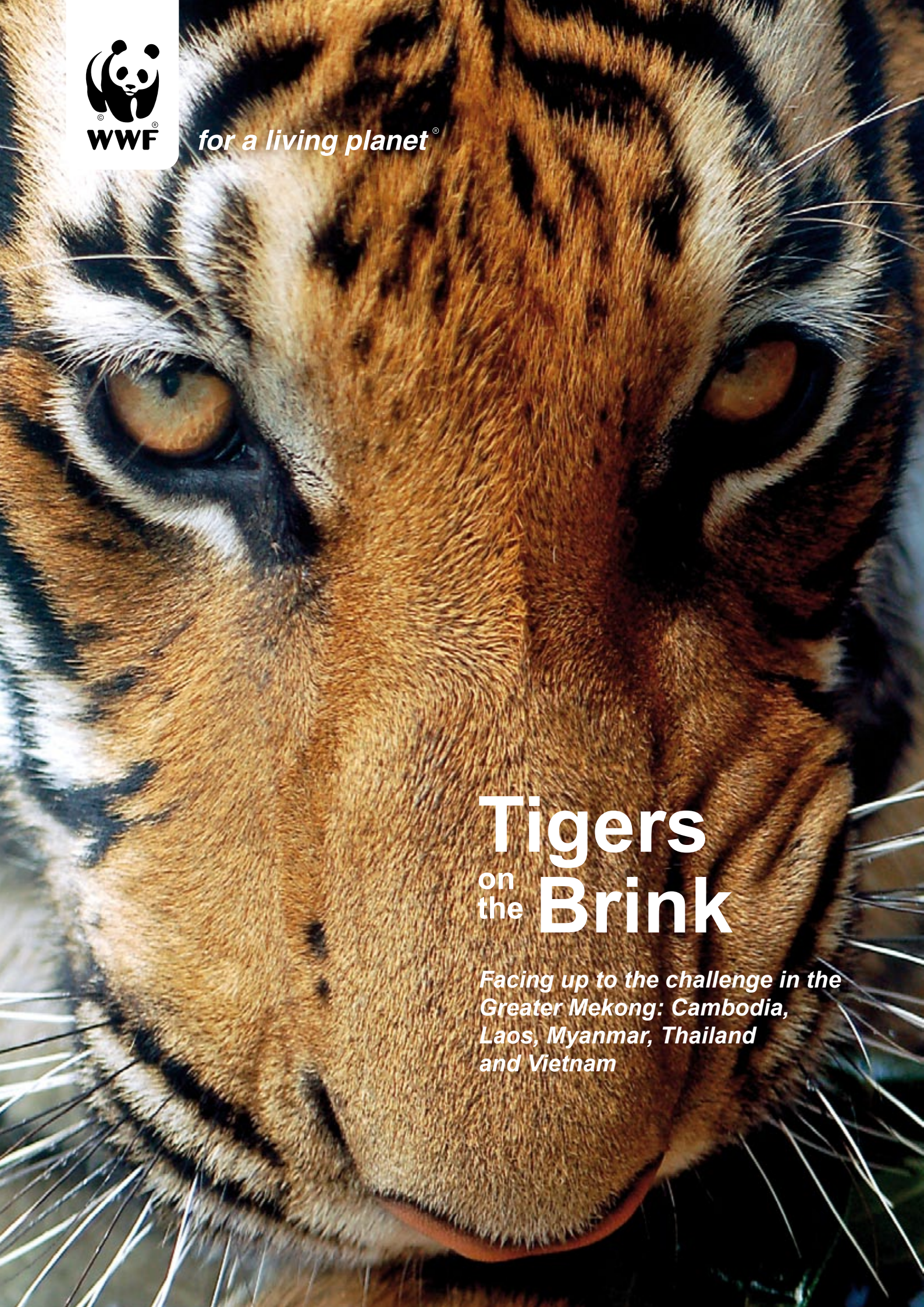

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# Tigers on the Brink

***Facing up to the challenge in the Greater Mekong: Cambodia, Laos, Myanmar, Thailand and Vietnam***

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# Executive summary

***Spanning five of the world's 13 tiger range states, the Greater Mekong region possesses the largest combined area of tiger habitat in the world today - an area of 540,000km$^2$; greater than the size of Thailand and roughly equivalent to the size of France. Estimates vary significantly but it is thought there could be as few as 350 Indochinese tigers remaining in this region, down from roughly 1,200 in 1998 – the last Year of the Tiger.***

During the last century, over 95% of the world's tiger population vanished. The global population of wild tigers is at an all time low – as low as 3,200. Today, it is a race against time. Action must be taken to reconnect, restore and conserve the wild habitats of the Greater Mekong and protect the region's remaining tiger populations, if these charismatic cats are to claw their way back from the brink of extinction.

If current trends persist, tigers are likely to vanish from the wild in many places, or shrink to the point of "ecological extinction" – where their numbers are too few to play their role as the top predator in the ecosystem. It is clear that bold and transformative actions are now needed.

Numbers of the Indochinese tiger *(Panthera tigris corbetti)* are in shocking decline across its range because of shrinking habitats, expanding human populations, and the increasing demand for traditional medicines and wild meat. Regional economic integration between the Greater Mekong countries of Cambodia, China, Laos, Myanmar, Thailand and Vietnam, is both transforming and fragmenting areas rich in natural resources that were until relatively recently little-touched and inaccessible, such as transboundary landscapes that include critical tiger habitat, putting unsustainable pressure on this species. Economic development is good for this region but it is unsustainable development such as poorly planned infrastructure through tiger landscapes, that has led to the decline in tigers.

Despite the trends, a number of relatively large (over 10,000km$^2$) contiguous tracts of near-natural forests provide potential habitats for tigers and experts now believe that the future conservation of tigers rests on securing the existence and expansion of viable populations in such key landscapes. Scientists have identified six tiger conservation landscapes in the Greater Mekong, including wildlife habitat outside the protected areas, buffer zones, and corridors, as well as the protected areas themselves. These landscapes are global priorities for tiger conservation - those with the highest potential to stabilise and then grow the world's tiger population, indicating that the Greater Mekong region holds great promise for tiger conservation.

The current international and domestic bans on trade in tiger products need to remain in place if tigers in the Greater Mekong are to be allowed to recover. Without these bans, wild tigers would be even worse off than they are today. However, few tiger range countries have invested the full political will and financial support necessary for effective tiger conservation.

2010, the Year of the Tiger in the Chinese lunar calendar, presents an unprecedented opportunity to galvanise political will, resources and action, and focus once more upon bringing this symbolic species back from the brink of extinction. With a commitment from all tiger range states and proper safeguards and investment in place, including ambitious measures to tackle the global drivers of tiger poaching and habitat destruction, it is possible to double the tiger population in the Greater Mekong by the time the next Year of the Tiger comes around again in 2022.

WWF aims to work closely with governments and other partners to:

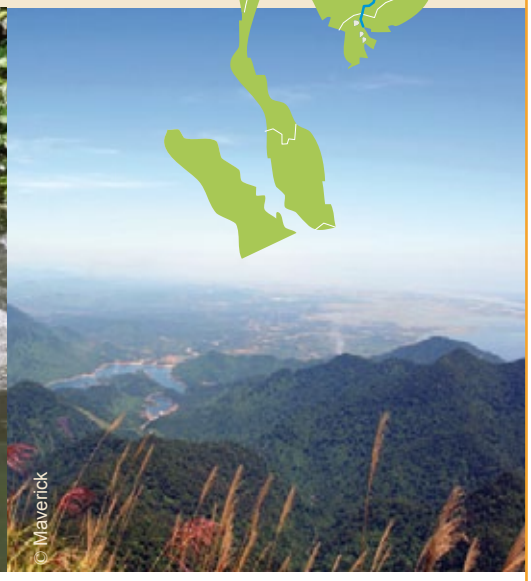
RESTORE tiger populations to forests where they were once abundant;
RECOVER tiger numbers where populations still exist; and
RECONNECT forest habitat to ensure tiger populations and their prey species increase.

To do this, WWF has launched an ambitious global initiative to coincide with the Chinese Year of the Tiger starting in 2010 that aims to scale up conservation efforts in 13 tiger landscapes in Asia to ensure that by the next Year of the Tiger in 2022, tiger numbers have at least doubled.

# Greater Mekong

## *Home of the Indochinese tiger*




Spanning the countries of Cambodia, Laos, Myanmar, Thailand, and Vietnam, this region nurtures and sustains Some of the richest and most biologically valuable habitats on Earth.

These precious habitats are home to an estimated 20,000 species of plant, 1,200 bird species, 800 species of reptiles and amphibians, and more than 500 mammal species, including Asian elephants, rare primates and ungulates, and one of only two populations of the critically endangered Javan rhinoceros in the world. In addition to threatened populations of Irrawaddy dolphins, the Mekong River basin is estimated to house at least 1,300 species of fish, including the Mekong giant catfish, one of the largest freshwater fish in the world. The Mekong is the richest waterway for fish biodiversity on the planet, fostering more species per unit area than the Amazon. Many of the species are endemic to the region.

More than 1,000 new species have been discovered in this global centre of biodiversity over the past decade alone and it is widely acknowledged that the true biological value of the Greater Mekong is much underestimated.

The iconic tiger, one of Asia's largest carnivores, is the apex predator in the region, as well as a revered and powerful cultural symbol. The Indochinese tiger can be found across five countries of the region[i] - Cambodia, Laos, eastern Myanmar, Thailand and Vietnam. But all is not well for this charismatic big cat. The tiger is one of the most endangered of large mammals and, within the species, the Indochinese subspecies is particularly threatened, with as few as 350 estimated to remain in small and scattered refuges.

**Above left:** Tiger pug marks found in the Khao Yai National Park, Thailand's second largest park in the Lower Mekong Dry Forests. **Above middle:** Indochinese tiger. **Above right:** Bach Ma National Park, Greater Annamites.

[i] The Indochinese tiger is also found in small numbers in Malaysia and there are reports of individuals in southwest China, however these two countries are not considered part of the Greater Mekong so are not included in the current report.

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# Indochinese tigers

## *Asian icon on the brink*

© WWF Cambodia

**Top:** The Indochinese tiger.
**Above:** Indochinese tiger caught by camera trap in the Eastern Plains Landscape, Cambodia, January 2006.

*The tiger, the largest cat of all, is a powerful religious and cultural symbol for the people that share its home. But the species is also one of the most endangered large mammals in the world.*

**Name:** *Panthera tigris corbetti* named after Jim Corbett, an Indian-born British hunter, conservationist and naturalist. Also known as Corbett's tiger, or Indochinese tiger, it was officially recognised as a subspecies by Vratislav Mazák, a Czech biologist, in 1968.

**Description:** The tiger is the largest species of all the cats. Male Indochinese tigers average 2.7m (9ft) from head to tail and weigh about 180 kg and large individuals can weigh well over 250kg. Females are smaller, measuring about 2.4m (8ft) in length and weighing approximately 115kg. This reddish orange to golden-yellow species differs from the better-known Bengal or Indian tiger in being slightly smaller and darker, with shorter, narrower stripes of black to dark grey colour. Its head is also less arched and has a longer and narrower nose, and a broad head[1].

**Distribution:** Most Indochinese tigers are presently found in Thailand, with smaller populations also found in Cambodia, Laos, eastern Myanmar and Vietnam. Indochinese tiger could be found in densities similar to those seen in India, i.e. more than 10 adult tigers/100km$^2$ in optimal habitat but this figure is hardly ever reached under present conditions, with densities currently ranging from 0.05-4 tigers/100km$^2$. Tigers are typically solitary animals, with each resident individual commanding and patrolling a large territory; healthy populations also support floaters that do not have a territory.

**Habitat:** Tigers reach highest densities in fertile mosaics of grass, shrubs and woodland; closed forest is a relatively poor habitat because ground-level plant productivity is low, but tigers depend for their own food upon grazing ungulates. These reach highest numbers in floodplains. Unfortunately these are also highly suitable for human settlement and agriculture so most prime tiger habitat in the Greater Mekong has long been converted. Tigers are now constrained to live in inferior habitats such as infertile plains and closed forests. Numbers are particularly low in hill/ mountain areas meaning that today the prime habitats are the remaining lowlands and gently undulating mosaics of forest with more open habitats. These comprise critical landscapes of global biological importance such as the Northern Indochina Subtropical Moist Forests, Annamite Range Moist Forests, Kayah-Karen/ Tenasserim Moist Forests, Cardamom Mountains Moist Forests and Lower Mekong Dry Forests.

Where tigers still occur, they have survived in large part because human access is naturally challenging. By and large, the tracts of rugged terrain make for poor tiger habitat, so densities are naturally lower, making tigers difficult to survey. Even in better habitat such as flat and open deciduous forests, other factors have led to unnaturally low densities. As a result, relatively little is known about the status of these tigers in the wild.

**Prey:** Tigers prey mainly on medium and large-sized wild ungulates. Sambar (the region's largest deer species), wild pigs, serow, and wild cattle such as banteng and juvenile gaur comprise the majority of Indochinese tiger's diet. Tigers also subsist on smaller prey, such as muntjac, porcupines, macaques and hog badgers and in areas where the large ungulate numbers have been seriously depressed by human activity, these smaller species may be the predominant prey. However, where large ungulates occur at low densities, tiger densities are also low.

**Status in the wild:** According to recent estimates, which for most of the range are imprecise and potentially inaccurate, there are possibly as few as 350 left in the wild, although some suggest somewhere between 880-1,230[2]. Cambodia, Laos, and Vietnam are likely to have no more than 30 tigers each, with the remainder in the large forest landscape on the Thailand and Myanmar border. In 1998 - the last Year of the Tiger - official figures suggested between 1,227 and 1,785 Indochinese tigers in the wild.

From frequent sightings in the 1960s, mass killings occurred in the 1970s to the point where it has been estimated that 300 tigers a year were killed in northern Vietnam alone[3]. The situation remained bad in the 1990s with estimates of one tiger a week being killed in the Greater Mekong[4]. Today tigers are rarely seen in the wild anywhere in the region.

To learn more about the abundance and behaviour of the elusive tigers, scientists often conduct camera-trap surveys in areas known to have or thought to have tigers. Camera-traps generate verifiable photographic evidence that is useful not only for confirming tiger presence, but also can potentially be used to help determine population sizes[5]. Recently, WWF has begun using sniffer dogs trained to detect tiger scat and therefore help determine tiger presence and a minimum tiger population estimate in key sites.

Indochinese tigers generally occur in very low densities compared with those tigers recorded in the optimal habitats in parts of India, and have been poached severely in many parts of their range. They have disappeared entirely from some protected areas across the Greater Mekong in the last 10 years. They are currently listed as Endangered on the IUCN Red List and are banned from international trade among parties to the Convention in International Trade in Endangered Species through listing on CITES Appendix I (NB. This does not restrict trade between non-parties). Scientists recently analysed the taxonomy of Southeast Asian tigers and found no significant differences among the mainland populations[6].


**Above:** Indochinese tiger caught in a camera-trap in Laos. This photo was taken in March 2003 on Phou Loey mountain within the heart of the Nam Et-Phou Loey National Protected Area in northern Laos.

# Greater Mekong

## *The world's largest tiger territory across Cambodia, Laos, Myanmar, Thailand and Vietnam*

Over the past decade the area occupied by tigers has decreased by perhaps as much as half. Clearly a transformational effort is needed to recover populations and lost ground.

An approach endorsed by 160 of the world's foremost tiger experts, including many WWF scientists, focuses on Tiger Conservation Landscapes (TCL); large contiguous blocks of habitat that provide the best areas for stabilising and growing the world's tiger populations[7]. This landmark research is based on the most comprehensive scientific study ever conducted on the status of tigers, and the habitat and landscape level requirements of the species. It concludes that conservation efforts must focus on conservation of prey species, conserving tigers' natural habitat, and cessation of tiger poaching and trade, to ensure that populations can be restored to ecological, genetic and behavioural viability.

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**Main:** View of the Khao Yai National Park, Thailand, once home to a healthy tiger population.

A critical aspect of conserving tiger landscapes is to secure core areas where breeding is most consistent. Protected areas linked via habitat corridors secure both the ecological requirements of wild tigers, and the connectivity to optimise conservation of genetic diversity. The recovery and protection of tiger prey populations is also an essential management intervention necessary for successful tiger population increase[8].

Following rigorous analysis of tiger habitat in four different regions of Asia[ii], the Greater Mekong region was found to possess more than a quarter of remaining potential tiger habitat, the largest area among the four regions[9]. This region comprises 20 TCLs and spans an area 540,000km$^2$, roughly equivalent to the size of France. The TCLs in the Greater Mekong are also the largest of all the regions examined. Six landscapes are deemed Global Priorities (Class I)[iii], a TCL classification denoting an area with the highest probability of persistence of tiger populations over the long term. They are the best representatives of tiger habitats across realms. Each of these TCLs contain sufficient habitat for at least 100 tigers.

Unfortunately, due to a combination of threats, tigers have largely been eliminated from many of the lowlands within the Greater Mekong, and restoring tigers to these areas will require a sustained, long-term effort. Conversely, habitat options are much better in the hill forests (with the exception of the Dry Forests in Northeast Cambodia); but these are inherently suboptimal tiger habitat that, therefore support tiger populations more vulnerable to any given level of hunting than are lowland populations.


Tiger captured in camera trap, in Eastern Plains Landscape, Cambodia, November 2007.

[ii] The four regions are the Russia Far East, Indian subcontinent, Indochina (including the Greater Mekong region) and Southeast Asia.

[iii] The six landscapes in the Greater Mekong are: 1. Cambodian Northern Plains (Cambodia) 2. Nam Et-Phou Loey (Laos/Vietnam) 3. Northern Forest Complex-Namdapha-Royal Manas (Myanmar) 4. Southern-Central Annamites (including Dry Forests) (Cambodia/Laos/Vietnam) 5. Kayah Karen-Tenasserim (Thailand/Myanmar) 6. Thap Lan-Pang Sida (Thailand).

## Tiger landscapes concept

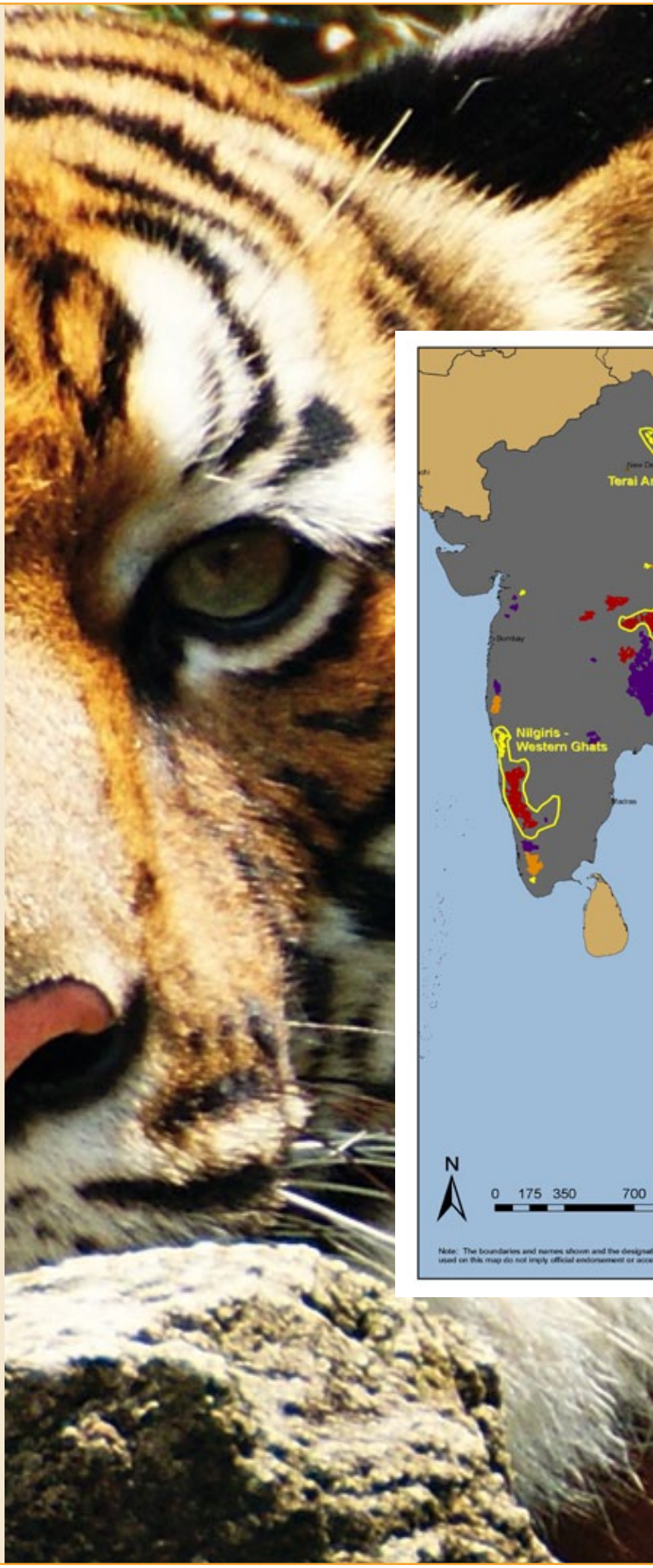
Conservation scientists have identified seventy-six Tiger Conservation Landscapes (TCLs) across the tiger's current range. These TCLs aim to redirect the current downward trajectory to ensure survival of wild tiger populations by:

- Highlighting the remaining tiger lands – the large landscapes of habitat often anchored by protected areas – that are priorities for conservation. These landscapes often cross political boundaries, reflecting the transboundary nature of tiger habitat requirements. Landscapes comprise protected areas that harbour tiger subpopulations linked by corridors. Corridors will permit necessary ecological processes, such as sub-adult dispersal from natal areas, and allow genetic exchange and maintenance of social structure to persist;

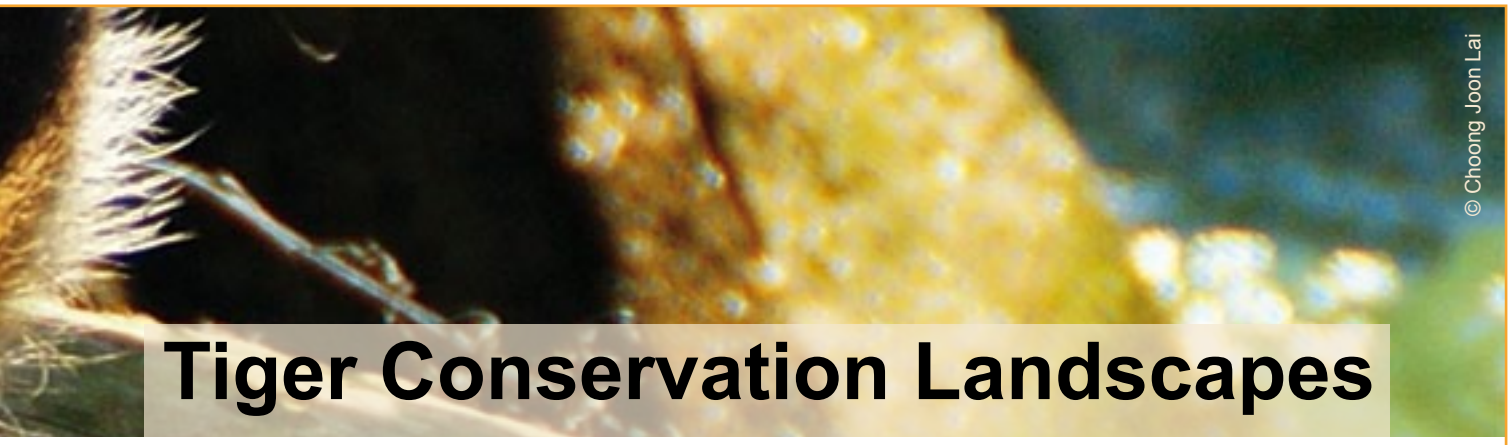
- Focusing on places where habitat restoration or improved conservation measures could bring tiger populations back from the brink of extinction. Each landscape is assigned to a management category based on its contribution to current tiger conservation and further prioritised (Class I, II, III or IV) in terms of its contribution to representation of tigers across their range;

- Integrating landscapes into national and regional resources and land management programs. The long term maintenance of landscapes is dependent on local, national and international support;

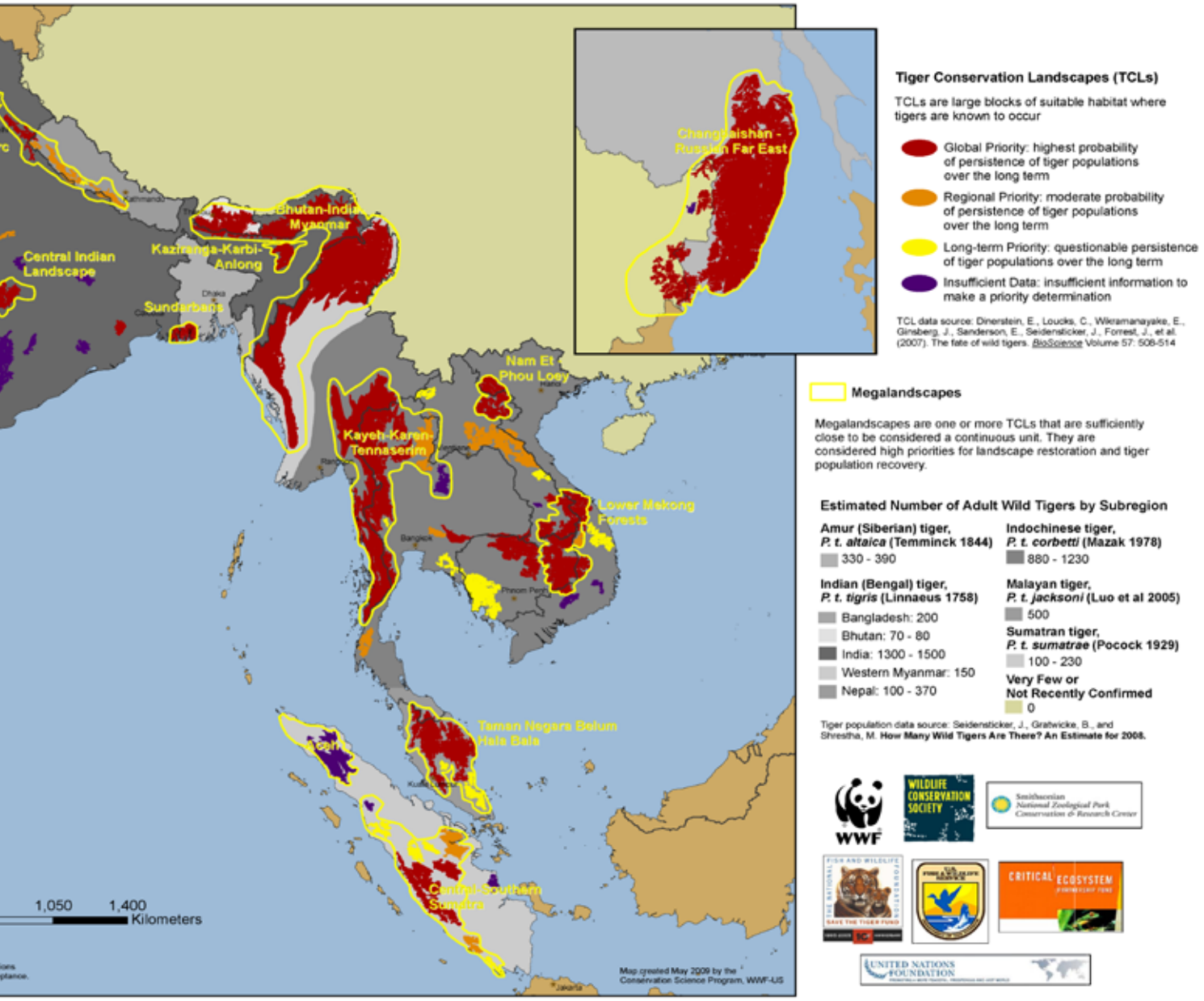
- Investing in these priorities will ensure the conservation of tigers and also help conserve ecosystems that provide human populations with essential ecological services.




**Right:** An Indochinese tiger cools off in a river.




# Tiger Conservation Landscapes




**Tiger Conservation Landscapes (TCLs)**

TCLs are large blocks of suitable habitat where tigers are known to occur

- Global Priority: highest probability of persistence of tiger populations over the long term
- Regional Priority: moderate probability of persistence of tiger populations over the long term
- Long-term Priority: questionable persistence of tiger populations over the long term
- Insufficient Data: insufficient information to make a priority determination

TCL data source: Dinerstein, E., Loucks, C., Wikramanayake, E., Ginsberg, J., Sanderson, E., Seidensticker, J., Forrest, J., et al. (2007). The fate of wild tigers. *BioScience* Volume 57: 508-514

**Megalandscapes**

Megalandscapes are one or more TCLs that are sufficiently close to be considered a continuous unit. They are considered high priorities for landscape restoration and tiger population recovery.

**Estimated Number of Adult Wild Tigers by Subregion**

**Amur (Siberian) tiger, *P. t. altaica* (Temminck 1844)**
330 - 390

**Indian (Bengal) tiger, *P. t. tigris* (Linnaeus 1758)**
- Bangladesh: 200
- Bhutan: 70 - 80
- India: 1300 - 1500
- Western Myanmar: 150
- Nepal: 100 - 370

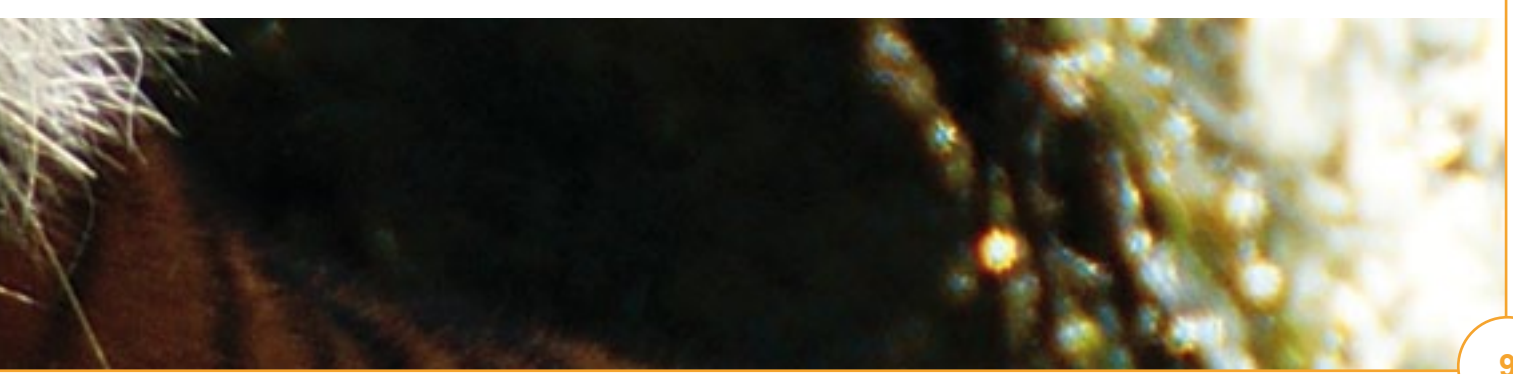
**Indochinese tiger, *P. t. corbetti* (Mazak 1978)**
880 - 1230

**Malayan tiger, *P. t. jacksoni* (Luo et al 2005)**
500

**Sumatran tiger, *P. t. sumatrae* (Pocock 1929)**
100 - 230

**Very Few or Not Recently Confirmed**
0

Tiger population data source: Seidensticker, J., Grafwicke, B., and Shrestha, M. **How Many Wild Tigers Are There? An Estimate for 2008.**



# WWF priority tiger landscapes

## In the Greater Mekong, WWF is focusing its efforts on two Global Priority Tiger Conservation Landscapes

**Kayah Karen-Tenasserim (Myanmar/Thailand)**

Located on the Thai-Myanmar border this mountainous landscape spans more than 213,000km$^2$, and is one of the highest priority conservation areas for tigers globally, on a par with sites in India and Siberia and one of the most significant biodiversity areas in Southeast Asia. This vast wilderness landscape comprises a continuous block of forest straddling Western Thailand and Eastern Myanmar. Vegetation within the area is a mosaic of lower montane, mixed deciduous, deciduous dipterocarp, and dry evergreen forest, and significant areas of bamboo forest. Huay Kha Khaeng Wildlife Sanctuary, in the heart of the complex, contains very large tracts of grassland, bushland, deciduous dipterocarp forest and semi-evergreen forest patches: fine tiger habitat.

Within this vast wilderness lies Thailand's world-class Western Forest Complex (WEFCOM), comprising an integrated group of more than 18 national parks and wildlife sanctuaries, several of which form a World Heritage Site. The Western Forest Complex has the largest population of Indochinese tigers in Thailand, and probably in all Southeast Asia. It is believed to be one of the Greater Mekong's best chances to recover tiger numbers.



According to a recent study, this forest complex of protected jungle habitat, provides an opportunity for tigers to thrive in Thailand, provided tigers and their major prey species are protected from poachers. Based on an extrapolation from one area surveyed, the Western Forest Complex could support as many as 2,000 tigers if its remaining habitats are maintained, and anti-poaching efforts are increased![10]

WWF has supported conservation efforts in the Western Forest Complex for over 25 years and is an active partner in strategic planning for this landscape. The integrated and participatory management of Thailand's Western Forest Complex has set the standard for landscape-level conservation efforts in Southeast Asia. WWF efforts within this region focus on the direct involvement of local people and institutions in conservation related activities, and include participatory approaches to tiger and elephant conservation, biological monitoring, habitat restoration, law enforcement, awareness-raising , and maintaining landscape connectivity.

The region is also globally important for Asian Elephant conservation, and shelters one of the few remaining breeding populations of the critically endangered Siamese Crocodile. Among the many other notable species occurring here are: Asian Tapir, Asiatic Black Bear, Sun Bear, Gaur, Rufous-necked Hornbill and one of the two wild water buffalo populations left in the wild.

**Above:** View of the Kayah Karen-Tenasserim landscape on the Thai-Myanmar border.
**Below:** Critically endangered Siamese crocodile.



**Southern-Central Annamites (Cambodia/Laos/Vietnam)**

This Tiger Conservation Landscape also includes the *Lower Mekong Dry Forests Ecoregion* though this is not reflected in the name. However, for ease, the two portions of the TCL are described separately:

- **Lower Mekong Dry Forests (Cambodia/Laos/Vietnam)**

The Lower Mekong Dry Forests Ecoregion contains the largest remaining tracts of open, tropical dry forests in Southeast Asia. As recently as 50 years ago, the Dry Forests in Cambodia supported some of the most diverse and abundant mega-faunal communities in Asia, which led to it being described as "one of the great game lands of the world…second only to the African gamelands in game abundance"[11]. This potential for high ungulate abundance, now unrealised because of massive hunting-driven declines, gives this relatively open landscape the highest potential tiger densities in Southeast Asia. The remaining Dry Forests landscapes in Cambodia, Laos, Thailand and Vietnam will continue to conserve a number of threatened species of mammals, including the Indochinese tiger, Asian elephant, and various critically endangered bird species; and conservation could be even more successful if managed as integrated trans-boundary landscapes.

**Above left:** Lower Mekong Dry Forests, Cambodia.
**Above right:** Asian elephant.

The Dry Forests once covered a huge area of more than 144,000km$^2$. In the last 50-60 years the natural habitats have been widely converted into agriculture, degraded, and hunted out of their large mammal populations, leaving the fragmented landscapes that remain today in southern Laos and northeastern Cambodia. The pace of change has accelerated particularly in the first decade of the 21st century, and increasing pressures for agricultural land, infrastructure development, and mining threaten to degrade the entire Ecoregion further. Climate change impacts are likely to compound these pressures. Tiger numbers have decreased as habitats have been converted and fragmented in the Dry Forests, and, most importantly, as prey numbers have been poached almost to ecological extinction, tiger numbers have likewise decreased.

Environmental conditions in the Cambodian Eastern Plains Dry Forests Landscape (EPL) are somewhat similar to parts of India where tiger densities are the highest recorded anywhere[12]. Years of war and hunting in this area has however, left much of this landscape nearly empty of wild ungulates. While tiger numbers here are low, in places where protection efforts have been stepped up there has been a recent and continuing increase in tiger prey such as wild ungulates and in other large predators such as leopard, wild dog and jackal. This rapid wildlife recovery makes the Eastern Plains a high priority site for restoring tiger populations.

In the EPL WWF and government partners are employing a new approach using highly trained scat detection dogs to sniff out tigers. Research and monitoring is a key component of tiger conservation as it tells teams which areas should be protected, what wildlife is present, and how quickly certain species are recovering, particularly in two top priority protected areas: Mondulkiri Protected Forest and Phnom Prich Wildlife Sanctuary.




- **Southern-Central Annamites (Cambodia/Laos/Vietnam)**

The Greater Annamites are dominated by a mountain range lying to the east of the Mekong River and which stretches along the border of Vietnam and Laos, with its most south-western outliners extending into the northeast of Cambodia. The region is a globally unique place; since 1992 alone, four new large mammals have been discovered which are found nowhere else in the world: saola, large-antlered muntjac, Annamite striped rabbit, and grey-shanked douc. However, the tiger is the area's most celebrated resident.

WWF is working closely with government partners to undertake protection activities in some of the priority sites for tiger and tiger prey in the Greater Annamites. This mainly focuses on the removal of snares, recognising that it is overhunting of tiger prey that has brought the tiger population so low, and that current habitat layout could support many more tigers were wild ungulate populations to recover. At three sites in Thua Thien Hue and Quang Nam Provinces (Bach Ma National Park, A Luoi Saola Reserve and Quang Nam Saola Reserve), WWF is training and funding National Park and Forest Protection Department rangers to conduct more targeted enforcement and over 3,000 snares have since been removed. It is believed that this is just the tip of the iceberg.

**Above left:** View of Annamite mountain range, Quang Ninh district, in Quang Binh province, central Vietnam. **Above middle:** Ranger from Forest Protection Department, Greater Annamites. **Above right:** In 2007, a team of scientists from WWF and Conservation International discovered the world's largest known population of grey-shanked doucs *(Pygathrix cinerea)* in the Greater Annamites, increasing the chances of the critically endangered monkey being saved from extinction. Fewer than 1,000 individuals are believed to still exist.

# Clear & present dangers

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**Top:** Illegally logged forest, Laos. This area was subsequently flooded with the construction of the Nam Theun II dam. **Above:** Logging operation, Laos. Habitat destruction and fragmentation is a key threat to the remaining tigers in the Greater Mekong.

*A world without tigers is hard to imagine, but as the economies of the Greater Mekong have grown, tiger populations have declined sharply. Severe poaching of tiger prey and habitat fragmentation, as well as direct poaching of tigers almost everywhere, has resulted in a range-wide population collapse.*

Wild tigers face unreduced threats today, including hunting, habitat destruction, and depletion of prey and illegal wildlife trade.

Tigers are disappearing fast. Numbers have fallen by about 95% since the start of the 20th century - down from around 100,000 to the present global estimate of around 3,200[13,14], and around 350 in the Greater Mekong region. Existing wild populations inhabit fragmented and isolated patches of land that constitute a tiny fraction of their historic range. Until the 1930s, hunting for sport was the main cause of the decline in tiger populations. Considered pests at the time, during one bloody four-year period between 1928 and 1932, 1,382 tigers were reported killed in Burma (Myanmar)[15]. Since 1940, the greatest threat has been rampant hunting, both of tigers and their prey, compounded by habitat loss restricting tigers to ever smaller patches. Since 1940 most potential tiger habitat has been converted and therefore today's maximum possible population is a fraction of that in 1940. But the sad fact is that hunting levels mean that even in quite large tracts of wilderness that still exist in the region today, these areas are almost bereft of tigers: so the present population is far lower than that which even today's fractured landscape could support.

**Habitat fragmentation**

Across Asia's 13 tiger-range countries there has been an explosive growth in human populations, doubling since 1965, to more than 3 billion today. Economic growth in these countries also saw a doubling in average per capita GDP between 1999 and 2006, leading to expanding markets fuelled by increasingly wealthy consumers. Within the Greater Mekong, greater stability and regional integration is seeing booming consumption of natural resources on an unprecedented scale to meet the rapidly increasing consumption demands both within the region and the wider Asia Pacific, notably China.

As a consequence of this increased development and consumption, the Greater Mekong is ranked as one of the top five most threatened biodiversity hotspots in the world with only five per cent of its natural habitat remaining[16].

For tigers, which rely on large areas of habitat, this is disastrous. Habitat degradation is widespread and caused by livestock grazing, shifting and permanent cultivation, logging, mining, permanent human settlements, and plantations. From a tiger population point of view, the grassland, scrub and deciduous forest mosaics that support the highest ungulate and thus tiger densities have often been seen as of secondary value to conservation and, thus, disposable, during the inevitable trade-offs that conservation policy involves. This mistaken perception is one of the most difficult challenges that tiger conservation efforts must address, particularly in those landscapes where prime tiger habitat still persists to any great extent.

Recent reports have found that tiger-occupied tiger habitat has shrunk by more 45% in the last 10 years alone[17], with the existing wild populations inhabiting fragmented and isolated patches of land. This loss and fragmentation of tiger habitat due to rapid development, especially of road networks, clear cutting for timber, conversion to agriculture, mining and infrastructure, is forcing tigers into scattered, small refuges - thereby isolating populations.

**Depletion of prey species and human-wildlife conflict**

Tigers require extensive habitats, adequate supplies of prey species (mainly deer, wild cattle, and wild pigs), and a reliable source of water. Habitat destruction has increased accessibility for Asia's rural poor and illegal wildlife traders to penetrate further into forests to harvest key tiger prey species such as deer and wild pigs[18,19]; and optimal tiger habitat is generally easier for road and boat access than is hill evergreen forests, and so bears a particular brunt of the recent increase in trade-driven wild meat hunting. In much of Southeast Asia large animal populations have been seriously depleted because of illegal hunting, resulting in the so-called "empty forest syndrome" – i.e. a habitat that looks botanically and structurally intact, but where most wildlife has been eliminated

Some Southeast Asian mammal species, such as the kouprey and Schomburgk's deer, are now extinct, and Eld's deer, hog deer and wild water buffalo are present only in a few relict populations.

As a result tigers are forced to subsist on smaller prey, such as muntjacs (small deer which are largely solitary and live at low population density: and thus are unable to represent the biomass of the larger and more social deer can), porcupines, macaques and hog badgers. Small prey by itself is barely sufficient to meet the energy requirements of a large carnivore such as the tiger, and is generally insufficient to support successful reproduction. To survive, a tiger must feed on a deer-sized mammal approximately once a week, consuming about 50 such animals per year. Assuming that in general the available prey populations can sustain an annual off-take of 10%, a prey population of about 500 deer-sized animals is therefore needed to support a single tiger.

Lack of habitat and competition for food has resulted in an increase in human-wildlife conflict with some tigers being killed in retaliation for livestock depredation. Recent research indicates that maintaining tigers in Laos's extensive protected area system (spanning 13% of the country) will be partly depend on the successful spatial separation of large carnivores and humans by modifying livestock husbandry practices and enforcing zoning[20].


**Above:** As a result of excessive hunting by humans, depletion of important tiger prey species has forced tigers to subsist on smaller prey, such as the red muntjac *(Muntiacus muntjak)*. These small, solitary, deers cannot meet the energy needs of a large carnivore such as the tiger.

**Illegal trade with dire consequences for tigers**

Recent seizures have shown how serious the threat is to the Greater Mekong's remaining wild tigers.

In Hanoi, Vietnam, July 2009, Hanoi's Environmental Police stopped a suspicious looking taxi at the Hoang Cau Stadium in the Dong Da District of the city and found a frozen tiger wrapped in several layers of blankets in the trunk, as well as 11kg of tiger limb bones.

Experts from the Institute of Ecology and Biological Resources (IEBR), Vietnam's CITES Scientific Authority, identified the animal and bones as tiger, and speculated that the animal, which weighed 57kg, was probably a young individual that had been recently killed and that the bones had come from at least two adult tigers.

The tiger was likely transported by taxi from the country's interior in Central Vietnam to Hanoi.

Two other tiger seizures took place in Hanoi in 2009. A January seizure of more than two tonnes of wildlife products including tiger bones, six tiger skins, from a store in Dong Da district, Hanoi, became the largest-ever seizure by Hanoi authorities of illegally-harvested wildlife products. This was followed by a February seizure of 23kg of frozen tiger parts, also in Dong Da.

**Below:** Hanoi's Environmental Police examine tiger bones found in the back of a taxi, July 2009.

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**Illegal wildlife trade**

The primary direct threat to tigers is poaching by hunters to supply the lucrative black market in tiger skins and bones for ornamentation and health remedies respectively[21]. The sale of products from a single wild caught tiger provides ample incentive for poachers and smugglers to catch and trade wild-caught tigers, even though the actual poacher receives only a tiny fraction of the profit.

Poaching has become so intense that entire tiger populations have been eliminated from what were once deemed to be secure reserves throughout Asia[22]. In the Lower Mekong Dry Forests region (Cambodia, Laos, Vietnam), both tiger and prey densities are generally low due to intensive hunting that has flourished due to weak law enforcement and growing demand over the past few decades.

The legal international trade in tiger products has been banned since 1975 through the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Though legislation is in place to protect tigers, wildlife agencies frequently lack resources for effective enforcement of laws.

In recent years, the illegal hunting of tigers for body parts used in traditional Chinese medicines has become a major problem. In 1993, a ban was introduced in China on the domestic trade in tiger bones and their derivatives.

A 2008 survey of nearly 2000 residents across six Chinese cities found that over 40% of respondents had consumed some product alleged to contain tiger parts after the 1993 ban went into effect[23]. More than 70% said that they preferred wild products over 'farmed products'[iv], with the two predominant products used being tiger bone plasters and tiger bone wine[24].

However, investigations provide strong evidence that China's trade ban has been effective at reducing the market for tiger products, particularly traditional medicines, but indicate that the trade remains a threat and China's progress in tiger conservation would almost certainly be undone if China's markets for tiger products were re-opened[25]. There remains both demand for tiger skins and in some cultures for tiger bones for wines and tonics in many Asian communities, and as a result this illicit trade continues to persist and grow. It is clear that without the Chinese bans, wild tigers would be even worse off than they are today.

[iv] In many countries tiger farms are operating legally under the guise of private zoos.

**Countdown to extinction: Three down, six to go?**

Three tiger subspecies have already become extinct, with a fourth not seen in the wild for over 25 years. Tiger subspecies and populations have disappeared from Java, Bali, and Central Asia and throughout much of China.

Like all the subspecies of tigers, the Indochinese tiger faces a disastrous combination of threats that place the future of the species at grave risk.

In the last century, the world lost three subspecies of tiger. The Balinese tiger (*Panthera tigris balica*), a subspecies of the Javanese tiger, was once limited to the Indonesian island of Bali but hunted to extinction. The last Balinese tiger was killed in September 1937. Genetic research in 2009 revealed that the current Siberian tiger population is almost identical to the Caspian tiger (formerly *Panthera tigris virgata*)[26], once found in parts of the Middle East and Central Asia. This population became extinct in the late 1950s. The Javan tiger (*Panthera tigris sondaica*) was limited to the Indonesian island of Java. This subspecies became extinct in the 1980s, as a result of hunting and habitat destruction.

No South China tigers (*Panthera tigris amoyensis*) have been sighted in the wild since 1983, with many fearing the subspecies is already extinct as a result of poaching. A number of these tigers exist in captivity but the genetic diversity required to ensure the subspecies continues may no longer exist, leading many scientists to believe that this tiger became extinct in the wild during the 1990s.

**The tigers' shrinking distribution**



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**Balinese tiger**


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**Caspian tiger**


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**Javan tiger**


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**South China tiger**

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# Conclusions & recommendations

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**Top:** View of the Kayah Karen-Tenasserim landscape from Mae Hong Son Province, Thailand.

*If current trends persist, tigers are likely to vanish from the wild in many places, or shrink to the point of "ecological extinction" – where their numbers are too low to play a role as the effective top predator in the ecosystem. It is clear that bold and transformative actions are now needed.*

Remaining habitats are being rapidly fragmented and converted to other uses and the synergistic impacts of both prey and tiger poaching have led to the collapse of populations. Protected areas, the stronghold of tiger conservation efforts across Asia, simply cannot be large enough to ensure the tigers' survival under these pressures, meaning that these areas require indefinite protection.

Consequently, potential habitat in the Greater Mekong must be secured to permit the existence and expansion of viable populations. Conservation efforts must also seek to expand tiger and prey populations in all core tiger breeding areas, other critical tiger habitat including connecting forest corridors and encourage recovery of wild tigers – perhaps also considering translocation as a strategy in some areas - and to allow genetic interchange between tiger populations through habitat recovery.

Research shows that tiger populations are far more likely to survive and thrive if they are well protected in situ and can recover relatively rapidly from substantial losses, with protection of habitat and prey species coupled with anti-poaching efforts[27]. In the Sikhote-Alin State Biosphere reserve in Russia, an area with sufficient habitat and protection, a rapid recovery of a tiger population occurred from a very few individuals[28], contributing to the Amur tiger's remarkable comeback from the brink of extinction to a population of 500.

The good news is that there still remain blocks of habitat capable of sustaining wild tigers, but only if the habitat is protected in large, well-connected landscapes, comprising judicious land use planning and zoning – of human use areas, core wildlife habitat, buffer zones, and corridors, as well as protected areas. Biologists have identified six global priority tiger conservation landscapes within the Greater Mekong, and these areas represent the best places to at first stabilise and then grow important components of the world's overall tiger population.

Conservation of tigers and other key species will help conserve ecosystems and landscapes that provide human populations with essential ecological services to ensure necessities such as food and water, and for maintaining a high-quality environment for health and economic reasons; it is not just tigers, but people who require conservation in the region. Tigers play some unexpected and much underappreciated, but nevertheless crucial, roles in sustaining ecosystems and building their resilience[29]. Action is needed now, not just to preserve this awe-inspiring creature, but also to ensure the health of ecosystems that are essential for our own survival.

Past conservation actions have been inadequate, in the sense that they have failed to prevent tiger population decline. However, without this past conservation action, tigers would probably be extinct already. Bold and transformative actions are now needed, in order to:

RESTORE tiger populations to forests where they were once abundant;
RECOVER tiger numbers where populations still exist; and
RECONNECT forest habitat to ensure tiger populations and their prey species increase.

Therefore, WWF has the following key recommendations for actions in the Greater Mekong region:

**Protected Areas and Biodiversity Corridors**

• Protected areas are the cornerstone of landscape-scale biodiversity and tiger habitat conservation; every effort should be made to ensure the region's protected areas are secured;

• The Greater Mekong sub-region contains extensive tiger habitat; it is primed for future successes in recovering tiger populations, but habitat must be protected in large, well-connected landscapes;

• Corridors need to be created to support and reconnect core biodiversity areas as well as promote sustainable natural resource use by local communities.

**Sustainable Economic Development in Tiger Landscapes**

• Environmental considerations need to be fully integrated into all development plans for the region's large wildlife-habitat landscapes to ensure that agriculture, and infrastructure projects in particular, are 'biodiversity sensitive';

• Trans-boundary cooperation is essential and urgently needed to scale up protection efforts on the ground in places to protect populations of tiger and tiger prey species;

• The threat from poaching is compounded by the proliferation of tiger 'farming' in Greater Mekong countries, including Laos, Thailand, Vietnam, and China; urgent resolution of this issue is needed in order to secure a future for wild tigers;

• Apply concepts such as the World Bank's 'Smart Infrastructure Framework' to existing and future development projects in tiger landscapes, in order to prioritise projects that are beneficial to tigers and tiger habitat and to ensure projects with potential negative impacts do not go forward without substantial modification to minimise their negative impacts; this would demonstrate considerable leadership for other development banks to follow and mainstream conservation of tigers (as global public goods) into their core business.

**(Recommendations continued over page)**


**Right:** Lower Mekong Dry Forests, Cambodia.

**Innovative Approaches to Financing Conservation of Tiger Landscapes**

• The reformed "GEF 5" process provides major incentives for countries to coordinate their conservation efforts under a "programmatic approach" to link regional efforts. Within this framework, any proportion of already-guaranteed payments that reflect a sufficiently coordinated regional approach will be matched with additional funding for all participating countries. The countries of the Greater Mekong are well-positioned to take advantage of these incentives and in so doing, strengthen regional tiger landscape conservation efforts;

• The World Bank should use its Forest Carbon Partnership Facility (FCPF) to encourage Greater Mekong country governments to prioritise efforts to reduce deforestation in tiger landscapes, as part of potential future REDD (Reducing Emissions from Deforestation and Degradation) initiatives;

• REDD payments, and other similar carbon finance mechanisms, could generate significant revenues for forest landscape conservation and sustainable management, though not in isolation;

• Large-scale trust funds and Payment for Environmental Services (PES) schemes may provide sustainable finance options, particularly for conserving prime tiger habitats. Ambitious funding targets are necessary to realise goals to restore tigers and their habitat.

**These actions are required immediately because:**

• Regional economic integration between the Greater Mekong countries is transforming and fragmenting areas rich in natural resources that were until recently relatively untouched and inaccessible, such as transboundary landscapes that include critical tiger habitat;

• Poaching remains a significant threat to wild tiger populations, particularly through depletion of the supply of prey populations; in response there must be renewed effort to strengthen formally protected tiger habitat and recover the prey populations these areas can support. A great opportunity for this exists through the ASEAN-WEN initiative; a regional initiative that has the political support to roll out training to national enforcement agencies as well as foster international enforcement collaboration.


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**WWF TIGER ACTION**

WWF Greater Mekong Programme works in 4 of the world's 13 tiger range states: Cambodia, Laos, Thailand and Vietnam. We focus on protecting tiger habitat inside National Parks and other protected areas. We do this by supporting government and community law enforcement and patrolling efforts to reduce illegal activities. Working together to:

RESTORE tiger populations to forests where they were once abundant
RECOVER tiger numbers where populations still exist
RECONNECT forest habitat to ensure tiger populations and their prey species increase

WWF is working to conserve 600,000km$^2$ of the world's most:
- biologically diverse,
- economically viable and
- seriously threatened

forests, grasslands and rivers within the Greater Mekong, home and life source to over 300 million people in Cambodia, China, Laos, Myanmar, Thailand and Vietnam

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