidol University, WFFT releases and monitors the gibbons to better understand their behaviours following reintroduction.

Lar gibbons in a village site in southern Myanmar were observed to use electricity lines installed for a new grid to move between forest patches, exposing them to the risk of electrocution. To protect the gibbons, WWF-Myanmar, the Karen Wildlife Conservation Initiative and Wildlife Asia worked together to insulate the power lines.
The dusky langur occurs in the Dawna Tenasserim in southern Myanmar and southwestern Thailand, and throughout the Malay Peninsula and a few small adjacent islands. The Dawna Tenasserim is one of the few landscapes where langurs are accorded a reasonably good degree of protection. The Kaeng Krachan Forest Complex in Thailand is a particular stronghold for this species. Myanmar’s second National Biodiversity Strategy Action Plan indicates a significant gap in protection for mammal species in southern Myanmar, including the dusky langur, that are not found inside existing protected areas. This gap partly motivated the proposals to establish the Tanintharyi National Park, as well as Lenya National Park and the Lenya National Park Extension, which together are intended to form the Tanintharyi Forest Corridor.

Although this species prefers closed primary forests, it is also found in a range of secondary and disturbed forests, as well as in plantations, urban areas and parks, suggesting a considerable adaptive capability.

The hunting of dusky langurs continues for the pet trade, for meat and for use in traditional medicine. For example, a traditional belief persists in Myanmar that eating langur stomach has health benefits. Outside of protected areas in Myanmar, habitat loss, fragmentation and degradation due to forest conversion for plantations and agriculture remain major threats, in addition to hunting.
The clouded leopard is a stunning medium-sized wild cat (although it is classed as one of the world’s nine big cats), weighing between 11 and 20kg. Due to its beauty, its pelt is prized by poachers, contributing to overall population decline and its listing as a Vulnerable species in the IUCN Red List.

Clouded leopards are believed to hunt most of their prey on the ground using their large canines. Their upper canine teeth are the largest of all wild cats relative to body size. A typical meal for a clouded leopard may include deer, wild pig, monkey, squirrel and bird. The clouded leopard commonly occurs in tropical evergreen rainforests but can also be found in dry tropical forests and mangrove swamps.

The Dawna Tenasserim mountain range has been identified as a stronghold for clouded leopards. However, only 5 per cent of its stronghold on the Myanmar side comprises protected areas, while 46 per cent overlaps with hotspots for forest loss. This gap in protection means that, particularly in Myanmar, habitat loss and fragmentation from deforestation and infrastructure development is a grave threat to clouded leopards, in addition to poaching. Habitat fragmentation is also an issue in Thailand, where the three most strongly protected populations in the WEFCOM, Kaeng Krachan National Park and Khlong Saeng–Khao Sok Forest Complex have habitat connectivity only through the Myanmar side. Myanmar’s current political situation and the rejection of a proposal to establish protected areas in Tanintharyi region pose serious threats to clouded leopard conservation on both sides of the border.

“The Tanintharyi-Maw Daung-Dan Singkhon road cuts through southern Tanintharyi, a critical area for wildlife movements and gene flow in a narrow part of the Dawna Tenasserim Landscape. Protecting the forests from the impact of the road and associated developments is crucial for the long-term survival of wildlife populations in the landscape,”

Nay Myo Shwe
Head of Wildlife, WWF-Myanmar

A camera-trap survey conducted by WWF, King Mongkut’s University of Technology, Thonburi, and the DNP in the Khlong Saeng-Khao Sok Forest Complex detected at least 27 clouded leopards. It estimated the density to be higher in the core zone of the forest complex than in areas that are accessible to people. Furthermore, the study found that the clouded leopard density in this area is among the highest recorded in South and Southeast Asia, and this might be related to the extirpation of other larger carnivores in the area.
Tenasserim lutung
*(Trachypithecus barbei): Status VU*

The Tenasserim lutung is an enigmatic species. Its existence has only recently been established and an IUCN Red List assessment in 2021 has changed the species status from Data Deficient to Vulnerable. It is restricted to about 4,000 km² on the Myanmar-Thailand border, largely inside the protected areas on either side. Edward Blyth initially described this species in 1847 and then re-described it in 1863 in a way that has led to continuing confusion. The species was also referred to by Francis Mason in his book “Tenasserim” in 1852 as follows:

“Barbe’s white-eyelid monkey abounds in the forests of Yay, and is nearly allied to the preceding species (P. phayre). Blyth says, ‘It is intermediate between P. phayre and P. obscurus; but seemingly, distinct from both. There is no vertical crest, as in the former; nor is the occipital hair lengthened and conspicuously much paler, as invariably in the latter species; but the shoulders and outside of the arm are silvered in both specimens and the under parts resemble those of P. obscurus. The tail is very slightly paler than the body; whereas in twelve adults of P. obscurus (lying together before me, at the time of drawing up this description), the tail is in everyone much paler than the body.””

In 2001, a specimen of leaf monkey was found in the Bangkok (Dusit) Zoo. While appearing similar to the *T. obscurus* group (including *T. obscurus* and *T. phayrei*), it did not entirely fit either description. Therefore, the mammal curator of the Bangkok Zoo suggested it might be a hybrid between the two species. While the exact origin of the individual was unknown, it was purchased by the zoo at an animal market. A subsequent genetic study on the Dusit Zoo specimen supported the classification of *Trachypithecus barbei* as a distinct species.45

While information on the population status of this species is limited, a population decline is suspected due to hunting and capture for pet trade and habitat degradation and loss, particularly on the Myanmar side. A recent survey in the southern WEFCOM of Thailand, conducted by Panthera and commissioned by WWF, documented that local communities are hunting langurs within the range of this species. The basic information available on this species is based on records of the following: an infant seen in June 2013 in Myanmar’s Tanintharyi Nature Reserve; confirmed occurrence in Thailand’s Sai Yok Yai National Park; and the identification of 15 to 25 individuals in Thailand’s Thong Pha Phum National Park. Fauna & Flora International and Friends of Wildlife Myanmar recorded this species during field surveys in Tanintharyi Nature Reserve in 2015 and 2016. In addition, three animals are known from captive facilities in Thailand: Dusit and Pata zoos in Bangkok and Krabok Koo Wildlife Breeding Center in Chachoengsao province.46
Fea’s muntjac or Tenasserim muntjac

*(Muntiacus feae)*: Status DD

This species is assessed in the IUCN Red List as Data Deficient due to a dearth of information, uncertainties over the validity of many reports of the species and the uncertain taxonomic distinction. Although its exact range and conservation status is difficult to assess, it is thought to be endemic to the Dawna Tenasserim and exist nowhere else. If the species has a predominantly montane distribution, it might be relatively safe, due to the protected status of this habitat and a relatively low hunting intensity in this habitat in Thailand. However, if the distribution extends more widely in Myanmar or has a distribution significantly extending to lower elevations, the species might be more seriously threatened due to hunting and habitat loss, particularly in Myanmar. If the Thailand records of Fea’s muntjac accurately represent the species, then it is fairly common in the montane evergreen forests of western Thailand, especially the Klong Saeng-Khao Sok Forest Complex, Thung Yai Wildlife Sanctuary and Kuiburi National Park. The presence of the species in Thailand’s WEFCOM is documented through camera trapping and field sightings, but identification cannot be considered conclusive. WWF includes Fea’s muntjac in its camera trapping inventory in both the Myanmar and Thailand sides of the Dawna Tenasserim. While the defining colouring of the Fea’s muntjac, with its dark pelage and blackish tail, distinguish it from the northern red muntjac, it is possible that muntjac species from neighbouring areas, including *M. gong-shanensis* and *M. rooseveltorum*, exist in the same range.47
Maize as a driver of deforestation in the Dawna Tenasserim

Habitat loss is one of the biggest threats to wildlife populations in the Dawna Tenasserim, in addition to poaching and the illegal wildlife trade. The landscape has been experiencing rising forest loss on both sides of the border. However, as Thailand has more effective forest protection in its extensive network of national parks, the rate of loss there is lower, and is also more subject to periodic spikes in the price of agricultural commodities. As a result, the rate of deforestation in the Thai side of the Dawna Tenasserim has remained around 0.4 per cent annually. On the Myanmar side, the rate has been double, at around 0.8 per cent over the past few years. An unpublished macroeconomic assessment of the drivers of deforestation in the Dawna Tenasserim undertaken by WWF in 2020 identified commodities like maize, rubber, and cassava as primarily driving the conversion of forests. Of these, maize was most significant, particularly in the northern parts of the landscape closest to the border crossing between the Myanmar town of Myawaddy and Thailand’s Mae Sot. Given that an estimated 50 per cent of Myanmar’s maize passes through this border crossing, it is unsurprising that areas surrounding Myawaddy and Mae Sot have high rates of forest conversion for agriculture. Unfortunately, these areas also contain some of the last remaining habitats for endangered wildlife, including the WWF-identified tiger sites of Umphang Wildlife Sanctuary in Thailand and Kweekoh-Mulayit in Myanmar.

Despite the major role of maize as a driver of deforestation in this landscape and the Greater Mekong generally, its cultivation is yet to be recognised globally as a significant forest risk.
The decline of vultures in Asia is one of the most drastic wildlife declines ever recorded. Since the 1990s, 99 per cent of Asia’s vulture population has been lost, going from several million to just a few thousand. Four species of Asian vultures – the white-rumped vulture (Gyps bengalensis), the red-headed vulture (Sarcogyps calvus), the slender-billed vulture (Gyps tenuirostris) and the Indian vulture (Gyps indicus) have been assessed as Critically Endangered. This listing indicates that these vultures could be entirely lost from Asia unless concerted and urgent actions are taken. The first three of the four species listed above were historically found in the Dawna Tenasserim. A few slender-billed and white-rumped vultures, and one red-headed vulture, were recorded in vulture surveys in 2007 in Myanmar’s southern Shan state, adjacent to the Dawna Tenasserim, but their current status is unknown. However, the species with the highest potential for recovery in the Dawna Tenasserim is the red-headed vulture, mainly due to the reintroduction efforts in Thailand by Kasetsart University.

Asia’s vultures have been devastated by the use of diclofenac, a non-steroidal anti-inflammatory drug, mainly in South Asia. This drug, used as a painkiller for domestic livestock, gets ingested in high concentrations by vultures feeding on livestock carcasses, leading to renal failure and visceral gout. As their numbers plummet elsewhere, the Dawna Tenasserim presents an opportunity of global significance for vulture conservation, given the possible persistence of three vulture species on the

Myanmar side. While diclofenac is not commonly used to treat livestock in either Myanmar or Thailand, all three vulture species are considered extinct in Thailand. The red-headed vulture was once abundant in Thailand and could be found even in Bangkok until the late 1960s to early 1970s.

In June 2016, the Zoological Park Organization of Thailand (ZPO), in collaboration with Kasetsart University, the DNP and the Seub Nakhasathien Foundation, initiated a red-headed vulture reintroduction programme in Huai Kha Khaeng Wildlife Sanctuary in the WEFCOM of the Dawna Tenasserim. The programme has been reintroducing groups of captive red-headed vultures from zoos to nature.

Despite the evidence of red-headed vulture presence in Myanmar, mainly in Shan state, local communities tend to have negative attitudes towards vultures. In one instance near Mine None village in southern Shan state, a large tree containing 89 vulture nests was destroyed because villagers disliked the vultures nesting close to the village. Given the critical status of vultures in Asia, there is an urgent need to raise awareness of the value of vultures for the ecosystem and human health. Public outreach should be complemented by developing a nest protection programme that includes locating, reporting and protecting nests, and scaling-up the captive-breeding and reintroduction programme.
More than 20 years after its rediscovery in 1986 (there were no field observations between 1952 and 1986), the Gurney’s pitta remains the number one target of birdwatchers visiting Thailand. The species was last seen in Khao Nor Chu Chi, south of Krabi. However, because of a subsequent influx of human activity in the area where they were detected, Gurney’s pitta is considered near extinct in Thailand.\footnote{51} A population was discovered in 2003 across four sites on the periphery of the Dawna Tenasserim in Myanmar, with no more than 10 to 12 pairs per site.\footnote{52} Recently, the species has experienced a swift decline, primarily due to the near total conversion of lowland forest in southern Myanmar and peninsular Thailand to fruit orchards and oil palm, coffee and rubber plantations, leading to the IUCN’s listing of this species as Critically Endangered. The assessment recommends strict protection measures in the proposed Lenya National Park, a key area for this species on the Myanmar side of the Dawna Tenasserim.\footnote{53}

The Gurney’s pitta has a striking appearance and its status as an exceedingly rare bird adds to its appeal. However, Myanmar’s Tanintharyi region, the last remaining habitat for Gurney’s pitta, has been subject to high deforestation rates in recent years, particularly in Myeik and Kawthaung districts. Eighty per cent of the Gurney’s pitta’s habitat in Tanintharyi has gone in the last 17 years,\footnote{54} with some major strongholds declining by 8 per cent in the last four years.\footnote{55} Much of the recent deforestation in Tanintharyi is driven by small-scale agriculture and the expansion of commercial oil palm and rubber plantations.\footnote{56} As a ground-dwelling bird, the Gurney’s pitta is also vulnerable to the nets and traps set to supply the burgeoning pangolin trade in Tanintharyi.\footnote{57}
Local community role in conservation

Given the remoteness and historic political conflicts in the transboundary Dawna Tenasserim landscape, particularly on the Myanmar side, the governance structures and staffing required to protect wildlife and their habitat have been insufficient. The local communities could play a crucial role in managing the landscape and ensuring the protection of endangered species. WWF-Thailand has made local community engagement and school outreach a central plank of their tiger conservation project in Mae Wong and Khlong Lan. The focus has been on easing unnecessary fear of this top predator and instilling pride among school children in their natural heritage. The HEC project for protecting Asian elephants in Kuiburi is a flagship model in Thailand. The DNP has a joint management arrangement with local communities giving them sole rights to lead elephant viewing tours. The shared revenues contribute to compensation for villagers whose crops and property have been damaged by elephants. On the Myanmar side of the Dawna Tenasserim, WWF has supported a robust community conservation initiative. Local communities in Tanintharyi region have made a case for the official recognition of seven Indigenous Community Conserved Areas. This appeal for recognition was comprehensively made, with natural resource assessments and management plans, in the 2020 publication *Tanawthari Landscape of Life: A Grassroots Alternative to Top-Down Conservation in Tanintharyi Region.*
Siamese crocodile

*(Crocodylus siamensis)*: Status CR

The Siamese crocodile is one of the world’s most endangered crocodilians. In 1992, *C. siamensis* was considered virtually extinct in the wild,58 and in 1996 it was listed as Critically Endangered in the IUCN Red List. Subsequently, previously unknown wild populations have been discovered, including in Thailand’s Kaeng Krachan National Park – the largest protected area in the Dawna Tenasserim landscape and a recently inscribed World Heritage Site. Historically, Siamese crocodiles were widely distributed across mainland Southeast Asia but its current global distribution is much diminished and fragmented, with populations reduced to approximately 20 per cent of the historical distribution.59 Only 11 per cent of their remaining habitat is within officially protected areas. Thailand hosts arguably the most effective and well-developed network of protected areas for Siamese crocodile recovery in Southeast Asia, and therefore has the potential to spearhead global *C. siamensis* recovery efforts. Of additional importance is that a reservoir of genetically pure Siamese crocodiles in commercial farms in Thailand could serve as a ready source of crocodiles for reintroduction efforts.60 Kaeng Krachan National Park is one of the few sites in Thailand that hosts a wild population of Siamese crocodiles,61 with about four to six individuals, although a reintroduced population is thought to exist in Pang Sida National Park. In early 2021, a three-metre-long Siamese crocodile was photographed in Kaeng Krachan, representing only the second time in a decade that the animal has been seen in the wild in Thailand.62 There is no evidence so far of this species occurring in the Myanmar side of the Dawna Tenasserim.
Roughback whipray

(*Fluvitrygon kittipongi*): Status EN

The roughback whipray is a small freshwater stingray found in the Mae Khlong River that originates in Thailand’s WEFCOM. Although rare, the species was also recorded in the Chao Phraya River in Thailand and a few rivers in Peninsular Malaysia and in Sumatra and Kalimantan in Indonesia. However, in the Mae Khlong, recordings of the species so far have been confined to the stretch downstream of the Thai town of Kanchanaburi; its presence further upstream and in the tributaries of Mae Khlong, within the boundaries of the Dawna Tenasserim (as defined by WWF), is unknown. This gap in information underlines the need for further surveys.

Other stingrays such as the Mekong freshwater stingray (*Hemitrygon laosensis*), which occurs in the same river systems in Thailand, have also declined because of overfishing, large-scale habitat degradation and destruction, and pollution from aquaculture and agriculture. Another major issue is the inability of this species to reproduce due to dam construction. It is highly likely that the roughback whipray is impacted by these same threats.

Although community no-fishing reserves established in Thailand may offer the whipray some protection, more extensive management, enforcement and monitoring has to be enacted to protect the species from extinction. In addition, the Mae Khlong watershed provides nearly 30 per cent of Bangkok’s water, so protecting and preserving the watershed’s ecosystem is essential for the future survival of the whipray and the Thai capital’s water supply.
Urgent action needed

The Dawna Tenasserim’s growing international recognition as a priority landscape has brought national and local-level attention to its wildlife and generated conservation momentum. However, while each species featured in this report has its own unique needs and faces its own threats, there are certain threats common to the survival of many of them. These include habitat loss; hunting for trophies, meat and medicine, particularly by snaring, which has a devastating impact on ground-dwelling animals; capture for the pet trade; killing in retaliation for crop damage and property loss; disease transmission from domestic species; poisoning, accidental or intentional; and pollution. While the current political situation in Myanmar makes it hard to predict the implications and opportunities for wildlife conservation in the short- to medium-term, the following conservation actions are urgently needed if these unique species are to be protected from further decline and extinction:
1. **Securing areas under effective protection** is essential for almost all the species featured in this report. Conversion of forest habitat for plantations and smallholder agriculture must be halted and habitats restored in critical areas. Furthermore, the protection of species from hunting and snaring in their habitats must be ensured. Such strict protection is crucial in national parks and other protected areas but it should also be extended to the remaining forested areas of the Dawna Tenasserim – in particular, those providing connectivity and acting as buffers for protected areas.

2. **Outreach to the public** on the importance of these endangered species and the devastating consequences of purchasing, trafficking and hunting them is crucial. In some cases, this may mean discouraging the use of wild animals as photo props in tourist sites, like tiger facilities. Also needed is outreach on the vital ecosystem service roles of species such as the red-headed vulture.

3. **Local communities and Indigenous peoples** can help achieve wildlife conservation goals. This could be done in Thailand by strengthening the wildlife components of the community forest management plans devised by the country’s 17,000 Forest User Groups. In Myanmar, it could be done by recognising (Indigenous) Community Conserved Areas, for which the 2018 Conservation of Biodiversity and Protected Areas Law provides a legal basis.

4. **Restoring forest landscapes** can help meet climate change mitigation goals, increase wildlife habitat and support local livelihoods.

5. **Crossborder coordination and information sharing** should be strengthened. Some species, such as the Tenasserim lutung, live in highly localised areas that follow natural and not political boundaries. The survival of such small range species and small populations depends on coordinated conservation efforts across the Thai-Myanmar border. The same holds true for tigers, with their viability in Myanmar tightly linked to the dispersal of tigers from protected areas in Thailand. In addition, the illegal wildlife trade is an issue that crosses national borders. Effectively combating the illegal trade through cross-border collaboration is therefore essential for protecting these species from extinction.

6. **Reintroducing locally extirpated species** to suitable, secure habitats under a comprehensive conservation plan should be a top priority. The conservation needs of many species on the brink featured here go beyond general species and habitat protection measures. For instance, the current efforts to reintroduce red-headed vultures and banteng should be continued and expanded. In addition, other species such as the Malayan tapir, dhole and Siamese crocodile should be considered for reintroduction. Augmenting depleted populations of the threatened species is also crucial to speed up the rate of population recovery to viable and functional levels. To aid reintroductions, captive breeding efforts may have to be established for species such as the Tenasserim lutung, Gurney’s pitta and roughback whipray.
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