

NATIONAL

TIGER ACTION PLAN

FOR MALAYSIA 2008 - 2020



Department of Wildlife and National Parks
Peninsular Malaysia



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National Tiger Action Plan for Malaysia 2008-2020

Department of Wildlife and National Parks Peninsular Malaysia
Ministry of Natural Resources and Environment
Government of Malaysia

In collaboration with

MYCAT
Malaysian Nature Society
TRAFFIC Southeast Asia
Wildlife Conservation Society
WWF-Malaysia

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List of Acronyms

ACAP	Asian Conservation Awareness Programme
ASEAN-WEN	Association of Southeast Asian Nations - Wildlife Enforcement Network
BMP	Better Management Practice
CFS	Central Forest Spine
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DANCED	Danish Cooperation for Environment and Development
DCA	Drug Control Authority
DID	Department of Irrigation and Drainage
DoA	Department of Agriculture
DoE	Department of Environment
DTCP	Department of Town and Country Planning
DVS	Department of Veterinary Services
DWNP	Department of Wildlife and National Parks Peninsular Malaysia
EIA	Environmental Impact Assessment
EPU	Economic Planning Unit
ESA	Environmentally Sensitive Areas
FDPM	Department of Forestry Peninsular Malaysia
FELDA	Federal Land Development Authority
FRIM	Forest Research Institute of Malaysia
FSC	Forest Stewardship Council
HTC	Human-Tiger Conflict
IPTA	Public Institutions of Higher Learning
JKPTG	Department of Lands and Mines
JKR	Public Works Department
JNPC	Johor National Parks Corporation
JPA	Department of Public Services
JUPEM	Department of Survey and Mapping Malaysia
KPKT	Ministry of Housing and Local Government
MACRES	Malaysian Centre for Remote Sensing
MNS	Malaysian Nature Society
MTIB	Malaysian Timber Industry Board
MTCC	Malaysian Timber Certification Council
MYCAT	Malaysian Conservation Alliance for Tigers
MYCAT SO	MYCAT Secretariat's Office
NFP	National Forestry Policy
NGO	Non-Government Organisation
NPBD	National Policy on Biological Diversity
NPE	National Policy on the Environment
NPP	National Physical Plan
NRE	Ministry of Natural Resources and Environment
T4T	Teachers for Tigers
PRF	Permanent Reserved Forest
PPKB	Biodiversity Education Programme
PSPC	Perak State Park Corporation
PWA	Protection Wild Life Act 1972
RAPPAM	Rapid Assessment and Prioritisation of Protected Areas Management
RELA	People's Volunteer Reserve
TCL	Tiger Conservation Landscapes
TCM	Traditional Chinese Medicines
TSEA	TRAFFIC Southeast Asia
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPEN	State Economic Planning Unit
USM	Universiti Sains Malaysia
WCS	Wildlife Conservation Society
WG	Working Group

List of Implementing Agencies

Anti Smuggling Unit
Association of Southeast Asian Nations – Wildlife Enforcement Network
Department of Agriculture
Department of Environment
Department of Forestry Peninsular Malaysia
Department of Immigration
Department of Irrigation and Drainage
Department of Lands and Mines
Department of Public Services
Department of Public Works
Department of Town and Country Planning
Department of Veterinary Services
Department of Wildlife and National Parks Peninsular Malaysia
Economic Planning Unit
Forest Research Institute of Malaysia
Johor National Parks Corporation
Land Agencies
Land Offices
Local Authorities
Malaysia Timber Certification Council
Malaysian Conservation Alliance for Tigers
Malaysian Nature Society
Malaysian Timber Industry Board
Marine Police
Media
Ministry of Natural Resources and Environment
MYCAT Secretariat's Office
Perak State Park Corporation
Public Institutions of Higher Learning
Royal Malaysian Armed Forces
Royal Malaysian Customs
Royal Malaysian Police
Sabah Wildlife Department
Sarawak Forestry Department
State Economic Planning Unit
State Governments
TRAFFIC Southeast Asia
Universiti Sains Malaysia
Wildlife Conservation Society Malaysia Programme
WWF-Malaysia



Minister's Message

Apart from being one of the 12 mega-diversity nations, Malaysia is one of the few strongholds for the tiger. A symbol of great strength, beauty and independence, the tiger was chosen as our national animal with the hope that it would protect the nation, illustrated by the two tigers flanking Malaysia's Coat-of-Arms in a protective stance.

Today, however, the tiger is in grave danger. Its endangered status is an indicator of ecosystems in crisis. Let us not be proud of a tiger economy without real tigers in the forest.

Vision 2020 promises Malaysia will attain fully developed status by 2020 but, as defined in the foundations of this vision, "It must be a nation that is fully developed along all the dimensions: economically, politically, socially, spiritually, psychologically and culturally". Development always comes at a price, and we are challenged with balancing progress and conservation. If, however, we persist with improper and ill-planned development guided by short-term profit, the healthy ecosystems that we humans are entrusted to manage sustainably for other species and our future generations will be lost forever, marking our failure to capture the essence of Vision 2020.

It is the government's duty to formulate and implement policies for sustainable management of forests and biodiversity conservation with state governments, scientists, the business community and the public. Some of the main tools that we have are the National Policy on Biological Diversity, the Protection of Wild Life, the National Forestry and the Environmental Quality Acts. Of particular significance is the National Physical Plan, which guides us to preserve the integrity of areas designated for conservation of natural resources.

Policies and laws mean nothing if not implemented or complied with. Boldly, we must work together – government, NGOs, the public and the private sector – to shoulder this responsibility cohesively. The government is committed to securing wild tigers and their habitats for future generations, and we trust that support from all these parties will help realise this vision for Malaysia.

Congratulations to all involved in developing this Action Plan. You have taken the first step; now it is crucial that you labour together to see this Plan duly implemented.

A handwritten signature in black ink, appearing to be 'Douglas Uggah Embas'. The signature is stylized and written over a faint, light-colored background that resembles a signature strip or a piece of paper.

Datuk Douglas Uggah Embas
Minister, Ministry of Natural Resources and Environment



From the Desk of the Secretary General

Indeed, what becomes of Malaysia, if we lose our national animal? We must feel pride when we think of the tiger, not a sense of loss.

The Ministry of Natural Resources and Environment, in line with its mandate, aims to ensure that Malaysia's natural resources and biodiversity assets are managed sustainably while contributing to national social and economic development objectives. It is not an easy balance to achieve, but the Ministry is firm in its commitment. To effectively counter increasingly sophisticated challenges, Malaysia continues to seek innovative methods and approaches.

For taking steps in the right direction of collaborative action to saving the Malayan tiger, I commend the Department of Wildlife and National Parks Peninsular Malaysia (DWNP) in the unique partnership with NGOs through the Malaysian Conservation Alliance for Tigers (MYCAT), the alliance comprising DWNP and the Malaysian Nature Society, TRAFFIC Southeast Asia, Wildlife Conservation Society and WWF-Malaysia.

This Tiger Action Plan is the true embodiment of the spirit of cooperation not just between the government and non-government sector, but also between agencies within the Malaysian government. Speaking of conservation area, while 6% of Peninsular Malaysia's total land cover falls under DWNP's jurisdiction as protected areas, a further 36% are permanent reserved forests managed by the Forestry Department. A crucial factor for successful implementation of the Plan is for these two departments, under this same Ministry, to work in unison for biodiversity conservation.

All the pieces are in place, now it is left to you to ensure you continue synergising your efforts in line with this Action Plan, and I wish you the very best of luck in successfully implementing the actions contained within.

A handwritten signature in black ink, consisting of a large, stylized loop followed by a horizontal line underneath.

Datuk Suboh bin Mohd Yassin
Secretary General, Ministry of Natural Resources and Environment



Preface

As the leading government agency in wildlife conservation in Malaysia, and in fulfilment with the National Policy on Biological Diversity, one of the critical roles of the Department of Wildlife and National Parks is to promote the integration of and collaboration with conservation partners in reaching the national vision of conservation excellence. It therefore gives me great pleasure to introduce the National Tiger Action Plan for Malaysia, truly a first-of-its-kind Plan developed in collaboration with Malaysia's NGOs.

The tiger is one of DWNP's priority species for conservation because it is an indicator species of ecosystem health, the keystone species at the apex of the food chain, and the umbrella species under which numerous other biodiversity can be protected.

The Action Plan was developed in accordance to the existing government policies and framework. It is a practical instrument linking conservation ideals to giving wild tigers a future; a real future that will stretch beyond the next century. I believe that Malaysia can give tigers a chance to survive and that the success story of tigers will showcase Malaysian Government's commitment to biodiversity conservation. The Action Plan is a 'living' document, which we will continue to review, update and amend to ensure its objectives are met in the context of a world that is constantly growing and changing. I look forward to implementing it with all the stakeholders involved.

A handwritten signature in black ink, appearing to read 'Dato' Abd. Rasid Samsudin'.

Dato' Abd. Rasid Samsudin
Director General
Department of Wildlife and National Parks Peninsular Malaysia

Acknowledgments

We would like to thank the participants of the Malayan Tiger Conservation Workshop, held in Lanchang, Pahang on 7 to 9 November 2006, for their active participation in the series of discussions that shaped and led to the *National Tiger Action Plan for Malaysia* (hereafter referred to as 'the Plan').

The workshop and drafting of the Plan was made possible by generous financial support from 21st Century Tiger, a programme of the Zoological Society of London, in addition to in-kind contributions from the Malaysian Conservation Alliance for Tigers (MYCAT) partners; i.e. the Department of Wildlife and National Parks Peninsular Malaysia (DWNP), the Malaysian Nature Society (MNS), TRAFFIC Southeast Asia (TSEA), the Wildlife Conservation Society – Malaysia Programme (WCS) and WWF-Malaysia. The MYCAT Secretariat's Office (MYCAT SO) received institutional support from DWNP and financial support from the US Fish and Wildlife Service and Save the Tiger Fund. WWF-Malaysia also provided financial assistance to support the action plan drafting team leader.

The workshop organising committee, headed by DWNP's Siti Hawa Yatim and comprised DWNP's Abdul Kadir Abu Hashim, Mohd Khairi Ahmad, Rahmah Illias, Clement Wong and MYCAT Coordinator, Loretta Ann Soosayraj, ensured the smooth running of the workshop. Logistical support from personnel of all MYCAT partners also made substantial contributions to the success of the workshop.

Based on presentations and discussions during the workshop, a draft plan was compiled by the action plan drafting team: Kae Kawanishi (MYCAT SO), Loretta Ann Soosayraj (MYCAT SO), Melvin Gumal (WCS), Gareth Goldthorpe (WWF-Malaysia), Chris R. Shepherd (TSEA), Kanitha Krishnasamy (MNS), and Abdul Kadir Abu Hashim (DWNP). Additional assistance was provided by Brian Lee (WWF-Malaysia), Salman Saaban (DWNP), Abu Zahrim Ismail (DWNP), James Compton (TSEA), Song Horng Neo Liang (TSEA), Suzalinur Manja Bidin (MYCAT SO), Rick Gregory (MNS Selangor) and Caroline Yap in completing the draft. Comments received from Misliah Mohamed Basir (DWNP), Sivananthan Elagupillay (DWNP), Zaharil Dzulkafly (DWNP), Dionysius Sharma (WWF-Malaysia), Surin Sukswan (WWF-Malaysia), Ahmad Zafir Abd Wahab (WWF-Malaysia), Mark Rayan Darmaraj (WWF-Malaysia), Carl Traeholt (Malayan Tapir Conservation Programme), John Seidensticker (Save the Tiger Fund) and Mahendra Shrestha (Save the Tiger Fund) helped improve the earlier draft of the Plan.

Besides numerous telephone and online discussions, the drafting team met 17 times between November 2006 and July 2007 to improve the draft plan, which underwent 11 revisions before submission to the DWNP Tiger Action Plan Advisory Board, headed by the DWNP Director General, Abd. Rasid Samsudin, and comprised Misliah Mohamed Basir, Zainudin Ab. Shukor, Siti Hawa Yatim, Sivananthan Elagupillay, Zaaba Zainol Abidin, and Khairiah Mohd. Shariff in August 2007.

This Plan is the culmination of the joint efforts of all interested parties involved in tiger conservation in Malaysia. Many thanks to everyone who made contributions towards developing a single Tiger Action Plan that will lead to a future in which tigers thrive in Malaysia.

We look forward to working together with an even greater sense of cooperation and commitment towards protecting the Malayan tiger in Malaysia.

Executive Summary

Globally, the tiger *Panthera tigris* has lost 93% of its habitat and three subspecies in the last 100 years. Today, less than 3,000 wild tigers survive in 14 countries. The initial decline in tiger numbers was primarily due to large-scale loss of habitat but in more recent times such losses have been exacerbated as the smaller and isolated populations that survive are hunted for their body parts, persecuted by angry farmers and villagers, and starved as their prey is over-harvested. Threats to the survival of wild tigers are mounting and a world without wild tigers may become a reality in our lifetime unless drastic measures are taken.

In stark contrast to today's situation, the 1950s saw as many as 3,000 tigers in Malaysia alone. During the subsequent two decades, however, as the country's agricultural base increased, tigers were seen as pests. Institutionally persecuted, with a bounty placed on them, tiger numbers rapidly dropped to only a few hundred. During the 1970s, attitudes changed and the fortune of the tiger in Malaysia took a turn for the better as it was listed as a totally protected species under the Protection of Wild Life Act 1972. However, this protected status has only slowed the decline down, not reversed it, and today only about 500 wild tigers are thought to survive in Malaysia. It has become increasingly clear that more precise conservation interventions are needed to recover and sustain tigers in Malaysia. By implementing a suite of concerted actions, backed by political commitment and public support, we as a nation and as part of the global conservation community can ensure that one of the most majestic and charismatic animals with which we share the planet will not vanish. To see the tiger disappear in this or any other century could only be a testament to our indifference, ignorance, greed and lack of compassion and foresight.

Malaysia is blessed with a rich and diverse store of biological resources, a stable socio-economic base and with national policies in place that promote sustainable development and biodiversity conservation. Although only 6% of the total land area of Peninsular Malaysia is protected by a network of Protected Areas (PAs) and most PAs are less than 1,000km², the system is augmented by the presence of Permanent Reserved Forests (PRFs) which act to buffer the PAs from the negative impacts often associated with human activities. This forestry management system covers an additional 36% of the land area of Peninsular Malaysia and is managed sustainably under the National Forestry Act 1984. The current thinking amongst conservationists in the country emphasises the essential roles that the PAs and PRFs, connected together with ecological corridors, play in supporting healthy, manageable, populations of tigers and their essential prey. Ensuring these connections will provide this endangered species and its prey with the condition they need to recover and thrive into the 22nd century. However, one of the big challenges for wildlife conservation in Malaysia is that, whilst policies are made at the Federal level, the implementation of actions pertaining to land-use and natural resource management are carried out at the level of the State.

Within Malaysia, tigers are found only on the peninsula and mainly in three landscapes. The Main Range Landscape (20,000km²) is in the west of the mainland and, runs from the Malaysia-Thai border to Negeri Sembilan. It is connected to the second landscape, the Greater Taman Negara (15,000km²) to the east, which includes Taman Negara National Park, the country's largest protected area. Finally, the Southern Forest Landscape (10,000km²) can be found south of the Pahang River but it is isolated from both the former landscapes. These forest landscapes form the basis for spatial planning in tiger conservation in Malaysia and each has a priority core area: Belum-Temengor Complex, Taman Negara, and Endau-Rompin Complex, respectively. In order to augment their potential for tiger conservation to facilitate the continued dispersal of tigers *within* the landscapes, priority ecological corridors have been identified, whereby habitat restoration and management can maintain connectivity: Belum-Temengor, Taman Negara-Lebir-Tembat, and Endau-Rompin-Mersing, respectively. One critical linkage that still exists and must be actively maintained and enhanced to ensure connectivity *across* the landscapes is a narrow strip of forest connecting the Main Range and Taman Negara near the western border of the park in Pahang. Existing and proposed linear infrastructures, such as roads, railways, and a major oil pipeline threaten the connectivity of habitats within and between all these areas but mitigation measures are available to counter the risk of fragmentation when incorporated into the early planning of infrastructural developments that may block corridors.

Because the challenges to the tiger's survival are complex, involving multiple stakeholders, the Department of Wildlife and National Parks Peninsular Malaysia (DWNP) formulated this National Tiger Action Plan for Malaysia in a participatory manner through a workshop and discussions with NGOs and other government agencies using a collaborative platform called the Malaysian Conservation Alliance for Tigers (MYCAT).

The aim of the Plan is to establish a holistic but focused and achievable conservation strategy that lays out specific actions to be taken over the next eight years (Phase I: 2008-15) towards an overarching vision of securing viable tiger populations in Malaysia for the next century and beyond. The Plan was developed around existing government policies and legislative structures relevant to wildlife conservation. Through this plan, the Malaysian government has the opportunity to present healthy tiger populations as an exemplar of its on-going efforts to develop economically in a sustainable manner rather than the Malayan tiger becoming another symbol of the systematic loss of tropical forest and an ecosystem in crisis. The nature of a country's development is demonstrated by the policies it implements. Of particular importance to wild tiger populations in Malaysia are the National Policy on Biological Diversity, National Forestry Policy, National Policy on the Environment and the National Physical Plan.

The National Physical Plan (NPP) is the blueprint for spatial planning in Peninsular Malaysia and, therefore, provides the backbone for the Plan's aspiration to secure a large expanse of interconnected tiger habitat, defined as the Central Forest Spine (CFS) in the NPP. Envisioned for realisation by 2020, the CFS is a network of forest complexes connected by green linkages that, together, form a contiguous forest spine for Peninsular Malaysia. Permanent Reserved Forests within the CFS provide critical habitat and connectivity to core tiger populations in the priority areas and buffer them from anthropogenic and natural demographic fluctuations. PRFs still contribute to the nation's economic drive, where ecologically sound land-use practices such as eco-tourism and sustainable forestry are permitted. This is vital for the nation and the tiger because the large forest ecosystems that the tiger needs to thrive are also a primary source of the resources upon which human livelihoods depend. The presence of healthy tiger populations across the CFS will signify the balanced progression of the country's ecology, society, culture and economy and, ultimately, an enhancement of the quality of life of Malaysians, which is the essence of the Vision 2020.

The goal for 2020 identified in this National Tiger Action Plan for Malaysia is:

Tiger populations actively managed at carrying capacities across the three landscapes within the Central Forest Spine and connected with functioning corridors.

This Plan identifies four objectives towards achieving this goal:

1. Secure the Central Forest Spine with strictly protected priority areas in landscapes connected with corridors.
2. Provide effective and long-term protection of tigers and their prey.
3. Promote and practice ecologically sound land-use, compatible with tiger conservation outside the priority areas.
4. Apply science in monitoring the efficacy of conservation actions and improving the knowledge of tiger ecology.

This Plan further outlines priority outcomes for each of the objectives and then translates these conservation objectives and desirable outcomes into concrete actions, responsible agencies, measurable indicators and realistic time-frames. These details lay out the first phase of the Plan to be carried out between 2008 and 2015; dates that deliberately coincide with the 9th and 10th Malaysian Plan.

In this Plan the importance of accountability and transparency in conservation actions is implicit, with an in-built evaluation and learning mechanism for a continued process of implementation. The overall indicator of success, or the Plan's measurable target, is:

About 1,000 wild tigers surviving on wild prey in the Central Forest Spine by the year 2020.

The success of this conservation strategy must be reflected in the known status of the distribution and density of the tiger populations in Malaysia. In order to use these indicators, we must first establish a base-line upon which we can monitor our efforts to stabilise, increase and manage tiger numbers. By doing this, we hold ourselves accountable to the wild tigers for which this Plan is devised; the importance of conservation science, the fourth objective of the plan, becomes imperative. Applying scientific methods to measure the efficacy of conservation actions allows for the efficient planning of, allocation of resources to, and the implementation of specific activities. This increases the accountability and transparency in the conservation actions taken.

As the custodian of the Plan, DWNP has the responsibility of implementing many of the identified actions. Of the 80 planned actions, DWNP, in collaboration with NGOs and other government agencies, takes the lead in implementing 59. Other government agencies that lead actions pertaining, for example, to the Central Forest Spine, sustainable forestry and park management include the Economic Planning Unit,

Ministry of Natural Resources and Environment, Department of Town and Country Planning, Forestry Department, Perak State Park Corporation, and Johor National Parks Corporation. Eight actions are led and implemented by various NGOs, namely the Malaysian Nature Society, TRAFFIC Southeast Asia, Wildlife Conservation Society and WWF-Malaysia. Implementation of the full Plan is therefore a responsibility shared by many stakeholders. As it is a government document with cross-departmental implementation, the Ministry of Natural Resources and Environment will provide the inter-agency coordination to link its implementation with that of other relevant national policies.

By using an adaptive management approach to implement the Plan, the agencies involved can ensure a process that is both proactive and reactive, allowing lessons to be learned and new knowledge and methods to be incorporated as the work evolves. As such, it is a living document. This Plan is a collection of working models, strengthened through stakeholder dialogues, tested in practice, and constantly reviewed and revised. In order for real and mutual accountability and learning to take place, the core of the stakeholder engagement strategy must involve a two-way mechanism (dialogues). Here, responsible agencies and individuals will be actively encouraged to exchange views, clarify expectations, address differences, enhance understanding and encourage creative and practical solutions.

The MYCAT Secretariat's Office will act as Secretariat to the Division of Conservation and Environmental Management of the Ministry of Natural Resources and Environment to monitor the progress of the implementation of the Plan. The Secretariat will compile and submit bi-annual reports to the Ministry, which will then chair a central stakeholder meeting where necessary decisions and adjustments to the Plan will be made. Towards the end of Phase I (2008-2015), the implementation of the Plan will be evaluated by an independent conservation audit team. The results from the evaluation will form the basis for a stakeholder workshop to set the work plan for Phase II (2016-2020).

Ringkasan Eksekutif

Di dunia, Harimau Belang *Panthera tigris* telah kehilangan 93% daripada habitat asal mereka. Tiga subspesies juga telah pupus di sepanjang abad yang lalu. Kini kurang daripada 3,000 ekor harimau hidup liar di 14 buah negara di dunia. Penurunan bilangan harimau yang disebabkan oleh kehilangan habitat secara berleluasa, tetapi sejak kebelakangan ini harimau semakin terancam kerana diburu untuk bahagian badan, dibunuh oleh petani atau penduduk kampung yang berang, malah kebuluran kerana kekurangan mangsa. Ancaman terhadap harimau liar sedang memuncak dan dunia tanpa harimau mungkin menjadi kenyataan sekiranya tiada tindakan segera diambil.

Berbanding sekarang, sepanjang tahun 1950an sahaja Malaysia dianggarkan memiliki 3,000 ekor harimau. Namun dua dekad berikutnya, kesan perkembangan sektor pertanian negara, harimau diburu dan dibunuh kerana dianggap sebagai haiwan perosak. Sepanjang tahun 1970an telah memperlihatkan perubahan positif sikap masyarakat yang turut memberi kesan baik terhadap nasib harimau. Harimau Belang disenaraikan sebagai spesies yang dilindungi sepenuhnya di bawah Akta Perlindungan Hidupan Liar 1972. Namun demikian, bilangan harimau masih menurun walaupun pada kadar yang lebih perlahan, sehinggalah ke hari ini dianggarkan hanya terdapat 500 ekor sahaja di negara kita. Oleh yang demikian, campur tangan yang lebih khusus diperlukan untuk memulihkan serta menstabilkan semula populasi harimau. Melalui pelaksanaan tindakan yang bersepadu serta sokongan politik dan rakyat, kita dapat memastikan haiwan yang digeruni ini tidak akan pupus. Untuk menyaksikan kehilangan harimau di abad ini atau berikutnya merupakan bukti kealpaan kita sebagai khalifah di bumi.

Malaysia dianugerahkan dengan kekayaan kepelbagaian biodiversiti, status sosioekonomi yang kukuh serta dasar perlembagaan yang menggalak pembangunan mampan mampu bergerak seiring dengan pemuliharaan kepelbagaian biodiversiti. Walaupun hanya 6% daripada keluasan tanah di Semenanjung Malaysia termasuk dalam jaringan Kawasan Perlindungan (PA) di mana kebanyakan PA adalah kurang daripada 1,000km², jaringan ini diperluaskan oleh Hutan Simpan Kekal (PRF) yang menampun PA dari aktiviti manusia. Sistem pengurusan hutan ini meliputi tambahan 36% daripada keluasan tanah di Semenanjung Malaysia dan tertakluk di bawah Akta Perhutanan Negara 1984. Pakar pemuliharaan menekankan betapa pentingnya kawasan perlindungan (PA dan PRF), bersambungan melalui koridor biodiversiti dalam menyokong populasi harimau dan mangsa. Sambungan kepada kawasan-kawasan perlindungan ini akan menyediakan keadaan yang sesuai bagi kelestarian harimau dan mangsa dalam abad ke-22. Namun satu cabaran utama pemuliharaan hidupan liar di Malaysia ialah dalam perihwal pelaksanaan dasar. Walaupun pada hakikatnya dasar diperkenalkan di peringkat kerajaan persekutuan, keupayaan pelaksanaan tindakan dan pengurusan perihwal penggunaan tanah dan sumber asli adalah bidang kuasa kerajaan negeri.

Harimau Belang hanya boleh ditemui di tiga lanskap utama di Semenanjung Malaysia iaitu *Main Range* (20,000km²) terletak di barat semenanjung melintasi sempadan Malaysia-Negara Thai hingga ke Negeri Sembilan. Ini bersambungan dengan lanskap kedua, *Greater Taman Negara* (15,000km²) ke arah timur yang merangkumi kawasan perlindungan terbesar negara. Seterusnya ialah *Southern Forest Complex* (10,000km²) di selatan Sungai Pahang, terpisah daripada *Main Range* dan *Greater Taman Negara*. Kesemua lanskap ini adalah asas dalam perancangan spatial untuk pemuliharaan harimau dan masing-masing memiliki kawasan teras utama iaitu Belum-Temenggor-Stong, Taman Negara dan Endau-Rompin. Dalam usaha meningkatkan potensi pemuliharaan dan pemantauan taburan harimau secara berterusan dalam lanskap, koridor biodiversiti yang penting telah dikenalpasti di mana melalui pemulihan semula habitat dan pengurusan akan mampu mengekalkan sambungan iaitu masing-masing Belum-Temenggor, Taman Negara-Lebir-Tembat, dan Endau-Rompin-Mersing. Terdapat satu koridor biodiversiti yang perlu diutamakan iaitu kawasan hutan yang menghubungkan *Main Range* dengan bahagian barat sempadan Taman Negara di Pahang, di mana keseluruhan kawasan perlu dikekalkan dan diperbaiki. Infrastruktur yang sedia ada atau yang masih dalam perancangan, seperti jalan raya, landasan keretapi dan paip minyak, mengancam perhubungan habitat di dalam dan di antara kawasan. Namun langkah pencegahan awal dapat dilakukan untuk menghalang risiko perpecahan hutan sekiranya langkah ini digabungkan ke dalam perancangan awal pembangunan infrastruktur yang berkemungkinan menghalang koridor tersebut.

Oleh kerana cabaran terhadap kemandirian harimau adalah kompleks serta melibatkan banyak pihak yang berkepentingan, Jabatan Perlindungan Hidupan Liar dan Taman Negara (PERHILITAN) telah memformulasi Pelan Tindakan Kebangsaan untuk Harimau secara kerjasama melalui perbincangan dan bengkel antara pelbagai agensi kerajaan lain dengan badan bukan kerajaan melalui sebuah pakatan yang dikenali sebagai *Malaysian Conservation Alliance for Tigers* (MYCAT).

Matlamat Pelan adalah untuk mewujudkan strategi pemuliharaan holistik tetapi khusus dan mampu dicapai serta menyediakan tindakan khusus yang perlu dilaksanakan dalam tempoh 8 tahun akan datang (Fasa I: 2008-2015) untuk meningkatkan populasi harimau. Pelan ini dihasilkan berpandukan dasar dan perundangan yang berkaitan. Melalui Pelan ini, pertambahan populasi harimau dapat dijadikan contoh usaha berterusan kerajaan dalam pemuliharaan hidupan liar serta pelaksanaan dasar pembangunan mampan yang berkesan. Antara dasar-dasar utama berkaitan dengan pemuliharaan hidupan liar ialah Dasar Kepelbagaian Biologi Kebangsaan, Dasar Perhutanan Negara, Dasar Alam Sekitar Negara dan Rancangan Pembangunan Negara.

Rancangan Fizikal Negara (NPP) merupakan rangka tindakan bagi perancangan spatial di Semenanjung Malaysia dan menjadi asas aspirasi Pelan untuk menyelamatkan habitat harimau yang besar dan bersambungan dikenali sebagai *Central Forest Spine* (CFS) dalam NPP. CFS ialah jaringan kompleks hutan yang berhubung dengan bersambungan hutan yang besar. PRF dalam CFS menyediakan habitat dan sambungan kritikal untuk populasi harimau di kawasan tumpuan dan menampakan dari antropogenik dan fluktuasi demografi semulajadi. Pada masa yang sama, PRF turut menyumbang dalam penjanaan ekonomi, di mana hutan digunakan bagi tujuan eko-pelancongan dan pembalakan secara mampan. Ini penting untuk negara dan juga harimau kerana ekosistem besar yang harimau perlukan turut menjadi sumber ekonomi negara. Kehadiran populasi harimau yang sihat di dalam CFS akan menjadi petunjuk keseimbangan ekologi, masyarakat, kebudayaan dan ekonomi negara.

Tujuan utama 2020 yang dikenalpasti dalam Pelan Tindakan Kebangsaan untuk Harimau di Malaysia ini ialah:

Pengurusan aktif populasi harimau dalam "*carrying capacities*" di ketiga-tiga lanskap di dalam CFS dan dihubungkan dengan koridor yang berfungsi.

Pelan ini mengenalpasti 4 objektif dalam usaha mencapai matlamat tersebut:

1. Memastikan kawasan perlindungan utama di dalam CFS dihubungkan melalui koridor.
2. Memberikan perlindungan jangka panjang yang berkesan untuk harimau dan mangsa.
3. Memperkenalkan dan melaksanakan penggunaan tanah secara mesra ekologi, bersesuaian dengan pemuliharaan harimau di luar kawasan yang dilindungi.
4. Penggunaan sains dalam memantau keberkesanan pelaksanaan dan mempertingkatkan pengetahuan dalam ekologi harimau.

Pelan ini selanjutnya menggariskan keputusan utama untuk setiap objektif dan kemudian diterjemah kepada tindakan konkrit, agensi bertanggungjawab, tunjuk ukur dan tempoh masa yang bersesuaian. Butiran ini merupakan susun atur peringkat pertama Pelan untuk dilaksanakan antara tahun 2008 dan 2015; serentak dengan pelaksanaan Pelan Malaysia ke-9 dan ke-10.

Dalam Pelan ini kepentingan tanggungjawab dan ketelusan dalam tindakan pemuliharaan adalah tersirat, dengan penilaian terancang dan mekanisme pembelajaran untuk satu proses pelaksanaan yang berterusan. Petunjuk kejayaan keseluruhan atau sasaran pada Pelan adalah:

Anggaran 1,000 ekor harimau liar hidup dengan memburu mangsa dalam *Central Forest Spine* menjelang tahun 2020.

Kejayaan strategi pemuliharaan ini perlu dibuktikan daripada pengetahuan status taburan dan kepadatan populasi harimau. Untuk menggunakan petunjuk ini, kita mesti terlebih dahulu mewujudkan satu garis dasar untuk memantau usaha dalam memantapkan, meningkatkan dan menguruskan jumlah harimau. Dengan cara ini, kita secara langsung bertanggungjawab terhadap harimau di mana kepentingan sains pemuliharaan menjadi objektif keempat rancangan Pelan. Penggunaan kaedah saintifik untuk mengukur keberkesanan tindakan pemuliharaan menunjukkan perancangan yang cekap dan peruntukan sumber untuk melaksana tindakan yang akan meningkatkan rasa tanggungjawab dan ketelusan dalam tindakan yang diambil.

Sebagai pengerusi Pelan, PERHILITAN bertanggungjawab melaksanakan kebanyakan tindakan yang telah dikenalpasti. PERHILITAN dengan kerjasama badan bukan kerajaan (NGO) dan agensi kerajaan lain akan mengetuai 60 daripada 82 rancangan tindakan. Agensi kerajaan lain yang mengetuai tindakan berkaitan CFS, perhutanan mampan dan pengurusan taman termasuklah Unit Perancang Ekonomi, Kementerian Sumber Asli dan Alam Sekitar, Jabatan Perancangan Bandar dan Desa, Jabatan Perhutanan, *Perak State Park Corporation*, dan *Johor National Parks Corporation*.

Lapan tindakan selanjutnya diketuai dan dilaksanakan oleh NGO iaitu Persatuan Pencinta Alam, *TRAFFIC Southeast Asia*, *Wildlife Conservation Society* dan *WWF-Malaysia*. Secara keseluruhannya, pelaksanaan Pelan adalah tanggungjawab bersama banyak pihak. Sebagai sebuah dokumen kerajaan yang melibatkan pelaksanaan antara jabatan, Kementerian Sumber Asli dan Alam Sekitar akan menyediakan koordinasi antara agensi untuk menghubungkan pelaksanaan dengan dasar-dasar negara berkaitan yang lain.

Melalui pendekatan pengurusan bersesuaian dengan pelaksanaan Pelan, agensi terlibat dapat memastikan proses yang proaktif dan reaktif, pembelajaran ilmu baru serta penggabungan kaedah semasa melaksanakan tindakan. Dengan demikian, Pelan adalah sebuah dokumen yang hidup. Pelan merupakan himpunan koleksi model terdahulu yang berfungsi, dipertingkatkan menerusi dialog, diuji semasa pelaksanaan serta dinilai dan disemak semula secara berterusan. Sebagai galakan tanggungjawab sebenar dan pembelajaran, teras pelaksanaan perlu melibatkan mekanisme dua hala (dialog). Agensi dan individu bertanggungjawab digalak untuk bertukar pandangan, memberi penjelasan terhadap jangkaan, mengemukakan perbezaan dan meningkatkan pemahaman serta mendorong penyelesaian kreatif dan praktikal.

Pejabat Sekretariat MYCAT akan bertindak sebagai Sekretariat untuk Bahagian Pemuliharaan dan Pengurusan Alam Sekitar di Kementerian Sumber Asli dan Alam Sekitar untuk memantau perkembangan pelaksanaan Pelan. Sekretariat akan menyusun dan mengemukakan laporan setengah tahun untuk kementerian yang kemudiannya akan mempengerusikan satu pertemuan di mana keputusan dan pembetulan yang perlu untuk Pelan akan dibuat. Di penghujung Fasa I (2008-2015), pelaksanaan Pelan akan dinilai oleh sepasukan audit bebas. Keputusan penilaian ini akan menjadi asas penyediaan Pelan bagi Fasa II (2016-2020).



Malayan tiger © Chris R. Shepherd

Introduction

Malaysia is a tropical country rich in biological diversity and natural resources. Many of Southeast Asia's threatened large mammals, such as the Sumatran rhinoceros *Dicerorhinus sumatrensis*, Asian elephant *Elephas maximus*, tiger *Panthera tigris*, gaur *Bos gaurus*, Malayan tapir *Tapirus indicus* and Malayan sun bear *Helarctos malayanus*, are still found here. The status of some of these species has reached a critical state while that of others remains largely unknown. Thus more effective conservation and research efforts are required to ensure the survival of these species (Locke, 1954; Medway, 1965; Hislop, 1968; Oliver, 1978; Khan *et al.*, 1983; Aiken and Leigh, 1985; Zaaba *et al.*, 1991; Mislihah and Sahir, 1997; Foose and van Strien, 1997; IUCN 2006).

Wildlife conservation in Peninsular Malaysia dates back to 1896, when the first wildlife legislation was passed to regulate the exploitation of wild birds in the Straits Settlements. Subsequently, large mammals were protected in Pahang and in 1903 the Chior Wildlife Reserve, the first protected area in Malaysia was established in Perak. Since then, 41 protected areas have been added to the national list. The Wildlife Commission of Malaya, established by the colonial government in 1930 reviewed the prevailing status of wildlife protection throughout Peninsular Malaysia (then Malaya). Their work resulted in the creation of several State Game Departments in 1936 and provided a framework for the consolidation of the state game offices and the establishment of the Protection of Wild Animals and Birds Ordinance 1955 in Peninsular Malaysia. After independence, this ordinance was repealed and the Protection of Wild Life Act 1972 (PWA) was enacted by the Malaysian Parliament. This enabled the federalisation of all State wildlife departments and the empowerment of the Director-General for the Department of Wildlife and National Parks (DWNP) over the State wildlife departments. Currently, the PWA is under review and is likely to be replaced by more comprehensive wildlife conservation legislation in the near future.

To complement conservation efforts by the government, several conservation organisations were founded. The country's oldest and premier nature conservation organisation, the Malaysian Nature Society (MNS), was formed in 1940 and currently has 3,000 members throughout Malaysia. Three decades later, in 1972, the global conservation organisation, WWF, established a country office in Malaysia (WWF-Malaysia). Following this, the New York-based Wildlife Conservation Society (WCS) established its Malaysia Programme in 1984 and more recently, in 1991, TRAFFIC, the wildlife trade monitoring network, established its Southeast Asian office, based in Malaysia (TSEA).

The tiger is the symbol of two contrasting realities: the vanishing Asian wilderness and the thriving Asian economy. Thirty years have passed since the tiger was listed as a totally protected species under the PWA and Malaysia is one of the 14 nations where tigers still survive in the wild. In addition to being totally protected within Malaysia, tigers are listed on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which prohibits international trade of live tigers, their parts and derivatives for commercial purposes. Yet tiger poaching continues. Throughout its global range, the species has lost 93% of its original habitat (Dinerstein *et al.*, 2006) and three subspecies are now extinct; all in just the past century. Threats to the survival of wild tigers are mounting and a world without wild tigers may become a reality in our lifetime unless drastic measures, backed by strong political commitment and public support, are taken.

Challenges to tiger conservation are multi-faceted. Finding solutions, therefore, requires an integrated conservation approach. As the leading government agency in wildlife conservation in Malaysia, one of the critical roles of DWNP is to promote the integration of and collaboration with conservation partners in reaching the national vision of conservation excellence.

Using this collaborative platform, DWNP organised and hosted a 3-day workshop in November 2006, at its Institute for Biodiversity in Lanchang, Pahang, to bring together key stakeholders and decision-makers to discuss the actions needed to save the Malayan tiger from impending extinction. The main goal of the workshop was to develop the *National Tiger Action Plan for Malaysia* (hereafter referred to as 'the Plan'). The Plan reflects national needs and local capacity in line with existing national policies relevant to tiger conservation.

Prior to the workshop, the MYCAT Working Group, comprising representatives from all partner organisations, met on four occasions to plan and prepare for the workshop. In September 2006, the Biodiversity Conservation Division of DWNP distributed threat assessment questionnaires to State DWNP, NGOs and other relevant individuals who have information on wild tigers to assess their threats.

The MYCAT Secretariat's Office analysed the data from 32 respondents and presented the results at the 4th MYCAT Working Group meeting in October 2006, and again, during the workshop in November 2006. Prioritisation was impossible as the perception-based assessment, which could not be substantiated with reliable data, resulted in similar rankings for most of the threats. Therefore, the Plan addresses major threats equally without prioritisation.

The Plan was developed in a participatory process at many levels. Based on the discussions and results from the workshop and additional information from literature, it was jointly drafted by the MYCAT partners. Through 15 meetings, numerous phone calls and online discussions, the drafting team reviewed and revised 10 earlier drafts that led to developing the Plan's implementation mechanisms, as identified within this document (Sec. 2.7). The draft Plan was then submitted to the DWNP Tiger Action Plan Advisory Board. After their thorough review, a revised Plan was circulated to the workshop participants, as well as selected experts in the international tiger conservation community for peer review. After additional improvements were made, it was finally endorsed by the Ministry of Natural Resources and Environment. In effect, this Plan has crystallised the collaborative efforts, knowledge and commitment of those who have made the survival of the tiger their concern.

The Plan outlines Malaysia's preparation for saving wild tigers in Malaysia and, as such, does not include management issues relating to captive tigers. In 2004, Malaysia's tigers were recognised as a new subspecies, *Panthera tigris jacksoni*, as they are distinct in mtDNA sequences from those of northern Indochina, *P. t. corbetti* (Luo *et al.*, 2004). While acknowledging the exciting new discovery, the Malaysian government recommends that this subspecies be named *P. t. malayensis* to reflect its geographic distribution. More recently, however, a morphological study has questioned the validity of this classification (Mazak and Groves, 2006). Regardless of the taxonomic classification, in this Plan, wild tigers resident to Peninsular Malaysia are referred to as Malayan tigers.

Because of the dynamic and some of the unknown nature of the factors that affect tiger populations and their habitats, it was considered impractical to design a single, comprehensive master plan. Similarly, such an approach would be precluded by the context where socio-political stability, emerging policies, macro- and micro-economics, human population growth, and climate change are all key issues. Instead, by using an integrated and holistic approach, a focused action plan that seeks to address major issues for the next eight years towards a unified long-term vision was developed.

The Plan is divided into two sections. Part 1 comprises background information on the natural history and the overview of the conservation status of the Malayan tiger based on available knowledge; whereas Part 2 comprises the goals, priorities, targets and planned actions.

The main contents of the Plan are found in Part 2, which lays out key actions. Specific actions are to be implemented over the next eight years (2008 to 2015) with the mid-term goal of actively managing tiger populations at carrying capacities across tiger landscapes connected with functioning corridors by 2020, in line with Malaysia's own development plans and existing government policies relevant to nature conservation. At the end of the eight-year implementation period, the Plan is to be evaluated by an independent auditor, its priorities and targets adjusted according to the eight-year outcomes, keeping in tandem with Malaysia's development plans (The 9th Malaysian Plan is for 2006-2010 and the 10th Malaysian Plan is for 2011-2015). The subsequent actions needed to reach the overall goal will then be planned. The implementation section in Part 2 describes mechanisms designed to monitor and measure the Plan's effectiveness and the accountability of parties and relevant stakeholders. Appendices provide supplementary information on the Malayan Tiger Conservation Workshop, held in November 2006.

An effort was made to use minimal technical jargon without compromising on the scientific integrity of the Plan. In addition to the first-hand information gleaned from the workshop, other sources of information such as unpublished reports/data and personal communications were used but whenever possible, citations for these were also included.

Status of Tiger Conservation in Malaysia

1.1 Natural History

1.1.1 Description, biology and behaviour

The tiger is the world's largest cat and a specialised predator that preys on large ungulate (hoofed animal) species. It is the only striped cat with the ground coloration of reddish orange to reddish ochre and white underparts. The pelage of tropical tigers tends to be darker than its temperate cousins, with shorter and less dense fur (Mazak, 1981; Sunquist and Sunquist, 2002). The largest tigers are found in the Russian Far East and India, where an adult male can weigh up to 250 to 300kg. The smallest, however, are in Peninsular Malaysia and Sumatra, Indonesia, where a large male and female weigh only about 140kg and 110kg, respectively (Table 1). Likewise, the total length of a large Siberian or Bengal tiger can reach up to 3m, while a large Sumatran tiger is about 50cm shorter. Zoo Melaka's records of the captive Malayan tigers show that the total length of the largest wild caught adult male is 1.94m and the largest female, 1.81m (Table 1).

Table 1: Records of captive Malayan Tigers in Zoo Melaka.

No	Sex	Date of admission	Age (yrs)	Type of Acquisition	Origin	Weight (kg)	HBL (cm)	SH (cm)	CG (cm)	TL (cm)
1	F	16 June 98	~9	WC	Terengganu	100	162	93	94	79
2	F	4 March 99	~18	CB	Zoo Melaka	85	ND	ND	ND	ND
3	M	22 March 99	~19	WC	Kelantan	110	ND	ND	ND	ND
4	M	16 June 1999	~26	WC	Kelantan	110	ND	ND	ND	ND
5	F	18 Sept 2000	~19	WC	Pahang	ND	ND	ND	ND	ND
6	F	7 March 2002	5	CB	Zoo Melaka	90	151	85	97	89
7	M	20 Aug 2002	~15	WC	Kelantan	120	157	ND	102	96
8	F	16 June 1999	~9	WC	Terengganu	90	ND	ND	ND	ND
9	M	12 Dec 2002	5	CB	Zoo Melaka	120	175	88	102	85
10	F	12 Dec 2002	5	CB	Zoo Melaka	110	164	88	120	89
11	M	3 Nov 2003	4	CB	Zoo Melaka	130	ND	ND	ND	ND
12	M	3 Nov 2003	4	CB	Zoo Melaka	130	ND	ND	ND	ND
13	F	3 Nov 2003	4	CB	Zoo Melaka	100	130	ND	120	88
14	F	3 Nov 2003	4	CB	Zoo Melaka	100	ND	ND	ND	ND
15	M	9 Feb 2003	4	CB	Zoo Melaka	100	164	89	105	81
16	M	20 July 2003	4	CB	Zoo Melaka	120	ND	ND	ND	ND
17	F	26 Feb 2004	~9	WC	Pahang	105	181	89	110	87
18	F	28 March 2003	~20	WC	Kelantan	90	ND	ND	ND	ND
19	F	23 Aug 2004	3	CB	Zoo Melaka	100	150	78	103	78
20	F	23 Aug 2004	3	CB	Zoo Melaka	100	162	82	108	87
21	M	24 June 2005	~9	WC	Pahang	135	194	115	124	97
22	F	11 Aug 2005	~2	WC	Johor	110	ND	ND	ND	ND
23	M	13 June 2007	~4	WC	Kelantan	100	164	84	92	89

WC: Wild Caught, CB: Captive Bred

Body weight is estimate only as a suitable weighing scale was unavailable.

HBL: Head-Body Length, SH: Shoulder Height, CG: Chest Girth, TL: Tail Length

ND: Data unavailable.

Data source: Zoo Melaka, *in litt*.

A tigress comes into heat at intervals of around three to nine weeks, and is receptive for about three to six days within that period. Gestation averages to around 105 days and a litter usually consists of two or three kittens, with a range of one to four (Mazak, 1981). A tigress produces a new litter only after her young are all dispersed, usually within 18-28 months (Smith, 1993). Sexual maturity is usually achieved in the third year, for females, and towards the end of the fourth year in males; whilst, in Nepal, the average reproductive lifespan was recorded as 6.1 years for females but only 2.8 years for males (Smith and McDougal, 1991). The oldest recorded wild tiger lived for at least 15.5 years, also in Nepal (McDougal, 1991), whilst the oldest captive tiger died at the ripe-old age of 26 (Jones, 1977).

Tigers can swim and hunt well in the water, as verified by Burton (1933) when he recorded a tiger swimming the 8km stretch from the Malay Peninsula to Penang Island and Locke (1954) where a tiger was recorded swimming across the Straits of Johor to Singapore. In the Sundarbans, tigers swam a 29km wide river (Garga, 1948). Tigers rarely climb trees but they can if provoked.

The tiger is a highly adaptable species, exhibiting tolerance to a wide range of forest types, climatic regimes, altered landscapes and prey bases. Being a generalist, the only requisites for survival seem to be plant cover, water and sufficient prey (Schaller, 1967). The historical distribution of tigers exemplifies the variety of habitat types to which they have adapted, ranging from the pine-oak forests of the Russian Far East and the rocky mountain slopes of Manchuria, to the tall grasslands of Nepal, the mangrove swamps of the Sundarbans and, of course, the rainforests of Malaysia and Indonesia. Generally, tigers prefer lowland areas where large ungulates are more abundant, but they have been reported at altitudes of up to 4,360m in Sikkim, India (Mazak, 1981).

Tigers are essentially solitary outside of the mating season and when young are fully dependent on their mother; but they are not entirely non-social as some groupings, especially of related individuals, have been reported (Schaller, 1967; Thapar, 1989).

Earlier efforts to monitor tiger populations in Peninsular Malaysia focused on Human-Tiger conflict (Stevens, 1968) and aspects of livestock depredation (Blanchard, 1977; Elagupillay, 1984); research on basic tiger ecology is still in its infancy and much of what is known is based on studies carried out

elsewhere, mostly in India and Nepal.

1.1.2 Feeding ecology

The tiger is the top predator in its ecosystem. Almost any terrestrial vertebrate is potential prey for this ultimate predator, as it has been known to attack elephant and rhinoceros calves as well as other carnivores, such as leopards *Panthera pardus* and dholes *Cuon alpinus*. But across its range generally, the main natural prey base consists of various species of deer, wild pig *Sus scrofa* and wild cattle (Seidensticker, 1986). In addition to hunting down live prey, tigers also feed on carrion (Schaller, 1967; Sunquist, 1981). On the other hand, aside from Man, no other species is individually capable of killing a tiger. There are, however, isolated reports of incidences in which a herd of water buffalo, a pack of dholes or an elephant have killed a tiger.



Wild pig juvenile © G. Fredriksson

Vertebrate predators in prey-rich habitats are selectively “energy maximiser(s)” (Griffiths, 1975). Tigers in Chitwan, for example, showed a preference for sambar *Cervus unicolor* (Sunquist, 1981; Seidensticker and McDougal, 1993); in Kanha tigers selectively killed adult male sambar (Schaller, 1967); and in Nagarahole, they selectively killed adult sambar and gaur (Karanth and Sunquist, 1995). A prey item the size of a gaur would sustain an adult tiger for one week. The nocturnal to crepuscular activity patterns of tigers in these areas reflect the activity patterns of the principal prey. That tigers in Taman Negara with minimal human disturbance were largely diurnal with three peaks at dawn, mid-day and dusk suggests that they were hunting diurnal and crepuscular species such as wild pig and barking deer *Muntiacus muntjak*, and possibly sun bear (Kawanishi and Sunquist, 2004). In more disturbed habitats of mixed secondary forests and plantations (e.g. Felda Jerangau Barat and Jerangau Forest Reserve in Terengganu and Gunung Basor Forest Reserve in Kelantan) in high Human-Tiger Conflict areas, tigers still show a crepuscular activity pattern, but were more nocturnal than tigers in Taman Negara (Ahmad Zafir *et al.*, 2006; Darmaraj, 2007).

Concealment and stalking are the main hunting strategies of tigers (Schaller, 1967; Sunquist *et al.*, 1999; Karanth, 2001) and prey is located primarily by sight (Schaller, 1967). In the rainforest, where visibility is greatly reduced, the proportion of prey species taken by tigers may simply reflect the rate of encounter, hence relative abundance of prey species. It was found that large prey (i.e., sambar and gaur) was extremely scarce in Taman Negara at 0-0.22 animals/km² with occupancy rates as low as 46% for sambar and 4% for gaur (Kawanishi and Sunquist 2004). In rainforests where prey density is typically low, and its distribution unaffected by ample availability of water and cover, large predators may be more opportunistic than selective feeders (Kawanishi, 2002).

A tiger can eat between 18-40kg of meat in one sitting (Locke, 1954; Schaller, 1967) and will return to its kill for up to a week, until little remains (Sunquist, 1981). The maximum amount of meat a tiger can consume in 24 hours has been estimated to be equal to about 20% of its own body weight (Sunquist, 1981), which, for a 120kg Malayan tiger is 24kg, about the size of a wild pig.

Dietary studies specific to the Malayan tiger are lacking but it is generally expected that the principal prey are the two, relatively abundant, large (>20 kg) ungulates – wild pigs and barking deer – as well as the less common sambar deer. In addition, tigers in Taman Negara are known to prey on sun bears (Kawanishi and Sunquist, 2004). It is unknown, however, whether or not gaur and tapirs are principal prey for the Malayan tiger. Although the former is rare in Malaysia, the latter appears as the third most common large ungulate, after wild pig and barking deer (Kawanishi *et al.*, 2002; Kawanishi and Sunquist 2004; DWNP unpublished data; Ahmad Zafir *et al.*, 2006; Darmaraj, 2007; Lynam *et al.*, 2007). Bearded pigs *Sus barbatus* are larger than wild pigs and could be more ideal prey for tigers, but their distribution is now reduced, currently restricted to the southern portion of the peninsula, probably as a result of having their migratory routes disrupted by land clearance for oil palm plantations and other large-scale developments (Kawanishi *et al.*, 2006).

More studies are needed to determine the status of other potential prey species such as the bearded pig and serow (*Capricornis sumatrensis*) to establish their importance in terms of the tiger’s dietary needs.

Between the two principal prey species, due to its relatively greater abundance and availability, the wild pig

is probably the most important prey species for Malayan tigers. If feeding only on wild pigs, an average male (120kg) and female (100kg) tiger would consume annually at least 104 and 87 wild pigs respectively, that is nearly, 100,000 wild pigs killed annually by 1,000 tigers. As a result of this perceived importance of the wild pig in the tiger's diet, the wild pig was listed as a protected species under the PWA in 1972. Since then, the hunting of wild pig has been regulated through a system of hunting licences.

The tiger's diet also often includes livestock in every range-country where domestic animals are reared adjacent to tiger habitats without proper management. In Peninsular Malaysia, DWNP data suggest that the two common livestock species taken by tigers are cattle and goats. In extremely rural areas, buffaloes are reared instead of cattle because of the ease of maintenance and their superior defence behaviour against predators. In these areas, tigers take buffaloes occasionally but, due to isolation, the incidences are rarely reported to the authorities (Kawanishi, unpublished data).

1.1.3 Tiger land tenure system and social organisation

The tiger land tenure system, which refers to the spatial and temporal occupancy of a habitat by individual animals, is dynamic and, typically, a male's range encompasses those of several breeding females. The size of an individual's territory and home range varies depending on several factors, including habitat type, prey biomass, tiger density and demographics (Schaller, 1967; Sunquist, 1981; Miquelle *et al.*, 1999). Typical range sizes for resident females have been recorded as being as small as 17km² in South Asia (Sunquist, 1981; Karanth and Sunquist, 2000) and as large as 400km² in the Russian Far East (Matjuschkin *et al.*, 1980; Miquelle *et al.*, 1999). The variation in daily distances walked, however, is less obvious with records of up to 32km in India (Schaller, 1967) compared to 15-20km in Russia (Matyushkin *et al.*, 1980) and only 10km in Nepal (Sunquist, 1981).

Maintenance of an exclusive home range or territory is an important component of tiger social structure (Sunquist, 1981; Smith *et al.*, 1987; Miquelle *et al.*, 1999). How dense tropical rainforests, as opposed to, say, more open temperate grasslands, affect territoriality is unknown. A home range study requires the application of telemetry technologies and these have not been tried on Malayan tigers. However, based on observations, the home range size of the Malayan tiger has been stated to be 380km² (Locke, 1954), whilst minimum range sizes, suggested by camera-trapping data in secondary forests and adjacent plantations, were 345km² for one male and 186, 198 and 229km² for three females in Jerangau Barat, Terengganu (Ahmad Zafir *et al.*, 2006). Smaller minimum ranges were recorded in Jeli, Kelantan with 60 and 289km² for two males and 98km² for one female (Darmaraj, 2007).

1.1.4 Tiger density

Tiger density has an inverse relationship with home range size and correlates positively with prey biomass (Seidensticker, 1996; Miquelle *et al.*, 1999). Using the data from 11 ecologically diverse sites in India, Karanth *et al.* (2004) demonstrated a simple mechanistic model that predicts tiger density as a function of prey density. Using this model, the highest tiger density site, Kaziranga, with its highly dense prey base (68 animals/km²) and associated biomass (5,200kg/km²) can support around 16.8 tigers in 100km². This is roughly ten times as many as the mean estimated density of tigers in Taman Negara (Kawanishi and Sunquist, 2004) where the crude estimate of prey biomass ranges from 270 to 430 kg/km². Two recent camera-trapping studies in the mark-recapture framework estimated adult tiger densities, *D(Standard Error)*, in Malaysia, as ranging from 1.10 (0.52) to 1.98 (0.54) tigers/100km² in the protected primary rainforests of Taman Negara (Kawanishi and Sunquist, 2004) and 2.59 (0.71) tigers/100km² in the disturbed mosaic habitat of secondary forest, plantation, orchards and human settlements in Gunung Basor Forest Reserve, Kelantan (Darmaraj, 2007).

The evergreen rainforests, especially mature primary rainforests like Taman Negara, offer little primary productivity at ground level and thus mammalian biomass is dominated by arboreal herbivores (Eisenberg, 1980). Consequently, tropical rainforests are not particularly rich habitat for tigers in terms of diversity and abundance of large ungulate communities.

Tigers in rainforests at the southern extreme of its distribution range (Malaysia and Indonesia) occur at among the lowest densities recorded in the entire global range (Kawanishi and Sunquist, 2004). An even lower tiger density (<1 tiger/100km²) has been recorded in Sikhote-Alin, Russian Far East, at the northern extreme of its distribution range, where prey is equally scarce (Miquelle *et al.*, 1999). More detailed references to the natural history of tigers can be found in Mazak (1981), Nowell and Jackson (1996), and Sunquist and Sunquist (2002).

1.2 National and Global Significance

For thousands of years, humans have respected and admired great cats of the genus *Panthera* such as lions, jaguars, leopards and tigers, for their beauty and strength (Seidensticker and Lumpkin, 2004).

In Malaysia, the tiger is a symbol of strength and royal power. Two tigers flank Malaysia's National Coat-of-Arms in a protective stance (Fig. 1) and the Johor state emblem. It is Malaysia's national animal, and the national sports teams call themselves "The Malaysian Tigers" and parade in yellow uniforms with black stripes.

Fig. 1 : Malaysia's National Coat-of-Arms with two tigers flanking the shield.



The symbolic power of tigers manifests itself in a number of commercial products as corporate

branding strategies. The global oil giant, ExxonMobil, is probably the most well-known example and is one of a few corporations that actually pay a "royalty" for the use of the tiger's image. Among all corporations using the image of the tiger for branding, ExxonMobil makes the largest financial contribution towards tiger conservation worldwide with US\$13.6 million (RM48 million) between 1995 and 2006 (Save the Tiger Fund, 2007). Malaysia's largest financial institution, Malayan Banking Bhd., also uses the tiger for its logo.

With its position at the apex of the terrestrial food chain, top predators maintain the balance of an ecosystem (Terborgh, 1988; Terborgh, 1990; Terborgh *et al.*, 1999; Miller *et al.*, 2001). This is the

tiger's main ecological significance. Top predators not only have a numerical and behavioural impact on their immediate prey species, but sometimes even regulate their populations, which in turn have effects on plants or smaller animals that these prey feed on. In other words, the loss of top predators may release cascade impacts and changes across the food web.

The tiger is also considered a landscape species since they roam a large area that encompasses different ecosystem or habitat types. And large carnivores generally are the first to disappear in the face of habitat destruction and human intrusion. The presence of a viable top predator population indicates the ecological integrity of a given ecosystem. Hence successful tiger conservation may not only ensure tigers, prey species and their habitat but also the processes that maintain the ecosystem. Once lost, the latter cannot be recreated *ex-situ*. The tiger's functional role in an ecosystem is thus important to humans who benefit from the ecological service provided by healthy forests. Protection of large tiger habitats therefore means protection of forests, its biodiversity, water catchment areas, and soil, however difficult it may be to put a price tag on such long-term ecological services.

Tigers are therefore important for Malaysians and the rest of the world culturally, ecologically, and economically. Aside from these reasons, humans have a moral obligation to safeguard a sufficient amount of wilderness areas where other creatures, such as the tiger that are so vulnerable to large-scale disturbance, can pursue their natural course of evolution, relatively, free of negative human impacts.

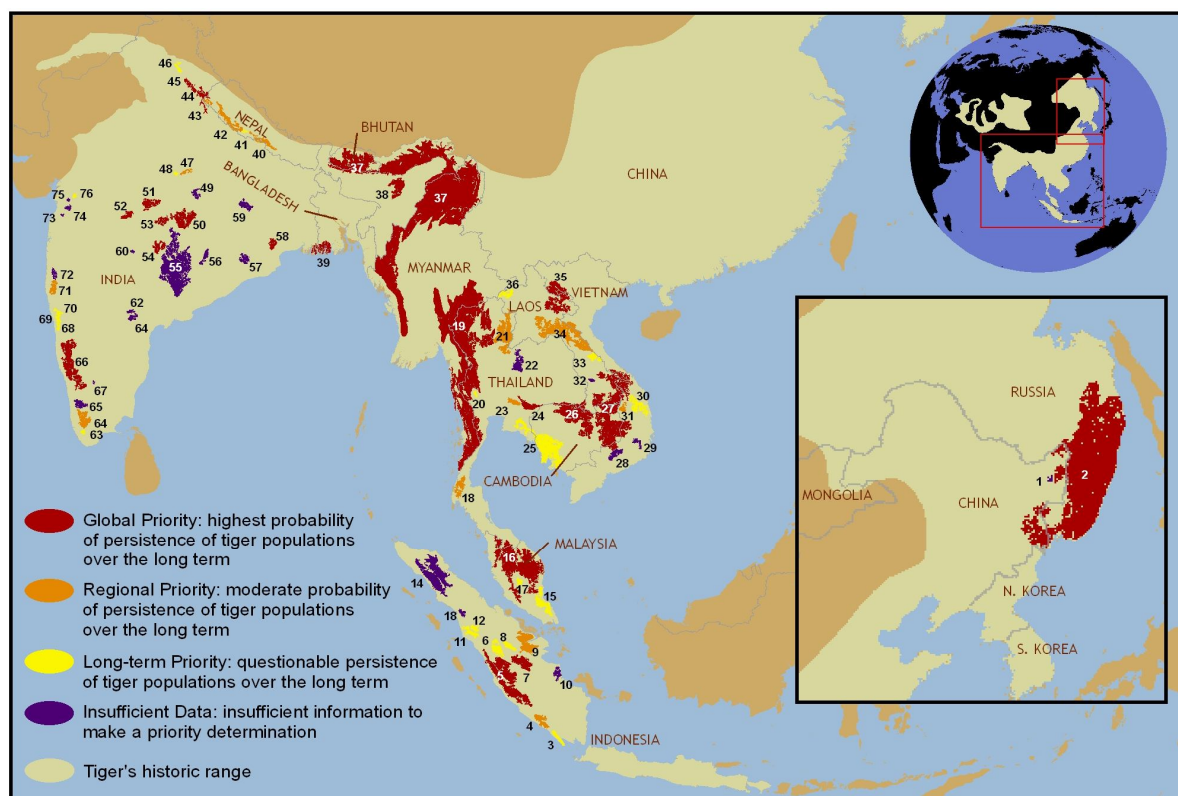
We now risk losing one of Asia's most beautiful and majestic animals – so admired, feared and respected throughout the history of the human race – because of our careless, short-sighted actions and misplacement of priorities and values.

Such actions are incongruous with moral and intelligent creatures such as ourselves, and we must today strive to be more morally responsible towards our fellow Earth inhabitants. Just like all other wildlife species, the tiger has an intrinsic value on this planet, as each occupies a specific niche. Saving the big cat thus requires our willingness to forgo some of our immediate self interests.

1.3 Tiger Distribution and Population

The historical distribution of tigers extended from eastern Turkey up to the northern tip of the Russian Far East and southward, through India, Indochina and the Malay Peninsula, all the way to the Indonesian islands of Sumatra, Java, and Bali. Tigers have been exterminated from 93% of their original range in the past century and estimates of the area occupied by tigers have dropped by as much as 40% in the past decade alone (Dinerstein *et al.*, 2006). The current distribution is represented in scattered fragments across this original range and a recent attempt to convey this into a kind of prioritisation process has identified 76 Tiger Conservation Landscapes (TCLs) where, there is sufficient habitat for at least five tigers, and the tiger presence was confirmed (Fig. 2). These TCLs were then prioritised into four classes based on their ecological and social potential for tiger conservation (Dinerstein *et al.*, 2006).

Fig. 2 : Tiger Conservation Landscapes and Priorities. Source Dinerstein *et al.*, 2006.



Source: www.savethetigerfund.org

With the extinction of the Javan and Bali tigers, true "rainforest tigers" of evergreen rainforests are now found only in the Malay Peninsula and the island of Sumatra. These areas are collectively called the Southeast Asia Bioregion (Dinerstein *et al.*, 1997 and 2006). This bioregion has 15 TCLs, three of which are considered to be global priorities. The only global priority TCL found in Malaysia encompasses the Main Range (i.e., the main western spine of the mountain range) and the Greater Taman Negara Landscape (i.e., Taman Negara National Park and the surrounding Permanent Reserved Forests). This TCL extends across the national border into southern Thailand, but the coverage in Thailand is minimal (Dinerstein *et al.*, 2006).

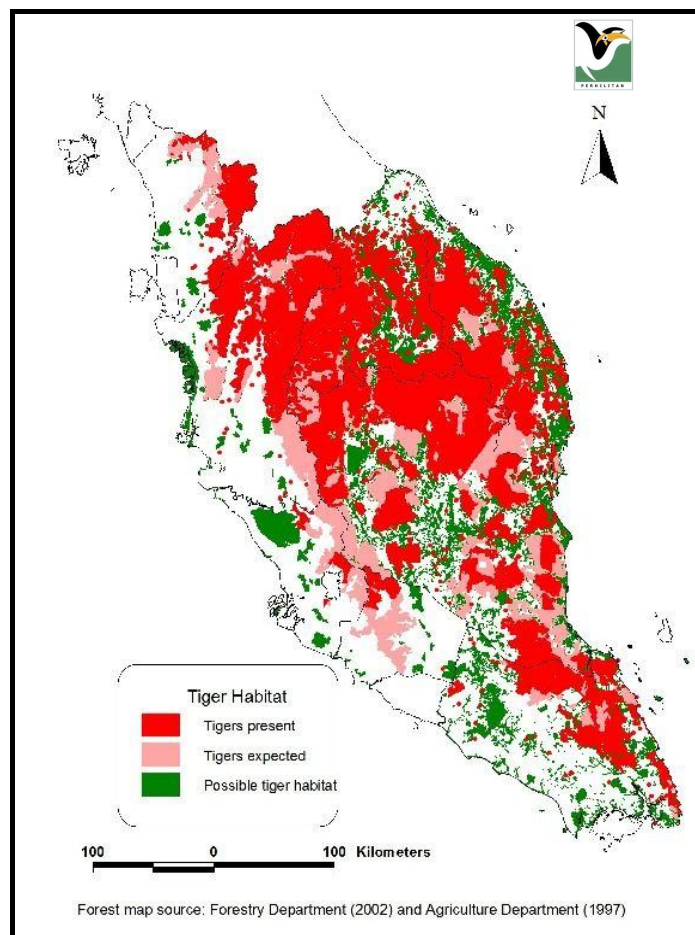
Corresponding to the loss of tiger habitat, the number of tigers has also dramatically declined in the past century and the tiger cannot afford to have another century like the last. There were once believed to be about 100,000 tigers in the original extent of the habitat, which by the 1990s dwindled to about 6,000, including India's 3,000 (Seidensticker *et al.*, 1999). After rampant poaching in some Tiger Reserves and mismanagement of resources (Thapar, 1999; Gupta, 2005), preliminary results of the India-wide population studies conducted in 2005 and 2006 have put the total number of tigers at between 1,300 and 1,500, more than 50% reduction from the 2001-2002 census result (Balla, 2007). Elsewhere in Cambodia, Vietnam and Myanmar, extensive forest tracts still remain but tigers have been hunted close to

extinction in all of these countries. In the Indochina bioregion, Thailand may represent the last hope for the tigers as it is estimated to have about 190 tigers remaining (Gratwicke *et al.*, 2006). All indications suggest that there may be fewer than 3,000 wild tigers left worldwide.

Peninsular Malaysia's forests are managed according to three different categories. The majority (80%) of forest cover (not the total land area) is Permanent Reserved Forests (PRFs) that are managed by state Forestry Departments. They are further classified into Protection Forests (for specific purposes including soil protection, water catchment, research and recreation) and Production Forests (for timber extraction). About 13% of the forest cover (not of total land cover) is classified as Protected Areas (PAs) such as national parks and wildlife reserves, managed by DWNP or, in the case of state parks, by state governments (e.g., Johor National Parks Corporation for Endau-Rompin and Perak State Park Corporation for Royal Belum). The remaining 7% are state land forests that are managed by state governments (FDPM, 2006).

An analysis of data, collected by DWNP between 1991 and 2003, shows that 51% or 66,211km² of Peninsular Malaysia was considered suitable as tiger habitats, including all forest types from peat swamps to mountain forests and even some non-forest lands (Fig. 3). Because forests represent 45% of Peninsular Malaysia's land-cover (FDPM, 2006), this means that 6% of suitable tiger habitats fall outside forests to include abandoned agricultural fields, early-succession scrublands, and pockets of swampy woodlands in plantations. The highest elevation where tigers have been recorded was 1,730m, on Gunung Bintang Hijau in Perak (DWNP, unpublished data). No tiger signs were recorded at the peak of Gunung Tahan at 2,187m (the highest mountain in Peninsular Malaysia) or in Cameron Highlands (Topani, 1990).

Fig. 3 : Three types of tiger habitat in Peninsular Malaysia based on analysis of data collected by the Department of Wildlife and National Parks between 1991 and 2003.



Source:http://www.wildlife.gov.my/webpagev4_en/printed_material/kmaklumat/harimau.pdf

Not surprisingly, smaller states such as Perlis and Malacca and the highly developed Federal Territories of Kuala Lumpur and Putrajaya appear to have lost their tigers in recent times, though tigers have been captured or sighted in forest reserves adjacent to Kuala Lumpur as recent as 2001 (DWNP, unpublished data). There are only a few tigers remaining in Selangor and Negri Sembilan as an escalation in development projects continues to fragment forests (Sec 1.5.1.2).

An inevitable result of all these development projects, coupled with the loss of lowland forests to large-scale agriculture over the last 50 years, is that nearly 90% of the remaining tiger habitat is found in only four states - Pahang, Perak, Kelantan and Terengganu. Each of these has relatively low human densities and large forest cover among the 12 states and federal territories of Peninsular Malaysia.

Tiger habitats fall into the following three categories depending on evidence of tigers, forest status, and forest connectivity. The qualitative assessment of a conservation value is meant to aid the decision-making process for intelligent resource allocation towards conservation of wild tigers.

Confirmed Tiger Habitats (37,674km² or 29% of total land area) with good conservation value

These habitats are either PAs or PRFs with evidence of tigers recorded between 1991 and 2003 by DWNP. All PAs ($n=4$) greater than 400km² in size in IUCN categories I-IV (IUCN 1994; DWNP/DANCED, 1996) were in this category. That 85% of the confirmed tiger habitats are in PRFs illustrates the significance of collaboration with the FDPM for on-the-ground protection of tigers and their habitats. The conservation value of these habitats is considered good because of the protected status of the forests combined with evidence of the presence of tigers.

Expected Tiger Habitats (11,655km² or 9% of total land area) with fair conservation value

These are forest blocks that are physically connected to confirmed tiger habitats but have yet to be adequately surveyed. Tigers are expected to occur in these habitats because of the physical connectivity. The conservation value of these areas can be raised once tiger presence is confirmed.

Possible Tiger Habitats (16,882km² or 13% of total land area) with marginal conservation value

These areas include forests in tiger states that are isolated from confirmed tiger habitats. It also includes areas with natural vegetation not defined as "forests" by the FDPM (e.g., scrublands and abandoned agricultural fields), but where tigers have been recorded (shown with red dots in Fig. 3). Because the future of these lands is uncertain, their conservation value is marginal, except for areas considered as potential corridors connecting confirmed/expected tiger habitats.

1.3.1 Tiger Landscapes

From the location of confirmed and expected tiger habitats, three main broad spatial units referred to as "Tiger Landscapes" were identified for planning and management purposes.

Main Range (ca. 20,000km²) to the west of Peninsular Malaysia. This landscape includes hill and montane forests that stretch longitudinally over 5 or 6 states, from Perak, at the Thai border, to Kelantan, Pahang, Selangor, Negri Sembilan, and possibly Kedah. It includes the Bintang Hijau forest complex in Perak, but may or may not include Ulu Muda in Kedah, which appears isolated by the Federal Road bisecting a 2-km stretch of a forest corridor at the Perak-Kedah border. The newly established Royal Belum State Park, at 1,175km² and the adjacent Temengor Forest Reserve at the northern end, is likely the main stronghold for the Main Range tiger population. But only general information on tigers is available from Belum and Temengor. Apart from a study in Gunung Basor Forest Reserve in Kelantan, where tiger density was estimated at 2.59 tiger/100 km² (Darmaraj, 2007), not much is known from the rest of the Main Range.

Data Gap: There needs to be a benchmark study on the status of tigers in Belum and Temengor and studies to determine their distribution throughout the Main Range. WWF-Malaysia has begun a study to determine the status of tigers in Temengor in 2007.

Greater Taman Negara (ca. 15,000km²) to the east of Peninsular Malaysia. This landscape encompasses Taman Negara National Park and contiguous PRFs north and south of the park that stretch over Kelantan, Terengganu, and Pahang. This area harbours the largest remaining lowland forests (<300 m asl) in Peninsular Malaysia. A benchmark study (Kawanishi and Sunquist, 2004) suggests that the Taman Negara tiger population, estimated at 52-84 adults, is viable if the threats from poaching are maintained at a negligible level to none. The population viability will be greatly enhanced by strong tiger-prey communities in the 11,000km² of PRFs surrounding the park. The genetic viability of the Greater Taman Negara tiger population will be enhanced by occasional gene flow from the two other landscapes. This landscape is at risk of isolation from the Main Range due to a railway and road running parallel to the western border of the park.

Data Gap: Population monitoring needs to be continued in Taman Negara and the distribution status in the rest of the landscape needs to be determined.

Southern Forest (ca. 10,000km²) to the south of Peninsular Malaysia. This landscape has already been isolated from the other two tiger landscapes and includes four groups of increasingly fragmented forest complexes located south of the Pahang River: the Chini/Ibam complex, south-east Pahang peat swamp forests, Endau Rompin, and Endau Kota Tinggi. It encompasses southern Pahang and Johor. Among the three main tiger landscapes, this is the smallest and most fragmented. Endau Rompin (402km² in Pahang and 489km² in Johor) is situated in the centre of the landscape and should serve as the source population, but little is known of tiger ecology in this area.

Data Gap: There needs to be a benchmark study on the status of tigers in Endau Rompin and surrounding areas. WCS has begun a study to determine the status of tigers and tigers' prey in the Johor portion of the landscape in 2007.

In the global assessment, the Main Range and Greater Taman Negara landscapes correspond with No. 16 Class I Tiger Conservation Landscape of a global priority, meaning that it has habitat to support at least 100 tigers, evidence of breeding, minimal-moderate levels of threat, and effective conservation measures in place and offers the highest probability of the persistence of tiger populations over the long term (Fig. 2; Dinerstein *et al.*, 2006). These two tiger landscapes make up the 5th largest TCL among the 20 global priority TCLs out of a total of 76 TCLs. The Southern Forest Landscape and Krau Wildlife Reserve are Class III TCLs that are considered long-term priority landscapes that require sustained efforts to restore them to Class I status. In the near- to mid-term, they are still important areas for developing a national tiger conservation strategy.

During wildlife surveys, tigers are rarely seen in the forest as they are widely dispersed at low densities and actively avoid humans. Camera-trapping studies, utilising a mark-recapture framework, (Karanth, 1995) is a powerful tool to estimate tiger densities but too expensive to be applied for large areas beyond a few selected priority sites. Hence, to gain a reliable estimate of the national tiger population is, then, an extremely difficult undertaking.

In the 1950s, it was roughly estimated that there were approximately 3,000 tigers in Malaysia (Locke, 1954). By 1977 the number declined to about 300 and in a decade it recovered to 600-650 animals (Khan, 1987) probably because the tiger was upgraded to the totally protected species in 1976. In 1990, based on surveys and verified reports of human tiger conflicts, the tiger population was conservatively estimated at 500 (Topani, 1990).

A more recent attempt for a crude population estimate was made based on typical prey biomass in tropical rainforests (Hoogerwerf, 1970; Seidensticker and Suyono, 1980; Seidensticker, 1986; Kawanishi and Sunquist, 2004), energetic needs of tigers (Sunquist, 1981), estimated tiger densities from studies carried out in tropical Asia (Griffiths, 1994; O'Brien *et al.*, 2003; Kawanishi and Sunquist, 2004; Linkie *et al.*, 2006; Darmaraj, 2007) and available tiger habitats in Peninsular Malaysia (Kawanishi *et al.*, 2003). The available information indicates that it is reasonable to assume the mean tiger density estimates in tropical forests falling somewhere between 1 and 3 tigers/100km² as earlier suggested by Santiapillai and Ramono (1987). Then the confirmed and expected tiger habitats of 49,300km² could support between 493 and 1,480 adult tigers (Kawanishi *et al.*, 2003). The wide range is typical of non-scientific guesstimates.

There are no demographic data on a wild Malayan tiger population. If we assume that 25% of a typical tiger population consists of cubs as suggested by Karanth and Stith (1999), the total potential tiger population is estimated at 657 to 1,973 tigers in Malaysia. Note, however, that this figure does not include the tigers recorded in the possible tiger habitats and assumes that the expected tiger habitats actually do support tigers. Some data were collected more than 15 years ago and thus the distribution status indicated by these old data may no longer be valid. See Kawanishi *et al.* (2003) for other limitations of the analysis.

Taking the lower bound of 493 adult tigers, if the assumptions are correct, Malaysia could be supporting the largest tiger population in Southeast Asia. Studies on the nationwide tiger occupancies and densities estimates from more sites including mountain forests will allow us to test the prediction.

1.4 Opportunities

Before discussing the threats to tigers, national policies and legislation already in place to protect tigers, their prey and habitats are presented in this section. Malaysia's stable socio-economy and conservation partnership for tigers are also presented as unique opportunities that need to be further harnessed to strengthen the tiger conservation efforts.

1.4.1 Pro-conservation national policies

Under the Malaysian Constitution, land-use is a State matter and the Federal government has no power over this except for Articles 83-86 and 88 which deal with the reservation and disposition of land held for Federal purposes. However, the Federal government may legislate to the extent of ensuring common policies over land matters and a common system of land administration, though such legislation again has to be ratified by the respective states. The Federal government may also extend its executive authority in the form of advice and technical assistance to the states. In this respect, the federal level councils, such as the National Physical Planning Council, National Forestry Council, and National Biodiversity Council, are empowered to coordinate the planning, management and development of respective natural resources. The following three policies and one plan are considered relevant to tiger conservation.

1.4.1.1 National Policy on Biological Diversity

Malaysia became a signatory of the Convention on Biological Diversity in 1994. As a result, the *National Policy on Biological Diversity (NPBD)* was drawn up by the Ministry of Science, Technology and Environment in 1998. This Policy serves as a guide towards conservation and sustainable management of Malaysia's rich natural resources and is implemented by the Ministry of Natural Resources and Environment.

There are 15 strategies towards achieving the objectives of the policy, and almost all are reflected in this Plan:

- i. Improve the scientific knowledge base
- ii. Enhance sustainable utilisation of the components of biological diversity
- iii. Develop a centre of excellence in research in tropical biological diversity
- iv. Strengthen the institutional framework for biological diversity management
- v. Strengthen and integrate conservation programmes
- vi. Integrate biological diversity considerations into sectoral planning strategies
- vii. Enhance skill, capabilities and competence
- viii. Encourage private sector participation
- ix. Review legislation to reflect biological diversity needs
- x. Minimise impacts of human activities on biological diversity
- xi. Develop policies, regulations, laws and capacity building on biosafety
- xii. Enhance institutional and public awareness
- xiii. Promote international cooperation and collaboration
- xiv. Exchange of information
- xv. Establish funding mechanisms

The policy also acknowledges that current legislative support and conservation efforts are inadequate for holistic biodiversity conservation and further highlights the need for measures to alleviate the impact of human activities resulting in displacement of wildlife.

1.4.1.2 National Physical Plan

The *National Physical Plan* (NPP) is Malaysia's first national blueprint for spatial planning and was published by the Department of Town and Country Planning in 2005. The NPP Council is chaired by the Prime Minister of Malaysia and this statutory document is being used to guide the National Five Year Development Plans leading towards the achievement of Vision 2020. Furthermore, the Plan also guides State Planning Committees and local planning authorities when formulating their respective Structure and Local Plans. Most relevant to the Tiger Action Plan is that the NPP sets a spatial framework for sustainable development and delineates important conservation areas for biodiversity and environmental protection purposes in a landscape ecology perspective.

Under the NPP, 36 policies provide a framework for sustainable development, including safeguarding the environment and biodiversity. Two of these 36 policies are of specific importance to the aim of this Tiger Action Plan, namely Policy 18: Environmentally Sensitive Areas (ESAs) and Policy 19: Central Forest Spine (CFS). Realisation of the two policies is crucial for securing the long-term future of landscape species, such as the tiger, as they provide the main tools by which large-scale land-use issues can be brought in-line with conservation efforts. This is expected to be achieved primarily through the identification and protection of ESAs and establishing green linkages through the Central Forest Spine (CFS) and strict control and sustainable development of highlands and coastal zones.

The three priority tiger landscapes identified in this Plan (Sec 1.3) fall within the CFS, complimenting current national policies and thereby reaffirming this Plan.

1.4.1.3 National Forestry Policy

Because individual states have complete jurisdiction over forestry matters, in order to ensure a common approach to forestry issues, the National Forestry Council was set up under the National Land Council in 1971. The National Forestry Council is the highest decision-making body on forest issues, representing a forum where head of states and federal governments discuss and decide on forest-related issues. The Council endorsed the *National Forestry Policy* in 1978. This Policy's objectives are to conserve and manage the nation's forest based on the principles of sustainable management and to protect the environment as well as to conserve biological diversity, genetic resources and to enhance research and education.

1.4.1.4 National Policy on the Environment

In keeping abreast with the country's rapid economic development and to meet with the nation's aspiration for an improved quality of life, the *National Policy on the Environment* 2002 integrates the three elements of sustainable development: 1) economic development, 2) social and cultural development, and 3) environmental conservation. The Policy aims to achieve: 1) a clean, safe, healthy and productive environment for present and future generations; 2) the conservation of the country's unique and diverse cultural and natural heritage with effective participation by all sectors of society; and 3) a sustainable lifestyle and pattern of consumption and production.

1.4.2 Obligations under international conventions

Internationally, Malaysia became a signatory to the Convention Concerning the World Cultural and Natural Heritage (World Heritage Convention) in 1988 although no sites in Peninsular Malaysia have yet been nominated for inscription on the World Heritage list. Likewise, no sites have been designated under the UNESCO Man and the Biosphere Programme.

Malaysia became party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1977. All tiger subspecies are listed in Appendix I of the CITES, which prohibits international trade of live tigers, their parts and derivatives for commercial purposes. DWNP is the local Management Authority for the CITES-regulated terrestrial faunal species.

The commercial international trade in all tigers and their body parts and derivatives was banned in 1987 under CITES. In 1994, CITES Parties agreed that additional measures for the protection of tigers were necessary, including the specific acknowledgment of threats posed by unsustainable trade in tiger parts for use in traditional medicine. CITES Parties then adopted a resolution (*Resolution Conf. 12.5*) to urge States

around the world to do everything possible to help conserve the tiger in 2002.

In Peninsular Malaysia, there are multiple CITES Management Authorities, which are responsible for the implementation of CITES. DWNP, however, has been historically the first point of contact for the CITES Secretariat and is the principal Management Authority. The Ministry of Natural Resources and the Environment (NRE), is the sole Scientific Authority for the country while the National Committee on CITES is a permanent committee that oversees the implementation of CITES in Malaysia. This structure may be changed in the near future, to strengthen the implementation of CITES in Malaysia. The Protection of Wild Life Act 1972 covers the protection of most CITES-regulated species in Peninsular Malaysia.

1.4.3 Existing administrative and legislative structure and enforcement agencies

Nationally, statutes relating to biological resources are in force at both state and federal levels, rendering a complexity in approach. Many of these legislations are currently under review for amendment. Therefore changes are likely and improvements are expected in the near future. There are a number of legislations related to the conservation of tiger habitat or protection of tigers, the most relevant of which are as follows.

1.4.3.1 Protection of Wild Life Act

The Protection of Wild Life Act 1972 (amended in 1976 and 1988) is the main legislation concerning wildlife in Peninsular Malaysia, which is enforced by DWNP. The tiger is a totally protected species under the Act and a conviction for shooting, killing or taking tigers (and parts thereof) carries the penalty of a fine not exceeding RM15,000 (USD4,000) or no more than five years imprisonment. The tiger, Sumatran rhinoceros and clouded leopard *Neofelis nebulosa* are afforded with the highest protection under the Act. Tigers' primary prey species, wild boar, sambar deer, and barking deer are protected game species for which hunting is restricted by licensing. In PAs, however, all forms of fauna and flora are totally protected. Steel wire snares are banned and offenders possessing more than 25 snares incur a mandatory jail sentence of up to ten years. For less than 25 snares, an offender is liable to a maximum fine of RM5, 000 (USD1,300) and/or imprisonment up to five years. The Act is currently being amended and the new legislation is expected to allow for higher fines and longer jail sentences for poaching tigers.

The use of registered firearms, for the purpose of hunting of game species, is regulated through licensing by DWNP, and Malaysia's strict *Firearms Act 1971*, which carries a mandatory death sentence, effectively reduces the hunting pressure using firearms.

1.4.3.2 Sale of Drugs Act and the Control of Drugs and Cosmetics Regulations

One of the main threats to tigers comes from the trade in tiger parts for use in traditional medicines. Important legislation relevant to Traditional Chinese Medicines (TCM) are the *Sale of Drugs Act 1952* and the *Control of Drugs and Cosmetics Regulations 1984* that regulate the sale and import of drugs in Malaysia. The Drug Control Authority (DCA) of the Ministry of Health is the executive body established under the Regulations whose main task is to ensure the safety, quality, and efficacy of pharmaceuticals and health and personal care products that are marketed in Malaysia. In accordance with the legal requirements of the Act and the Regulations, the *Guidelines for the Registration of Traditional Medicines* were drawn up by the DCA.

As of 1992, all traditional medicines must be registered under the *Sale of Drugs Act*. The DCA also ensures that all registered products are labelled according to stipulated labelling requirements. A product will be registered only if it satisfies all the requirements of the DCA through laboratory screenings, especially with respect to safety, efficacy, and quality of the product. After a product is registered, the applicant can apply for a licence for it to be manufactured, imported, or wholesaled (Ng and Burgess, 2004).

Every registered product is given a registration number, which must be printed on its label or package. These numbers start with 'MAL' or 'PBKD', followed by 6 or 8 digits, and ending with the letter 'T' for traditional medicine products (Pereira *et al.*, 2002).

1.4.3.3 National Parks Act

The National Parks Act 1980 (amended in 1983) provides for the establishment of national parks and

applies to Peninsular Malaysia. It is implemented by DWNP. The Act, as amended, allows the appropriate Federal Minister to request that any state land be reserved for the purpose of a national park, although this has no legal force without the assent from State authorities. Despite the federal budgetary allocation for the park management, the states have been cautious to establish new conservation sites, with the only one exception being the Penang National Park in 2003. Taman Negara was established before this Act and the power of the Act does not apply to the park.

Other legal instruments for the establishment of protected areas in Peninsular Malaysia include the National Land Code 1965, Local Government Act 1976, Johor National Parks Corporation Enactment 1989, Perak State Parks Corporation Enactment 2001, and (amended) Perlis Forestry Enactment 2001.

1.4.3.4 Taman Negara Enactments and Taman Negara Master Plan

The Taman Negara National Park was established by three separate enactments, which cover the three states the park spans:

- i. Taman Negara Enactment (Pahang) No. 2 of 1939
- ii. Taman Negara Enactment (Kelantan) No. 14 of 1938
- iii. Taman Negara Enactment (Terengganu) No. 6 of 1939

The content of the three enactments are similar. These enactments empower DWNP to manage Taman Negara as one National Park in accordance to the *Taman Negara Master Plan* (DWNP, 1987).

1.4.3.5 National Forestry Act

The *National Forestry Act 1984* (amended in 1993) was formulated to standardise and update the various State Forest Enactments, which were adopted in the early 1930s and enables the Forestry Department to implement the National Forestry Policy. The Act provides for the administration, management and conservation of forests and forestry development throughout Peninsular Malaysia and is enforced by the respective State Forestry Departments. It classifies the Permanent Reserve Forests into eleven categories depending on its purpose and ensures that production forests are managed sustainably and the virtues of other forest types are protected permanently. Apart from production forests where logging is allowed, protection forests are broken down to ten categories depending on specific purposes: soil protection, soil reclamation, flood control, water catchment, forest sanctuary for wildlife, virgin jungle reserve, amenity, education, research, and forest for federal purposes. State governments have formally agreed to adopt the categories and restrictions on use in each category, although these differ slightly from state to state.

Since 2002, Perlis, Kelantan and Selangor, have amended their respective National Forestry Enactments (the National Forestry Act as adopted by the individual states) to create an additional category of forest use, i.e. "state park". Selangor was the first to use this approach to gazette the Selangor Heritage Park in 2007.

To further supplement forest management and harvesting plans, the Forestry Department has adopted regulations and guidelines for sound forest harvesting, including 'Standard Road Specifications' and 'Forest Harvesting Guidelines' with special emphasis on environmental conservation measures. These regulations and guidelines are incorporated into harvesting licences issued to logging contractors and their implementation is monitored and supervised by State Forestry Departments' personnel.

1.4.3.6 Town and Country Planning Act

Conservation is specifically recognised to be an essential element of land-use planning under the *Town and Country Planning Act 1976*, which is enforced by the Department of Town and Country Planning (DTCP). The Act gives the provision to the state and local authorities to set aside certain land to be conserved and protected in one way or another. However, the form and content of the *Town and Country Planning Act* adopted by states may differ significantly from the parent Federal Act. Rather than as a mandate, the Federal DTCP advises the state DTCP in the state land management plan.

1.4.3.7 Environmental Quality Act

Besides regulating the sources of possible pollutants to the environment, the *Environmental Quality Act 1974* was amended to include Environmental Impact Assessments in 1985 which came into force in

1987. It is enforced by the Department of Environment. Detailed EIAs prepared by the project proponent are required by law to be made available to the public who are afforded an opportunity to comment on the Detailed EIA. The Environment Quality Act, Order 1987 contains a list of Prescribed Activities for which Detailed EIAs are required to be undertaken by the project proponent. For activities that do not fall under the list of Prescribed Activities, Preliminary EIAs may be prepared but these are exempted from the public participation process. Prescribed Activities involving logging and land conversion of forests are as follows:

- i. land development schemes converting an area of 500ha or more of forest land into a different land-use;
- ii. drainage of wetland, wildlife habitat or virgin forest covering an area of 100ha or more;
- iii. land-based aquaculture projects accompanied by clearing of mangrove forests covering an area of 50ha or more;
- iv. conversion of hill forest land to other land-use, covering an area of 50ha or more;
- v. logging or conversion of forest land to other land-use within the catchment area or reservoirs used for municipal water supply, irrigation or hydro-power generation or areas adjacent to state and national parks, and national marine parks;
- vi. logging covering an area of 500ha or more;
- vii. conversion of mangrove forests for industrial, housing or agricultural use covering an area of 50ha or more;
- viii. clearing of mangrove forests on islands adjacent to national marine parks; and
- ix. other activities which may affect forest, such as coastal reclamation.

1.4.4 Stable socio-political and economic system

As more and more tigers live in human-dominated landscapes, they have to contend with a myriad of threats brought by human activities. This is why their survival largely depends on the people who share the same landscapes. When the basic livelihoods of people are threatened by political unrest, social turbulence and unstable or unbalanced economies, wildlife suffers. In many countries where the rural poor are struggling for bare essentials such as clean water, cooking fuel, electricity, and sanitation, there is a perception among conservation and humanitarian organisations, a fairly recent concern for the former, that the first need is to alleviate the poor living conditions of the people with whom, for example, tigers have to share limited resources. Furthermore in nations where people's basic needs are not secured, it is difficult for the government to commit itself to saving wildlife before saving its people; yet such high level commitment is what is most needed to save the big cats (Jackson, 1997; Thapar, 1999; Dinerstein *et al.*, 2007).

Whether poverty alleviation actually makes a significant positive contribution towards conservation goals is unclear, but this is not of high, immediate concern for tigers in Malaysia, for the basic needs of most Malaysians are met, and poverty levels are among the lowest in the tiger nations (CIA, 2007).

Malaysia has one of the strongest Tiger Economies next to Singapore and Hong Kong. After the Asian financial crisis in 1998, Malaysia was the first to recover among the Southeast Asian tiger nations.

While maintaining steady national economic growth, the government strives to eradicate rural poverty by improving welfare, youth and sports programmes, education, agricultural subsidies, low-income housing and health care. Malaysia is also one of a few countries in Southeast Asia where racial harmony is maintained. Malaysia, in fact, has bilateral agreements with the governments of neighbouring countries to assist them in improving social harmony.

Educated people tend to be more vocal in defending their interests and confronting unrepresentative governments. Research found that civil and political liberties are linked positively to improved governance, which in turn is positively associated with per capita income, quality of health care, and sustainable environment (Thomas *et al.*, 2000). Due to the distortion it introduces into the policy-making process, corruption is incompatible with sound natural resource (such as logging) or environmental management. The level of corruption is expected to be high in politically unstable, low-income nations (Transparency International, 2001). Among the tiger nations, Malaysia is the second-least corrupted nation after Bhutan (Transparency International, 2006).

Government accountability and transparency, together with the political will to prioritise conservation issues, are all important prerequisites for allowing the effective expenditure of conservation funds and for gaining public support. The case of the tiger reserves in India is a good example of how, despite lucrative

financial allocations, the lack of these three requirements can still result in disaster (Thapar, 1999; Gupta, 2005; Dinerstein *et al.*, 2007).

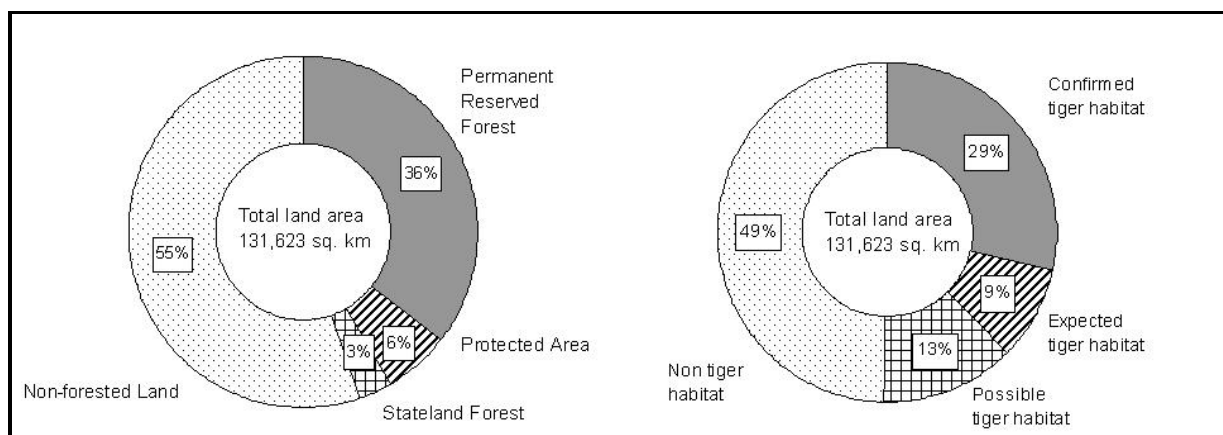
Malaysia, however, has the political will and reasonably effective anti-corruption measures necessary to avoid a tiger disaster. The Malaysian government has made clear its priority to conserve wild Malayan tigers by seeking to consolidate national expertise, through the initiation of the Malaysian Conservation Alliance for Tigers (MYCAT) in 2003 (Sec. 1.4.6). In fulfilment with the fifth objective of the NPBD to enhance the scientific knowledge on biodiversity, DWNP has supported external tiger research projects such as those conducted by WWF-Malaysia, New York-based Wildlife Conservation Society, and the University of Florida in the past decade. DWNP is in the process of doubling its manpower and once the positions are filled, 17 entry/exit points in nine states will be manned permanently in an effort to eradicate illegal wildlife trade (Misliah, B., DWNP, pers. comm.). Enforcement efforts are further strengthened by cooperation with the Royal Malaysian Army, Anti-smuggling Unit of the Royal Customs and Excise Department, Immigration Department and Royal Malaysian Police. With the support from the Army, for example, DWNP had arrested an unprecedented number of foreign poachers, 75 in the Protected Areas between 2001 and 2005 (DWNP, unpublished data). In addition to the existing enforcement units, to forge better networking among the staff with the intention to strengthen actions and produce efficient results, DWNP established a flying squad called the Wildlife Crime Unit in 2005.

These social contexts are not merely a background to biophysical requirements for tigers' long-term survival. A stable socio-political system and economy, coupled with sound conservation priority, are important for successful and cost-effective tiger conservation. So are the education and governance of the people. This is why Malaysia stands a good chance of saving its tigers in the long run.

1.4.5 Contiguous forests and wide tiger distribution

As mentioned in the preceding Sec. 1.3, based on the data collected between 1991 and 2003, Malayan tigers are widely distributed in existing forests and even in non-forested habitats. There appeared many small tiger populations still surviving in isolated forests such as the Krau Wildlife Reserve (624km²) and Kemasul Forest Reserves (460km²) in Pahang, Mercang Forest Reserve (87km²) and Rasau-Kertih Forest Reserve (168km²) in Terengganu and Jemaluang-Tengaroh Forest Reserves (168km²) in Johor with little or no protection on the ground (DWNP, unpublished data). Whilst these populations may not be viable in the long run, they illustrate Peninsular Malaysia as a unique case where tigers are still found outside the major forest blocks or PAs. The tiger distribution is synonymous to the forest coverage (Fig. 3) and the proportion of tiger habitats vs. non-tiger habitats is similar to the proportion of forests vs. non-forests (Fig. 4).

Fig. 4 : Comparison of the forest coverage (FDPM, 2006) and the three categories of tiger habitat (Kawanishi *et al.*, 2003) in Peninsular Malaysia. Detailed descriptions of the three habitat categories are in Sec. 1.3.



Large contiguous forests, and therefore the largest contiguous tiger distribution in Peninsular Malaysia, are mainly found in the north of the Pahang River, in the Main Range to the west connected to the Greater Taman Negara Landscape to the east. At 49,181km², this area corresponds with the 5th largest landscape of the 76 Tiger Conservation Landscapes identified in Asia and assumes a significant conservation value to the global tiger conservation effort (Dinerstein *et al.*, 2006). More than 50% of the tiger habitat fall within forests with good conservation value and the majority of the remaining forests are managed by FDPM as PRFs or DWNP and other state agencies as PAs (Sec 1.3). Encroachment and land-use changes threaten

PRFs, but a majority of tiger habitat appears to be secured from large-scale forest conversion. Forest fragmentation such as that caused by road construction is of a greater concern (Sec 1.5.1).

1.4.6 Conservation partnership, MYCAT

"The future of the tiger lies in reaching out and forging and sustaining key partnerships."

- John Seidensticker, Sarah Christie and Peter Jackson, *Riding the Tiger*, 1999.

Those working to save wild tigers have come to recognise there is no "silver bullet"; saving wild tigers requires supportive tiger range governments in partnerships with NGOs and individuals, engaged in continued actions at multiple scales to contain and reduce threats over the long term (Seidensticker, 1997; Gratwicke *et al.*, 2007). Besides addressing the multitudes of threats directly, what is also needed in this century is a major shift in human values, interests, and behaviour that will allow tigers and their prey to share their landscape with humans. Such changes in the fundamental values and perceptions of quality of life involve a long and complex process of conscious actions by many and varied stakeholders all driven by a shared vision and a willingness to work together.

Stakeholder engagement that starts with dialogues with immediate partners is vital in finding solutions to the challenging dilemmas in the human dimension of wild tiger conservation. Frequent and open dialogues strengthen and broaden partnerships; it is the best strategy to address the complex problems and create the solutions needed to sustain wild tiger populations.

Recognising the complexity of the challenges to conservation and importance of the partnership, international organisations are increasingly teaming up to share resources and expertise for wildlife conservation. Such alliances among groups that share similar goals can result in mutually beneficial programs. Partnerships increase efficiency by reducing duplication in effort and provide more innovative solutions to problems by bringing people together with a variety of experiences and perspectives. They strengthen public influence by pooling support, and further reduce inter-organisational conflicts through open communication and long-term collaboration, based on understanding. In its *National Policy on Biological Diversity 1998*, the Malaysian government recognises the importance of partnerships in biodiversity conservation.

As the lead government agency for wildlife conservation in Malaysia, DWNP promotes the integration of and collaboration with conservation partners in reaching the goal of conservation excellence.

For an integrated approach to conservation, close coordination amongst researchers, members of the public and the policy makers, is crucial. With the overarching spirit of partnership, DWNP initiated the Malaysian Conservation Alliance for Tigers (MYCAT) in 2003 (Siti Hawa and Kawanishi, 2003). It is chaired by the Director General of DWNP and the MYCAT Secretariat's Office (MYCAT SO) is led by the DWNP Division Director of Biodiversity Conservation.

MYCAT is an alliance of conservation organisations with a unified goal of saving the Malayan tiger in the wild. MYCAT's primary objective is to provide a formal yet flexible platform for information exchange, collaboration, and resource consolidation among the conservation partners. It is the first Malaysian partnership to be focused exclusively on the conservation of tigers, their habitat and prey species. Internationally, it is the first formal coalition of tiger conservation organisations initiated and led by a national government. The current partners of MYCAT are: DWNP, MNS, TSEA, WCS and WWF-Malaysia.

The alliance's primary function emphasises the importance of communication among the partners. Enhanced knowledge of the focused areas and strength of the others help each partner ascertain ways to compensate weaknesses and share benefits while avoiding duplicities towards the common goal. As a result of increased communication, MYCAT has experienced the benefit of consolidating resources such as funds, manpower, information, and expertise, across institutional boundaries, leading to the development of this National Action Plan.

To better facilitate close and regular communication, the MYCAT Working Group was established in March 2005. The members are representatives from the partner organisations. The Working Group meets quarterly to update and learn from each other the status of their respective tiger work, and discuss relevant issues or joint projects. Besides the quarterly meetings, subsets of the Working Group, consisting of personnel directly involved in joint projects, meet more often. Some of the members are trained biologists and thus are able to provide technical advice to partner organisation's research projects or

provide timely, ecologically sound information to policy makers on conservation issues ranging from an Environmental Impact Assessment on a development project in a critical wildlife corridor area to management of tigers in Human-Tiger Conflict situations.

The MYCAT SO receives institutional support from DWNP and financial support from external donors. Strategically located in the DWNP Headquarters, MYCAT SO serves as a hub of communication among the partners through Working Group meetings and other conventional communication means, as well as with the members of the general public through a media network, publications and the MYCAT e-group (http://groups.yahoo.com/group/malaysian_cat/). A case study of MYCAT's web-based communication is presented in Sec 1.6.2.4. Since 2003, more than 1,700 e-news and discussion items have been registered in the MYCAT e-group. The partners provide space in respective publications such as MNS' *Pencinta Alam* and the *Malaysian Naturalist* to raise public awareness and promote tiger conservation. In addition, the partners have jointly raised funds from international donors and the local corporate sector to support basic operational costs and joint projects. Besides the joint fundraising and in-kind support, the partners have directly contributed funds to MYCAT joint projects, such as WWF-Malaysia's contribution to the costs of drafting of this Plan or all partners' contribution to printing of the annual newsletter, *MYCAT TRACKS*, in 2005.

In addition to providing a platform for communication, since 2005, MYCAT has expanded the scope of its partnerships by collaborating on joint projects coordinated by the MYCAT SO and led by an individual partner. Some of the notable examples are the DWNP *Malayan Tiger Conservation Workshop*, DWNP Taman Negara community outreach, WCS *Teachers for Tigers* (T4T) Zoo Educators Training Course, and TSEA Media Workshop *Media Tigers*. In 2007, MYCAT SO led a series of targeted campaigns against the local trade and consumption of tigers and their prey with newly identified partners at local levels such as the Johor National Parks Corporation and a local communications agency, 9-Lives Communications Sdn Bhd. The MYCAT network enables campaigns like this to be mobilised using a unique approach; the community outreach programmes in tiger trade hotspots are closely coordinated with DWNP's law enforcement arm.

In effect, MYCAT fulfils eight strategies in the *National Policy on Biological Diversity* as follows:

- i. Strengthen and integrate conservation programmes (Strategy V)
- ii. Improve the scientific knowledge base (Strategy I)
- iii. Exchange of information at the local and international levels (Strategy XIV)
- iv. Enhance institutional and public awareness (Strategy XII)
- v. Promote international cooperation (Strategy XIII)
- vi. Determine funding mechanisms (Strategy XV)
- vii. Encourage private sector participation (Strategy VIII)
- viii. Enhance skill, capabilities and competence (Strategy VIII)

Through the collaborative platform, the conservation partners try to balance competing interests and institutional differences for the effective implementation of the Action Plan. MYCAT is still a relatively new initiative, yet, the benefit of the alliance is clearly felt by all the partners. One of the challenges faced by MYCAT is quantifying the positive impact of from the partnership on wild tigers in Malaysia. In the immediate future, the success of MYCAT will be reflected in the implementation and monitoring of the progress of this Plan (Sec 2.7).

1.5 Key Threats

Most declining tiger populations are threatened, primarily, by habitat loss and fragmentation, commercial poaching, Human-Tiger Conflict, declining prey base, and science deficiency in monitoring of tiger and tigers' prey (Nowell and Jackson, 1996; Seidensticker, 1997; Karanth et al., 2002; Sunquist and Sunquist, 2002; Myanmar Forest Department and Wildlife Conservation Society, 2003; Bhutan Department of Forests, 2005).

In Malaya, during colonial times, tigers were hunted for sport, and bounties were paid for tigers killed as a measure of pest control (Locke, 1954; Blanchard, 1977), which undoubtedly contributed to the earlier decline of tiger populations. After Malaya's independence from Britain in 1957, tigers continued to be actively hunted to make way for agriculture and development. In 1976, the species was finally listed as a totally protected species under the Protection of Wild Life Act 1972. Today, tigers can only legally be killed in Malaysia under exceptional circumstances where they threaten lives or property, and by law, any such

incidents must be reported to DWNP.

While a loss of genetic diversity is potentially a problem for tigers, large carnivores, especially felids, are known to maintain naturally low genetic heterozygosity. Even in a small population, say less than 50 individuals, a low level of genetic exchange of one male per generation appears sufficient to maintain genetic health (Sunquist and Sunquist, 2001). As we are most concerned about the next 100 years, the loss of genetic diversity or consequence of inbreeding is considered insignificant in comparison to other threats described in more detail below.

1.5.1 Habitat loss and forest fragmentation

The endangered status of the tiger in the larger part of the last century is a direct consequence of habitat loss and active persecution of tigers. The frequently quoted estimate of a reduction in tiger numbers from 100,000 to 5,000 during the 1900s directly reflects the severity of the habitat loss (Sec 1.3). Today, tigers number less than 3,000 as the cumulative impacts of all threats mentioned above in the recent past have taken a devastating toll, especially on India's populations that used to constitute more than half of the total number of wild tigers.

Although Malaysia still retains 45% of the land area as forest cover (FDPM, 2006) and there are other habitat types that support tigers (Kawanishi *et al.*, 2003), the loss of majority of lowland forests in the last century certainly caused a great decline in the numbers of many large mammals, including tigers. Displaced animals have a higher tendency to be involved in conflict situations with humans, and are either physically removed by the authorities or killed by locals (Zainal Zahari *et al.*, 2001). The Javan rhinoceros *Rhinoceros sondaicus* is extinct; the Banteng *Bos javanicus* with a few alleged sightings may be ecologically extinct in Peninsular Malaysia (Aiken and Leigh, 1992), the Sumatran rhinoceros is critically endangered (IUCN, 2006) and the gaur exists in isolated populations of a few hundred in total (DWNP, unpublished data).

1.5.1.1 Rates of habitat loss in Malaysia

At the turn of the 19th century, primary rainforest covered over 90% of Peninsular Malaysia (Collins *et al.*, 1991). By 1957, the estimated forested cover had declined to 74% (Myers, 1980). However, since then, vast areas of lowland forest (<300m asl) have been converted to agricultural use by the Federal Land Development Authority (FELDA) and other state agencies. Forest cover declined further during the 1970s (61%) and 1980s (47%) with an annual loss of around 7,000 km² (Lanly, 1982).

By the mid-1980s, there were little remaining lowland dipterocarp forests outside of protected areas available for large-scale conversion and the overall proportion of the forest cover has remained steady during the past two decades under the *National Forestry Act 1984*. Most of the remaining forests are found in mountainous regions (which, naturally, support a lower density of large ungulates), namely the Main Range in the west, the Tahan Range in the centre, and the Eastern Range in the east and the majority of these are logged-over forests. By 1985, only 9.8% or 13,000km² of the land area was intact primary forest (Collins *et al.*, 1991). In Peninsular Malaysia where the deforestation rate has stabilised and its main economy has moved from the forestry sector to industry to service, it is not necessarily the loss of habitat *per se* but cumulative impacts of forest fragmentation due to construction of roads, pipelines and railways that may impose a greater lasting threat to the tiger.

1.5.1.2 Forest fragmentation

Life history traits of large mammals generally make them more vulnerable to the effects of forest fragmentation and smaller populations are more susceptible to extinction due to stochastic events (Soule *et al.*, 1979; Eisenberg and Harris, 1989). Seidensticker (1986, 1987) attributed the extinction of Balinese and Javan tigers mainly to extensive habitat fragmentation and the isolation of small forest blocks (less than 500km²) as well as the loss of critical ungulate prey.

To support a minimal viable population of six breeding females suggested by (Karanth and Stith, 1999), under strict protection with no poaching of tigers and tigers' prey, a reserve must be at least 1,000km² in tropical rainforest. This argument uses 1.6 adult tigers/100km² as the typical tiger density in tropical rainforest (Griffiths, 1994; O'Brien *et al.*, 2003; Kawanishi and Sunquist, 2004). Of 42 Protected Areas in Peninsular Malaysia, only Taman Negara and Belum are greater than 1000km². It is clear, then, that the

long-term survival of the Malayan tiger largely depends on improving protection mechanisms within the country's Forest Reserves (PRFs).

Currently, PRFs are criss-crossed by logging roads. Tigers that often come into contact with humans or livestock at the edge of PAs and on roads outside of PAs tend to be subject to relatively high mortality rates. Generally, the construction of linear features, such as roads or above-ground pipelines, result in habitat fragmentation and, thus, increases the potential for extinction in small populations by habitat removal and division (Schonewald-Cox and Buechner, 1992); the creation of barriers that inhibit the daily, seasonal and dispersing movements of animals (e.g. Fehlbeg, 1994); area avoidance (e.g. Mace *et al.* 1996; Lovallo and Anderson, 1996) and the provision of corridors for the immigration of non-resident species (e.g. Seabrook and Dettmann, 1996). More direct effects include disturbance of breeding activity (e.g. Reijnen *et al.* 1997) and, ultimately, an increase in levels of mortality (e.g., Bruindernik and Hazebroek, 1996; Putman, 1997; Philcox *et al.*, 1999; Woodroffe and Ginsberg, 1999).

The numerical impact of forest fragmentation to large mammal populations is virtually unknown in Malaysia. The analysis based on the data collected by DWNP between 1991 and 2003 shows that the construction of the North-South Highway that was completed in 1994 effectively eliminated tiger habitats west of the road. Spanning 966km in distance, it runs from Bukit Kayu Hitam in Kedah near the Malaysian-Thai border to Johor Bahru in southern Malaysia and is the longest highway in Malaysia. Tigers are reported every year in the east coast Malaysia where an improved transportation network is proposed with a high-speed rail connecting Kota Bharu at the Malaysian-Thai border and Johor Bahru, a multi-lane express way between Kuala Terengganu and Kuantan similar to the North-South Highway, and an upgrade of the existing coastal road (DTCP, 2005).

Forest corridors are imperative for the dispersal of sub-adult tigers, especially males. Without these corridors, the young dispersal-aged males are either killed by resident males or forced into inhospitable habitats and killed by humans as seen in the on-going case of the Florida panther (Smith, 1993; Maehr, 1997).

Maximising the size of contiguous, unfragmented protected areas and minimising the potential for conflict between tigers and humans is the single most important strategy for tiger conservation (Woodroffe and Ginsberg, 1998). In Malaysia where most PAs are too small to support viable tiger populations, the vast PRFs need to be considered as "unfragmented protected areas" of the future. The strengthening of enforcement and patrol efforts on main access roads near PAs in the Russian Far East has contributed to increased and stabilised populations of the Amur tiger despite fairly extensive poaching pressure on tigers (Kerley *et al.*, 2002; Miquelle *et al.*, 2005; Seidensticker, Save the Tiger Fund, pers. comm.). Collaboration with FDPM and other forestry sectors is critical to enhance the tiger's survival in Malaysia's vast PRFs.

1.5.2 Poaching and wildlife trade



Tiger parts © DWNP

While habitat protection is essential for the long-term survival of the tiger, illegal trade is a more urgent threat, having the greatest potential to do maximum harm in a short time (Nowell and Jackson, 1996). Tiger populations have been decimated in many parts of their former range due to illegal hunting for their skins, bones and other body parts (Banks and Newman, 2004; Shepherd and Magnus, 2004; EIA-WPSI, 2006; Nowell and Xu, 2007).

Throughout Southeast Asia, one of the main threats comes from the trade in tiger parts for use in traditional medicines. Many different cultures use tiger parts for their purported medicinal qualities (Chalifour, 1996), including the bones, blood, sexual organs and other parts. Bones are the most valuable part of the tiger, more so than the skin (Sunquist and Sunquist, 2002). In a number of countries, skins, skulls, claws and canine teeth are traded as trophies and talismans, and meat consumed in restaurants serving exotic dishes.

The frequency of apprehension of tiger poachers or finding poached tigers has been on average less than

one case per year, excluding the cases pertaining to the illegal possession of tiger body parts for which the origin is unknown (Table 2). The actual number is suspected to be higher, but the detection of “red-handed” cases is difficult and more realistic figures are not available. Despite the lack of actual figures of tigers poached, it is obvious that tiger poaching continues and is likely to be having an adverse impact on Malaysia’s tiger populations.

Table 2 : Tiger-related offences apprehended and fined either by court or DWNP from 1990 to 2006.

Type of Offence	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	Total
Stuffed tiger	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Skin	2	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	6
Bone and skull	1	1	2	0	0	1	0	0	0	0	0	1	0	2	0	0	0	8
Claw	3	1	3	0	0	0	1	0	1	0	0	0	0	2	0	0	0	11
Tooth	1	0	3	0	0	0	1	0	0	0	0	0	0	2	0	0	0	7
Penis	0	0	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	4
Meat	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Illegally imported	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Tiger killed	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	1*	0	4
Misc. case	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1*	0	1
TOTAL	8	2	11	3	1	2	2	1	1	0	0	3	1	7	2	3	0	47

* A tiger was found butchered and stored in a fridge.

** A tiger cub was 'rescued' or bought from a restaurant and handed over to DWNP.

Data source: Elagupillay *et al.*, 2001; Anon., 2002; Chandrasekaran, 2003; DWNP, 2004; Anon., 2004a; Anon., 2004b; Abdullah, 2005; Chia, 2005; Chiew and Teoh, 2005; DWNP, unpublished data.

Tigers are also killed in retaliation to livestock depredation (see Sec. 1.5.3.1). It is suspected that some of these “conflict” tigers also enter the illegal trade, as was found to be the case in Sumatra (Shepherd and Magnus, 2004), but the relationship between these mortalities and the trade are unclear here. Potential impact of poaching of tigers’ prey is discussed in Sec. 1.5.4.

1.5.3 Human-Tiger Conflict

DWNP defines Human-Tiger Conflict (HTC) as “attacks by tigers on humans or livestock, or the perceived fear of attacks”. The nature of the tiger and Man means that wherever the homes of either meet or overlap there will be conflict. Unfortunately, this overlap happens far too often as both species seek the benefits associated with lowlands with relatively fertile soils and the mechanisms for dealing with the consequences are lacking on the whole. As a direct result of this, tigers are pushed up into higher and less productive grounds and now, as discussed earlier, inhabit only a fraction of their original habitat.

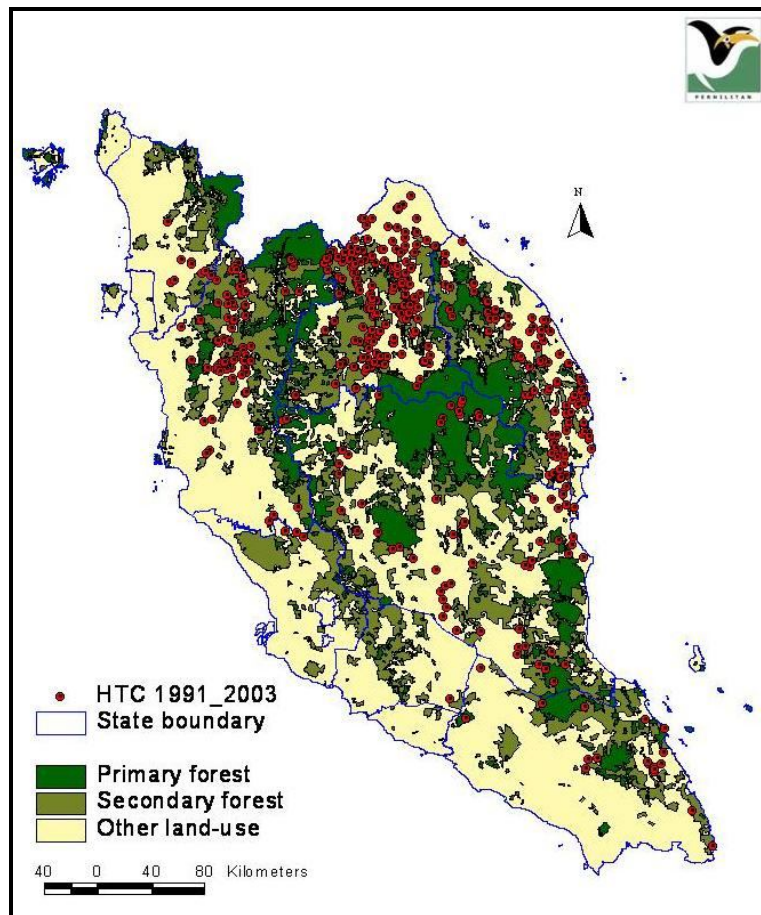
Further exacerbating the problem is people competing with the tiger for large ungulates as a source of protein. This has effectively reduced the carrying capacity of remaining forests for tigers whilst encroachment into the forest has, through the concept of the “edge effect”, increased the likelihood that tigers, an ecotone species and naturally drawn to such areas, will encounter humans and their livestock. Such encounters invariably result in the death of livestock, or in rare but extreme cases, humans. Both will lead to the removal of the tiger. Inappropriate management of some human interests, such as commercial plantations and livestock, augment this clash and, in some areas of the world, HTC has become a significant source of tiger mortality.

Ultimately, the impact of HTC on tiger conservation is compounded immeasurably as people who fear for their safety or perceive economic risks from tigers will not generally support conservation agendas. It is also suspected that poachers operate in high HTC areas in Sumatra, turning problem tigers into cash (Shepherd and Magnus, 2004).

In Malaysia, when HTC events are reported, a response team is dispatched as soon as possible and such a rapid response is a routine task for the DWNP. Cases of HTC in Malaysia, consistently over the years, constitute only around 4% of general human-wildlife conflict events, whilst frequencies of those involving, for example, long-tailed macaques *Macaca fascicularis*, elephants and viverrids are 54%, 17%, and 6%, respectively (DWNP, 2004).

All states with tiger populations are affected by HTC (Fig. 5) and between 1991 and 2006, 2,398 HTC complaints, including tigers attacking humans, livestock, or merely tigers sighted by villagers, were filed at an average of 160 cases annually. The number of cases reported is in decline (from 355 cases in 1999 to 123 cases in 2006) but the reasons behind this are unknown as data is incomplete (DWNP, unpublished data).

Fig. 5: Location of Human-Tiger Conflict cases reported to DWNP between 1991 and 2003.



Source: DWNP, unpublished data

1.5.3.1 Livestock depredation

Incidence of livestock depredation by tigers increased substantially in the 1970s due to a combination of two factors; the conversion of forest for other land use and the introduction of large scale livestock farming either on commercial basis or subsistence farming. This led to the killing of tigers by farmers and farm managers in defence of their livestock. As a result the DWNP had to undertake management interventions to resolve the conflict and protect the tiger population. One of the interventions was the creation of Tiger Management Units at the state level and a Tiger Research Unit headed by Richard Blanchard from the

American Peace Corps (Elagupillay, 1983). To resolve the increasing livestock depredation by tigers, Tiger Management Units were deployed to devise methods to trap such tigers rather than kill them.

About 23% of 204 HTC complaints filed in 2005 and 2006 constituted livestock depredation cases. The minimum economic losses estimated for 72 cattle and 12 goats were RM124,750 (DWNP, unpublished data). The seriousness of livestock depredation is probably much greater, however, as a gross disparity between the number of cases reported to DWNP and that to the Department of Veterinary Services (DVS) indicates that only a small fraction of cases is reported to DWNP. There is no compensation for loss, but because many breeding cows are on loan to the farmers by DVS, the loss has to be reported to DVS before applying for another loan (Noraini Kanis, Division of Livestock Commodity Development, Department of Veterinary Service, pers. comm.).

It is also important to note that the figure represents only those cases that are reported to DWNP headquarters, where annual statistics are calculated; there are an additional number of reports that only get as far as the state-level agencies and maybe many more that go completely unreported. For example, according to records kept by the Terengganu DVS, the average number of cattle reported killed by tigers in that state, between 1999 and 2003, was 309 per year. At an estimated value of RM1,200 per head of cattle, this represents a loss of almost RM2 million over the five year period, or RM380,000 annually (Sharma *et al.*, 2005; WWF-Malaysia, unpublished data). A site-specific and detailed study of livestock depredation patterns in Jerangau Barat, Terengganu shows that, within only a six month period, 53 heads of cattle were killed by tigers with one particularly busy night that saw as many as 30 heads of cattle killed (Sharma *et al.*, 2005).

Upon receiving a report, the relevant DWNP state office dispatches a response team to investigate the site and decide on further action following the stipulated guidelines (DWNP, 2006). Subsequent actions depend on the seriousness and urgency of the situation and include: monitoring, patrolling, drive-off shooting, trapping for placement in zoo, and shooting to kill.

Public safety is DWNP's priority and the team will advise farmers on safety measures and on ways to improve plantation and livestock management. DWNP also collaborates with police and Angkatan Relawan Malaysia (RELA), Malaysia's voluntary enforcement force, to enhance public safety. Frequent dialogues with those affected by HTC are important, if only to motivate communities to protect themselves effectively and DWNP does this on an informal basis. Villagers often assist the team with their investigations and may also be called upon to assist with subsequent actions. A community outreach programme, to enhance the working relationship between remote communities and DWNP, has just started near some of the priority wildlife conservation areas, such as Taman Negara (Kawanishi, 2005; Kawanishi and Soosayraj, 2005).

1.5.3.2 WWF-Malaysia experience in Jerangau: success and lesson learnt

WWF-Malaysia's pilot mitigation project in Jerangau, Terengganu (Sharma *et al.*, 2005) showed that cattle depredation can be minimised if certain Best Management Practices (BMP) are applied to existing livestock husbandry systems. In the study, WWF-Malaysia assisted selected communities to build paddocks to house otherwise free-roaming cattle at night. Loss of cattle to tigers was, accordingly, prevented (for those who took part in the study) but a problem of continuity was identified, whereby, upon perceiving the threat to have been lifted, cattle owners would revert to allowing their animals to roam free at night. A longer-term solution, then, requires the programme participants to continue using these mitigation measures once support from organisations, such as WWF-Malaysia, have left. As Jerangau is one of many areas affected by livestock depredation by tigers, financial sustainability for replicating WWF-Malaysia's success is the biggest challenge. WWF-Malaysia is currently undertaking studies to identify economic approaches to HTC.

1.5.3.3 Attack on humans

Between 1979 and 2006, 31 attacks on humans were recorded by DWNP (an annual average of just over one person), half of which were fatal (Badrul Azhar, 2003; DWNP, unpublished data). The figures also reveal that rubber tappers are a relatively high risk group, being involved in 39% of the attacks. In contrast to reports of livestock loss, almost all cases involving humans are reported to DWNP with possible exceptions being those involving aborigines (*orang asli*) living in the forests. An inter-state comparison shows that 15 cases, or nearly 50% of attacks on humans, occurred in Kelantan, followed by seven cases in Pahang and three each in Perak, Terengganu and Johor.

Though the tragedy of people being killed cannot be ignored, we must put these incidents into the context of conservation priority. Overall, only about 2% of all tiger-related complaints detail attacks on humans, and this constitutes less than 0.1% of the combined total of all human-wildlife conflict events reported to DWNP (DWNP, unpublished data). Despite this relatively small number, these cases usually feature prominently in the local and vernacular media. Though interest in these cases is understandable, the sensationalising of the issue compounds the overall negative impact that HTC has on tigers. People learn to fear and, therefore, hate the animal.

1.5.3.4 Removal of tigers due to HTC



Tiger of Gua Musang @ DWNP

Tigers are removed from high conflict areas by either trapping for relocation to Zoo Melaka, DWNP's wildlife rescue centre, or in cases of where humans have been attacked, are shot as the last resort if trapping fails. Before 1981, all problem tigers were shot by DWNP for "agricultural protection"; between 1960 and 1967, 132 tigers were removed in this manner (Stevens, 1968). This practice, however changed, and DWNP began capturing problem tigers for relocation to zoos in 1981 (Ismail, 1981).

Since 1991, 13 tigers have been killed by the authorities whilst over the past decade 25 tigers have been captured and placed in Zoo Melaka (22) and Zoo Taiping (3) at an annual average of less than four tigers officially removed (DWNP,

unpublished data). The restrictions laid down by the PWA mean that these actions must be carried out by DWNP staff, occasionally assisted by the police or RELA. However, there is a clause in the law (Section 56) that allows any person to kill a tiger that poses an immediate danger to human life. Another clause (Section 55) allows landowner, occupier or his servant to kill tiger which is killing (or about to kill) livestock. In both cases, the person who has killed the tiger has a legal obligation to report the incident to DWNP and the remains of the tiger are the property of the state.

The annual average of 3-4 tigers removed does not, of course, incorporate the retaliatory killing of tigers by villagers and the difficulties associated with obtaining this kind of data means that its impact remains unknown. However, of 112 Felda Jarangau Barat settlers interviewed, around 22 (20%) admitted to having the intention to kill tigers if they continued to attack livestock. Though most settlers could not recall an actual figure when asked how many tigers had been killed in the area, one claimed that he knew of about 10 tigers killed in retaliation (Sharma *et al.*, 2005).

The overall decline in the number of HTC events reported to DWNP is not, necessarily, a cause for complacency as it could reflect any number of underlying causes, including a commensurate decline in tigers. The estimated tiger density in the forests surrounding Jeli, Kelantan is 2.59 tigers/100 km² (Darmaraj, 2007), the highest recorded density in Peninsular Malaysia. The removal of one animal a year would not seem to represent a significant threat to tiger populations, though further research is warranted. However, the frequent removal of resident tigers will have an impact on the stability of that population's land tenure system; one result could be an escalation in HTC.

1.5.3.5 Possible translocation of captured problem tigers

Tigers captured in HTC cases by DWNP are sent to zoos and are currently not considered for release back to the wild. The difficult but, in many respects, preferred option of euthanasia is avoided due to the risk of public outcry. Although it has tremendous appeal, the translocation or reintroduction of large carnivores, especially of those labelled as problem animals, is extremely difficult both socially and biologically (Breitenmoser *et al.*, 2001). Because tigers are wide-ranging and territorial predators, there is considerable risk and cost (both in terms of funding and manpower) involved in the release and subsequent monitoring.

Furthermore, there are currently no tried and tested methods for reliably monitoring post-release tigers in tropical rainforests, though recent advances in telemetry equipment are making this more and more feasible. Ultimately, however, this approach may merely result in relocating the problem itself, introducing

HTC into an area in which it had not been an issue before.

1.5.3.6 Relief Fund for Wildlife Attack Victims (*Tabung Bantuan Mangsa Serangan Binatang Buas*)

There is financial support available for tiger attack victims. The Relief Fund for Wildlife Attack Victims, set-up by the Malaysian Cabinet, has been operational since 2005. The fund is managed by the Ministry of Women, Family and Community Development under the Department of Welfare, with an annual grant of RM1 million. Either DWNP or the police are required to verify the authenticity of each claim and only serious injuries, causing permanent disability or death, qualify for compensation. The applicant has to be a Malaysian citizen who was not hunting, legally or illegally, at the time of attack. Cases in which an attack was provoked by the victim are automatically disqualified.

1.5.4 Depletion of Tiger Prey

The most important ecological determinant of tiger density is the abundance of large (>20kg) prey in a given area (Sunquist, 1981; Seidensticker, 1986; Karanth and Sunquist, 1995; Karanth and Stith, 1999; Sunquist *et al.*, 1999; Karanth *et al.*, 2004). Karanth and Stith (1999) used a stochastic demographic model to show that prey depletion has a strong impact on tiger populations by reducing the carrying capacity for breeding females, decreasing cub survival and, ultimately, decreasing population size. Similarly, prey depletion, due to adverse human impact, has been identified as a primary cause of decreasing tiger densities in 11 ecologically diverse sites around India (Karanth *et al.*, 2004).

A basic understanding of feeding ecology and prey population dynamics is needed. Little is currently known about the ecology of the Malayan tiger, let alone its feeding ecology or prey population dynamics (Sec. 1.1.2). Basic knowledge of general rainforest ecology provides some insight. For example, tropical rainforests, particularly those dominated by dipterocarps, tend to have low primary productivity at the ground level and, as a result, the diversity and abundance of browsers, such as deer, is naturally low (Eisenberg, 1980). The low density of ungulates coupled with the low visibility of the rainforest may affect the hunting strategy of tigers that use visual cue to locate a prey (Schaller, 1967). This leads to the assumption that rainforest tigers are opportunistic, rather than selective, hunters (Sec. 1.1.2). However, understanding of the basic large mammal energetics also tells us that tigers cannot live on only smaller mammals, such as mousedeer *Tragulus* spp. and pangolins *Manis javanica* (Sunquist *et al.*, 1999). In rainforests where very large ungulates (>40kg) are scarce, medium-size and abundant mammals such as wild pigs are likely to be important prey species for tigers.



Sambar deer © DWNP

The population status of the three expected primary prey species – wild pigs, barking deer and sambar deer – are even less understood than that of tigers. They are all protected species under the PWA, but all can be legally hunted with an appropriate licence from DWNP. Assuming a positive relationship between the number of photographs taken and the abundance of the species, 6,000 wildlife photographs taken in 13 camera-trapping studies carried out throughout Peninsular Malaysia give us some insights into the relative abundance of tiger prey. The studies jointly expended nearly 35,000 trap nights between 1998 and 2005 (Laidlaw *et al.*, 2000; DWNP/DANCED, 2002; Mohd Azlan and Sharma, 2003; Kawanishi and Sunquist, 2004; Ahmad Zafir *et al.*, 2006; Darmaraj, 2007; Lynam *et al.*, 2007).

We recognise the problems associated with relative abundance indices based on count statistics (Thompson *et al.*, 1998; Nichols and Karanth, 2002) and we do not assume a perfect detection probability of animals or equal and constant probabilities among different animals at different sites. Almost unequivocally at all sites, however, the most abundant ungulate species, excluding elephants, appear to be the wild pig, followed by barking deer and tapir. Photographs of sambar deer, serow and gaur were all rare with the majority of them taken in the protected area, Taman Negara (Table 3). Next to the Sumatran rhinoceros, of which no photographs were taken, the gaur appears critically rare. These data combined with DWNP inventory and licence data can be used to gain a deeper insight into the critical status of some

of the tigers' prey species needing urgent conservation actions.

Table 3: Preliminary analysis of the relative abundance of tigers' primary prey species based on 13 camera-trapping studies conducted in Peninsular Malaysia between 1998 and 2005.

Species	Total no. photos	No. sites recorded (Max no = 13)	Proportion of photos taken in Taman Negara (%)
Wild pig	2295	13	22
Barking deer	1391	13	42
Tapir	1156	12	46
Sambar deer	426	3	75
Serow	56	5	93
Gaur	10	2	90

Data source: Laidlaw *et al.*, 2000; DWNP/DANCED, 2002; Mohd Azlan and Sharma, 2003; Kawanishi and Sunquist, 2004; Ahmad Zafir *et al.* 2006; Darmaraj, 2007; Lynam *et al.*, 2007.

Relative abundance does not, however, give us any clues as to how much food, in terms of biomass, is available for tigers. In one of the 13 studies, in Taman Negara, the prey biomass was roughly estimated to be between 270 to 430 kg/km² and consists mainly of wild pigs and barking deer. This is comparable to other estimates suggested from Indonesian rainforests, all of which were below 500 kg/km² (Seidensticker, 1986). These biomass estimates are an order of magnitude less than biomass estimates from semi-tropical or seasonal forests in India that support ten times as many tigers in a unit area (Karanth *et al.*, 2004). Tigers naturally occur at low densities, but they are even rarer in tropical rainforests due to the naturally low prey biomass. A decline in prey density is likely to change the Malayan tiger status in specific areas from rare to extinction. It is even more important in Malaysia's forests that the prey species are protected.

The perception of the omnipresent and hyper-abundant wild pigs is dangerous if not tested. A benefit to the Malayan tiger is that consumption and selling of pigs is prohibited for the Muslims who constitute the majority of the Malaysian population. High tolerance for human disturbance, preference for agricultural fields, high fecundity, and their adaptability to a wide environmental variables, coupled with the cultural avoidance by people and legal protection, all result in a general perception of the wild pig as being hyper-abundant and, thus a concern of possible food deficiency for tigers is unnecessary. Incidental data from research projects, DWNP inventory data and interviews with local communities in the main tiger states all seem to support this. A worrying effect of this is a false sense of security that tigers' prey is indeed abundant. The densities of wild pigs except for a few sites (Ickes, 2001; Kawanishi and Sunquist, 2004), the trends in their populations in response to hunting pressure or environmental variables and the relative importance of wild pigs in the tiger's diet remains unknown. The hunting licence for wild pigs does not have a quota but there is an additional albeit indirect restriction; first, one must obtain a firearm licence from the police to own a firearm, usually granted for sport (shooting range activities), crop protection, defence etc. If one wants to use the firearm for hunting purposes, then it is necessary to obtain approval of the hunting clause from the police, which would allow the firearm to be taken out of one's premises/district where the licence was issued. Once approval is issued, one can apply for a hunting licence from DWNP.

Managers and researchers urgently need to undertake studies on wild pigs and other tiger prey species. Just as foresters have sustainable methods for extracting timber from forests, wildlife managers must have sustainable methods to harvest game species. An important tool for this is population monitoring, which is difficult and costly in tropical forests. As a result, no one knows when the populations of the sambar, wild pigs or any other game species, reach their critical thresholds for recovery from either legal harvesting or poaching. Often, such species become ecologically extinct before we even notice a decline. At that point, any emergency actions are almost always too late.

Closer examination of existing data will determine the current state of conservation and knowledge on tiger prey species as well as identify gaps that require urgent attention. The method for data collection must be improved and greater resources are needed to monitor ungulate populations both in terms of density and occupancy for better management of these species.

Following the rationale behind the precautionary principle, and until we know more, we must assume the worst and adopt a cautious approach to the management of a species like the sambar, where the best available information suggests rarity. Better protection from hunting and poaching will allow sambar

populations to recover in the forest naturally.

1.6 Challenges and Indirect Threats

1.6.1 Insufficient understanding of the tiger's response to various human impacts

Understanding the negative impact of human activities and the positive impact of conservation actions is a vital component of wildlife conservation and adaptive management. The job of conservation biologists is to inform the public and policymakers of practical solutions based on careful research. In reality, actions such as arresting poachers or removing problem tigers cannot wait for research, and therefore, many actions have to be taken without any prior scientific basis. If, however, all conservation efforts are based on ad-hoc reactions, there is no chance to solve the problems from the root cause, reverse the negative trend and create a better future for the tiger. Science, then, provides a less subjective foundation for more proactive conservation. Ideally, conservation strategies should be based on sound knowledge from scientific research and adapted according to the efficacy of the prescribed actions (Sec. 2.7.1). Even in less ideal situations, the basic ecology of the target species and its response to major threats should be laid out before strategies are developed.

Early efforts to study tiger ecology in Peninsular Malaysia revolved around livestock depredation studies (Hussain, 1973; Blanchard, 1977; Elagupillay, 1983; Khan, 1987) as the then Game Department assumed the major duty to keep the wildlife menace under control. Wildlife officials had a great understanding of the nature of depredation and hotspots. The traditional methods of data collection were observation of secondary signs and interviews with expert rangers and affected communities. The results were mostly expert opinion and perception-based.

Today, we aim for informed conservation interventions guided by reliable ecological knowledge. Insufficient knowledge on the status of tigers hindered past efforts to formulate an effective conservation strategy for tigers in Peninsular Malaysia and elsewhere. Furthermore, the lack of scientific rigor in the approaches to assess the status of wild tiger and prey is now clearly recognised as a serious gap in global conservation efforts (Karanth *et al.*, 2003). The life history characteristics of tigers make it difficult to study the animals, especially in the evergreen rainforest of Peninsular Malaysia, where chances of observing either the tiger or its prey are minimal. Even the most intensive scientific study on a tiger population done so far suffered from a weak inference due to a small sample size (Kawanishi and Sunquist, 2004).

The nature of scientific inquiry has changed as our ability and the tools to measure and quantify have advanced (Seidensticker, 2002). Application of infrared motion sensor cameras, "camera trapping", to detect otherwise difficult-to-observe wildlife brought an important advance in tiger research (Karanth, 1995; Karanth and Nichols, 1998). In India, the latest advance in analytical procedures of multiple years of camera trapping revealed demographic characteristics such as survival and recruitment rates of a tiger population that were possible only from radio-telemetry studies in the past (Karanth *et al.*, 2006).

In Peninsular Malaysia, since the late 1990s, with the advent of the modern technologies such as camera trapping and Geographic Information System, knowledge on the two basic aspects of tiger ecology: distribution and abundance, has considerably improved. At the national level, DWNP compiled and analysed data collected by its staff between 1991 and 2003 to determine the tiger habitat and crude potential population size in the whole of Peninsular Malaysia (Kawanishi *et al.*, 2003; Sec. 1.3). In more detailed ecological studies, coupled with population models, the modern technologies allowed researchers to estimate densities of tigers in Taman Negara (Kawanishi and Sunquist, 2004) and Gunung Basor Forest Reserve in Jeli, Kelantan (Darmaraj, 2007).

Camera trapping also provided information on the activity period of the tiger and its prey (Laidlaw *et al.*, 2000; Kawanishi Sunquist, 2004; Ahmad Zafir *et al.*, 2006; Darmaraj, 2007; Lynam *et al.*, 2007), crude estimates of prey biomass (Kawanishi and Sunquist, 2004), relative abundance of tigers (Lynam *et al.*, 2007) and prey species (Darmaraj, 2007) and incontestable evidence of breeding populations (Mohd Azlan and Sharma, 2003; Darmaraj, 2007). With these, we have made the transition in our understanding of tiger ecology from the realm of expert opinion to a more science-based approach (Seidensticker, 2002).

Sampling-based research of large mammals in Peninsular Malaysia is still in its infancy. Without a doubt, there are many aspects of tiger ecology that are still unknown. For example, there is a lack of vital information on the tiger's feeding ecology; i.e. what they eat and in what proportion. How do tigers respond

to prey availability? No one knows the land tenure system and social organisations of tropical tigers. Technical difficulties hampered past attempts in Peninsular Malaysia to duplicate the efforts of successful predecessors in Nepal, India and Russia for radio-tracking tigers. Many questions important to tiger conservation remain unanswered, such as how many young a tigress produces in a lifetime, what affects the cubs' survivorships, how many years wild tigers live, how tigers communicate with one another, how tigers respond to different habitat matrices, how tigers respond to logging or any other human activity, how far a tiger can disperse in different land-use types, why tigers in certain areas are prone to attack humans, what values tigers have to humans, and how to make sustainable forestry management tiger-friendly. With new advancement in sophisticated technologies, a number of other innovative approaches to research methodology are underway and applications of these will allow us to delve deeper into the secret world of tropical tigers.

In the textbook used by tiger researchers and managers, *Monitoring of Tigers and Their Prey* (Karanth and Nichols, 2002), the authors talk about three goals of scientific monitoring of tiger and prey populations: 1) evaluate the success and failure of management interventions, so as to react adaptively and solve problems; 2) establish benchmark data that can serve as a basis for future management; and 3) develop a body of empirical and theoretical knowledge that can potentially improve our predictive capacity to deal with new situations. Goal 2 is basic research for biologists and managers and Goal 3 is applied research for academicians. Goal 1 is clearly the primary interest of wildlife managers and conservation agencies, but is currently not practised in Malaysia.

Without monitoring of conservation actions, resources can easily be spent on a wrong area or in an incorrect manner. Fifty years of global experience of tiger conservation suggests that surrogate measures such as money raised, number of schools reached and income generated for rural community are poor yardsticks for monitoring (Karanth, 2001). Two vital and direct measures of our success are distribution at the landscape level and population trend at priority areas (Sec. 2.5).

1.6.2 Insufficient public awareness and support

Tigers often invoke an emotional response from the public, either in support of these animals or in anger because of Human-Tiger conflict situations especially where death of humans have occurred. It is always much easier to work with groups that are supportive as the negative groups are not easily identified or open to discussions on education programmes to help save tigers, e.g. illegal traders, poachers and farmers. Researchers often have to go 'undercover' to find out more about these negative-impact groups and there is often a dearth of accurate information (Bulte and Damania, 2005; Goh and O'Riordan, 2007).

Malaysians are increasingly becoming more aware of the environment, given the repeated general awareness programmes on saving the planet from global warming, deforestation, toxic wastes, etc. through radio, television, newspapers and even within the school curriculum. Although surveys have been conducted to understand the awareness level, Rambo (2003) reported that only a few results have been published and are often anecdotal, or based on small, localised or biased sample sizes like those published in newspapers (e.g., Anon., 2007b). Furthermore, simply being aware of the issues does not translate to action (Wildlife Conservation Society and Sarawak Forest Department, 1996; Kingston, 2006). For instance, comparative studies done on different methods of communication between posters and hands-on activities have shown that whilst posters are useful in raising awareness, it does not lead to greater liking or empathy for conservation (Kingston, 2006; Gumal, unpublished data). There is thus a need to push the intended audience towards the conservation need (Ehrenfield, 2000; Nadkarni, 2004; Kingston *et al.*, 2006 Takacs *et al.*, 2006). Understanding how people learn (Leamson, 1999; Nuhfer and Pavelich, 2001) and the different methods of effectively communicating with the audience are thus extremely important, if resources and opportunities are not to be wasted. However, it is beyond the scope of this Plan to go into the details of knowledge surveys, learning cycles, generators, fractals, rubrics, neurons and growing brains (Leamson, 1999; Nuhfer and Pavelich, 2001).

The Plan recommends educating the audience on 'what to think', i.e. conserving the tiger, its prey and habitats, as opposed to a more general approach of educating on 'how to think'. It also advocates a multi directional approach, where there is a sharing of information and perspectives (Brewer, 2002), instead of a unidirectional where all the knowledge is passed on from the scientist or educator to the audience. Finally, given space limitations, this section of the Plan will also only focus on three items: the audiences; methods of communication in getting the message out, and case examples of how to get the message across.

1.6.2.1 Conservation education philosophies and approaches

Underlying the push to garner public support are the basic goals to help individuals, communities and target audiences acquire:

- Awareness: of the importance of tigers, their prey, and their habitats, and threats faced by these three elements;
- Knowledge: a basic understanding of the tigers, their habitats and their prey, its problems, and humanity's role in it; and
- Values: strong feelings of concern for the tigers, their habitats, and their prey, and motivation to participate in its protection.

At a much later stage, and with continued participation in either conservation education or training programmes, participants will then hopefully be able to acquire:

- Skills: the ability to investigate and offer possible solutions to these problems;
- Evaluation ability: the ability to evaluate conservation programmes on tigers, prey and their habitats; and
- Enthusiasm to participate: a sense of responsibility and urgency regarding the problems, stimulating appropriate action.

It is widely accepted that not all conservation education, training or even university education programmes will lead participants up to the levels of increased evaluation ability, thus sometimes, dampening their enthusiasm to participate.

Even in the longer-term contact between lecturer and students at universities, these higher levels of thinking up to the ability to self analysis are rarely met (Nuhfer, Idaho State University, pers. comm.). There are therefore several important concepts that need to be known to the educator:

- i. Good teaching or instruction is learned.
- ii. Individual tutoring produces the most learning.
- iii. Conservation education programmes need Instructional Alignment. This refers to the degree to which intended outcomes, instructional processes, and instructional assessment match with efforts to produce the outcomes. Learning can be improved markedly by aligning the objectives with teaching and the evaluation. Instructional alignment is not pedagogy or an assemblage of "teaching tricks." It is an integrated approach to focused practice in a class or course.
- iv. A component that is often missed is "what is in it for me – the intended audience?"

The basic planning sequence in trying to solicit support for tigers either within general awareness, conservation education or training programmes would be:

1. Identify the audience (e.g., rural communities, community leaders, general public, school children, teachers); and become closely acquainted with them and their problems, or opportunities for increase in tiger conservation;
2. Identifying the message to be conveyed (e.g., general awareness, practical guidance, motivation);
3. Choose the educational strategy (e.g., exhibitions, demonstrations, shows, dramas, role playing, mass media, posters);
4. Evaluate the effectiveness of the strategy.

1.6.2.2 Tiger conservation education focal groups

Some of the target groups for tiger conservation are shown in Table 4. These target groups are listed as they affect tigers, their prey or their habitats. They are not ranked in order of priority, as different government departments and NGOs have their own set of priorities.

Table 4: Some target groups affecting tigers in Peninsular Malaysia, and examples of where conservation education programmes are often held.

	Target groups	Examples of where the public awareness programmes are often carried out
1.	School and university students	Schools, universities, nature camps, field trips
2.	Teachers and lecturers	Schools, teacher training colleges, universities
3.	Rural communities living in and around areas having tigers	Village centre, community halls, field visits to protected areas, on-the-job training at parks and research projects
4.	Park staff	Universities, training centres, on-the-job training
5.	Reporters and journalists	Workshops for media, scientific and popular publications
6.	Faith groups	Mosques, churches, temples, training centres for the religious teachers, religious associations
7.	Politicians	Opening of research or conservation projects or workshops, discussions at cabinet, resource centre for parliamentarians
8.	Police, RELA and military personnel	Workshops, presentations, booklets at their training centres and headquarters
9.	Customs and airport personnel	Workshops, presentations, booklets at their training centres and headquarters
10.	General public	Mass media – newspapers, magazines, journals and sometimes attending field trips
11.	Logging company personnel	Meeting rooms at logging camps and in boardrooms of company managers
12.	Oil palm plantations	Meeting rooms at oil palm plantations and in boardrooms of company managers
13.	State-level Information Department and District Offices	Policies and booklets sent to District Offices
14.	Poachers and traders	Village centres, mass media and courtrooms

1.6.2.3 Communication methods

The communication methods used by the various agencies in tiger conservation education are shown in Table 5. Only some of the organisations are listed.

Table 5: Conservation education programmes by various organisations

Organisation	Target audiences	Communication methods	Notes
DWNP	School students, teachers, special interest groups such as RELA	<ul style="list-style-type: none"> • Hands-on activities • Posters • Booklets • Dialogue 	<ul style="list-style-type: none"> • 6 Biodiversity Education Centres • 3-day PPKB programmes • 3-day exhibitions • Camping programmes • Community outreach programmes in PAs • 1 to 3-day programmes which includes T4T • Website news
MNS	School students and teachers	<ul style="list-style-type: none"> • Hands-on activities • Posters 	<ul style="list-style-type: none"> • 2-hour activities on T4T during Nature Camps • Co-production of ACAP Teachers' Educational Kit with WildAid
MYCAT Secretariat's Office	General public, school students, rural communities at wildlife trade hotspots	<ul style="list-style-type: none"> • Hands-on activities • Interactive presentations • Dialogues • PowerPoint presentations • Interviews on radio/TV • Publications in popular magazines and newsletters • Online news • Posters, bookmarks • T-shirts 	<ul style="list-style-type: none"> • Uses T4T and self-generated interactive PowerPoint presentations • Interactive info booths/talks at invitation of schools conducting awareness programmes • Channels info to media contacts • MYCAT e-group which sends tiger news to 151 members currently
TSEA	Special interest groups such as airport personnel and customs, media	<ul style="list-style-type: none"> • PowerPoint presentations • 1 to 3-day workshops with hands-on activities • Booklets • Posters 	<ul style="list-style-type: none"> • Self-generated PowerPoint presentations and other training modules • Ranges from hour-long presentations to 3-day workshops on wildlife enforcement and trade
WCS	Rangers, conservation educators in NGOs and zoos, rural communities	Workshops	<ul style="list-style-type: none"> • 3 to 5-day workshops with target audiences
WWF-Malaysia	School students and teachers	<ul style="list-style-type: none"> • Hands-on activities • General awareness from mobile units • Publications in booklet form, newsletters • Calendars, notebooks • T-shirts • Folders 	<ul style="list-style-type: none"> • 1 to 3-day programmes with target audiences. • Also carries out mobile conservation education with a van for schools throughout Malaysia. • Jeli community liaison

1.6.2.4 Working examples – case studies

i. Web-based communication, linking research, education, policy and media

One of the main functions of the MYCAT Secretariat's Office is to facilitate communication among all the organisations, government and NGOs, working on tigers in Peninsular Malaysia. The Secretariat's Office also ensures that each partner organisation is kept up-to-date on individual partner activities, and consolidates current expert information from partner organisations so as to inform the public through the mass media. In terms of the latter, MYCAT has been constantly pushing conservation stories out to newspapers although the print media is generally more interested in human-wildlife conflict issues (see Table 7). The Secretariat's Office also maintains an online news and discussion group (http://groups.yahoo.com/group/malaysian_cat/), which focuses on issues pertaining to tiger conservation. Discussions range from scientific comments on occupancy surveys to promoting tiger awareness through various media such as brochures, t-shirts and popular journals (see Table 6). This e-group often results in ideas which lead to further collaboration, new research, or newspaper articles.

Table 6: The number of news and discussions registered in MYCAT e-group between 2003 (the inception of MYCAT) and 2007. The increased discussion also reflects a greater communication between partners.

Year/Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2007	33	46	46	87	124	91	85	79	72	126	54	47	890
2006	52	58	42	62	32	52	63	77	43	29	46	70	626
2005		12	32	43	40	63	53	19	66	119	45	41	533
2004	2											5	7
2003									3	6	2	3	14

http://groups.yahoo.com/group/malaysian_cat/

The media plays a great role in influencing public opinions. To increase the quality and quantity of conservation-related articles in the local media, TSEA organised two media workshops in Kuala Lumpur (hosted by Zoo Negara) and Singapore (hosted by Singapore Zoological Gardens) in December 2005. It was attended by 15 members of the print, online and broadcast media. It is difficult to ascertain the effectiveness of the workshop, as feedback from the reporters who attended, indicated that they are often at the mercy of editors who try to balance other interests such as politics, health, economy and business, etc. Environmental reporting is quite new in Malaysia, although a very small handful of reporters have been in this field for over 10 years. There is also quite a high level of turnover of reporters themselves.

To attain the objectives of having more conservation reports in newspapers and accurate reporting, it is therefore imperative that the editors and the higher management of the local media houses be targeted in future training exercises, and important fact sheets in vernacular languages, where necessary, are provided to reporters covering stories. Educators, scientists and project coordinators should also be on hand, if follow-ups are needed.

Some of the guidelines for environmental reporters are (Nelson, 1995):

1. write original stories;
2. build and maintain good sources;
3. prepare in advance;
4. translate environmental jargon;
5. make the story alive and relevant;
6. report science carefully;
7. be careful with statistics;
8. look for hidden interests;
9. seek balance;
10. follow-up.

A breakdown of newspaper reports on tigers and other wildlife since 2000 is shown in Table 7. Between

2000 and 2002, tiger-related reports dominated newspapers which carried cases on wildlife. However, by 2003, the ratio of tiger-related to general wildlife news (not tiger-related) decreased to about 44%. In 2006, the ratio declined to 27%. There are many factors which probably contributed to this change, among them increased media attention on other wildlife issues such as trade or other species and reduced Human-Tiger Conflict cases (reported to DWNP) over the recent years (Sec 1.5.3).

Table 7: Breakdown of tiger- and wildlife-related reports carried by national Malaysian newspapers*.

Year	Tiger-related reports	Non-tiger related wildlife reports	Notes
2000	136	90	Four newspapers carried reports on tigers and wildlife throughout the year. Reports ranged from attacks by tigers on humans, to tiger road kill.
2001	42	1	Three newspapers reported on tigers in 2001. Most of the reports were on HTC issues.
2002	37	36	Six newspapers have included reports on tigers this year. Most reports were on HTC issues.
2003	40	91	Most of the reports were on HTC issues. There were some reports on education programmes, enforcement issues and permits for exotic pets. Eight newspapers reported on these issues.
2004	57	100	Nine newspapers carried reports on tigers. Most were on HTC issues.
2005	65	289	Five newspapers carried reports on tigers. There is a marked increase in investigative reporting on wildlife issues and trade.
2006	35	132	Most of the reports were on HTC.

Source: *TRAFFIC Southeast Asia, in litt.*

* Numbers of tiger- and wildlife-related reports were extracted from the online archives of the New Straits Times, New Sunday Times, The Star, The Malay Mail, and to a lesser extent, Berita Harian and Utusan Malaysia, as not all reports are uploaded. The archive search of the Malay and Chinese language media is incomplete, as these were not all available online, but was included wherever possible. Reports in foreign newspapers as well as Malaysian regional newspapers such as the Borneo Post are not included.

ii. Training the trainers

In 1978, DWNP initiated the Nature Study Programme and Weekend Camping Programme, designed to create nature awareness among youth, primarily secondary school students. These programmes are conducted jointly with the Ministry of Education, and include field activities such as jungle trekking, river expeditions, wildlife observations. From 1978 until 1997, approximately 30,000 students had participated in these programmes (Abd Rahim and Aminuddin, 1997). In early 2000, these programmes were revised and are now known as the Biodiversity Conservation Education Programme, mainly used at seven DWNP centres currently, although there are plans to expand its application to all the states.

It was only in 2004 that Malaysia started having tiger-focused conservation education programmes, through the WCS' *Teachers for Tigers* (T4T) Programme. The first programme was carried out with 41 participants from DWNP as well as from NGOs such as MNS, TSEA and WWF-Malaysia. T4T was fine-tuned to Malaysian conditions as well as translated to Bahasa Malaysia. Since then, T4T has been continuously used by DWNP, MNS, the MYCAT Secretariat's Office, WCS Malaysia and WWF-Malaysia. Between the training held in January 2005 to May 2006, MNS used T4T modules in 15 Nature Camps, attended by about 350 participants (teachers and students) from schools throughout Malaysia. T4T continues to be used, and in March 2007, DWNP used the modules in their conservation education camps at Penang National Park for 40 students and three teachers from three schools from Perak (Nurul Azura, DWNP, pers. comm.). The MYCAT Secretariat's Office also uses T4T for their education outreach programmes and in 2007 the activities were translated to Mandarin, targeting Mandarin-language schools in rural areas.

It does appear that participants from the initial workshop benefited from the training. Evaluations before and immediately after the training revealed a major change in knowledge on tigers and how they can be studied or conserved. However, it should also be noted that the participants were a motivated lot and as such the training was almost 'preaching to the choir'. It would be probably most interesting to examine whether this approach would have a similar effect on school teachers, and rural communities or their

leaders.

1.6.3 Insufficient human resources and capacity

1.6.3.1 Lack of staff

Lack of staff to help conserve and protect wildlife and their habitats has often been cited as one of the reasons why wildlife is constantly under threat in Peninsular Malaysia, from poaching, land clearance and illegal wildlife sale and trafficking (Mislih and Sahir, 1997; DWNP-DANCED, 1996). The lack of capacity was considered so severe that DWNP-DANCED (1996) proposed a large increase in staff numbers from 758 to 1,070. As DWNP's responsibilities have grown in recent years, the staff figures have also grown (Table 8) and it is expected to surpass the DWNP-DANCED (1996) projection. In fact, DWNP expects to have at least 1,497 staff by the end of the new departmental restructuring exercise in 2008.

Table 8: Increase in staff numbers, administrative and development expense (million RM) of the Department of Wildlife and National Parks Peninsular Malaysia and the size (km²) of Protected Areas in Peninsular Malaysia between 1996 and 2005.

Staff, budget/ Years	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05
Staff numbers	716	689	677	684	684	793	794	737	869	971- 1,475*
Administrative expenses	20.2	20.3	17.7	18.1	NA	24.2	27.9	29.4	30.9	38.5
Development expenses	5.7	5.5	13.6	26.8	21.2	29.7	13.6	17.1	17.5	21.7
Total size of PAs	7,514	7,514	7,514	7,514	7,514	7,514	7,514	7,527	7,527	7,527

Source: DWNP Annual Reports, DWNP-DANCED (1996)

* The higher figure is the number of posts that has been approved but not yet filled.

It is often difficult to compare staff numbers and budgets between similar departments or protected areas across several countries, due to cultural, economic, poaching and local population stresses on the park (Bruner *et al.*, 2001). A case-in-point would be, a comparison between staffing needs in Nagarahole National Park (India) (644km²) and Taman Negara (4,343km²) without considering poaching caused by local communities living close or within the protected areas. In Nagarahole, there are about 100,000 local people living inside or close to the park (@ 155 persons/km²), whereas in Taman Negara, there would probably be less than 5,000 people living within or close to Taman Negara (@ 1 person/km²). Thus the need for more staff for patrolling would appear to be much greater in Nagarahole as compared to Taman Negara. But using numbers of local people living within or close to a national park as the only index for potential poaching would also be insufficient due to the global nature of wildlife poaching, as some poachers have travelled long distances (crossing international boundaries) as seen by the nationality of arrested poachers in Taman Negara (DWNP, 2005).

But, if one were to just examine the coarse trend in staffing numbers/100km² in similar departments across Asia (Table 9), Taman Negara appears to have the lowest staffing/100km². This trend is important as a study on the effectiveness of Protected Areas in protecting biodiversity in the tropics, found that PA effectiveness correlated very strongly with the density of guards (Bruner *et al.*, 2001). In the 15 most-effective PAs in the tropics, the median number of guards/100km² was more than 3. This figure does not include administration staff, and the most effective PAs had in general, over eight times more staff than the least effective PAs. In the most extreme form, one PA had up to 200 staff/100km², whereas another had none (Bruner *et al.*, 2001).

Table 9: Staff numbers and annual operational budgets within protected areas with tigers.

PAs with tigers in various countries	Number of staff	Budget (million RM)	Total size of PA (km ²)	Staff/100km ² of PA*
Malaysia Taman Negara	105	3.2	4,343	2.41
Thailand Huai Kha Khaeng NP	200	1.68	2,740	7.30
India Nagarahole NP	200	NA	644	31.06
Indonesia				
a) Gunung Leuser	229	NA	7,927	3.68
b) Way Kambas	166	NA	1,300	12.77
c) Berbak-Sembilan	76	NA	1,700	4.47

* Inclusive of administration staff.
NP – National Park
NA – Data not available

In a subsequent analysis, Bruner *et al.* (2004) also found that under-funding jeopardised the ability of protected areas to safeguard biodiversity and the benefits that intact nature provided to society. Taman Negara has had repeated poaching issues even recently in 2007 (Anon., 2007c). Sadly, of the 42 Protected Areas in Peninsular Malaysia, only Taman Negara is afforded with regular on-the-ground patrol. The majority of the 100+ Taman Negara staff is however engaged in the park administration, visitor facilitation, and law enforcement near the headquarters. DWNP alleviates this manpower issue by sending staff from state DWNP in rotation for 10 days a month to patrol Taman Negara jointly with the existing staff. With the limited manpower, DWNP also gets support from the Royal Malaysian Armed Forces to join the annual inventory that involves 100-200 men combing the forests in search of wildlife tracks and poachers. Poachers are apprehended or flushed out every year during the 2-week operation. Ideally, a patrol of this intensity or more should be conducted daily in a national park of such high conservation significance.

Since 2001, more than 80 foreigners have been apprehended for encroachment and poaching activities in Taman Negara. This is an issue of concern, given that the latest encroachment occurred in March 2007 (Anon., 2007c). Worldwide, tigers are disappearing from their natural range, and protected areas such as those in India have also become hotspots for poaching (Dinerstein *et al.*, 2007). It is therefore important to follow-up, to critically examine whether there is indeed adequate budget and staff for field patrolling and enforcement to ensure protection of wildlife and tigers in Protected Areas. Both adequate staff and budget are listed as criteria in widely accepted tools used for assessing management effectiveness (Hocking *et al.*, 2000).

1.6.3.2 Occupational standards

In line with having adequate numbers of staff, there is also a need to ensure that the enforcement, fines or penalties be carried out to completion (Akella and Canon, 2004; Albers and Grinspoon 1997; Dinerstein *et al.*, 2007; Gibson *et al.*, 2005; Lee *et al.*, 2005). Enforcement, patrolling and penalties when carried out regularly serve as a deterrent to poachers (Albers and Grinspoon, 1997; Gibson *et al.*, 2005). As there has been high profile losses of enforcement cases due to technicalities (Hah, 2007), there is thus an urgency to improve competencies among various officers within DWNP, among them law enforcement staff.

Improving competencies is not new, as DWNP recognised the importance of occupational standards for its staff by participating in the drafting of the 'Competence Standards for Protected Area Jobs in Southeast Asia, 2001' (Appleton *et al.*, 2001).

The document outlines clear sets of occupational duties and responsibilities by all officers at various levels. In late 2006, DWNP initiated discussions on a Training Needs Analysis in pursuit of increasing competencies among its staff.

Focus on staff competencies is important because increasing staff numbers alone without training and occupational standards does not mean a job well done. Increasing staff numbers may actually increase the level of corruption, thus dilution of conservation and enforcement efforts (Gupta, 2005; Brickle, WCS Indonesia, pers. comm.; Praveen, Centre for Wildlife Studies, pers. comm.).

1.6.4 Inadequate legislation, enforcement and penalties

Illegal wildlife trade is a major threat to the tiger and its prey species. The *Customs Act 1967* and the *Customs Regulations 1977* regulate the import and export of goods into and out of Malaysia. There are no specific provisions in the Act and Regulations regarding the import and export of protected and totally protected wildlife, though the Act identifies DWNP as the reference agency for import and export of any wild bird and animal, alive or dead. But, as the definition of “goods” does not explicitly specify parts or derivatives of wild animals, there is nothing that allows enforcement agencies, such as Royal Customs Malaysia or DWNP, to seize products that contain protected and totally protected animals in their ingredients, such as Traditional Chinese Medicine, at Malaysian ports of entry.

The trade of Traditional Chinese Medicines (TCM) containing tiger derivatives in Peninsular Malaysia continues partially due to a loophole in the PWA that allows non-readily recognisable parts and derivatives to be sold in the form of manufactured and processed medicines. The PWA states that “parts” of totally protected animals cannot be traded, but does not presently cover manufactured and processed medicines containing protected species (derivatives).

While on the subject of TCM, as of 1992, all traditional medicines must be registered under the *Sale of Drugs Act (Sec. 1.4.2.3)*. The Drug Control Authority also ensures that all registered products are labelled according to stipulated labelling requirements. The TSEA surveys of TCM shops conducted recently found that some medicines that claim to contain tiger bones carried registration numbers (Nijman, in press). However, the *Guidelines for the Registration of Traditional Medicines* maintain that traditional medicines containing parts or derivatives of animals listed in Attachment 8 of the regulations will not be considered for registration. The tiger and leopard are listed under Table 2, Part 2, of the Attachment. This means that all TCM products claiming to contain tiger parts or derivatives sold in Malaysia are illegal either by having fake registration numbers or sold without registration. What is needed is the enforcement of the current law.

Enforcement in general throughout all tiger range states and in consuming countries, is still insufficient, as evidenced by the continual availability of tiger parts in trade and the serious decline in wild tiger populations as well as declines in tiger prey populations (EIA-WPSI, 2006). Strong political will in range states to stop and reverse the declines in tiger populations as well as sufficient resources to tackle the illegal killing and trade are sorely needed.

Furthermore, wildlife crime is still not considered a priority within the judicial system and penalties for such crimes are often extremely low and therefore do not serve as a deterrent. Maximum penalties currently amount to a total of a fine not exceeding fifteen thousand Ringgit (USD4, 286 at 2007 rates) or to a term of imprisonment not exceeding five years. No one, however, has so far received the maximum sentence. For instance, a Malaysian man in possession of one tiger skull, 31 tiger claws and 10 tiger canines was fined RM3,000 (USD857) by the courts in 2003 (DWNP, unpublished data), far less than the true market value of these items.



Seized tiger © DWNP

In another case, a Malaysian man found with a butchered tiger in his home was fined RM7,000 by the Magistrate's Court, despite the PWA providing a maximum custodial sentence of 5 years, or fine of up to RM15,000 (Table 10).

Table 10: Tiger-related offences recorded by the Department of Wildlife and National Parks Peninsular Malaysia between 2001 and 2005 and subsequent actions taken

Year	Offence	Action Taken
2001	Illegal possession of 15kg of tiger bones	Fined RM16,000 by court
2001	Illegal possession of 5 pieces of tiger penis	Fined RM3,000 by court
2001	Illegal possession of 1.5kg of tiger meat	Fined RM4,000 by court
2003	Illegal possession of 33.7kg of tiger bones, 4 tiger canines and 6 tiger claws	Fined RM6,000 by court
2003	Illegal possession of 1 tiger skull, 31 tiger claws and 10 tiger canines	Fined RM3,000 by court
2005	Illegal possession of 1 dead tiger	Fined RM7,000 by court; Later ordered retrial

Part 2

Action Plan

“Future generations would be truly saddened that this century had so little foresight, so little compassion, such lack of generosity of spirit for the future that it would eliminate one of the most beautiful and dramatic animals that the world has ever seen.”

- George Schaller

This Tiger Action Plan (hereafter referred to as the Plan) will guide Malaysian politicians, civil servants, NGOs, biologists and the general public to create the social conditions that allow tigers to co-exist with humans on the same landscape. When this Plan is implemented, Malaysia will secure the future for the Malayan tiger.

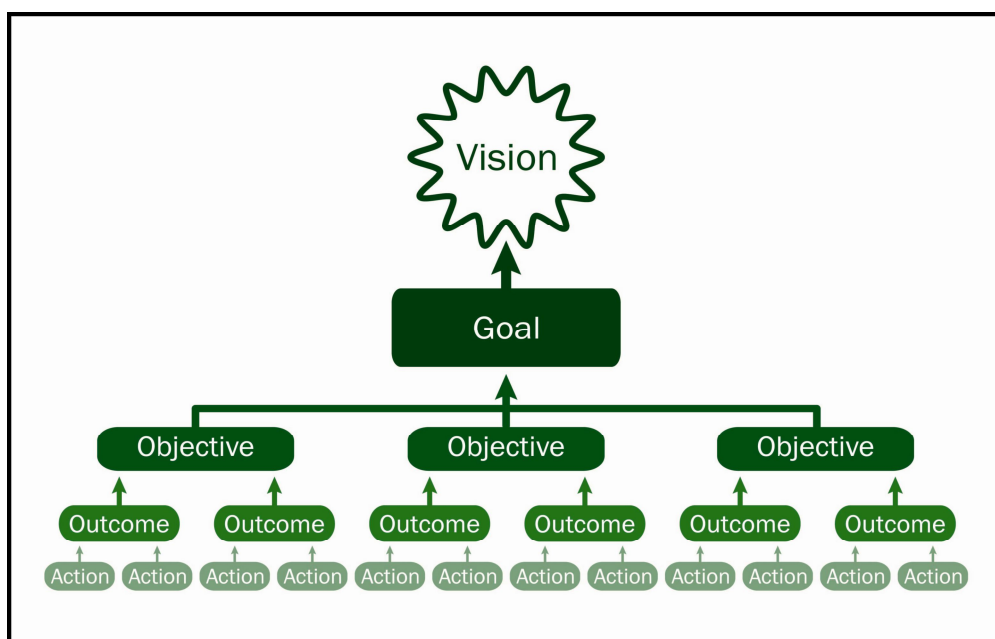
The aim of the Plan is to establish a holistic but focused conservation strategy that lays out specific actions for the next eight years (2008-2015) with the overall goal of securing viable tiger populations in Malaysia for the next century and beyond. We therefore need to have a clear vision of what we would like to see and a clear sense of how to get there. As such, we focus on short-term outcomes and measurable mid-term target, whilst keeping mindful of our ultimate vision. Obviously any conservation plan, in order to be useful, must be practical and in line with existing policies. To this end, the Plan was developed within the Malaysian Government's existing framework for environmental and biodiversity conservation. Specifically, the National Policy on Biological Diversity and National Policy on the Environment set the underlining principles, whilst the National Physical Plan laid out the spatial framework. It is a result-driven, adaptive action plan, bound by the commitment of the Malaysian government and other MYCAT partners.

Definitions of the terms used often in Part 2 are as follows:

Short-term	The eight year period between 2008 and 2015.
Mid-term	Foreseeable future from 2008 to 2020.
Long-term	The 22 nd century and beyond.
Action	A concrete measure to be implemented in the short-term towards the outcome.
Outcome	A priority condition that needs to prevail in the short-term towards the mid-term objective.
Objective	A primary change that needs to take place in the mid-term range as a precondition for the goal.
Goal	The mid-term goal that is achievable in our life time towards the vision
Vision	The ultimate long-term aspiration of the Tiger Action Plan

The Plan first presents the shared long-term vision for the century, followed by the mid-term goal and thirdly the four main objectives (Fig 6). The Plan then identifies several realistic short-term outcomes, which is finally followed by specific actions. It is important to note that not all outcomes necessary to achieve the four primary objectives are included in this Plan; only those considered as urgent or priorities, achievable in the next eight years, are detailed herein. Depending on the performance of our actions in the next eight years, the Plan will be revisited and next steps identified and implemented wherever necessary, or more outcomes will be added, or existing ones adjusted. As such, efforts will be maintained or increased to ensure that these realistic objectives are met. In situations beyond the control of all the partners and stakeholders, objectives will be reviewed, and if necessary, realigned. Each of these components from the vision to actions is described in detail in the subsequent sections.

Fig. 6: A schematic diagram of the framework detailing the pathway from actions to success.

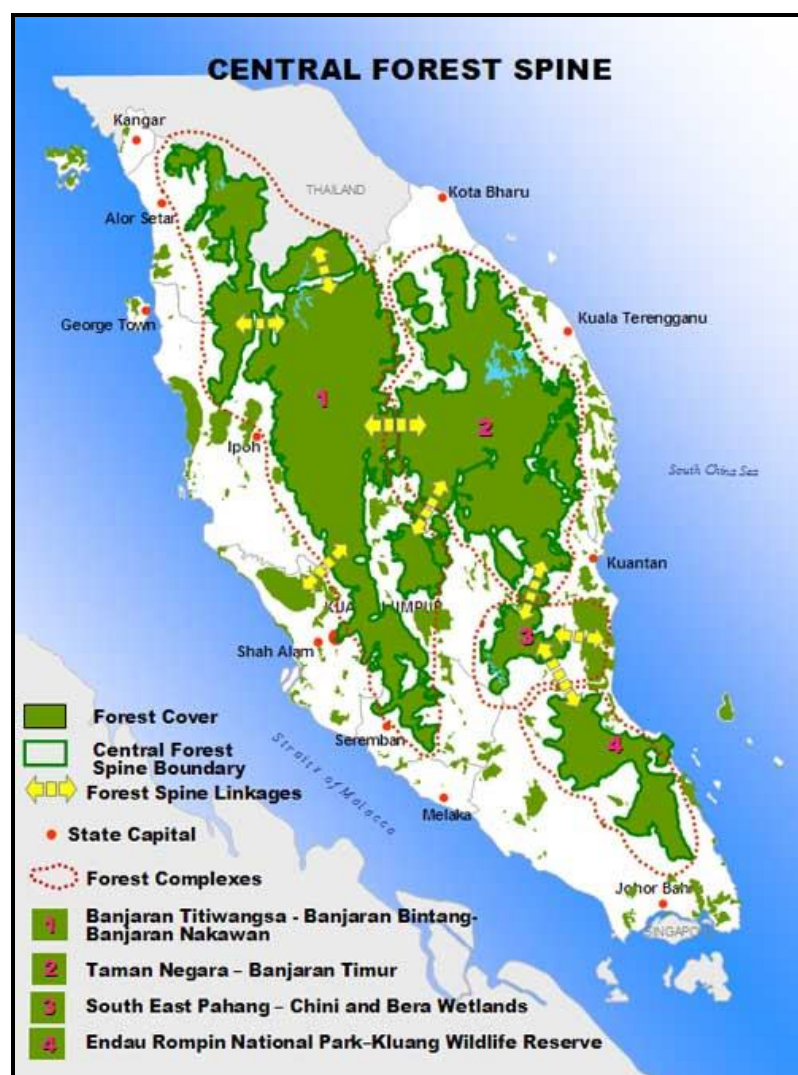


2.1 Vision

A Malaysia in which tigers thrive in the Central Forest Spine in the 22nd century and beyond.

The Central Forest Spine is defined in the National Physical Plan (DTCP, 2005) as the backbone of the Environmentally Sensitive Area (ESA) network (Fig. 7). Through the protection and restoration of this forest system, the NPP aims to maintain the country's forest cover, reconnecting the fragmented forests for better protection of the nation's environment and biodiversity, all within a timeline that runs to the year 2020. Encompassing approximately 51,000km², the CFS comprises mostly ESA Ranks 1 and 2, interspersed by smaller Rank 3 ESAs.

Fig. 7: Central Forest Spine identified in the National Physical Plan (DTCP, 2005)



Source: Federal Department of Town and Country Planning (www.npptownplan.gov.my)

The management criteria for the CFS (Table 11) are in line with tiger conservation in that it promotes the protection of core areas of biodiversity and resource rich forest (ESA 1) inter-connected through a system of large forest blocks where ecologically sound land-use, compatible with tiger conservation is practiced (ESA 2).

Table 11: The management criteria for the three types of the Environmentally Sensitive Areas in the Central Forest Spine.

ESA Rank	Criteria
1	No development, agriculture or logging shall be permitted except for low-impact nature tourism, research and education.
2	No development or agriculture shall be permitted. Sustainable logging and low-impact nature tourism may be permitted subject to local constraints.
3	Controlled development where the type and intensity of the development shall be strictly controlled depending on the nature of the constraints.

Source: DTCP (2005)

The CFS appears almost identical to the tiger habitat map (Fig. 3) because a generic forest cover map formed the base layer for both. That is to say, the tiger is a forest dweller and the majority of forest remaining in Peninsular Malaysia can be found within the CFS. The NPP also used the tiger and elephant as the flagship landscape species to aid in identification of ESA Ranks 1 and 2 as well as approximate locations of the potential corridors. The NPP also suggests the use of river corridors to maintain the integrity and connectivity of forest ecosystems, which, when combined with an intact vegetative cover, would also be readily used as dispersal corridors by tigers.

At the moment, however, the CFS concept is represented only as a coarse grain polygon corresponding with forest-cover map. The actual delineation of boundaries and definition of linkages are immediate actions planned in both the NPP and this Plan.

2.2 Policy Statement and Guiding Principles

Instead of symbolising the loss of forests and ecosystem in crisis, a healthy tiger population can be the star in the Malaysian Government's on-going efforts in implementing a number of policies regarding sustainable development and management of natural resources (Sec 1.4.1), in addition to being the national symbol (Sec 1.2). Adapted from the policy statements for the National Policy on Biological Diversity and the National Policy on the Environment (Table 12) the operative policy statement for this Plan is:

A healthy tiger population across a landscape of well conserved and contiguous forest ecosystems indicates ecologically and socio-economically balanced progress of the nation that translates into a better quality of life for all Malaysians.

Table 12: Policy statements for the National Policy on Biological Diversity (NPBD) and National Policy on the Environment (NPE).

Policy	Policy statement
NPBD	To conserve Malaysia's biological diversity and to ensure that its components are utilised in a sustainable manner for the continued progress and socio-economic development of the nation.
NPE	For continuous economic, social and cultural progress and enhancement of the quality of life of Malaysians through environmentally sound and sustainable development.

Source: NPBD (MOSTE, 1998), NPE (MOSTE, 2002)

The definition of a healthy tiger population for the purpose of this Plan is:

A contiguous population of about 1000 adult tigers in the Central Forest Spine that has a greater than 90% projected survivorship into the 22nd century.

The following underlying Principles which are primarily based on the National Policy on Biological Diversity and National Policy on Environment form the basis for this Plan. Whilst the actions planned in this document are to address the priority and/or urgent issues for the next eight years, the Principles should be referred to for guidance in identifying actions needed to deal with emerging threats or events that are not specifically included in the Plan:

- i. Wild Malayan tigers are the pride and heritage of the people of Malaysia and the rest of the world. Decision makers, resource users, and NGOs, with support from the general public, are committed to securing the forests, and wild tigers, for future generations, and are accountable in formulating and implementing the Plan. Securing the continued existence of the tiger and its habitat while managing the forests in a sustainable manner is an indication of our ongoing effort to achieve a sustainable society and excellence in conservation.
Adopted from Vision 2020; NPBD Principles ii, iii, vi, v; NPE Principles 2, 4, 7 and Objective iv
- ii. Conservation ethics, including the inherent right to existence of Malayan tigers in the wild, is deeply rooted in the religious and cultural values of all Malaysians.
Adopted from NPBD Principle i; NPE Principle 2
- iii. Challenges to tiger conservation transcend political boundaries and Malaysia continues to exercise a proactive, collaborative and constructive role in international activities with the aim of conserving forests and Malayan tigers.
Adopted from NPBD Principle viii; NPE Principle 8
- iv. Public awareness and education as well as collaboration, information exchange, capacity building and research are all essential components of integrated conservation programme for Malayan tigers.
Adopted from NPBD Principle x, Objective v and Strategies I, V, VII, XII, XIII, XIV
- v. Malaysia prohibits the commercial trade of live tigers and tiger parts, whether sourced from wild populations or captive bred stock.
Protection of Wild Life Act 1972; CITES

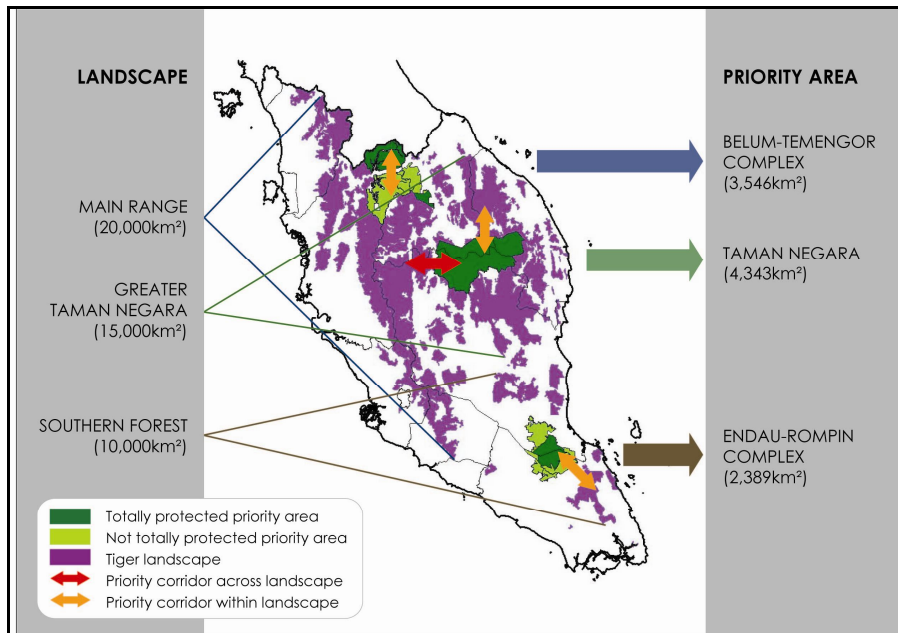
2.3 Goal

The vision of ensuring a future for wild Malayan tigers beyond the 22nd century is the ultimate national-level, long-term aspiration. Achievable in our lifetimes, our goal is:

Tiger populations actively managed at carrying capacities across the three landscapes within the Central Forest Spine and connected with functioning corridors.

The goal is broken down to a set of sub-goals that vary in terms of their implementation in space and time. In order to be able to define these sub-goals the Plan uses three spatial scales, Nation, Landscape and Priority Area, (Fig. 8) and two temporal scales, short-term (2008-2015) and mid-term (2008-2020) to define how these goals will be achieved (Table 13).

Fig. 8: The three priority areas in the three respective tiger landscapes with important corridors to link tiger habitats within and across the landscapes.



Each of the three tiger landscapes has a core priority area and priority corridor. The Belum-Temengor Complex in the Main Range Landscape contains the Royal Belum State Park, Gunung Stong Tengah State Park, Temengor PRF, Gunung Basor PRF and Gunung Stong Utara PRF. Taman Negara is the only priority area in the Greater Taman Negara Landscape. The Endau-Rompin Complex in the Southern Forest Landscape contains Endau Rompin National Park, Lesong PRF, Labis PRFs, Endau PRF and Pukin PRF (Fig. 8).

The priority ecological corridor to be restored and maintained across the landscapes is the Main Range-Greater Taman Negara linkage. Within the landscapes, there are three areas where the habitat connectivity needs to be maintained and enhanced: Belum-Temengor, Taman Negara-Lebir-Tembat, and Endau-Rompin-Mersing (Fig. 8).

The sub-goals that vary in terms of their implementation in space and time are shown in Table 13. The two temporal tiers are the short-term and the mid-term. The year 2020 was chosen as the end-year due to its national significance, as defined by Vision 2020 and its restriction to what can be classed as the foreseeable future. Furthermore, 2020 sets the limit for our measurable target because any response to conservation efforts that will be seen in tiger population dynamics will, realistically, take longer than the initial eight years to manifest. During that initial period, however, a reliable and practical scientific methodology to better monitor the target tiger populations and their distribution is envisaged to be established.

2.4 Objectives and Outcomes

The four realms of consideration in the Plan to address the different types of threats described in Part 1 are: 1) Central Forest Spine; 2) patrol and enforcement; 3) habitat management, conflict resolutions and land-use; and 4) conservation science and monitoring. Some issues are cross-cutting and thus the realms are not mutually exclusive, but this division was necessary for the ease of planning, implementation and monitoring. One main objective for each realm was identified, together to achieve the goal by the year 2020. Not all possible outcomes but three to four priority outcomes that need to take place in the next eight years to achieve each objective have been identified (Table 14 and also see Sec. 2.6 for details of planned objectives and outcomes).

Addressing these objectives is not a feat that can be accomplished by the members of MYCAT and other primary stakeholders alone; it will certainly need support from the public through awareness programmes,

support from other institutes in building local capacity and, of course, financial support from industry, international agencies and private philanthropists. Therefore, these enabling factors, awareness, capacity and financing are implicit in each objective (see *Sec. 2.6.5* for a discussion on public awareness programmes as part of a wider-view that benefits more than one objective).



Mangrove Forest @ DWNP

Table 13: Scale-dependent implementation of the goal for tiger conservation in Malaysia between 2008 and 2020.

Spatial		Temporal	
		Short term/Phase I 8 years (2008-2015)	Mid term Vision 2020 (2008-2020)
Priority Area	Belum-Temenggor Complex	<ul style="list-style-type: none"> Improved protection of habitat, tigers and their prey Connectivity between Belum, Temengor and others in the Complex maintained/restored Establish a benchmark for monitoring of tiger population Improved knowledge on the population status of tigers, their prey, and key threats Strengthening management capacity 	<ul style="list-style-type: none"> Increased carrying capacity of tigers Maintenance of breeding tiger populations at the maximum potential density in each priority area Strictly protected tigers and their prey with no loss to poaching
	Taman Negara	<ul style="list-style-type: none"> Maintained occupancy of tigers Stabilized tiger density at 1-2 adults tigers/100km² Improved protection of habitat, tigers and their prey Improved knowledge of tiger ecology and continued monitoring of the population Strengthening management capacity 	
	Endau-Rompin Complex	<ul style="list-style-type: none"> Establish a benchmark for monitoring of tiger population Improved knowledge on the population status of tigers, their prey, and key threats Improved protection of habitat, tigers and their prey Strengthening management capacity 	
Landscape	Main Range Greater Taman Negara Southern Forest	<ul style="list-style-type: none"> Improved knowledge on tiger distribution Directed patrol of selected key forests Directed campaign against local consumption of tiger and their prey at selected hotspots The landscape connectivity mapped and threats to fragmentation identified Maintenance of landscape connectivity Promotion of ecologically sound land-use, compatible with tiger conservation and forestry practice outside the core areas Community-based mechanisms and sustainable financing means to reduce HTC identified and implemented at the local level Land-use guidelines and recommendations for existing/potential HTC areas developed and incorporated into Local/Structure Plans at the state level 	<ul style="list-style-type: none"> Tiger distribution and landscape connectivity maintained in each landscape Loss of tigers suppressed Improved protection for prey
	National Peninsular Malaysia	<ul style="list-style-type: none"> Tigers present in natural habitats across the three landscapes (CFS) Maintenance of existing connectivity between Greater Taman Negara and Main Range No loss of forest cover in CFS Improved legislation for tigers and their prey Improved enforcement of existing legislation Established scientific monitoring system and research plan for tigers and their prey Nationwide consumer education campaign and awareness programmes Increased awareness and capacity Overall management capacity strengthened 	<ul style="list-style-type: none"> Tiger populations actively managed at carrying capacities across the three landscapes within the CFS and connected with functioning corridor

Table 14: The pathway from short-term outcomes to the overall vision.

VISION				
A Malaysia in which tigers thrive in the Central Forest Spine in the 22nd century and beyond				
GOAL				
Tiger populations actively managed at carrying capacities across the three landscapes within the CFS and connected with functioning corridors				
Realm	Central Forest Spine	Patrol and Enforcement	Habitat Management, Conflict Resolution and Land-use	Conservation Science and Monitoring
Objective (2008-2020)	CFS with strictly protected priority areas in landscapes connected with corridors	Effective and long-term protection of tigers and their prey	Ecologically sound land-use, compatible with tiger conservation outside the priority areas	Application of science in monitoring the efficacy of conservation actions and improving knowledge of tiger ecology
Outcome 1 (2008-2015)	Priority areas important to tigers are strictly protected, expanded, or sustainably managed	Strengthening of wildlife legislation	Sustainable utilisation of land areas in current and potential Human-Tiger Conflict areas as well as forest reserves with strengthened management capacity	<i>Malayan Tiger and Large Mammal Monitoring Guidelines</i> based on existing mechanisms in place within the DWNP and internationally accepted methods established
Outcome 2 (2008-2015)	Important tiger habitats outside the priority areas identified and effectively managed as Environmentally Sensitive Area 1 or 2 at state and local levels	Improved legislative or regulatory protection of key prey species	Community-based, Better Management Practices to mitigate HTC established in affected areas	Monitoring of the occupancy of tiger and their prey across landscapes and tiger densities in priority areas
Outcome 3 (2008-2015)	Critical areas for landscape connectivity acknowledged, established and managed at state and local levels	Marked improvement in focused and intelligence driven anti-poaching patrol of key forest sites and enforcement of wildlife and wildlife trade laws	Effective awareness programmes in HTC areas at state and district levels	Improved planning, coordination and scientific integrity of research on tiger ecology and conservation through development and implementation of the tiger component of the <i>Wildlife Research Plan</i>
Outcome 4 (2008-2015)			Sustainable financing mechanism to mitigate HTC in place	Enhance knowledge and information base on tiger ecology and conservation
Enabling means and resources	Awareness building – Capacity building – Securing funds			

2.5 Target

Wild tigers are the primary beneficiary of this Plan. Ultimately, the success of any conservation action must be reflected in their population status and dynamics that need to be first determined, next stabilised and then finally increased – both in terms of distribution and density. By using the population status as the overall indicator of success, we hold ourselves accountable to wild tigers for which the resources are mobilised. The overall indicator of success is:

About 1,000 wild tigers surviving on wild prey in the Central Forest Spine by the year 2020.

Contrary to common belief, we will not count each and every individual tiger in the forest to measure our success. The target population figure is a function of estimates of the proportion of forest habitats that are occupied by tigers and estimates of tiger densities at representative sites. Currently, the maximum *potential* tiger population size, in all tiger habitat available in Peninsular Malaysia, is 1,480 adults. This is based on an *expected* mean density estimate of 3 tigers/100km² within 49,329km² of contiguous tiger habitat (Kawanishi *et al.*, 2003) excluding small isolated forests where tigers are still present. Recent studies in Malaysia indicates that tiger densities range from 1.10 to 2.59 tigers/100km² (Kawanishi and Sunquist, 2004; Darmaraj, 2006).

With improved protection of tigers, their habitats and their prey, we expect the overall carrying capacity of tigers to increase by the year 2020. By then, most of the fragmented and isolated forests, and their associated tiger populations, that lie outside of the three main tiger landscapes (Fig. 8) may disappear. Since the future of the habitats outside the three landscapes are uncertain, this Plan focuses on the CFS to maintain and re-connect tiger populations. We can hypothesise multiple models that achieve the same target. For example:

- i. Tigers present with 100% occupancy in the CFS at a mean density estimate of 2/100km²
- ii. Tigers present with 80% occupancy in the CFS at a mean density estimate of 2.5/100km²
- iii. Tigers present with 100% occupancy in the three priority areas at a mean density estimate of 2/100km² and 80% occupancy in the rest of CFS at a mean density estimate of 2.5/100km²

During the next eight years, we will work on establishing a nationwide tiger monitoring system, based on internationally accepted methods, which will allow us to test these hypotheses. Once these methods are shown to be field-worthy they will form the basis for a long-term monitoring programme. Note that, according to the principles of modern wildlife management, these models are adaptable to emerging knowledge and technologies as well as the success, or failure, of conservation interventions. For example, as a purely hypothetical situation, if we successfully increase the average carrying capacity of tigers in Malaysia to ten adult animals/100km², similar to the high densities documented from Indian forests, then our long-term measurable target will be raised. Given the potential prey biomass naturally supported in tropical dipterocarp forests, this is not however probable in any foreseeable future. Raising the mean carrying capacities to 2-2.5 tigers/100km² at the high occupancy rate of 80-100% in CFS is reasonably achievable in the next 13 years. Therefore, despite the potential to be much more ambitious, we set the minimum target of about 1,000 adult tigers in CFS.

In addition to directly monitoring tiger population status as the overall indicator of success, some other quantifiable indicators that could measure the progress of conservation actions include:

- Recruitment and mortality rates within the tiger population
- Population status of the main tiger prey species
- Nett loss or gain of forests in CFS
- Area of forest reserves in ESA 1 and ESA 2 gazetted as protection forests under the National Forestry Act
- Number of corridors maintained and actually used by tigers
- Number of traditional medicine practitioners selling medicines claiming to contain tiger
- Number of actual man-hours patrolled
- Size of area patrolled
- Proportion of tigers diet consisting of natural prey
- Number of cattle killed by tigers
- Number of offenders sentenced to imprisonment
- Number of snares confiscated

2.6 Actions, Implementing Agencies, Indicators and Timelines

This section translates the principles of conservation objectives and desirable outcomes (Sec 2.4) into concrete measures and tangible activities to be implemented in the field. It presents the steps which must be taken, and by whom and when, in order to deliver each outcome (summarised in Table 15 at the end of this section). Besides the leading and collaborating agencies, each action lists a measurable indicator against which the progress will be monitored (Sec. 2.7.4). The leading agency will be ultimately responsible for implementation of the action and reporting the progress. Collaborating agencies in reality may include more than those listed since only currently known partners are included in the Plan. Some outcomes are achievable within the next eight years. Others may not be, and any additional time required for these is dependent on the performance by the related agencies over the next eight years. Not all the steps are in a sequential order; for the chronology of the steps, refer to the timeline for each step.

2.6.1 Secure the Central Forest Spine with strictly protected priority areas in the landscapes connected with corridors

The three outcomes are:

- i. Priority areas important to tigers are strictly protected, expanded or sustainably managed.
- ii. Important tiger habitats outside the priority areas are identified and effectively managed as ESA 1 or 2 at state and local levels
- iii. Critical areas for landscape connectivity are acknowledged, established and managed at state and local levels

This objective is primarily to secure the physical habitat requirement of a healthy, viable population of tigers (defined in Sec. 2.2). It is heavily driven by the National Physical Plan with an emphasis on the Central Forest Spine with Environmentally Sensitive Areas connected with corridors. As such, the collaborating agencies encompass a wide array of government agencies, especially at the state level. This poses a challenge to the DWNP, collaborating agencies and other stakeholders in terms of efficient coordinating and monitoring. Since DWNP and WWF-Malaysia are part of the Working Group for the NPP's Master Plan for Central Forest Spine (DTCP, in prep), the rest of the MYCAT partners will work closely with DWNP and WWF-Malaysia to implement and monitor the actions. Demarcation of CFS and ESAs conceptualised in NPP is identified as one of the priorities in the CFS Action Plan. Therefore the focus of the Tiger Action Plan is on the three priority areas and priority corridors (Sec. 2.3). Effective management of the three priority areas is included here as well.

The three existing PAs are to be expanded by inclusion of Temengor as a gazetted National/State Park and/or buffer zones around the Protected Areas. All PAs must develop management plans, that include staffing and budgetary needs. Existing management plans for Taman Negara and Endau Rompin will be reviewed, updated and improved using existing guidelines, including those from IUCN and the Rapid Assessment and Prioritisation of Protected Areas Management (RAPPAM) methodology (Ervin, 2002).

Other important tiger habitats, especially for breeding and dispersal, outside the priority areas, need to be first identified in order to secure these areas. The options and decisions to manage them as new PAs, buffer zones or protection forests are dependent upon national and state priorities and initiatives, and are within the prerogative of respective state governments, where land is concerned. Towards maintaining and improving the critical landscape linkages, specific sites must be acknowledged as wildlife corridors with appropriate management prescriptions in state Spatial Action Plans, Local Plans and Structure Plans.

2.6.2 Provide effective and long-term protection of tigers and their prey

The three outcomes are:

- i. Strengthening of wildlife legislation
- ii. Improved legislative or regulatory protection of key prey species
- iii. Marked improvement in focused and intelligence-driven anti-poaching patrol of key forest sites and enforcement of wildlife and wildlife trade laws

More effective wildlife legislation will be enacted and implemented. It is anticipated that the amended legislation will raise the penalties, including mandatory jail sentence, for offences committed against totally protected species. There will be an increased emphasis on better protection of primary prey base through increased knowledge, upgraded status from protected game to totally protected species and regulation of

issuance of hunting and dealer licences. In order to upgrade the protected status of threatened prey species, status reports for each species will be compiled based on existing information that will also identify knowledge gaps. In selected sites, the status of prey species will be closely monitored to determine the numerical response of the prey populations to the moratorium on the issuance of hunting licences. In addition to these ecological studies, monitoring of hunting and trade of tigers and their prey species will be continued.

Marked improvement in focused and intelligence-driven anti-poaching patrol and enforcement of wildlife and wildlife trade laws was identified as the utmost urgent priority by many at the National Tiger Conservation Workshop in 2006. The current effort will be enhanced with greater commitment, skills, resources, collaboration and a monitoring mechanism. To achieve this, prioritised needs for critical resources (e.g., skills, manpower, equipment, funds) for better enforcement/patrol will be identified and the ways to acquire them will be strategised. The performance and effectiveness of enforcement and anti-poaching patrols will be monitored. Furthermore, inter-agency collaboration will be enhanced with FDPM to actively enforce the wildlife laws at checkpoints on key logging access roads and spot-checks at logging concessions; with local authorities/councils to revoke business licences from restaurants and traditional medicine shops that violate the wildlife laws; with other national enforcement agencies (e.g., Royal Customs of Malaysia, Anti-smuggling Unit, Immigration Department, and Royal Malaysian Police) for broader intelligence network; and with ASEAN-WEN and CITES member countries to reduce illegal trade across the national borders.

In addition, a study will be conducted to determine the feasibility of providing incentives to Customs, cargo and FDPM personnel for good detection of wildlife trade offences. Capacity building for trans-boundary enforcement/patrol and building and managing informant networks is planned for enforcement staff.

2.6.3 Promote and practice ecologically sound land use, compatible to tiger conservation outside the priority protected areas

The four outcomes are:

- i. Sustainable utilisation of land areas in current and potential Human-Tiger Conflict areas as well as forest reserves
- ii. Establishment of community-based Better Management Practices (BMPs) to mitigate HTC in affected areas
- iii. Effective awareness programmes in HTC areas
- iv. A sustainable financing mechanism to mitigate HTC

Habitat management and land-use practices inside the priority areas are addressed by the first objective (Sec 2.6.1). Here, land-use practices and human activities outside the priority areas, especially in the HTC areas, are dealt with. Besides the HTC issues, ecologically sound forestry practice, compatible with tiger conservation is addressed by implementing sustainable forest management in PRFs, with practical and scientifically acceptable wildlife monitoring procedures incorporated into the management.

Land-use guidelines and recommendations for both existing and potential HTC areas (as based on spatial modelling) will be incorporated in the subsequent NPP review and eventually reflected in Local or Structure Plans. Community-based BMP to mitigate HTC will be established and complemented with sustainable financing mechanisms.

Where applicable, negotiations will be conducted with private land owners to ensure land use and activities on private lands are compatible with tiger conservation. Where it is difficult to impose restrictions on private land, the concept of conservation easements should be explored whereby land owners are compensated for giving up certain options pertaining to land use and activities.

2.6.4 Apply science to monitor the efficacy of conservation actions and to improve the knowledge of tiger ecology

The four outcomes are:

- i. Establishment of the *Malayan Tiger and Large Mammal Monitoring Guidelines* by adapting existing mechanisms in place within the DWNP and based on internationally accepted methods
- ii. Monitoring of the occupancy of tiger and their prey across landscapes and tiger densities in priority areas

- iii. Improved planning and coordination of research conducted on tiger ecology and conservation through development and implementation of the tiger section of the *Wildlife Research Plan*
- iv. Enhanced knowledge and information base on tiger ecology and conservation

The indicator of success is measured in tiger occupancy across landscapes and population sizes or densities in priority areas (Sec. 2.5). The nationwide occupancy survey will determine the distribution of not only tigers but also all large mammals, including tigers' main prey species that can be detected and identified by their secondary sign. In addition to the occupancy survey, the intensive camera-trapping studies in priority areas will provide information on not only tiger densities, but also on the relative abundance of many other wildlife species. Because nationwide monitoring requires the collaboration of multiple parties, the basic sampling framework will be standardised using internationally accepted scientific methods. This is not a strict protocol, but a set of guidelines which remain flexible to site variables or the specific needs and priorities of a particular organisation. The minimum standard, such as the use of a unified grid and basic methodological frameworks, will be standardised and agreed by the involved partners. Proposed methods will be rigorously tested in the field and revised and updated until the guidelines are finalised. The nationwide monitoring will commence once the guidelines are established.

Besides the monitoring of the status of tigers and their prey, there are many other studies that can be conducted in order to deepen the understanding of tiger ecology and conservation. During the National Tiger Conservation Workshop in 2006, participants made a list of questions that could be addressed through such studies – questions that lend themselves to specific research topics for the future. The list encompassed a variety of topics, from biological to social issues, regarding wild and captive tigers. The next step is to prioritise these topics and identify the resources (skills, manpower and funds) required for their implementation in a MYCAT-organised workshop where MYCAT partners, local universities, other independent tiger researchers and potential donors are involved. The tiger section of the *Wildlife Research Plan* will provide guidance to planning, endorsement, and fundraising for tiger research in the future. Request for proposals by DWNP according to this section will be reviewed by MYCAT, assisted by international tiger experts when necessary, to ensure the integrity of the research conducted.

2.6.5 Educate and empower the public for greater support and engagement in tiger conservation

The steps to build capacity and secure funds for achieving respective outcomes are implicit in the respective objectives. Potential outcomes of public awareness programmes have compounding benefits to overlapping objectives. Therefore, except for the community outreach programmes specific to issues of HTC (Sec. 2.6.3), the public awareness components are addressed in this separate section. Besides general public awareness programmes conducted by various partners in the forms of publications and talks (Sec. 1.5.2.3), programmes with more clearly defined goals are necessary if awareness and knowledge are to be translated to actions and changes in values. Although potential target groups are mentioned in Sec 1.5.2.2, identification of desirable outcomes and effective communication tools for each target group was beyond the scope of the National Tiger Conservation Workshop in 2006 and thus specific actions were not discussed. Important target groups identified during the workshop were: 1) exotic meat restaurant patrons, 2) TCM practitioners/dispersers/consumers, 3) private zoos, 4) enforcement agencies, 5) rural community living near tigers, 6) Orang Asli, 7) school children, and 8) media.

For each target group, the following actions are necessary (Sec 1.6.2.1).

- i. Define a desirable outcome to be brought about by changes in their actions, attitudes, and values
- ii. Identify the message to be conveyed
- iii. Select the educational/communication strategy
- iv. Identify and acquire necessary resources (skills, manpower and funds)
- v. Conduct the programme
- vi. Evaluate the effectiveness of the programme

Development and implementation of specific programmes will be further discussed and coordinated in the MYCAT framework either in a special meeting or workshop.

Table 15: Actions, implementing agencies, indicators, and timelines (Refer to Page viii for the list of acronyms)

		Leading Agency	Collaborating Agency	Indicator	Means of Verification	'08	'09	'10	'11	'12	'13	'14	'15
1	Secure Central Forest Spine with strictly protected priority areas in landscapes connected with corridors												
1.1	Priority areas important to tigers (i.e., Belum-Temengor Complex, Taman Negara and Endau-Rompin Complex) are strictly protected, expanded, or sustainably managed												
1.1.1	Identify potential for expansion of the targeted PAs and for new PAs	Management Authorities for Priority Areas (i.e. DWNP, PSPC & JNPC respectively)	NRE, UPEN, EPU, DTCP	Recommendations for targeted agencies	Proceedings of workshop; media; meeting minutes; correspondence	x	x						
1.1.2	Implement recommendations for expansion and creation of new PAs		State governments	Local Plans; EXCO decisions; notification of new PAs published in State gazettes	State gazette			x	x				
1.1.3	Ensure PAs have effective management plans for implementation		MYCAT	Published management plans	Management plans	x	x	x	x				
1.1.4	Ensure effective implementation of the management plans in PAs		MYCAT	Management effectiveness evaluated using RAPPAM or equivalent; revenues and expenditures for PAs.	RAPPAM reports; annual financial reports	x	x	x	x	x	x	x	x
1.2	Important tiger habitats outside priority areas are identified and effectively managed as ESA 1 or 2 at state and local level												
1.2.1	Identify important tiger habitats outside PAs	DWNP	WWF, MYCAT SO, NRE, DTCP, Land Office, UPEN, Local Authority, FDPM	Important tiger habitats outside PAs identified	Maps showing the areas; recommendations to various depts; proceedings	x	x	x	x				
1.2.2	Implement sustainable forest management in PRFs, with practical and scientifically acceptable wildlife monitoring procedures incorporated into the management	FDPM	DWNP, MTCC, concessions	Implementation of suitable conservation initiatives adopted by FDPM	Certificate from MTCC; checklist		x	x	x	x	x	x	x
1.2.3	Upgrade the conservation status or gazette important tiger habitats in state lands as PRFs, ESA 1 or 2 in line with the NPP	DTCP, FDPM, DWNP	Land Office, UPEN, MYCAT	ESAs identified in revised local plans/structure plans; notification of PRFs in State gazettes	Local plans/structure plans; State gazettes		x	x	x	x	x	x	x
1.2.4	Identify and/or secure important tiger habitats in private/alienated lands	DWNP,DTCP, UPEN	Land Office, JKPTG, MYCAT	Corridors and buffer zones implemented through purchase of private/land/conservation easements/restrictions to land use	State gazettes; reflected in local plans/structure plans; announcements; media; agreements with private land owners announcements; media		x	x	x	x	x	x	x

1.3	Critical areas for landscape connectivity are acknowledged, established and managed at state and local levels												
1.3.1	Engage relevant authorities in identifying specific linkages and implementation options	NRE, DTCP	WWF, Linking Landscapes Working Group	Prioritised sites and implementation options approved by relevant authorities	Meeting minutes; Cabinet announcement; media; proceedings	x	x						
1.3.2	Conduct relevant studies to select specific sites and implementation methods	DWNP	WWF, MYCAT SO, FDPM	Results of the studies	Reports; presentations; maps; meeting minutes	x	x	x					
1.3.3	Establish the respective linkages and implement effective management	NRE, EPU, UPEN	JKPTG, DWNP, FDPM, WWF, JKR, DoE, DID, DoA, relevant agencies	Infrastructure and/or ecologically sound land-use practices in place; guidelines/management plans in place; budget to implement the plans in place; increased socio-economic benefits to local community	Media; EIA reports; wildlife monitoring system; reports of tiger presence; guidelines/management plans with budget				x	x	x	x	x
1.X	Integrate above projects towards the 10 th and 11 th Malaysian Plan	DWNP		Projects discussed at meetings, budgeted and granted	Meeting minutes, reports, proposals, and budgets for the 10 th and 11 th MP	x	x	x			x	x	x
		Leading Agency	Collaborating Agency	Indicator	Means of Verification	'08	'09	'10	'11	'12	'13	'14	'15
2	Provide effective long-term protection of tigers and their prey												
2.1	Strengthening of wildlife legislation												
2.1.1	Determine the level of illegal trade in tigers and their prey in Malaysia through surveys of TCM shops and exotic meat restaurants and highlight the need for improved legislation and enforcement	DWNP	TSEA, MYCAT SO	Publication and dissemination of TSEA reports on trade of tigers and their prey in Malaysia	Reports; media pick-ups	x							
2.1.2	Complete the internal review of the PWA	NRE	DWNP	Notice of passing of amended legislation published in Federal Gazette	Federal Gazette	x							
2.1.3	Publicise the amendment made to the PWA	DWNP, MYCAT SO	Media, MNS, TSEA, WCS, WWF	Information in the public domain	Media pick-ups; MYCAT e-group; press releases		x						
2.2	Improved legislative or regulatory protection of key prey species												
2.2.1	Place a 3-year moratorium on issuance of hunting licence for sambar deer and barking deer	DWNP	MYCAT	No licences issued	DWNP statistics	x							

2.2.2	Assess the current status of the sambar deer, barking deer, bearded pig and wild pig based on existing information to justify the needs for better protection and identify the knowledge gap for conservation	DWNP, MYCAT SO	TSEA, WCS, WWF, JNPC	Better understanding of the prey species status	DWNP fact sheets; report	x											
2.2.3	Establish a baseline and monitor populations of these species in selected sites to assess the impact of the moratorium	DWNP	WCS, WWF	Population and occurrence study	Report; publication	x	x	x	x	x	x	x	x	x	x	x	x
2.2.4	Publicise the findings	DWNP, MYCAT SO	Media	Information in the public domain	Media pick-ups		x	x	x	x	x	x	x	x	x	x	x
2.2.5	Based on 2.2.3, review legal status of sambar deer, bearded pig and barking deer and change accordingly	DWNP	MYCAT	Species protection reviews	Amendment recommendations		x										
2.2.6	Publicise the changes in regulation/legislation	DWNP, MYCAT SO	Media	Information in the public domain	Media pick-ups		x	x	x	x	x	x	x	x	x	x	x
2.3	Marked improvement in focused and intelligence driven anti-poaching patrol of key forest sites and enforcement of wildlife and wildlife trade laws																
2.3.1	Identify and prioritise the needs for critical resource (skills, manpower, equipment, funds) for better law enforcement/patrol and strategise the ways to acquire them	NRE, JPA, DWNP	MYCAT, donors	Workshop to devise wildlife enforcement and anti-poaching strategy organised	Strategy published	x											
2.3.2	Establish a mechanism to monitor the work performance and effectiveness of the anti-poaching patrols and enforcement activities	DWNP		Mechanism such as activity/performance log established and updated monthly	Regular reports submitted to DWNP HQ	x	x	x	x	x	x	x	x	x	x	x	x
2.3.3	Increase intelligence-driven anti-poaching patrol at locations determined through coordination with DWNP	DWNP	Army, FDPM	Key sites continuously patrolled; increase in detection rates of snares and poachers; increase in areas covered in each state; increase in number of man-days patrolled	Monthly reports	x	x	x	x	x	x	x	x	x	x	x	x
2.3.4	Establish and coordinate community ranger patrol units for focused and intelligence-driven patrolling in key sites	JNPC, PSPC	MYCAT	Area patrolled; no. snares removed; no. poachers arrested	Monthly reports; Police reports	x	x	x	x	x	x	x	x	x	x	x	x
2.3.5	Increase the frequency of spot-checks and arrests on wildmeat restaurants, TCM shops, hunters, commercial dealers, middlemen, zoos and private	DWNP		Each state to double the number of spot-checks	Reports on enforcement activity	x	x	x	x	x	x	x	x	x	x	x	x

	owners												
2.3.6	Increase the number of successfully prosecuted cases	DWNP		Increasing success in prosecution of cases	Judgements from court; media pick-ups; annual reports	x	x	x	x	x	x	x	x
2.3.7	Revoke licences and/or no more issuance to offenders	DWNP		Increase in the no. licences revoked or rejection of applications for repeat offenders	State blacklist of offenders	x	x	x	x	x	x	x	x
2.3.8	Collaborate with relevant local authorities to revoke business licences of those who violate the wildlife legislation	DWNP, MYCAT SO	Local authorities	Positive response from the relevant local authorities/councils; business licences revoked	Meeting minutes; reports	x	x	x	x	x	x	x	x
2.3.9	Collaborate with FDPM for active enforcement at checkpoints at key logging access roads and spot-checks at logging concessions	DWNP, FDPM	WCS, WWF	Increase in no. spot-checks in PRFs	Monthly reports; enforcement log	x	x	x	x	x	x	x	x
2.3.10	Enhance the collaboration with ASEAN-WEN and CITES member countries	DWNP	TSEA, ASEAN-WEN, MYCAT SO	Regional workshop on trans-boundary wildlife enforcement	Proceedings; media pick-ups	x		x		x		x	
2.3.11	Enhance inter-agency enforcement task force	NRE	DWNP, FDPM, MTIB, Sabah Wildlife, Sarawak Forestry, Anti-smuggling Unit, Police, Customs, Immigration	Malaysian Wildlife Enforcement Network established	MOU or meeting minutes	x							
2.3.12	Enhance informant networks at local level	DWNP	MYCAT	Meetings and dialogues to work with local community leaders organised; the current reward system publicised	Reports	x	x	x	x	x	x	x	x
2.3.13	Enhance the existing incentives to the Customs, cargo staff, FDPM staff for good detection	DWNP		Agreed formula in place	Reports	x	x						
2.3.14	Enhance the capacity of enforcement/patrol teams at the Malaysia-Thai border and the Straits of Malacca	DWNP	TSEA, Army, Police, Marine Police	Capacity building training held	Training materials	x	x						
2.3.15	Enhance informant networks through effective training for enforcement staff	DWNP	TSEA, Police, Customs	Capacity building training held	Training materials	x	x						

	in building and managing informant networks												
2.3.16	Monitor illegal trade trends of tiger and prey species	DWNP	TSEA	Surveys conducted	Reports	X	X	X	X	X	X	X	X
2.X	Integrate above projects towards the 10 th and 11 th Malaysian Plan	DWNP		Projects discussed at meetings, budgeted and granted	Meeting minutes, reports, proposals, and budgets for the 10 th and 11 th MP	X	X	X			X	X	X
		Leading Agency	Collaborating Agency	Indicator	Means of Verification	'08	'09	'10	'11	'12	'13	'14	'15
3	Promote and practice ecologically sound land-use compatible with tiger conservation outside the priority areas												
3.1	Sustainable utilisation of land areas in current and potential HTC areas as well as forest reserves												
3.1.1	Update the existing monitoring system developed at DWNP HQ on HTC areas using GIS	DWNP	WWF	HTC maps produced; updated using GIS	Master map available to stakeholders; DWNP staff at state and district levels able to use the system to monitor HTC	X							
3.1.2	Develop a spatial model based on existing HTC sites to predict potential HTC sites	DWNP, WWF	IPTA	Map of potential HTC sites	Modelling and survey reports available to stakeholders	X	X	X	X	X	X	X	X
3.1.3	Develop Land-use Guidelines & Recommendations for existing/potential HTC areas	DTCP, WWF	DWNP, IPTA, EPU, FDPM	Guidelines produced	Local Plan, Structure Plan, revised NPP and other land-use plans for relevant areas incorporating the guidelines and recommendations		X	X					
3.1.4	Implement suitable wildlife-friendly initiatives in forestry sector	FDPM, DWNP, MTCC, WWF	FRIM	Practical and scientifically acceptable monitoring guidelines incorporated into forestry documents	State Forest Management Plans		X	X	X	X	X	X	X
3.2	Establishment of community-based Better Management Practices (BMPs) to mitigate HTC in affected areas												
3.2.1	Identify community-based BMPs for mitigation in HTC areas	DWNP	WWF, Land agencies, DVS, DoA	List of BMPs for Jeli, Kelantan identified	Reports	X							
3.2.2	Test, review and refine the BMPs in three pilot sites in Jeli, Kelantan to develop community-based HTC mitigation protocol	DWNP	WWF	Results at tested sites	Reports	X	X						
3.2.3	Implement the protocol	DWNP	WWF, relevant agencies	Reduction in HTC	Survey reports			X	X	X	X	X	X

3.3	Effective awareness programmes in HTC areas												
3.3.1	Carry out assessment for awareness programmes in HTC affected areas	DWNP	WWF, WCS	Appropriate awareness/outreach programme needs identified	Reports; statistics	x							
3.3.2	Enhance appropriate programme and materials	DWNP	WCS, WWF	Awareness programme manual and materials	Published manual	x	x						
3.3.3	Train personnel	DWNP	MNS, WCS, WWF	Relevant personnel trained to carry out the programme	Training workshop		x	x					
3.3.4	Implement the programme	DWNP	MNS, WCS, WWF	Programme implemented with positive feedback	Site visit; media pick-ups			x	x	x	x	x	
3.4	A sustainable financing mechanism to mitigate HTC												
3.4.1	Conduct a feasibility study on sustainable financing mechanism for resolution of HTC	WWF		Potential mechanisms identified	Reports	x							
3.4.2	Develop a sustainable financing mechanism, modify and link to financial agencies	WWF	UPEN Kelantan, USM, DWNP, Financial agencies	Mechanism developed	Legal documentation of the developed mechanism	x	x						
3.4.3	Test out the mechanism in a pilot site	WWF	UPEN Kelantan, USM, DWNP, Financial agencies	Mechanism agreed and supported by stakeholders, financial agencies	Statistics	x	x						
3.4.4	Implement at other affected areas	WWF	Depends on the result of 3.4.2 and 3.4.3. Yet to be determined.	Reduced socio-economic losses among affected locals; sufficient funds to implement BMPs; new income generated	Survey; conflict incidence report; reports		x	x	x	x	x	x	
3.X	Integrate above projects towards the 10 th and 11 th Malaysian Plan	DWNP		Projects discussed at meetings, budgeted and granted	Meeting minutes, reports, proposals, and budgets for the 10 th and 11 th MP	x	x	x			x	x	x
		Leading Agency	Collaborating Agency	Indicator	Means of Verification	'08	'09	'10	'11	'12	'13	'14	'15
4	Apply science to monitor the efficacy of conservation activities and to improve knowledge of tiger ecology												
4.1	Establishment of the <i>Malayan Tiger and Large Mammal Monitoring Guidelines</i> based on existing mechanisms in place within the DWNP and internationally accepted methods												
4.1.1	Introduce underlining principles and best practice for monitoring tiger and tiger prey populations to local researchers	WCS	DWNP, MNS, WWF	Training workshop conducted	Workshop programmes and materials	x							

4.1.2	Agree to use standardised methodology and grid system	DWNP	MNS, WCS, WWF, MYCAT SO	Meeting to discuss standardised method held	Meeting minutes endorsed by respective agencies	x								
4.1.3	Assess the applicability of best practice to the nationwide tiger monitoring exercise	DWNP	MNS, WCS, WWF, MYCAT SO	Results	Meeting minutes or proceedings	x								
4.1.4	Identify the resource needs (personnel, capacity, funds) for tiger monitoring	DWNP	MNS, WCS, WWF, MYCAT SO	Results	Meeting minutes or proceedings	x								
4.1.5	Determine the sampling sites and timeline	DWNP	MNS, WCS, WWF, MYCAT SO		Meeting minutes or proceedings	x								
4.1.6	Test the occupancy method, share the result, and modify the method if necessary	WCS	DWNP, MNS, WWF, MYCAT SO	Presentation; discussions	Reports; meeting minutes	x								
4.1.7	Based on the field-tested methods, draft guidelines	WCS	DWNP, MNS, WWF, MYCAT SO	Draft guidelines circulated for review and revised	Draft guidelines reviewed and finalised	x								
4.1.8	Endorse the guidelines	DWNP		guidelines established	Published guidelines	x								
4.2	Monitoring of the occupancy of tigers and their prey across landscapes and tiger densities in priority areas													
4.2.1	Conduct training	DWNP	WCS	Relevant personnel trained	List of trainees	x								
4.2.2	Fundraising for nationwide monitoring	MYCAT		The target amount raised	Grant agreements	x								
4.2.3	Conduct research	Respective researchers		Results	Reports; data		x	x	x	x	x	x	x	x
4.2.4	Share experience	Respective researchers	MYCAT	Information shared	MYCAT e-group; meeting minutes		x	x	x	x	x	x	x	x
4.2.5	Disseminate the results to scientific community	Respective researchers		Publications in peer-reviewed journals and popular magazines; presentations at conferences	Publications; proceedings			x	x	x	x	x	x	x
4.2.6	Disseminate the result to the general public	DWNP, respective researchers	MYCAT SO, media	Publications in popular magazines or newspapers; public presentations	Media pick-ups; seminar announcements			x	x	x	x	x	x	x
4.2.7	Modify the guidelines if necessary	DWNP, WCS	MYCAT SO, MNS, WWF	Modified guidelines circulated and accepted	Updated guidelines			x	x	x				
4.3	Improved planning, coordination and scientific integrity of research conducted on tiger ecology and conservation through development and implementation of the tiger section in the <i>Wildlife Research Plan</i>													
4.3.1	Identify and prioritise research topics regarding tiger ecology and	DWNP	MYCAT SO, MNS, TSEA, WCS,	Included in the draft <i>Wildlife Research Plan</i>	A section of the draft <i>Wildlife Research Plan</i>		x							

	conservation		WWF, universities, other researchers														
4.3.2	Identify the resource (personnel, capacity, funds) needs for priority research	DWNP	MYCAT SO, MNS, TSEA, WCS, WWF, universities, other researchers	Included in the draft <i>Wildlife Research Plan</i>	A section of the draft <i>Wildlife Research Plan</i>		x										
4.3.3	Develop and review the tiger section of the <i>Wildlife Research Plan</i>	DWNP	MYCAT SO, MNS, TSEA, WCS, WWF	Draft tiger section circulated for review and revised	Final draft of tiger section submitted to DWNP		x										
4.4	Enhance knowledge and information base on tiger ecology and conservation																
4.4.1	Request for Proposals according to the tiger section in the <i>Wildlife Research Plan</i>	DWNP	MYCAT SO	Tiger section in the <i>Wildlife Research Plan</i> and Request for Proposals	Available at DWNP website and from MYCAT SO			x	x	x	x	x	x	x	x	x	x
4.4.2	Peer review of research proposals	DWNP	MYCAT SO, scientific community	Proposals circulated for expert review	Comments and recommendations from the reviewers to DWNP and researchers			x	x	x	x	x	x	x	x	x	x
4.4.3	Approve research proposals involving animal handling or by foreign institutions	DWNP		Letters of approval	Copy of letters maintained by MYCAT SO	x	x	x	x	x	x	x	x	x	x	x	x
4.4.4	Conduct research	Respective researchers		Results	Reports; data	x	x	x	x	x	x	x	x	x	x	x	x
4.4.5	Share experience and results	Respective researchers	MYCAT	Information shared	MYCAT e-group; meeting minutes	x	x	x	x	x	x	x	x	x	x	x	x
4.4.6	Disseminate the results to scientific community	Respective researchers		Publications in peer-reviewed journals; presentations at conferences	Publications; proceedings		x	x	x	x	x	x	x	x	x	x	x
4.4.7	Disseminate the result to the general public	DWNP, respective researchers	MYCAT SO, media	Publications in popular magazines or newspapers; public presentations	Media pick-ups; seminar announcements		x	x	x	x	x	x	x	x	x	x	x
4.X	Integrate above projects towards the 10 th and 11 th Malaysian Plan	DWNP		Projects discussed at meetings, budgeted and granted	Meeting minutes, reports, proposals, and budgets for the 10 th and 11 th MP	x	x	x					x	x	x	x	x

2.7 Implementation of the Plan

The Plan thus far has presented:

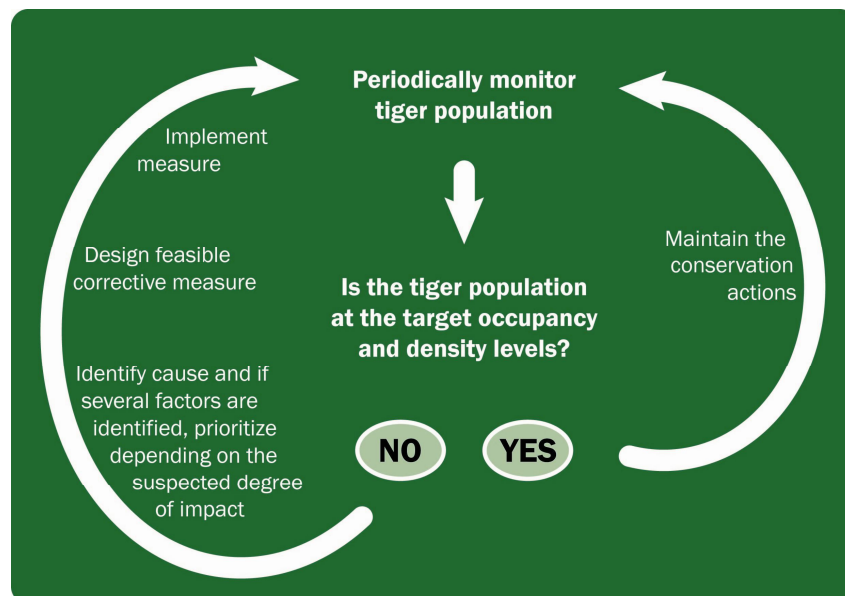
- Natural history and conservation status of tigers in Malaysia
- The ultimate, shared vision to be achieved in this century
- The time- and space-dependent goals, primary objectives and main outcomes (i.e. the road map to success)
- Quantifiable target for the year 2020
- Specific actions with indicators, responsible agencies and timeframes for the next eight years

The adaptive approach that is needed to successfully implement the Plan relies wholly on the stakeholders collectively learning from experiences and identifying methods needed to improve the actions. This section describes this dynamic approach in more detail and explores the importance of accountability and stakeholder engagement in the learning process. This culminates in the presentation of a method to monitor the implementation of the Plan.

2.7.1 Adaptive Management

New knowledge and new solutions to complex problems faced by tigers are created by concerned and interested people coming together over a long period of time to try things out, share their experience, insights and understanding, and to make decisions on what to do in the future. Besides obvious resources necessary, successful implementation of the Plan, therefore, depends on effective feedback and learning (Fig. 9).

Fig. 9: A simplified schematic diagram of an adaptive management framework for tiger conservation (Modified from Gratwicke *et al.*, 2006).



This Plan is seen as the basis for more proactive, enhanced actions for tiger conservation, achieved through learning processes, improvements and advances in information and knowledge. It is a collection of working models to be strengthened through stakeholder dialogues and to be tested in practise, constantly reflected on and revised upon.

Given the limited resources available for conservation and the alarming rates at which both tigers and their habitat are disappearing, the accountability of conservation actions is critical. Applying sound methods to measure the efficacy of conservation actions can lead to more efficient planning, allocation of resources and implementation.

In order for real and mutual accountability and learning to take place, the core of the stakeholder engagement strategy must involve a two-way mechanism (dialogues) for exchanging views, clarifying expectations, addressing differences, building shared understanding, encouraging creative but practical solutions, and building trust. Furthermore, all this must be done in an environment of openness and honesty where personal or organisational differences are set aside in order to focus on the task at hand.

2.7.2 Accountability

The strength in plans of this nature lies in the power to demand accountability. Accountability defines the relationship between the parties involved, and the beneficiary of the Plan should necessarily be in the best position to assess the effective implementation of the Plan. In this case, the beneficiary is the tiger, and therefore, the primary accountability will be reflected in their population status, which will be measured using internationally accepted methodologies standardised to Malaysian application (Sec. 2.5).

Besides the primary accountability to the beneficiary of the Plan, there are two other lines of accountability.

- i. **Vertical Accountability:** The implementing agencies are accountable to those who have legal authority and who can demand accountability because they control financial resources. For example, DWNP is accountable to NRE and, likewise, NGOs are accountable to their donors. The Malaysian Government is also accountable to the taxpayers collectively. On ethical grounds, the Plan, which is entrusted to save wild tigers in Malaysia, is ultimately accountable to the future generations of Malaysia as well as the global citizens at large, to whom the tiger in the wild may become an unknowable thing of the past.
- ii. **Horizontal Accountability:** The Malaysian government is accountable to the implementation of this plan in its entirety, which is developed in parallel to the various national policies it has established, keeping in mind its commitment to the international community through the multilateral environmental agreements it has subscribed to, such as the Convention on Biological Diversity and CITES. Implementing agencies are accountable to one another by the binding pledge to work together towards the unified goal. Since the implementing agencies are committed to using sound science, the agencies are also accountable to skilled peers within the scientific community.

2.7.3 Stakeholder Engagement

"... vision, persistence, thinking at the right social and spatial scales, and constructive dialogue are keys to the tiger's future. "

- Ullas Karanth

Important stakeholders for this Plan are generally:

- **Primary stakeholders:** those who implement the Plan directly for the purpose of tiger conservation or provide necessary resources or skills to the implementation of the Plan; or influence the course of effective implementation significantly. These include MYCAT partners, NRE, FDPM and donors.
- **Secondary stakeholders:** those who implement the Plan primarily for other goals that indirectly contribute to the goal of this Plan. These include the DTCP, Police, Army, Customs, as well as specific local communities involved in sustainable resource utilisation or HTC resolution work. In other words, all other organisations involved in the Plan outside the primary partners are secondary stakeholders.
- **Tertiary stakeholders:** those who are affected by, or indirectly influence the outcomes of the Plan. These include state governments and the general public.

At an activity level, these categories are not hard-and-fast as what makes a particular group fall into a particular category depends on the level of involvement of each organisation in a specific programme. For example, in a conflict-resolution programme, the affected community is, at least, the primary stakeholder and perhaps even a beneficiary of the desired outcome. Furthermore, the Forestry Department exerts considerable influence on how tigers survive in forest reserves. Even though their primary task in forest management, FDPM is therefore considered a primary stakeholder for the Plan.

While short-term, project-based, collaborations around narrow objectives might be established and managed quite easily, the success of longer-term partnerships depends on building mutual confidence and trust, which requires frequent dialogues among the partners. This is where the MYCAT platform plays a vital

role.

Frequent dialogues are an excellent basis for learning through the adaptive management approach. There are four types of dialogues involved in the implementation and monitoring of the Plan:

- i. MYCAT dialogues – Besides day-to-day communications among the MYCAT partners, MYCAT Working Group members meet once every few months to keep each other updated on activities, and to discuss emerging issues and generally strengthen a mutually beneficial working relationship.
- ii. Central stakeholder dialogues – More formal dialogues with the primary and secondary stakeholders will be called by NRE every six months to review the Plan implementation, share lessons, resolve issues, and to make minor adjustments to planned actions.
- iii. Local stakeholder dialogues – Dialogues with those local communities that are directly affected or local government agencies that are collaborating on specific projects will be done at the local level. The implementing lead agency will bring lessons learnt and unresolved issues from the local stakeholder dialogues to central dialogues to share with the rest of the stakeholders.
- iv. Dialogues with the donor of each project/organisation are done by the respective grantee. In the case of the Malaysian Government, the donors are the Malaysian taxpayers and the public reporting is done in the form of an annual report, which is available in print and online.

2.7.4 Monitoring Mechanism

As the custodian of the Plan, DWNP is given the responsibility of implementing many actions. However the implementation of the full Plan is a responsibility shared by both primary and secondary stakeholders. Because the primary stakeholder involves one other agency in NRE, namely FDP, and the secondary stakeholders involve many other agencies in NRE and in other Ministries, NRE will provide the inter-agency coordination and ultimately monitor the progress of the Plan implementation. Another key responsibility of NRE will be to link the implementation of the Plan with the implementation of other relevant Policies such as NPP, NPBD and NPE.

The formal progress reporting will be conducted every six months during the central stakeholder meeting called by NRE (*Sec. 2.7.3 ii*). For this purpose, MYCAT Secretariat's Office will act as Secretariat to the NRE Division of Conservation and Environmental Management.

Every sixth month of the implementation (tentatively June and December of every year), the MYCAT SO will call for a 6th-month progress report from the implementing lead agencies using a standardised log frame. MYCAT SO will compile the reports, ensure the conformity of the report to a standard style and submit it to NRE that chairs the bi-annual central stakeholder meeting.

The reports include the following information for each action:

- Status of progress (completed, in progress, not yet started)
- Indicator
- Constraints which led to the delayed or incomplete action
- Measures taken or proposed to overcome the constraints
- Request for change or support
- Recommendations and plans for next step

The progress of each action will be reviewed in the order it appears in the Action Plan Table (Table 15). Necessary decisions and adjustments to the Plan will be made to resolve challenges to implementation. The specific responsibilities of MYCAT SO, as the Secretariat to the NRE Division of Conservation and Environmental Management, in the monitoring of the Plan are:

- To establish a standardised reporting format
- To ensure that all the relevant agencies are informed of the monitoring process
- To call for 6-month progress reports from the leading agency for each action
- To compile the report in a standardised manner and submit it to NRE
- To facilitate communication among MYCAT partners and other stakeholders

- To publicise and communicate with the public the implementation of the Plan

Towards the end of Phase I (2008-2015), the implementation and success of the Plan will be thoroughly reviewed and evaluated by an external conservation auditing team working with the MYCAT SO. The results from the evaluation will form the basis for a major stakeholder workshop on the work plan for Phase II (2016-2020).

2.7.5 Public Reporting

For the purposes of public accountability and transparency, the log frame used for monitoring and resolutions from the bi-annual central stakeholder meetings called by NRE will be made available through the MYCAT e-group or from MYCAT SO to anyone who requests the progress report. Additionally, annual the MYCAT newsletter, *MYCAT TRACKS*, will highlight the major progress and challenges in implementing the Plan and this will be made available in print and online.



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Appendix 2: Programme of the Malayan Tiger Conservation Workshop 2006

7 Nov 2006	
Opening speech Malaysia's vision for the Malayan Tiger	Dr Nadzri Yahya Deputy Undersecretary, Conservation and Environmental Management Division Ministry of Natural Resources and Environment
Introduction to the workshop Expectations and outputs	En Rasid Samsudin Director General, Department of Wildlife and National Parks
Malaysia in global tiger conservation efforts Significance of Malaysia and international funding mechanisms for tiger conservation efforts worldwide	Dr John Seidensticker Chairman, Save the Tiger Fund Council
Where we are and where we want to go? Focused action plan using a holistic and integrated approach	Dr Kae Kawanishi Secretariat, Malaysian Conservation Alliance for Tigers
Tiger Management Plan and priorities	Mr Kadir Hashim Principal Assistant Director, Biodiversity Conservation, Department of Wildlife and National Parks
Role of NGOs in tiger conservation	Ms Kanitha Krishnasamy Science Officer, Malaysian Nature Society
Capacity building, community outreach and awareness programmes	Dr Melvin Gumal Malaysia Programme Director, Wildlife Conservation Society-Malaysia
Panel Discussion 1: Implementation of National Physical Plan a. Implementation, enforcement and monitoring of National Physical Plan (NPP. 18 and 19)	Ms Siow Suan Neo Deputy Director, National Physical Plan Division, Department of Town and Country Planning
b. What it means to tigers, challenges and possible resolutions	Mr Brian Lee Tiger Project Leader, WWF-Malaysia
Panel Discussion 2: Combating the tiger trade a. Specific trade-related threats to tigers in Malaysia	Mr Chris R. Shepherd Senior Programme Officer, TRAFFIC Southeast Asia
b. Current mitigation measures, plans and recommendations for the future	Ms Misliah Mohd Basir Director, Law & Enforcement, Department of Wildlife and National Parks
Panel Discussion 3: Human-Tiger Conflict as a result of unsustainable rural development a. Current status, mitigation measures and recommendations for the future	Mr Salman Saaban Senior Assistant Director, Biodiversity Conservation Division, Department of Wildlife and National Parks
b. Resolutions from Human-wildlife Conflict Mitigation Workshop in July 2006	Mr Ahmad Zafir Abd Wahab Tiger Team Scientific Officer WWF-Malaysia

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