GTF

ACTION TIGER

TIGER ACTION PLANS OF 12 TIGER RANGE COUNTRIES

IFAW.org
A Better World for Animals and People

Wildlife Trust of India

10 Years in Service of Nature

ACTION TIGER

Tiger Action Plans of 12 Tiger Range Countries

Compiled by
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The Wildlife Trust of India (WTI) is a non-profit conservation organization committed to help conserve nature, especially endangered species and threatened habitats, in partnership with communities and governments. In the long run, it aims to achieve through proactive reforms in policy and management, an atmosphere conducive to conservation.

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PREFACE

It is with great pleasure that International Fund for Animal Welfare (IFAW)-Wildlife Trust of India (WTI) associates itself with the publication of the first edition of the "**ACTION TIGER**: NATIONAL TIGER ACTION PLANS OF 12 TIGER RANGE COUNTRIES" as available with the secretariat of the Global Tiger Forum (GTF), of which IFAW is a member.

IFAW is committed to strengthening the GTF and as part of this process, put on secondment from its India partner, WTI, a Technical officer who worked in GTF secretariat for the period 1st April 2005 to 31st March 2007. The technical officer, Dr. Joydeep Bose, compiled the National Tiger Action Plans (NTAPs) of 12 tiger range countries into one document which was placed at the 8th Executive committee meeting of GTF in New Delhi in May 2006. Soft copies of the document were then sent to all the tiger range countries in 2006. The document has now been further edited, without changing the contents, into a uniform layout and published. The draft National Tiger Action Plan of Nepal and India which were not available for inclusion at the time of preparation of the earlier document, have now been included in the compilation. The Nepal document was made available to the GTF secretariat during the 4th General Assembly (GA) of GTF at Kathmandu in April 2007. The National Tiger Conservation Authority (NTCA), India has also submitted its draft National Tiger Action Plan to WTI, representing IFAW in India, which has been included in this compilation.

IFAW would also like to commit to bringing out future editions of this publication to be presented at General Assemblies of GTF, the next one (5th) being in 2010. It must be mentioned that some of the NTAPs need up-gradation especially with regard to budgets and time lines for action. It is hoped that the tiger range countries would update their NTAPs as required and send these to the GTF secretariat for compilation of future updated editions.

I am grateful to Mr. S.C. Dey, Secretary General, GTF for giving IFAW-WTI the opportunity of publishing this very important document, on its behalf. I am also thankful to all the tiger range country representatives at the 4th GA who endorsed the document in writing and provided the go ahead for publication of the compiled document.

VIVEK MENON

Global Team leader, Tigers
International Fund for Animal Welfare (IFAW)
Executive Director, Wildlife Trust of India

FOREWORD

India, the country supposedly in possession of more than 50% of the world's wild tiger population is currently facing what may be termed as the "Third Tiger Crisis" having been triggered off by the Sariska Tiger Reserve fiasco, which lost all its tigers to poaching. Reports from various sources suggest a possible decline in tiger population in India. Though officially, a tiger crisis has not been reported from any other country, the situation in these countries is far from satisfactory, with some countries not even having estimates of the number of tigers in the wild. The situation, therefore is grim, and requires urgent attention. This need for urgent action can be better guided if the countries possess formal National Tiger Action Plans (NTAPs) for guiding tiger conservation efforts in-country. Of the 14 tiger range countries of the world, only two countries do not have NTAPs. These are Laos and North Korea.

The GTF secretariat is in possession of NTAPs of 12 countries that do have such a plan. While some are comprehensive, others can be termed as a blueprint or strategy only. Some of the plans (Bhutan, Nepal and Vietnam) have been revised and recently submitted to the GTF secretariat afresh. Of the 12 action plans, Myanmar (prepared in 2003), Bhutan (2005), Thailand (2004), Nepal (2007) and Indonesia (1994) have comprehensive plans, while that of China (1998), Russia (1996), Bangladesh (2004) and Vietnam (2005) can be termed as strategy only. The NTAPs of Malaysia (1995) and Cambodia (1994) can be treated as only blue prints. Indian Tiger Action Plan is costed against each activity but is required to be developed for details. Of the 12 NTAPs, Bhutan, China, Bangladesh, Cambodia and Vietnam NTAPs are costed.

The GTF secretariat has compiled 12 NTAPs in this single document and it gives me immense pleasure to place this document for the use of tiger conservationists. The secretariat was in correspondence with countries having pre-2000 NTAPs, seeking to know whether their NTAPs have been revised and updated or not. Though no written reply to this was received by the GTF secretariat, but on personal contact by Mr. Vivek Menon, representing the International Fund for Animal Welfare (IFAW), all country representatives except China, confirmed that the draft document is O.K. in the sideline of the 4th General Assembly of GTF at Kathmandu, Nepal in April 2007. However, Indonesia and Malaysia verbally reported that they have taken up the revision work of their existing plans. Thus, the available versions of these NTAPs have been used in this compilation. Cost figures of Bangladesh NTAP have been revised and a few points dropped as per further government communication, so their original action plan has been modified by the secretariat accordingly. No other changes have been made to the contents of these plans except minor English corrections and standardizing layout.

On behalf of GTF I thank IFAW and its India partner, Wildlife Trust of India (WTI) for taking up the job of compilation of this document voluntarily, financing the cost of its printing and their commitment for help in future revision of this document.

I hope that the country governments would find this compilation (12 NTAPs as a single document also available as soft copy) useful, as each NTAP has its own merits and demerits. The countries can consult other countries NTAP for reference while revising/updating their NTAP or preparing new ones.

S.C. DEY
(SECRETARY GENERAL)

International Fund for Animal Welfare

IFAW
www.ifaw.org

MESSAGE

It gives me great pleasure to know that the Global Tiger Forum is bringing out a single document that compiles the National Tiger Action Plans for 12 countries. The tiger is facing one of its worst periods of existence on this planet and it is pertinent that range countries put in all their efforts to save this magnificent creature. For this, many governments have provided resources and the International NGO Community also provided support. Such a document will help the International NGO Community in better understanding the priorities and requirements of range countries and in turn to prioritize their own agenda.

I am delighted that International Fund for Animal Welfare (IFAW) has been able to play a critical role in bringing this document together and I assure you that the tiger will remain a key regional priority for our organization.

I am glad that this document could be brought out with cooperation of all the 12 tiger range countries in our brief tenure on the executive committee of the GTF (2004-07)

Fred O Regan
President, IFAW

A Better World for Animals and People

CHAPTER 1

TIGER ACTION PLAN

BANGLADESH

Prepared by
Bangladesh Forest Department
Ministry of Environment and Forests

1. GENERAL BACKGROUND

The Bengal Tiger *(Panthera tigris tigris)* formerly had a wide range of occurrence in Bangladesh and used to be found in almost every forest type of the country. Presently, the Sundarbans Reserved Forests (SRF) has the only stable population of the tiger in the country and is still maintaining a viable population despite all odds.

There has been no authentic report of the occurrence of the tiger in the tropical forests of Chittagong Hill Tracts, Chittagong, Sylhet or Cox's Bazar in the recent past. The tiger is extinct in these tropical forests, the last animal having been killed in the reserved forests of Masalong of Chittagong Hill Tracts (CHT) in the year 1976.

No action plan has ever been implemented in the SRF mangrove forest for the conservation of tigers. The demography of the tiger and other ecological aspects have been never investigated in the SRF. In this situation, an action plan for conservation of the tiger in Bangladesh particularly for SRF is now essential. A project known as the Wildlife Management and Development project funded by the Government of Bangladesh has been implemented. Besides this project, there is a component for the management of the sanctuary under the Forestry Resources Management project (FRMP) funded by the World Bank.

The total area of the SRF is 6017 sq.km (about 601700 hectares) and in 1993 the tiger population here was estimated to be around 362. The population size and distribution pattern of the tiger in SRF is changing with the passage of time. However, the forests still possess potential habitats for the conservation of the tiger through appropriate initiatives.

In 1967 Guy Mountfort reported that there may be 100 tigers in SRF. This was followed by four further surveys: in 1971 by Hendriks, who estimated there may be 350 tigers in SRF; in 1982 and 1992 by the Forest Department, who put the figures at 450 and 359 tigers respectively; and in 1993 K.M. Tamang who estimated that there may be 362 tigers in SRF.

It is noted from various reports that the tiger population in SRF is concentrated in the southern parts. The northern part of SRF is adjacent to human habitation, and thus subjected to varied pressures such as poaching and people entering the reserve for gathering forest produce. This has naturally had a negative impact on the habitat, as well as on both the prey and the predator populations. Scientific research on the tiger, its prey and habitat in SRF would help in developing appropriate conservation methods. In the SRF area, the tiger enjoys cultural respect by the local people, especially social groups such as the fishermen, mowah (honey collectors) and bawali (wood cutters) people. To the armed forces and security forces, it symbolises courage. Thus protection of SRF and its tiger population is given value by the local populace. Unfortunately, the tiger is facing incredible pressures from poaching, habitat destruction, cyclones, tidal surges and inhospitable saline condition of the forests.

The need for the conservation of this globally threatened species has already been recognized by the formation of the Global Tiger Forum (GTF). The SRF is the only Ramsar Site in Bangladesh as a wetland of international importance. The UNESCO has also declared the SRF as a World Heritage Site with special emphasis on the conservation of biodiversity. Simultaneously, the demand for the conservation of the tiger by environmentalists and conservationists, from within Bangladesh and outside the country, has been mounting. Thus an action plan is warranted for the conservation, study and continuous research on the tigers of SRF.

The broad objectives of the Action Plan are:

i. Conservation of the tiger in the SRF.
ii. Conservation of habitats for tigers as well as prey species in SRF.
iii. Capacity building of officers and staff of the Forest Department.
iv. Training and education.
v. Creation of awareness among the people for tiger conservation.

2. HISTORY OF TIGER CONSERVATION IN BANGLADESH

Shooting and killing of the tiger continued till the end of 1972. The year 1973 was the year for change. In this year, the Bangladesh Wildlife (Preservation) Ordinance 1973 (President's Order 23 of 1973) was promulgated creating a ban on tiger killing. The ordinance was enacted in 1974 under the name of the Bangladesh Wildlife (Preservation) (Amendment) Act 1974. The tiger was included in the third Schedule of the said ordinance for conservation. Henceforth, the shooting of the tiger, deer and other wildlife was stopped. Several protected areas were declared under the ordinance, including three wildlife sanctuaries in the

SRF. The areas of there sanctuaries were extended in the year 1996. The three sanctuaries known as East, South and West sanctuary are important habitats for tiger conservation. Any kind of operation is prohibited inside the sanctuaries. The total area of the three sanctuaries is 1,39,700 hectare, which was declared a World Heritage Site by UNESCO in 1997 and ceremonially declared in February, 1999 by Sheikh Hasina, then Prime Minister of Bangladesh.

Bangladesh is one of the signatories to CITES which helps in curbing international illegal trading of tiger parts, derivatives and products. Bangladesh is also a party to the Ramsar Convention under which SRF was declared a Ramsar Site or a wetland of international importance. A management plan for the three sanctuaries was prepared in 1997 under the Forestry Resources Management project (FRMP) financed by the World Bank. A division was created for the management of the protected areas under the FRMP known as Environment Management Division. A project known as the Biodiversity Conservation of the SRF Reserved Forest funded by Asian Development Bank is under process of implementation where a number of actions will be undertaken for the conservation of tigers.

3. CURRENT STATUS OF THE POPULATION AND HABITAT OF THE TIGER

The current status of tigers can be seen at a glance from the reports of different surveys in the following table.

Agency	Year	Number	Comments
Hendriks	1975	350	Based on pug mark and study in some areas
Forest Department	1982	450	Based on the information of east, south and west sanctuaries
Forest Department	1992	359	Based on interviews
Tamang	1993	362	Based on pugmark and studies in some areas
IUCN	1999	6	From direct sighting in east sanctuary

Bangladesh has evergreen, semi evergreen, deciduous and mangrove forests. The tiger is now found only in the SRF, the world's largest contiguous mangrove forests. The SRF still maintains a viable population of tigers due to its large size, dense forest cover, isolation from human habitation, and since it has enough food and undisturbed breeding grounds. The total area of the SRF is 6,017 sq.km .The main forest species are Sundri *(Heritiera femes),* Keora *(Sonneratia apetata),* Howr *(Excoercarin agallocha)* Passur *(Xylocarpus mekongensis)* Dhumdul *(Xylocarpus granamm)* Goram *(Ceriops decandra),* Goal pata *(Nypa fauiticans)* etc.

In addition to the tiger, spotted deer, barking deer, red jungle fowl, otter, rhesus macaque, estuarine crocodiles, python etc. are found in the SRF. Each day the forest floors are inundated twice by saline tidal water from the Bay of Bengal.

Hendriks (1971) report on the population of spotted deer, wild boars, monkeys and otter is shown in the following table.

Wild animals	Numbers
Spotted deer	80,000
Wild boar	20,000
Monkeys	40,000
Otter	20,000

Tamang's (1993) report on the number of wild animals other than the tigers is shown in the following table.

Wild Animals	Numbers
Spotted deer	90,537
Barking deer	29,181
Monkey	40,000
Wildboar	45,269

4. THREATS TO THE TIGER

Anthropogenic Threats: The people living in and around SRF and also those who are working inside SRF are not aware of the need to conserve the tiger,

other wildlife, forests or biodiversity. Other threats in the form of poaching, poisoning of the tiger by the locals, as well as habitat destruction is still rampant.

Environmental Threats: There is a general lack of knowledge regarding the extent of environmental degradation to the SRF and its impact on tigers. However, the rise of water salinity and habitat destruction, cyclones and tidal surges are major threats for the tigers' existence in SRF.

5. DETAILS OF POACHING AND ILLEGAL TRADE

It was reported by Curtis (1931) in the working plan of the SRF that 452 tigers were killed from 1912 to 1921. During that period incentives were given by the Forest Department for killing tigers and depositing the tiger skin in the Divisional Forest Office. The Divisional Forest officer of SRF used to recruit professional hunters as boatmen or forest guards whose services were used for killing tigers (especially man-eaters near timber coupe operational areas). Forest Department staff and Khulna Newsprint Mills staff also killed a lot of tigers and received remuneration (varying from Rs. 50 to Rs.100) from the department.

There is a gap in records in the intervening years, and again it was gathered from records of SRF Forest Division that 33 tigers were killed by poachers from 1981 to 1999. Shotguns are commonly used by the poachers for killing tigers. Muzzle loaders and rifles are also used in some cases. Poison baits are another form of killing tigers, especially when they enter villages for lifting cattle or domestic dogs.

6. CURRENT ADMINISTRATIVE SUPPORT AND CAPACITY

Since its inception in the year 1876, the Divisional Forest officer (DFO), SRF Division, is responsible for overall protection including protection of wildlife. There are four ranges known as Chandpai, Sharonkhola, Khulna and Satkhira Ranges. Revenue stations and patrol camps have been set up, mostly situated in the periphery, for the protection of resources and realization of revenue. At present there are 17 revenue stations and 48 patrol posts in SRF.

A separate division has been created in 1993 for the management of the sanctuaries, under a development project named the Forest Resource Management Project. This is known as the Environment Management Division. It has established eight centers in the sanctuary areas for conservation and management of wildlife. One Assistant Conservator of Forests (ACF) is responsible for each of the sanctuaries. The Divisional Forest officer is responsible for the overall performance of the division.

7. OPPORTUNITIES AND HURDLES OF CONSERVING TIGERS

The tidal heartland of SRF may not be the most suitable habitat for tigers but this is the only abode of the tiger in the country. The entire forest floor is damp and wet round the year due to inundation and monsoon rains. Tigers are found in the SRF through its length and breadth, which is from north (adjoining private territories) to the south along the coast, and from the east of Baleswar River (fresh water zone) to the extremely saline zone in the west (Harinbhanga River). The abundance of prey animals is the significant limiting factor for tiger distribution. Tigers encounter the following problems in SRF:

- Shortage of prey especially in the northern parts
- Disturbance of habitat
- Scarcity of fresh water
- Scarcity of sufficiently high and disturbance-free breeding grounds
- Onslaught of the tidal surges
- Easy access to SRF by poachers

In Bangladesh, the tigers are today concentrated mainly in the SRF. However, it is known from records that tigers used to exist in all types of forests of Bangladesh in the early forties. Rampart killing of the tiger, along with destruction of the habitat, are the causes of elimination of the animal from all other forests except SRF. There are opportunities to re-introduce the tiger in different forest tracts of Sylhet, Chittagong, Cox's Bazar and Chittagong Hill Tracts by developing habitats suitable for the tiger and re-stocking its prey.

8. COUNTRY-WIDE APPROACH TO TIGER CONSERVATION

The following approach to tiger conservation may be adopted in the action plan.

a. If not the whole of the SRF, the present sanctuary areas may be further extended to include more areas of SRF. (It is to be mentioned that initially the

area of the three sanctuaries established in the year 1977 was 320.00 sq.km, which was extended to 1996.99 sq.km. in the year 1996). This will help to increase the habitat and thereby establish a broader base for a stable population of the tiger and its prey. However, the most effective results would show if the entire SRF were included in the plan; and if all attempts at inflicting any damage on the tiger, its prey and the habitat, were curtailed.

b. Undertaking a tiger project in the SRF is the need of the day. The project should look after all aspects of tiger conservation: management, research, study, and training and education of officers and employees engaged in the project.

9. TIGER ECOLOGY AND BEHAVIOUR OVER THE YEARS

The SRF mangrove forest area is considered as an intact forest area free from any encroachment and fragmentation. But the quality of forest has faced degradation with the passage of time.

The hilly forests were once the habitat of the tiger. But the upland forests of Chittagong Hill Tracts, Patharia Forests of Sylhet and south-eastern forests of Chittagong have suffered serious damage due to jhuming, encroachment, official and unofficial logging, and failure to restock the harvested area. Moreover, the official removal of trees to encourage monoculture plantations has also contributed to the destruction of the habitat of the tiger and its prey.

It has been officially estimated that tigers have killed 521 men during 22 years from the year 1975 to 1999. An unknown unofficial estimate may be added to this figure.

10. CURRENT ACTION PROGRAM WITH PHYSICAL AND FINANCIAL TARGETS

a. Tiger and prey population: A scientific study needs to be undertaken for the management of prey and predators. Such studies should also determine the present trend of population of the animals. Breeding behaviour of the tiger should also be studied thoroughly. A continuous research initiative will have to be kept in place for five years initially to gain knowledge on the ecology and biology of the tiger including other problems in the SRF.

The study on the management of prey and predators, present trend of population, breeding behavior, ecology and biology of the tiger and other problems in the SRF will be conducted by the Wildlife Management and Nature Conservation Division, Khulna with necessary support from Sunderban East and West Forest Division. The tiger census of SRF has been conducted by Wildlife Management and Nature Conservation Division, Khulna in 2004. The Census report has been published and approved by the Ministry of Environment and Forest. There is a provision to run this program every two years.

Approach and Method: The pugmark counting method is normally followed for tiger census. Deer*(Axis axis)* and wildboar *(Sus scrofa)* are the principal prey for the tigers. It is necessary to assess prey abundance in the nine different vegetation types of the SRF. Foot prints and pellet counting in plots of a transect is the main method of prey abundance survey.

November to May is the dry season of Bangladesh and therefore field work has to be done within this period every year.

b. Habitat of the tiger: SRF has good forest cover for the tiger. Prey animals (spotted deer, wild boar, rhesus monkey, etc) are also found in good numbers. It is important however that continuous monitoring and research is carried out for a period of five years. Wildlife Management and Nature Conservation Division Khulna, is mandated to do the studies.

Initially the tiger would be captured and radio collared in the sanctuary areas of SRF. Eventually it will extend to nine different types of vegetation in relation to prey abundance. Data gathered from radio telemetry and tracking the tigers' home range; behavior in response to tidal, diurnal and seasonal fluctuations of water; behavioural change with cubs and last kill etc. will be studied.

One female tiger has already been captured in SRF in April 2005. Now field data is being collected on this animal by daily tracking and radio-telemetry.

c. Regeneration of mangrove plants: SRF has a fragile mangrove ecosystem which is dependent mainly on natural regeneration. Continuous monitoring of the floral regeneration is to be conducted for the maintenance of habitat of the tiger and its prey. This kind of regeneration monitoring is a long term project which may extend up to 5 years.

Management Plan Division, Khulna will be doing the study and monitoring. There are 120 Permanent Sample Plots (PSP) and 1200 Temporary Sample Plots (TSP) in the SRF. Regeneration of mangrove species and other relevant growth information would be collected from PSPs and TSPs and will be compared with previous data-base. Growth regeneration data collected will be used to prepare a management plan and the data-base will be documented and published. Field work should be confined to the dry season, that is November to May and data entry, compilation work, office work etc. will be done over the rest of the year.

d. Capacity building: A basic introduction to wildlife management is given to forest staff and officers from Forest Guard to Assistant Conservator of Forest during their training in Forest Schools at Rajshahi, Sylhet and the Bangladesh Forest Academy, Chittagong. But there is a need of further and advanced training on wildlife management among the forest officers. Training of FD personnel on mangrove ecosystem, biodiversity conservation, conservation biology, ecotourism, wildlife treatment, camera trapping, tranquilizing etc. is necessary.

Presently the FD is facing acute problems due to shortage of officers and employees.

The current staff strength of Wildlife Management and Nature Conservation Division Khulna is given below:

1. Divisional Forest Officer -1
2. Assistant Conservator of Forests – 4
3. Range officer / Field investigator – 5
4. Deputy Ranger - 4
5. Forester- 8
6. Forest Guards –13
7. Boatmen- 10
8. Head malli - 5
9. Office Assistant –2
10. MLSS - 2
11. Night guard - 1
12. Sweeper- 1
13. Driver- 1

Total : 58

The DFO has got training on tiger census from India. Besides this, nobody from this division is trained regarding wildlife conservation.

The target forest personnel for training are Conservator of Forest, Deputy Conservator of Forest, Assistant Conservator of Forest, Range Officer, Forester, Forest Guards and Boatmen. The duration of the training program could vary from a three-day short program to one-year long program, depending on the nature of training (within the country or abroad).

e. Motivation and public awareness campaign: People living in and around SRF forests are not aware of the importance of the tiger and its contribution to the maintenance of an environmental balance. An awareness program on tiger conservation should be undertaken on a massive scale.

Public Awareness programmes for local opinion-makers, teachers, students, NGO, SRF users who are staying at impact zone/periphery of the SRF is necessary.

Training of tour operators and tour guides about wildlife conservation is also necessary. Sunderban East division and Sunderban West division will arrange one program every year.

In the impact zone of SRF there are 1,194 villages, 82 Unions and 8 Upazillas. Village people will be trained and will be covered by the awareness program. In total 1000-1200 people will be provided training.

f. Building veterinary capacity: The need to study the diseases and treatment of the tiger is a long-felt requirement. Sometimes wild animals, including tigers, get injured due to poaching, trapping and natural calamities and treatment becomes difficult due to lack of skilled personnel. So it necessary to train FD staff in basic veterinary skills.

g. Photography and radio collaring of the tiger: Photography and radio collaring of the tiger within the sanctuary as well as outside the sanctuary is required. This will help monitor the tiger population, its habitat, breeding status, health, etc. Such kind of photography may be a continuous process and may also be useful for motivational and public awareness programs.

Radio collars might last about eight months in the SRF conditions. One female tigress was radio collared on 22 April, 2005. The tigress is currently still radio collared and doing well. There is a high demand for good quality photographs of wild tigers among researchers, wildlife lovers, students and mass media.

h. Anti-poaching Measures: Poaching of the tiger and its prey such as deer occurs in the SRF mangrove forest due to easy access into the forests through the numerous river systems. As a result, there is a need for strong anti-poaching measures for the survival of tigers and their prey.

The following measures will help to control poaching and illegal trade:

1. Introduction of compensation and reward system and creation of appropriate working/living conditions and incentives for field staff.
2. Give priority to the control of illegal trade with a focus on law enforcement.
3. Anti-poaching training programs.
4. Daily patrolling in the SRF and in the impact zone.
5. Establishment of an information network in the impact zone with incentives for informers.
6. Establishment of a tiger conflict control unit and rescue center.

i. Orienting magistrates: A well-designed orientation programme for magistrates on the provisions of the acts, as well as conservation of not only the tiger but also the habitat and environment, will be of immense help. At least 10 first class magistrates of Khulna, Bagerhat and Satkhira districts will be trained. Forest Department and Khulna University will provide the short training of 2-3 days duration, jointly.

Poaching trends and tiger mortality:

Year	Cause of death			Total	No. of skin recovered
	Natural death / over	Retaliate death	Killed by poacher		
2000	2	2	1	5	5
2001	3	-	-	3	3
2002	-	2	1	3	3
2003	-	4	-	4	3
2004	2	-	1	3	3
2005	-	-	-	-	-
Total	7	8	3	18	17

11. CURRENT STATUS OF TIGER PROJECTS IMPLEMENTED IN THE COUNTRY

There is no official plan on tiger conservation currently being implemented in the country. Bangladesh Forest Department has submitted a development project proposal to the government on tiger conservation in SRF. The government has spent an insignificant amount of money for a public awareness campaign. IUCN Bangladesh is implementing a study with funding from the British Council. The department of zoology and wildlife of Jahangir Nagar University is implementing the project

A national NGO known as the Coastal Area Resource Development Management Association (CARDMA) completed a program on the compilation of information on the tiger of SRF. This program was jointly financed by Shell Bangladesh, Cairen Energy Bangladesh and Unicol. Recently, a UK-based wildlife photography agency named CICADA produced a film on the tiger with funding from the Churchill Foundation.

12. COMPONENT WISE COST (IN USD) OF THE TIGER ACTION PLAN FOR BANGLADESH

Component	Activity	Unit cost	Year-1	Year-2	Year-3	Year-4	Year-5	Total
1	2	3	4	5	6	7	8	9
A. Population Survey a. The tiger population survey	The relative abundance of the tiger population will be conducted in different habitat of SRF. 7 days survey program							
1) Trainers training (Foreign)	5 person for 7 days	4000	20000		20000			40000
2) Training of field staff	40 teams of 8 person	20	6400		6400			12800
3) Equipment	Plaster of Paris, battery, container, wooden sticks, compass, bag, etc. for each group	50	2000		2000			4000
4) Boat rent	Two water vessels for each group for seven days	500	20000		20000			40000
5) Fuel: a) for field activities		300	1200		1200			2400
b) For monitoring, supervision, security	Nine teams	1000	9000		9000			18000
6) Field activities	Team mobilization, organization and field work	200	8000		8000			16000
7) Labor			3000		3000			6000
8) Boat repair			2000		2500			4500
9) Mapping & reporting			1500		2000			3500
10) Medical team	4 teams with doctor & medicine		400		400			800
Total			**73500**		**74500**			**148000**
b. Prey abundance survey	Herbivores (spotted deers and wild boars) density through foot prints and pellet counts 11 days of 9 groups							
1) Trainers training (Foreign)	3 person 7 days	4000	12000		12000			24000
2) Training of field staff	9 groups of 5 person for 9 vegetation type	20	900		900			1800
3) Equipment		50	360		360			720
4) Boat rent		500	4500		4500			9000
5) Fuel cost								
ii) Monitoring, supervision and security	4 groups	500	2000		2000			4000
6) Field activities		200	1800		1800			3600

Component	Activity	Unit cost	Year-1	Year-2	Year-3	Year-4	Year-5	Total
7) Labor			1500		1500			3000
8) Medical team	1 team	1000	1000		1000			2000
9) Boat repair			2000		2000			4000
10) Mapping & reporting			2000		2000			4000
Total			**30310**		**30310**			**60620**
B. Habitat & Behavior study	3 normal tigers & 1 problem tiger will be collared every year							
1) GPS-collar		5000	20000	20000	20000	20000	20000	100000
2) Snare with accessories	80 snares each year	150	12000	12000	12000	12000	12000	60000
3) Iron case	4 members	3000	12000					12000
4) Bait with fodder	15 bait for each group	7000	7000	7000	7000	7000	7000	35000
5) Other equipment	GPS, silva campus, tranquilizing equipment, batteries etc.		2000	2000	2000	2000	2000	10000
6) Boat rent			2000	2000	2000	2000	2000	10000
7) Boat repair			2000	2000	3000	3000	3000	13000
8) Fuel			7000	7000	7500	9500	9500	40500
9) Labor			2500	2500	2500	3000	3000	13500
10) Deployment of field staffs and conducting the work	4 groups of 5 person each		4000	4000	5000	5000	5000	23000
11) Monitoring, supervision & security			10000	10000	10000	12000	12000	54000
12) International consultants								
a. Remuneration	2 person for 4 months each year	4000	32000	32000	32000	32000	32000	160000
b. International travel			5000	5000	5000	5000	5000	25000
c. Domestic travel & per diem			4000	4000	4000	4000	4000	20000
13) Training of field staff			2000	2000	2000	2000	2000	10000
14) Study tour (foreign)	5 FD person	4000	20000		20000	20000		60000
15) Mapping & reporting	2 reports: mid term & final		2000	2000	2000	2000	2000	10000
16) Digging water-holes	Drinking water for wild life - 20 numbers	3000	15000	15000	15000	15000		60000
Total			**160500**	**128500**	**151000**	**155500**	**120500**	**716000**

Component	Activity	Unit cost	Year-1	Year-2	Year-3	Year-4	Year-5	Total
C.Regeneration Study of Mangrove Species	Natural regeneration study and monitoring for maintenance of habitat for the tiger and its prey 2 teams consisting of 10 person							
1) Data collection from PSP								
i) Deployment of field staff & doing the work			2000		2000			4000
ii) Labor			1000		1000			2000
iii) Fuel			3500		4000			7500
2) Data collection from TSP								
i) Deployment of field staff & doing the work			2000		2000			4000
ii) Labor			1000		1000			2000
iii) Fuel			3500		4000			7500
3) Training of field staff	2 years		1000		1000			2000
4) Equipment			3000		2000			5000
5) computer/ workstation	2 units	2600	5200		5200			10400
6) Boat rent/ repair			2000		2000			4000
7) Fuel for supervision & monitoring			2000	2000	2000	2000	2000	10000
8) Collection of inventory data								
i) Collection of satellite imagery			3500					3500
ii) Ground truthing, field activities			6000	6000	6000	5000	5000	28000
iii) Map updating & database creation			3000	3000	3000	3000	2000	14000
iv) Printing equipment & material			6000	6000				12000
9) Fielding of staff & doing the field activities including fuel, labor			5000	2000	5000	1500	1500	15000
10) Mapping & reporting					2000	2000		4000
Total			49700	19000	42200	13500	10500	134900

Component	Activity	Unit cost	Year-1	Year-2	Year-3	Year-4	Year-5	Total
D. Capacity building	Providing advance training on wildlife management							
1) Fellowship, MS/PG Diploma Program (mangrove ecology, biodiversity conservation, animal biology, wildlife conservation/ management)	5 nos	40000	80000	80000				160000
2) Certificate course (foreign)	10 nos	2000	6000	6000	4000	4000		20000
3) Short training (foreign) for study tour, workshop, seminar etc.	20 nos	4000	20000	40000	20000			80000
4) Short course (foreign) (Course on tranquilization, telemetry, man and tiger conflict mgt.)	20 nos	2500	20000	20000	10000			50000
5) In country workshop/ seminar	5 nos	3000	6000	6000	3000			15000
6) In country international workshop	2 nos	10000		10000		10000		20000
7) In country short training	100 nos of 5 groups including DA, remuneration, material cost, equipment	2000/ group	4000	4000	2000			10000
Total			**136000**	**166000**	**39000**	**14000**		**355000**
E. Motivation & Public Awareness Campaign	Making people aware of the contribution of tiger and wildlife for maintenance of environment and ecosystem							
1) Designing public awareness materials	Local communication consultants, 24 man months	1500	18000	18000				36000
2) Graphic designer	24 man months	1000	12000	12000				24000
3) Trainers training								
i) Awareness tour program (foreign)	10 nos	4000	20000	20000				40000
ii) Training program (local)	30 nos in 2 groups	2000	4000					4000

Component	Activity	Unit cost	Year-1	Year-2	Year-3	Year-4	Year-5	Total
iii) Refreshers course	30 nos in 4 groups		1000	1000	1000	1000	1000	5000
4) National workshop								
5) Training for locals elites, teachers, students, NGO etc.	Entertainment, daily allowances, remuneration, 20 nos	1500	3000	3000	3000	3000	3000	15000
6) Training for tour guide & tour operators	10 nos	1500	3000	3000	3000	3000	3000	15000
7) Awareness program for forest users	20 nos	1500	6000	6000	6000	6000	6000	30000
8) Development of awareness materials:								
i) Graphic design	2 nos	1500	15000	1500				3000
ii) Brushier, booklets etc.			1000	1000	1000	1000		4000
iii) T-shirt, caps, Show-piece etc.		1500	1500	1500	1500	1500	1500	7500
iv) Sign board	30 nos	150	1500	1500	1500			4500
v) TV spot	5 nos	2000	6000	4000				10000
vi) Nature camp	10 nos	2000	4000	4000	4000	4000	4000	20000
vii) Observation of different days (Honey-hunting Day, Sundarban Conservation Day, World Wetland Day etc.)	4 nos/yr	1000	4000	4000	4000	4000	4000	20000
viii) Bill boards	30 nos	300	3000	3000	3000			9000
ix) Documentary films	3 nos, 30 mts. Each	20000	20000	20000	20000			60000
x) Broadcast of documentary film on TV, cinema etc.	10 times/yr	4500	4500	4500	4500	4500	4500	22500
xi) Advertise-ment in the mass media, news paper, magazine, TV, radio, local fare etc.			2000	2000	2000	2000	2000	10000
10) Multimedia projector	3 nos	5000	5000	5000	5000			15000
Total			**121000**	**115000**	**59500**	**30000**	**29000**	**354500**

Component	Activity	Unit cost	Year-1	Year-2	Year-3	Year-4	Year-5	Total
F. Treatment of injured The tigers	Wild animals injured at the time of poaching, trapping, and natural calamities, nourishment and treatment of injured animals are necessary							
1) Skilled development training on the tiger injury, disable, other illness etc. (foreign)	5 nos	4000	20000	20000				40000
2) Training on food habitat & the tiger habitat (local)	5 nos	2000	10000	10000				20000
3) Training on treatment, tranquilizing, medicine, observation			5000	5000	5000	5000	5000	25000
4) Veterinary doctor with one assistant	2 nos	1000	12000	12000	12000	12000	12000	60000
Total			**47000**	**47000**	**17000**	**17000**	**17000**	**145000**
G. Photography & Radio Collaring	Photography and filming for motivation and public awareness							
1) Training on photography video as well as still photo	10 nos	1000	5000	5000				10000
2) Digital video camera	2 nos	1500	1500	1500				3000
3) CCTV with battery and solar panel	5 set	3000	9000	6000				15000
4) Still camera with telelens	3 nos	2000	6000	4000				10000
5) Filming & photography								
i) The tiger photography including baits & all supports			5000	5000	5000	5000	5000	25000
ii) Video filming	2 nos	105000	105000		105000			210000
6) Camera for camera trapping	5 sets	1500	4500	3000				7000
7) Boat rent			2000	2000	2000	2000	2000	10000
8) Fuel			3000	3000	3000	3000	3000	15000
Total			**141000**	**29500**	**115000**	**10000**	**10000**	**305500**

Component	Activity	Unit cost	Year-1	Year-2	Year-3	Year-4	Year-5	Total
H. Anti-poaching Measures								
1) Establishment of the tiger control unit/ camp	5 units	10000	10000	10000	10000	10000	10000	50000
2) Introduction of compensation to the tiger affected person & domestic animal		200/ livestock & 800/ person	12000	12000	12000	12000	12000	60000
3) Establishment of rescue center for accommodating wildlife & trophy		3000	3000	3000	3000	3000	3000	15000
4) Reward for informers & FD staff		1000	1000	1000	1000	1000	1000	5000
5) Intensive patrolling in the SRF								
i) Fuel		10000	10000	10000	10000	10000	10000	50000
ii) Purchase of speed boat								
a. Cabin cruiser	3 nos	24000	24000	24000	24000			72000
b. Open type speed boat	5 nos	12500	37500	25000				62500
c. Communi-cation system	Repeater-3 nos, Base set-5 nos & Hand set-20 nos		40000	40000	20000			100000
Total			**137500**	**125000**	**80000**	**36000**	**36000**	**414500**
I. Training towards Magistrates, Police & other Government official								
1) Preparation of training manual & published it			3000	2000				5000
2) Training	3 days, 5 groups, 10 person of each group	10000	10000	10000	10000	10000	10000	50000
Total			**13000**	**12000**	**10000**	**10000**	**10000**	**55000**
J. General Project Expenditure								
1) Project office: Establishment & maintenance	1 unit		15000	2000	2000	2000	2000	23000
2) Field unit office	3 units	5000	15000	4500	4500	4500	4500	33000
3) Office furniture	4 units		5000	2000	2000	2000	2000	13000

Component	Activity	Unit cost	Year-1	Year-2	Year-3	Year-4	Year-5	Total
4) Cabin cruiser (imported)	1 no		62000					62000
5) Cabin cruiser for field activities	3 nos	24000	24000	24000	24000			72000
6) Open type speed boat	10 nos	12500	62500	37500	25000			125000
7) Four wheeled Jeep	4 nos	54000	162000	54000				216000
8) Wooden patrol boat	10 nos	8000	40000	24000	16000			80000
9) Generator	4 nos	750	2250	750				3000
10) Motor	6 nos	200	800	400				1200
11) Solar panel	6 nos	800	3200	1600				4800
12) Work station	5 nos	2600	7800	5200				13000
13) Laptop computer	3 nos	2500	5000	2500				7500
14) Maintenance			15000	15000	15000	15000	15000	75000
15) Traveling allowances for officer & staff			2000	2000	2000	2000	2000	10000
16) Contingency			12000	12000	12000	12000	12000	60000
17) Stationery			4000	4000	4000	4000	4000	20000
Total			**437550**	**191450**	**106500**	**41500**	**41500**	**818500**
K. Project Manpower								
1) Office	1 no	350	4900	4900	4900	4900	4900	24500
Manager cum account officer								
2) PA to PD	1 no	150	2100	2100	2100	2100	2100	10500
3) Computer operator	6 nos	160	13440	13440	13440	13440	13440	67200
4) Accountants	1 no	160	2240	2240	2240	2240	2240	11200
5) Office assistant	5 nos	150	10500	10500	10500	10500	10500	52500
6) Engine man	5 nos	100	14000	14000	14000	14000	14000	70000
7) Driver	5 nos	110	7700	7700	7700	7700	7700	38500
8) Night guard	5 nos	75	5250	5250	3250	3250	3250	26250
9) MLSS	5 nos	75	5250	5250	5250	5250	5250	26250
Total			**65380**	**65380**	**65380**	**65380**	**65380**	**326900**
L. GOB office & staff in kind								
1) Conservator of Forests as PD	1 no	350	4900	4900	4900	4900	4900	24500
2) Deputy conservator of forests	4 nos	320	17920	17920	17920	17920	17920	89600
3) Assistant conservator of forests	5 nos	160	11200	11200	11200	11200	11200	56000
4) Forest ranger	5 nos	120	8400	8400	8400	8400	8400	42000
5) Forester	10 nos	80	11200	11200	11200	11200	11200	56000
6) Forest guard/ Boat man	20 nos	70	19600	19600	19600	19600	19600	98000

Component	Activity	Unit cost	Year-1	Year-2	Year-3	Year-4	Year-5	Total
7) Office assistant	5 nos	80	5600	5600	5600	5600	5600	28000
8) Accountant	5 nos	80	5600	5600	5600	5600	5600	28000
9) Driver	5 nos	75	5250	5250	5250	5250	5250	26250
10) Engineman	10 nos	75	10500	10500	10500	10500	10500	52500
11) MLSS	10 nos	60	8400	8400	8400	8400	8400	42000
Total			**108570**	**108570**	**108570**	**108570**	**108570**	**542850**

Bangladesh Forest Department
Ministry of Environment and Forests

CHAPTER 2

TIGER ACTION PLAN

BHUTAN 2005

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Nature Conservation Division
Department of Forests
Ministry of Agriculture
Royal Government of Bhutan
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Tiger Sangay of NCD compiled all the materials from the Tiger Conference in Paro and put this document together. Tshewang Wangchuk of WWF International was instrumental in refining the contents of the TAP and Trishna Gurung of WWF International assisted in editing and layout of the document at FORMAT Graphics. The maps were produced with help from Kinley Gyeltshen and Kinga Deki of NCD. Kuensel, WWF, Bhutan Museum of Natural History, and NCD provided the photographs. Save the Tiger Fund and WWF provided financial and technical assistance for the meeting that has made this document possible.

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"WALKING THE EXTRA MILE"

M(I)MOA/MISCE/2005/ 13 June 2005

FOREWORD

Guru Rinpoche brought Buddhism to Bhutan riding on the back of a flying tigress. The tiger is one of our four protector animals in the "Tag Seng Chung Druk" quartet (the other three animals being the mythical snow lion, garuda and dragon). Thus the tiger is a symbol of great reverence in Bhutanese society. Ecologically, it stands at the top of the food chain, and its presence in the forest symbolizes the well being of many other species living with it. For all these reasons, the survival of the tiger is vital for the very existence of every Bhutanese.

It gives me immense pleasure to introduce the 'Tiger Action Plan for the Kingdom of Bhutan 2005-2015' that was put together by Bhutanese and international tiger experts during a meeting in Paro from 14-16 September 2004. The content of the Tiger Action Plan (TAP) was discussed during the conference and post-conference consultations with some of the world's best tiger experts. This document is the synthesis of their wisdom, knowledge and expertise, and signifies yet another commitment by the Royal Government of Bhutan towards tiger conservation.

The TAP has three main components viz. species conservation, habitat conservation and human-wildlife conflict management. It outlines some of the enabling environments which are necessary for its successful implementation. Environmental integrity is one of the four pillars of "Gross National Happiness", our development philosophy instituted by His Majesty the Druk Gyalpo. Successful implementation of the TAP will no doubt contribute significantly towards this. Ensuring the tiger's survival in the wild means protecting its habitat, prey species and a myriad of other species, ecosystems and processes.

I want to express my thanks to the Save the Tiger Fund, and our long-time conservation partner, WWF, for rendering assistance in this venture. Many thanks also go to all the international and Bhutanese participants at the meeting for putting this important document together.

I wish the Department of Forests every success in the implementation of the TAP, and in ensuring that future generations of Bhutanese will continue to hear the tiger roar in the pristine forests of Bhutan, in very natural conditions of abundant habitat and prey.

Tashi Delek.

Sangay Ngedup
Minister
Ministry of Agriculture

EXECUTIVE SUMMARY

Bhutan is fortunate to have extensive forest area with approximately 35 percent of the country set aside in protected areas linked by biological corridors. While we are proud of our rich biodiversity, we also recognize that wildlife and human needs have to be reconciled. In this Tiger Action Plan we present our endeavour to safeguard and conserve the majestic tiger and its habitat in the country. While this plan is the culmination of the outputs from the Tiger Conference held in September 2004, and inputs from various Bhutanese and foreign experts, it is the beginning of a strategic and planned effort to enhance existing conservation programs and activities.

Recognizing existing opportunities and threats, this ten-year Action Plan takes into consideration some of the country's important commitments such as maintaining 60 percent forest cover, and the "middle path" approach to conservation. At the same time we hope to address one of the most crucial constraints to effective management and conservation of rich biodiversity: the lack of detailed information on many aspects of biodiversity.

The ultimate goal of the Action Plan is to maintain a viable interconnected population of breeding tigers in Bhutan, a population existing predominantly on wild prey with minimal conflict between humans and tigers. We hope to achieve the above goal through three major areas of focus, namely: species conservation, habitat conservation, and human wildlife conflict management. The fourth section focuses on creating an enabling environment for achieving this goal through education and awareness, regional cooperation and human resource development. The main areas of focus for the initiation of the ecological study component of the program are in Royal Manas, Jigme Singye Wangchuck and Jigme Dorji National Parks. This contiguous tract of the Bhutan Biological Conservation Complex spans from the sub-tropical forests to alpine meadows. Once these areas are covered, activities will be replicated in other areas.

The first theme, species conservation, focuses on developing field-based information through various survey methods, suppression of killing of tiger and prey species, and halting the illegal trade of tiger parts and products and other endangered wildlife.

The second theme, habitat conservation, focuses on assessing the status of tiger and prey habitat, monitoring changes over time and identifying and resolving existing conflict land use policies affecting tiger and prey habitat through several means. This information will be used to develop a national "conservation radar" that will inform decision makers on impending threats well in time.

The third theme, human wildlife conflict management, will focus on determining the main causes of livestock depredation and reducing retaliatory killing through preventive and mitigatory measures as well as incentives.

To further enhance these three focus areas, enabling factors such as education and awareness programs for various stakeholders and audiences,regional cooperation to reduce trans-boundary poaching and

Honourable Minister for Agriculture H E Lyonpo Sangay Ngedup with conference participant

trade, and human resource development through increase in number of adequately trained staff will be carried out.

At the end of these ten years we will have developed a database on tiger and ungulate prey population status and acquired enough information on the ecology, demography, movement patterns and behavior of tigers in the selected sites. We will be able to confidently inform decision makers whether tiger and prey numbers are increasing or decreasing in particular locations as well as the cause of such changes. Where human wildlife conflicts are the cause of the demise of tigers, mitigatory measures will have been tested and adopted.

Research projects concerned with tiger ecology, prey species and habitat conditions will be embarked upon and through experience, we hope to be able to exchange information with other international experts and scientists to further enhance our conservation programs.

INTRODUCTION

Nestled in the Eastern Himalayas, the Kingdom of Bhutan, with an area of 38,394 sq km (RGoB 2002) represents a region that exhibits one of the richest diversities of wild plant and animal life on earth. Biological inventories have so far recorded some 7,000 vascular plants, 770 species of birds and 160 species of mammals (Ministry of Agriculture 1998). Three main biophysical features are responsible for this incredible biodiversity. First, the country straddles two major bio-geographical realms, the Palearctic characterized by temperate and alpine regions of the central and northern mountains, and the Indo-Malayan characterized by tropical and sub-tropical ecosystems of the lowlands and southern foothills. Secondly, climate and altitude vary between two extremes. Annual rainfall ranges from

Much of Bhutan is marked by thick forests

The Bhutan tigers are found from the tropical south to the temperate north

5,000 mm in the southern part of the country to less than 500 mm in the alpine highlands, and elevations range from 100 meters above sea level (masl) in the southern foothills to more than 7,000 masl in the northern mountains. The eastern part of the Himalayan region receives more rainfall than the western part and hence vegetation and tree line extends higher in the former. Lastly, over 72.5 percent of the country's geographical area is covered with undisturbed forests.

Bhutan's socio-political conditions have been, and continue to be, favorable for the conservation of biological diversity. The Royal Government of Bhutan (RGoB) is strongly committed to environmental conservation as reflected in various national policies and legislations. One of the most important commitments of the 1974 Forest Policy has been to maintain 60 percent of the country under forest cover, in perpetuity. This clause is now embodied in the new Constitution that was released for nationwide debate in 2005. Further, several factors provide optimum conditions for the continued conservation of the kingdom's rich environmental resources, namely; 1) a small population of less than one million, 2) a Buddhist ethic that strongly supports nature conservation, 3) the integration of conservation into mainstream economic development as one of the four pillars of Gross National Happiness (GNH), prime indicator of Bhutan's development philosophy, 4) the "middle path" conservation approach of avoiding the extremes of

severe protectionism and outright destruction, and 5) Bhutan's rugged topography that makes many parts of the country inaccessible, and therefore out of reach of environmental degradation.

Nature conservation as a national program pre-dates planned development, which only began in 1961 with the advent of the Five-Year Development Plans. Traditional conservation ethics existed with the protection of important forests and catchment areas as the abodes of deities and spirits. This practice still exists in many parts of Bhutan. Nature conservation was initiated as a national program with the creation of the Department of Forests in 1952. Subsequently, it was enhanced by the establishment, in 1966, of the country's first protected area, the Manas Wildlife Sanctuary (now Royal Manas National Park) in southern Bhutan, followed by the enactment of the Bhutan Forest Act in 1969. Until 1984, all wildlife management responsibilities were vested in the various territorial divisions of the Department of Forests. In 1984, two functional entities, the Northern and Southern Wildlife Circles, were established under the administrative and technical assistance of the Department of Forests to oversee wildlife conservation and protected area management activities. In 1992, the two circles were integrated to form the Nature Conservation Division that currently functions as the nodal agency for overall planning, coordination, implementation and technical support of nature conservation and protected area management.

2. STATUS OF TIGER CONSERVATION IN BHUTAN

2.1 Tiger Conservation Program

Although a specific program focusing primarily on tigers did not begin until 1996, many conservation needs of the species were addressed through the establishment and management of a network of protected areas and the enactment of the updated Forest & Nature Conservation Act of Bhutan in 1995, which replaced the Bhutan Forest Act (1969). The national protected areas system accounts for 26 percent of the country's area and encompasses the full range of all major ecosystems found in the country. An additional 9 percent of the country is included for conservation as biological corridors, based on results from tiger surveys. The Forest and Nature Conservation Act of Bhutan (1995) accords the tiger "fully protected" status: extended to 22 other species of wild animals and seven wild plants found in Bhutan.

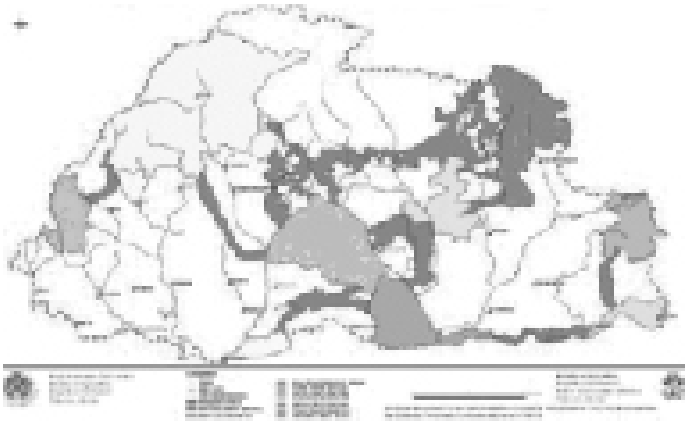
Taktshang-tiger's den temple

In 1996, the Department of Forests and WWF Bhutan Program initiated the Tiger Conservation Program aimed at achieving three objectives:

1. to complete a tiger survey for the entire country in order to assess presence/ non-presence, distribution, and density of tigers across Bhutan
2. to develop the capacity of protected area and territorial Forest Department staff to conduct technically competent tiger surveys
3. to promote public awareness of tiger conservation and related issues.

Major achievements of the program, to date, are the following:

1. the formulation and endorsement by RGoB of a national strategy for tiger conservation based on a nationwide tiger sign survey, in 1998
2. the training of more than thirty-five Forest Department staff in and outside protected areas on tiger and prey survey methodology
3. the declaration of nearly 9 percent of the country's total land area as biological corridors, thereby ensuring that critical forest areas outside the protected areas are also protected in the long-run
4. the expansion of two protected areas viz. Thrumshingla National Park (from 768 to 905 sq



Dorji Droloed riding a tigress

Buddhist and respect all forms of life. The tiger is also revered because it is believed to be the protector of Buddhism and the mount of Guru Rinpoche, who flew on the back of a tigress when he brought Buddhism to Bhutan in the eighth century. Taktshang or "Tiger's Den" is one of the holiest temples in Bhutan.

Bhutan offers one of the best opportunities for the long-term survival of the tiger. Over a quarter of its surface area, about 10,714 sq km, was estimated to be potential tiger habitat (McDougal & Tshering 1998).

However, logically, all forested areas in Bhutan, connected with the main tiger habitat are potential tiger habitat. More surveys and field investigations need to be carried out to confirm this. Additionally, nowhere else can the tiger move in contiguous forests over such a wide range in altitude, from 100 to over 4000 masl. Bhutan is also one of the last places on earth where large cats such as the tiger can undergo evolutionary processes under fairly undisturbed natural conditions. Tigers exist at the edge of snow leopard habitat in the north; with leopards over much of Bhutan; and also with clouded leopards in the lower areas. They survive on different prey species in different parts of a contiguous habitat across an altitudinal gradient, while sambar and wild pigs are the main prey.

Not only is Bhutan's tiger population distributed throughout most parts of the country, the habitats also connect with those in India. Tigers in Bhutan move from Phibsoo Wildlife Sanctuary to the Manas Tiger Reserve and three Reserved Forests of Assam, and to Buxa Tiger Reserve and Jaldapara Wildlife Sanctuary of West Bengal. This continuous distribution forms the nucleus of one of the two largest tiger populations in South Asia, the Manas- Namdapha Tiger Conservation Unit (TCU). The other population, in the Sundarban TCU, is shared between India and Bangladesh. Clearly, Bhutan's contribution will be crucial to the long-term survival of the tiger in the region.

3. OPPORTUNITIES

Bhutan is in a favorable and unique position with respect to tiger conservation compared to other tiger range countries, and can play a key role in this at regional and international levels. Unlike other countries, Bhutan offers an opportunity for preemptive conservation - a chance to act before the damage is actually done. This is attributed to the following factors:

3.1. Extensive Habitat

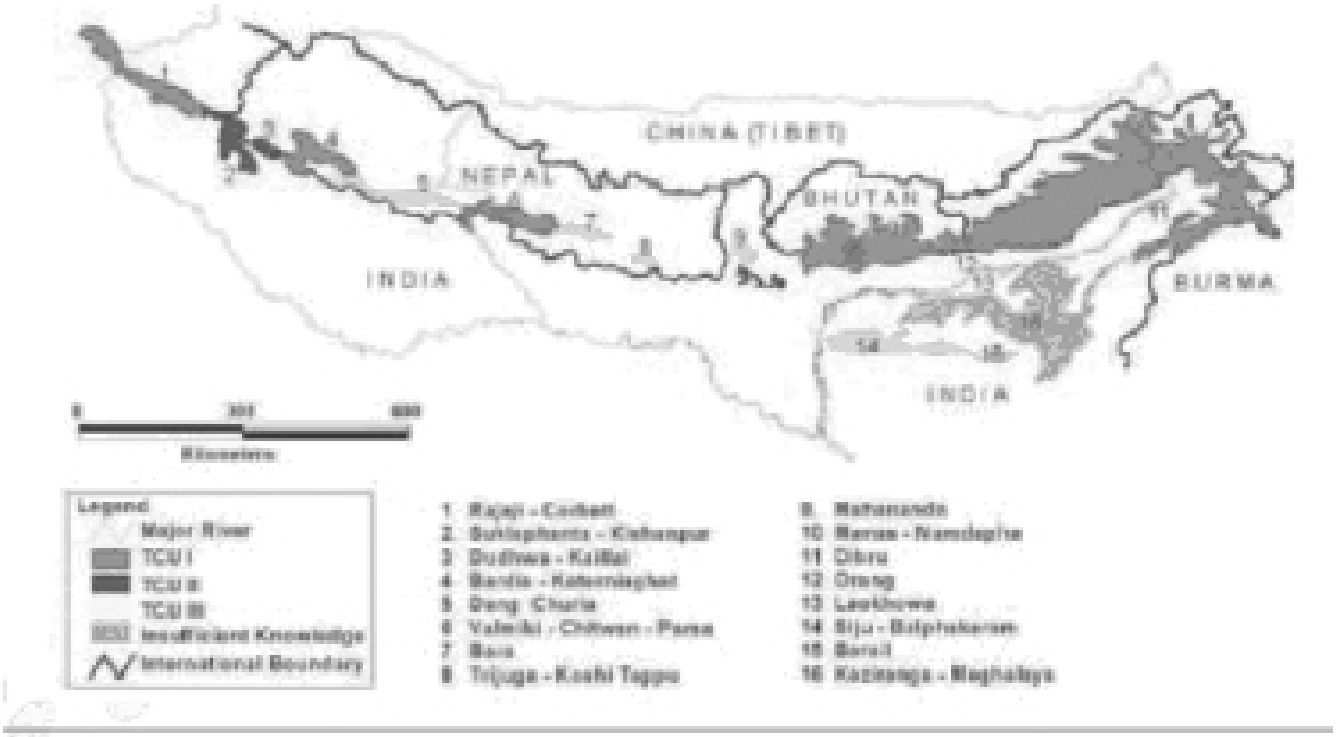
The country has approx. 72.5 percent of its total surface area under forest cover (LUPS 1997), providing potential habitat for tiger and prey species. This is also important for many species that are endangered in other parts of the eastern Himalayan region. Tiger habitat in Bhutan contains several different prey species in one contiguous habitat: in the north, takin, sambar and wild pigs are the dominant prey while in the south it is mostly sambar, chital, gaur, and buffalo. Protected areas cover more than a quarter of the country's total land area. The tiger is confirmed present in six protected areas:

Jigme Dorji National Park, Jigme Singye Wangchuck National Park, Royal Manas National Park, Thrumshingla National Park, Phibsoo Wildlife Sanctuary and Bomdeling Wildlife Sanctuary and is expected in the three others.

All these protected areas have been legally recognized and have implemented conservation management activities.

Moreover, breeding tigers are found in the corridors between Jigme Dorji National Park and Jigme Singye Wangchuck National Park/Royal Manas National Park; between Jigme Singye Wangchuck National Park and Thrumshingla National Park; and between Thrumshingla National Park and Bomdeling Wildlife Sanctuary, making these linkages more than mere corridors for dispersing tigers. The National Tiger Conservation Strategy, adopted by the Royal Government of Bhutan in 1998, calls for protection of the corridors linking the protected areas where tigers are located resulting in the establishment of biological corridors. The biological corridor complex was gifted under the "Gift to the Earth" campaign of WWF in 1999 during His Majesty the King Jigme Singye Wangchuck's silver jubilee celebration. Aptly named the Bhutan Biological Conservation Complex (B2C2) this landscape spans across Bhutan, and is the focus of its conservation efforts.

Forestry official, veterinarian and community leader verifying livestock killed by tiger



TCU's in the Eastern Himalayan Region (Source: WCS/WWF)

Moreover, the tiger population spanning the six protected areas in Bhutan spreads south into India's state of Assam, linking up directly with the 2,840 sq km Manas Tiger Reserve. It spreads westward into West Bengal's Buxa Tiger Reserve (370 sq km) and Jaldapara Wildlife Sanctuary (220 sq km), both of which provide good forest cover.

3.2. Legislation

The tiger is listed as a "fully protected" species, as it is included in Schedule I of the Forest and Nature Conservation Act of Bhutan, 1995, and is equivalent to the status of Appendix 1 'endangered' in the IUCN Red Data Book. The penalties for killing a tiger, or being in possession of its parts/products, as per the Forest and Nature Conservation Act of 1995, include imprisonment of up to 5 years, and fines from Nu 50,000-200,000 (USD 1,100-4,400) or both. While this is enforced strictly, the monetary fine seems low at present - for this reason the government is revising the schedule of fines for wildlife crimes against endangered and threatened species.

3.3. Inaccessible Habitat and Wide Tiger Distribution

Bhutan is a mountainous country and the tiger inhabits very rugged terrain. The inaccessibility of this terrain makes it very difficult for poachers to hunt tigers as well as to exploit the forest frequented by tiger and prey. The extensive and contiguous nature of tiger and prey habitat in Bhutan allows for a wide distribution of tigers, ranging from the sub-tropical south through the middle hills up to the temperate and alpine north. However, inaccessibility and the dense nature of the forests also present a challenge for carrying out tiger and prey surveys.

3.4 Pro-conservation Development Strategy and Stable Political Conditions

The development strategy and the national policy for development have emphasized long-term sustenance of the environment rather than short-term economic growth.

The Royal Government has had a stable political system that always accorded high priority to conservation initiatives. These conditions have greatly aided conservation efforts in the country. Bhutan is also probably the only country where tiger conservation efforts entail pre-emptive and proactive efforts to maintain existing conditions. It does not have to deal with expensive restoration or rehabilitation of habitat.

4. KEY THREATS

4.1. Commercial Poaching and Wildlife Trade

Many parts of the tiger have alleged medicinal value, while some parts are made into highly priced souvenirs. These parts and products have a lucrative market in the region, as well as in the United States and Europe. In addition, Bhutan has a porous border with both India and China, making the transportation of wildlife parts and products across borders relatively easy. At present, there is no legislation to allow law enforcement agencies in Bhutan to check and apprehend foreign traders. The problem is compounded by the lack of manpower to effectively carry out antipoaching patrolling.

4.2. Fragmentation of Habitat

Bhutan is a developing nation. Consequently, many development activities have yet to be completed. For instance, in the current Five Year Plan, the Department of Roads has plans to construct 633 km of roads (DOR 2003), the Ministry of Agriculture plans to construct 183.8 km of farm roads (MOA 2003), and, the Forestry Development Corporation will construct 120 km of forest roads. By the end of 2007, a 937 km stretch of forests, with a width of 10 m, will be cleared for road construction, which will disturb wildlife habitat in various places.

Poaching and illegal trade of Asian big cats is a threat

Bhutan Power Corporation will install 1033 km of transmission lines with a corridor width of 50 m, carrying power to India from the Chukha and Kurichu Hydroelectric Projects (BPC 2003). For the next five years, the Forestry Development Corporation has earmarked 2142.67 sq km of forests for the harvesting of timber; an annual allowable cut of 208,088 m3 has been projected (FRDD 2001). Annually, the Forestry Development

Poorly aligned roads can fragment vital habitat

Corporation harvests 57,000 m3 of timber and 50,000 trees are marked for rural consumption. Additionally, Bhutan's natural resources have been under threat of forest fires, especially during the dry winter months.

From 1992 to 2003 approximately 1,251 sq km of forests have been destroyed in 803 forest fire incidences (Social Forestry Division 2004). All these factors cumulatively place a huge pressure on tiger and prey habitat all across the country.

While the northern and central temperate forests face potential fragmentation due to development activities, it is mainly the southern broadleaf forests that face a greater threat from hydropower projects, industries and infrastructure development. Although much of the tiger habitat within Bhutan is more or less contiguous, it is important to maintain connectivity of swathes of the level I TCU (number 10) with tiger reserves (Buxa and Manas) and other forests in India. This would allow for exchange of genes between a larger metapopulation of tigers and maintain genetic vigor in the long run.

Improper alignment of transmission lines can cause breaks in habitat connectivity

4.3. Reconciling Tiger Conservation and Human Needs

Villagers in much of Bhutan still follow the age-old tradition of livestock rearing. They move livestock to higher elevations during summer and back to lower grounds in winter. This practice has exacerbated human-wildlife conflict, resulting in depredation because livestock are left to graze freely in the forests. It is inevitable that a tiger will attack livestock, especially in areas where natural prey is scarce or steep terrain makes hunting difficult.

Indiscriminate snaring kills may intargeted animals

Such conflict has led to retaliatory activities, notably the poisoning of carcasses with the intention of eliminating the threat to valuable property. There is an increasing trend in livestock depredation incidents in most parts of the country. This trend has led to increasing human-wildlife conflict that has resulted in retaliatory killings of tigers and other predators. In 2000, angry villagers near Thrumshingla National Park killed a tiger by poisoning a tiger kill.

Tiger prey species such as wild pig and sambar cause considerable damage to agricultural crops. As much as 41.9 percent of all farm households on an average had reported crop damage by wild animals (MoA 2002). Villagers often set up snares and traps to catch these animals. The most widely used steel wire snares are indiscriminate and frequently kill predators as well. It is important to take this aspect of human wildlife conflict into consideration as well. To this end, in 1995, the Department of Forests notified herders and farmers that such practices were considered illegal and that they would face legal action if found guilty.

4.4. Lack of Public Awareness on Tiger Conservation Issues

Approximately 79 percent of the Bhutanese population is agrarian and lives in close proximity to tiger habitat. However, the people are, for the most part not aware of long-term consequences of environmental destruction. Often, many rural people and government officials do not understand clearly the dynamics of predator-prey relationships and, therefore, are unable to relate to the consequences of removing predators such as the tiger or wild dog. At other times they are compelled by economic forces to let survival and their immediate livelihoods take precedence over any long-term effect. It was through a livestock protection programme in the 1980s that many wild dog populations were exterminated from some regions of the country. A profusion of wild pigs followed the drop in wild dog populations, and soon farmers all across the country were lamenting about crop loss due to wild pigs.

There is a gradual trend of urbanization and migration of youth from rural to urban areas. Increasingly, the urban youth are removed from their natural surroundings and lose awareness about the interconnection of the ecosystems that was so natural to them in their rural settings.

4.5. Inadequate Database and Data Management

Although the tiger program has been up and running since 1996, the program still lacks a good information database. There is a definite need to set up a centralized database at Nature Conservation Division (NCD) to store survey data from various field surveys. Information from previous surveys has not been properly stored and cannot be easily retrieved. Lack of a systematic procedure for data collection, compilation, analysis and development of management prescriptions remain a stumbling block for better informed tiger conservation efforts.

There are plans for numerous field studies including grid-based index, line transect, and camera-trapping surveys of tiger and prey species. In order for all of these efforts to be useful, a sound database has to be set up in NCD.

5. ACTION PLAN

Bhutan is fortunate to have an extensive land area under forest cover, with approximately 35 percent set aside in protected areas linked by biological corridors. A landscape approach to conservation is essential for

Anti-poaching team briefing before heading out on a patrol

the long-term survival of floral and faunal diversity. However, one of the impeding factors to the effective management and conservation of rich biodiversity is the lack of detailed information on this diverse biodiversity, be it the tiger, prey species or local socio-economic activities. It is recognized that such information is crucial for the successful implementation of any conservation and management interventions.

Bhutan's Tiger Action Plan (TAP) 2006 – 2015 will address the key threats identified above. The planning of the Tiger Action Plan was part of an international conference held in Bhutan in September 2004 to update the existing Tiger Conservation Strategy.

The strategy used in designing the Tiger Action Plan had three focal themes: i. species conservation - covering the tiger, its prey species and their status; ii. habitat conservation - including forests, protected areas and biological corridors; iii. human-wildlife conflict management.

Participants were divided into three groups and discussions were held on the three topics. The groups conducted situational analyses, identified threats and recommended actions to mitigate these threats. These three themes were then integrated to formulate a Tiger Action Plan for the next decade.

In order to achieve the objectives within these themes, a fourth section focuses on creating an enabling environment, which includes an education and awareness program, regional cooperation and human resource development.

5.1. Objectives of Tiger Action Plan

Species Conservation

- In the first five years, develop field-based information on tiger and ungulate prey population status (ecology, demography, genetics), with special focus on three key areas (Royal Manas NP representing the subtropical belt, JSWNP representing the middle hills, and JDNP representing the northern temperate belt). This is then to be replicated in other areas representative of the whole country by 2015

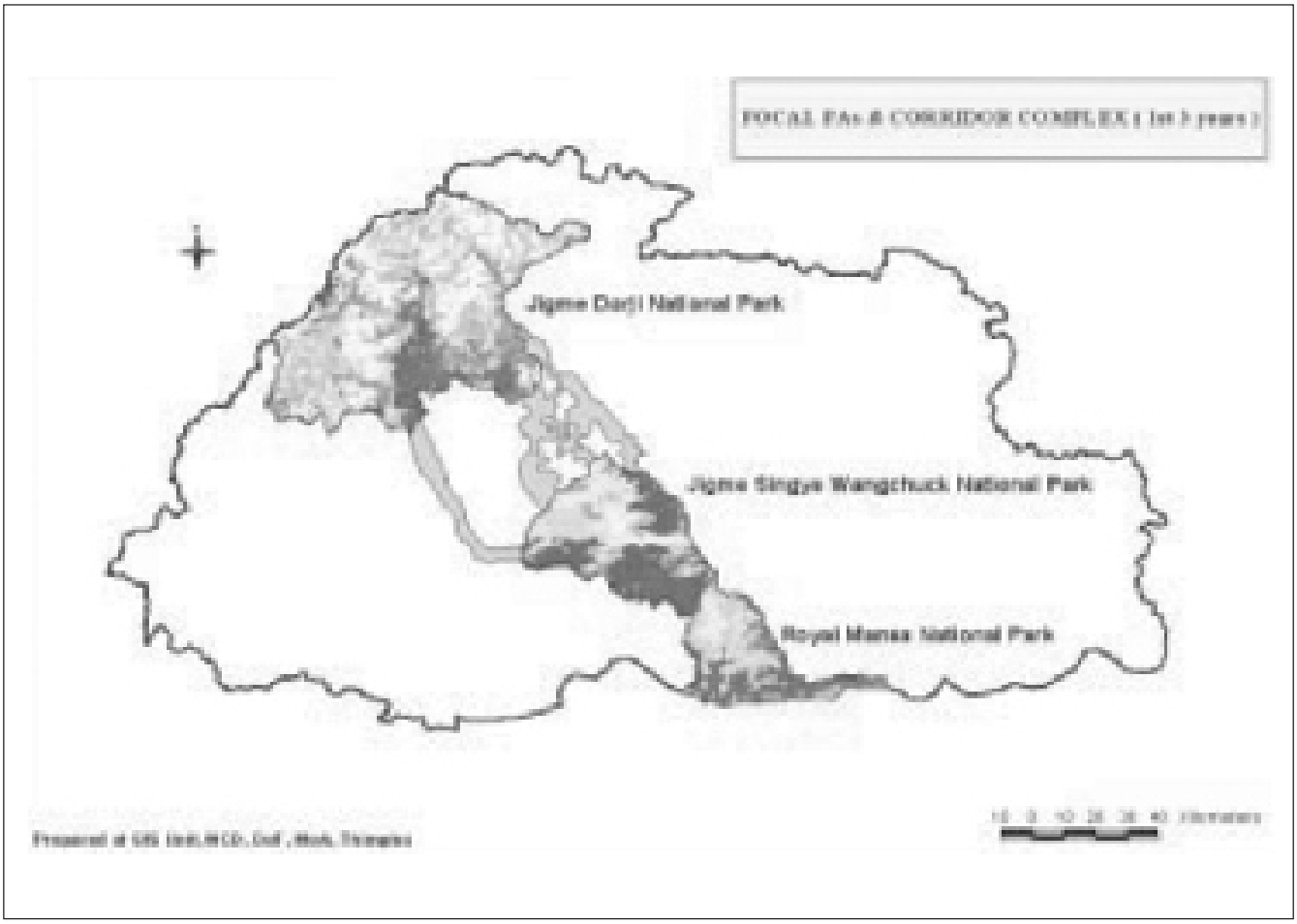
- Suppress killing of tiger and prey species, and halt the illegal trade of tiger parts and products, and other endangered wildlife.

Habitat Conservation

- Assess country-wide tiger and prey habitat status and change over time using GIS and remote-sensing, identify critical areas for management intervention in order to maintain habitat contiguity

- Identify existing conflicting land-use policies affecting tiger and prey habitat and resolve them through multi-sectoral dialogue, and develop a legal mechanism to ensure future policies adequately accommodate tiger conservation concerns

Conference participants visiting Jigme Dorji National Park



Human-Wildlife Conflict Management

- Determine main causes of livestock depredation by tigers in three areas including Punakha Dzongkhag (where livestock depredation was highest in 2004) in order to understand the conflict so that appropriate remedies can be adopted. This study would then be replicated to other sites

- Reduce retaliatory killing through preventive and mitigation measures as well as incentives

Developing Enabling Factors

Education and Awareness Program

- Increase general awareness on the tiger's ecological and cultural significance to various stakeholders and audiences

Regional Cooperation

- Reduce trans-boundary poaching through bilateral dialogue, legislation and enforcement, as well as explore transboundary cooperation for habitat linkages

Human Resource Development

- Increase the number of adequately trained staff of NCD/DOF

A. Species Conservation

Objective A1: In the first five years, develop a database on tiger and ungulate prey population status (ecology, demography and genetics) and trends, with special focus on three key areas (Royal Manas NP representing the subtropical belt, JSWNP representing the middle hills, and JDNP representing the northern temperate belt) by 2010. This is then to be replicated in other areas representative of the whole country by 2015.

The last nationwide tiger survey was conducted in 1998. At that time, the total population was estimated to be between 67 to 81 breeding tigers. There is a need to further update this result using more intensive surveys, and to determine the population trends.

In order to narrow down the study focus, three sites representing the PAs and NCD, after training them on survey methodology. Most of the staff selected have

already undergone previous training on tiger and prey surveys.

In each of the sites, tiger and prey distribution and relative abundance will be surveyed using interviews, index-surveys, line transects, and capture-recapture sampling with double-sided camera-traps.

Additionally, the program will embark on research projects concerned with tiger ecology, prey species and habitat conditions in the country. The identified teams will undergo a short training program, and will then be trained on-the-job. One component of the field research will focus on analysis of tiger diet composition through scat analysis. A reference slide collection of ungulate hair and tissues will be developed for use by NCD. This will further provide information on the genetic diversity and viability of the tiger population in Bhutan through non-invasive collection and analysis of tiger DNA materials (to be carried out at the PCR lab of the Ministry of Agriculture).

Information associated with tiger range, territory and movement patterns and behavior would be useful and provide better tools for conservation. Due to difficult terrain in much of the country, conventional VHF radio collars will be useful only in limited places like parts of RMNP where animals can be tracked from elephant-back, on foot and from vehicles. It might be possible to track animals on the eastern and northern sides of JSWNP from along the highway. However, resource permitting, GPS satellite collars should be used for radio telemetry studies as far as possible in most parts of Bhutan.

Output

- Data on tiger and prey distribution and their relative abundance in three PAs collected, which would then be extrapolated to the larger adjoining areas, and finally to the whole country
- Information on tiger ecology and ranging behavior in Bhutan collected
- A detailed report on the genetic profile and long-term viability of the tiger population in Bhutan produced
- Spatial distribution and habitat partition by wild herbivores in the three study areas determined
- Reference slide collection of ungulate hair and tissue samples, and an identification manual prepared

Activities

- Establish randomly selected grid-based study sites of adequate size in the field for routine monitoring of tiger and prey populations
- Conduct index surveys, line transect surveys, and capture-recapture sampling surveys using camera traps to evaluate tiger and prey distribution and relative abundance for each one of the three PAs selected
- Study the behavior and ecology of the tiger and its prey species using radio telemetry, camera trapping and other modern techniques
- Survey and assess tiger and prey habitat conditions
- Obtain, tranquilize and take genetic samples from collections of blood and tissue from wild tigers captured for radio telemetry or those that die from other causes
- Conduct DNA testing and other genetic studies of tigers
- Perform exploratory population viability modeling
- Establish a permanent monitoring system of the habitats of the main tiger prey species
- Determine food habits of tigers through tiger scat analysis, and develop a reference collection of ungulate hair samples and an identification manual

Objective A2: Suppress killing of tiger and prey species, and halt the illegal trade of tiger parts and products, and other endangered wildlife.

Between 1999 and 2003, three tigers were reported to have been poached based on apprehension reports compiled by the Forest Department. In the same period a total of 17 sambar and 19 musk deer poaching cases were reported (FPUD 2004). While these are relatively low figures, it is likely that several cases have gone unreported. Further, the low poaching record is also a direct result of stringent antipoaching efforts by the Forest Department both inside the PAs and outside.

In anticipation of and to prevent poaching, there is need to put in place an effective anti poaching patrol system that is well equipped, trained, and well-informed. An informer network comprising local

community members should enhance detection of poachers and poaching activities. The existing penalties for wildlife crime, especially pertaining to killing of the tiger and illegal trading in tiger parts is very low, and does not act as a deterrent: killing a tiger has a monetary fine ranging from Nu 50,000 (USD 1,100) to 2,00,000 (USD 4,400) and or imprisonment up to five years. This has to be reviewed and updated to make the penalties stronger so that they act as deterrents to wildlife crimes.

Output

- Two hundred government officials representing various law enforcement, airport and border regulatory authorities, and tourism agencies trained in identification of wildlife and wildlife parts, CITES regulations and national and international legislation regarding illegal wildlife trade
- Killing of tiger and prey species and other wildlife crime reduced or stopped
- The Schedule of Fines in the Forest and Nature Conservation Act reviewed and updated

Activities

- Organize training on identification of wildlife parts and products for Forest Department, Customs, Police, Tourism, Bhutan Agriculture and Food Regulatory Authority (BAFRA), Immigration and other relevant law enforcement officials
- Establish network of informants using local communities to assist in detection of poachers and poaching activities
- Strengthen anti-poaching capacity by providing effective communication equipment and field gear
- Conduct regular anti-poaching patrols and surprise checks by PA and Forest Department staff
- Survey poached animals and plants, and identify and document trade routes, volumes and market forces.

B. Habitat Conservation

Objective B1: Identify critical areas of tiger and prey habitat for management intervention, using GIS and remote sensing, in order to maintain habitat integrity and contiguity

Bhutan is fast developing with a myriad of developmental activities occurring simultaneously across the country. As a result, there is a great risk that critical tiger

and prey habitat will be converted for infrastructure development. This is especially true for the broadleaf forests that lie in the industrial belt of the south, which are also critical corridors connecting tiger habitat in India. In order to understand the dynamics of habitat change over time, a detailed analysis of forest cover change will be carried out using time-series satellite images. Such analyses will be coupled with ground-truthing where necessary. This will then provide a tool with which to identify critical breaks in habitat contiguity and highlight threatened areas.

Having done this, appropriate habitat protection and management recommendations can be made.

Output

- Forest cover change maps (from 1960's - or earliest available - till present) developed
- Maps highlighting critical and potential breaks in connectivity developed
- Report on overall habitat status and management prescriptions produced
- Map of critical tiger and prey habitat developed

Activities

- Interpret satellite image and classify vegetation types based on existing LUSS vegetation types for one standard of vegetation classification
- Carry out forest cover change detection over time
- Identify critical and potential breaks, validate causes for these on the ground, and restore the breaks or remove potential threats
- Develop criteria for defining critical tiger and prey habitat developed based on information on tiger and prey distribution, usage of habitat, level of threat and others
- Delineate critical tiger and prey habitat, especially in the southern broadleaf belt that should be closely observed for upcoming or planned industrial or infrastructure development

Objective B2: Identify existing conflicting land-use policies affecting tiger and prey habitat and resolve them through multi-sectoral dialogue, and develop a legal mechanism to ensure future policies adequately accommodate tiger conservation concerns.

A systematic review of all the legislation regarding land-use has to be carried out in order to highlight conflicting issues. These will then need to be discussed and resolved. For this purpose, a multi-sectoral consultation workshop will be organized.

The workshop will bring together representatives from sectors such as agriculture, forests, livestock, survey and land record, road, energy and trade and industry. Key stakeholders such as the Bhutan Power Corporation, the Royal Audit Authority, the National Environmental Commission Secretariat (NECS) and private organizations will also participate in the consultations. The workshop is expected to make recommendations to the government on measures for land-use conflict resolution and the means to resolve them.

The Royal Audit Authority (RAA) now has the capability to perform environmental audits. It is important for the Department of Forests to nominate a forestry official to be on the RAA committee in order to put forth concerns of the department. A mechanism will also be put into effect that will assure the Department of Forests' review of all developmental activities before the NEC issues "environmental clearance". This is primarily to avoid destruction to critical wildlife habitat.

The Department of Forests will also need to form a review team that will review proposals before the issuance of "environmental clearance".

Output

- A gap analysis report of all policies and legislation related to land-use, highlighting loopholes, bottlenecks and conflicting issues with regard to threats to critical tiger and prey habitat compiled

- A mechanism and protocol to consult or inform the review committee on any developmental activities in critical tiger and prey habitat put in place

Activities

- Contract a legal expert to work with NCD to carry out a gap analysis of all relevant existing legislation pertaining to land-use that could have a negative impact on critical tiger and prey habitat

- Conduct multi-sectoral consultation workshops on conflicting land-use in order to resolve existing conflicts and prevent future conflicts

- Appoint a Forest Department representative to the environmental auditing committee

- Identify land-use conflict zones (development and infrastructure projects) based on surveys and habitat analyses

C. Human-Wildlife Conflict Management

Objective C1: Determine main causes of livestock depredation by tigers in three areas including Punakha Dzongkhag (where livestock depredation was highest in 2004) in order to understand the conflict so that appropriate remedies can be adopted. This study would then be replicated to other sites.

In 2004, 714 cases of livestock depredation by tiger and other carnivores across the country were reported. Out of these 127 cases were related to depredation by tiger (Sangay 2004). Based on survey reports, most of the depredation occurred during the months of July-September coinciding with the rainy monsoon season. Why is this happening? If there is adequate prey, why are livestock preyed upon? Could we attribute livestock depredation to low prey density, or poor livestock management; or are there other reasons? To understand and resolve human-wildlife conflict these questions must be answered. When the causes for depredation are identified, appropriate remedial measures must be taken. The program would also like to build a geo-referenced database on livestock depredation that will be crucial in the identification of depredation hotspots in the country. Once these hotspots are identified and mapped, detailed investigations must be carried out to understand the main causes of livestock depredation.

Output

- Livestock depredation hotspot map produced

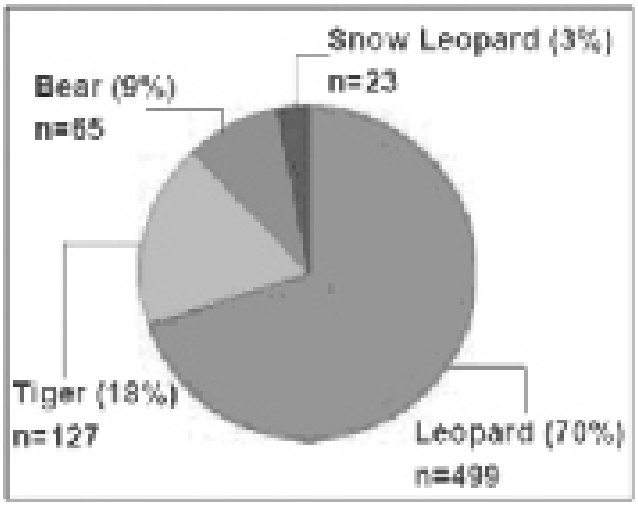
- Report on livestock depredation by tiger that highlights its relation to habitat quality, prey abundance, human influences and other factors

- Successful interventions tried and tested to prevent livestock depredation and mitigate human-wildlife conflict

Activities

- Set up a geo-referenced database on livestock depredation and map hotspots.

- Conduct studies in areas that have the highest number of tiger depredation cases to compare with other tiger areas with little or no depredation.



Livestock depredation incidents reported in 2004

- Explore appropriate remedial measures like providing improved breed of cattle (to discourage open grazing in the forest), reinforced corrals to protect cattle and other livestock, and improved animal husbandry practices.

Objective C2: Reduce retaliatory killing of tiger and prey species through prevention and mitigation measures as well as incentives.

At present, the program does not have any credible livestock data regarding: 1) livestock holding, 2) livestock type/breed, 3) rearing systems (free ranging, migratory and stall-fed), 4) migratory routes and stations, and 5) population trends (whether the population is stable, increasing or decreasing by breed). Livestock information will be sought from the Department of Livestock and will be cross-checked with the RNR census database to build a database for future assessment on livestock-related issues. The program will also explore experimental measures for reducing livestock depredation, i.e. agriculture intensification programs designed to change the livelihood of people who depend solely on livestock, promotion of superior breeds, stall feeding, infrastructure enhancement and improved husbandry practices. In order to foster friendly relations with livestock owners and to prevent retaliatory killings, the program has started the ambitious Tiger Conservation Fund, a compensation scheme to compensate owners for livestock killed by tigers, snow leopards, common leopards or Himalayan black bears. This scheme was started two years ago and there is a need to study its effectiveness while exploring alternative measures or incentives to cash compensation.

Output

- Report on the analysis of the existing compensation scheme produced

- A database on livestock information and depredation cases in the country developed

- Various options for preventive and conflict mitigation measures explored and put in place

- Peoples' attitude towards, and acceptance of human-wildlife conflict studied

Activities

- Evaluate current compensation schemes and explore opportunities for improvement

- Collation of livestock information from various districts and other institutions

- Explore other opportunities and options to compensation

- Conduct survey on local people's perception on wildlife damages

Creating an Enabling Environment

To successfully achieve the three above goals, a healthy and conducive environment has to be created. These are through the supportive activities outlined below.

D. Education and Awareness Program

Objective D1: Increase general awareness on the tiger's ecological and cultural significance to various stakeholders and audiences

The participation and ownership of local residents are the most important factors for the success of any conservation effort. Local communities should be made

aware of the importance and significance of the conservation of endangered species like the tiger. The benefits of tiger conservation should be understood, appreciated and received by those who have to live with the tiger, often losing their primary source of livelihood to depredation.

Output:

- Education materials (print, electronic, audio/visual) on ecological and cultural significance of tigers prepared and distributed
- These materials included by Education Department in school curricula at different levels
- Education and awareness materials prepared and distributed to the urban and rural public, at border entry points, check posts and other relevant places

Activities:

- Printing of education materials on ecological and cultural significance of tigers in Bhutan
- Production of a 30-minute audio-visual as well as radio program on the status of tigers in Bhutan, threats to its survival, and long-term conservation needs
- Consultation meeting with the Education Department, particularly the Curriculum Division, to discuss the inclusion of tiger-specific chapters in science and environmental studies in the lower school curricula
- Discussion with Sherubtse College, Natural Resources Training Institute, Ugyen Wangchuck Institute of Forestry and Environmental Studies and Bhutan Forestry Institute to include tiger-specific chapters in their lesson plans
- Identify network of institutions, nature clubs, schools and community groups in the urban and rural public, at border entry points, check-posts and other relevant places to distribute printed educational material

E. Regional Cooperation

Objective 5: Reduce trans-boundary poaching through bilateral dialogue, legislation and enforcement, and explore trans-boundary cooperation to maintain and improve habitat linkages.

Tiger habitat in Bhutan spreads across at least six protected areas (additional surveys are likely to yield positive data from more areas). It is further connected to India at Manas Tiger Reserve in Assam, and Buxa Tiger Reserve and Jaldapara Wildlife Sanctuary in West Bengal. This forms a contiguous tiger habitat all the way to Namdapha in Arunachal Pradesh on the Myanmar border, resulting in one of the largest contiguous TCUs in the region.

Bhutan is a landlocked nation that shares open borders with India in the east, west and south, and China in the north. These extensive borders are very porous and are often actively used for poaching and illegal wildlife trade activities. It is of utmost importance to collate information on transboundary issues of wildlife trade and poaching in order to understand their nature and extent.

There is a need to organize frequent transboundary meetings to discuss cross-border poaching and wildlife trade. A Memorandum of Understanding (MOU) that will include detailed legal provisions for prosecuting and extraditing foreign offenders has to be signed between the Royal Government of Bhutan and the Government of India. In addition, joint anti-poaching patrols need to be stepped up to monitor border protected areas such as Royal Manas National Park, Phibsoo and Khaling Wildlife Sanctuaries. Exchange visits between Bhutanese and Indian Forest officials will allow them to share experiences on PA management, and discuss issues of common concern especially regarding poaching, habitat destruction and other wildlife crimes.

Output

- Protocol and Memorandum of Understanding drawn up and signed between the Royal Government of Bhutan and Government of India
- Joint anti-poaching patrolling of border protected areas increased
- Joint exchanges of field visits to share experiences and discuss issues of common concern increased

Activities

- Identify and establish a baseline of hotspots in poaching and wildlife trade activities
- Study the current legislation gaps and protocol developed for the prosecution of international poachers that will be the main content of the MOU with the Indian authorities

- Initiate dialogue on trans-boundary conservation issues between India and Bhutan

- Conduct joint inspection and patrols of border PAs with Indian authorities

- Arrange exchange visits between Bhutanese and Indian forest officials

F. Human Resources Development

Objective 6: Increase the number of adequately trained staff of NCD/DOF and partners to implement the Tiger Action Plan.

At present, the country is acutely short of human resource at all levels. This is especially true in the protected areas. To cope with this, the Department of Forests has employed villagers as forest guards to help reinforce the protection of forests. These village forest guards need basic training in surveying and monitoring wildlife. There is also a need for additional training to locally trained foresters in order to update their skills in survey methodologies adapted to local conditions. These trainings will be in the form of specialized courses, study tours and attendance at various regional and international conferences and workshops on tiger and wildlife conservation. In order to implement the Tiger Action Plan, the following capacity building activities are foreseen:

Training on Survey Methodologies and Monitoring Techniques

Presently, untrained personnel execute the program activities in the field and as a result, information generated is not compatible or useful. The program will train some (territorial divisions and parks) field staffs on survey methodologies and monitoring techniques for two weeks. The training will enhance their capacity to carry out program activities independently.

Training on Advanced and Intensive Research and Sampling Methods

The Tiger Conservation Program will initiate and implement field research projects as required. To enhance the capability of locally trained staff members, they will join a twelve week intensive course on research and survey methodologies in a regional institution such as the Wildlife Institute of India. The course will be tailor-made to meet our requirements and is expected to include: 1) development of research proposals, 2) various survey techniques such as camera trapping, pellet group sampling, line transects, etc. 3) data collection, 4) identification of animal signs, 5) tracking animals using radio telemetry, 6) use of GPS, 7) statistical analysis (spatial analysis using GIS), 8) conservation biology (including wildlife health and medicine) and, 9) tranquilizing animals. Upon completion of the training, they will form the core team for program implementation.

- Training on advanced and intensive research and sampling methods

- Long-term studies

- Training in scat analysis

- Training on capture and recapture sampling

- Training on image classification using GIS and remote sensing

- Training on survey methodologies and monitoring techniques

- In-country training on survey methods

- In-country workshop

- Regional and international meetings

- Hosting General Assembly and Executive Committee Meeting of the Global Tiger Forum in the year of the Tiger (2010)

- Training course in management of wild tigers

- Training in wildlife management and conservation biology

Output

- 50 staff from territorial forest divisions and six protected areas trained in the region on these specialized courses viz. research and sampling methods, scat analysis, capture and recapture sampling, survey methodologies and monitoring techniques and image classification and remote sensing

- 400 staff involved with the program will attend or participate in the in-country training and workshop, and attend

- courses on wildlife management and conservation biology

- 70 senior staff attended regional and international meetings, workshops and conferences on matters related to tiger and wildlife conservation

Activities: Co-ordinate and organize various training needs of the program staff (as per annexure 2)

BUDGET AND WORKPLAN (BHUTAN)

		Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	**Activities**	**Amount in USD**										
Goal: 'to maintain a viable interconnected population of breeding tigers in Bhutan, a population existing predominately on wild prey with minimal conflict between humans and tigers'												
Species Conservation												
Objective: • In the first five years, develop field-based information on tiger and ungulate prey population status (ecology, demography, genetics), with special focus on three key areas (Royal Manas NP representing the subtropical belt, JSWNP representing the middle hills, and JDNP representing the northern temperate belt). This is then to be replicated in other areas representative of the whole country by 2015												
Data on tiger and prey distribution and their relative abundance in three PAs collected, which would then be extrapolated to the larger adjoining areas, and finally to the whole country	Establish randomly selected grid-based study sites of adequate size in the field, for routine monitoring of tiger and prey populations 4705.00	4705.00 2350.00	4705.00 35275.00			4705.00	4705.00	4705.00	2350.00	2350.00	2350.00	2350.00
Information on tiger ecology and ranging behavior in Bhutan collected	Conduct index surveys, line transect surveys, and capture- recapture sampling surveys using camera traps to evaluate tiger and prey distribution and relative abundance for each one of the three PAs selected	11765.00 5880.00	11765.00 88225.00			11765.00	11765.00	11765.00	5880.00	5880.00	5880.00	5880.00

		Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	**Activities**	**Amount in USD**										
A detailed report on the genetic profile and long term viability of the tiger population in Bhutan produced	Study the behaviour and ecology of the tiger and its prey species using radio telemetry, camera trapping and other modern techniques											
Spatial distribution and habitat partition by wild herbivores in the three study areas determined	Survey and assess tiger and prey habitat conditions					11765.00	11765.00	11765.00	11765.00	11765.00	5880.00	64705.00
Obtain, tranquilize and take genetic samples from collections of blood and tissue from wild tigers captured for radio-telemetry or that died from other causes.	Reference slide collection of ungulate hair and tissue samples, and an identification manual prepared											
	Conduct DNA testing and other genetic studies of tigers.	2350.00	2350.00	2350.00	2350.00	2350.00						11750.00
	Perform exploratory population viability modeling											35294.12
	Establish a permanent monitoring system of the habitats of the main tiger prey species	2350.00	2350.00	2350.00	2350.00	2350.00	11765.00	11765.00 5880.00	11765.00 5880.00	11765.00 5880.00	11765.00 5880.35	58825.00 23520.00 11750.00

		Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	**Activities**	**Amount in USD**										
	Determine food habits of tigers through tiger scat analysis, and develop a reference collection of ungulate hair samples and an identification manual											
		2350.00	4705.00	4705.00	2350.00	2350.00						16460.00
Objective: • Suppress killing of tiger and prey species, and halt the illegal trade of tiger parts and products, and other endangered wildlife.												
200 government officials representing various law enforcement, airport and border regulatory authorities, and tourism agencies trained in identification of wildlife and wildlife parts, on CITES regulations, and on national and international legislation regarding illegal wildlife trade	Organize training on identification of wildlife parts and products for Forest Department, Customs, Police, Tourism, Bhutan Agriculture and Food Regulatory Authority (BAFRA), Immigration and other relevant law enforcement officials	4705.00	4705.00	4705.00			4705.00					18820.00
Killing of tiger and prey species, and other wildlife crime reduced or stopped	Establish network of informants using local communities to assist in detection of poachers and poaching activities											
		2350.00	2350.00	2350.00	2350.00	2350.00	2350.00	2350.00	2350.00	2350.00	2350.00	23500.00

		Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	**Activities**	**Amount in USD**										
The Schedule of fines in the Forest and Nature Conservation Act reviewed and updated	Strengthen anti-poaching capacity by providing effective communication equipment and field gear	9410.00	9410.00	9410.00	4705.00	4705.00	4705.00	4705.00	4705.00	4705.00	4705.00	61165.00
	Conduct regular anti-poaching patrol and surprise checking by PA and Forest Department staff	1175.00	1175.00	1175.00	1175.00	1175.00	1175.00	1175.00	1175.00	1175.00	1175.00	11750.00
	Conduct survey on poached animals and plants, as well as identify and document trade routes, volumes and market forces.	1175.00					1175.00					2350.00
Habitat Conservation												
Objective: Identify critical areas of tiger and prey habitat for management intervention, using GIS and remote sensing, in order to maintain habitat integrity and contiguity												
Forest cover change maps (from 1960's – or earliest available – till present) developed	Interpret satellite image and classify vegetation types based on existing LUSS vegetation types to maintain one standard of vegetation classification	**11765.00**										**11765.00**

		Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	**Activities**	**Amount in USD**										
Maps highlighting critical and potential breaks in connectivity developed	Carry out forest cover change detection over time	7060.00										7060.00
Report on overall habitat status and management prescriptions produced	Develop criteria for defining critical tiger and prey habitat developed, based on information on tiger and prey distribution, usage of habitat, level of threat and others	4705.00										4705.00
Map of critical tiger and prey habitat developed	Identify critical and potential breaks, validate causes for these on the ground, and restore the breaks or remove potential threats	5880.00										5880.00
	Delineate critical tiger and prey habitat, especially in the southern broadleaf belt that should be "closely observed" for upcoming or planned industrial or infrastructure development	7060.00										7060.00
Objective: Identify existing conflicting land use policies affecting tiger and prey habitat and resolve them through multi-sectoral dialogue, and develop a legal mechanism to ensure future policies adequately accommodate tiger conservation												

		Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	**Activities**	**Amount in USD**										
A gap analysis report of all policies and legislation related to land use, highlighting loopholes, bottlenecks and conflicting issues withregards to threats to critical tiger and prey habitat compiled	Contract a legal expert to work with NCD to carry out a gap analysis of all relevant existing legislation pertaining to land use that could have a negative impact on critical tiger and prey habitat.	5880.00										5880.00
A mechanism and protocol to consult or inform the review committee on any developmental activities up in critical tiger and prey habitat put in place.	Conduct multi-sectoral consultation workshops on conflicting land use in order to resolve existing conflicts and prevent future conflicts	3530.001										3530.00
	Appoint a Forest Department representative to the environmental auditing committee	1175.00										1175.00
	Identify land-use conflict zones (development and infrastructure projects) based on surveys and habitat analyses.	2350.00										2350.00

		Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	**Activities**	**Amount in USD**										
Human/Wildlife Conflict Management												
Objective: • Determine main causes of livestock depredation by tigers in 3 areas including Punakha Dzongkhag (where livestock depredation was highest in 2004) in order to understand the conflict so that appropriate remedies can be adopted. This study would then be replicated to other sites												
Livestock depredation hotspot map produced	Set up a geo-referenced database on livestock depredation and map hotspots	5880.00	1765.00	1765.00	1765.00	1765.00	1765.00	1765.00	1765.00	1765.00	1765.00	20000.00
Report on livestock depredation by tiger that highlights its relatedness to habitat quality, prey abundance, human influences and other factors prepared.	Conduct studies in areas which have highest number of depredation cases by tiger to compare with other tiger areas without any depredation, or where depredation is low.		4705.00							4705.00	4705.00	14115.00
A set of successful interventions to prevent livestock depredation, and mitigate human wildlife conflict tried and tested	Explore appropriate remedial measures such as providing improved breed of cattle (to discourage open grazing in the forest), reinforced corrals to better protect cattle and other livestock, and improved animal				4705.00						5880.00	10585.00

		Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	**Activities**	**Amount in USD**										
Objective: Reduce retaliatory killing of tiger and prey species through prevention and mitigation measures as well as incentives												
Report on the analysis of the existing compensation scheme produced	Evaluate current compensation schemes & explore opportunities for improvement.				2350.00							2350.00
A database on livestock information and depredation cases in the country developed	Collation of livestock information from various districts and other institutions		2350.00									2350.00
Various options for preventive and conflict mitigation measures explored and put in place	Explore other opportunities and options to compensation				2350.00							2350.00
Peoples' attitude towards, and acceptance of human wildlife conflict studied	Conduct survey on local people's perception on wildlife damages			2350.00								2350.00
Education and Awareness Program												
Objective: Increase general awareness on the tiger's ecological and cultural significance to various stakeholders and audiences												
Education materials (print, electronic, audio/visual) on ecological and cultural significance of tigers prepared and distributed	Printing of education materials on ecological and cultural significance of tigers in Bhutan	4705.00	4705.00	4705.00	4705.00	4705.00	4705.00	4705.00	4705.00	4705.00	4705.00	47050.00

		Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	**Activities**	**Amount in USD**										
These materials included by Education Department in school curricula at different levels	Production of 30 minutes video program as well as radio program on the status of tigers in Bhutan, threats to its survival, and long term conservation needs					3530.00				3530.001		7060.00
Education and awareness materials prepared and distributed to the urban and rural public, border entry points, check-posts and other relevant places	Consultation meeting with Education Department, particularly Curriculum Division, to discuss on the inclusion of tigerspecific chapters in the science and environmental studies subjects in lower school curricula			1175.00							1175.00	2350.00
Baseline on people's perception of tiger developed	Discussion with Sherubtse College, Natural Resources Training Institute, Ugyen Wangchuck Institute of Forestry and Environmental Studies and Bhutan Forestry Institute to include tiger-specific chapters in their lesson plans			2350.00							2350.00	4700.00

		Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	**Activities**	**Amount in USD**										
	Identify network of institutions, nature clubs, schools, and community groups in the urban and rural public, border entry points, check-posts and other relevant places for distribution of the printed education materials				3530.00				3530.00			7060.00
Regional Cooperation												
Objective: Reduce trans-boundary poaching through bilateral dialogue, legislation and enforcement, as well as explore trans-boundary cooperation for maintaining and improving habitat linkages.												
Protocol and Memorandum of Understanding drawn up and signed between the Royal Government of Bhutan and Government of India	Identify and establish a baseline of hotspots in poaching and wildlife trade activities.	2350.00				2350.00			2350.00		2350.00	9400.00
Illegal poaching and cross border trade across the Indo-Bhutan borders reduced	Carry out a study on the current legislation gaps and protocol developed for the prosecution of international poachers which will be the main content of the MOU		1770.00									1770.00

		Year 1 2005-06	Year 2 2006-07	Year 3 2007-08	Year 4 2008-9	Year 5 2009-10	Year 6 2010-11	Year 7 2011-12	Year 8 2012-13	Year 9 2013-14	Year 10 2014-15	Total in USD
Output	**Activities**	**Amount in USD**										
	Initiate dialogue on transboundary conservation issues between India and Bhutan					2350.00					2350.00	4700.00
Human Resource Development												
Objective: Increase the number of adequately trained staff at NCD/DoF												
	Specific training, refresher course, study tours and workshop and conference	17650.00	17650.00	17650.00	17650.00	17650.00	17650.00	17650.00	17650.00	17650.00	17650.00	176500.00
Total		**81155.00**	**82930.00**	**82920.00**	**87620.00**	**80575.00**	**84105.00**	**81755.00**	**87635.00**	**84105.00**	**80565.00**	**833365.00**

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ANNEXURE 1: LIST OF CONFERENCE PARTICIPANTS

National Participants

Department of Forests

1. Dasho Dawa Tshering, Director General, Department of Forests
2. Tashi Wangchuk, Head, Bhutan Museum of Natural History, Dept of Forests
3. Dechen Dorji, Project Director, Ugyen Wangchuck Institute for Forest and Environment, Dept of Forests.

Nature Conservation Division

4. Sangay Wangchuk, Joint Director, Nature Conservation Division
5. Raling Ngawang, Head, Data and Information Management Section
6. Ngawang Norbu, GIS Officer In-charge, D & IM Section
7. Karma Tenzin, Ethno-botanist, D&IM Section
8. Karma Tshering, Head, Management Planning and ICDP Section
9. Sonam Choden, Env. Education Officer, MP & ICDP Section
10. Namgay Dendup, Ranger Officer, ICDP, MP & ICDP Section
11. Deki Yonten, Head, SCREaM Section
12. Sherub, Ornithologist, SCREaM Section
13. Nagdrel Lhamo, CITES, SCREaM Section
14. D.S.Rai, ADF, SCREaM Section
15. Sangay, Co-ordinator, Tiger Program, SCREaM Section
16. Sherab Wangchuk, Deputy Ranger, Tiger Program, SCREaM Section

Protected Area System

17. Tshering Phuntsho, Park Manager, Jigme Dorji National Park
18. Sonam Wangyel Wang, Park Manager, Jigme Singye Wangchuck National Park
19. Sonam Wangchuk, Park Manager, Thrumshingla National Park
20. Thinley Dorji, Park Manager, Royal Manas National Park.
21. Phurba Lhundup, Park Warden, Bomdelling Wildlife Sanctuary
22. Pema, Park Manager, Sakteng Wildlife Sanctuary

WWF Bhutan

23. Kinzang Namgay, Country Representative, WWF Bhutan
24. Chadho Tenzing, Conservation Director, WWF Bhutan
25. Vijay Moktan, Sr. Program Officer, WWF Bhutan
26. Pema Yangzom, Finance and Administration Manager, WWF Bhutan
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ANNEXURE 2

Human Resource Development

Training on Advance and Intensive Research and Sampling Methods

The Tiger Conservation Program will enhance the capability of the program staff that are locally trained with a twelve-week course on advanced and intensive research and sampling methods. The course is expected to include: 1) development of research proposals, 2) various survey techniques such as camera trapping, pellet group sampling, line transects, etc. 3) data collection, 4) identification of animal signs, 5) tracking animals using radio telemetry equipments, 6) use of GPS and geo-referencing, 7) statistical analysis (including spatial analysis using GIS), 8) conservation biology (including wildlife health and medicine) and, 9) immobilization and translocation of animals. The staffs will be sent to reputed institutions in the region.

Long-term Studies

The program plans for long-term research where studies can be integrated with higher degrees. Dedicated and motivated staff from the Nature Conservation Division and Protected Areas could pursue independent studies for postgraduate degrees (Diploma, MSc and PhD).

Training in Scat Analysis

The program will identify two staff to undergo a two-week training on scat analysis handling and management at the Wildlife Institute of India. They will carry out scat analysis to determine tiger diet composition.

Training on Capture and Recapture Sampling

The program will send three staff to attend a three-week on-the-job training at the Centre of Wildlife Studies, India, on capture and recapture sampling. They will then train other staff in camera trapping exercises, and conduct capture and recapture samplings in selected study areas.

Training on Image Classification Using GIS and Remote Sensing The program will be updating land-use maps and will need to carry out habitat classification from satellite images. At present, the GIS unit of NCD does not have the capability to carry out image classification using GIS and RS. Therefore, two GIS personnel will be trained in image classification using GIS and RS at either ESRI or ITC (Netherlands). As far as possible expertise from other agencies such as Land Use and Stastistic Section and Survey of Bhutan will be used.

Study Tours and Training on Surveying Methodologies and Monitoring Techniques

The program will send the staff who are closely involved with the program on a study tour to Nepal and India. Such trainings and tours will expose them to tiger conservation efforts and challenges outside their immediate experience.

In-country Training on Survey Methods

A week-long in-country training and refresher course will be conducted for forestry and park staff on survey methodologies and monitoring techniques that are necessary to carry out wildlife surveys. The training will also cover the tigers and its conservation efforts and It will be attended by 40 staff from various territorial forest divisions and parks and held every alternate year.

In-country Workshop

A one-day in-country workshop will be held to report on survey and research finding as well as on the compensation results. This workshop will be organized once every three years.

Regional and International meetings

As Bhutan has recently ratified and joined CITES (2002), this allows for the CITES management authority and scientific authority personnel to attend CITES meetings. It is important for the Bhutanese government officials to keep abreast of what is happening in relation to tiger conservation in the region and internationally.

General Assembly and Executive Committee Meeting of the Global Tiger Forum

The Global Tiger Forum Secretariat has requested Bhutan to host its General Assembly and Executive Committee meeting, which we would like to host in the Year of the Tiger (2010), to showcase our commitment to tiger conservation. The meeting will be attended by all members of the Global Tiger Forum, as well as by organizations that have a stake in tiger conservation.

Training Course in Management of Wild Tigers

The Wildlife Institute of India (WII) has conducted a three-week course on the management of wild tigers. The program would like to request the Institute to organize a similar training course for Bhutanese staff

in Bhutan. It will be attended by select staff that have proven their dedication to tiger conservation.

Training in Wildlife Management and Conservation Biology

The Smithsonian Institution has conducted several training on wildlife management and conservation biology in various countries. The program will request it to conduct a similar training in Bhutan. About 50 staff from the forestry divisions and parks including researchers will attend the three-week session.

CHAPTER 3

TIGER ACTION PLAN

CAMBODIA 1994

Prepared by
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1. GENERAL BACKGROUND

The Kingdom of Cambodia occupies an area of 181,035 sq.km in the southwestern corner of the Indochina Peninsula. It is bordered by Thailand to the west, Lao PDR to the north, Vietnam to the east and the Gulf of Thailand to the south.

2. POPULATION

In 1992, the human population was an estimated 9.2 million with a rate of increase of approximately 2.8 % per year. Approximately 85% of the population lives in rural areas, with the vast majority located in the central plains. The forested districts generally support a population density of below 20 habitants per square kilometer.

3. FOREST STATUS

The Kingdom of Cambodia has the largest intact deciduous forest remaining in Southeast Asia and about 60% of the country is still forested. Unfortunately the country is facing rapid deforestation in recent years; more than 8% of the forest cover has been degraded between 1989 and isolated from the international economic community. The country's present economic and political situation meant that necessary foreign exchange revenue was garnered by selling timber.

The situation was further compounded by the government's inability to control logging in those areas where it was selling sizeable timber concessions. In order to stop this destruction, a moratorium on log export was put by the United Nations in 1993. This moratorium unfortunately resulted in the proliferation of illegal saw-mills, thus accelerating the demand for timber. In order to stop this situation the Royal National Government tried to enforce a strict moratorium on the export of logs and sawn timber starting on 31 March 1994, but under the pressure of the Ministry of Defense the government recently decided to stop the moratorium and to allow the Army to control timber export.

4. ESTIMATED POPULATION OF TIGERS IN CAMBODIA

There has been no formal survey of the population of tigers in Cambodia. The Forestry Department estimated the population of wild cats as such: *Panthera tigris* (200), *Panthera pardus* (300), *Felis temminski* (100), *Felis viverrina* (500), and *Felis marmorata* (100). In comparison with the results of the trade survey, these figures seem an underestimation. A wildlife survey concentrating on the tiger is essential to elaborate any policy regarding their conservation and also to have a better idea of the situation at a regional level.

5. TRADE

Tiger products are easily found in Cambodia. There is nearly no legislation and traders do not operate underground but freely and very openly. Tiger skins are exhibited in shops open to the public. A very recent survey was undertaken by Esmond Bradley Martin with an agent from the Wildlife Protection Office. The main trading places are Phnom Penh (the capital city) and Poipet on the border to Thailand where during the survey 3 and 15 skins respectively were found. The turnover of tiger skins was estimated at approximately 10 to 16 per month, or 100 to 200 tigers per year. Most of the skins are brought by Cambodian soldiers. The prices are between US$150 to 1200 per skin, depending on the quality, and around US$100 / kg for bones. Live animal trade also abounds with tigers, said to be sold to Thailand for US$ 2,500 per animal. Although the main market is Thailand, Vietnam is also a market. Most of the tigers are sourced from the Cardamom Mountains of the north-east. Other wildlife products include elephants tusks, deer antlers, gaur and banteng horns, other wild cats skins (including leopards, fishing cats, etc.), tortoises, snakes skins, monkeys, gibbons and Malayan sun bears.

6. CONSERVATION POLICY - INSTITUTIONAL

Facing the threat of uncontrolled economic development, and previously the troubled war period, the Royal National Government has decided to support and promote an active conservation policy regarding nature and natural resources. This policy will be developed essentially through the activities of the State Secretariat for Environment but also be the responsibility of each ministry within its own mandate. The State Secretariat for Environment, headed by H.E. Dr. Mok Mareth State Secretary for Environment, includes a Department of Nature Conservation and Protection that has the responsibility of supervising and developing a system of Protected Areas, as well as monitoring the development in fragile areas such as coastal, wetlands and watershed zones. The Forestry Department through the Wildlife Protection Office, is in charge of hunting regulations as well as ex-situ conservation programs (zoological gardens).

7. LEGISLATION - WILDLIFE CONSERVATION

Legislation regarding the protection of wildlife was very inadequate and not enforced. The only two relevant articles (#22 and 23, Decree 35 on forest rules) only prohibited any kind of hunting till a list of protected species was provided by the Ministry of Agriculture. This list has now been drafted and has entered into force. The Wildlife Protection Office of the Forestry Department is in charge of hunting regulations. This office is now working on drafting a Wildlife Conservation Act that will be much more comprehensive and will provide the baseline for the implementation of the CITES convention (of which Cambodia is not yet a member).

8. PROTECTED AREAS

A Royal Decree creating 23 protected areas covering 3.3 million hectares was signed by the King Norodom Sihanouk on 1st November 1994. Protected areas are divided into four categories: National Parks (7 with a total area of 736,250 ha), Wildlife Sanctuaries (10, with a total area of 2,030,000 ha), Protected Landscape (3, with a total area of 97,000 ha), Multiple-Use Area (3, with a total area of 403,950 ha). These very important measures have not yet been applied on the ground due to the lack of trained personnel and the lack of budgets. The State Secretariat for Environment has the responsibility for their establishment through the Department of Nature Conservation and Protection. This Department (DNCP) comprises 43 staff, mostly with forestry background.

9. IMMEDIATE NEEDS AND PERSPECTIVES

The Kingdom of Cambodia has now the requisite institutions and will soon have the appropriate legislation for the management of wildlife and nature, but there are some immediate needs that are crucial for the success of nature conservation in Cambodia.

a. **The need for trained personnel:** The total staff of the two institutions involved directly in nature conservation is around 60 people. They mostly have a forestry/fishery/hydrology background or are veterinarians, engineers and technicians, but have very little background and experience in wildlife and protected areas management. Most of the trained staff have been killed or moved to western countries during the Pol Pot regime, so that the skills of these institutions are extremely poor in specialized matters. Assistance is crucially needed for the training of these staff: short training courses, academic studies, visits of foreign experts or overseas experience.

b. **The need for information and data:** There has been nearly no formal survey of the country since the war (i.e. 1970), and basic information on the estimated numbers of tigers and their location is critical for future management.

c. **The need for an appropriate legislation** on wildlife protection and the training of enforcement agents is vital to stop the current trade.

d. **The need for funds** for the implementation of the protected areas system is also crucially needed before a further degradation of these sites occurs.

10. PROPOSALS TO SUPPORT TIGER CONSERVATION IN THE KINGDOM OF CAMBODIA

The Kingdom of Cambodia still hosts an important population of tigers and has major tracts of forest in its habitat. This situation is rapidly deteriorating due to deforestation and poaching for trade. These threats could be addressed through the provision of adequate human and financial resources to support the conservation policy of the Royal Government of Cambodia.

The important forest cover of Cambodia and the existing trade of tiger products indicate that Cambodia has a significant role to play in the conservation of tigers in South-east Asia and that action could lead to success in this matter.

The institutional and legal situation regarding wildlife conservation issues in Cambodia is rapidly improving, but there is still no reliable data on tiger numbers and location, no appropriate enforcement capacity, no public awareness (especially among armed forces and traders), and no experience in protected areas and buffer zones management. The following proposals outline crucial actions that need to be undertaken in the very near future and these are listed with a minimum estimated cost.

Proposal-I: Trade Survey

Knowledge on hunting and trade patterns is essential for the efficient implementation of conservation measures that will be taken in the near future. A national survey will be conducted by a small team of two people to identify:

- professional hunters
- trading places and traders
- trading routes and means of transportation
- final destinations (exportation)

This survey will allow an estimation of the volume of tiger products on the market as well as their destination. This survey will also provide necessary data to determine the most appropriate enforcement techniques.

Budget (US$)

– Transportation		
	air	800
	car	750
—Staff per diem		600 (2X300)
—Miscellaneous		200
Total US$		2,300

Proposal-2: General Survey on Tiger Status in Cambodia

There is no data available on the number and distribution of tigers in Cambodia. This grant will support a small survey team of three to four people who will travel extensively throughout the country, security permitting, over a period of three months (90 working days). This team will also establish a network for data collection (especially using the forest rangers who will be specifically trained in wildlife conservation). A short (2-4 weeks) field training course on "the tiger ecology and behavior and the tiger survey techniques" will be organized in a neighboring country in order to provide some background and experience to the survey team (4 persons). Any data collected during the tiger survey in Cambodia will thus be more effectively compared with existing data on other tiger populations living in similar ecosystems. It will provide a better tool in the formulation and monitoring of a successful management plan for the conservation of the tiger in Cambodia.

Budget (US$)

Field training course		5,500
Transportation		
	car	4,600
	airfare	1,200
Staff per diem		3,600 (3X4X300)
Field Equipment		3,500
Expenses and report		3,000
Subtotal US$		21,400
Expatriate (wildlife veterinary)		5,400 (3X1, 800)
Total US$		**26,800**

Proposal-3: Legislation and Enforcement Legislation:

There is a list of protected species to help enforce the current forestry legislation but this ministerial decree is not comprehensive enough. This grant will support the drafting of a new Wildlife Conservation Act, that will provide hunting and trading regulations and will be the legal basis for the protection of wildlife, especially the tiger, and the implementation of the CITES Convention in Cambodia.

Budget (US$)

Drafting	200
Meetings and communications	250
Distribution	500
Total US$	**950**

Enforcement:

There is nearly no enforcement capacity at the present moment. The official agents are the forest rangers, but they lack basic understanding about legal protection for wildlife. This grant will support a training program to teach approximately 100 forest rangers wildlife ecology and values; the new legislation (list of protected species) and the legal process of enforcement; as well as carry out awareness raising exercises among the general public, and the police and military in particular. Special attention will be given to tiger protection during this training. Awareness material will be provided, including posters, leaflets on the legislation and its enforcement.

This training will be organized by the Forestry Department in collaboration with the Department of

Nature Protection. Ten training sessions, of five days each, will be held by groups of ten forest rangers. One special training session will be organized for customs officers.

Budget (US$)

Preparation of the training	600
Transportation from provinces	3,800
Per diem in Phnom Penh	4,200
Training material	1,500
Awareness material	5,000
Total US$	15,100

Impact assessment:

A workshop of representatives from each province (Forestry Department and State Secretariat for Environment, around 30 persons) will be organized one year later in order to assess the impact of the new legislation, determine future needs and their implemetation.

Budget (US$)

Preparation of the workshop	500
Transportation from provinces	1,200
Per diem in Phnom Penh	1,260
Workshop expenses	500
Total US$	3,460

Proposal-4: Support for the Management of Protected Areas

Support is needed to establish protected areas designated by the Royal Decree "Creation and Designation of Protected Areas". A survey on the status of the tiger will provide information on the estimated status of the tiger in several of these protected areas. The most important for the conservation of the tiger will be chosen to receive specific support. This would include the assignment of staff, the education and participation of the local communities, the demarcation of boundaries and the elaboration and implementation of a management plan oriented on the conservation of the tigers. A rough estimate for a five-year protection would be around US$ 150,000.

PROTECTED AREAS

National Parks

1. Kirirom (35,000)
2. Bokor (140,000)
3. Kep (5,000)
4. Ream (150,000)
5. Botum Sakor (171,250)
6. Kulen (37,500)
7. Virachey (332,500)

Wildlife Sanctuaries

8. Phnom Aural (253,750)
9. Peam Krasob (23,750)
10. Phnom Samkos (333,750)
11. Roneam Daunsam (178,750)
12. Kulen Promptep (402,500)
13. Boeung Per (242,500)
14. Lomphat (200,000)
15. Phnom Prich (222,500)
16. Phnom Nam Lear (47,500)
17. Snoul (75,000)

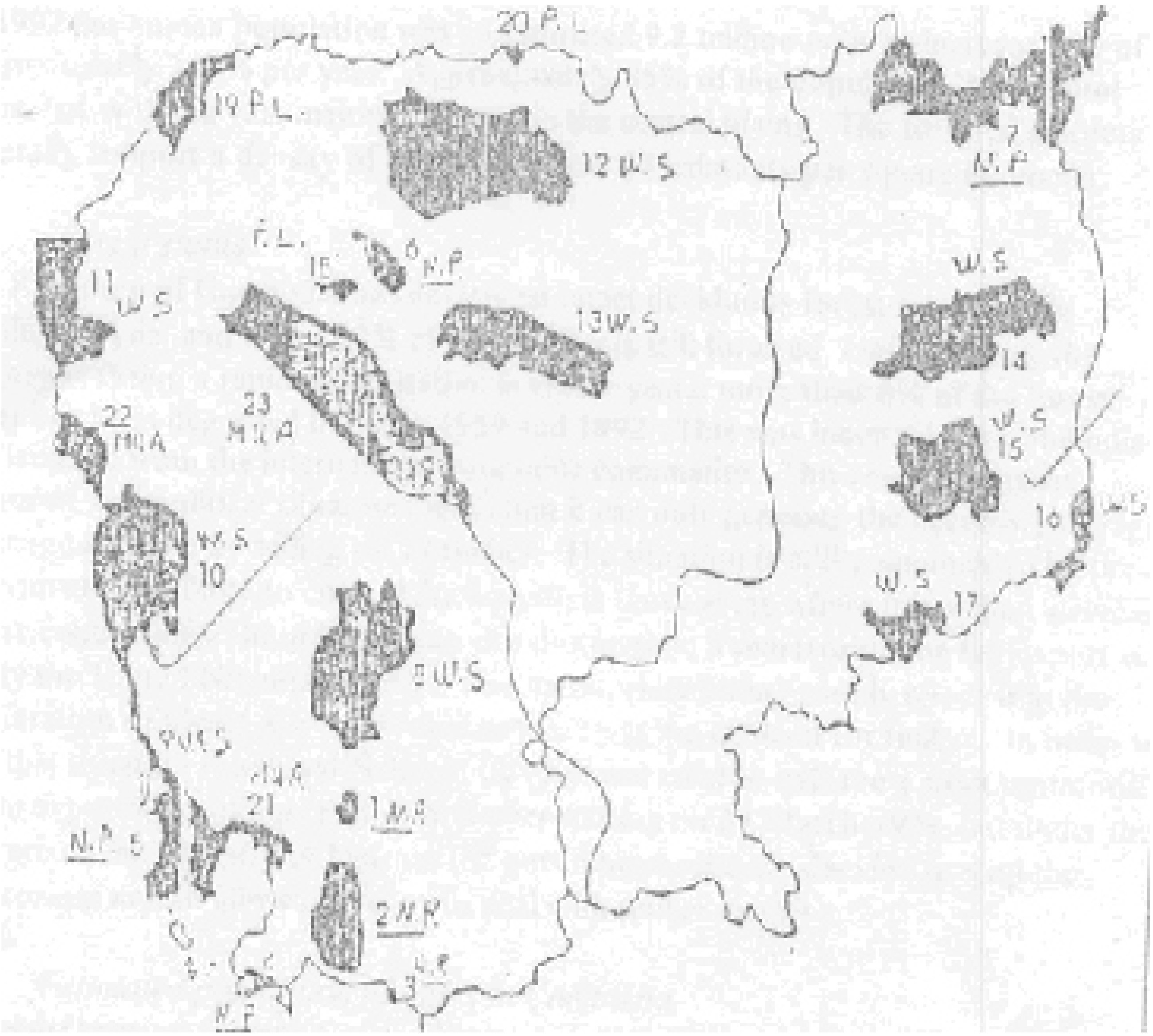
Protected Landscapes

18. Angkor (10,800 to be revised to 37,000)
19. Banteay Chhinas (81,200)
20. Preah Vihear (5,000)

Multiple-Use Areas

21. Dang Peng (27,700)
22. Som Lot (60,000)
23. Toule Sap (316,250) (in hectares)

Total: 3,402,200 ha or 34,022 km^2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CHAPTER 4

TIGER ACTION PLAN

CHINA 1998

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INTRODUCTION

Worldwide Status - From its origin in South China about one billion years ago, the tiger has radiated into eight different subspecies: *Panthera tigris altaica, P.t. balica, P. t. sondacia, P. t. virgata, P.t. amoyensis, P.t. corbetti, P. t. sumatrae, P. t. tigris.* The tiger once inhabited an immense region as far west as Turkey, to the eastern coasts of Russia and China; as far north as Siberia, to as far south as the Indonesian island of Bali. At present, *P. t. amoyensis, P. t. tigris, P. t. corbetti and P. t. altaica* are present in China, which therefore has the most subspecies in the world. *P. t. amoyensis* is endemic to China.

In the past 50 years, three tiger subspecies; the Bali (*P. t. balica*), Caspian (*P. t. virgata)* and Javan (*P. t. sondaica*) tigers have become extinct. The surviving five subspecies face the same threats i.e. poaching and degradation of appropriate habitats, which have been the main causes responsible for tigers in the wild being on the brink of extinction. Since the wild population has significantly decreased over the last century, many countries and international organizations have worked out schemes to build natural reserves, promote anti-poaching measures, enhance research and manage captive tigers, and protect wild population.

In 1969, the General Assembly of the International Union for the Conservation of Nature and Natural Resources (IUCN) set the tone by calling for international efforts to save the tiger. The World Wildlife Fund (WWF) responded in 1972 with Operation Tiger, a program to fund conservation efforts for tigers in the Indian sub-continent, Indochina and Indonesia. In the seventies, many countries, including Indonesia, Bhutan, India, Nepal, Bangladesh, Malaysia and Thailand, established stronger wildlife protection laws including prohibiting tiger-hunting and creating new reserves. For example, in addition to Project Tiger, which notified special reserves for the tiger throughout the country, the Indian government passed the Wildlife Protection Act which banned tiger hunting. Three tiger reserves were also notified in Nepal.

In 1975, all tigers (except the Siberian subspecies *P.t. altaica* which was listed in 1987) were listed on Appendix I of Conservation on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In some reserves, tigers, their prey and habitat recovered under effective management efforts. However, such improvements only happened in such few regions as India, Nepal and the Russian Far-east. At present, the total wild tiger population in the world is about 4600-7200 according to reports of WWF (1996).

Status in China - Tigers were once dispersed in the entire forest zone of China, from the Daxinganling mountain range in the north to Hainan Province in the south. Xinjiang was the western limit and the eastern coastal forest was the eastern limit. However, with the local economies developing, forest exploitation and wildlife hunting made a great impact on tiger survival. In East and South China, most forests were changed into agricultural land, which caused the South China tiger population to decline sharply. The cutting of forests in the Northeast made the Siberian tiger decline dramatically in this century. From the 1950s to the 1970s, the wild population of the South China Tiger received a fatal blow as they were hunted as "harmful predators" and due to loss of habitat. Since the 1970s, the Chinese government began to strive for tiger conservation, e.g. surveying the wild population, establishing reserves, working out relative laws and banning tiger-hunting. In 1981, China joined the CITES; and in 1993 promulgated "Circular of the State Council for banning trade in rhinoceros horn and tiger bone".

At present, there are about 20-30 wild *P.t. amoyensis* and 50 captive individuals; also there are no more than 30 wild *P.t.altaica,* 30 wild *P.t.tigris* and 30-40 wild *P.t. corbetti.* The total wild tigers are only about 100 and therefore tiger conservation in China is extremely critical. If there are no appreciable measures taken, the tiger would be extinct in the next century according to some expert forecasts.

Tigers play a key role in the ecosystem they inhabit and the tiger is important in keeping the natural balance. The tiger has also become a cultural symbol of strength and beauty. Moreover, tiger conservation has not only biological significance but has also become a symbol for conserving the earth's environment and the biosphere. Thus it is very important to execute a tiger conservation action plan to conserve the Chinese tigers.

1. HISTORICAL DISTRIBUTION AND DEMOGRAPHY OF CHINESE WILD TIGER POPULATION

1.1 *P.t. altaica* lives in the cold-temperate coniferous forest zone and mixed broadleaf and coniferous temperate forest zone and it was once widely distributed in the forested areas of northeastern China. But its distribution and population has declined because of increasing human activities since the beginning of this century.

In the Daxinanling Mountain, there have been only a few tigers since the 1920-30s. After a female tiger was killed at the mouth of Shilehe River in 1967, there has been no report about tigers and perhaps tigers became locally extinct in the1970s.

In the 1950s the Yichun district in the Xiaoxinganling Mountain was regarded as the most important distribution area for tigers and many tigers were captured from there. With increasing deforestation and hunting, there were only 4 wild tigers left in the area according to a survey in 1975-76. Its range was thought to have retreated eastwards. Since 1980s there have been no tigers in the area.

A few tigers were captured in the 1950s in Ji'an county, Jilin province. But a survey conducted in 1975-76 showed no tiger in Ji'an county and the tiger's distribution retreated further south and east to the Lushui River, Fushong county and the frontier of Changbai county.

In the early 1960s, it was estimated that adult tigers were no more than 200 in northeastern China. According to a survey of 1974-76, only 151 individuals lived in the wild; about 70 were distributed in the Yanbian district in Jilin province, the others were distributed in Heilongjiang province. *P.t. altaica was* distributed in the mountains east of E127^{O} including the Dafeng forest bureau of Yichun district in the north and the Tangyuan county, Shangzhi county and Wuchang county of Heilongjiang province. These tigers lived mostly in Hejiang district, Mudanjiang district, Songhuajiang district in Heilongjiang Province and Yanbian district in Jilin province. *P. t. altaica* was now only distributed in Wandashan Mountain, Laoyeling mountain and Zhangguangcailing mountain in Heilongjiang Province and in Wangqing country and Changbaishan natural reserve in Jilin province. It has a very small existing population of no more than 30 animals (Meng et al. 1995).

1.2. *P.t.amoyensis* once lived in the subtropical evergreen broadleaf forest zone and its range covered east China, central China, South China, south-west China and part of the Shaanxi province, east of Ganshu Province, west of Henan Province and south of Shanxi Province. Its range was from the boundary of Zhejiang Province and Fujian Province in the east (which is about E119^{o} – 120$^{o)}$ to the edge of the Qingzang plateau and Sichuan Province in the west (which is around E100^{o}). This is more than 2000km in breadth. In the south, it ranged from N21^{o} north to N35^{o,} to the Qingling mountains south of the Yellow River where it covered an area of more than 1500 km in length.

The historical distribution core of *P.t.amoyensis* is located in Hunan and Jiangxi provinces. The second grade distribution areaas are around Guangdong, Guangxi, Fujian and Guizhou province. Zhejiang province, Hubei province, Sichuan province had also a low density of the sub-species. Few tigers are dispersed south-west of the Henan Province and south of the Shanxi province. Tigers are scattered occasionally east of Ganshu in Qinghai. In the 1950s tigers were still present in the provinces of Hunan, Jiangxi, Guizhou, Fujian, Guangdong, Guangxi, Zhejiang, Hubei, Sichuan, Henan, Shanxi and Ganshu.

Tigers are known to have been captured near Ningbo city, Guangzhou city and Nanjing city in the 1880s. In the 1950s, tigers were found in more than 20 counties in Jiangxi province. For example, areas such as Weining city west of Gui Zhou province in 1959, Hubei province in 1963, Shanxi province, Wan county of Sichuan Province and Anhui province during 1950-60 and Foping county of Shanxi province in 1964 have all recorded tigers. According to trade statistics (bone and pelt) Shou (1964) concluded that there were 800 tigers killed every year. This shows that *P.t.amoyensis* was distributed widely and in large numbers.

In the past 50 years, the explosive growth of human population and economic development has led to a vast loss of forest habitat, and the distribution and population of the tiger has decreased sharply. In Jiangxi province, 171 tigers were captured during 1955-1956 although since 1970, tigers were seldom recorded and tigers captured were less than 10 per cent of that 20 years ago. No tiger was captured in 1970-75. The same was the case in Hubei and Hunan provinces. 170 *P.t.amoyensis* had been captured in Hunan province in 1952-53. In Hunan province and Zhejiang province, three tigers were captured in a year in the 1970s, while

in Henan province 7-8 individuals were captured each year (only 70 percent of that of 1960-1963). In Guangdong Province, the captured tigers numbered about 50 in 1950s, about 20 in 1960s and less than 10 in 1970s.

The population size of *P.t.amoyensis* had been estimated as 40-80 by the end of 1970s, (Hu, et al., 1992). In 1980s, wild *P.t.amoyensis* was very rare, but there were still a few reports. From December 1985 to May 1987, the "Investigation on *P.t.amoyensis* in Guangdong" concluded that there were 4 adult tigers and 1-2 young tigers in Guangdong province according to tracks, fecal and claw signs. (Xu 1989). In 1980's, the total wild *P.t.amoyensis* population was estimated at 30-80 (Tan 1986; Yuan, 1994). During 1990 -1993, a survey conducted in cooperation by the Ministry of Forestry and WWF, which investigated population and habitat of *P.t. amoyensis* in Guangdong, Hunan, Jiangxi, Fujian Province, showed that there were about 30 wild individuals. (Meng,et al., 1995). *P.t.amoyensis* can only be occasionally seen in Guangdong, Fujian, Jiangxi and Hunan province, and has a low density (Meng, et al., 1995).

1.3. *P.t.tigris and P.t.corbetti* - It is estimated that 20 *P.t.tigris* are distributed in the Southeast of Tibet and Northeast of Yunnan province. *P.t.tigris* are distributed mainly on the southern slopes of the Himalayas in Motuo county and Chayu county. In addition, a few individuals are distributed in Linzhi county, Milin county and Shannan district - the frontier between China and Bhutan

Meng, et al (1995) estimated that currently there were 30-40 *P.t.corbetti* distributed mainly in the south of Xishuangbanna region in China.

2. CAPTIVE TIGER POPULATION

2.1 *P.t.altaica* is the most successful captive-bred subspecies. Between 1959 and 1979, 68 offspring survived in the Harbin zoo. The newborn tigers went up to 113 in 1985 and 84 survived. The offspring were sent to 40 zoos, such as Beijing, Shanghai and Tianjing zoos. Some of the new-born tigers were also sent abroad as exchanges (Li, 1984). Hengdaohezi Felidae Raising and Breeding Center in Heilongjiang, the base of Harbin Siberian Tiger Park, had up to 83 *P.t.altaica* based on a founder population of 8 individuals in 1986 - the breeding and neonatal survival rate were highly advanced.

From 1959 to 1985, in Xuanwuhu zoo of Nanjing city, 58 of the 80 newborn *P.t.altaica* from 26 farrows survived. In Dalian zoo, 43 individuals were born till 1992. Inbreeding experiments were carried out and shown no degeneration based on careful and correct selection of parent tigers. From 1976 to 1989, 3 tiger pairs had 14 farrows and 31 of 36 newborn tigers survived. The average survival rate was 86.11% and the inbreeding coefficient was as high as 31.25% (Gang, et at., 1991). From 1956 to 1991 there were 95 individuals born and 11 newborn tigers survived from 1989 to 1991 in Beijing zoo.

2.2. *P.t.amoyensis* - In the 1950s, there were many *P.t. amoyensis* individuals in zoos while a large number of individuals lived in the wild. Many zoos such as Zhunyi park, Qianlin park in Guizhou province, Shanghai zoo and Beijing zoo collected several wild tigers. From 1970s to 1986, no wild *P.t. amoyensis* was sent to any Chinese zoo. There were 40 individuals dispersed to 16 zoos, most of them 3rd generation or 4^{the} generation originating from a female from Fujian and 4-5 males from Guizhou. Only two tigers were 2nd generation in 1988. Hu, et al. (1989) reported there were only 41 *P.t. amoyensis* propagated artificially till the end of June 1988.

In the middle of the 1980s, many problems appeared on the captive *P.t.amoyensis stock* in Chinese zoos: the first was that the males (24, and 60%) were more than females (16, and 40%) ; the second was that not many tigers were being paired, except in the Chongqing zoo, Shanghai zoo and four other zoos in Guiyang, Hefei, Wuhan, Nanchang city.

It is reported more than 40 *P.t.amoyensis* were raised in China with a low rate of increase in the early 1990s (Hu, et al, 1992). All tigers were the offspring of five wild *P.t.amoyensis* captured during the late 1950s to the early1960s. According to heredity, they were classified into two branches; one was the offspring of one male and two females in Qianling Park in Guiyang city, which were captured in Guizhou province; the other, born in Shanghai Zoo, was the offspring of one male from Guizhou Province and one female from Fujian province. The tigers in Choungqing Zoo belonged to the Guiyang branch. These two branches hadn't crossed until the 1980s. All tigers were inbred because pedigree research was delayed. It was difficult to find a wild *P.t.amoyensis* in the late 1970s. Inbreeding resulted in degeneration, i.e. smaller body size (only as small as a leopard) and lower survival rate. Most individuals were reluctant to mate and breed.

At present, there are only 51 *P.t.amoyensis* in zoos of China; 33 males and 18 females (Xie Zhong, et al., 1996). Only four of them can breed. The main difficulties in breeding *P.t.amoyensis* are degeneration resulting from inbreeding. The distribution, population and pedigree of *P.t.amoyensis* in China is still dubious. All captive *P.t.amoyensis* in China originated from six individuals and 64% of them come from two individuals. The captive population growth rate was almost zero during 1985-95, due to the negative effect of inbreeding, (Xie, et al., 1996).

2.3. *P.t.tigris* and *P.t.corbetti* - There was little research on the captive populations of *P.t.tigris* and *P.t.corbetti*. *P.t.tigris* had been raised and bred successfully in Beijing Shengyang, Kunming City and Hendaohezi Felidae Raising and Breeding Center. There are still no reports on captive *P.t.corbetti* in China.

3. CONSERVATION MEASURES IMPLEMENTED

Below is an outline of the conservation and management programmes executed in China thus far:

3.1. Administrative and legal measures

The Chinese government started to take measures to protect the tiger after 1949. The first step was to enforce administrative legislation on protecting wildlife. The Ministry of Forestry listed *P.t.altaica,* together with the panda and golden monkey, as "Rare wildlife, capturing and killing are forbidden to prevent from their extinction" in 1959. The State Council published the "Instructions on Active Preservation and Reasonable Utilization of Wildlife Resources", referring once again to the preservation of *P.t.altaica*, stating that "catching and hunting are strictly forbidden". In 1962 Nature Reserves were planned to be set up in the main habitats of *P.t.altaica* to protect it efficiently. In the "Regulations on Preservation of Wildlife Resources" (draft) issued in 1973, *P.t.altaica, P.t.amoyensis* and *P.t.tigris* were put on the list of preserved wildlife. The Ministry of Agriculture and Forestry promulgated regulations and listed *P.t.altaica, P.t.amoyensis* and *P.t.tigris* as nationally preserved wildlife in 1977.

The "Act of Wildlife Conservation" and the "List of Nationally Preserved Wildlife", was promulgated in 1988, and listed tigers as the first Grade Nationally Preserved Wildlife to protect them strictly.

Currently, the Chinese government is part of strict international treaties and is resolutely examining and attacking the illegal activity and poaching of wild tigers. The State Council issued a Circular of the State Council for banning trade in rhinoceros horn and tiger bone in 1993, which pointed out that exporting tiger bone, including any discernible parts and medicine which contains components, is absolutely forbidden. For such actions, the Chinese suffered economic losses amounting to more than 20 billion RMB Yuan. In spite of the financial difficulty, the Hengdaohezi Felidae Raising and Breeding Center, located in Hailin County, Heilongjiang province, has managed to seal more than 30 dead tigers (which had died naturally).

In the recent past, wildlife conservation, especially prohibition of tiger bone trading was listed in the examination of the Environmental Protection Committee of the NPC (National People's Congress) and the Environmental Protection Committee of the State of Council, P.R. China. In 1993, more than 40,000 people were deployed to inspect 3000 markets and drugstores. The tiger bones seized during an inspection in 1993 and destroyed in Harbin city in January 1994, weighed about 50 kg. A tiger bone peddling case in Heilongjiang Province was investigated in August 1994, and a batch of tiger bones and relevant products were seized. 577 cases of musk and tiger bone plaster were seized and destroyed in Nanning city of Guangxi province in 1994. Two trafficking and smuggling cases were ascertained in Heilongjiang province in 1993 and in 1994, respectively, in which 8 tiger skeletons were seized and 11 criminals were put into prison. These results revealed the Chinese Government's strong resolution to preserve tigers seriously and to execute international treaties.

Meanwhile the study on alternatives to tiger bone was carried out in China and it has been placed in the "95" Nationally stressed Technological Project and the 21st Century Agenda Action Plan of China, which is mandated to find alternatives to tiger bone so as to meet the needs of Chinese medicine.

3.2. Build reserves & breeding centers, investigate wild populations and study

In order to preserve effectively the habitat of tigers, 40 tiger reserves have been established, such as the Qixinglazi Tiger Reserve in Heilongjiang province, Changbai mountain Reserve in Jilin province, Meihua Mountain Reserve and Wuyi Mountain Reserve in Fujian province, Xishuangbanna Reserve and Fanjinshan Reserve in Guizhou province, and the Nangun river Reserve in Yunnan province. Twenty-eight reserves have been set up for preservation of the wild *P.t.amoyensis* population.

A field survey of the *P.t.altaica* had been executed in early 1974. The second survey of wild *P.t.amoyensis* was conducted in Guangdong, Hunan, Jiangxi, Fujian province with cooperation of China and WWF. Initial exploration and research on *P.t.amoyensis* was also carried out in the early 1990s. In 1993, "Chinese Biodiversity Conservation Action Plan" regarded the conservation of *P.t.amoyensis* as a first action in protecting Chinese Biodiversity. In June, 1996, a project for protecting *P.t.amoyensis* planned by the Conservative Department of the Ministry of Forestry was listed as the priority in "Chinese Forestry Action Plan, Agenda 21". In 1996, the tiger was listed as an important species in the project "General Investigation of National Terrestrial Wildlife". A special investigation on the resource of tiger was carried out in September 1997.

Some tiger sub-species, including *P.t.amoyensis* and *P.t.tigris,* were bred continuously in zoos to meet the needs of public enjoyment and education, as well as for reproductive research. These studies led to the success in reproduction of these tigers and increased the captive tiger population. In 1986, in order to study and release *P.t.altaica,* Hengdaohezi Felidae Raising and Breeding Center was set up by Heilongjiang province and the Ministry of Forestry. Recently in this center, the population of artificially raised tigers has gone up to 80, to become the largest population in the world. At present, the Chinese government is taking steps to preserve *P.t.amoyensis.* The Chinese Zoo Association has set up a Cooperation Committee for Conserving the South China Tiger. In 1995, a working conference on *P.t.amoyensis* reintroduction protection was convened in Chongqing. The tigers raised in the zoos of Shanghai, Suzhou, Chongqing, Guangzhou have been evaluated on their health, breeding and management. In Shanghai Zoo, a gene library of *P.t.amoyensis* has been reviewed and a semen bank established.

3.3. International cooperation for tiger conservation

The Chinese government has fully recognized the importance of protecting the tiger, and has taken an active part in international cooperation in the field. In 1986, an international symposium named "International Tiger Conservation Strategy" was convened in Minnesota USA where the *P.t.amoyensis* was listed as the most endangered animal. In 1990-1993, in cooperation with WWF, the Chinese Ministry of Forestry carried out a survey of the South China tiger in four provinces (Guangdong, Hunan, Jiangxi, Fujian).

At the beginning of 1995, with the help of international organizations and specialists, the Coordination Committee for protecting South China tiger used sparks software to analyze the captive population.

In 1995, the Minister of Forestry, China and the Minister of Environment and Forestry Ministry of India signed the "Tiger Conservation Agreement between the Government of the P.R. China and India". It was decided to strengthen the two countries' cooperation in protecting the tiger, and to take action to prevent the tiger from extinction. It was also decided that the two countries would take measures to curb illegal activities, such as poaching, smuggling, selling tigers, tiger parts and their derivatives. The two countries were to start bilateral cooperation and training and exchange scientific experience in wildlife management.

The Ministry of Forestry, P.R. China and the Russian Ministry of Environment and Natural Resources Protection signed "The Tiger Conservation Agreement between the Government of China and Russia" in December 1997. In cooperation with Russia, China will set up a transboundary conservative area for the tiger.

The department of wildlife and forest plant conservation, Ministry of Forestry called for improving the tiger conservation status and set up a special fund to carry out the "Project of Saving and Protecting South China Tiger". At the same time, China is applying for financial aid from IUCN, WWF, RTCF, IFAW and other international organization and the World Bank.

3.4. Enforce public education and propaganda

In order to improve public awareness about protecting tigers and other endangered animals, a series of nation-wide actions are held regularly, such as "Week of Protecting Birds", "Month of Protecting Wildlife" etc. Lectures, exhibitions and film shows are all part of these exercises.

In 1993, after ban on the trade of tiger bone and rhinoceros horn and their production, the State Council's news office held a press conference to introduce the protection measures taken for the tiger by the government.

The Felidae's Raising and Breeding Center, with the help of news media, received a donation from all over the country, adding up to $36,000 in 1995. In Heilongjiang province, the city of Mudanjiang,

cooperated with the Wildlife Conservation Association and organized the action of donating pictures and books for protecting *P.t.altaica.*

4. CURRENT PROBLEMS

The distribution and size of the wild tiger population has reduced apparently throughout Asia from the last century. The tiger has become an endangered felid. Although the Chinese government has taken all kinds of measures to protect wild tigers, the tiger's critical status has not improved radically. There are four key reasons that such protection effort hasn't had an ideal effect.

4.1. Lack of sound information on wild population

All past surveys have only focused on the fact whether the tiger exists or not in China. The numerical figures of tigers mostly come from estimation. There is little knowledge on the tigers' distribution, the integrity of their habitat or the numbers of their prey. This data is very important in both setting up suitable reserves for key populations and evaluating the integrity of the tiger reserves. Although several censuses have been carried out, the range of each sub-species has not been mapped out.

4.2. Lack of scientific reserch on wild tigers

The Chinese government has carried out some research on the Siberian tiger's biological characteristics. But there is a lack of biological and ecological research on the whole. Moreover, the study on wild South China tiger is less complete than that on the Siberian Tiger, while the study on the Indo-Chinese Tiger and Bengal Tiger is scarcer still.

Although many reserves have been established, the management is not effective. The reserves lack not only manpower, effective organization and training, but also camp, night patrol, arms and ammunition, transportation facilities, communication facilities, guards and other staff to fight poaching. They receive limited financial aid as well. The management plans often cannot be implemented on the ground. Although some key habitats are protected by law, landscape management usually is under different agencies, and the tigers cross the boundaries governed by different departments.

Although there are many laws in relation to the protection of the tiger, there aren't special protection laws for wild, endangered species and tigers. It is difficult for the present laws to be put into effect since the law enforcement officials' facilities and funds are inadequate.

China aims to put forward a comprehensive strategy to protect wild tigers since the tiger is threatened by loss of habitat and their prey, as well as illegal hunting. First of all, we should identify the high priority populations and prevent them from decreasing, and their prey needs protecting in time. The effect of these measures will be evaluated regularly through scientifically monitoring.

4.3. Lack of scientific management of captive population

The problem of inbreeding can only be solved through protection genetics and by carrying out reasonable mating selections, so that the breeding population develops healthily. All captive bred individual tigers should be marked. In addition, such problems as imperfect lineage, bad conditions of raising, inadequate nutrition and reproductive action still need to be solved.

4.4. Habitat fragmentation and lack of connections between metapopulations

A series of economic developments such as deforestation, road and house construction and mining has fragmented, decreased and degraded tiger habitat. Reserves are the last living spaces for the tiger. Tigers are sensitive to the changing surroundings because they are located on the top of the food chain. After the cutting of primary forest, secondary forests and monocultures will remain. The biological diversity of secondary and planted forest is lower than that of primeval forests. Chopping the forests large-scale will damage not only the tiger's habitat but also that of the large ungulates (roe deer, wild boar, red deer) which are the tiger's food. These factors lead to a reduction of the tiger's prey food. The split habitat keeps the tigers from communicating. Furthermore, small habitats limit the tiger's action, expose them to the danger of poaching and lead to inbreeding, gene deterioration and population decline. Once the tiger population reduces to a dangerous level, it will crumble.

At present the tiger reserves are too small. Shortage of habitat is the main threat for the reserves and so China should enlarge the area of reserves. The reserves are still disturbed by the surrounding human communities' economic activities. The communities' industrial structure needs changing quickly. Local economic development should be united with the tiger's protection. At present many reserves where the tiger exists have not legally defined their main goal as protecting the tiger. So activities such as exploiting other kinds of forest produce, human settlements, and cattle-raising and agriculture, are permitted. Many tigers live

outside the reserves where they face the risk of loss of habitat.

5. CONSERVATION GOAL

The main purpose of protecting the tiger in China is to ensure its population viability and increase in numbers. For this the following steps have to be implemented.

a) Make clear the tiger's distribution area, numbers and survival status;

b) Conduct scientific researches on ecology of wild population;

c) Stabilize and enlarge captive tiger population;

d) Impart training for the reintroduction of captive tigers into the wild;

e) Recover the tiger's core active habitat;

f) Put forward detailed measures after scientific researches.

6. CONTENT OF TIGER CONSERVATION ACTION PLAN

a. Survey of wild tigers: Standard methods to estimate the density of wild tigers precisely, as used in India, Nepal and Russia, include calculating tiger population density based on habitat quality, supervised directly by radio collaring technique and using camera traps. China could adopt these techniques based on its own national conditions.

To estimate the tiger population trends, the indirect signs of tigers such as their excrement and their claws' signs could be used. However, the more precise method is to take photos by using special photography, from which different tigers can be distinguished and tiger population quantity can be added up. The technique of radio remote detecting can provide the detail of home range, prey composition, long-term survival rate, and habitat utilization, etc.

The tiger populations and habitat is to be inspected and supervised regularly. The survey period is once per three years. The objectives are to make a thorough investigation of distribution, quantity, living condition of wild tigers and captured tigers.

b. Improve technical apparatus and strengthen scientific research: To strengthen research work on the condition of wild tiger's habitat, the selection of habitat, the population trends and the factors that affect the population such as ecological factors, behavior, food type, regularity of reproduction, hereditary character, diseases and protection.

c. Personnel training to protect wild tiger habitat: To train responsible researchers and managers who are familiar with tiger conservation and let them work in reserves, scientific research departments, colleges, academies, and local administrative departments. Training contents include methods of resources investigation and scientific research, laws and regulation.

d. Supplement tiger prey: The fundamental food for tiger is the big or medium large ungulate, such as wild boar and deer whose populations are decreasing as well. When the natural resources are not enough, the tiger will prey on livestock. This will make people catch and kill more tigers and increase conflict between tiger reserves and residents. So it is important to prohibit hunting and increase the wild ungulates in the tiger's habitats. The tiger's food should be especially protected in the tiger's distribution area.

e. Establish a network of reserves for wild tigers and construct corridors for isolated tiger populations: Present reserves should be protected and new reserves established. Migratory passages between different islands of distribution areas should be created.

f. International cooperation should be enhanced and trans-boundary reserves established. In China, we should try our best to win financial and technical support of international organizations. Countries such as India, Vietnam, Cambodia, Laos, Thailand, Malaysia, Bhutan, Indonesia and Russia have worked out their own Tiger Conservation Action Plans and got foreign support. China should make full use of the present base to strive for international financial and technical supports and extend international support on tiger conservation.

Bilateral relationships should be formed with adjacent countries such as India, Myanmar, Vietnam, Laos, Bhutan, Nepal, Russia and Korea. Exchange of information with them must take place frequently. International reserves in the transboundary distribution area of tigers should be established.

g. Conservation education should be enforced and it should be ensured that the tiger conservation policy can be supported by local people. All this should include efficient management of reserves, sponsor-ship of local economy and guidance of the local people to take active part in conservation

Managing tiger conversation is not only the business of the conservation departments but also it needs support of residents. Government should support local residents to develop economy, adjust industrial structure, establish continuously developing ecological plans, reduce destruction to the habitat of tiger, increase their income and raise residents' activities in protecting tiger.

The tiger conservation policy must gain the support of residents. Propagation about protecting the tiger should be strengthened all over the country and the effect should be as powerful as that of protecting the Panda. Especially, it should be done well among residents who depend on the forest where the tigers inhabit, and compensate the livestock killed by tigers.

h. Mark every captive bred tiger and establish captive tiger studbook: To establish the studbook for captive tiger population is of top priority. The research on *P.t.altaica* management and breeding was carried out earlier and had significant achievements but little work was done on raising and breeding of *P.t.amoyensis.* Henceforth this aspect should be strengthened. The work on saving endangered *P.t.amoyensis* is significant, and it should be taken as a major direction in the Chinese tiger conservation action plan. Research work should be strengthened on artificial raising and breeding of *P.t.corbetti* and *P.t.tigris.*

Establishing gene banks of *P.t.altaica, P.t.amoyensis, P.t.tigris and P.t.corbetti* is essential for breeding tigers, establishing a breeding population and saving the endangered *P.t.amoyensis.*

7. TIMETABLE OF TIGER CONSERVATION ACTION PLAN

The first stage of the Chinese tiger conservation action plan is ten years from 1998 to 2008, the timetable is divided into three stages:

1998 – 2000
Objective: Clarify the distribution, numbers and survival status and take efficient action to protect the surviving population

Contents: Survey wild population; conduct scientific research on tigers; protect wild population and habitats of each tiger subspecies; investigate pedigree captive population.

Funds needed: 0.2 billion RMB Yuan

2001 –2005
Objective: Protection of species and habitats

Contents: Conduct scientific research on tigers; Protect wild population and habitats of each tiger subspecies, mainly for habitat of *P.t.amoyensis;* construct reserves, investigate pedigree captive population.

Funds needed: One billion RMB Yuan

2005 - 2010
Objective: Increase tiger population

Contents: Carry on further protection of habitat, study tiger's biology and ecology, enhance population size.

Funds needed: One billion RMB Yuan

8. SPECIAL ACTION FOR DIFFERENT SUBSPECIES

1. *P.t.amoyensis* is endemic to China. Only 20-30 wild individuals are left. There are 51 captive *P.t.amoyensis* in China. *P.t.amoyensis* is the most endangered subspecies in the world. It is of great urgency to carry out its conservation.

The first step is to clarify its distribution and status of wild population. After this the following projects need to be implemented:

1) Research on protection and management of habitat and food resources of *P.t.amoyensis.*
2) Research on ecology and biology of *P.t.amoyensis.*
3) Research on the distribution, quantity, pedigree of captive *P.t.amoyensis*
4) Marking the captive population, research on raising and breeding techniques of *P.t.amoyensis,* including artificial insemination and cloning.
5) Genetic diversity of *P.t.amoyensis.* Establish gene bank.

The distribution areas of *P.t.amoyensis* have been surveyed in Guangdong, Fujian, Hunan, and Jiangxi province. The present reserves should be enlarged, and new reserves must be established. Protect the corridors used by the *P.t.amoyensis* and carry on the *P.t.amoyensis* Conservation Project.

The purpose of the *P.t.amoyensis* Conservation Project is to try and expand their habitats, link different

P.t.amoyensis populations and enhance their genetic exchangethereby improving the breeding coefficient. Conduct protection and management. Strengthen protection. And establish artificial breeding population gradually.

At present, the inbreeding of captured *P.t.amoyensis* is a very serious problem. Since its almost impossible to supplement using wild tigers, the breeding plan should be laid out according to the pedigree analysis of captured populations. DNA of doubtful individuals should be analysed and inbreeding restricted. Artificial insemination possibilities should be studied in male adult tigers which cannot mate naturally. Each adult tiger should breed. In order to raise the newborn tiger's survival rate, steps such as natural breeding, artificial supplementary breeding and artificial breeding should be strengthened.

2. *P.t.altaica* - The following steps should be carried out:

1) Establish new reserves in the Wanda mountains, Laoyeling mountain, Zhang Guangchai mountain and expand present reserves. Set up protective corridors in the tiger's area of movement. Establish international cooperation reserves with Russia and Korea.

2) Keeping up the study of captive breeding*P.t.altaica.* Improve survival rate of the young; strengthen prevention and cure of disease, execute releasing training. Select the suitable reserve and release captured tiger.

3) Investigate the pedigree of captured *P.t.altaica*

4) Carry on further study of the ecology and biology of *P.t.altaica,* especially the study of the wild habitat.

3. *P.t.tigris* and *P.t.corbetti* - Investigate numbers and protect their habitat

A surveys to be carried out on the distribution and number of *P.t.tigris and P.t.corbetti*. Reserves should be established in key habitats, and prey animals such red goral (*Nemorhaedus cranbrooki*), serow (*Capricornis sumatraensis*) etc should be managed in forest zone tiger ranges. Herd owners whose livestock are eaten by tigers should be compensated properly. If the environment is degraded seriously residents should be encouraged to migrate. Support should be extended to the development of the local economy, education of children for tiger conservation and strengthening of cooperation with India, Bhutan, Nepal.

9. GUARANTEE FUND

The Chinese tiger conservation action needs 2.2 billion RMB Yuan. The first stage (from 1998-2005) needs 0.2. billion RMB Yuan; the second stage (2005-2010) needs one billion RMB Yuan; and the third stage needs one billion RMB Yuan.The Ministry of Forestry is applying for funds and aid from domestic and international organizations.

10. GUARANTOR FOR EXECUTING PROJECT

This project is charged by the Department of Wildlife and Forest Plants of the Ministry of Forestry, P.R. China with cooperation of the other relative departments, institutes and legal system.

*Tiger conservation action plan is charged by the Department of Wildlife and Forest Plants of the Ministry of Forestry, China

** Any suggestions from tiger conservation organizations, institutes and experts are welcome.

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CHAPTER 5

TIGER ACTION PLAN
INDIA

Prepared by
Project Tiger, Ministry of Environment & Forest.
Government of India

1. Analysis of existing situation

"Project Tiger" was launched in 1973 to ensure a viable population of the tiger in the country. The Project coverage, since its inception, has increased from nine tiger reserves to 28 tiger reserves falling in 17 States. This encompasses almost 3,7761 sq. km of tiger habitat in the form of forests, meadows, mountains and scrubland. The distribution of tigers and their density vary in the states due to several ecological and human reasons, viz. forest cover, terrain, natural prey availability, presence of undisturbed habitat and the quality of managerial efforts taken towards protection. The distribution of tiger is poor outside tiger reserves and the protected area system. Based on a country level evaluation of tiger habitat in the GIS domain done by the National Tiger Conservation Authority and Wildlife Institute of India in 2006, it is seen that tigers have become locally extinct from 97 districts in the last 150 years. This amounts to 26 per cent of their original range in the country. The all-India tiger estimation process using the new methodology is ongoing, and results pertaining to four States (Madhya Pradesh, Maharashtra, Chhattisgarh and Rajasthan) have been finalized. The estimation so far shows decline of tiger population outside tiger reserves and protected areas, while the status of the tiger in protected areas / tiger reserves does not show a significant change. The reasons for tiger decline in areas outside tiger reserves / protected areas are as below:

(i) Degradation of forest status outside Protected Areas / Tiger Reserves owing to:
  (a) human pressure
  (b) livestock pressure
  (c) ecologically unsustainable land uses

(ii) Fragmentation leading to loss of gene flow from source populations

(iii) Loss of forest quality in terms of prey biomass

(iv) Tiger deaths due to man-animal conflict

(v) Tiger deaths due to poaching

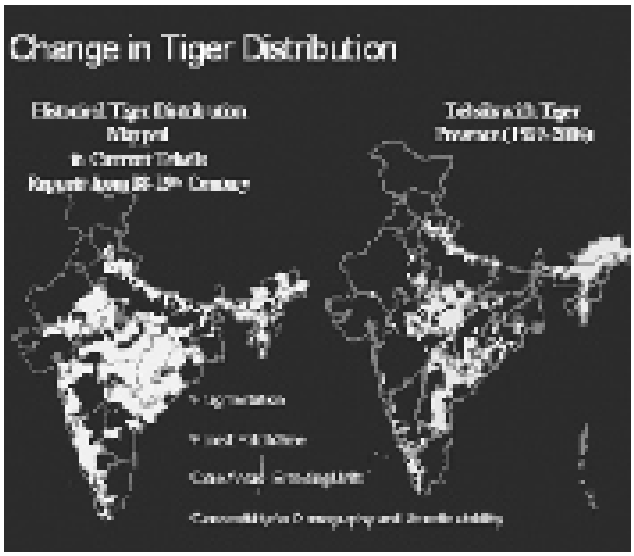
(vi) Loss of reproduction owing to disturbance on account of heavily used infrastructure like highways, etc

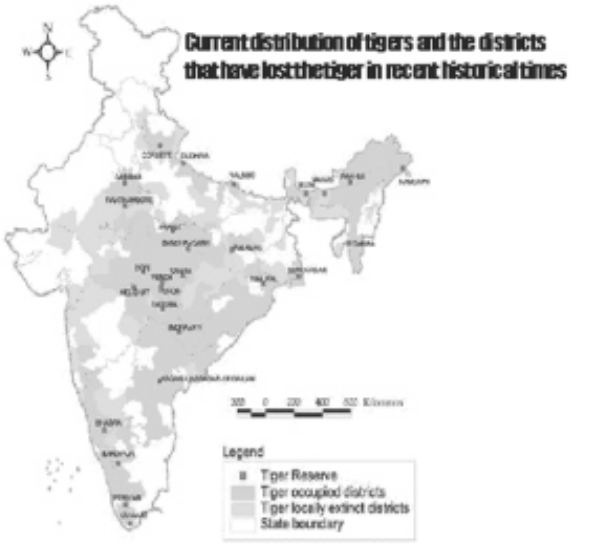
(vii) Lack of adequate protection in outside areas

(viii) Insurgency / law and order problems

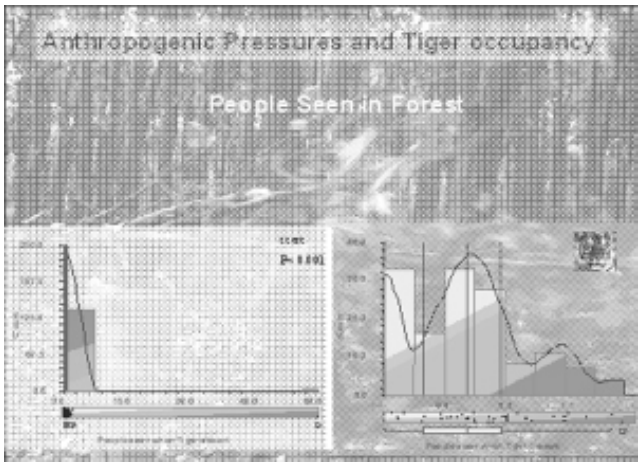
2. Nature and magnitude of problems to be addressed

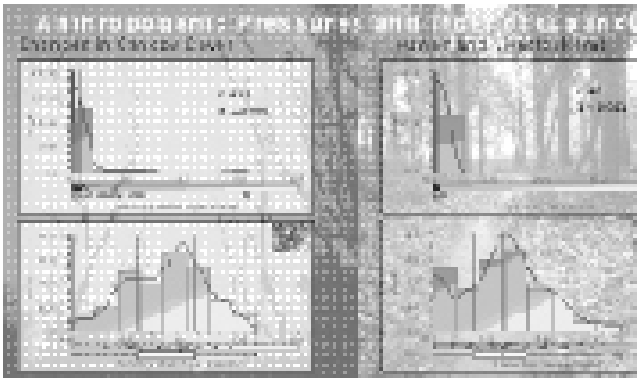
The project has been addressing several problems, which are quite natural in a diverse country like ours. The traditional resource dependency of the forest dwellers are not benign, and have caused several distortions in our forest dynamics. With just two percent of forest area of the world, we support around 17% of the global livestock and almost an equal percentage of humans as well. The tiger is a very resilient species with a short gestation, and responds well to habitat management. There are chronic as well as immediate limiting factors which affect our tiger habitat, which have to be addressed on a priority basis.





Some of the common managerial constraints of tiger reserves include: paucity of frontline field staff owing to a ban on recruitment, delayed fund availability to field units, lack of a well-conceived staff development plan to implement the management plan for achieving the project objectives, the need for ensuring the right leadership, ready and proactive measures for redressing man-animal conflicts, the need for sectoral integration to ensure low key eco-developmental inputs in the buffer zone through tiger reserve management, mainstreaming of wildlife concerns in the landscape, the need for updated, site specific research inputs and a regional perspective.





3. Need and justification of the project in the context of national priorities

On the basis of the recommendations of the National Board for Wildlife chaired by the Prime Minister on 17th March, 2005, a Task Force was set up to look into the problems of tiger conservation in the country and to suggest measures for improvement. The recommendations requiring immediate attention have been accepted for implementation, which interalia include strengthening of Project Tiger by giving it statutory as well as administrative powers. Further, it has also been recommended that the report relating to Project Tiger should annually be sent to Parliament so that the commitment to the Project is reviewed from time to time.

Since the inception of Project Tiger in the early seventies, the Government of India has invested considerably in the protection and conservation of tiger. The Tiger Task Force appointed by the Prime Minister has reviewed the work done over these years and has advocated the following urgent recommendations, which have been accepted for implementation:-

(i) Reinvigorating the constitution of governance.

(ii) Strengthening efforts towards protection of the tiger, checking poaching, convicting wildlife criminals and breaking the international trade network in wildlife body parts and derivatives.

(iii) Expanding the undisturbed areas for the tiger by reducing human pressure.

(iv) Repair the relationship with local people who share the tigers' habitat by fielding strategies for coexistence.

(v) Regenerate the forest habitats in the fringes of the tigers' protective enclaves by investing in forest, water and grassland economies of the people.

The significance of tiger conservation transcends state as well as national boundaries. The following decimating factors threaten the survival of tigers which warrant a focused project approach for tiger conservation:

- Loss of tiger habitat
- Poaching and illegal international trade
- Revenge killings / man-animal conflict
- Bottlenecks in implementation (managerial)
- Insurgency / law and order problem

4. Strategy

Owing to habitat fragmentation on account of biotic pressures and ecologically unsustainable land uses, coupled with poaching pressures, the following strategy is imperative in the present context for tiger conservation planning:

4.1 Consolidating and strengthening of 'source' populations of tiger in tiger reserves and protected areas

The management interventions would involve:

(a) Protection, anti-poaching activities and networking
(b) Strengthening of infrastructure within Tiger Reserves
(c) Habitat improvement including water development
(d) Rehabilitation package for traditional hunting tribes living around tiger reserves

(e) Staff development and capacity building

(f) Delineating inviolate spaces for wildlife and relocation of villagers from crucial habitats in Tiger Reserves within a timeframe (five years) and settlement of rights

(g) Safeguarding tiger habitats from ecologically unsustainable development

4.2 Managing 'source-sink' dynamics by restoring habitat connectivity to facilitate dispersal of tigers to repopulate the core areas

The management interventions would involve:

(a) Co-existence agenda in buffer / fringe areas (landscape approach/sectoral integration) with ecologically sustainable development programme for providing livelihood options to local people, with a view to reduce their resource dependency on the core. The strategy would involve reciprocal commitments with the local community on a quid-pro-quo basis to protect forests and wildlife, based on village level, participatory planning and implementation through eco-development committees (EDC).

(b) Addressing man-animal conflict issues (ensuring uniform, timely compensation for human injuries and deaths due to wild animals, livestock depredation by carnivores, crop depredation by wild ungulates).

(c) Mainstreaming wildlife concerns in the buffer landscape by targeting the various production sectors in the area, which directly or incidentally affect wildlife conservation, through 'Tiger Conservation Foundation', as provided in the Wildlife (Protection) Amendment Act, 2006.

(d) Addressing tiger bearing forests and fostering corridor conservation through restorative strategy in respective working plans of forest divisions, involving local communities, to arrest fragmentation of habitats.

(e) Ensuring safeguards / retrofitting measures in the area in the interest of wildlife conservation.

The Wild Life (Protection) Act, 1972 has been amended in 2006 to provide enabling provisions for preparing a Tiger Conservation Plan, which would strengthen the source populations of the tiger in core areas, while addressing the issue of resource dependency and mainstreaming wildlife concerns in the outer buffer and corridors.

5. Preliminary site investigations, stakeholder commitments and risk factors

The tiger reserves are designated in areas which have a viable population of tigers (around 20 breeding tigresses). The proposal for constituting a tiger reserve is made by the State, which interalia contains attributes (flora, faunal, unique) of the site, resource dependency of local people, strength/weakness/opportunity and threats relating to the area and commitment of the State Government.

6. Approximate cost estimate

Project Tiger would be implemented as an ongoing Centrally Sponsored Scheme by the National Tiger Conservation Authority (NTCA). The details of cost estimation for implementing the ongoing activities, apart from new initiatives for addressing the threats to the tiger population while implementing the Tiger Task Force recommendations, are given in **Annexure-I**.

ANNEXURE-I

The details of cost estimation for implementing the ongoing activities, apart from new initiatives for addressing the threats to the tiger population while implementing the Tiger Task Force recommendations

(Rs. in crores)

S. No.	Name of Activities	1st Year	2nd Year	3rd Year	4th Year	Total
1	Anti-poaching	13.50	14.00	14.50	15.00	57.00
2	Strengthening of infrastructure within Tiger Reserves (including new Tiger Reserves)	15.00	17.00	13.00	12.00	57.00
3	Habitat improvement and water development	10.00	15.00	20.00	20.00	65.00
4	Addressing man-animal conflict (ensuring uniform, timely compensation for human deaths due to wild animals, livestock depredation by carnivores, crop depredation by wild ungulates)	20.00	25.00	25.00	25.00	95.00
5	Co-existence agenda in buffer / fringe areas (landscape approach/sectoral integration/ecologically sustainable development programme/livelihood options/eco-tourism)	25.00	30.00	40.00	40.00	135.00
6	Rehabilitation / resettlement of denotified tribes / communities involved in traditional hunting	20.00	25.00	25.00	30.00	100.00
7	Research, providing equipments (camera traps, GPS, etc.), computer softwares, All India Estimation of Tiger/Co-predators/Prey Animals, habitat monitoring and evaluation	4.00	4.00	5.00	5.00	18.00
8	Staff development and capacity building	4.50	5.00	5.50	6.00	21.00
9 *	Deciding inviolate spaces for wildlife and relocation of villagers from crucial habitats in Tiger Reserves within a timeframe (five years) and settlement of rights	1024	1024	1024	1024	4096.00

10	Mainstreaming livelihood and wildlife concerns in forests outside tiger reserves and fostering corridor conservation through restorative strategy involving locals to assess fragmentation of habitats	20.00	30.00	30.00	40.00	120.00
11	Safeguards / Retrofitting measures in the interest of wildlife conservation	8.00	10.00	12.00	14.00	44.00
12	Providing basic infrastructure / Strengthening of NTCA at the Centre and establishing a monitoring lab in the Wildlife Institute of India	4.00	4.00	2.00	2.00	12.00
13	Independent Monitoring and evaluation of tiger reserves	0.50	0.60	0.60	0.60	2.30
14	Establishment and development of eight new tiger reserves	8.00	8.00	8.00	8.00	32.00
15	Provision of project allowance to all categories of Project Tiger field staff	2.00	2.00	2.00	2.00	8.00
16	Staff welfare activities	1.00	1.00	1.00	1.00	4.00
17	Fostering ecotourism	2.00	2.00	2.00	2.00	8.00
	TOTAL	**1181.5**	**1216.6**	**1229.6**	**1246.6**	**4874.3**

* For 273 villages at the rate of 150 families on an average per village: 40,950 families; projection made at the rate of Rs 10.00 lakhs per family, the total cost works out to Rs 4,09,500 lakhs or 4,096 crores for 28 tiger reserves

CHAPTER 6

TIGER ACTION PLAN

INDONESIA

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DEPARTEMEN KEHUTANAN

DIREKTORAT JENDERAL PERLINDUNGAN HUTAN
DAN PELESTARIAN ALAM

SURAT PENGESAHAN

Nomor : 229/DJ-VI/BA/94

Dalam rangka melaksanakan konservasi harimau di Indonesia, maka "INDONESIA TIGER CONSERVATION STRATEGY" yang disusun oleh Direktur Jenderal Perlindungan Hutan dan Pelestarian Alam bekerjasama dengan IUCN, PHKSI, WWF, dan Taman Safari Indonesia dapat dijadikan acuan untuk konservasi harimau di Indonesia.

Demikian surat pengesahan ini dibuat untuk dipergunakan seperlunya.

Jakarta, 17 April 1994

Direktur Jenderal
Perlindungan Hutan dan
Pelestarian Alam

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DEPARTEMEN KEHUTANAN

DIREKTORAT JENDERAL PERLINDUNGAN HUTAN
DAN PELESTARIAN ALAM

LETTER OF ENDOKSEMENT

NUMBER : 379/DJ-V/PA/94

In order to implement the conservation of the tiger in Indonesia, the "INDONESIAN TIGER CONSERVATION STRATEGY" which was developed by Directorate General of Forest Protection and Nature Conservation in Cooperation with IUCN, PKBSI, WWF and Taman Safari Indonesia, is to be used as a model for the conservation of tiger Indonesia.

This letter of endorsement can be used as needed.

Jakarta, 17 April 1994

Ir. Sutisna Wartaputra

Director General of Forest
Protection and Nature Conservation

1. INDONESIAN BIODIVERSITY

Indonesia covers only 1.3 % of the Earth's land surface, yet it harbors 10% of all flowering plants, 12 % of the world's mammals, 16% of the world's reptiles and amphibians, 17% of all birds and more than a quarter of all marine and freshwater fish.

This richness can be attributed to the fact that Indonesia spans two major biogeographical realms, Indo-Malaya and Australia, and can be divided into seven distinct biogeographic regions. The 17,000 islands of the archipelago support a wide range and variety of habitats from lowland rain forests and mangroves to savanna grasslands, swamp forests, limestone hills, montane forests, alpine meadows and snow-topped mountains. These varied habitats support a rich flora and fauna.

These habitats and species are now threatened by developments in logging, mining, shifting agriculture and other changing land uses as Indonesia's economy expands to meet the needs of its increasing population. Lowland habitats and wetlands are particularly threatened since these are the areas most accessible for agricultural developments.

The Indonesian Government recognized the need to conserve its rich biological resources, and has made a commitment to protect 10% of the land area and eventually 20 million hectares of coastal and marine habitats as conservation areas. Although in situ conservation must be the first priority, the protected area network alone will not be sufficient to secure all of Indonesia's biodiversity for future generations.

The Biodiversity Action Plan for Indonesia sets out a strategy for action under four main headings in situ conservation in terrestrial parks and protected areas; in situ conservation outside the protected area network (production forests, wetlands, agricultural lands); in situ conservation of coastal and marine resources; and ex situ conservation.

Much loss of biodiversity in Indonesia, as elsewhere, is due to economic policy distortions that encourage rapid exploitation of biological resources rather than sustainable use. Slowing the rate of biodiversity loss will require policy and institutional reform as well as institutional strengthening for effective action in all four areas.

The active participation and support of local communities will also be essential for in situ conservation for they are the responsible managers of forest, wetland and marine resources. The plan calls for greater collaboration between government agencies and local communities and NGOs to work together as partners in biodiversity conservation.

One of the most endangered species of Indonesia, the Sumatran tiger *(Panthera tigris sumatrae),* is recognized as a "key species" in biodiversity conservation. Its conservation will help to protect other wildlife and a range of habitats in lowland to sub-montane areas across all of Sumatra. The Sumatran tiger represents the last of three Indonesian subspecies that originally occurred on the islands of Sumatra, Java and Bali. Thus, the Sumatran tiger is not only a significant component of Indonesian biodiversity but also is symbolic of Indonesia's remaining biodiversity. Its loss would be more than just an ecological loss; it would be a political embarrassment.

The government of Indonesia is signatory to the Convention on Biological Diversity and the Convention on Trade in Endangered Species of Fauna and Flora (CITES). The Indonesian Sumatran Tiger Conservation Strategy was developed by the national conservation authority of the Republic of Indonesia, the Directorate General of Forest Protection and Nature Conservation (PHPA) in the Ministry of Forestry. Information on wild tiger populations was based on the Sumatran Tiger Action Plan of PHPA and the Conservation Breeding Specialist Group of the IUCN- The World Conservation Union, while information on captive populations is based upon the Indonesian Regional Sumatran Tiger Captive Management Masterplan of PKBSI or Perhimpunan Kebun Binatang Seluruh Indonesia (the Indonesian Zoological Parks' Association).

The Indonesian Sumatran Tiger Conservation Strategy will also contribute significantly to the high priority placed on tiger conservation by the United Nations Environment Program and CITES. It outlines immediate and attainable priorities for tiger conservation action in Indonesia and suggests further studies on policy and funding mechanisms for implementing the Indonesian Sumatran Tiger Conservation Strategy.

2. RECENT HISTORY OF TIGERS IN INDONESIA

As recognized by the recent UNEP/CITES initiatives and the intensifying IUCN and WWF programs, there is a global crisis regarding the conservation of tigers. All five tiger subspecies are threatened with extinction; three subspecies have already become extinct in this century.

About the turn of the century, there were three subspecies of the tiger (Panthera tigris) in Indonesia: P.t. balica in Bali; P.t. sondacia in Java and P.t. sumatrae in Sumatra. Today however, both Bali and Javan tigers have become extinct and only the Sumatran tiger survives. The extinction of the two subspecies of tiger in Indonesia was both rapid and deliberate and it occurred at a time when conservation was already the accepted national policy. This fact underlines the inherent difficulty in conserving a large predator in environments dominated by man. It shows clearly that much more than mere legal protection and reservation of habitat is needed to safeguard the species in the wild. It therefore calls for a more discretionary and selective strategy to replace our current strategy of responding to crisis in the management of carnivores in general and the tiger in particular. The ecological and behavioral factors that restrict the tiger's range in Sumatra likewise make it susceptible to pressures from man's modification of its habitat. Because of its vulnerability to a spectrum of limiting factors, the tiger in Sumatra faces precarious prospects if its present distribution were to be substantially reduced and populations become even more small, fragmented and isolated from one another. In Sumatra, tiger populations, tiger prey and tiger habitat are shrinking fast and unless prudent policies are adopted by the Indonesian Government, the tiger will almost certainly be at great risk of extinction.

The historical documentation of tigers in Sumatra is sketchy. In 1978 a question and answer survey of Sumatra estimated the number of tigers to be about 1,000. Since then, Sumatra has undergone much agricultural development and subsequently, tiger habitat has declined. Subsequently surveys of Sumatran tigers put the number "not in the thousands but in the hundreds".

A more recent survey in 1985 estimated tiger distribution based upon information obtained from local PHPA staff and people living around areas inhabited by tigers, not from direct field observations. This survey tentatively identified 26 protected areas in Sumatra where tigers might live. If these habitats were completely saturated with tigers, there could be up to 800 tigers living in Sumatra. In reality, it is rare for large predators to be living at habitat saturation across all of their available range. This, and the recent estimates of Sumatran tiger home ranges in lowland and sub-montane forests of north Sumatra, suggests that the actual number of living tigers was probably fewer.

At the Sumatran Tiger Population and Habitat Viability Analysis (PHVA) workshop in November 1992, a spatial database using Geographic Information System (GIS) was developed for the five major conservation areas of Sumatra. Indonesian Land-use and Forest Status maps (series RePPProT 1988; scale 1: 250,000) were used for protected area boundaries (for both HL - Conservation Forest or Hutan Lindung and HSA - National Park Forest or Hutan Suaka Alam) and vegetation cover. The main forest types distinguished in the five areas were lowland forest (below 1,000 meters), sub-montane forest (between 1,000-2,000 meters), montane forest (above 2,000 meters), and inland and mangrove swamp. Thus, tiger numbers for the five national parks were estimated in two ways: 1) using tiger presence as indicated on the maps by park officials at the PHVA workshop. Again, these numbers are imperfect, but do put more accurate constraints on the extent of habitat availability, and when this is coupled with the collective observations of all experienced PHPA staff and wildlife biologists working in Sumatra, the numbers for tigers.

Results of the Sumatran Tiger PHVA Workshop indicated that there were about 400 Sumatran tigers living in five national parks and two game reserves, with another 100 tigers living in unprotected areas which will soon be lost to agriculture (see Table 1). Poaching is ongoing and uncontrolled, and forest disturbance has further fragmented these populations. The largest population of about 110 tigers is estimated to be in Gunung Leuser National Park; the remaining populations are about one-half this size or smaller. These small populations, particularly those of 50 or fewer, are extremely vulnerable to poaching or removing "problem" tigers, and because of their isolation and fragmentation, will need intervention management strategies for their long term viability. This led to the development of an Indonesian Sumatran Tiger Action Plan which outlined short-term and long-term goals to address these problems.

Fig. 1. GIS map of Kerinci Seblat National Park.

Table 1. Summary of tiger population estimates and viability for major protected areas.

Protected Area	Total Area (ha)	Available Habitat for Tigers (ha)	Estimated Tiger Population	Est. Annual Removal Rate	Probability of Extinction in 100 yrs (Pc)	Genetic Diversity Left (Hc)
Gunung Leuser NP	900,000	360,000	110	2-4	0% (2 rem.) 87% (4 rem.)	80% 75%
Kerinel Sablat NP	1,500,000	600,000	76	6	100% (within 50 yrs.)	—-
Barisan Selatan NP	357,000	282,000	68	1	1-10% (with no fragmentation)	84%
Berbak NP	163,000	114,000	50	2	97%	—-
Way KambasNP	130,000	97,500	20	0	49-94%	inbred
Kerumatan GR	120,000	78,000	30	2	100% (within 50 yrs.)	—-
Rimbang GR	136,000	122,000	42	2	100% (within 25 yrs.)	—-

3. CURRENT POPULATION VIABILITY

Tiger numbers: Population viability analyses were conducted on tiger populations within the major protected areas of Sumatra. There are about 400 free-ranging tigers living within the seven major protected areas—Gunung Leuser, Kerinci Seblat, Berbak, Way Kambas, Barisan Selatan, Kerumutan, and Rimbang. This assumes that all available habitat is occupied by tigers and that sufficient prey exist to maintain these tiger populations indefinitely. In all likelihood, this is not the case, and more thorough ground censuses need to be undertaken to establish the density of tigers across the range of habitats within these protected areas. Smaller populations of tigers were estimated to be living in a number of isolated forest patches, some of which are protected and many of which are not protected. The presence of these small, fragmented tiger populations needs to be verified by ground census and decisions made whether these populations can be limited to larger, adjacent tiger populations. Even within some large protected areas like Kerinci Seblat, the habitat is significantly fragmented and thus, tiger populations are probably also fragmented; future analyses need to consider the degree of fragmentation in these populations. In this analysis, tigers within Kerinci Seblat were treated as a single population and the results are probably not valid.

Human pressures: Human population growth, transmigration programs and other human pressures mostly linked to agriculture will cause a decline of non-protected tiger habitat, generally referred to as production forest (HL) as well as a gradual deterioration of habitat quality at the edges of protected forest (HSA). A second significant variable is the rate of removal of tigers through poaching, poisoning and trapping. The factors that threaten tiger populations are small population size in conjunction with removals that have dramatic consequences relative to long-term survival. The smaller reserves are unlikely to support viable tiger populations in the future. Such small populations of tigers currently occurring in these areas are highly vulnerable to local catastrophes. Stochastic changes in population structure, such as marked fluctuations in the sex-ratio, have proportionately more impact in smaller populations. Two ways to manage such small populations of tigers are to establish forest corridors to link smaller reserves with larger ones (if feasible), or through demographic and genetic management of metapopulations using assisted reproduction techniques.

Management strategies: Once any of these small tiger populations in Sumatra begins to decline, management strategies will need to be implemented to prevent them from going extinct. Thus, there is a need to closely monitor these populations on a continuing basis. Management strategies for the wild tiger populations that were discussed included: expanding protected populations by converting production forest (HL) to protected forest (HSA); linking isolated populations through establishing forest corridors; minimizing or stopping poaching and poisoning; increasing the prey base, and exchanging or supplementing genetic material among populations (both wild and captive).

Tiger protected areas also need to be managed according to the ecological needs of the species. That may involve the implementation of centrally located core areas where tigers and their prey live with little interference from humans. Multiple-use zones around protected areas, as employed in Indian tiger reserves, may or may not be applicable to Sumatran tigers, which have been driven from lowland habitat to less preferred sub-montane forest which are protected by virtue of their value to the maintenance of watersheds.

4. INDONESIAN SUMATRAN TIGER CONSERVATION STRATEGY

Conservation and preservation of nature has been established in Government policy for many years in Indonesia. With the growing worldwide concern for conservation of nature, formulated into The World Conservation Strategy, Indonesia adopted it into its recent Conservation Strategy, in which conservation is based on the protection of life support systems, preservation of genetic resources and sustainable use of living natural resources. The Indonesian Government's Act No. 4/1982 on the Management of the Living Environment and Act No. 5/1990 on Conservation of Living Resources and their Ecosystems provide a strong commitment to the conservation of nature in Indonesia.

The Indonesian Sumatran Tiger Conservation Strategy is based upon the above government Acts. It was formulated at the Directorate General of PHPA's Sumatran Tiger Population and Habitat Viability Analysis (PHVA) Workshop held in 1992 for wild tiger populations, and at the PKBSI Sumatran Tiger Captive Management Workshops held at the Indonesian Center for Reproduction of Endangered Wildlife (ICREW) in 1992 and 1994 for captive populations.

Objective

The objective of the Indonesian Sumatran Tiger Conservation Strategy is to develop and sustain a conservation program in Indonesia that will ensure the long-term viability of wild Sumatran tigers (Panthera tigris sumatrae) in major protected areas of Sumatra, to develop a captive management program for Sumatran tigers at ICREW and other PKBSI institutions, and to link these in situ and ex situ conservation activities for the reinforcement and recovery of wild populations as part of the IUCN/SSC CBSG Tiger Global Animal Survival Plan (GASP).

Current Situation

The Sumatran tiger is critically threatened in Indonesia. There are about 400 Sumatran tigers living in five national parks and two game reserves, with another 10 tigers living in unprotected areas which will soon be lost to agriculture. Poaching is ongoing and uncontrolled, and forest disturbance has further fragmented these populations. The largest population of about 110 tigers is estimated to be in Gunung Leuser National Park; the remaining populations are about one-half this size or smaller. These small populations are extremely vulnerable to poaching or removing problem animals. Even without any further losses, the present populations are so small that they are vulnerable to severe environmental catastrophes, as well as demographic and genetic problems typical of small populations. The continued loss or deterioration of tiger habitat further intensifies this crisis. Because of their isolation and fragmentation, these populations will need intervention management strategies to ensure their long-term viability.

5. RECOMMENDATIONS AND PRIORITIES

There are four general categories of recommendations that comprise the Indonesian Sumatran Tiger Conservation Strategy to ensure the long-term survival of Sumatran tigers throughout their remaining range. Each of these categories involve multiple components, many of which are overlapping. In general, they encompass absolute protection of wild tiger populations and habitat, intervention strategies for populations at risk, captive management for reinforcement and recovery of wild populations, and creation of a task force to coordinate all aspects of the Indonesian Sumatran Tiger Conservation Strategy.

I. The highest priority for the conservation of wild Sumatran tigers is to secure and protect all remaining tiger populations and their habitat.

- Enact more effective legislation and stricter enforcement of conservation laws for tigers.
- Implement immediately a review of PHPA's needs to prevent further loss of wild tigers and their habitat in the major protected areas of Sumatra.
- Improve management structure, training, resources and budget to become more effective in protecting tiger populations and their habitat.
- Develop and implement policies for better integration of conservation, development and enforcement.
- Decrease or eliminate tiger losses, official or illegal, from wild populations by mobilizing anti-poaching teams in major tiger protected areas (perhaps in conjunction with Sumatran rhino anti-poaching units).
- Develop an accurate (standardized) mapping system using computer linked Geographic Information Systems (GIS) to establish the extent of habitat types in protected, as well as distribution and habitat preference of tigers in these areas.
- Analyze land use practices in all tiger habitat, including those areas outside of protected areas, and use this data to suggest possible viable population management strategies, including extending protection to additional tiger habitat areas, linking habitats through corridors, and reconfiguring protected areas.

II. A second priority is to develop conservation management goals and intervention strategies for the remaining wild Sumatran tiger populations. This may include demographic and genetic support for most populations.

- Develop a set of specific recommendations for each tiger population which would consider genetic and demographic management, control of losses through poaching, poisoning and official PHPA removals, loss or deterioration of habitat and subsequent decrease in prey base, and possible expansion of habitat through incorporation of additional tiger habitat and use of corridors to link sub-populations.

- Initiate field research to establish the critical life history parameters of wild Sumatran tiger populations (particularly mean litter size and neonatal mortality) as well as spacing patterns in lowland, peat swamp and sub-montane forests.

- Develop a program for long-term monitoring of tiger population status through time in each protected area to help support development of more effective intervention management strategies for wild tiger populations.

- Establish cooperative projects with tiger biologists in field research and analysis, beginning with a pilot project in Way Kambas NP and later extension into other protected areas dominated by sub-montane forests, such as Kerinci-Seblat NP.

- Evaluate extending boundaries of protected areas to include areas of tiger habitat and to link tiger habitats in Berbak NP and other protected areas.

III. A third priority is to develop a Sumatran tiger captive management program for the reinforcement and recovery of wild populations.

- Continue to support and expand the PKBSI Sumatran Tiger Captive Management Program, at both the Indonesian Center for Reproduction of Endangered Wildlife (ICREW) and within PKBSI zoos, to provide genetic and demographic resources for use in intervention management strategies of wild populations.

- Integrate in situ (protection of tigers and protected areas) with ex situ (captive tiger management) tiger programs within Indonesia so that the two programs have the same common goal, the long-term survival of wild tiger populations.

- Develop a tiger rescue team, equipment and funds to capture so-called "problem" tigers identified by PHPA outside of protected areas and incorporate these tigers into the PKBSI captive managed population. "Problem" tigers are migrants outside of protected areas that come into conflict with villagers and if not rescued, are killed by local police or military because of the threat they pose to human life.

- Medically evaluate all wild-caught "problem" tigers brought into the captive population through official PHPA removals for indicators of genetic diversity and inbreeding depression, pathogens and diseases, body weights and physical parameters.

- Continue to expand the Indonesian DNA library, blood serum bank, and genome resource bank for Sumatran tigers at the Indonesian Center for the Reproduction of Endangered Wildlife (ICREW) by collecting biomaterials from all incoming "problem" tigers.

IV. A fourth priority is to establish a communication and infrastructure network that is responsible for the survival of Sumatran tigers in Indonesia, accountable to PHPA, national and international conservation agencies, NGOs, and the Indonesian public.

- Establish an Advisory Board of the Indonesian Sumatran Tiger Foundation, which will support the organization, management, personnel and funding of both in situ and ex situ tiger programs.

- Create a Tiger Program Officer, who will be primarily responsible for coordinating all in situ and ex situ tiger issues.

- Integrate a strong communication network among the in situ and ex situ programs, PHPA, PKBSI, ICREW, IUCN, WWF, and Indonesian and international conservation agencies to foster cooperation and the sharing of information regarding tiger conservation.

- Develop a standardized reporting system within PHPA to report in a timely manner all tiger observations, possible tiger poaching events, and tiger-human interactions from the park guards to the Sub-Balai to the Balai to the Chiefs (Kopala) of the National Parks to the Jakarta PHPA Office and to the Sumatran Tiger Advisory Board.

- Integrate an Indonesian-wide tiger conservation network into a broader conservation education program for all citizens of all ages in Indonesia.

6. PRIORITY I: PROTECT WILD TIGERS AND THEIR HABITAT

The Sumatran tiger is a species where the basis for its conservation in the wild must be in terms of aiming to keep human settlements and wildlife refuges well separated. This is becoming increasingly difficult to achieve, given the demography of the human populations in Indonesia. Prior to about 1900 when agricultural settlement in Sumatra first led to a substantial degree of deforestation, most of the island was covered in primary forest. Presumably up to that time, although its population density will always have been low, the Sumatran tiger was more or less continuously distributed throughout the whole island. Less than a century later, we find that predator has been squeezed out of huge tracts of forested areas. The conversion of primary forest into agricultural holding is a particularly serious cause of conservation problem in Sumatra, and the tiger has been among the species most seriously affected by it. The IUCN Red Data Book lists all the extant subspecies of tiger as endangered.

The government of Indonesia, in recognition of the importance of biodiversity in general and the long term survival of such keystone species as the rhino, tiger and elephant in particular, has made a long standing commitment to protect as much as possible the country's natural wealth and heritage. Already Indonesia has established more than 400 conservation areas covering 52,000 km^2 of forest land. In Sumatra many of the important conservation areas such as the Gunung Leuser NP, Barisan-Selatan NP, Way-Kambas NP, and Berbak NP are large enough to maintain viable populations of tigers. The major national parks in Sumatra cover more than 35,000 km^2 of forest, and they protect not only the Sumatran tiger but also vital watersheds as well as thousands of other animal and plant species, many of them rare or endangered.

The tiger is very exacting in its conservation requirements for two other reasons. The need for extensive forest cover with good populations of mammalian herbivore species as its prey is clear. The other factor is the very high commercial value of the pelt (and bones), which despite strict CITES ban, is still traded illegally in the international market by smugglers. Trade in tiger skin and bones, is therefore highly profitable, and even given well-organized customs enforcement, it would be inherently extremely difficult to control, let alone eliminate.

Given this background, the overwhelming emphasis in conservation policy must be on maintaining forest cover over large areas uninterrupted by human settlements and roads, where difficulty of terrain and density of cover provide natural protection. The second issue in any conservation policy for the Sumatran tiger, given the greatly reduced distribution, is that even quite small local populations are valuable and should be protected wherever feasible.

For the continued survival of the Sumatran tiger in the wild, protection from poaching is of vital importance. This can only be achieved by continued presence in the field of dedicated Tiger conservation Teams performing an anti-poaching function in the major tiger protected areas: Kerinci-Seblat NP, Gunung Leuser NP, Bukit Barisan Selatan NP, Way Kambas NP and Berbak NP, Kerumutan and Rimbang Game Reserves-need to be evaluated for the placement of Tiger Conservation Teams in their boundaries.

PHPA needs to create Tiger Conservation Teams whose responsibilities would include patrolling of protected areas for poachers and poachers' traps, surveying or monitoring tiger populations where needed, setting up education programs for villagers living around tiger protected areas and throughout all of Indonesia, compiling information on tiger-human interactions, and all other events that are important to the tiger's continued survival.

7. PRIORITY II: DEVELOP TIGER INTERVENTION MANAGEMENT STRATEGIES

Interactive Management Options

Tiger populations in Sumatra are fragmented and isolated into 5-12 protected areas that have varying degrees of migration between them. In the case of the five distinct National Parks, natural migration among park populations is not possible. These small isolated populations are at high risk from random and deterministic processes such as skewed sex ratio, failure to locate mates, disease, genetic drift, and inbreeding. Therefore, these populations will require intensive interactive management strategies if the tiger is to remain viable.

A high priority is to develop conservation management goals and intervention strategies for each of the remaining wild Sumatran tiger populations. This may include demographic and genetic support for populations of less than 100 animals. Special

consideration needs to be given to periodic genetic supplementation to populations of 50 or fewer animals.

Most of the protected areas or their fragments are too small to retain a viable population of tigers over the long-term. Protected areas that cannot support a population of more than 50 tigers should be removed, or reserves that possess a larger population but experience removal pressure will require continuing intensive management assistance. All current tiger populations in Sumatra fall within these limits. This assistance will take the form of either augmentation (to make greater) of an existing population with additional tigers, genetic management, or the reestablishment of populations that have become extirpated. Passive management or no action will lead to a gradual extinction of the Sumatran tiger through attrition of the existing populations through time.

Augmentation will be required in populations that have reduced heterozygosity and begin to show inbreeding depression and/or in populations which experience severe demographic perturbations such as highly skewed sex ratios. Although augmentation or establishment are not issues requiring immediate attention in this Indonesian Sumatran Tiger Conservation Strategy, investigation into their feasibility should begin now, before the situation becomes so critical that these management options are no longer feasible. The following section discusses several scenarios which may be considered for management of wild Sumatran tiger populations.

No Action. As stated above, this management decision will lead to a slow decline in the number of extant tiger populations on Sumatra with the eventual extinction of the subspecies in all but the very largest parks. Even the largest population in Gunung Leuser may be at risk in the future if no action is selected.

Translocation of Wild Tigers Between Protected Areas. In this scenario, tigers are moved between or among geographic locations depending upon genetic or demographic need. This would require the capture and physical translocation of wild tigers. The decision process would include from which site the tiger comes from, what sex and age is it, and to which site does the tiger go.

Current knowledge, based upon the assumption that reproductively effective males maintain individual territories, suggests that it would be best to move adult or subadult females rather than similarly aged males. One advantage of this strategy is that the translocated animals are already habituated to the wild, and therefore, have a higher likelihood of surviving over captive bred counterparts. Hands on access to individual tigers will increase the database exponentially on the health and genetic status of wild populations.

The number of tigers that will have to be transferred among populations to maintain genetic diversity will depend on the amount and type of genetic diversity PHPA wishes to retain and the size of the recipient population. The smaller the population and the more genetic diversity desired, the more migrants per generation required. As a general rule, one tiger per generation (every 7-10 years) may be sufficient to meet these genetic needs. This may also be an outlet for problem tigers such that they are not removed from the entire metapopulations.

Assisted Reproduction of Wild-Caught Adult Females. In this strategy, adult, wild female tigers are captured, held in captivity for a brief period to be artificially inseminated, and then released back into their home range. Semen is collected from wild or captive male tigers and used to inseminate wild-caught females. The primary advantage of this approach, include avoiding the need to transfer tigers between populations. Again, having direct hands-on access to wild tigers will help establish a database on the medical status of the wild population. The disadvantages are that females must undergo the stress of short-term capture and anesthesia. It also will be difficult, if not impossible, to determine if a female scheduled for capture is potentially pregnant. There is the remote possibility that a captured female may lose her territory. In reality, AI has been used to produce offspring one time after dozens of attempts in the tiger, so technology is not available at this time.

Translocation (Release) of Captive Tigers into Wild Populations. Tigers used in this program should be offspring of wild-caught parents and should be released into the wild as young adults. Major decisions will include determining the sex and age class of the captive-bred young for release. The best captive-bred candidates for reintroduction are probably sub adult or adult females.

The major advantage is that a captive management program exists within PKBSI and a state-of-the art

facility has been constructed at Taman Safari Indonesia. Other advantages are control of genetics, sex, and diseases of tigers to be released. The primary disadvantage is the lack of information on survivorship of captive-bred felids released into native habitats.

Field Programs of Wild Tigers

In order to develop intervention management strategies for wild tiger populations, a number of questions about the subspecies' biology and life history need to be answered by carefully planned field studies. The Sumatran tiger does not need a traditional field study that focuses only on its behavior and ecology. Critical issues that need to be resolved in order to develop management strategies are knowledge of the tiger's life history characteristics, particularly mean litter size, neonatal mortality rates, spacing patterns in lowland, peat swamp and sub-montane forests, causes of mortality, disease profiles, genetic health, and evidence of fragmentation into sub-populations, for tigers in Sumatra. Without these pieces of information, it will be difficult to develop effective inventive management strategies, which will probably be the only way to keep wild populations viable.

Long-Term Monitoring of Wild Tigers

It is extremely difficult to carry out a census on wild tigers because of their secretive nature and near complete avoidance of humans. Even where tiger populations are counted regularly, as in the tiger reserves of India, their numbers vary from year to year and because the estimates are based primarily upon identification of individual tiger tracks, the reliability of this technique has been thought by some to be without scientific basis. In Sumatran forests of Indonesia, the problems with census of tigers is compounded by the fact that the national parks are huge, some areas within these parks are practicably inaccessible, and because of low overall prey densities in these habitats, tiger densities are correspondingly low. Remote camera census has provided reasonable estimates of tigers in two areas of Gunung Leuser National Park. This promising technique needs to be expanded in scope and evaluated as a tool for the long-term monitoring of tiger populations throughout Sumatra.

The long-term monitoring of tiger populations in the major tiger protected areas should be an ongoing process. Without this information, Indonesia may lose the opportunity to augment sub-populations before they reach genetic or demographic crises.

Human-Tiger Conflict

A third aspect that is critical to the tiger's survival in Sumatra includes an evaluation of human needs and tiger needs of forest resources, conflict resolution when these needs overlap, and human attitudes towards local conservation ideas. PHPA is vague on how either poaching or official removal of tigers from forests impacts wild populations; yet, this is one of the most critical issues regarding tiger viability in the wild. Human growth trends in villages adjacent to tiger protected areas need to be modeled on how they will impact forest resources in the future. New concepts need to be designed in the study of wild tiger populations to answer these questions while there are still sufficient numbers of tigers in Sumatra to conduct the study.

8. PRIORITY III: DEVELOP INDONESIAN CAPTIV E MANAGEMENT PROGRAM

Before populations of wild tigers fall to crisis levels, which preclude developing emergency management strategies, captive populations of tigers need to be secured while there are still sufficient numbers of wild tigers left. These captive populations will provide a genetic and demographic reserve to reestablish or revitalize wild populations when the need and opportunity arises. The first stage in developing a regional captive management program for tigers in range countries is to establish a regional studbook, train a tiger management group in concepts of tiger management, husbandry and health, plan the breeding facility, and initiate the regional tiger master plan. This process allows range countries to develop their own management programs for their endemic subspecies as recommended by the IUCN/SSC CBSG Tiger GASP.

The second-stage development of regional captive management programs provides hands-on training sessions at each zoo that focuses on proper animal health procedures for medical treatment, immobilizations, immunizations, evaluations, health maintenance and diets, and the use of ARKS record-keeping software program. This is culminated with a master plan meeting where the master plan with institution-by-institution breeding recommendations are drafted, translated into range country language, and distributed to participating zoos. At the same time, biological material (usually sperm, blood, and tissue) are collected and cryopreserved under the guidelines of the IUCN/SSC CBSG Tiger Genome Resource Banking Action Plan. These biomaterials are kept at a designated Indonesian site; currently ICREW is taking on the responsibility of storing these materials.

The Sumatran Tiger Captive Management Program in Indonesia will serve as the heart of the global Sumatran tiger population by preserving sufficient genetic diversity to provide animals for reinforcement of world captive and wild populations as recommended in the Tiger GASP. The establishment of this Indonesian program can serve as a model for other captive management programs for endangered species in Asia.

Indonesian Tiger Studbook

All species management programs in captivity are predicated on the creation of a studbook, which establishes the identity and origin of each individual animal, and tracks each animal from birth to death. Information regarding all Sumatran tigers in Indonesian zoos has been compiled and verified for entry into the Indonesian Sumatran Tiger Studbook using the Single Population and Analysis Record-Keeping System (SPARKS) available through the International Species Information System (ISIS). Temporary studbook numbers were assigned to those animals which could not be linked to the International Tiger Studbook, kept by the Leipzig Zoo, Germany. At the completion of the first Indonesian Sumatran Tiger Captive Management Workshop, information regarding 76 Sumatran tigers (38 male, 38 female) comprised the Indonesian Sumatran Tiger Studbook. Of the 42 Sumatran tigers (25.17) currently living in Indonesian zoos, 11 (7.4) are wild-caught founders (only three of which have produced offspring).

Genome Resource Bank

A successful cryobiology program for tigers will have a significant impact on conserving genetic diversity. A resource of frozen tiger semen will be used interactively with living tiger populations to periodically infuse genetic material from captive or wild populations and to instill captive populations with preserved genes from previous generations. The options cryobiology brings to long-term tiger conservation strategies are limited only by our imagination, but only as long as this program proceeds in concert with protection of wild populations. The Tiger GASP strongly recommends that a systematic Genome Resource Bank (GRB) for tigers be initiated, which includes the collection, storage, use, exchange, and further research of genetic material from founders and selected free-ranging and captive individuals.

Rescue of "Problem" Sumatran Tigers

From time to time wild tigers wander out of their natural habitat and come into contact with local villages surrounding the national parks. Because there is no natural prey available to tigers, they usually end up killing and eating the villagers' livestock. Sometimes these tigers even turn into "man-eaters". Then the police or military are requested to help and in most instances, and because there is no safe way to capture the tiger, it is shot and killed. This is an unfortunate waste of such a valuable Indonesian resource.

When rescued tigers are transported to ICREW, each tiger must be given a medical evaluation, proper immunizations and identified with a tattoo and transponder. At the same time, biological materials (blood serum, tissue biopsies, DNA hair samples, and sperm, if male) will be collected and cryopreserved as part of the Indonesian tiger GRB program underway at ICREW.

9. PRIORITY IV: IMPLEMENT THE INDONESIAN SUMATRAN TIGER CONSERVATION STRATEGY

Advisory Board

The establishment of an Advisory Board of the Indonesian Sumatran Tiger Foundation will be critical to the tiger's survival in Indonesia. The recommended composition of the Advisory Board is as follows:

1) Directors within the Directorate General of PHPA
2) Chairman of PKBSI
3) Tiger Program Officer for wild populations
4) Tiger Coordinator for captive populations
5) University representative
6) L.I.P.I. representative
7) IUCN/SSC Cat Specialist Group representative
8) IUCN/SSC CBSG Tiger GASP Coordinator
9) Prominent Indonesian corporate leader

It is recommended that the Advisory Board should meet routinely every 2.5 years in Indonesia. Every second meeting (i.e. at 5-yearly intervals) should undertake a major review of all projects and programs, including captive management and reintroduction of Sumatran tigers. In addition in its routine meetings, the Board is authorized to appoint ad hoc working groups, as necessary, to address specific problems. Such groups may include appropriate members of the Board, as well as invited experts with knowledge of the specific problems under consideration.

The responsibilities of the Board shall be the giving of advice to PHPA on, and the periodic evaluation of, the following matters:

1) Organization and management of in situ and ex situ tiger conservation programs.
2) Personnel, expertise, and training relative to tiger management, both in situ and ex situ.
3) Law enforcement and protection of wild tiger populations.
4) Conservation education extension and public awareness programs.
5) Fund raising efforts and establishment of a foundation for Sumatran tigers.
6) Conservation partnership evaluation, both for wild and captive programs.
7) Crisis management for catastrophic events and emergency issues.

Funding

An overall program budget for the Indonesian Sumatran Tiger Conservation Strategy is needed, with a prioritization of recommended actions. Commitment to the Indonesian Sumatran Tiger Conservation Strategy by the Indonesian Government is essential in order for funds to be raised in support in situ and ex situ conservation programs. Components of such a budget include:

1) Increased protection and monitoring of wild tiger populations in Sumatra.
2) Strengthening of PHPA management capabilities of protected areas.
3) Initiation of field research studies on tiger status and life history.
4) Development of community relations and conservation education programs specifically focused at villagers living near wild tiger populations and generally for Indonesian citizens nationwide.
5) Development of a tiger rescue team for "problem" tigers identified by PHPA.
6) Initiation of molecular DNA library, blood serum bank, and genome resource bank for both wild and captive Sumatran tigers.
7) Evaluation of genetic diversity of small isolated wild populations.
8) Improved facilities, nutrition and medical management of captive tigers.
9) Provision for sustainability of the Sumatran tiger conservation program through fund-raising and marketing programs.

The objectives of the Indonesian Sumatran Tiger Conservation Strategy will have to be "packaged" in relation to more general programs of PHPA and other government agencies, and so that they are incorporated into the Government of Indonesia's budgeting procedures and Bappenas's priorities. Coordination between externally funded tiger conservation programs and protected areas where tigers occur is essential.

10. SUMATRAN TIGER ACTION PLAN

This Indonesian Sumatran Tiger Conservation Strategy has two main components: an in situ and an ex situ component. The in situ component is primarily responsible for the absolute protection of wild tiger populations and their habitat and for developing intervention management strategies for these populations. The ex situ component is responsible for the development of a captive managed population of Sumatran tigers and the genetic, disease and gamete resource banks for the reinforcement and recovery of the wild populations. These two components are based upon the recommendations and priorities of the Indonesian Sumatran Tiger Conservation Strategy which are guided by advice from the Tiger Advisory Board.

The recommendations and priorities set forth in the Indonesian Sumatran Tiger Conservation Strategy are explained in greater detail in the following Sumatran Tiger Action Plan. Because of the crisis facing tigers in Sumatra, these recommendations are not given priorities.

I. The highest priority for the conservation of wild Sumatran tigers is to secure and protect all remaining tiger populations and their habitat.

- **Improved Management Structures of PHPA**

  PHPA management structure should be upgraded in major protected areas of Sumatra to provide maximum protection to tiger populations and their habitat.

  PHPA policies of integrated conservation and development need to be developed and implemented in and around all National Parks. Besides its major role in development, planning, and management of protected areas, PHPA should also be involved in the regulation of buffer zone activities and land-use around protected conservation areas.

A vitally-needed upgrade is the development of an accurate (standardized) mapping system using computer linked Geographic Information Systems (GIS) to establish the distribution and habitat preference of tigers in Sumatra.

Through the use of GIS, analyze land-use practices in all tiger habitat, including those areas outside of protected areas, and use these data to suggest possible viable population management strategies, including extending protection to additional tiger habitat areas.

PHPA needs to create Tiger Conservation Teams whose responsibilities would include patrolling of protected areas for poachers and poachers' traps, surveying or monitoring tiger populations where needed, setting up education programs for villagers living around tiger protected areas and throughout all of Indonesia, compiling information on tiger-human interactions, and all other events that are important to the tiger's continued survival. The specific responsibilities of the Tiger Conservation Teams are listed below.

- **Law Enforcement and Anti-Poaching**

  For the continued survival of the Sumatran tiger in the wild, protection from poaching is of vital importance. This can only be achieved by continued presence in the field of dedicated Tiger Conservation Teams performing in an anti-poaching function in the major tiger protected areas: Kerinci Seblat NP, Gunung Leuser NP, Bukit Barisan Selatan NP, Way Kambas NP and Berbak NP. Kerumutan and Rimbang Game Reserves need to be evaluated for the placement of teams in their boundaries.

  Five Tiger Conservation Teams should be formed. These teams will primarily conduct tiger surveys, train additional tiger monitoring and anti-poaching units if necessary, assist in research programs, coordinate local community education programs, and document all human-tiger conflicts.

  The in situ operation of the teams will be coordinated by the Tiger Program Officer, who will liaise with government and non-government departments, provide guidelines for field activities, and keep the Tiger Advisory Board informed of program progress.

- **Prevention of Poaching**

  The methods employed in poaching prevention are primarily field patrols to look for traps and other signs of poachers, to destroy these traps, and to gather evidence to identify and arrest the people involved.

  PHPA park guards and all Tiger Conservation Teams should have the authority to arrest poachers. They must also be adequately equipped to deal with armed poachers.

  Tiger Conservation Teams will be required to develop good relations with local people, to obtain information and assistance in the prevention of poaching, and to increase awareness of the plight of the tiger and the importance of its conservation. They should also try to establish the identity of contact persons and the routes used for the trade in tiger bones and pelts, and relay such information to the appropriate authorities. Monetary rewards to individuals who identify poachers should be considered.

- **Qualification of Tiger Conservation Teams**

  Members of the Tiger Conservation Teams should be recruited in part from people in the locality of major protected areas. All members should have considerable knowledge of the forest but in each team one member should have authority to apprehend poachers. Each team should consist of four to five members, one of which should be team leader with appropriate rank and skills.

  Salaries and other benefits for team members should be adequate to attract well-qualified people. A bonus system for good performance should be considered.

- **Control of Trade in Tiger Products**

  Tiger Conservation Teams and the Tiger Program Officer should associate and coordinate closely with the existing Forestry Security Coordination Teams (TKPH), both at regional and national level. Procedures should be developed to ensure that appropriate action be taken upon information received from the field. Possibly special investigation techniques and procedures should be developed together with the other agencies involved.

The control of the trade in tiger products and the prosecution of offenders should be regarded as a high priority issue of national interest and PHPA should seek support from the highest levels of government.

II. A second priority is to develop conservation management goals and intervention strategies for each of the remaining wild Sumatran tiger populations.

• Monitoring of Tiger Populations

Initiate field research and long-term monitoring to establish the critical life history parameters of wild Sumatran tiger populations in various habitats and protected areas. Of particular significance is to determine home range size and density in lowland and sub-montane forest, mean litter size and neonatal mortality.

Conservation programs should be based on reliable data on the status of the populations and species, especially when dealing with critically endangered animals. To provide such data, a continuous monitoring program for Sumatran tigers should be initiated in all reserves. Reliable census methodology should be developed and personnel should be trained in census techniques and in the evaluation of the results. Teams should be trained in these exercises.

• Field Research on Sumatran Tigers

Scientific research is an essential ingredient in the conservation of endangered species, biodiversity, and protected areas. Detailed investigations on life history characteristics of the Sumatran tiger are considered essential for long-term conservation management of the species.

Establish cooperative projects with tiger biologists in field research and analysis, beginning with a pilot project in Way Kambas NP and later extension into other protected areas dominated by sub-montane forests, such as Kerinci-Seblat NP.

Evaluate extending boundaries of protected areas to include areas of tiger habitat and to link tiger habitats in national parks and other protected areas.

III. A third priority is to develop an Indonesian captive management program for the reinforcement and recovery of wild populations.

• PKBSI Sumatran Tiger Captive Management Program

Continue to support and expand activities of ICREW and the PKBSI Sumatran Tiger Captive Management Program to provide genetic and demographic resources for use in inventive management strategies of wild populations. Components of this program include:

Preventive Medical Procedures: Veterinary staff need to implement their training that has focused on proper animal health procedures for medical treatment, immobilizations, immunizations, evaluations, and health maintenance. All incoming tigers and newborn tigers need to be given physical examinations, including permanent tattooing of each animal with a temporary studbook number and placement of a transponder as a backup identification system.

Tiger Facility: The tiger captive breeding facility constructed at the Indonesian Center for the Reproduction of Endangered Wildlife will serve as the site for processing all tigers rescued from the wild.

Husbandry: Animal management staff need to implement proper animal husbandry procedures for maintaining captive tigers on a day-to-day basis. The tiger husbandry manual Management and Conservation of Captive Tigers needs to be translated into Bahasa Indonesia and used as a guide.

Reproductive Evaluation Procedures: Training on assisted reproductive techniques needs to be updated as the technology becomes available regarding semen collection, evaluation and storage techniques necessary for the establishment of a genome resource banking program. Semen needs to be collected and cryopreserved from all incoming male tigers for permanent storage in Indonesia.

Studbook: The Indonesian Sumatran Tiger Studbook needs to be updated annually and the Indonesian Tiger Studbook Keeper continually kept updated in the development of new versions of SPARKS.

Masterplan: An Indonesian Captive Management Masterplan for Sumatran tigers was drafted; and a PKBSI Tiger Management Committee was formed.

- **Rescue of "Problem" Tigers**

  Develop a Tiger Rescue Team under the direction of ICREW, equipped and funded to rescue so-called "problem" tigers identified by PHPA and incorporate these tigers into the PKBSI captive managed population. "Problem" tigers are migrants from protected areas that come into conflict with villagers and if not rescued, are killed by local police or military because of the threat they pose to human life.

  Evaluate all wild-caught "problem" tigers brought into the captive population through official PHPA removals for indicators of genetic diversity and inbreeding depression, pathogens and diseases, body weights and physical parameters.

  Continue to expand the DNA library, blood serum bank, and genome resource bank for Sumatran tigers at ICREW by collecting biomaterials from all incoming "problem" tigers.

IV. A fourth priority is to establish a communication and infrastructure network that is responsible for the survival of Sumatran tigers.

- **Tiger Program Officer**

  Establish a position of Tiger Program Officer to coordinate all activities of tiger conservation in Indonesia.

  This position should be a permanent post within PHPA. The officer should report directly to the Director General PHPA and to the Tiger Advisory Board, and should coordinate his/her activities with the other directorates and other agencies involved in tiger conservation activities.

  Considering the complexity of the task, the program officer should have sufficient administrative support, both from a scientific perspective and from an administrative and fiscal perspective. This includes sufficient funding for participation in field activities.

  The Tiger Program Officer should develop a standardized reporting system to report tiger observations, tiger-human interactions and other relevant information from park guards (as well as Tiger Conservation Teams) to the Sub-Balai to the Balai to the Chiefs (Kepala) of the National Parks to the Jakarta PHPA Office.

  The Tiger Program Officer should incorporate tiger conservation information into broader conservation education programs in Indonesia.

- **Education and Awareness program**

  Tiger Program Officers, both in situ and ex situ should be responsible for coordinating the conservation education and awareness programs. The Tiger Conservation Teams will play an important role in the education of the people living around tiger areas.

  Conservation education staff needs special interpretive training skills on how to interact with people (individually and in large gatherings) and how to convey ideas regarding values, natural history, economics and Indonesian culture.

APPENDIX I. Status of Wild Sumatran Tiger Populations

Wild tigers are extremely difficult to census because of their secretive nature and near complete avoidance of humans. Even where tigers populations are counted regularly, as in the tiger reserves of India, their numbers vary from year to year and because the estimates are based primarily upon identification of individual tiger tracks, the reliability of this technique has been suggested to be without scientific basis. In Sumatran forests of Indonesia, the census of tigers is complicated by the fact that the national parks are huge, some areas within these parks are practicably inaccessible, and because of low overall prey densities in these habitats, tiger densities are correspondingly low. Remote camera census has provided reasonable estimates of tigers in two areas of Gunung Leuser National Park. This promising technique will need to be greatly expanded in scope before we can use it for ascertaining tiger population estimates throughout Sumatra.

The historical documentation of tigers in Sumatra is meager. In 1978 a survey of Sumatra estimated the number of tigers to be about 1,000. Since then, Sumatra has undergone much agricultural development and subsequently, pristine tiger habitat has declined. Subsequent surveys of Sumatran tigers put the number "not in the thousands but in the hundreds".

A more recent survey in 1985 estimated tiger distribution based upon information obtained from local

PHPA staff and people living around areas inhabited by tigers, not from direct field observations. This survey concluded that, on average, tiger densities in Sumatra were about 1 tiger per 100 Km^2 in mountainous areas and 1-3 per 100 km^2 in optimal lowland habitats. Using these density estimates, it was tentatively suggested that the 26 protected areas in Sumatra could support up to 800 tigers, but that the actual number of living tigers was probably fewer.

There is evidence for the presence of tigers in 26 protected areas in Sumatra (Table 1). These areas total 4,564,121 ha or 45,600 km^2 and account for 9.6% of the total land area of Sumatra. Within these areas, tigers inhabit an altitude range from sea level to over 1,000 m. In addition, tigers are also known outside the network of protected areas, especially in rubber plantations where attacks on man and livestock have been reported.

Rain forest habitat in general does not support a high biomass of large ungulates. Optimum habitat is provided by sub-climax vegetation, such as transitional zones between forest and grasslands support a higher density of tiger's principal prey species. On the other hand, lowland forests support a greater biomass of ungulate prey such as wild pig *(Sus scrofa),* sambar *(Cervus unicolor)* and barking deer *(Muntiacus muntjak)* which are among the species preferred by tiger in Sumatra. But it is precisely such lowland forest habitats rich in prey species that are fast disappearing in Sumatra as a result of a host of development programs. It is estimated that between 65% and 80% of the forests in the lowlands of Sumatra have already been lost. The mountain areas to date have been less seriously affected, but disruption of continuous cover is already substantial in some cases, and perhaps 15% of their total area may tentatively be estimated as already removed on the evidence available.

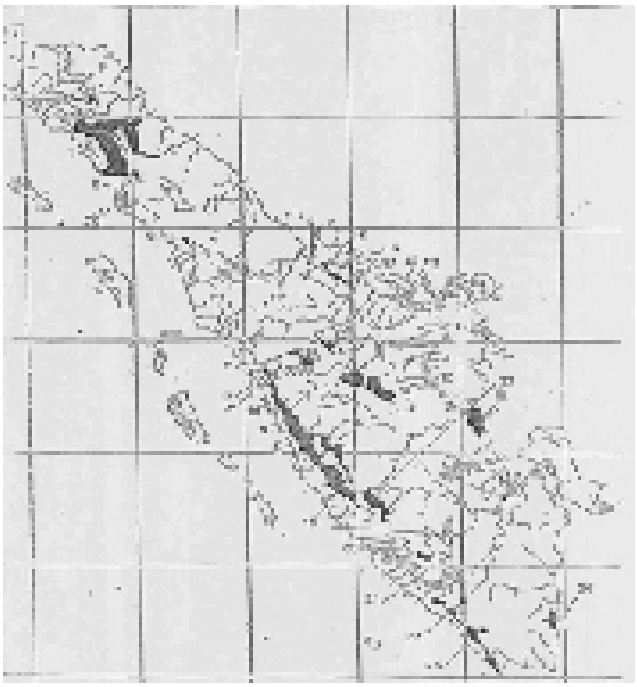

Fig. 1. Distribution of Sumatran tiger (Panthera tigris sumatrae). Solid shading: positive evidence of presence of tiger. Cross hatching: extent of additional suitable habitat but where positive evidence is not available. Numbers reffer to the areas indicated in table 1

Table 1. Protected areas of Sumatra where tigers are found

No.	Reserve/Park/Forest	Prov.	Status	Area (ha)	Alt. (m)
1	Gunung Leuser	Aceh	NP	792,675	0-3419
2	Lingga Isaq	Aceh	HR	80,000	800-2823
3	Dolok Sembelin	Nsum	Pfo	33,910	150-1604
4	Sibolga	Nsum	NR	20,100	200-1230
5	Kerinci-Seblat	Wsum	NP	1,484,650	500-3800
6	Lembah Anai	WSum	Pfo	96,002	600-1811
7	Lembah Harau	Wsum	Pfo	23,476	600-1256
8	Maninjau	Wsum	Pfo	22,106	600-1724
9	Bkt. Sebelah/Pangean	Wsum	Pfo	22,803	600-1078
10	Bajang Air Tarusan	Wsum	Pfo	81,865	500-20000
11	Kerumutan Baru	Riau	GR	120,00000	0-0
12	D. Pulau Besar/Bawah	Riau	GR	25,000	0-0
13	Seberida	Riau	NR	120,000	150-830
14	Bkt. Rimbang/Baling2	Riau	NR	146,000	200-1090
15	Peranap	Riau	HR	120,00000	120-492
16	Siak Kecil	Riau	NR	100,000000	0-20
17	Air Sawan	Riau	GR	140,000	100-176
18	Berbak	Jamb	GR	190,0000	0-20
19	Merangin Barat	Jamb	Pfo	64,600	1000-1931
20	Gumai Pasemah	SSum	GR	45,883	200-1776
21	Isau-Isau Pasemah	SSum	GR	12,114	500-1431
22	Gunung Raya	SSum	GR	39,500	300-2232
23	Rawas Hulu Latikan	SSum	GR	213,437	300-2384
24	Padang Sugihan	SSum	GR	75,000	0-50
25	Barisan Selatan	Ben/Lam	NP	365,000	0-1964
26	Way Kambas	Lamp	GR	130,000	0-50
		Total		**4,564,121**	

NB: NP=National Park; NR=Nature Reserve; HR=Hunting Reserve; GR=Game Reserve; PFo=Protection Forest.

Underlined areas are lowland forests.

11. RECENT POPULATION ESTIMATES OF SUMATRAN TIGERS

At the Sumatran Tiger Population and Habitat Viability Analysis (PHVA) workshop in November 1992, a spatial database using Geographic Information System (GIS) was developed for the five major conservation areas of Sumatra. Indonesian Land-use and Forest Status maps (series RePPProT 1988; scale 1: 250,000 were used for protected area boundaries (HAS and HL, see Table 1 for definitions) and vegetation cover. Only vegetation cover within the five major protected areas was digitized from these maps. The main forest types distinguished in the five HAS areas were lowland forest (below 1,000 m), sub-montane forest (between 1,000-2,000 m), montane forest (above 2,000 m), and inland and mangrove swamp. In addition, other vegetation types such as bush and agriculture were included in the database.

To estimate vegetation cover outside of the five major protected areas, the World Conservation Monitoring Center (WCMC) provided a digitized coverage of vegetation on Sumatra (series RePPProT 1990; scale 1: 2.5 million). WCMC's database only distinguishes between lowland forest, montane forest, inland and mangrove swamp and non-forest. Thus, all areas without forest, such as bush and agriculture, are treated as a non-forest category.

The database created therefore contains a distinction between the information available for vegetation cover inside and outside of the five major protected areas. Outside HAS boundaries all areas without forest are labeled non-forest, while inside HAS boundaries non-forest is divided into bush and agriculture. Roads, towns, and rivers were digitized from geological maps (Geological maps 1988; 1: 250,000).

The Sumatran Tiger PHVA concentrated on the long-term viability (10 years) of tigers in HSA areas. Other areas, namely HL, were also discussed in terms of tiger numbers but an extensive analysis was not performed on these protected areas, because most of them are scheduled for conversion to agricultural purposes, are extremely small in size and isolated from larger protected areas. In an effort to gain an estimate of tiger numbers in a protected area, Griffith's estimates of tiger home range sizes in Gunung Leuser National Park were used.

Low tiger densities (1 male tiger per 380 km^2, 1 female tiger per 190 km^2) were assigned to montane forest and agricultural. Although agricultural areas may have a higher prey-base (and thus would be good tiger habitat), given poaching and poisoning pressures from humans and the tiger's propensity to avoid humans, it is unlikely that tigers would have an extensive part of their home range covering agricultural lands.

Medium tiger densities (I male tiger per 274 km^2, 1 female tiger per 137 km^2) were assigned to submontane forest and peat-swamp forest. Submontane forest on the maps roughly corresponds to Griffith's data (medium tiger densities were from 600 to 1700m, on our maps it is 1,000m to 2,000m). Peat-swamp habitat was assigned to this category, based upon conflicting reports of its suitability as tiger habitat (see section on Berbak National Park, below).

High tiger densities (1 male tiger per 180 km^2, 1 female tiger per 90 km^2) were assumed for lowland forest, swamp (except peat swamp forest), bush and logged forest. Logged forest was included in the high density category because secondary forest is thought to have a higher prey-base than primary forest. Bush and swamp were included in the high density category based upon the argument that tigers are especially associated with these habitats.

Tiger numbers for the five national parks were estimated in two ways: 1) using the vegetation cover on the RePPProT (1988) maps stored in the GIS database, and 2) using tiger presence as indicated on the maps by park officials at the PHVA workshop. Kerinci Seblat, Way Kambas, Barisan Selatan and Gunung Leuser all have complete data sets and both methods were used for these parks. Berbak was analyzed using only the vegetation types from the GIS database.

Gunung Leuser National Park

Tiger estimates from HSA areas (from data received at the PHVA workshop): There were 31 units labeled as lowland, swamp and logged. Two units were not labeled and were assigned lowland forest status based on the GIS database. One of the units labeled as swamp was indicated as not having tiger presence and was therefore removed from the analysis. Therefore, there were 30 units of the high density category comprising 3,000 km^2, for an estimated 16-17 male and 33-34 female tigers. There were 41 submontane units in the grid, for an estimated 14-15 male and 29-30 female tigers. There were 15 montane units in the plot, for an estimated 3-4 male and 7-8 female tigers. The total population was thus estimated to be between 102-108 tigers (33-36 male and 69-72 female).

Kerinci Seblat National Park

Tiger estimates from HSA areas (from data received at the PHVA workshop): There were 45 units of lowland and bush labeled with the presence of tigers, for an estimated 25 male and 50 female tigers. There were 30 units of submontane forest labeled for tiger presence, for an estimated 10-11 male and 21-22 female tigers. There were 17 units of agriculture and montane labeled for the presence of tigers, for an estimated population of 4-5 male and 8-9 female tigers. The total population was thus estimated between 118-122 (39-41 males and 79-81 females).

Barisan Selatan National Park

Tiger estimates from HSA areas (from data received at the PHVA workshop): From the tiger distribution received at the PHVA workshop, the tiger population of Barisan Selatan appears to be fragmented into five separate populations. The number of individuals is estimated for each population, from south to north.

The first population has 1,000 km^2 of lowland forest, for an estimated population of 5-6 male and 11-12 female tigers. The second population has 200 km^2 of lowland forest and 100 km^2 of agriculture, for an estimated population of 1-2 male and 2-3 female tigers. The third population has 200km^2 of lowland and 100 km^2 of submontane forest, for an estimated population

of 1-2 male and 2-3 female tigers. The fourth population 4 has 200 km^2 of lowland forest, for an estimated population of 1-2 male and 2-3 female tigers. The fifth population has 100 km^2 lowland forest with an estimated tiger pair.

The total population, using tiger presence from the grid, was estimated to be between 9-13 males and 18-22 females. If the tiger population is fragmented as depicted, there is suitable tiger habitat between these populations and because the distances between the populations are not great, tigers can probably cross these areas. Therefore, the populations are more than likely not genetically isolated.

Way Kambas National Park

Tiger estimates from HAS areas (from data received at the PHVA workshop): All 12 units labeled for tigers had lowland, bush or swamp, for an estimated 6-7 male and 13-14 female tigers. The total population was estimated at 19-21 tigers.

Berbak National Park

Tiger estimates from vegetation in GIS database (data from vegetation analysis): Using the vegetation types that occur within current park boundaries, there are 120 km^2 of swamp and logged forest. This results in an estimate of 1 male and 1-2 female tigers. There are 1,517 km^2 of peat-swamp forest, for an estimate of 5-6 male and 11-12 female tigers. The total estimated population for Berbak between 18-21 tigers, 6-7 males and 12-14 females.

Future Directions

The results and analysis of the PHVA Workshop presented here provide a beginning, not the final result, of a commitment to ensure the long-term viability of free-ranging Sumatran tigers. As such, there are several issues that need to be further explored to gain better estimates of tiger distribution and densities. Within the context of this paper, these include: expansion of the database to include all viable tiger habitats, including both protection and production forest; identification of unsuitable habitat within these areas; better estimation of tiger home range sizes in tropical rain forest habitat; and better evaluation of the threats to wild tiger populations.

Table 2. Summary of tiger population estimates for five protected areas.

Protected Area	Vegetation analysis			Tiger distribution, from plots			PHVA
	M	F	Total	M	F	Total	Total
Barisan Selatan	16-18	33-35	49-53	9-13	18-22	27-35	68
Berbak	6-7	12-14	18-21	6-7	12-14	18-21	50
Gunung Leuser	36-39	74-77	110-116	33-36	69-72	102-108	110
Kerinci Seblat	44-47	89-92	133-139	40-41	80-82	120-123	76
Way Kambas	7-8	14-15	21-23	6-7	13-14	19-21	20
Kerumutan	-	-	-	-	-	-	30
Rimbang	-	-	-	-	-	-	42
Totals			339-361[a]		268-287[a,b]		396

[a] **Does not include other parks with tigers (Rimbang and Kerumutan)**

[b] **Includes estimates from vegetation analysis of Berbak National Park.**

APPENDIX II. Threats to Wild Sumatran Tigers

Poaching and illegal trade in tiger products are widespread throughout Asia. By their clandestine nature, both are difficult to detect. Poachers may bury tiger remains, including skins, if bones are the target. Unless there are sufficient forest guards, tiger carcasses are unlikely to be found and soon vanish. While skins can be easily identified, only a handful of experts can identify tiger bones, which can be readily transported and mistaken for other (legitimate) animal bones, in which there is normal trade. Tiger products are being sold in local markets in Laos, Vietnam, and Thailand, and trafficking of tiger products has been documented in India, Nepal and Indonesia. Outside of tiger range countries, large numbers of bones and other tiger products have been found in Taiwan and South Korea, many of which were from Indonesia. China, however, by virtue of its large population, is the largest consumer and producer of manufactured medicines containing tiger parts.

Opinions differ on how exactly poaching and the illegal trade in tiger products impact wild populations. In recent years increased poaching levels have been documented in India, Nepal and the Russian Far East, and the consumption of tiger products in China, Taiwan and South Korea continues unabated. The question is: From where did all of these tiger parts originate? No one knows for sure from where or at what rate tigers are being removed from the wild. The general consensus, however, is that the free-ranging populations across Asia are decreasing, and unless poaching is stopped, or at least the demand for tiger products (which contributes to poaching) is stopped, these numbers will continue to decrease.

Official PHPA Reports:

- At the PHVA Workshop in November 1992, PHPA staff estimated that, on average, about 17 incidents involving problems with tigers are reported every year from the five national parks of Sumatra. Of these 17 instances, PHPA reported that about 12 resulted in tiger losses; about six through poaching or poisoning and another six through official removal by PHPA (see Vortex section of this report – Appendix III)). These estimates are only for the five national parks of Sumatra and do not include other instances involving tigers living in much smaller and fragmented forest patches designated as game reserves or protection (and production) forests.

- The Indonesian Ministry of Forestry requires registration permits for all persons keeping endangered species. The initial registration period was to extend from February through May of 1992 (Decree No. 301/Kpts-II/1992) but was extended to October 1992 (Decree No. 479/Kpts-VI/1992). A total of 1,081 mounted tigers were reported to have been registered at the time of the PHVA workshop. The origin of these tigers was undetermined, but presumably they were from Sumatra originally, or were captive-born offspring from either wild-caught or privately-held tigers.

- Registered tiger specimens included 100 stuffed Sumatran tigers kept in houses of government officials and businessmen in South Sumatra. Another 20 stuffed tigers are held by private individuals in Lampung and about 300 in Palembang.

International Trafficking Reports:

- South Korean customs administration statistics show that, between 1975 and 1992, South Korea imported 3,720 kg of tiger bones from Indonesia. Traders in Southeast Asia report that the amount of dried tiger bones from a single tiger ranges from 6-11 kg, which implies South Korea imported the equivalent of 338-620 tigers over the 18-year period. In fact, Indonesia accounted for 61% of the total tiger bone import (6,128 kg) for South Korea.

- In the last three years alone (1991-1993), 475 kg, or about 20 tigers annually, were exported to South Korea.

- Tiger bone is an important ingredient for nine South Korean companies in the manufacture of pharmaceutical products. As of 15 October 1992 the East Asian Medical Journal, a South Korean bi-monthly newspaper, carried a full-page price list for Chin Hyung Dried Medicine Materials Company listing tiger bone at US$ 1,600/kg (3.3 million Rp/kg.

- In Singapore the retail price for a well-tanned adult Sumatran tiger skin is reputedly about US$ 2,000 (4.1 million Rp). The retail price for a Sumatran tiger penis is reputedly about US$ 100.

Published Reports:

- In the last decade a number of newspaper reports appeared in The Jakarta Post concerning tigers

harassing villagers and killing their cattle. In South Aceh province, North Sumatra, a tiger killed and devoured a man and dozens of cows, goats and sheep. In West Aceh province a tigress killed a teenager and dozens of cattle before it was caught by PHPA. Local pawangs (traditional tiger charmers) were quoted as having successfully trapped 64 live tigers over several months.

- Since 1986 to about 1993 extensive poaching of tigers has been carried out along the forest edge in Gunung Leuser National Park, North Sumatra, especially in the west where the animals have been killed in this period, but second-hand accounts from the leading poacher indicate as many as 50 tigers were killed between 1986 and 1990. Tiger numbers on the forest edge (much of which is still outside the park) have decreased and now pig numbers (that used to be controlled by tigers) have increased with subsequent loss of crops.

- In a report on Berbak National Park, it was stated that an average of one tiger has been killed in the vicinity of the park each year for the past eight years, according to one PHPA staff member, and three tigers are known to have been poached in 1991.

Removal of Problem Tigers By PHPA

From time to time wild tigers causing problems for local villagers (primarily by killing and eating their livestock) are captured by PHPA and transferred to Indonesian zoos. Many of these tigers constitute the genetic founders of the Indonesian Zoological Parks Association (PKBSI) Sumatran Tiger Masterplan. The current Indonesian Sumatran Tiger Studbook (1994) lists a total of 30 (18 living) reputed wild-caught tigers from Sumatra (captured from 1965-1992). These tigers, which are outside of the boundaries of the protected areas, need to be removed by PHPA; if not, more than likely they will be poisoned or killed by villagers.

Estimate of Impact on Wild Populations

It is almost impossible to estimate how many tigers are being lost to poachers, how many are being killed by poison, and how many are dying naturally. Currently, only records of tigers that have been caught by PHPA and transferred to the PKBSI for captive breeding, and a few reports of tigers being killed by police or other individuals in and around villages, are known. It is conservatively estimated that from about 1975 and 1992 a minimum of 42 tigers are lost annually from the wild population. This minimum number is derived from the following: 6 problem tigers that are removed by PHPA, and 36 tigers poached for taxidermic mounts. The validity of these numbers can be arguably challenged, but give a perspective that tigers are being lost.

This rate of removal takes into consideration that tiger bone exports may have been derived from the same tigers that were reported as taxidermic mounts or skins. This conservative rate of removal assumes that the taxidermic mounts were obtained at a constant rate and are applicable to the last several years. Also, it is difficult to reconcile historical rates with current rates of removal. Finally, not all of these tigers were necessarily wild-caught; some may have been derived from captive-born animals from the private sector.

However you interpret this information, one unescapable conclusion is that tigers are being lost from the wild, and that tiger products are leaving Indonesia and entering the pharmaceutical industry elsewhere in Asia. Vortex modeling (see Vortex section of this report) suggests that losses of wild tigers at the above rate will reduce even relatively large wild tiger populations, such as those in Gunung Leuser and Kerinci Seblat National Parks, to non-viable levels. The bottom line is that we cannot accurately quantify how many tigers are being lost, but the goal is to reduce or eliminate poaching altogether of wild tigers.

APPENDIX III. Sumatran Tiger Population Viability Analysis

Introduction

The tiger population on Sumatra is fragmented and isolated in 5-12 reserves and surrounding unprotected areas. Migration between some of these areas may be possible based upon the presence of forested corridors. However, no natural migration is possible among the five National Parks, so that the tiger populations in each now must function and be managed as separate genetic demographic population units.

These small and isolated tiger populations are at risk of extinction from the interaction of random and deterministic processes (e.g., skewed sex ratio, failure to locate mates, disease, genetic drift, inbreeding depression, fighting, reduction in populations of prey animals, poaching, and poisoning). These populations and their habitat will require intensive management if the Sumatran tiger is to survive in the national parks for even 50 to 10 years.

The need for and effects of intensive management strategies can be modeled to suggest which practices may be the most effective in preserving the individual tiger populations. A stochastic population simulation modeling package, VORTEX 6.2 written by Robert Lacy and Kim Hughes was used as a tool to study the interaction of multiple variables treated stochastically to gain assist a better understanding of the effects of different management manipulations.

VORTEX is not intended to give absolute answers, since it is projecting stochastically the interactions of the many parameters which enter into the model and because of the random processes involved in nature. Interpretation of the output depends upon knowledge of the biology of the Sumatran tiger, the conditions affecting each of the individual populations, and possible changes in the future. The output is constrained by the input. Where needed input data are not available or uncertain, data from the simulations can be used to suggest the most critically needed data to provide more reliable results and thus assist the design of needed research for management of the populations.

Model Input

Tiger natural history data used for the VORTEX model were taken from published studies on the Panthera tigris tigris in the Royal Chitwan National Park, unpublished data contributed by the workshop participants, information from PHPA staff working in the individual Protected Areas, and information from the studbooks for captive tiger populations.

Carrying Capacity: Carrying capacity or K defines an upper limit for the population size, above which additional mortality is imposed in order to return the population to K. In other words, VORTEX uses K to impose a ceiling model of density-dependence on survival rates.

Habitat size and prey availability (density) are indicators of carrying capacity of the respective Parks and surrounding areas. Estimates of possible and probable tiger population numbers (animals 1 year and older) in the respective protected areas ranged from 25 to 150 animals. There are areas with fewer than 25 tigers but it is unlikely that any of the protected areas will sustain more than 150 animals. Therefore, 4 carrying capacities of 25, 50, 100, and 150 tigers to encompass this range were included in the sets of scenarios simulated.

Age First Reproduction. VORTEX defines breeding as the time when young are born, not the age of sexual maturity. VORTEX also assumes discrete intervals of years in the case tigers. For tigers on average the age of first reproduction in wild populations appears to be 3 years for females and 4 years for males although younger animals in captivity can breed. These values were used in all of the simulation scenarios. The breeding structure was assumed to be polygynous.

Litter Size. Environmental variation in reproduction is modeled by entering a standard deviation (SD) for the percent of females producing litters each year. VORTEX then determines the specific mean (e.g. 50%) and SD (e.g., 12.5%). Thus about 66% of the time, the percent of females breeding will fall within + 2 SD of the mean. The relative proportions of litters of each size (1,2,3, etc.) are kept constant; what is varied from year to year is the percent breeding (litter size >0) and the percent not breeding (litter size=0).

The maximum litter size observed in wild tigers is 5 cubs (also litters with more than 5 cubs comprise less than 2 % of captive litters). Most information on wild tiger litter sizes is based upon observation of cubs 3-6 months of age and thus does not represent birth litter sizes. Data on P.t. tigris indicate mean litter sizes of 3 at this age. Limited field observations in Sumatra indicate a mean of 2 cubs at about 6 months of age. We therefore made litter size one of the variables included in all of

the systematic comparisons using mean litter sizes of 2 or 3. The distributions of litter sizes for the respective means were set as follows:

The proportion of females breeding each year determines the mean interbirth interval. This interval is reported to be 2 years in wild tigers so that 50% of adult females, on average do not produce litters each year. A modest amount of annual variation was included using a standard deviation of 12.5%. The sex ratio at birth is taken as equal (o.50 proportion of males) based upon observations of more than 500 litters in captive populations.

Males Breeding. The breeding system modeled by VORTEX assumes that mates are randomly reshuffled each year and that all animals that can breed have an equal probability of breeding. A proportion of the males- 50%- were excluded from the breeding pool in a given year in the base scenarios to reflect the fact that some males are excluded from breeding by the social structure.

Age of Senescence. VORTEX assumes that animals can breed (at the species typical rates) throughout their adult lifespans. The maximum life expectancy is not used if the species does not reproduce throughout its entire life. This age was estimated as 15 years for wild tigers based upon several known age animals in Nepal and this value was used in all of the scenarios. Reproduction in captive female tigers appears to decline after 12 years of age.

Mortalities. Mortality as a percent (between 0.0 and 100.0) may be entered for each age class of immature female and males. Once reproductive age (adult) is reached, the annual probability of mortality remains constant over the life of the animal in these models and is entered only once. The mortality schedule used in all of the scenarios for the Sumatran tigers is drawn from the data on P.t. tigris in Nepal.

Inbreeding. A population with the level of inbreeding depression of one lethal equivalent per diploid genome may have one recessive lethal allele per individual (as in the Recessive Lethals model in VORTEX); or it may have some combination of recessive deleterious alleles which equate with one fully lethal allele per individual. Natural selection does not remove deleterious alleles at heterotic (or over-dominant) loci (because all alleles in this model are partly deleterious when homozygous), thus the effects of inbreeding are unchanged during repeated generations of inbreeding. The default number of lethal equivalents for the Heterosis model is 3.14 which is a median value obtained in a study of 40 mammalian species.

Inbreeding depression has been observed in inbred lines of captive Siberian tigers (P.t. altaica). To include this potential threat in these models the Heterosis model in VORTEX was used in which we entered the number of "lethal equivalents" as 3.14. The inclusion of inbreeding was varied systematically in the scenarios developed for the Sumatran tiger populations so that comparisons were made under identical conditions with this factor present or absent.

Threats. Major potential threats for the wild populations of Sumatran tigers include continued loss of habitat, increasing fragmentation of remaining habitat, reduction of prey species density, removal of tigers for control purposes, and poaching for bone and skin or other products. Wild tiger populations, perhaps because of their relative isolation and thin distribution, are not known to have been affected by epidemic disease.

The impact of habitat loss has been modeled by using different carrying capacities as a guide to the changing risk of extinction with decreasing population size. Removals, on a continuing basis were modeled by using the harvest module of VORTEX with either 0,2 or 4 adult tigers, split evenly between the sexes, removed per year. This in effect is a systematic increase in annual adult mortality. Scenarios that included losses modeled as less frequent events (catastrophes) did not include these systematic harvests or removals.

Catastrophes. Catastrophes can be thought of as the extreme of environmental variation. Catastrophes are events that impact either reproduction or survival. Catastrophes do happen and are very real considerations when attempting to model the fate of small populations. We define the impact of these catastrophes in terms of effects on reproduction and survival. A catastrophe may have occurred when a mortality rate is noted that is statistically higher than the normal variation. The reproduction and survival rates for catastrophe years are obtained by multiplying the (non-catastrophe) probability of reproduction or surviving by a severity factor. The severity factor ranges from 0.0 to 1.0. Entering 0.0 indicates a total loss of reproduction or survival for the population and 1.0 indicates that the catastrophe, if it occurs, will have no effect.

Catastrophes in wild tiger populations might include large scale fires (which they might escape but suffer the consequences of reproduction in the prey base), abrupt forest removal, unusual declines in the prey population, and poaching for bone and skin or other products. Since poaching events tend to be more episodic, occurring at uncertain intervals we modeled separately the impact of events occurring on the average either at 5 (20% probability) or 10 (10% probability) year intervals. The event, in both cases, was given a severity effect of 0.90 on survival (about 10% additional loss of animals to the population, i.e. 2-3 animals in a population of 25-30 animals) and no effect on reproduction of the remaining animals. This may underestimate the negative effects on reproduction of the potential social disruption that may occur.

Age Distribution. We initialized all of the models with a stable age distribution which distributes the total population among the various age classes. The initial population sizes used were 25 for K=25 or 50 and 75 for K=100 or 150. VORTEX automatically enters values for all age classes, proportionate to the stable age distribution.

Base Models. Two basic models were constructed from the available life history data using mean litter sizes of either two or three cubs with all other variables the same. The other parameters systematically varied were carrying capacity (25, 50, 10, 150), inbreeding depression (column 4-present or absent using a heterosis model with 3.14 lethal equivalents), and catastrophes (column 3-absent, or present with a frequency of 10 or 20% and a survival severity factor of 0.9).

The two basic models do not include effects of annual harvests, inbreeding depression, catastrophes, or further habitat degradation. The effects of these additional factors were systematically added to the basic models to evaluate their impact on the risk of extinction and population dynamics. These factors generally increase the probability of extinction, decrease surviving population sizes, and decrease the amount of genetic variation remaining in the simulated population.

12. SUMMARY AND INTERPRETATION OF SIMULATION RESULTS FOR EACH PROTECTED AREA

Definitions. Estimated population sizes are for animals 1 year and older. About half this number will be breeding age adults. The estimate of removed tigers includes animals lost to poaching as well as problem animals removed. This information was provided by PHPA staff at the workshop. The estimates of extinction risk are for 10 years. In all instances the probability of extinction is high with removals if the mean litter size is 2 cubs. The risk estimates quoted are for litter sizes of 3 with no inbreeding depression but with either 0% or a 10% probability of a catastrophe event which reduces survival by 10% in the year of occurrence. We believe that these are conservative estimates because the risks would be greater if inbreeding depression is included in these small population simulation scenarios.

Gunung Leuser National Park

Total area (ha):	Hd 900,000
Available habitat:	40% (3,60,000 ha)
Estimated population size:	110 tigers (2000 ha per tiger)
Number tigers removed per year:	2-4

Comments: Risk of extinction is 20% (100 years) given two tigers removed per year (Te mean = 59 years; 80% H_c retained); probability of extinction rises to 87% with four tigers removed per year (Te mean=45 years; 75% H_c retained).

Kerinci-Seblat National Park

Total area (ha):	Hd 1,500,000
Available habitat:	40% (600,000 ha)
Estimated population size:	76 tigers (7,895 ha per tiger)
Number tigers removed per year:	6

Comments: Even if the tiger population is assumed to be one population (no fragmentation, which is unlikely), there is essentially a 100% probability of extinction within 50 years (mean=17 years to extinction). Poaching/removal has an overwhelming effect on the survival of the population.

Barisan Selatan National Park

Total area (ha):	Hd 356,800
Available habitat:	79% (281,872 ha)
Estimated population size:	68 tigers (4,145 ha per tiger)
Number tigers removed per year:	1

Comments: This population, with only one tiger removed per year, has less than 1% probability of extinction in 10 years, with 84% H_c retained. However, this simulation did not include catastrophes or inbreeding effects, which may increase the Pe to 10% in 10 years in this size population.

Berbak National Park

Total area (ha):	Hd 162, 700
Available habitat:	70% (113,890 ha)
Estimated population size:	50 tigers (2,278 ha per tiger)
Number tigers removed per year:	2

Comments: Highly likely to go extinct (Pe = 97%) within 10 years (mean=31 years to extinction). Although the estimated population is smaller than that for Kerinci, the Berbak population does slightly better in the simulations because of the lower estimated level of removed/poached individuals. If the model starts with an initial population of 150 tigers (50 adults in park, 50 adults in the proposed surrounding HL area, 50 immatures), then there would be a 1% probability of extinction, with 85% H_c retained.

Way Kambas National Park

Total area (ha):	Hd 130,000
Available habitat:	75% (97,500 ha)
Estimated population size:	20 tigers (4,875 ha per tiger)
No. tigers removed per year:	0

Comments: Probability of extinction is 40-70% (depending upon mean litter size) within 100 years (mean=48 years to extinction). Even though no animals are being removed from the population, random events in small populations greatly increase the risk of extinction. Inclusion of inbreeding effects in the simulation model increases the risk of extinction to 94+% or the inclusion of a catastrophe at 10% probability of occurrence increases the PE to 49%. Both factors are real risks. If the model starts with 40 tigers (additional adults plus some cubs), then there is only 2% probability of extinction, but the population becomes very inbred (only 50% H_c retained). By adding one female to the population every year, the probability of survival remains the same, but the population retains much more heterozygosity, 88% H_c.

Kerumutan Game Reserve

Total area (ha):	Hd 120,000
Available habitat:	65% (78,000 ha)
Estimated population size:	30 tigers (2,600 ha per tiger)
Numbertigers removed per year:	2

Comments: 100% probability of extinction in 50 years with a mean time to first extinction= 15 years.

Rimbang Game Reserve

Total area (ha):	Hd 136,000
Available habitat:	90% (122,400 ha)
Estimated population size:	42 tigers (2,914 ha per tiger)
No. tigers removed per year:	2

Comments: There is a projected 100% probability of extinction (Te = 25 years). The populations at Kerumutan and Rumbang Game Reserves are very vulnerable to poaching effects (without poaching, results should be similar to Way Kambas with initial population size of 40); therefore, it is important to control poaching.

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CHAPTER 7

TIGER ACTION PLAN

PENINSULAR MALAYSIA

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1. INTRODUCTION

Currently the status of the wild Indochinese tiger (*Panthera tigris corbetti*) is relatively unknown throughout its range, which includes most of Southern China, Vietnam, Cambodia, Lao PDR, Thailand, Eastern Myanmar and Peninsula Malaysia. The status of wild population in Peninsula Malaysia is generally acknowledged to be between 450-500 animals although their wide distribution makes it difficult to quantify accurately.

Habitat degradation, encroachment and the loss of major prey species through hunting have resulted in the incidence of tigers in or near human settlements. Previous capture and translocation of tigers that were accidentally snared indicated the vulnerability of this species. In addition, recent reports of tigers in agricultural farms (cattle and buffaloes) and logging roads further exacerbated the situation. Cases of tigers in unnatural surroundings have ended up in capture and translocation or culling.

Wildlife surveys done regularly in forest and wildlife reserves have yielded high frequencies of tigers. The distribution and population trend discovered from censuses provided an estimate and a baseline to formulate a conservation strategy for this species. However, as more information on the population and habitat is gathered and analyzed, the conservation strategy will be evolved accordingly. A more collaborative and regional effort between the range states must be initiated to secure the viability of the Indochinese tiger.

The long term survival of this species in the wild is affected by hunting, human encroachment, habitat loss, and the loss of prey species. The tigers are mainly hunted as a result of cattle depredation, and for consumption as medicine locally, and by the Chinese communities in China, Taiwan, South Korea and Hong Kong. Human encroachment and establishment of cattle farms near or within tiger ranges have resulted in eventual depredation and subsequent removal of the tiger through trapping or killing. Cases of non-target species snare-traps that often kill or maim tigers have resulted in the animal preying on the easier domesticated cattle. Once again the cycle repeats itself. Habitat loss creates "wandering" tigers that end up in unnatural areas and pose conflict with the humans.

Habitat loss through logging causes displacement of tigers as well as increases hunting pressure on prey species through increased accessibility. The effectiveness of the tiger conservation strategy in the country can be increased through increase in staffing, budget allocation, equipment and vehicles, within the Department of Wildlife and National Parks. As with other species of large mammals in Asia, the continued human encroachment, habitat transformation for agriculture, housing and industry, coupled with the persistent demand for tiger parts by Chinese folk medicine would have a negative result on the tiger population in the wild. The current protection afforded to tigers is limited due to limited resources as mentioned above. Increased staffing and reallocation of priority of the enforcement division from urban to rural and in-situ coverage are crucial steps in protecting this flagship species.

Captive breeding of Indochinese tigers has been very successful in Peninsular Malaysia with over 30 individuals born to date. These captive bred animals would serve as genetic reservoirs to reinforce the wild population or to repopulate known tiger habitat. The major role of the captive breeding program for long term conservation goals of tigers within its subspecies range country was emphasized during the 1986 International Symposium of the IUCN/SSC Cat Specialist and Conservation Breeding Specialist Groups. The 1993 IUCN/SSC/CBBSG Tiger Global Animal Survival Plan (GASP) further reinforce the above strategy that links the *in-situ* and *ex-situ* conservation activities.

The commitment of the country to conservation, significant bio-geographical location and the promising status of the Indochinese tiger are positive factors in the conservation of this species.

The goal of Malaysia's National Policy on Biological Diversity is to transform the country into the world's centre of excellence in tropical biodiversity by the year 2020. This was marked by the Langkawi Declaration on Environment and Development in 1980 involving the heads of Government of commonwealth countries. This conference led to the United Nations Conference on Environment and Development in 1992. Malaysia is also a signatory to the Convention on International Trade on Endangered Species of Wild Fauna and Flora (CITES) apart from being a member of the International Union for the Conservation of Nature and Natural Resources (IUCN). An obligation under the IUCN is the establishment of protected areas systems for the conservation of habitats and ecosystems.

The geographical location of Peninsular Malaysia with the narrow Isthmus of Kra connecting to Thailand, provides an isolation of genetic reservoirs as shown by DNA fingerprinting of the Seladang (*Bos gaurus hubbacki*) which differs from those in Thailand. It is speculated that the same isolation exists for the tiger. Tiger populations were observed frequently during the recent rhino surveys within the National Parks and forest reserves in Johore, Pahang, Kelantan, Trengganu, Perak and Kedah. In addition, the increased recruitment of qualified staff into the Department and the upgrading of present staff through further education, shows the commitment of the DWNP in establishing a core of highly motivated and qualified cadre to conserve wildlife specifically, and national biodiversity, generally.

2. PRESENT STATUS

The Management Information System (MIS) of the DWNP and the DWNP/DANCED Masterplan for Capacity Building and Protected Areas, 1996 have established the acreage and distribution of protected areas in Peninsular Malaysia. Currently, there are 39 protected areas which constitute 5.7% (4.5% under the IUCN Category) of the country. The present network of protected areas on land includes 831,755 ha of National and State Parks, Wildlife Sanctuaries and Wildlife Reserves in Peninsular Malaysia.

The distribution of the Indochinese Tiger in Peninsular Malaysia was obtained through wildlife surveys and sightings and reports by the public. The data available from chance sightings and reports from the public totaled 284 for the period of 1992-1995 (Table 1). The total for the country ranged from 450-500 individuals.

Table 1: Estimated number of tiger sighted or reported in Peninsula Malaysia (1992-95)

Year	Estimated Number
1992	50
1993	95
1994	84
1995	55
Total	**284**

Source: DWNP 1995

3. PROPOSED ACTION PLAN

In situ

1. Develop Population Database Systematisation for Indochinese Tigers

Intensive and systematic censuses are required to establish accurate population, distribution and population trends. The use of photo traps would provide key information on the individuals, their home ranges and density to enable database systematization for its management in the wild. A pilot project can be initiated in smaller reserves to determine the most effective strategy to enhance the continued existence and proliferation of the Indochinese tiger in Peninsular Malaysia. It is essential to develop target population numbers and areas sufficient for long term genetic and demographic viability. The current areas with a large population size and acreage for long term viability include Endau Rompin, Taman Negara, Belum and Selama.

Surveys must be carried out in the Banjaran Titiwangsa (main range) which forms the backbone of Peninsula Malaysia, to establish a baseline data on their population and home range. A planned large scale census covering as much of the range should be carried out. The Banjaran Titiwangsa due to its biophysical properties and accessibility can act as a last frontier for many wildlife species.

Mapping out the spatial structure of this species requires information on their distribution within and outside the reserves. In Peninsular Malaysia, tiger inventory must also be carried out in the adjacent forest around protected areas.

2. Expand and Enhance the Tiger Conservation Units (TCU) to Implement Conservation Strategies

A concerted effort to develop and activate the Tiger Conservation Units must be initiated, mobilized and increased consequently to cover the entire Peninsula Malaysia. The present Tiger Unit is insufficient to provide protection for the tiger population and is mainly involved with capture or trappings of problems tigers. The DWNP must provide an effective co-ordination system for the tiger conservation strategies through concentration of available resources including manpower and budget allocation. Collective utilisation of existing Rhino Protection Units together with the Tiger Conservation Units (TCU) would increase patrolling, expand coverage and provide a mutual advantage for the two species. Team leaders for the TCU should be

selected from dedicated staff and assigned to the major protected areas. The provision of necessary camping, survey and capture equipment are essential for an effective functioning of these TCU. Capacity building must include a team of highly motivated and well trained personnel to be stationed in the states of Pahang, Terengganu, Kelantan, Perak and Taman Negara. The team will function to accumulate relevant data on the situation of Indochinese tiger in the major tiger range states and formulate recommendations to facilitate *in situ* management of that population.

3. Increase Protection of Prey Species

The availability of adequate food source will ensure the survivability of a species. Habitat richness in terms of prey species for the tigers will enable the existing population to reproduce and increase in numbers. An increase in protection must be offered to the species of ungulates consumed by tigers which includes wild boar, sambar deer and barking deer. A controlled hunting pressure will allow the growth of the population of prey species. Reproduction and recruitment rates for wild boars are very high. The monitoring of tiger population by TCU should also include database for the population of prey species. This information will be vital in formulation of a controlled licensing of species for the purpose of hunting.

4. Community Outreach

The demand for tiger parts are on the increase as the numbers in the wild decreases. The effort to educate the decision makers, the school children, non governmental organizations and the general public must emphasise the importance of this heritage species in maintaining a well balanced ecosystem. Apart from the existence of localized action to educate the community, a nationwide activity must be focused to create awareness on the importance of conserving the species. The work of education extension must concentrate around areas adjacent to the protected areas. A conservation awareness program should include economic incentives through income generation. Job opportunities must be created in or near these protected areas in relation to conservation and ecotourism and better management of local resources. The local community is encouraged through information networking whereby useful data on poaching activities will be rewarded with bonuses. Similarly relevant data on the movement of tigers within the locality which could facilitate anti-poaching strategy will be rewarded with incentives.

The existing DWNP Wildlife Home Page will be utilized for various biological heritage species including the Indochinese tiger. This would enhance the capacity to educate and inform the local public and the global community of the critical situation and their responsibility in conservation. A more aggressive approach must be initiated to ensure the flow of information to the end users. The production of posters, pamphlets and booklets are necessary to inform the various levels of the community on the ecology, behaviour, biology, status, problems, solutions and the responsibilities of the citizens and the government in conserving this species.

Ex-situ

1. Develop and elaborate captive breeding centres and program

The present captive breeding centres should be improved to facilitate husbandry, breeding and research and their numbers increased to accommodate the "problem" wild population. These additional animals would serve as a foundation for the genetic, demographic and reproductive enhancement. A breeding plan that involves local and regional counterparts should be established to ensure continued survival of the species through exchange of animals and genetic materials.

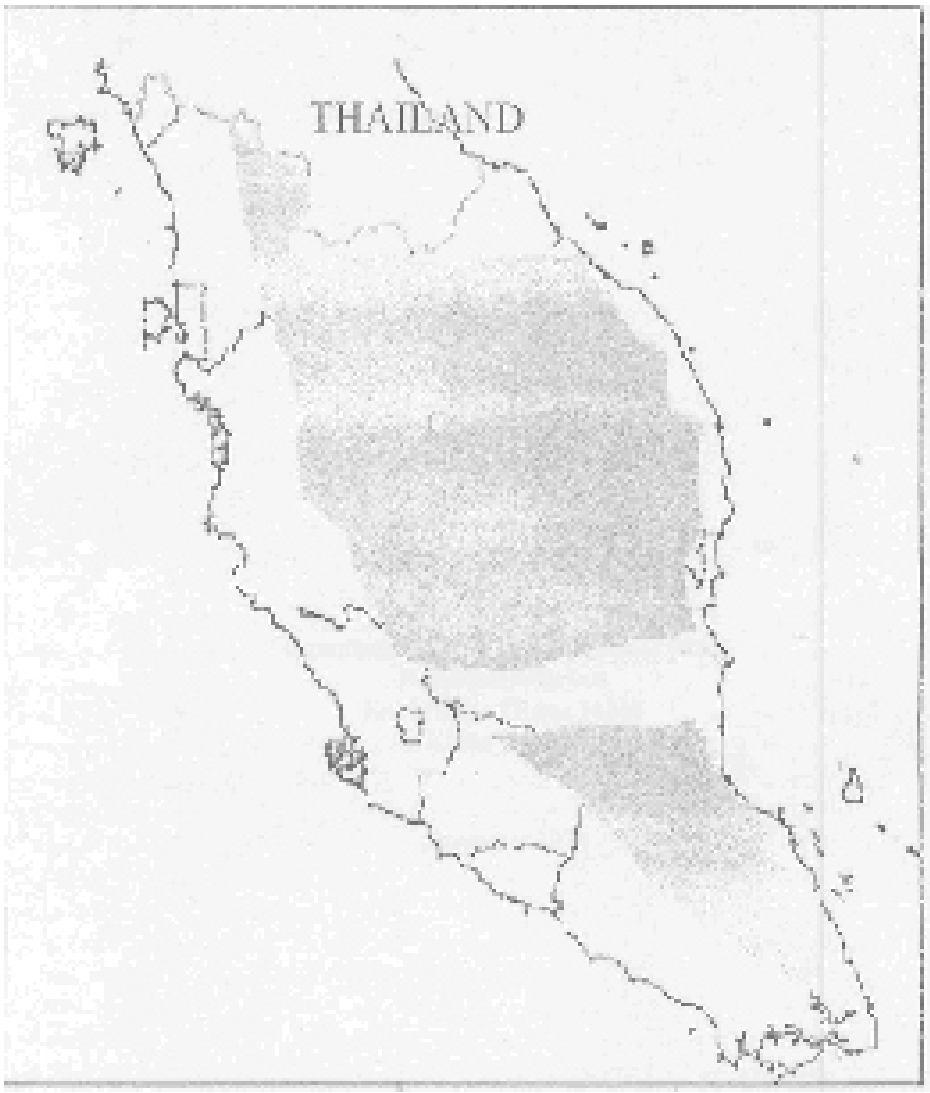
Through the ex-situ breeding program based at Melaka Zoo, 33 cubs have been bred. However, the breeding program has been momentarily stopped due to inadequate space. An expansion of the facility is necessary to provide compartments for a minimum of four breeding pairs.

Plan Phasing

The time frame and phasing of the Indochinese Tiger Action Plan are reflected in the table below. The initial priority is to conduct the appropriate scientific surveys and incorporate these data into the GIS for systematization of the conservation actions. The expansion of the present captive breeding facility in Zoo Melaka is essential to rapidly increase the captive population for exchanges with local and regional counterparts.

Activities	1996	1997	1998	1999	2000
Population census					
Database					
Establish tiger core areas					
TCU Activation-Patrolling and Monitoring					
Captive breeding facilities					
Education and Awareness programs					
Capture and relocation of problem tigers					
Breeding of captive tigers					
Tiger Management plan					

Map 1. Tiger range in Peninsular Malaysia (1991)



Tiger range

CHAPTER 8

TIGER ACTION PLAN

THE UNION OF MYANMAR

Prepared by:
Antony J. Lynam Ph.D
Associate Conservation Scientist

PREFACE

Tiger represents many things to Myanmar people and to the Union of Myanmar and its natural wilderness. It is a national symbol for the country, a flagship for conservation, an indicator of intact and healthy forest ecosystems, and a keystone species upon which other biodiversity and the forest itself are dependent. Despite their importance, the status of Myanmar's tiger population was uncertain for many years due to poaching for the trade in Traditional Chinese Medicine (TCM), hunting of their prey species, and forest clearance to meet human needs at the expense of wildlife. In the absence of detailed knowledge about where tigers live and how they are threatened in those places, plans to conserve the species were thwarted.

In 1999, the Myanmar Forest Department commissioned a study to determine the current status and distribution of tigers, and formulate an updated national strategy for their future management and conservation. This document" *A National Tiger Action Plan for the Union of Myanmar*" is the end product of a three-year program conducted jointly by the Myanmar Forest Department and the Wildlife Conservation Society with funding from the US National Fish and Wildlife Foundation and Exxon Mobile's "Save Tiger Fund", I am pleased to say that the program has gone well beyond my expectations. The Plan details what is needed to save Myanmar's tigers from extinction and so provides a valuable prospectus for future conservation. It will become a part of the Myanmar forest policy for recovery of the species.

U Shwe Kyaw
Director-General
Forest Department

FOREWORD

It is with great pleasure that I introduce the National Tiger Action Plan to the government and the people of Myanmar. Upon first arriving in Myanmar in 1993, I remember how surprised I was by the intense feeling of "rightness" that overcame me. Having worked more than a decade in other parts of Asia I was feeling despair over the future of conservation in the region. I had grown tired of grappling with issues that never got resolved, despite my best efforts, and I was losing faith in the ability of people to realize how important wildlife and wild lands were to the quality and integrity of their lives. It seemed impossible to me at the time that any place I chose to work again would be different. But I was wrong. Myanmar was different.

I had first become interested in Myanmar because of its potential as one of the world's last strongholds for large mammal species such as tigers, clouded leopards, and Asian elephants. And I hungered to go into the hinterlands of a country that contained the world's last great stands of teak trees, rugged, unexplored mountain ranges, and a diversity of wildlife almost unparalleled in the Asia-Pacific region. But what I had never anticipated was the intelligence, kindness, integrity, and diversity of the Myanmar people, and how seriously the Myanmar Forest Department and the Wildlife Division took their mandate to protect and conserve the country's remaining forests and wildlife.

I am pleased to have had the opportunity for the last ten years to work with staff of the Myanmar Forest Department. I feel honoured to have played a role in helping survey and designate some of the country's and the region's finest protected areas, such as Hkakabo Razi National Park and Hukaung Wildlife Sanctuary. But our work is only beginning. I was saddened to learn the results of tiger surveys that were carried out by WCS and the Myanmar Forest Department. Yet I was heartened by the fact that there were still places of intact habitat where tigers and other wildlife had a chance for the future if proper actions were taken.

This National Tiger Action Plan compiled by Dr. Antony Lynam and the Myanmar Forest Department is a landmark document. Nothing of this magnitude has been compiled for any country where tigers still roam. But this document should not simply be viewed as a finished product to be placed on a shelf. It is a realistic plan of action that, if followed, could bring tiger, a national treasure, back to Myanmar in numbers that will guarantee their future in the region for many generations to come. I am optimistic that the government and the people of Myanmar will do what needs to be done to save tiger and the other spectacular wildlife species that wander their forests. And I hope that I and other WCS scientists will continue to have the opportunity to assist in any way possible towards this end.

I was correct about the feeling of "rightness" when I came to Myanmar in 1993. I hope I am also correct that in the years to come, Myanmar will point to its forests and wildlife with pride, and they will be held up as an example to other countries of what is possible when one cares about its natural heritage.

Alan Rabinowitz Ph.D
Director, Science and Exploration Program
Wildlife Conservation Society

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A vast number of people made this project possible. Firstly, the Minister of Forests, Director- Generals U Soe Tint, U Shwe Kyaw, and former D-G U Kyaw Tint, and U Khin Maung Zaw, Director of the Nature and Wildlife Conservation Division. Territorial staff of the Forest Department, the Local Commander of Taninthayi Division, and U Tun Paw Oo, Director of the Taninthayi Forest Department. U Aung Than wrote the first NTAP in 1996. In 1998 at the Saving tiger Conference in Dallas, Texas, he and U Uga made the call for a revised NTAP. The field assessments were carried out by U Saw Htoo Tha Po, U Myint Aung, U Myint Maung, U Kyaw Thinn Latt, U Tin Mya Soe, U Sein Aung Min, U Thein Lwin, U Khin Maung Htay, U Tun Tun Lwin, U Moe Myint Aung, U Zaw Naing Tun, Daw Myint Myint Oo and Daw Khin Htay. U Kyaw Thinn Latt assisted with data management and analysis. U Saw Tun Khaing and U Than Myint coordinated with the Forest Department to initiate and guide the project. Drs Alan Rabinowitz, Joshua Ginsberg, Madhu Rao of the Wildlife Conservation Society provided advice on project design and implementation. They and Drs Tim O'Brien and Dale Miquelle (WCS) provided comments on this Plan. Workshops with WCS tiger workers in New York (1999) and Thailand (2001) inspired some of the considerations for conservation action described in this report. Thanks to Dr Alan Rabinowitz for helping us see the big picture of tiger conservation, and to Dr Ullas Karanth who showed us how tigers can recover from the seemingly most impossible situations. Finally, the project was made possible with a generous grant from the "Save Tiger Fund", a joint project of the US National Fish and Wildlife Foundation and ExxonMobile Corporation, and from the Michael Cline Family Foundation. Initial funds for implementation of this conservation strategy are being made available by USFWS, the Nancy Abraham Conservation Fund and the " Save Tiger Fund".

A GUIDE TO USING THIS DOCUMENT

This document is divided into three sections. An executive summary of findings and general recommendations and a National Action Plan with specific recommendations, a schedule for the implementation of these actions, and responsible agencies is provided in pages 134-140. This is **minimum reading** for decision makers. For readers with some time to appreciate the background and rationale for these actions, PARTS 1-5 of this document (pages 141-155) is **essential reading**. PART 6 (pages 155-163) provides details of the field program that was mounted to acquire the information that provides the foundation for the Action Plan, and is **optional reading**.

1. EXECUTIVE SUMMARY OF FINDINGS AND RECOMMENDATIONS

1. Background

A hundred years ago the tiger (*Panthera tigris*) occurred across Asia from eastern Turkey to the Russian Far East and south to the Indonesian archipelago. Myanmar is one of fourteen countries in Mainland Asia where tigers persist today.

Reports and anecdotal information from surveyors, hunters, foresters, consultants and researchers attest to the former widespread occurrence of tigers in Myanmar, except in higher elevation areas in the north. That tigers existed over wide areas in the past was partly due to the existence of large expanses of intact habitat where human population density was low and disturbance to tigers and their prey was minimal.

Recent attempts to quantify Myanmar's tiger population were hampered because while rapid assessments for wildlife had been made in many areas, standardized survey methodologies for tigers were not yet available.

While tiger status remained uncertain, the trends for tigers and their habitats are well understood. Widespread loss of habitat with changing land use patterns, and the uncontrolled hunting of tiger prey, along with sport hunting, and commercial hunting for tigers spurned by a recent demand for traditional medicines in Asia led to the demise of tigers in the past. By the early part of the 20th Century thousands of tigers had been reported killed in Myanmar.

Myanmar lost 25% of its forest cover, potential habitat for tigers and other wildlife between the 1940's and 2000 (FAO, 2000). By 2002, 4.73% (31, 792 km^2) of the country was either formally protected or proposed for protection. Tigers require large areas of contiguous habitat, usually 3,000- 15,000 km^2 in size for long-term survival. While forest areas of this size exist in the country only three areas are currently protected. Nearly 80% of the protected areas are less than 1,000 km^2, with 10 areas less than 100 km^2.

2. Summary of activity and main findings

As a first step towards long-term future planning for tigers in Myanmar, and to guide efforts to identify new areas for protection, a project to develop an updated National Tiger Action Plan was initiated in 1998. The primary objective of the program was to determine tiger occurrence via direct field survey across potential tiger habitats, and use this information to select areas for special protection for tigers.

Tigers may serve as conservation "umbrellas". This is the concept that protecting places with tigers effects the conservation of other wildlife and biodiversity elements with smaller ranges. The Myanmar Forest Department and the Wildlife Conservation Society initiated the program with financial support from the" Save Tiger Fund," a joint project of the US National Fish and Wildlife Foundation and Exxon Mobile Corporation.

A tiger conservation and survey techniques training workshop was conducted for Forest Department and NGO junior staff at Alaungdaw Kathapa National Park, historically known for its tigers. From the training, a team of seven participants was recruited to carry out field surveys, and conduct awareness work in communities adjacent to survey areas.

Using the results of a previous planning analysis for tigers, and updated maps of forest cover, a set of 17 potential tiger areas were identified from large blocks of forest.

Interviews of local people were done to determine likely places where tigers existed in these forest complexes and guide the selection of survey locations.

Using a field technique first developed in India, and modified for use in Southeast Asia, a team of trained staff conducted presence-absence surveys for tigers at each site. A field survey effort during 1999-2002 involving 15,000 nights with camera-traps, and 1,300 hours of sign searching across 5,500 km^2 of potential tiger habitat revealed the following results:

- Tiger occurred in less than a quarter of the potential areas;
- Based on the results of field surveys, tigers have disappeared from five areas surveyed; Alaungdaw Kathapa, Thaungdut, Mahamyaing, Nankamu, Panlaung-Pyadalin:
- Based on the results of field surveys, tigers have disappeared or occur at very low density in eight of the areas surveyed; Paletwa and Kaladan river catchment area, Sumprabum, Khaunglanphu, Paunglaung, Momeik-Mabain, Central Bago Yoma, Rakhine Elephant Range, Saramati Taung and adjacent areas;
- Based on reports from forestry officials, tigers may occur at low density in two other areas that were not surveyed; Shan Yoma (Kayah-Kayin) and S. Kachin:
- Based on the results of field surveys, tiger occur in Htamanthi Wildlife Sanctuary, Sagaing Division and surrounding areas. The population is small (<10 individuals) and is threatened with extinction:
- Based on the results of field surveys, tigers occur in a large intact forest landscape comprising Hukaung Valley and surrounding areas, in Kachin State. Moderate numbers (<50) of tigers are thought to exist there:
- Based on the results of field surveys, tigers occur in a large intact forest landscape in northern and southern Taninthayi Division. A relatively large (>50) population is thought to exist there. Together these areas represent the largest, intact habitats for tigers in Mainland Southeast Asia:
- In all areas where they persist in Myanmar tigers are threatened by poaching for commercial international trade, and poaching of prey for local consumption and local trade:

  Based on information collected during the field survey program, probably no more than 150 tigers now exist in the wild in Myanmar and the population is rapidly declining. Tiger might soon be on the verge of extinction in Myanmar if action is not taken immediately.

  Recommendations for Addressing Conservation Needs of the Tiger

  Although the situation is critical, tiger populations may potentially be recovered if the Government makes an immediate and long-term plan of action.

  The priority actions necessary in the short-term (2-5 years) for saving tigers are;

- Establish protected areas, protected corridors and priority management areas in and around the Hukaung Valley, and in Taninthayi Division to protect wild tigers and their habitat;
- Establish monitoring programs for tiger and prey population in these places to assess the effectiveness of conservation efforts;
- Reduce killing of tiger prey species and trade that has developed around those species. Train government staff in anti-poaching and anti-trafficking techniques and develop systems for patrolling these areas to ensure the preservation of these resources;
- Suppress all killing of tigers and the illegal trade in tiger products. Amend existing wildlife legislation to fall in line with international laws. Conduct wildlife conservation and awareness training for government personnel and recruit them to help identify and suppress wildlife trade;
- Define roles and responsibilities of field staff responsible for tiger conservation;

The priority actions necessary for saving tigers in the long-term (6-20 years) are;

- Improve public awareness and develop education curricula concerning the importance of tiger conservation to increase support from local people;
- Stop further loss of tiger habitat and to restore degraded habitat by practicing sustainable forest management;
- To conduct zoning of forest areas so as to avoid development and human intrusions inside tiger critical habitats;
- Strengthen international cooperation to maintain connectivity of tiger habitat across international boundaries possibly through the establishment of cooperative management of contiguous protected areas along borders.

TABLE 1: NATIONAL TIGER ACTION PLAN FOR MYANMAR

Action	Organization delivering		Timeframe / to be completed by				
	Lead	Other possible relevant partners	2003	2004	2005	2006	2007
1. Suppressing all killing of tigers and the illegal trade in tiger product							
a) Amend the Protected Wildlife and Protected Areas Law to enable the enforcement of international laws within Myanmar. This would include articles prohibiting the sale or purchase of products suggesting or implying content of tiger bones, hair, organs, blood, teeth, claws or hide.	Myanmar Gov.		✓				
b) Impose heavy fines for offenders and use partial proceeds towards implementing international legislation.	Myanmar Govt.		✓				
c) Conduct wildlife conservation and awareness training for 100 government personnel, including military, customs , police, immigration and local administrative staff in Yangon, Mandalay, Myakyina and other internal transit points for wildlife. This would include basic training in identifying wildlife protected by domestic and international legislation and knowing their protection status.	Myanmar Govt. (relevant Ministries)	WCS and other NGOs	✓				
d) Conduct wildlife conservation and awareness training for all staff in tiger sites and landscapes.	Myanmar Govt. & WCS		✓				
e)Recruit local government staff to help identify tigers in trade and encourage them to report their observations to relevant authorities	Myanmar Govt. & Mandalay, Sagning and Taninthayi Division, Kachin and Shan states	WCS and other NGOs	✓				
f) Create a Wildlife Investigation Unit to investigate and suppress crime against wildlife including trade, trafficking, illegal killing and capture habitat destruction and other persecution. The unit will enforce domestic and international legislation. The unit would include staff of the Ministries of Home Affairs, Forestry and Tourism and would report directly to the Minister of Forestry	Myanmar Govt.	WCS and other NGOs	✓				
g) Train and recruit government staff to join the Wildlife Investigations Unit. Form mobile units to suppress wildlife crime across the country.	Myanmar Govt.	WCS and other NGOs	✓				
2) Reducing killing of tiger prey species and associated trade.	Myanmar Govt.						
a) Amend the Protected Wildlife and Protected areas Law to enable the enforcement of International Laws within Myanmar. Modify Chapter V, Article 15 to recognize the international classifications of wildlife species and their associated protection status.	Myanmar Govt.	WCS	✓				
b) With the view to protecting tiger prey species, allow the commercial farming of only selected wildlife species only in facilities designated by the Forest Department.	Myanmar Govt.		✓				
c) Take action to stop all killing of prey species at places where tigers are currently or potentially found.		WCS and other NGOs					✓
d) Train government staff at Hukaung Valley and Hamtold in anti-poaching and anti-trafficking techniques. Where possible involve local military personnel as instructors.	Myanmar Govt.		✓				

e) Recruit teams of Eco Rangers whose sole responsibility is protection. Numbers of Eco rangers should at least be 3 guards/100sq Km for effective management. Provide eco rangers with necessary equipments, and salary incentives to motivate them to combat poaching.	Myanmar Govt.	WCS		✓			
f) Develop systematic patrolling inside all protected areas using Eco Rangers. Make patrolling a mandatory management activity with a monthly schedule and budget.	Myanmar Govt.			✓			
g) Update the Wildlife Law to include protection for wildlife outside protected areas, and empower government staff to enforce the legislation.	Myanmar Govt	WCS		✓			
h) Outside protected areas, study paterns of hunting and consumption of wildlife to determine its sustainability especially for prey species.	WCS				✓		
i) In the List of Protected Animals (Ministry of Forestry, 1994), promote the following tiger prey species from Protected status to Completely Protected status; Wild buffalo (*Bubalus bubalis).*	Myanmar Govt		✓				
j) In the List of Protected Animals (Ministry of Forestry, 1994), promote the following tiger prey species from Seasonally Protected status to Protected status; Hog deer *(Axis porcinus)* and Barking deer *(Muntiacus muntjak).*	Myanmar Govt		✓				
k) Wildlife conservation and awareness training for all wildlife offenders.	Myanmar Govt	WCS		✓			
l) Impose fines for wildlife offenders in tiger areas with proceeds towards supporting tiger conservation activities.	Myanmar Govt			✓			
3.Improving forestry management to stop further loss of tiger habitat and to restore degraded habitat.							
a) The National Code of Forest Harvest Practice involves 30 year cutting cycles and use of elephants for removal of logs reduce environmental damage over other practices. Apply this traditional method of forest harvest effectively in all concessions in the country.	Myanmar Govt	WCS, FAO, UNDP			✓		
b) Ban the hunting of wildlife in forest harvest areas.	Myanmar Govt	WCS			✓		
c) Provide wildlife conservation awareness and education training to timber harvest staff.	WCS	Myanmar Govt		✓			
d) Define Strict Conservation Zones for Hukaung Valley and Htamanthi where no human use of natural resources is allowed. Create buffer areas to allow restricted use by local people including extraction of non-timber forest products, fuel wood collection and live stock grazing. Ban shifting cultivation and hunting of all kinds in the buffer area. Use Eco Ranger patrol teams to enforce the restrictions.	Myanmar Govt	WCS	✓				
4. Improving forestry management to reduce intrusions of local people into tiger habitat and improve planning to avoid development in tiger critical areas							
a) Reclaim plantations and revoke all mining licenses in Hukaung Valley and Htamanthi Wildlife Sanctuaries.	Myanmar Govt						✓
b) Consider the location of government camps and permanent settlements outside of these reserves.	Myanmar Govt						✓
c) Ban the construction of roads in protected areas and forest reserves.	Myanmar Govt			✓			

d) Close or limit access along logging roads in Taninthayl Division to reduce the risk of collisions with tigers	Myanmar Govt				✓		
e) Include wildlife assesment in land development programs for Taninthayl Division	Myanmar Govt	WCS	✓				
f) Develop education programs to improve awareness about wildlife for local people living in and around forest reserves in Taninthayl Division.	WCS	Myanmar Govt		✓			
5. Establishing protected areas, ecological corridors and priority management areas to protect wild tigers and their habitat							
a) Revise or create management plans for Hukaung Valley and Htamanthi to include specific actions for conserving tigers, including recommendations in 2,…3,…4 and below	Myanmar Govt and WCS			✓			
b) Expand Htamanthi Wildlife Sanctuary to increase its size to at least 3,000 sq.km to ensure long term survival of tigers	Myanmar Govt.	WCS		✓			
c) Create a dedicated tiger reserve including the Hukaung Valley and adjacent forest reserves. The reserve will serve to link tiger populations in India with those in Myanmar. Expand the eastern border of Hukaung Valley Wildlife Sanctuary to protect potential tiger habitat in the Sumprabum area	Myanmar Govt.			✓			
d) Establish limited human use zones (buffers) that will soften the edges of Hukaung Valley and Htamanthi reserves reducing the risk of mortality for tigers	Myanmar Govt.			✓			
e) Create new protected areas or special tiger management zones in the Taninthayi Division, including the Lenya River, Greater and Lesser Taninthayi River catchments. These sites will protect tigers and their habitats and allow limited human use of natural resources around the reserves in a manner complementary to tiger conservation	Myanmar Govt.						✓
f) Use existing GIS capabilities in the FD to identify and demarcate special management zones and corridors for tigers	Myanmar Govt. and WCS			✓			
6. Improving international cooperation and establish cooperative management of contiguous protected areas along borders to maintain connectivity of tiger habitat across international boundaries							
a) Conduct wildlife conservation and awareness training for 100 government personnel, including military, customs, police, immigration and local administrative staff, stationed near or on country borders. This would include basic training in identifying wildlife listed in the Myanmar Protection of Wildlife and Protected Areas Law 1991, and knowing their protection status	Myanmar Govt. and WCS			✓			
b) Hold 2 internal workshops involving local government officials to discuss trans border issues including trade, trafficking and wildlife and develop plans to suppress the trade	Myanmar Govt.	WCS	✓				
c) Recruit local government officials on both sides of the Thailand border to suppress trans border wildlife trade at Mawdaung-Prachuap Kiri Khan, Kaleinaung-Ban Tong Kawthaung-Ranong (especially Tha Htay Island), Myawaddy-Mae Soi, Three Pagoda Pass and Tachleik MaeSoi and prevent access by professional poachers from Thailand	Myanmar Govt., Thailand Govt.	WCS		✓			
d) Create a tiger reserve in Taninthayi Division opposite Thailand protected areas that support large populations of tigers, Western Forest Complex and Kaeng Krachan National Park	Myanmar Govt.			✓			

e) If possible expand the reserve or create new reserves to form a corridor between these two Thai reserves	Myanmar Govt.						✓
f) Develop a spatially explicit tiger conservation database for the Huai Kha Khaeng-Thung Yal Naresuan TCU (Level I TCU 73)	Myanmar Govt. & WCS, Thailand Govt.	WCS			✓		
g) Where possible coordinate antipoaching patrols and/or wildlife surveys on both sides of the Thailand Myanmar border	Myanmar Govt.				✓		
7. Monitoring the status of the tiger and prey population to assess the effectieness of conservation efforts							
For Hukaung Valley landscape:							
a) Identify critical habitats and core areas for tigers and prey across the landscape	Myanmar Govt., WCS		✓				
b) Estimate numbers of female tigers within the landscape and ascertain that there is a reproductively viable population of tigers	Myanmar Govt., WCS		✓				
c) Document the current threats, demographics and range of human activities that must be taken into account if the proposed landscape is to be successful and sustainable in the long term	Myanmar Govt. & WCS			✓			
d) Create a GIS Map and database to show current land use patterns, possible future land use trends and tiger and prey source areas.	Myanmar Govt. and WCS			✓			
For Taninthayl Division landscape:							
e) Train local foresters how to identify tiger and prey via sign surveys, in use of camera traps for wildlife survey and methods for making observations and recording data.	WCS			✓			
f) Determine occupancy of habitats in accessible sites across the landscape, including Myintmoletkat and Lenya River areas, away from sites where tiger are known.	Myanmanr Govt. and WCS					✓	
g) Determine prey abundance using line transect sampling.	Myanmar Govt. & WCS				✓		
h) Determine tiger abundance using double sided camera trap sampling.	Myanmar Govt. & WCS				✓		
For sites in Paletwa and Kaladan river catchment, Sumprahum Khaunglanphu Paunglaung Momcik Mabain Central Bago Yoma Rakhine Elephant Range, Saramati Taung Area.							
i) Train local foresters how to identify tiger and prey via sign surveys.	WCS		✓				
j) Determine occupancy of habitats at the sites using sign surveys.	Myanmar Govt. and WCS		✓				
k) Establish a logbook to record observations of tiger and prey and encourage use of the logbook.	Myanmar Govt. and WCS			✓			
8. Improving public awareness of the importance of tiger conservation to increase support from local people.							

a) Develop wildlife education programs to discourage hunting by local people in and near tiger reserves. Where possible recruit local people, especially ex-hunters to help implement these programs.	WCS			✓			
b) Involve 50 local people in wildlife survey and research activities to make positive use of their local or indigenous knowledge.	WCS	Myanmar Govt.	✓				
c) Collaborate with authorities in charge of development projects to include wildlife conservation as a component of those projects and resolve any potential conflicts between the needs of people and wildlife.	Myanmar Govt. & WCS		✓				
d) Produce a documentary about tiger conservation in Myanmar and broadcast it on National Television.	WCS			✓			
e) Dub existing wildlife documentaries about Myanmar into local language and broadcast.	WCS		✓				
f) Adapt WCS education materials about tigers into Myanmar language and implement a special training program for school children at selected high schools in Yangon and adjacent to Tiger reserves.	WCS			✓			
9) Defining roles and responsibilities of personnel responsible for tiger conservation							
a) Provide special training for managers of tiger reserves in management techniques, including leadership skills, decision making, planning, protection, use of information and technology and personnel management.	WCS		✓				
b) Invite managers of tiger reserves to observe the day to day operations in selected tiger reserves in India and Thailand.	WCS	Thailand, India Govts.		✓			
c) Define roles for junior staff in Hukaung Valley and Htamanthi Wildlife Sanctuaries and for Taninthayi Division junior forestry staff, and staff in other areas in conducting field monitoring of tigers and prey.	Myanmar Govt.		✓				

PART I

INTRODUCTION

Myanmar is a high priority country for biodiversity conservation in Asia with extensive forested landscapes, high species diversity and endemism (Wikramanayake et al. 2001). This diversity ranges from rich alpine floras and tropical pine forests in the north, to dry dipterocarp and mixed deciduous forest in central dry zone, to tropical rainforests in the Peninsular. Coral reef ecosystems in the Myeik Archipelago are among the least disturbed in the region.

Unique to the region natural forests in Myanmar cover a third of the country, including large intact expanses with low human inhabitation (UNEP 1995). Prior to 1994 the country had <1% of lands in protected areas but by 2002 this had increased to just under 5% (Fig. 1), a 500% increase in size in less than a decade. While most reserves in the system are too small to support tigers, later additions to the system include large expanses of forest and corridors between areas that are more than enough to support tigers as well as other species with large area requirements.

Deforestation in neighbour countries brought about by unsustainable land-use practices has led to pressure on Myanmar's natural resources, especially in border areas in the far north and south which contain high biodiversity but are difficult to access and monitor. Logging, extraction of forest products, loss and fragmentation of forests and hunting have reduced wildlife populations and their habitats.

The remainder of this essential reading section includes a review of the pressing threats to tigers in Myanmar (Part 2), a review of the history of conservation planning for tigers (Part 3), a summary of the current status and distribution of tigers in the country (Part 4), and a rationale for the National Tiger Action Plan (Part 5), with proposed solutions for addressing the threats, for recovering tiger populations and guiding future conservation efforts in the country.

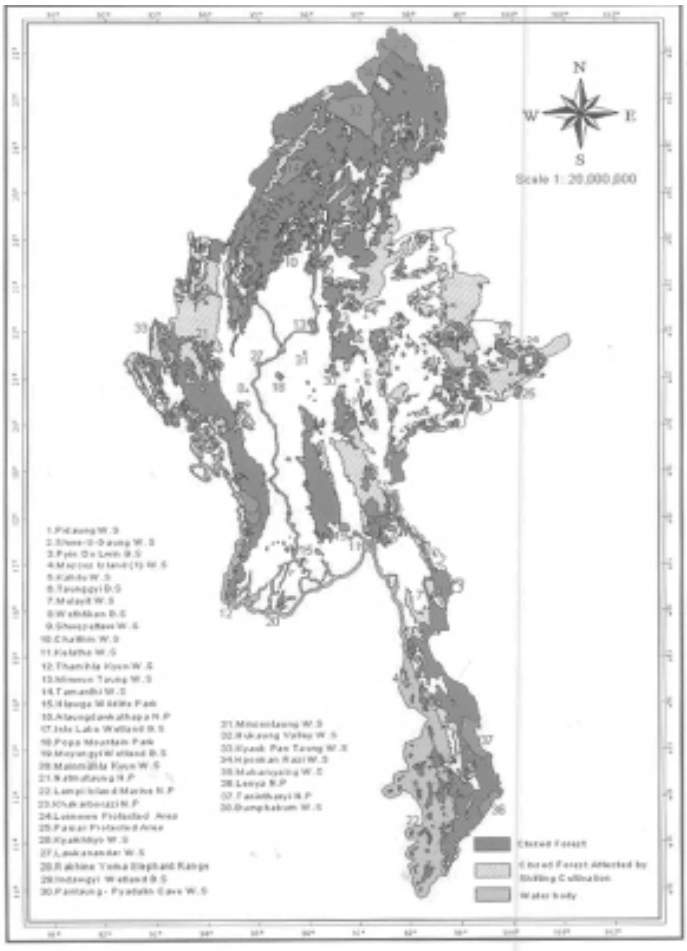


Fig. 1. Forest cover, existing and proposed protected areas of Mayanmar-2002

PART II

THREATS TO THE TIGER

Although tiger is potentially found over a wide range of habitat and disturbance conditions, it is sensitive to a variety of human influences. The prospects for tiger survival in places where they occur in Myanmar are affected by a number of key threats;

1. Hunting for commercial trade in tiger products - The hunting of tigers has a long history in Myanmar- (Pollok & Thom 1900). Tigers were traditionally considered pests and until 1931 the government provided licenses and rewards for killing them. This led to depopulation on a massive scale through sport hunting. For example, during a 4 year period from 1928-1932,1,382 tigers were reported killed in British Burma (Prater 1940), an order of magnitude larger number than the current tiger population in Myanmar. Tigers were historically widespread in Myanmar (Fig. 2) although their densities were not uniform across intact habitat, possibly a result of variation in hunting pressures from place to place (Prater 1940). More recently, declining tiger populations across the range combined with increasing prosperity of Asian countries, have led to an increasing demand for tiger products for traditional Chinese medicines. Various tribal groups hunted tigers to supply the trade (Rabinowitz 1995) leading to their extirpation in some areas (Rabinowitz 1998). The sale of tiger products was banned by CITES since 1975 but thrives in the black market, especially in some border areas where it is uncontrolled (Fig. 3a). Although it is difficult to measure the size of the trade, at least 10,000 kg of tiger bone representing 500-1,000 tigers was imported by East Asian countries between 1970 and 1993 (Hemley & Mills 1999). Tiger hunting continues in those areas that still contain tiger (Fig 3b.). As the population declines every tiger killed makes the harvest an increasingly unsustainable one. To demonstrate the efficiency of the trade, Myanmar shopkeepers on the Thai border claim they can provide a tiger within 3 days for a deposit of US $12. Direct hunting of tigers threatens to drive the Myanmar population to extinction. Improved domestic legislation combined with monitoring of markets and law enforcement can contribute to reducing the trade in tiger parts.

2. Prey depletion - Since it is dependent on a relatively large intake of food to support its metabolism, tigers are sensitive to loss of prey through hunting (Karanth & Stith 1999). The erosion of available energy has a "bottom-up" effect on ecosystem structure (Seidensticker 2002). Myanmar's per capita income in 1998 was US$1,200, making it one of the poorest countries in the world. People living in and around forested areas traditionally hunted wildlife for subsistence. More recently local people hunt to supplement increasingly meager incomes from farming. This trend is widespread (Rabinowitz 1995) occurring in up to 70% of protected areas (Rao et al. 2002). Trade in tiger prey species occurred near all the places where the National tiger Team conducted field surveys during 1999-2002. The illegal trade in wildlife is globally worth $7 billion a year, only less than the trade in arms and drugs (Kanwatanakid et al. 2000). Myanmar is a part of the trade in Asia with a network of markets and routes established to supply the demand in China and Thailand. Markets for the sale of wild, meat and trophies, of tigers and prey species have existed along the Thai border at Tachileik, Myawady, Three Pagodas Pass and Maung Daung for a long time and continue to offer wildlife prohibited by CITES (Bradley-Martin & Redford 2000; Hill 1994; International 1999; Bennett and Rao 2002). The volumes of wildlife in the trade fluctuate according to the security situation, and decreased following the cancellation of Thai logging concessions after 1993, and escalation of hostilities between KNU and the Myanmar government after 1996 (International 1999). There is some evidence to suggest that some of the Thai border wildlife trade may have moved to Yangon. As an example, several restaurants and shops in central Yangon offers a range of wild meat dishes, and tonics made from animal parts (A.J. Lynam personal observation). In contrast, wildlife trade is rampant and uncontrolled in Shan State, especially towns near the China border (Than 1998) (Fig. 4.). Prey and tiger populations may be restored in the wild if they can be protected from hunting and wildlife trade (Madhusudan & Karanth 2002).

3. Habitat loss, degradation and fragmentation - Myanmar had an estimated 46.6% closed forest cover in 1990, with 37.4% remaining in 1997 (FAO 2000), one of the highest levels in the Asia - Pacific region. The net deforestation rate between 1989 and 2000 was 0.21% (Brunner et al. 2002), a fraction of the deforestation rate in Thailand during the same period. Deforestation is highly concentrated and is largely a result of logging in forest reserves (Rao et al. 2002)(Fig. 5). While forests are easily cut down they are only restored with great investments of time and resources (Elliott et al. 2000), usually beyond the capacity of forestry budgets. Except in parts of Shan State, where remaining forest resembles the highly fragmented situation in Thailand, large

extensive tracts of closed forest characterize the Myanmar landscape providing good potential tiger habitat (Fig. 1). Disturbance that degrades or destroys natural forests, including grazing by domestic animals, shifting and permanent cultivation, mining, permanent human settlements, and plantations occur in 90% of protected areas (Rao et al. 2002). These threats could be reduced by improved agricultural and animal husbandry practices, and improved land-use planning.

4. Harassment and displacement -Rural development has progressed slowly in Myanmar so that dams, roads, pipelines, power lines, and settlements - infrastructure that disrupt wildlife populations by creating barriers to dispersal (Goosem 1997) -have had localized effects on tiger populations. For example, roads occur in only 25% of Myanmar protected-areas (Rao et al. 2002) (Fig. 6) and most are non-paved and seasonal access only. However, roads whatever their condition provides improved access to forests for poachers. Because tigers often use non-paved roads as movement corridors, this potentially increases the chances of encounter with humans. Aside from human infrastructure, the disturbance caused by local people entering forests to engage in the extraction of non-timber forest products (Fig. 7.) can have adverse affects on tiger behaviour. Such disturbances occur in 85% of protected areas (Rao et al. 2002), and probably reflect the incidence in non-protected forests, so the effect may be considerable. Improved land use planning and zoning in forest reserves can reduce the threat from internal fragmentation.

5. Genetic erosion - A number of studies have shown that small populations are more likely to go extinct than large ones. One of the reasons is that at small size, survival rate or reproductive rate of a population is reduced because its members have difficulty finding mates, sex ratios are skewed, and they tend to breed with related individuals (Allee 1931). This results in a net loss of genetic variation, sometimes expressed by an increase in expression of deleterious mutations through homozygosity. Fitness is often reduced in the process. Despite this, many populations have persisted for long-periods of time with low levels of genetic variation e.g. cheetahs (Caro 2000). It is likely that genetic and demographic processes interact so that as populations decline it is increasingly harder to recover them (Gilpin & Soule 1986). Tigers in severely fragmented habitats in Myanmar would fall into this category. Maintaining natural corridors between forest patches inhabited by tigers can reduce this threat.

6. Protected area management - Myanmar is one of the least externally funded and internally protected tropical countries in Asia (Balmford & Long 1995) .As a result while forests have been conserved for timber production for almost 150 years (Bryant 1997), and the earliest protected area was gazetted in 1918, legislation to protect both wildlife and their habitats was only introduced in 1994. Wildlife training for protected area staff was initiated in 1995 with only a third of staff having received training (Rao et al. 2002) (Fig. 8). Only since 1998 have protected areas been designed to protect entire landscapes and the ecological processes within. Consequently, many of the older protected areas e.g. Pidaung Wildlife Sanctuary, no longer support tigers and other wildlife because of large-scale degradation and loss of habitat inside them. A recent review found that human activities incompatible with conservation occur in every protected area (Rao et al. 2002). Extraction of non-timber forest products occurred in 85% of the areas, hunting in up to 70%, while buffer zones for the protection of core forest zones were generally lacking.

Fig. 2. Historical records (pre-1999) of Tiger occurrence in Mayanmar

The combined effect is a loss of habitat quality for tigers. Myanmar protected areas (Fig. 1.) currently do not provide adequate representation of the diversity of habitats inhabited by tigers. Reserve managers need training to understand threats to wildlife, and how to best manage available resources to enable effective conservation of wildlife. In general, the roles and responsibilities of protected area staff need to be carefully defined so that available personnel cover important tasks.

7. Social perception -Where tiger populations have been decimated, their long-term recovery can be ensured only by a combination of political will and acceptance by people living in and around tiger areas. If tigers are worth more dead than alive to local people, then efforts to preserve tigers in the human dominated landscape will fail. Awareness and education of the importance of tigers can be improved through dedicated learning programs.

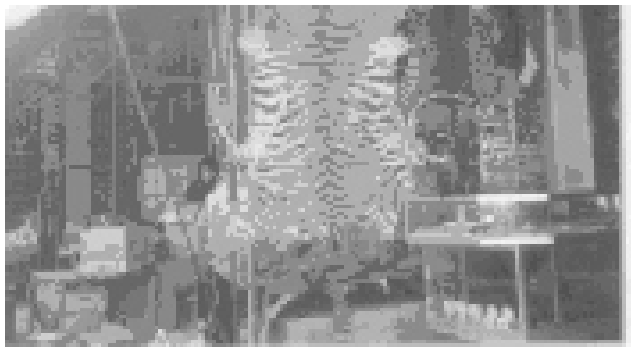


Fig. 3a. Tiger skin for sale in Tachileik market, Shan State.

Fig. 3b. Poacher recrded by camera-trap at Paunglaung Catchment, Mandalay

Fig. 4. Wildlife for sale at Mongla market, Shan State

Fig. 5. Logging reduces available habitat, and alters habitat quality for tigers and their prey

PART III

BRIEF HISTORY OF CONSERVATION PLANNING FOR THE TIGER IN MYANMAR

Previous attempts to estimate the Myanmar tiger population were based on habitat models. Using information on existing forest cover (Collins 1991), and assuming tiger densities of 0.6-1.0 individuals/100 km^2 from other places (Rabinowitz 1993a), a conservation plan estimated 600- 1,000 tigers for Myanmar across 12 priority areas and other fragmented populations (Myanmar Forest Department 1996). A previous tiger action plan recommended surveys to estimate population sizes in the priority areas, creation of tiger reserves, strengthening of institutional capabilities to protect tigers, a national policy and long-term action plan, increasing public awareness and cooperation with other tiger range countries.

Uga and Than (1998) revising this plan considered the original population estimates as overestimates and

suggested the true numbers might be in the range 250-500. They considered tigers probably occurred in potential areas defined by tiger Conservation Units (TCU's) (*sensu* Dinerstein et al. 1997). They defined a set of priority actions for tigers including training of government staff, mapping of habitats, field assessments to identify critical tiger populations inside and outside of protected areas, and actions to preserve these populations, including tiger reserves and protection of corridors, and the formation of mobile education units to provide awareness. This set the stage for the development of a new updated The National Tiger Action Plan that was proposed to the Myanmar Government in June 1998 (WCS 1998).

Fig. 6. Road construction opens up the forest facilitating access to poachers

A number of important actions were taken as part of the new project;

1. A special tiger survey and conservation-training course was provided to 23 protected area and forestry staff at Alaungdaw Kathapa National Park, during December 1998.
2. A seven-member National Tiger Survey Team was selected from the training participants to be responsible for spearheading research and conducting tiger surveys within Myanmar.
3. Priority areas for tiger surveys were located and mapped.
4. Surveys to determine tiger presence-absence and prey relative abundance were done in high priority areas, and threats to tigers documented for these areas.
5. A tiger information database was created from current and historical data for use with designing tiger conservation activities and decision-making.
6. Official meetings were held with Myanmar government officials, to present information on tiger status in order to draft and produce a The National Tiger Action Plan for the Union of Myanmar.

PART IV

STATUS AND DISTRIBUTION OF TIGERS IN MYANMAR - 2002

Direct field surveys for tigers were done at 17 sites (Fig. 9; see also Appendix I for site descriptions). Although the survey efforts covered only 1.3% of areas with forest cover, these sites were places where tigers were known historically, and where the most recent

Fig. 7. The extraction of rattan and other non-timber forest products is often done on a massive scale and affects habitat quality for tigers and their prey

Fig. 8. Mayanmar foresters undertaking basic wildlife training with the author, Alaungdaw Kathapa National Park, December 1998

available evidence, including reports from foresters and local people, suggested tigers might still be found. The surveys provided new and unique records of occurrence for 19 globally threatened species, 25 CITES listed species and 45 Myanmar protected species (Appendix II).

4.1 Tiger status and distribution -Tigers were reported present at 88% of sites, but confirmed by direct survey in just 23% of sites (Table 2) .The rate at which tigers were "caught " (detected) by camera-traps was just over 3,000 trap nights of sampling per photo-record. For example, if 30 camera-traps were placed in the field each for l00 days, one might expect on average 1 photorecord of tiger from the survey effort. In comparison, using a similar survey design in Thailand (Lynam et al. 2001), tigers were reported at all seven potential tiger sites, and detected at 86% of the sites, for a capture rate of just over 200 trap-nights per photo-record. For example, of 20 camera-traps were placed for 10 nights, one might expect to get a single photo-record of tiger. The survey effort required to find a tiger at the Myanmar sites was an order of magnitude higher than at the Thailand sites.

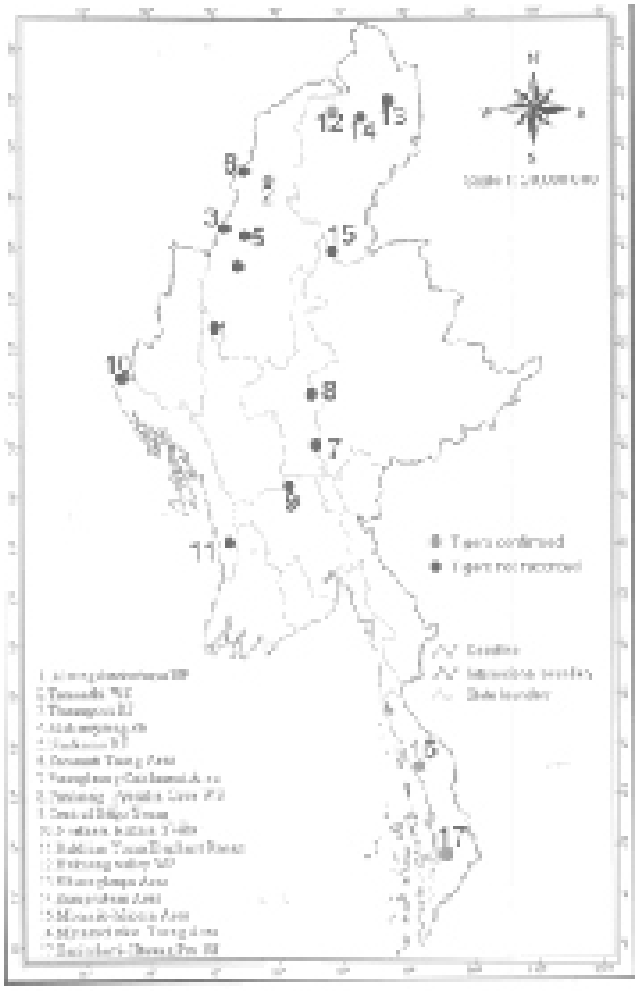
Table 2.Comparison of tiger survey results inmmyanmar and Thailand.

***All Thailand sites were in long-established protected areas**

Several features of the data warrant further explanation. Firstly, tigers were detected at a low proportion of sites where tigers were reported. Some local people living in and near forest areas apparently perceive other animals in the forest as tigers. For example in Alaungdaw Kathapa National Park, rangers mistook tracks of Golden cat and Asiatic leopard for tiger, and because these two species were abundant near

park headquarters, the rangers reported tiger as common (Lynam et al. 1999) .As a result, a conservation agency mounted a campaign to"Save tigers of Alaungdaw Kathapa ", when direct survey efforts across 25% of the park found no tigers. A wider monitoring of habitats found no further evidence of tigers suggesting that they are now extirpated from the Park. Clearly, some rangers and local people cannot resolve tiger tracks and signs from other cat species, and need further training to be able to do so with some degree of confidence.

Almost a third of the reports of tigers were of direct sightings made after 1990 (Appendix III). The two extreme explanations are that all local people made mistakes in identifying tigers e.g. they saw something else but reported tiger, or that all local people actually saw tigers when they reported seeing tigers. The truth probably lies somewhere between the extremes. It is possible, at least for more disturbed sites, that tigers are no longer resident but populations instead consist of transient individuals that hold no territory or defined



home range (G. Schaller pers. comm., 2002). These transient individuals might cover relatively large areas in search of food and mates, returning to a place only after a lengthy period of time. This would explain their absence during the surveys but infrequent recent reports from locals.

Differences in survey technique or skill levels are unlikely to explain the differences between tiger occurrence at Myanmar and Thailand sites. Training for field staff was standardized and given by the same trainer (A.J. Lynam). Sign surveys were conducted with the same degree of rigor and camera-trap locations chosen in the same ways by teams in the different countries. If tigers were present they should have turned up in the surveys in Myanmar. However, if tigers are

absent or not continuously present at a site, then their probability of detection by any survey method would be less than one. Where tigers occur at very low density e.g. <0.38 tigers/ l00 sq. km, a mammoth survey effort is required with camera-traps to detect tigers (Carbone et al. 2001). That tigers were found in only three of 17 areas surveyed, whereas other large mammals were detected at frequencies similar to the Thai reserves, suggests that the observations are real. Tigers were either absent or non-resident, or occurred at very low density at most of Myanmar survey sites, at the time of survey. Since the sites chosen were the best potential sites given all the information available prior to the surveys, the suggestion is that tiger in Myanmar has suffered a range collapse and is in an advanced state of decline towards extinction.

Important to note is that the Thailand sites were all established protected areas with a history of protection. Only two Myanmar sites were protected areas, and tigers were found in one of the areas. Protection at Thai sites, combined with a lower intensity of directed poaching for tigers there explains why tigers have persisted there better than at Myanmar sites. Despite the differences in occupancy patterns for tigers, sites in both countries had similar richness and abundance of large mammals, suggesting similar availability of prey for tigers. Therefore, Myanmar sites have good potential for the recovery of tiger populations.

4.2 Tiger population size -It is impossible to know the true number of tigers remaining in Myanmar and difficult to estimate numbers. Because of their rarity and cryptic behaviour, tigers cannot be directly counted, and sampling is required to estimate numbers. However, it is impossible to sample every square mile of every potential habitat using camera-traps.

Despite these limitations, tiger team attempted to estimate very roughly how many tigers might be present across the suite of available habitats. They did this not by considering the extent of available habitat, assuming a density and a correction factor, and extrapolating tigers numbers (Rabinowitz 1993; Uga and Than, 1998). Instead they used a subjective approach, by sitting down at a table. poring over maps, and field notebooks, considering information from sign surveys and locations of camera-trap captures, and the most reliable interview data, and arriving at a consensus among themselves. Given their expert knowledge - they know more about the recent natural history of the study sites than any other workers - they estimated the numbers in Table 3. These numbers are one estimate of the remaining tiger population of Myanmar.

In the absence of independent verification, the numbers are educated "guesstimates". However, it is possible to independently estimate tiger numbers for the Hukaung Valley using a modification of the approach of Rabinowitz (1993), and the estimate of tiger density (0.91 "- 1.29 tigers/l00 sq. km; see section 6.8.7). If one assumes a 50% reduction in tiger density because of direct poaching of tigers within the reserve (the most serious threat to tigers in Myanmar), and an additional 20% reduction due to hunting, forest fires, smaller settlements and human access provided by the Ledo Road, the number of tigers in the reserve (6,460 sq. km) is 18- 25. This estimate is strikingly similar to that derived by the consensus approach (15- 20; Table 3). While the estimates may have some validity, carefully designed mark -recapture studies will however be needed to determine the size of tiger subpopulations in the areas in Table 3.

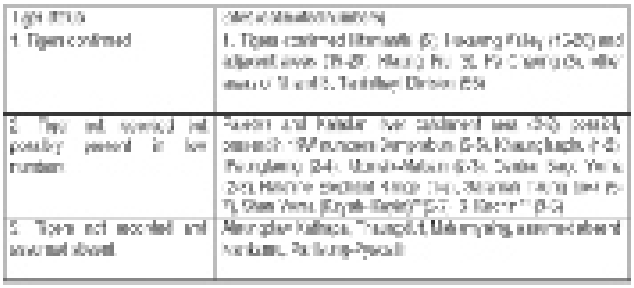


Table 3. Status of tigers in Myanmar*

* Numbers are estimates based on consensus approach of Myanmar Tiger Team surveyors.

** Indicates areas that were not surveyed. Evidence for tigers comes from unconfirmed reports from local people and foresters

PART V

RATIONALE FOR A NATIONAL TIGER ACTION PLAN FOR MYANMAR

Potentially tigers are recoverable to their former abundance across their range in Myanmar. In practice however, full recovery is unlikely. This section describes a Plan for recovering tigers to a semblance of their former abundance in key parts of their range where they still exist, and restoring areas where tigers have been lost so that natural recolonization might in future occur in those places. Broadly, the Plan will work towards increasing tigers, prey and habitat, which are "measurable currencies" for tiger conservation (Ginsberg 2001).

The Plan will be implemented over a 5-year period between 2003-2007. This will allow a number of targets to be achieved over spatial scales relevant to tiger conservation (Ginsberg 2001);

- Site (an area containing at least several breeding female tigers) e.g. Htamanthi Wildlife Sanctuary is a tiger site.
- Landscape (a larger area containing several populations of females and habitat connections between the populations) e.g. the Hukaung Valley, and forest reserves in Taninthayi Division are tiger landscapes.
- Tiger Conservation Units (TCU's) (areas encompassing several landscapes) e.g. the Northern Triangle TCU (60) which contains Hukaung Valley, Huai Kha Khaeng'- Thung Yai Naresuan TCU (73) which includes Taninthayi Division.

The targets for tiger conservation will vary according to timeframes and spatial scales but fit into the general framework given in Table 4. By the end of the implementation period, the short-term targets should be realized. An annual review of progress is suggested with a comprehensive review of progress towards achieving the short-term goals at the end of 2007. Success at reaching the short -term targets will set the stage for meeting the longer- term (10- 20 years) targets. Important to recognize is the fact that efforts to save tigers in Myanmar are part of a larger global effort to save the species. The recovery of tigers in Myanmar will contribute towards the larger goal of species recovery across the range.

The Plan addresses the key threats to achieving these goals for tigers in Myanmar, described in section 3 (above); (a) Hunting for commercial trade in tiger products, (b) Prey depletion, (c) Habitat loss, degradation and fragmentation, (d) Harassment and displacement, (e) Illegal trade in tiger products, (f) Genetic erosion, (g) Protected Area management, (h) Social perception.

Specifically, implementation of the Plan will reduce the key threats by,

1. Suppressing all killing of tigers, and the illegal trade in tiger products.
2. Reducing killing of tiger prey species, suppress associated illegal trade.
3. Improving forestry management to stop further loss of tiger habitat and to restore degraded habitat.
4. Improving forestry management to reduce intrusions of local people into tiger habitat, and improve planning to avoid development in tiger critical areas.
5. Establishing protected areas, ecological corridors and priority management areas to protect wild tigers and their habitat.
6. Improving international cooperation and establish cooperative management of contiguous protected areas along borders to maintain connectivity of tiger habitat across international boundaries.
7. Monitoring the status of tiger and prey population to assess the effectiveness of conservation efforts.
8. Improving public awareness of the importance of tiger conservation to increase support from local people.
9. Defining roles and responsibilities of personnel responsible for tiger conservation.

5.1 Suppressing all killing of tigers and the illegal trade in tiger products

Table 4. Targets for tiger conservation with various time and spatial scales (adapted from Ginsberg. 2001)

	Targets	
	Short Term (2 - 5 years)	Long Term (10 - 20 Years)
SITE(an ear containing several Maintain occupancy breeding females) e.g. Htamanthi Widlikfe Sanctuary, forest reserves in Taninthayi Division	• Maintain occupancy of tiger habitat • Define critical areas within sites • Stabilize present tiger populationss • Prevent loss of tigers	• Maintain potentially breeding populations of tigers at maxiumum density • Maintain expanding population (at >1) • Strictly protect core areas
LANDSCAPE(A larger area containing several populations of breeding females) e.g. Hukaung valley, Taninthayi Division	• Maintain potential for dispersal between site	• Maintain ecologically functioning viable tiger populations. • No human intervention required to achieve stable/ growing populations • Recolonization of empty habitat
TIGER CONSERVATION UNIT (An area containing several landscapes) e.g. the Northern Triangle TCU(60), Huai Kha Khaeng - Thung Yai Naresuan (TCU (73)	• Maintain integrity of intact habitat • Maintain sufficient prey base • Maintain multiple landscape including transboundary landscapes in each TCU • Coordinate establishing protected areas across boundaries • Promote tiger friendly conservation in each country in TCU	• Re-establish connections between sites and landscapes to ensure genetic exchange • Maintain heterogeneity of eco region

Specific issues and action items for achieving the targets of tiger conservation in Myanmar are detailed as follows. For ease of reference the action items are also listed in Table 1 along with a proposed timetable for their implementation, and responsible agencies.

5.1.1 Key issues

a) The trade in tiger products is part of the illegal trade in wildlife worth an estimated US$7 billion annually (Bennett and Rao 2002).

b) Myanmar is one of the countries supplying tiger trade and has a well-developed network involving poachers, middlemen and trafficking routes to move tiger products from forest to market (Bennett and Rao 2002).

c) The hunting of tigers to supply the trade has been the ultimate cause of extirpation of wild tigers from multiple forest and nature reserves e.g. Alaungdaw Kathapa, and entire regions e.g. northern Myanmar (Rabinowitz 1998).

d) Knocking off the top predator can have destabilizing effects at lower trophic levels in tropical ecosystems (Seidensticker 2002).

e) Tiger populations that exist today are being decimated by hunting and face certain extirpation in the short-term if action is not taken (Kenney et al. 1995; Seidensticker et al. 1999).

5.1.2 Key actions

a) Amend the Protected Wildlife and Protected Areas Law (SLORC, 1994) to enable the enforcement of international laws within Myanmar.

This would include laws prohibiting the sale or purchase of products suggesting or implying content of tiger bone, hair, organs, blood, teeth, claws or hide. Completion date: December, 2003

b) Impose heavy fines for offenders and use partial proceeds towards implementing international legislation. Completion date: December, 2003

c) Conduct wildlife conservation and awareness training for l00 government personnel, including military, customs, police, immigration and local administrative staff in Yangon, Mandalay, Myitkyina and other internal transit points for wildlife. This would include basic training in identifying wildlife protected by domestic and international legislation, and knowing their protection status. Completion date: December, 2003

d) Conduct wildlife conservation and awareness training for all protected area staff.

Completion date: December, 2003

e) Recruit local government staff to help identify tigers in trade and encourage them to report their observations to relevant authorities. Completion date: December, 2003

f) Create a Wildlife Investigations Unit to investigate and suppress crime against wildlife, including trade, trafficking, illegal killing and capture, habitat destruction, and other persecution. The unit will enforce domestic and international legislation. The unit would include staff of the Ministries of Home Affairs, Forestry and Tourism and would report directly to the Minister of Forestry. Completion date: June, 2004

g) Train and recruit government staff to join the Wildlife Investigations Unit. Form mobile units to suppress wildlife crime across the country. Completion date: June, 2004

5.2 Reducing killing of tiger prey species and associated trade.

5.2.1 Key issues

a) "Tigers cannot survive where they lack access to ungulate prey that is at least about half their own body mass because of mass-specific energy needs." (Seidensticker 2002)

a) Because tropical forests support ungulates at relatively low densities, the killing of prey has been the proximate cause of the decline in tiger populations in Mainland Asia (Karanth and Sttith 1999).

b) Few, if any ethnic communities rely on large mammals as a subsistence source of protein but trade in wild meat, horns, fur, hides and other products is part of a massive illegal trade in Myanmar, and is well developed in border areas where enforcement is difficult (Rabinowitz 1998; Martin and Redford 2000).

c) The commercial farming of wildlife provides a potential legal mechanism for the poaching of wild individuals to supply the trade and may contribute to the extirpation of some species.

d) Evidence suggesting that hunting can be sustainably managed exists for only a few tropical wildlife species but evidence that wildlife harvest is unsustainable exists for a vast number of species (Robinson and Redford 1994; Robinson, and Bennett 1999).

e) Protected areas are currently understaffed and ill equipped to prevent the loss of wildlife to poachers (Bennett and Rao 2002).

f) The presence of forest guards in sufficient numbers can mitigate against hunting of wildlife (Bruner et al. 2001).

g) Outside of protected areas, laws governing wildlife are difficult to enforce because staffing is low and capacity is low.

5.2.2 Key actions (in addition to those described above for tigers but are generally relevant)

a) Amend the Protected Wildlife and Protected Areas Law (SLORC 1994) to enable the enforcement of international laws within Myanmar. Modify Chapter V, Article 15 to recognize the international classifications of wildlife species, and their associated protection status. Completion date: June 2003.

b) With the view to protecting tiger prey species, allow the commercial farming of only selected wildlife

species only in facilities designated by the Forest Department. Completion date: June 2003.

c) Allow the hunting of wildlife species only when scientific evidence proves it can be done sustainably. Completion date: June 2003.

d) Take action to stop all killing of prey species at places where tigers are currently or potentially found. Completion date: December 2007.

e) Train all government staff at Hukaung Valley and Htamanthi, in anti-poaching and anti-trafficking techniques. Where possible involve local military personnel as instructors. Completion date: December 2003.

f) Recruit teams of EcoRangers whose sole responsibility is protection. Numbers of EcoRangers should at least be 3 guards /100 sq.km for effective management. Provide EcoRangers with necessary equipment, and salary incentives to motivate them to combat poaching. Completion date: June 2004.

g) Develop systematic patrolling inside all protected areas using EcoRangers. Make patrolling a mandatory management activity with a monthly schedule and budget. Completion date: December 2004.

h) Update the Wildlife Law to include protection for wildlife outside protected areas, and empower government staff to enforce legislation. Completion date: December 2004.

i) Outside protected areas, study patterns of hunting and consumption of wildlife to determine its sustainability, especially for prey species. Completion date: December 2005.

j) In the List of Protected Animals (Ministry of Forestry, 1994), promote the following tiger prey species from Protected status to Completely Protected status; Wild water buffalo (Bubalus bubalis). Completion date: June 2003.

k) In the List of Protected Animals (Ministry of Forestry, 1994), promote the following tiger prey species from Seasonally Protected status to Protected status; Hog deer (*Axis porcinus*) and Common barking deer (*Muntiacus muntjak*). Completion date: June 2003.

l) Wildlife conservation and awareness training for all wildlife offenders. Completion date: June 2003.

m) Impose fines for wildlife offenders in tiger areas with proceeds towards supporting tiger conservation activities. Completion date: June 2004.

5.3 Improving forestry management to stop further loss of tiger habitat and to restore degraded habitat

5.3.1 Key issues.

a) Extraction of non-timber forest products, fuel wood collection, shifting cultivation and livestock grazing disturbs tigers, damage tiger habitat, and depletes prey resources (Rao et al. 2002).

b) Clear cutting of plantations, and cutting of other economically valuable hardwoods may seriously compromise tiger habitats (Rao et al. 2002).

c) There exist no economic incentives for conducting environmentally sound forest use practices.

5.3.2 Key actions

a) The National Code of Forest Harvest Practice involves 30-year cutting cycles, and use of elephants for removal of logs reduces environmental damage over other practices. Apply this traditional method of forest harvest effectively in all concessions in the country. Completion date: December 2005.

a) Ban the hunting of wildlife in forest harvest areas. Completion date: June 2004.

b) Provide wildlife conservation awareness education training to timber harvest staff. Completion date: December 2004.

c) Define Strict Conservation Zones for Hukaung Valley and Htamanthi where no human use of natural resources is allowed. Create buffer areas to allow restricted use by local people including extraction of non-timber forest products, fuel wood collection, and livestock grazing. Ban shifting cultivation and hunting of all kinds in the buffer area. Use EcoRanger patrol teams to enforce the restrictions. Completion date: December 2003.

5.4 Improving forestry management to reduce intrusions of local people into tiger habitat, and improve planning to avoid development in tiger critical areas

5.4.1 Key issues

a) Plantations and mines open up forest areas (Rao et al. 2002), encourage markets that wipe out tiger prey, and allow tigers to be hunted more easily.

b) Permanent camps and settlements seriously compromise tiger habitat (Rao et al. 2002)

c) Road construction internally fragments and damages tiger habitat, facilitates intrusions by poachers, and opens up remote areas to wildlife trade (Bennett and Rao 2002; Rao et al. 2002).

5.4.2 Key actions

a) Reclaim plantations and revoke all mining licences in Hukaung Valley and Htamanthi Wildlife Sanctuaries. Completion date: December 2007.

b) Consider the location of government camps and permanent settlements outside of these reserves. Completion date: December 2007.

c) Ban construction of roads in protected areas and forest reserves. Completion date: December 2004.

d) Close or limit access along logging roads in Taninthayi Division to reduce the risk of collisions with tigers. Completion date: December 2005.

e) Include wildlife assessment in land development programs for Taninthayi Division. Completion date: December 2003.

d) Develop education programs to improve awareness about wildlife for local people living in and around forest reserves in Taninthayi Division. Completion date: December 2004.

5.5 Establishing protected areas, ecological corridors and priority management areas to protect wild tigers and their habitat

5.5.1 Key issues.

a) The minimum area required to support a genetically viable population of large predators would be the area that supports 300 breeding females (Barbault & Sastrapradja 1995).

b) If female tigers in Myanmar have home ranges the size of Nepali tigers (10-50 sq. km; (Smith 1987), the area required would be 3,000- 15,000 sq. km.

c) Landscapes of this size exist in Myanmar but most are not yet protected for wildlife. The largest intact forest expanses in Myanmar are in Kachin State, Sagaing and Taninthayi Divisions.

d) Tigers may use forest reserves as movement corridors between the Hukaung Valley and Sumprabum, and poslibly as far east as Kaunglamphu; within Taninthayi Division, and across the Thai-Myanmar border, and; between north-eastern Sagaing Division and western Kachin State.

e) There is a lack of landscape level planning and analysis for wildlife conservation in Myanmar (Rao et al. 2002).

f) Management plans for sites containing tigers do not specifically define actions necessary to conserve tigers.

5.5.2 Key actions

a) Revise or create management plans for the Hukaung Valley and Htamanthi to include specific actions for conserving tigers, including recommendations in 5.2.2, 5.3.2, and 5.4.2, and below. Completion date: December 2003.

b) Expand Htamanthi Wildlife Sanctuary to increase its size to at least 3,000 sq. km to ensure long-term survival of tigers. Completion date: December 2004.

c) Create a dedicated tiger reserve including the Hukaung Valley and adjacent forest reserves. The reserve will serve to link tiger populations in India with those in Myanmar. Expand the eastern border of Hukaung Valley Wildlife Sanctuary to protect potential tiger habitat in the Sumprabum area. Completion date: June 2004.

d) Establish limited human use zones (buffers) that will "soften" the edges of Hukaung Valley and Htamanthi reserves reducing the risk of mortality for tigers. Completion date: June 2004.

e) Create new protected areas or special tiger management zones in the Taninthayi Division, including the Lenya River, Greater and Lesser Taninthayi River catchments. These sites will protect tigers and their habitats and allow limited human use of natural resources around the reserves in a manner complementary to tiger conservation. Completion date: December 2007.

f) Use existing GIS capabilities in the Forest Department to identify and demarcate special management zones and corridors for tigers. Completion date: December 2003.

5.6 Improving international cooperation and establish cooperative management of contiguous protected areas along borders to maintain connectivity of tiger habitat across international boundaries

5.6.1 Key issues

a) Trade and trafficking in tiger and other wildlife products is often associated with the trade in drugs and arms (Bennett and Rao 2002).

b) In Myanmar the trade is concentrated in areas with weak enforcement, especially along the border with China and Thailand (Bennett and Rao 2002) .The trade is fuelled by the disparity in economies between neighbour countries, creating an underground economy and a drain on Myanmar's wildlife.

c) Local government officials in border areas are unaware of the Wildlife Law or the importance of wildlife, and sometimes supplement their incomes from wildlife trade.

d) Local militias effect law enforcement in border areas but National laws are only weakly enforced or not enforced at all.

5.6.2 Key actions

a) Conduct wildlife conservation and awareness training for l00 government personnel, including military, customs, police, immigration and local administrative staff, stationed near or on country borders. This would include basic training in identifying IUCN and CITES protected wildlife species. Completion date: December 2003.

b) Hold internal 2 workshops involving local government officials to discuss trans border issues including trade, trafficking and wildlife, and develop plans to suppress the trade. Completion date: December 2003.

c) Recruit local government officials on both sides of the Thailand border to suppress transborder wildlife trade at Mawdaung-Prachuap Kiri Khan, Kaleinaung-Ban I Tong, Kawthaung-Ranong (especially Tha Htay Island), Myawaddy-Mae Sot, Three Pagoda Pass, and Tachileik-Mae Sai, and prevent access by professional poachers from Thailand. Completion date: December 2004.

d) Create a tiger reserve in Taninthayi Division opposite Thailand protected areas that support large populations of tigers, Western Forest Complex and Kaeng Krachan National Park. Completion date: December 2004.

e) If possible expand the reserve or create new reserves to form a corridor between these two Thai. reserves. Completion date: December 2007.

f) Develop a spatially explicit tiger conservation database for the Huai Kha Khaeng – Thung Yai Naresuan TCU (Level I TCU 73). Completion date: December 2005.

g) Where possible coordinate antipoaching patrols and/or wildlife surveys on both sides of the Thailand-Myanmar border. Completion date: December 2004.

5.7 Monitoring the status of tiger and prey population to assess the effectiveness of conservation efforts

5.7.1 Key issues

a) The success of the Plan will need to be assessed by monitoring tiger and prey populations.

b) The Hukaung Valley landscape will be a target for an extensive monitoring program.

c) Landscapes not yet protected but containing tigers e.g. Taninthayi Division, should be targets for medium intensity monitoring.

d) Sites where tigers were not found but are suspected to occur (Table 3) should be targets for low intensity monitoring (Karanth and Nichols 2002).

e) Specific methods used for monitoring will depend on the level of knowledge available for tigers (Karanth and Nichols 2002) (Table 5).

5.7.2 Key actions For Hukaung Valley

a) Identify critical habitats and core areas for tigers and prey across the landscape. Completion date: June 2003.

b) Estimate numbers of female tigers within the landscape and ascertain that there is a reproductively viable population of tigers. Completion date: December 2003.

c) Document the current threats, demographics, and range of human activities that must be taken into account if the proposed landscape is to be successful and sustainable in the long term. Completion date: June 2003.

d) Create a GIS map and database to show current land use patterns, possible future land use trends, and tiger and prey source areas. Completion date: December 2003. For forest reserves in Taninthayi Division;

e) Train local foresters how to identify tiger and prey via sign surveys, in use of camera- traps for wildlife survey, and methods for making observations and recording data. Completion date: December 2004.

f) Determine occupancy of habitats in accessible sites across the landscape, including Myintmoletkat and Lenya River areas, which away from sites where tigers are known. Completion date: December 2005.

g) Determine prey abundance using line transect sampling. Completion date: December 2005.

h) Determine tiger abundance using double-sided camera-trap sampling. Completion date: December 2005.

For sites in Paletwa and Kaladan river catchment, Sumprabum, Khaunglanphu, Paunglaung, Momeik-Mabain, Central Bago Yoma, Rakhine Elephant Range and Saramati Taung area;

i) Train local foresters how to identify tiger and prey via sign surveys. Completion date: June 2003.

j) Determine occupancy of habitats at the sites using sign surveys. Completion date: December 2003.

k) Establish a logbook to record observations of tiger and prey, and encourage use of the logbook. Completion date: December 2003.

5.8 Improving public awareness of the importance of tiger conservation to increase support from local people

5.8.1 Key issues

a) Local government officials encourage local people to hunt tigers and split profits from the sale of wildlife products.

b) Professional hunters and hill tribal people (Kachin, Lisu, Naga, Khanti Shan) who consume wildlife live in villages adjacent to the Hukaung Valley, and pose a threat to wildlife.

c) Little public information exists about wildlife in Myanmar.

d) Wildlife education essentially does not exist in schools.

5.8.2 Key actions

a) Develop wildlife education programs to discourage hunting by local people in and near tiger reserves. Where possible recruit local people, especially ex-hunters to help implement these programs. Completion date: December 2004.

b) Involve 50 local people in wildlife survey and research activities to make positive use of their local or indigenous knowledge. Completion date: December 2003.

c) Collaborate with authorities in charge of development projects to include wildlife conservation as a component of those projects and resolve any potential conflicts between the needs of people and wildlife. Completion date: December 2003.

d) Produce a documentary about tiger conservation in Myanmar and broadcast it on National television. Completion date: June 2004.

e) Dub existing wildlife documentaries about Myanmar into Myanmar language and broadcast. Completion date: June 2003.

f) Adapt WCS education materials about tigers into Myanmar language and implement a special training program for schoolchildren at selected high schools in Yangon, and adjacent to tiger reserves. Completion date: June 2004.

5.9 Defining roles and responsibilities of personnel responsible for tiger conservation

5.9.1 Key issues

a) Wildlife conservation is hampered by a lack of understanding of roles and responsibilities of government staff.

b) The efficiency of protected area management can be improved by defining tasks and expectations for staff.

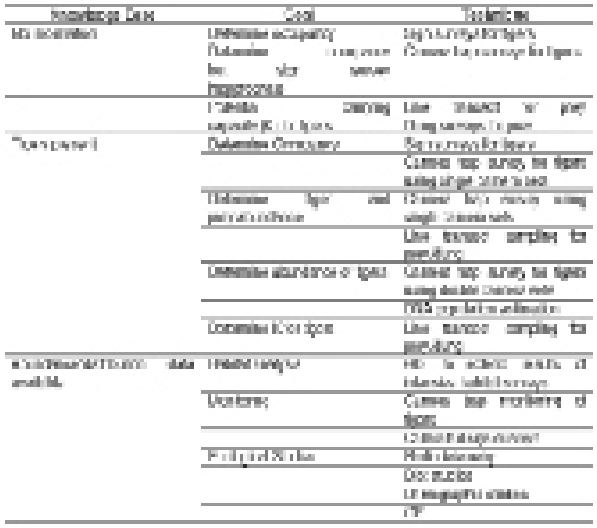
c) Park managers need leadership training to be able to perform their jobs successfully, and to direct human resources to effect conservation.

5.9.2 Key actions.

a) Provide special training for managers of tiger reserves in management techniques, including leadership skills, decision-making, planning, protection, use of information and technology, and personnel management. Completion date: December 2003.

b) Invite managers of tiger reserves to observe the day-to-day operations in selected tiger reserves in India and Thailand. Completion date: June 2004.

c) Define roles for junior staff in Hukaung Valley and Htamanthi Wildlife Sanctuaries, and for Taninthayi Division junior forestry staff, and staff and in other



areas in conducting field monitoring of tigers and prey. Completion date: December 2003.

Table 5. A guide to research methods for tiger conservation

[1] 'for tigers' implies that sampling is designed to maximize the probability of encountering tigers

PART VI

HISTORICAL DATA, FIELD SURVEY METHODS AND DATA ANALYSIS.

This section is optional reading for researchers and others interested in the historical distributions of tigers, specific field methods used to collect information on current distributions, and data analysis techniques. All of this material provided the background for developing the Action Plan described in the previous section.

6.1 Past distributions of tiger in Myanmar.

In order to provide a framework for understanding the current situation for tigers, information on where tigers used to occur and the factors that brought about their decline was considered. For the purposes of this report, historical records were considered as those pre-1999, when this study began. A number of sources were used to reconstruct former distributions of tigers in Myanmar:

1. Published scientific papers. Prior to 1999, few biological surveys had been attempted in the country. Milton and Estes (1963) conducted the first dedicated biological surveys in the early 1960's. They identified declining wildlife populations in areas such as Pidaung Wildlife Sanctuary. Then during the 1980's a series of wildlife assessments were done in the context of assessing areas for forest protection by UNDP/FAO (1985). These reports prescribed the formation of new protected areas as critical for the future conservation of wildlife. In the 1990's WCS made efforts to document and define new areas for inclusion in the protected area system.

2. ***Hunter records.*** The majority of historical records come from published reports and books written by hunters. Game hunting was popular during the period of occupation by the British (pre-1948). These publications describe in detail the circumstances in which tigers were shot, trapped, snared or otherwise encountered by humans.

3. ***Survey reports.*** A number of reports by foresters and surveyors attest to the former occurrence of tigers.

6.2 Quality and reliability of information.

A gazetteer was assembled from historical tiger records. The information was categorized as follows;

(a) *Confirmed presence* -where there was no reasonable doubt the observation was of tiger. These observations were from direct sightings, tigers killed, or reports of attacks by tigers on humans or livestock;

(b) *Provisional presence* -where there was a possibility that leopard or other species was in fact observed but was mistaken for tiger. These were observations of tracks and sign, or reports from other sources e.g. villager reports.

(c) ***Provisional absence*** **-**where a lack of evidence of tigers was reported. True absence over a given area can only be confirmed through monitoring over a period of time ranging from several months to several years (depending on the size of the area) but except for recent efforts at Alaungdaw Kathapa this has yet to be attempted at any of the study sites. Verbal reports were not considered as historical records due to the persistent problems with identifying large cats from track and sign (Duckworth & Hedges 1998; Lynam 1999) and because reports not written down at the time of observation invariably change in content and accuracy and become unreliable.

6.3 Characteristics of past distribution.

A total of fifty-eight observations provided an historical record of tigers for the period 1903 – 1999 (see Fig. 2.; Appendix IV). Tigers were historically recorded from all areas but gaps in information exist for the delta area, the central east (Shan State) and the far north. The absence of records probably reflects that tiger was not reported rather than it never existed in these places. Tigers can survive in mangrove forests although the habitat is sub optimal (U. Karanth, pers.comm. 2002). Similarly, the absence of documented records from Shan State is due to the inaccessibility of the area rather than lack of tigers. (Rabinowitz 1998) reported tigers had disappeared from the far north but evidence from hunters suggests their existence there in the past.

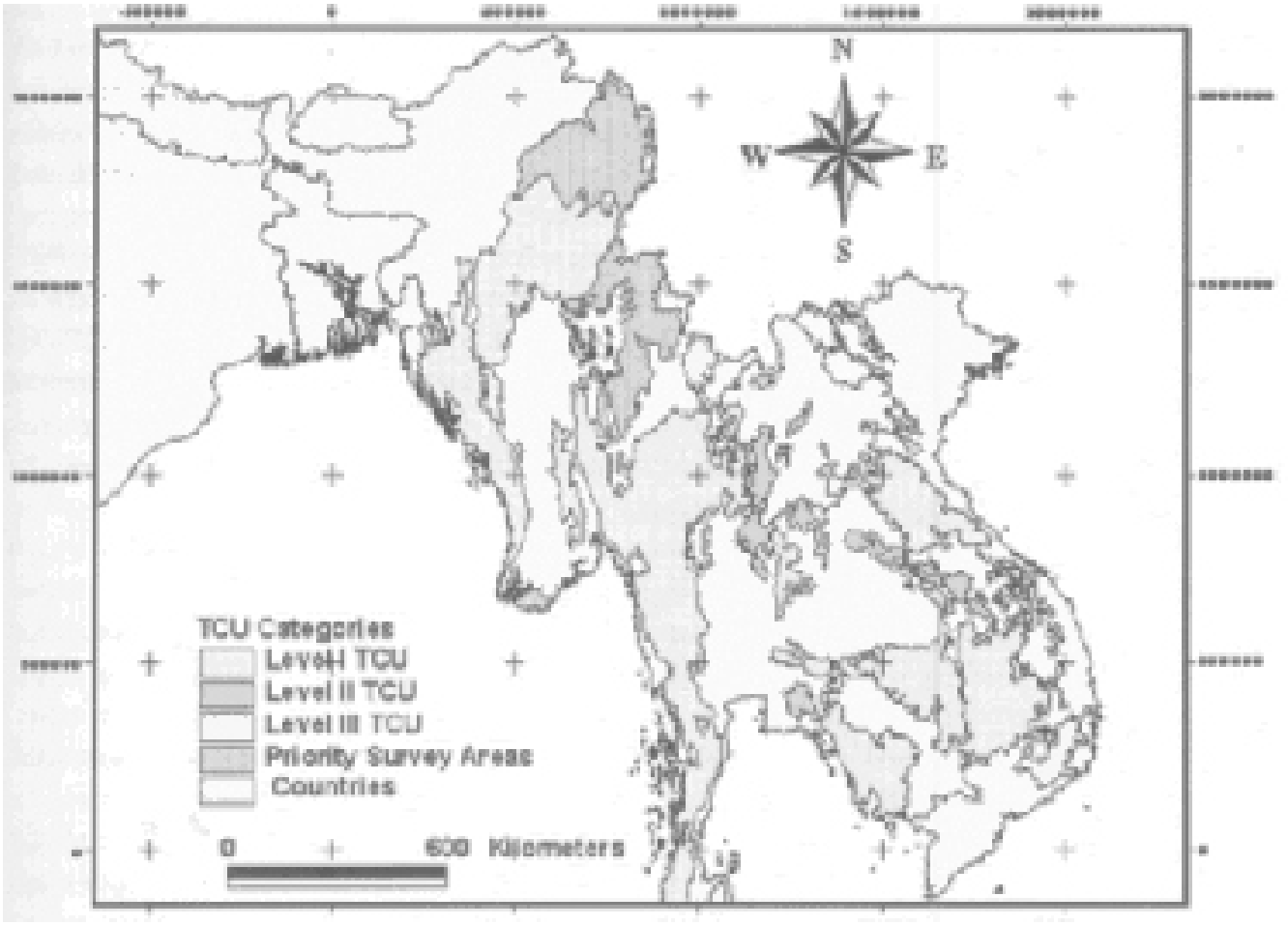
6.4 Potential tiger areas.

During the early 1990's with the advent of new techniques for assessing population viability through consideration of genetics, the focus on conserving tigers shifted towards a small population paradigm (***sensu*** Caughley & Gunn, 1996). The idea was that tigers were fast being driven towards extinction in the wild so that

captive breeding and genetic management would be necessary to save them' (Tilson et al. 1995). There is no doubt that for some critically endangered species such as Guam rail, Black footed ferret and Arabian oryx, and the subpopulation of tigers in southern China, species survival depended primarily on successful management in zoos. However, this approach ignored the fact that potentially viable populations of tigers still existed across most of their range in the wild but that their status remained unknown (Rabinowitz 1999), so that effective conservation planning could not happen. In an attempt to refocus attention on the plight of wild tigers, WWF and WCS attempted a geographic assessment of the extent and availability of habitat, and potential prey resources (Dinerstein et al. 1997). This analysis identified a series of potential areas – Tiger Conservation (TCU's) – in which tigers could conceivably occur. For example, it was considered that tigers might occur across large expenses of potential habitat.

In Myanmar, four areas with the greatest potential for tigers (Level I TCU's) are large and relatively intact forest transboundary forests in the west along the Myanmar – Bangladesh and Myanmar – India frontier; and forests in central Bago Yoma (Fig. 10). A series of much smaller, highly fragmented forest areas provide lower potential for tigers. These are termed Level II and III areas. According to the analysis, forests in the far north, central east and delta areas had unknown occupancy for tigers. These areas were considered priorities for immediate survey reflecting large gaps in historical information on tiger occurrence.

Several characteristics of the potential tiger habitats are worthy of mention. Firstly, despite the relative intactness and contiguity of forests in the level I category, tigers may not be uniformly found across available habitat (Prater 1940; Rabinowitz 1995). Secondly, the Level I TCU's include areas of degraded or completely cleared habitats. Tigers if occurring there would likely be nonbreeding transient individuals (G. Schaller pers. Comm., 2002), a small percentage of the population that are prepared to risk movement across hostile areas in the landscape to cross between forest



Part 6: Historical Data, Field Survey Methods and Data Analysis
Fig. 10. Tiger Conservation Units (TCU'S) for Mayanmar and neighbour countries

patches. Finally, the TCU analysis was a very useful exercise because it did two things; it refocused attention on the plight of wild tiger populations, defined areas where information on the status of the wild populations was lacking.

6.5 Rationale for tiger status survey program.

Despite the past distributions and current potential areas for tigers, areas of natural vegetation available for wildlife declined from 75% of land area to 50% in 50 years (Collins 1991; FAO 2000). Land use patterns changed after 1948 when traditional forest management regimes that regulated and systematized harvest were replaced with less regulated and in some cases opportunistic clearance. For example, while good management of natural forest occurs in most areas, foreign logging companies clear – cut or felled timber outside concessions in near the border during the period 1989 – 1993 (International 1999).

By the early 1990's hunting and illegal trade had reduced tiger populations to an unknown subset of the potential areas. Some areas with apparently suitable habitat were devoid of tigers (Rabinowitz 1999). Prior to the commencement of this project in 1999, the state of knowledge of tigers amounted to reports of tiger occurrence for a limited number of areas (Rabinowitz 1999). Hunting of tigers has been going on for a very long time (Pollok & Thom 1900). More recently with reduced supply of tigers and tiger parts in the marketplace, demand has increased (Hemley & Mills 1999) with unmeasured effects on wild tiger populations.

In order for effective conservation planning to take place, there was an urgent need to know where tigers existed across the vast landscapes of Myanmar, and what was the condition of tiger subpopulations. A field program was mounted to satisfy the following objectives:

1. To train government field staff in tiger assessment methods.
2. Using information on potential tiger areas from historical records and local knowledge to determine tiger presence-absence across these areas, and limits of tiger distributions.
3. To define threats to tigers and their habitats.
4. To redefine priority areas for future tiger conservation.

6.6. Training and selection of Tiger Team members.

The capacity of field staff to conduct independent wildlife survey and research is generally poor in Asia and this had led to problems with interpreting basic information on species occurrence and abundance for protected areas (Duckworth & Hedges 1998). Park staffs are generally unfamiliar with animal tract and sign thus making reports of tiger occurrence unreliable. As an example of this, at Alaungdaw Kathapa National Park, historically one of the better-known tiger areas (UNDP/FAO 1982), park staff reported tigers as common in 1998 but plaster casts of tracks purported to be of tiger were on inspection found to be of Asiatic leopard and Golden Cat (Lynam et al. 1999). Part of the problem in Myanmar is a general one across Asia in that training of government staff has traditionally focused on production forest management and silviculture. Protected areas conservation is relatively new task for foresters and wildlife training is generally unavailable at the college or university level.

Wildlife training for Myanmar foresters began with a WCS program in 1995. The training based on a standard curriculum (Rabinowitz 1993b), provides instruction in techniques for observing and recording wildlife, and basic survey and analytical techniques. Since 1995, 270 protected area field staff, and local NGO staff have received the WCS basic training Smithsonian Institution, and the California Academy of Sciences provided other specialist training in wildlife monitoring techniques to Forest Department staff.

As a starting point for the National Tiger Action Plan project, the Wildlife Conservation Society – Myanmar Programme in collaboration with the Myanmar Forestry Department provided a training course in tiger survey techniques and conservation at Alaungdaw Kathapa National Park, from December 7 – 21st, 1998. The objectives of this training were,

1. To train junior forestry staff in basic techniques of map and compass, wildlife observation and data recording.
2. To provide specialized training in describing tiger habitats, conservation and census techniques for tigers and tiger prey species.
3. To identify talented Forest Department staff for inclusion in a National Tiger Survey Team (NTST).

WCS staff from New York, Thailand and Myanmar conducted the training. Dr. Alan Babinowitz, Director

of Science, Asia Programs, an expert on large carnivore conservation ecology, and the author, lectured to the trainees and directed a variety of classroom based and field based training activities. WCS Myanmar Country Progrmme Coordinator U Saw Tun Khaing and Research and Training Coordinator U Than Myint supported them. This was the first time this kind of training had been done in Myanmar, and the first time anywhere in Southeast Asia.

Twenty trainees and three observers attended the 14 – day training (Fig. 8.). Those staff came from twelve national parks and sanctuaries, the Institute of Forestry, and the Forest Resources and Environment Development Association (FREDA). The trainees were assessed on their participation in group assignments and a 4-day field project, and on their individual performance in class and practical assignments, a comprehensive exam, and overall level of participation in the training.

From the training a group of six talented young forestry professionals were selected to form the first roving tiger field survey team to participate in field assessments for tigers at selected forest sites across Myanmar.

6.7 Methodology. The surveys were intended to determine presence – absence for tigers, and relative abundance for prey species, so as to permit the evaluation of study areas for their potential for tigers. The surveys were not intended to determine numbers of tigers in the reserves.

Tigers, like other tropical mammals, are generally difficult to observe directly due to their rarity, cryptic behaviour, partial nocturnality and avoidance to humans (Griffiths & van Schaik 1993; Schaller 1967). A combination of indirect and direct survey methods was used to detect tigers and other large mammals; potential prey species.

Field observations of tigers can be categorized so as to facilitate interpretation of their ecological status. Four types of observations are given in Table 6. Tigers may be detected or not detected by a given survey technique. The detection of tigers confirms presence but may or may not indicate a reproductive population. Where tigers are not recorded, this could indicate problems with sampling, for example where tigers are missed due to extreme rarity, or true absence.

Where tigers occur at densities under 0.38 tiger/‘100 square kilometer, very large amounts of sampling with camera-traps (>1,000 trap nights) needs to be done in order to detect them (Carbone et al. 2001). In this study sampling of > 1,000 trap nights were not feasible so that tigers might not be recorded at some low – density sites though they were present.

Table 6. Interpretation of Tiger Population Status from Field Observations

Observation	Population Status	Interpretation
1a Tigers recorded	Reproductive population	Indicated by observations of [illegible]
1b Tigers recorded	Present but not necessarily reproductive	[illegible] non – pregnant adult female individuals
2a Tigers not recorded	Low density, ecological effective absence	Tiger may be present at low density but are not recorded due to sampling [illegible]
2b Tigers not recorded	True absence	[illegible]

6.7.1. ***Choice of study areas*** – Given the time frame of the project (3 years) it was not possible to investigate tiger occurrence in all forest areas. Using information from historical records and potential tiger areas, 17 sites with the highest probability of supporting tigers were chosen for survey (Fig. 9). These areas represented a non – random subset of available landscape and habitat options for tigers spanning the geographic extent of the country from approximately 11^{o} – 27^{o}N, and 93^{o} – 99^{o}30’E.

1. Alaungdaw Kathapa National Park (AKNP)
2. Htamanthi Wildlife Sanctuary (HTM)
3. Thaungdut Reserve Forest (TD)
4. Mahamyaing Reserve Forest (MHM)
5. Nankamu Reserve Forest (NKM)
6. Saramati Taung (SRMT)
7. Paunglaung Catchment (PGL)
8. Panlaung Pyadalin Cave Wildlife Sanctuary (PPDL)
9. Central Bago Yoma (BGY)
10. N. Rakhine (RN) or Paletwa and Kaladan river catchment
11. Rakhine Elephant Range (RER)
12. Hukaung Valley (HKV)
13. Khaunglanphu (KLP)
14. Sumprabum (SBP)
15. Momeik – Mabain (MB)
16. Myintmoletkat (MMLK)
17. S. Taninthayi (TNTY)

Descriptions of each site are given in Appendix I.

6.7.2. *Interview surveys* – Interviews of people living in suspected tiger areas are potentially useful because they draw upon local knowledge of wild accumulated over long periods of time, and may help determine the status and identify threats to tigers and other mammals Rabinowitz 1993b). However, the reliability of information to be gained depends upon a number of factors, especially the correct interpretation of local information by the interviewer (Duckworth 1999), the manner and disposition of the interviewer, and how the interviewee preceives this. An interview protocol (Appendix V) was designed during tiger – training course (Lynam et al. 1999) and this was used by Myanmar – speaking interviewers to gain indirect evidence on tiger occurrence in the 17 potential areas. Direct survey was done in and around locations of the most recent reliable reports of tigers from interviewees.

6.7.3 *Track and sign* – Large mammals produce tracks, faeces, scrapes, scratches, kills and other sign so that under certain circumstances the substrates on wildlife trails, streambeds and ridges may indicate their recent presence (Wilson 1996). However, there is significant large cats (Duckworth & Hedges 1998; Kanchanasakha et al. 1998) so that tiger may be confused with other species (Lynam et al. 1999). For these reasons sign was considered not sufficient for the identification to species level for cats, dogs, civets, deer muntjak, wild cattle, and otters. However, the abundance of sign was generally indicative of the level of mammal traffic in an area. Ungulate sign was additionally used to indicate possible areas of carnivore activity, and as such to help guide the placement of camera – traps for detecting the latter (below).

Standardized datasheets were used to record date, time of day, weather, location (latitude/longitude) type of sign, dimensions of track/sign, probable species/ genus identity, age, substrate, and habitat type (Appendix VI). Locations where mammal sign was encountered were recorded with a Global Positioning System (GPS) device capable of resolving position information beneath tree canopies, accurate to $\pm$ 100 m* (Garmin 12XL,Garmin Corporation, Kansas USA). Feline tracks with total length 120 mm or pad width 7cm, and scat 3.5cm in diameter were considered to be indicative of tigers (A.J. Lynam, A Rabinowitz & R.K. Laidlaw unpublished data; Cutter 1999; Duckworth & Hedges 1998). Where the size of a feline track was ambiguous because of the substrate or age of a track, the track was identified only as "large cat" meaning either tiger or leopard. Other species were identified using a field guide to Thai mammal tracks (Green World Foundation 1999). An index of abundance "Encounter Rate (CR)" was estimated from sign surveys as ER = No. Sign detected/hr.

6.7.4. *Camera* – *trapping* - Remote Camera methods have been used successfully to photographically record wildlife in tropical Asian forests (Chapman 1927; Griffiths & van Schaik 1993). Although these devices are relatively expensive they offer a reliable method for inventory of species that are cryptic nocturnal or rare, including tigers (Lynam et at. 2001). Passive infrared – based camera – traps (Camtrak South Inc., Georgia USA) (Fig. 11.) were used in all surveys.

Fig. 11. Infrared–based camera – traps were used to detect tigers and prey species.

To achieve the best possible resolution of species identity from photographs, camera – traps were secured to trees 0.4m above the ground, 3 – 5 from a wildlife trail. All camera – traps were set to allow continuous recording of wildlife movements day and night. Traps were left in place for at least 24 days to allow for adequate sampling of large mammals species richness (A.J. Lynam unpublished data) and atleast 1,000 trap nights to correctly determine tiger presence or absence (Carbone et al. 2001). For example, tigers were considered absent from a site if they were not recorded in any trap, with absence referring to the particular area was estimated by placing a buffer around the outermost locations of camera – traps with the length of the buffer equivalent to half the mean distance between camera – traps. A time delay of 3 or 6 minutes prevented entire rolls of film being taken by groups of animals lingering in front of the camera – trap. An index of abundance "Capture Rate" (CR) was estimated from camera trapping as CR = No. Photo records/100 camera – trap nights.

6.7.5. *Survey design* – Two survey designs were employed for tigers (Fig. 12.) In both cases, the primary

intention was to gain information on (1) tiger presence –absence, (2) tiger and prey micro distribution and activity in each study area.

First, camera-traps were placed at random locations within 10 x 4 km sampling grids, in alternative 1 km^2 grid blocks. This was termed the plot-based survey design (Lynam et al. 2001). The random locations were reached using Global Position System (GPS) receivers (Garmin 12XL, Garmin Corp. Kansas USA). Traps were

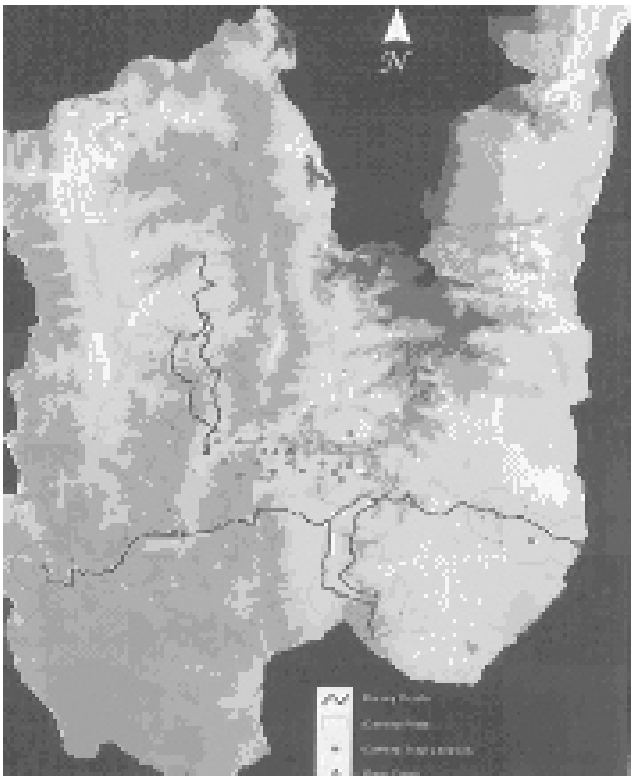


Fig. 12. Tiger survey design (see text for details)

established on trails or other suitable positions within 100m of random locations. Grids were located in areas where interviews suggested tigers occurred, or where tiger occurrence could not be determined, in the part of a study area least disturbed by humans. Tigers require a core area of undisturbed habitat for their survival (Schaller 1967) although this may be a small part of their entire home range (Miquelle et al. 1999). If tigers are present in an area they are likely to at least frequent a core undisturbed area and should be detectable there.

In the second design, camera-traps were deliberately placed along trails and roads where sign of tigers, large cats or their prey species were recorded. This was termed the *trail*-based survey design (Lynam et al. 2001). Sampling locations where capture probabilities for tigers are highest (Karanth and Nichols 1998) increases the likelihood of their detection at a site.

Because the stripe patterns of tigers are unique to an individual (Schaller 1967) but are different on left and right sides, camera-trap photographs of both sides of an animal must be used to distinguish it from other tigers (Franklin et al. 1999) While specific methods are available for estimating tiger density from double-sided camera-trap designs (Karanth 1995) this was not the purpose of this study. However, to gain information on the minimum number of tigers known to be alive (MNKA) inside the survey area, pairs of camera-traps were placed on opposite sides of animal trails, staggered by 2-3 m at locations where field staff considered tigers were likely using e.g. because of presence of sign of tiger and/or large ungulates. These "checkpoint" arrangements were established to gain double-sided photographs of tigers.

In summary, the surveys obtained four types of indices: (i) tiger presence-absence, (ii) minimum numbers of tigers known alive (MNKA); (iii) minimum ranges of individual tigers from linking outermost points of locations where tigers were captured in camera-traps or identifiable from tracks and sign; (iv) an index of abundance (traffic) of large mammal species, i.e. Capture Rate= No. Captures/100 trap nights

6.7.6 *Survey personnel.*

At all sites surveys were done by Myanmar Forest Department staff in collaboration with WCS personnel (except in Taninthayi Division), and local forestry or other government staff. Local people were hired as porters to carry equipment and assist with field logistics. In security areas teams of military personnel joined the survey team. The size of the field survey teams was 3-7 key staff with 10-40 support staff. The average cost of each survey was US$ 3,600.

6.7.7. *Survey effort, constraints and coverage.*

In most cases, the survey areas were remote and difficult to access, and surveys required special permissions and clearances. Surveys were constrained by a number of factors including extremes of weather, topography, and security considerations. The particular sites where camera-trap surveys were done at MMLK and TNTY were *not* optimal sites, and were in fact selected by security personnel assisting the team. At each site, field staff attempted to obtain the maximum coverage of the area suspected in tiger survey. All surveys were conducted on foot and consumed 26$\pm$ 5 days (range: 15-100) to reach the survey area, and 86$\pm$ 12 days (range: 10-207) to complete a survey from start

to finish. Total survey coverage was 3,432 sq.mi (5,491 km^2), or 202 ± 29 sq.mi (range: 91-525 sq.mi). At Alaungdaw Kathapa and Htamanthi the areas covered by survey (244 and 329 sq.mi, respectively) were each one-quarter the size of the protected areas. Interviews of a total of 990 people, or 58+ 17 interviews (range: 5-276) per site were done to determine areas for direct survey. A total of 1,382 hrs, or 81 ± 9 hrs (range: 32-171) per site were spent searching for track and sign of tigers. Camera-traps were established in a total of 430 locations, or 25 ± 3 locations per site (range: 0-45) to detect tigers.

6.7.8. ***Data recording and storage-***

Standardized data recording forms were employed to record all field data from surveys (Appendices VI-VIII). In the field, staff recorded information on camera-trap operation, measured a suite of microhabitat characteristics at survey locations, and records of track and sign taken along survey routes. All records of wildlife were spatially referenced in UTM grid format using GPS. Following camera-trap retrieval, films were developed at a laboratory in Yangon, and slides catalogued and scored, with records entered into a spreadsheet. Slides were scanned at low resolution and archived.

In order to manage the volume of information arising from the field program, to facilitate analyses of data, and to develop a clearinghouse of baseline information on tiger and other wildlife for the 17 survey areas for use in future management efforts, an electronic database was developed for the project. This database, written in Microsoft Access by U Myint Thann, contains 15,021 records including all results of track and sign and camera-trap surveys, as well as measurements of microhabitat structure.

In addition to the Access database, a spatial database was developed using Arcview 3.1 software (ESRI Systems, Inc., Redlands, USA) with the assistance of the Myanmar Forest Department (FD) GIS Facility. The database includes information on forest cover and land use, locations of survey sites, drainages, topography, human settlements, roads and other human infrastructure. In the future, the two databases will be linked to allow quick retrieval of information from surveys directly from the spatial database. This GIS could serve as a template for a National Wildlife Database to which other information on biodiversity might be archived in the future.

6.8 Results

6.8.1. ***Camera-trap operation.***

A total of 4,099 photo records were made by camera-traps including 3,341 records (88%) of wildlife, 358 records (9%) of humans, and 112 records (3%) of domestic animals (Appendix II). A total of 19 globally threatened species and 3 globally near- threatened species were recorded by camera-traps, and 12 CITES Appendix I, 6 Appendix II, and 7 Appendix III species. Eighty-three percent were Myanmar protected species, with 40% totally protected species.

The mean failure rate per site was 17 ± 3% (range: 1-33, N=15). Camera-traps failed to work for a variety of reasons ranging but were mostly a result of mechanical failure. Extremes of heat, cold and moisture may cause internal circuits and sensors to stop working in the field. Theft, and damage from animals, especially elephants, were secondary reasons for trap failure.

6.8.2. ***Species richness.***

Camera-traps revealed a diverse assemblage of fauna at fifteen sites (Appendix II). Forty-two species of large mammals were recorded with an average 16.4 ± 1.3 species (range: 6-22, N = 15) per site (Appendix IX). Six species were recorded at MB, the least rich site, while at four sites, AKNP, TMT, RN and SPB, 22 species were documented.

In addition, sixteen species of birds, small mammals and reptiles were recorded. However, these fauna were likely to be recorded as accidents of sampling in camera-traps so that the surveys were not representative of their richness.

6.8.3. ***Wildlife traffic.***

Surveys indicated a range of levels of wildlife traffic across sites. Only large mammal species are considered here. From camera-traps, sites had a mean capture rate of 15.0 ± 2.6 animals/100 trap nights (N = 17). MB had the lowest capture rates (5.7 animals/ 10 trap nights) with BGY and RN having the highest capture rates (36.2 and 34.2 animals/ 100 trap nights, respectively). From track and sign surveys, the mean encounter rate of wildlife sign was 4.1 ± 0.5 signs/hr. PPDL had the lowest encounter rates (1.7 signs/hr) with NKM the highest (8.3 signs/hr).

6.8.4. ***Human traffic.***

Levels of human traffic also varied across sites. From camera-traps, sites had a mean capture rate of 2.1 ± 0.7 photorecords/100 trap nights (N = 17). TMT and SRMT had the lowest human traffic (0.15 and 0.18 photorecords/ 100 trap nights) with PPDL having the highest traffic (11 photorecords/100 trap nights, respectively). From track and sign surveys, mean human traffic was 0.3 + 0.05 signs/hr. TMT and RER had the lowest encounter rates (< 0.1 signs/hr) with TNTY the highest (0.7 signs/hr).

6.8.5. ***Occurrence of carnivores.***

One or more of the large carnivores-tiger, Asiatic leopard (*Panthera pardus*), Malayan sunbear (*Helarctos malayanus*) and Asiatic black bear (*Selenarctos thibetanus*) and Asian dhole (*Cuon alpinus*) were recorded by camera-traps at all 17 survey sites (Appendix IX). Sunbear occurred at all but two sites, SRMT and PPDL, making it the most frequently occurring large carnivore species. Dhole occurred at all but four sites, TMT, SRMT, PLG, and MB. Leopard occurred at just over half the sites. Asiatic black bear occurred at just under one-quarter of sites.

6.8.6. ***Occurrence of tigers across study sites***

Interviews. A total of 990 local people were questioned about the occurrence of tigers and other wildlife at the 17 sites (Appendix III). These individuals were local villagers, hunters, and government officials living in or around forest areas. Two hundred and thirty eight (24%) individuals interviewed reported having either seen tigers, encountered sign, or heard tigers. One hundred and seven (45%) records were direct sightings. Eighty-seven (81%) of these eyewitness accounts were made after 1990. Direct survey. Signs of large cats (tiger or leopard) were recorded at all survey sites. Tigers were confirmed by camera trapping at four of 17 sites, TMT, HKV, MMLK and TNTY (Appendix IX; Fig. 13.).

1. TMT: a single photo of a tiger was recorded during October 1999 along with two sets of tracks during the trap retrieval exercise. After the survey team left the area, a tiger was reported killed by hunters from an area adjacent to the survey site.
2. HKV: Fresh sign was found on both sides of upper and lower Shipak Hka between Tarung Hka and Brangbram Hka, and at Numpraw Hka on 3 rd February 2002, during the camera-trap set up exercise. Three photos of tiger were recorded by camera-traps on 11.2.01, 10.3.01, and 11.3.01. Tigers are thought to be resident in the upper Brangbram Hka, upper Tanaing Hka, Maingkwan and surrounding area, and around Shingbweyang.
3. MMLK: Fresh tracks were found during the camera-setup (26.9.01-4.10.01) and retrieval exercises (7.11.01-14.11.01) and plaster cast records made. A single photo of a tiger was recorded from a camera trap unit set up on a trail on 10.10.01. Nine of 25 units failed to operate so more photo-records might have been made.
4. TNTY: a set of tracks was encountered during the camera-setup operation (17-20.1.02) and a plaster cast made. Although no photo records were made local people reported a killing of a tigress on 17.1.02 at Kyachaung Village, 2 mi S of Manoron

(Footnotes)*

As of 1 May 2000 the United States Department of Defence, the agency that controls GPS satellites, turned off Selective Availability (SA) or "scrambling" of GPS satellite signal information. Prior to this date the accuracy of GPS position fixes was limited to ± 100 m. Most recreational GPS devices are now capable of real time position fixes accurate to ± 20-25m.

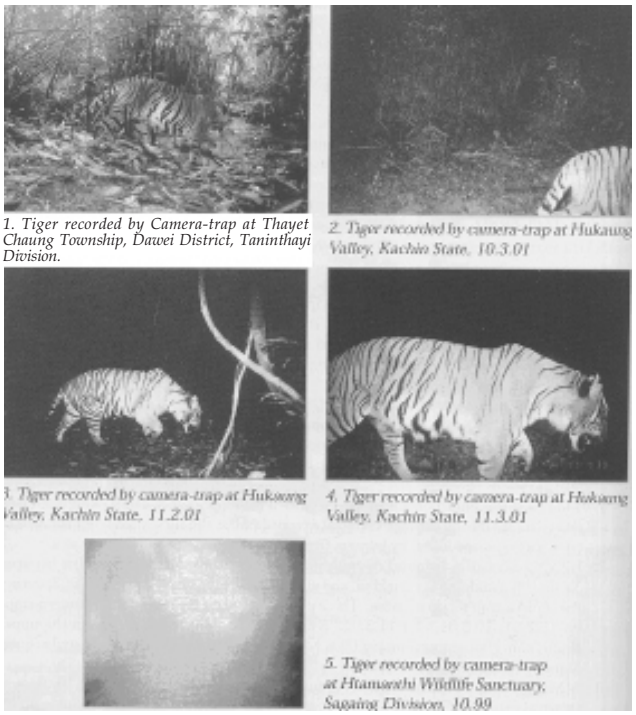


Fig.13. Camera-trap photo records of tiger from 17 survey sites in Myanmar, 1999-2002.

6.8.7. *Tiger density*.

(Karanth & Nichols 2000) estimated tiger density for multiple sites in India. One of their study sites- Bhadra-is similar in topography and vegetation to northern Myanmar forests. Using information from single sided captures, tiger density was estimated for the Hukaung Valley, where captures of two individual tigers were made. Using a mark-recapture approach (Karanth and Nichols 1998) and assuming a capture probability for tigers (0.788) and a sampling buffer (2 km), densities were estimated for tiger populations at HTM, HKV and MMLK (Table 7).

6.8.8. *Occurrence of other large mammals.*

Large (> 1 kg) herbivores were recorded from all survey sites (Appendix IX). Common muntjak (*Muntiacus muntjak*) was the most abundant species in camera-traps and was found at all sites. Wild cattle were recorded at all sites except SRMT, PPDL, and MMLK. Banteng (*Bos javanicus*), a globally threatened species was found at 3 sites, AKNP, MHM and BGY. Sambar (Cervus unicolor) was present at all sites except SRMT, PPDL, and MB. Serow (*Capricornis sumatraensis*) was recorded at just fewer than 50 % of sites

.

6.8.9. *Human traffic within study sites.*

Camera-traps recorded suspected poachers at 8 (47%) of sites (Appendix IX) with villagers recorded at all but three sites, HKV, SPB, MB. Traps at AKNP recorded park rangers on patrol, while traps at MMLK and TNTY recorded military personnel on patrol.

Table 7. Tiger Densities at Some Rainforest and Evergreen Forests in Myanmar and other Southeast Asia Countries.

Country	Site	No. tigers detected	Density est.* (tigers/100 km2)	Min density	Max density
India	*Bhadra*	*7*	*3.42*	*2.58*	*4.26*
Thailand	Kaeng Krachan	4	2.82	1.96	3.67
Thailand	Hala	3	2.68	2.42	2.93
Thailand	Bala	2	1.79	1.50	2.07
Malaysia	*Temenggor*[1]	*2*	*1.78*	*0.94*	*2.63*
Indonesia	*Bukit Berisan*[2]	*9*	*1.60*	*1.2*	*3.2*
Myanmar	**Hukaung Valley**	**2**	**1.10****	**0.91**	**1.29**
Myanmar	**Myintmoletka**	**1**	**0.67****	**0.38**	**0.96**
Thailand	Phu Khieo	1	0.62**	0.35	0.88
Myanmar	**Htamanthi**	**1**	**0.49****	**0.28**	**0.70**
Thailand	Khao Yai	1	0.38**	0.22	0.54

* Single sided M-R estimates using Program CAPTURE

** No recaptures. Density (D) = No. tigers (N)/ Area, where N = No. tigers detected/p, and p=0.778 (from Badhra, India; Karanth and Nichols, 2000)

[1] R. Laidlaw and DWNP (unpublished data)

[2] O' Brien et al. ms

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APPENDIX I. DESCRIPTIONS OF 17 MYANMAR TIGER SURVEY SITES

1. Alaungdaw Kathapa National Park (AKNP)

Location: Lies between 22°14″-22°29″N and 94°17′-94°36′E between the Chindwin River floodplain and Myittha River valley in Sagaing Province, approximately 100 mi (160 km) west of Mandalay.

Elevation: 100-3,440′ (30-1048m).
Survey area: Centred on Mindon Camp covering an area of 152 sq.mi (390 km^2).

Description: The area is dissected by a number of high elevation 2000-4000+′ (700-1219m) ridges that run in a north-south direction, and is drained by the Patolon and Taungdwin Rivers that flow northwards into the Chindwin River.′

Vegetation: Varies from Dry Upper Mixed Deciduous (DUMD) forest on the high ridges and slopes to Moist Upper Mixed Deciduous (MUMD) forest on lower slopes. Bamboos are common in the under storey on lower slopes. Semi-Indaing forest, high Indaing forest or Pine forest occur in patches on the tops of some high ridges.

Access: Alaungdaw Kathapa is accessed from the east by road from Yinmarbin, and via a newly constructed road that links India with Mandalay and cuts through the northwest of the park. Walking distance from the nearest road was 1 day.

Rainfall: The area is subject to two monsoons, a southwest monsoon which brings most of the yearly rainfall between May and October, and heaviest between August and September. Mean annual rainfall is 588″ (1,507 mm). Water is available year round in the major drainages with smaller tributaries mostly drying up by the end of March.

Human impact and landuse: The park is surrounded almost completely by cultivated land but inside the park the only settlements are of park staff, mahouts and a monastery. Government camps and religious pilgrimages pose threats to wildlife. Other threats are hunting for wildlife trade, extraction of non-timber forest products, livestock grazing and fishing.

2. Thaungdut (TD)

Location: Lies between 24°17′-24°30′N and 94°30′-94°43′ E in the Homalin Township, Sagaing Division and includes with Kabaw Valley.

Elevation: 432-2,314′ (130-695 km^2)
Survey area: Covers an area of 82 sq.mi. (210 km^2) 10 mi (16 km) from Thuangdut village.

Description: The survey area is surrounded by Thaungdut Reserve Forest in the east, southeast and by Kabaw Valley in the north and northwest. The Nantanyit Chaung runs south to north between Minthamee Mountain 1,871′ (570m) and Nantanyit Mountain 3,545′ (1,080m) and enters the Chindwin River near Thaundut village.

Vegetation: Varies from DUMD forest, MUMD forest, to Indaing forest. Bamboos such as Myin Wa, Tin Wa, Wa Bo, Wa Nipa, Theik Wa, Kya Khet Wa, as well as rattan are common.

Access: Thaungdut village is accessible by boat along the Chindwin River year-round. It takes about 2 days travel by boat from Monywa. From Thaungdut village the survey area can be accessed by elephant or on foot.

Rainfall: 74-99″ (188-251 mm) of rain per annum.

Human Impact and Landuse: Timber extraction has occurred in the area for several years, with the Myanmar Timber Enterprise still extracting hard wood, mainly teak. Hunting, timber cutting, and intrusions by elephant workers and fishermen are threats to wildlife in this area. There were no signs of human settlements or cultivation in the area at the time of survey.

3. Htamanthi Wildlife Sanctuary (TMT)

Location: Lies between 25°16″-25°44′ N and 95°19″-95°46″ E. It is bounded to the N by Nampilin Chaung, to the E and SE by Pali Taung, Temein Taung, and New-ta-mein Taung 1,000″-2,000′ (304-609m) and the Uyu River, to the S by numerous streams, and to the W by the Chindwin River.

Elevation: 490-1,100′ (149-335m).

Survey area: Covers an area of 205 sq.mi (526 km^2).

Description: Vegetation is primarily tropical evergreen forest with dense bamboo and rattan undergrowth. Mixed deciduous teak forest is also found on higher slopes in the eastern part of the sanctuary.

Access: The area is accessible by boat from Homalin, the nearest town, 57 mi. (91 km) and a 2 day journey away.

Rainfall: 136″ (3,491 mm) per annum. The area is drained by the Nampilin, Nam Emo, Nam Ezu, Nam Pagan and Nam Yanyin all of which flow W into the Chindwin River.

Human impact and landuse: No permanent human settlements exist inside the sanctuary but the area is used by Lisu hill tribes who hunt wildlife, and by local people who fish and extract non-timber forest products. Oil drilling occurs in the area.

4. Mahamyaing (MHM).

Location: Lies between 23°31″-23°43′N and 94°51″-94°57′E. The area includes parts of Lawthar, Pyaungtha, Maingwan, Mahamyaing and Nonsabai Reserve Forests.

Elevation: 226″-2,071′ (68-631m).
Survey area: 78 sq.mi. (200 km^2)

Description: The landscape is characterized by evergreen, mixed deciduous and Indaing (Dipterocarp) forests. The area is drained in the W by the Kaedan Chaung which originates at Honan Taung Dan 2,017″ (614m) and flows into the Chindwin River. In the E the Pyaungthwe Chaung drains into the Mu River.

Access: Reached on foot from Aungchanthar Village, 20 mi. (32 km) away on the MonywaKhanti highway.

Rainfall: 46-69″ (117-175mm) per annum.

Human impact and landuse: Timber extraction from the surrounding areas has taken place since 1973. At present two private companies are extracting dipterocarp timber from part of the area. Numerous current and old settlements occur in the area. Cattle grazing is taking place. Oil drilling occurred in the past.

5. Nankamu (NKM)

Location: Lies between 24°03′-25°15′N and 94°57′-96°12′E between Paungbyin and Pinlebu Townships. It includes parts of Sanda, Kaingshe and Paungbyin Reserved Forests. In the N it is bounded by the catchment of Thetla Chaung, a tributary of the Chindwin River, to the E by Zibu Taungdan 2,319′-2,910′ (706-886m), a catchment of the Mu River, to the S by the Namkawin and Kodan Chaung, tributaries of the Chindwin River.

Elevation: 186-2,100′ (56-640m)
Survey area: 94 sq.mi. (243 km^2).

Description: Vegetation is dominated by moist upper mixed deciduous forest, with evergreen forest and Indaing forest.

Access: The area is accessible by the newly constructed Pinlebu-Paungbyin Road. Paungbyin Town is 300 mi (482km) from Monywa. The base camp was 25 mi (40 km) from Paungbyin.

Rainfall: Averages 91″ (2,342 mm) per annum
Human impact and landuse: Teak extraction occurred in the area 15 years ago. Bamboo and mushroom collecting occurs along trails in the area.

6. Saramati (SRMT)

Location: Lies between 25°20′-25°43′N and 94°50′-95°40′E. To the N it is bounded by the Saramati Range, to the E by the Chindwin River and Laytin Ridge 5,790′ (1,764m), to the S by Lawpe Mountain 8,455′ (2,577m) and W by the Myanmar-India border.

Elevation: 410-12,553′ (124-3,826m)
Survey area: 254 sq.mi. (650 km^2)

Description: Streams in the Saramati and Laytin catchments flow to the Nantalaik River, one of the principal tributaries of the Chindwin River. The survey area is contiguous with India's Shiloi Reserve Forest. Vegetation cover consists of evergreen, pine, moist hill evergreen and sub-tropical evergreen forest with bamboo under storey.

Access: The area is accessible by road from Layshi in the dry, or during the wet season on foot. Mt Saramati, in the N of the survey area is 40 mi (64 km) from Layshi, accessible only on foot.

Rainfall: Averages 91″ (2,342 mm) per annum

Human impact and landuse: Though sparsely populated, shifting cultivation occurs as high up as 7,000′ (2,133m) elevation.

7. Paunglaung Catchment (PLG)

Location: Lies between 19°52′N-20°17′N and 96°24′E-96°35′E in Pyinmana Township, Mandalay Division. It is bounded to the N by Yamethin Township, to the E by Pinlaung Township, to the S by Pyinmana Township, and to the W by Tatkan Township.

Elevation: 500-6,252′ (152-1,905m)
Survey area: 134 sq.mi. (343 km^2)

Description: Riverine evergreen and moist upper mixed deciduous (MUMD) forest occur in the lowlands with dry upper mixed deciduous (DUMD), Indaing (dipterocarp), grassland and alpine forest at higher elevations. The entire catchment is 1,779 sq.mi. (4,608 sq.km). A rugged mountain range dissects the area.

Access: Two days walk from Taunggya to the centre of the study area across a 6,000′ (1,828m) mountain range.

Rainfall: 55-95″ (140-241 mm) per annum

Human impact and landuse: Numerous villages occur near the study area. Shifting cultivation occurs in the area, encroaching on the reserve forest. The area is sparsely populated owing to difficult access.

8. Panlaung Pyadalin Cave Wildlife Sanctuary

Location: Lies between 20°56′N-21°00′N and 96°16′-96°27′E in Ywa Ngan Township, Shan State, 21 miles (33km) from Kinda Dam and Hydro Power Project

Survey area: Covers an area of 61 sq.mi. (157 km^2) in the Kinda Dam area and includes two reserve forest areas, Panlaung and Pyadalin.

Description: The area is bounded by the Kinda Dam in the north, Ywa Ngan Township in the east, Thazi township in the south and Wan Twin Township in the west, respectively.

Vegetation: Riverine evergreen forest, Moist deciduous forest, and Dry deciduous forest each with diverse bamboo communities, and rattan.

Access: Panlaung-Pyadalin is accessible by road from Kume village, Myittha Township, 1 hour by boat from the Kinda Dam, and one hour's walk.

Rainfall: No data available

Human Impact and Landuse: Temporary human settlements occur in the area. Bamboo collection for making chopsticks is practiced. Timber extraction, non-timber extraction, fishing, hunting and cultivation are threats to wildlife. Roads passing through the wildlife sanctuary are used for extracting timber and moving cattle.

9. Central Bago Yoma (BGY)

Location: Lies between 19°02′-19°15′N and 95°53′-96°59′E, and includes parts of Sabyin, West Swa and Kabaung Reserve Forests. It is bounded to the N and E by the Sabyin River, to the E by the Swa River, to the W by the Bago Yoma Range 1,865′ (568m), and to the S by the Pyu Mountain 1,537′ (468m) and the Kabaung River catchment.

Survey area: 130 sq.mi. (334 km^2)
Elevation: 330″-1,885′ (100-574m)

Description: The area is drained by the Sittaung River and its tributaries. Vegetation is characterized by DUMD forest, MUMD forest and evergreen forest. Bamboos are common in the under storey.

Access: The area can be reached by 3 days walk from Swa Dam, to the west of Swa Town on the Yangon-Mandalay highway about 200 mi. (320 km) from Yangon by road.

Rainfall: 126″ (3,235 mm)

Human impact and landuse: Large scale extraction of teak and other hardwood, and other signs of human encroachment including bamboo and rattan collection, hunting and fishing was observed during the study period. No evidence of cultivation or permanent human settlement was observed in the study area.

10. Northern Rakhine (RN) (Paletwa and Kaladan river catchments)

Location: Lies between 21°05′-21°22′N and 92°21′-92°29′E is located between and contains the northern Kalapanzin River catchment, Saingdin Ridge and northern Mayu Range.

Survey area: 69 sq.mi. (177 km^2)
Elevation: 710″-2,494′ (216-760m)

Description: The area is bounded to the N by the Myanmar-Bangladesh border, with the Saingdin River to the E, the Obru and Pairwan Rivers to the S, and the Mayu Range in the W. Vegetation is characterized by sporadic evergreen forest in ravines with extensive Kayin bamboo patches. Forest covers approximately 40% of the survey area. Bamboo is more common in shifting cultivation areas at lower altitudes with dry evergreen forest at higher elevations. Due to logging and bamboo cutting, degraded secondary growth occurs on undulating slopes.

Access: The survey area is accessible by boat along

the Mayu and Kalpanzin Rivers, and during the dry season by 6′ wide paths cleared by the UN.

Rainfall: (no data available)

Human impact and landuse: A number of tribal settlements occur in areas fringing the forest. The lower Kalapanzin River valley is fertile and supports large villages (100-1,000 households) of Bengali people. Hunting, shifting cultivation and extraction of non-timber forest products all occur in the area.

11. Rakhine Elephant Range (RER)

Location: Lies between 18°01′-18°59′N and 94°36′-94°45′ E on the western side of the Rakhine Yoma Range.

Survey area: 57 sq.mi. (146 km²)
Elevation: 252″-3,416′ (77-1,041m)

Description: The area is dissected by a series of tall ridges running north to south range from 2000″-4000′. The area is drained by the Tandwe, Salu and Kyeintali Rivers that flow westwards into the Bay of Bengal. Vegetation includes semi-evergreen, mixed deciduous and secondary tropical moist forest, and bamboo brake.

Access: The study area was 3 days walk from Bogale Village, which is 48 mi. (77 km) from Gwa by road. Gwa Town is 180 mi (289 km) NW of Yangon by car.

Rainfall: (No data available)

Human impact and landuse: Thirty-three villages surrounding the Elephant Range consisting of Rakhine tribes (82%) and Chin tribes (18%). They farm rice and groundnut, practice shifting cultivation, and practice commercial hunting of wildlife.

12. Hukaung Valley (HKV)

Location: Lies between 26°36′-26°42′N and 96°34′-96°53′E in the newly declared Hukaung Valley Wildlife Sanctuary (2,493 sq. miles; 6,459 km²).

Survey area: 525 sq.mi. (840 km²)
Elevation: 193″-1,307′ (59-398m)

Description: To the N an upland area 6,758′ (2,060m) divides the Tarung-Tawan watershed and Gedu River catchment, with the Kumon Mountains to the E, the Nambyu and Nampyek River catchments in the S and the Tarung River and old Ledo Road to the W. Vegetation is predominantly dense lowland evergreen forest interspersed with meadows.

Access: The area lies 20 miles (32km) N of Tanaing and can be accessed during the wet season by boat and during the dry season by baggage elephant. The Ledo Road is paved for 90 miles (149 km) of its length providing year-round access from Myitkyina.

Rainfall: 91″ (2,339 mm)

Human impact and landuse: Apart from a 5 acre shifting cultivation area near Tawang River there were no permanent human settlements in the area.

13. Kaunglaungpu (KLP)

Location: The survey area is located in the Kran River and Phet River catchments between 26°44′-26°53′N and 97°53′-98°04′E.

Survey area: 127 sq. mi. (326 km²)
Elevation: 200′-9,080′ (61-2,767m)

Description: These rivers along with the Shinyan and Hteei Rivers drain the area. The area is covered in natural forest (40%) consisting of tropical evergreen, subtropical hill, warm and cool temperate rainforest and alpine. The remainder (60%) is secondary forest damaged by shifting cultivation in former times. These areas are dominated by bamboo, teat trees, phetwin, and old woody lianas. Extraction of some hard woods was taking place.

Access: This area is reached from Putao by road to Mabweza (63mi.; 101 km). The survey area is accessed by a 63 mi. (8 day) walk on foot passing Sunnochat Mountain.

Rainfall: (no data available)

Human impact and landuse: Intensive shifting cultivation has transformed natural forests into secondary forests. Threats to tigers and prey include a new road built from the China border, timber extraction, non-timber forest product extraction, mining, subsistence hunting and wildlife trade with China.

14. Sumprabum (SPB)

Location: The survey area lies 9mi. (15km) east of the Kumaon Range and 10 mi. (17 km) W of Sumprabum at 26°29′-26°36′N and 97°21′-98°28′E.

Survey area: 130 sq.mi. (334 km²)
Elevation: 460′-4, 950′ (140-1,508m)

Description: It is bounded to the N by the Chaukan Pass and hills that receive snow in winter. The Hukaung Valley lies to the W, with Myitkyina Township to the S. The area is drained by the Hpungchan, Hpung-in and Mali Rivers in the east and northwest, and from the south by the Magyeng River. Vegetation is tropical evergreen, sub-tropical moist hill forest, and subtropical wet hill forest. Bamboos and rattan species occur in the under storey. Some swampland occurs in the area.

Access: The area is reached on foot from Sumprabum. Sumprabum is 131 miles (210 km) N by road from Myitkyina.

Rainfall: 91" (2,339 mm)

Human impact and landuse:
The area is sparsely populated (3.8 people/sq.mi.; 2.5/sq.km) with local people practicing shifting cultivation.

15. Momeik-Mabain (MB)

Location: The survey area is located between 23°45'-23°55'N and 96°43'-96°51' E and includes parts of Manpon, Nampa and Namme Reserve Forests.

Survey area: 133 sq.mi (340 km^2)
Elevation: 426'-1,965' (130-599m)

Description: It is drained by the Maingthar and Namme River. Alluvial plains dominate the survey area with some rugged, rocky peaks including Parhoke Mountain 3,101' (945m), Wantu Mountain 3,003' (915m) and Kweanung Mountain 2,393' (729m). Vegetation comprises evergreen, MUMD and Indaing forest.

Access: From Mabain the study area is accessed by boat (18 mi.; 29 km), then by cart (12 mi.; 19 km), then on foot (18 mi.; 29 km). Mabain is 38 mi. (61 km) by ferry from Momeik. Momeik is 156 mi. (251 km) from Mandalay.

Rainfall: 52" (1,338 mm)
Human impact and landuse: Development of roads and infrastructure for gold mining has taken place since 1988 resulting in forest disturbance and pollution of natural drainages. Over 300 residents inhabit four goldmines in the forest. In the dry season, miners turn to bamboo and rattan cutting and resin tapping.

16. Myintmoletkat (MMLK)

Location: The survey area lies in the Htaung Pru Reserve Forest between 11°45'-11°38' N and 99°07'-99°03'E in Taninthayi and Bokpyin Townships, Myeik District.

Survey area: 120 mi. (310 km^2)
Elevation: 110'-2,264' (33-690m)

Description: Description: Pe River Valley is bounded to the N by the Mintha Reserve Forest, to the E by Myintmoletkat Mountain 6,801' (2,072m) to the S by the fork of the Pe and Plauk Rivers and on the W by Pe Mountain 2,720' (829m). Vegetation is characterized by a mosaic of riverine evergreen forest (30%) with sporadic secondary growth (30%) and shifting cultivation and orchard (40%). Areca palm and catechu plantations dominate the cultivated areas.

Access: By road from Myeik (58mi).

Rainfall: The area has two monsoons with a prolonged wet season from June-November, and annual rainfall of around 160" (4,127 mm).

Human impact and landuse: Base camp was situated 3 miles (5 km) S of Htaung Pru Village containing 15 households, with a further 38 households in adjacent Monoron Village.

17. S. Taninthayi (TNTY)

Location: The survey area lies in the Pe River Valley at 13°30' N and 98°38'E in Thayetchaung Township, Dawei District.

Survey area: 110 mi. (285 km^2)
Elevation: 208'-2, 010' (63-612m)

Description: The eastern portion is drained by the Naukpyan, La Mu, Tabalat, and Ngawun Streams which flow into the Little Taninthayi River. To the west the Monoron Stream flows into the Lenyar River to the south. The area is partially low-lying with swamp and grassland that is annually flooded, interspersed with mixed evergreen-bamboo forest groves on higher ridges. The area lies on both sides of the new Taninthayi-Bokpyin highway, and is partially under cultivation for rice and areca palm with some shifting cultivation.

Access: The area is accessible from the Dawei-Myeik Highway, 53 mi. (85 km) south of Thayetchaung, and on foot 15 mi. (24 km) east of Pedat.

Rainfall: The area has two monsoons with a prolonged wet season from June-November, and annual rainfall of around 161″ (4,127 mm).

Human impact and landuse: Due to the security situation, permanent settlements no longer exist in the area and farmers are permitted only weekly access to maintain and harvest their lands.

APPENDIX II. WILDLIFE RECORDED BY CAMERA-TRAP SURVEYS AT 17 SITES IN MYANMAR 1999-2002

Species	Scientific name	IUCN Status	CITES Status	Myanmar Status	No. records
Tiger	Panthera tigris	EN	App I	TP	5
Leopard	*Panthera pardus*	LR	App I	TP	92
Clouded Leopard	*Neofelis nebulosa*	VU	App I	TP	50
Golden cat	Catopuma temminkii	LR/VU	App I	TP	34
Marbled cat	*Pardofelis marmorata*	DD	App I	TP	15
Leopard cat	*Prionailurus bengalensis*	EN	App II	P	80
Wild dog	*Cuon alpinus*	VU	App II	P	34
Small Indian civet	*Viverricula indica*	-	App III	TP	6
Large Indian civet	*Viverricula zibetha*	-	App III	P	135
Large spotted civet	*Viverricula megaspila*	-	-	P	1
Common palm civet	*Paradoxurus hermaphroditus*	VU	App III	P	14
Three-striped palm civet	*Arctogalidia trivirgata*	EN	-	P	1
Masked palm civet	*Paguma larvata*	-	App III	P	3
Spotted Linsang	*Prionodon pardicolor*	-	App I	TP	2
Banded Linsang	*Prionodon linsang*	-	App II	TP	5
Binturong	Arctictis binturong	*VU*	*App III*	*P*	*15*
Malayan sunbear	*Harlarctos malayanus*	DD	App I	TP	72
Himalayan black bear	*Ursus thibetanus*	VU	App I	P	17
Yellow-throated marten	*Martes flavigula*	-	App III	P	16
Wild Pig	*Sus scrofa*	VU	-	-	443
Hog badger	*Arctonyx collaris*	-	—	—	33
Myanma ferret badger	*Melogale personata*	-	-	-	1
Mongoose species	*Herpestes spp*	—	—	P	1
Crab-eating mongoose	*Herpestes urva*	-	App III	P	22
Elephant	*Elephas maximus*	EN	App I	TP	81
Gaur	*Bos gaurus*	VU	App I	TP	265
Banteng	*Bos javanicus*	EN		TP	38
Tapir	*Tapirus indicus*	VU	App I	TP	3
Sambar	*Cervus unicolor*	-		P	166
Serow	*Naemorhedus sumatraensis*	VU	App I	TP	25
Common muntjak	*Muntiacus muntjak*	-		SP	847
Leaf deer	*Muntiacus putaoensis*	-		TP	2
Large mouse deer	*Tragulus napu*	EN		TP	9

Lesser mouse deer	*Tragulus javanicus*	-		TP	9
Malayan porcupine	*Hystrix brachyura*	VU		-	128
Brush-tailed porcupine	*Atherurus macrourus*	EN		-	32
Pangolin	*Manis javanica*	LR/NT	App II	TP	2
Rhesus macaque	*Macaca mulatta*	LR/NT		P	97
Pig-tailed macaque	*Macaca nimestrina*	VU		P	59
Capped leaf monkey	-	-		-	2
Phayres langur	*Prebytis phayrei*	-		P	1
Dusky leaf monkey	*Semnopithecus obscurus*	LR/NT	-	TP	1
Squirrel	*Ratufa spp*	-	App II	-	11
Other small mammal species	-	-		-	24
Blue Whistling Thrush	*Myiophoneus caeruleus*			SP	1
Green magpie	*Cissa chinensis*			P	1
Indian pied hornbill	*Anthracoceros albirostris*			TP	1
Jungle fowl	*Gallus gallus*			-	80
Laughingthrush species	*Garrulax spp*			P	1
Orange bellied leafbird	*Chloropsis hardwickii*			SP	17
Owl	*Strigiformes spp*			TP	2
Parrot	-			P	4
Pheasant species	-			TP	163
Black Stork	*Ciconia nigra*		App II	-	2
Quail	*Coturnix spp*			-	2
Monitor lizard	*Varanus spp*			P	1
Tortoise	-			P	1
Green viper	*Trimeresurus spp*			P	1
Unidentified					165
Human sign					
Domestic elephant					10
Domestic buffalo					29
Domestic cow					46
Domestic dog					27
Villagers					242
Suspected poacher					61
Military					30
Government staff					25
				Total	**3811**

APPENDIX III. RESULTS OF INTERVIEW SURVEYS FOR TIGERS AT 17 SITES IN MYANMAR

Site	Direct (sighting) observation	Track and sign	Heard	Total observ.	Date of most recent direct observation
AKNP	**3**	5	9	17	1998
BGY	**2**	10	1	13	1998
HKV	**9**	10	0	19	2001
KLP	**6**	21	0	27	Oct 2000
MB	**16**	1	1	18	2001
MHM	**2**	5	0	7	Dec 1998
MMLK	**14**	6	0	20	Oct 2001
PLG	**9**	20	1	30	Apr 2000
PPDL	**6**	7	1	14	2000
RER	**6**	1	3	10	Jun 2000
RN	**7**	4	0	11	Jan 2000
SPB	**6**	10	0	16	1998
TD	**3**	3	1	7	2000
TMT	**4**	5	1	10	1996
TNTY	**14**	4	1	19	Feb 2002
Totals	**107**	**112**	**19**	**238**	

APPENDIX IV. HISTORICAL RECORDS OF TIGER IN MYANMAR - PRE-1999

APPENDIX V. TIGER INTERVIEW PROTOCOL

1. How long have you been in this village?
2. What is your ethnicity?
3. Where do you get bamboo and wood to repair your house?
4. (If you get it from the forest) How far from your house to the forest?
5. How many times do you go into the forest per month?
6. Have you ever seen wild animals when you go inside the forest?

If yes,

Sr.	Animal (Prey)	Quantity		Forest		Human disturbance		Remark
		Many	Few	Unclassified	Reserved	Yes	No	

Sr.	Animal (Predator)	Quantity		Forest		Human disturbance		Remark
		Many	Few	Unclassified	Reserved	Yes	No	

1. Do you have any experience with predators attacking humans or livestock?

Sr.	Predator	Livestock						Time occur	Place occur	Remark
		Human	Buffalo	Cow	Goat	Pig	Others			

2. How do people use wild animal products in this area?

Sr.	Animal	Products				Usage			Market situation			Remark
		Meat	Bone	Skin	Horn	Medicine	Food	Traditional	Place	User	Price	

3. What hunting methods do people use? What kinds of tools do they use for hunting?

Sr.	Prey	Hunting methods				Tool						
		Tracking	Smelling	Remnants	Info	Gun	Cross	Bow	Dogs	Snare	Trap	Digging
				of food			bow					hole

4. (If he/she does cultivation) How much land do you use? What kinds of crops do you plant? Do wild animals destroy your crops? If yes, what animals are they?

Sr.	Crops	Acres	Total acres		Animal that destroyed crops	Time occur	Remarks
		Paddy field	Shifting cultivation	Extended land		Day	

1. What kind of animals do you raise? How do you raise livestock?
   (Free grazing/ farming) How far from village to grazing field? How many acres used for grazing/ (estimate)

2. Have you ever seen a tiger?
   (Yes-No Place……/ Time……../ Size……..)
   Have you ever heard a roar of a tiger?

3. Have you ever seen track, scratch, and faeces of tiger?
   If yes, how big is it?
   (Showing a track of tiger) Have you ever seen a track like this?

4. Have you ever seen a leopard? Size? Colour pattern?

5. What is your opinion about the usages of tiger product medicine?

6. How many tigers do you think live around this region?

7. Is there any tiger product trade around this region?

8. What is your feeling and opinion about tigers?

9. Please show animals you have seen from these pictures?

10. Please talk about tigers that your parents and grandfather/mother have talked about?

APPENDIX VI. TRACK AND SIGN FIELD RECORD FORM

Myanmar Tiger Survey *Wildlife Conservation Society, Myanma Program*

Form No. 3
Track & Sign Data

Study Site: .....
Observation team: .....
Observors: .....
.....

Location: .....
Weather: .....
Forcast type: .....
Compass bearing: .....

Date: .....
Time start: .....
Time finish: .....
Length of trail: .....

Time (hh:mm)	Distance	Position GPS Latitude N Deg	Min	Longitude E Deg	Min	Altitude	Way pt. No	Macro habitat A	B	C	Direction/ location	Species name	Track/ signs	Sub-strate	Age F/O	Measurement (mm) L	W	PW	Dia	Remarks
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:																				
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Use blue ink for entering data.

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Date:

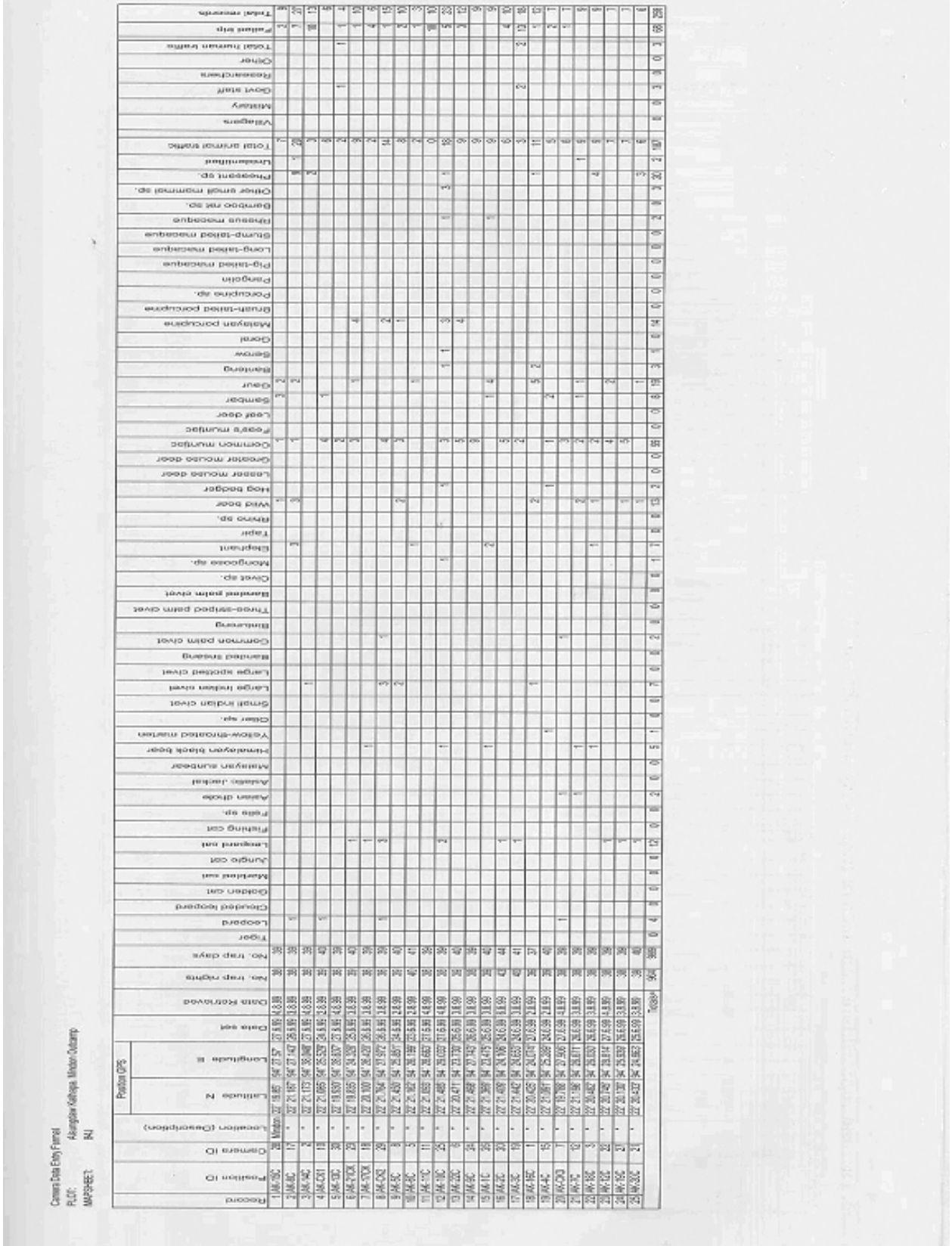
Editor should use red ink.

Checked & edited by:

Date:

APPENDIX VII. CAMERA TRAP FIELD USAGE FORM

APPENDIX VIII. CAMERA-TRAP RECORD FORM



APPENDIX IX.

a. Detections of wildlife from camera-trap surveys at 17 sites in Myanmar, 1999-2002

b. Detections of wildlife from track and sign surveys at 17 sites in Myanmar, 1999-2002

CHAPTER 9

TIGER ACTION PLAN

NEPAL 2007-2011

Prepared by
Government of Nepal
Ministry of Forests and
Soil Conservation
Department of National Parks
and Wildlife Conservation
April 2007

DNPWC	NTNC	WWF

Facilitated by
Nepal Nature.com

• Revised and updated version of the 1999 Tiger Action Plan for Nepal

Publishers Government of Nepal, Ministry of Forests and Soil Conservation, Department of National Parks and Wildlife Conservation; National Trust for Nature Conservation; and WWF Nepal Program

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Acronyms and Abbreviations

BCC	Biodiversity Conservation Center
BNP	Bardia National Park
BZ	Buffer Zone
CBAPO	Community Based Anti-Poaching Operation
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNP	Chitwan National Park
DDC	District Development Committee
DFID	Department for International Development
DNPWC	Department of National Parks and Wildlife Conservation
EIA	Environment Investigation Agency
GIS	Geographical Information System
GO	Gazetted Officers
GoN	Government of Nepal
GPS	Global Positioning System
GTF	Global Tiger Forum
ITNC	International Trust for nature Conservation
IUCN	The World Conservation Union
MFSC	Ministry of Forests and Soil Conservation
MIS	Management Information System
NA	Nepal Army
NG	Non gazetted staff
NGO	Nongovernmental organizations
NP	National Park
NPWCA	National Parks and Wildlife Conservation Act
NTNC	National Trust for Nature Conservation
PA	Protected Areas
PALNet	Protected Areas Learning Network
PWR	Parsa Wildlife Reserve
Rs	Rupees
SAARC	South Asian Association for Regional Cooperation
SNV	Netherlands Development Organization

SWR	Shuklaphanta Wildlife Reserve
TAL	Terai Arc landscape
TCAP	Tiger Conservation Action Plan
TCL	Tiger Conservation Landscapes
TCM	Traditional Chinese Medicine
TRAFFIC	Trade Records Analysis of Flora and Fauna in Commerce
UNDP	United Nations Development Program
UNESCO	United Nations Economic, Scientific and Cultural Organization
VDC	Village Development Committee
WCPA	World Commission on Protected Areas
WR	Wildlife Reserve
WTO	World Trade Organization
WWF	World Wildlife Fund

FOREWORD

The tiger, at the apex of the food web, is an indicator species of a healthy ecosystem. Acting as an umbrella species, its conservation includes the preservation of a whole array of species sharing the same habitat. The tiger has played an important role in the rise of the international conservation movement. The long-term survival of this magnificent animal is uncertain, however, largely due to the loss and fragmentation of its habitat, poaching, and the illegal trade of tiger parts. Of the eight tiger sub-species, three are already extinct; and the remaining five are also under various threats.

A conservation action plan and its effective implementation have become essential to every tiger range country, to ensure long-term conservation of the tiger. Rapid shrinkage and fragmentation of its habitat in Nepal has made us realize the importance of a landscape approach to tiger conservation that includes both protected areas and national forest. Corridors and connectivity between protected areas within the country, as well as between Nepal and India-are essential to allow for the safe dispersal of the tiger. Trans-boundary conservation meetings, between India and Nepal, have extended the scope of mutual conservation interests of the two neighboring countries. Cooperation among international conservation communities is very important to achieve the tiger conservation goal. The Regional Symposium on the Royal Bengal Tiger-held in the Chitwan National Park, in December 1998 was an attempt to bring together experts, policy makers, and organizations involved in tiger conservation, in a forum to discuss tiger conservation in the whole region. The Chitwan Declaration, derived from this Symposium, has increased the scope of regional cooperation among the tiger range states.

The activities of anti-poaching units and the active cooperation from local people have been successful in curbing the poaching of several endangered wildlife species, including the tiger. The Department of National Parks and Wildlife Conservation in collaboration with the King Mahendra Trust for Nature Conservation and the International Trust for Nature Conservation-is conducting annual surveys of protected areasin the Terai to assess the status of the tiger. WWF has been supporting His Majesty's Government of Nepal in tiger conservation since the early 1970s when the history of protected areas began in Nepal.

This document was started in January 1998, at the University of Minnesota; and was presented at the Year of the Tiger Conference-held in Dallas, Texas, USA-in February 1998. Mahendra K. Shrestha and Dr. Anup R. Joshi deserve recognition for preparing this document. Without their consistent work, we could not have seen this document at this stage. Criticism, from several scholars and officials in Nepal and abroad, were valuable in preparing this document.

Cooperation from all sectors of government, non-governmental organizations, and communities living around the natural areas-is essential for the effective implementation of this Tiger Conservation Action Plan. Such cooperation will ensure the continued survival of this majestic animal in the wild for our future generations.

Rabi Bahadur Bista
Secretary
Ministry of Forest and
Soil Conservation Kathmandu,
Nepal. August 1999

ACKNOWLEDGEMENTS IN THE 1999 TIGER ACTION PLAN

On behalf of the Department of National Parks and Wildlife Conservation, I would like to express my deep appreciation to all those who made their valuable comments on the earlier versions of this document. The comments and suggestions of many experts, from governmental and nongovernmental organizations, were helpful in refining this action plan. We also appreciate the inputs from the participants of the Year of the Tiger Conference-held in Dallas, Texas, USA, in February 1998; and the Regional Symposium on the Royal Bengal Tiger, held in the Chitwan National Park, in December 1998.

I would like to thank Dr. J.L.D. Smith and Linda Weir, from the University of Minnesota, USA, for their help in the initial development of this document. I appreciate the efforts of Dr. Charles McDougal, from the International Trust for Nature Conservation, and Ukesh R. Bhuju, from WWF Nepal Program; their inputs, expertise, and experiences associated with tiger conservation in Nepal were most valuable. In addition, the support and suggestions from Rabi B. Bista, Secretary of the Ministry of Forest and Soil Conservation, were equally valuable. I would also like to thank the staff of the Department of National Parks and Wildlife Conservation-specifically, Dr. Uday R. Sharma, former Director General; Narayan Poudel, Ecologist; and many officers. Their comments and support, in giving this document its final shape, are much appreciated.

Special thanks must be given to Mahendra K. Shrestha, Conservation Officer of the Department of National Parks and Wildlife Conservation; and to Anup R. Joshi, Ph.D., Research Associate from the University of Minnesota, USA. They have been involved with the preparation of this Tiger Conservation Action Plan, from its inception to its completion. They compiled information, collected comments, and created the final format. Their untiring efforts are deeply appreciated.

The preparation of this Tiger Conservation Action Plan has been possible, due to the deep interest of many people and organizations. I hope that these characteristics of collaboration and interest will also be present in its implementation.

Tirtha M. Maskey, Ph.D.
Director General
Department of National Parks and
Wildlife Conservation
August 1999

•Revised and updated version of the 1999 Tiger Action Plan for Nepal

1 Russian Far East (Russia), Terai Arc (Nepal and India), Satpuda-Maikal range (India), Sundarbans (Bangladesh and India), Lowe r Mekong Forests (Cambodia, Lao, and Vietnam), Taman Negara-Belum-Halabala (Malaysia and Thailand), and Kerinci Seblat/ Bukit Barisan Selatan (Indonesia)

2 previously known as Tiger Conservation Units

3 **Nepal 4**: Parsa Wildlife Reserve, Chitwan National Park, Bardia National Park, and Shuklaphanta Wildlife Reserve; **India 7**: Valmikinagar Wildlife Sanctuary, Sohelwa Wildlife Sanctuary, Katarniaghat Wildlife Sanctuary, Dudhwa National Park, Kishanpur Wildlife Sanctuary, Corbett National Park, and Rajaji National Park

4 The First Transboundary meeting took place in Kathmandu, 3-5 January 1997, the second in Suraj Kund, near New Delhi, India from 28 February-1st March, 1999, and the Third in Budanilkantha, Kathmandu from 13-15 September 2002.

5 The time frame applies for five years during 2007-2011, unless specified.

EXECUTIVE SUMMARY

The goal of this Revised Tiger Conservation Action Plan (TCAP) is to preserve, recognize, restore, and increase the effective land base that supports tigers in Nepal, in order to maintain a viable tiger population. The action plan aims at identifying areas that are most important for maintaining the largest, least fragmented land base for tigers; and developing conservation strategies that include and benefit local communities. Ecosystem management, with an emphasis on building partnerships is crucial for maintaining tiger habitats outside protected areas because:

1. the existing protected areas, by themselves, are not large enough to maintain viable tiger populations
2. there are extensive forestlands outside protected areas where tigers currently occur
3. forests outside protected areas are often degraded and need ecological restoration
4. the key to restoring habitat outside protected areas is the inclusion of local people as stakeholders, who directly benefit through conservation actions, and contribute to management decisions.

Threats to tiger populations continue to increase, due to poaching, loss of habitat and illegal trade. Many of the world's tiger populations are restricted to small protected areas, with uncertain long-term viability. Therefore, it is critical to manage entire tiger populations, by maintaining corridors, and by including both prime habitat, in protected areas, and large tracts of adjacent forest habitats. Preservation of the tiger will ensure the conservation of all the species sharing its habitat, as well as a healthy ecosystem.

With establishment of Chitwan National Park (CNP) in 1973, a network of protected areas (PA) was established all across the country. The establishment of protected areas undoubtedly protect important wildlife habitat. However, it also initiated conflict, between the park authorities and the local people regarding forest based needs. Subsequently, various management measures have been applied to combine conservation goals with the needs of the local people.

Successful participatory resource management practices and its replication in Buffer Zone management program brought revolutionary change in the concept of protected area management. These change involved the active participation of local communities, in the conservation and management of protected areas and the adjacent buffer zones. In return, local communities get a 30-50 percent share of park income, to be used directly in conservation and community development.

This partnership, between the park management and local communities, has widened the scope of wildlife conservation beyond park boundaries. A significantly degraded area, in the periphery of CNP, has been restored, in collaboration with local communities. Now, tigers and rhinos occur in the restored habitat; and local people have begun to market elephant rides and overnight stays to visitors in these areas. In collaboration with various organizations, the Department of National Parks and Wildlife Conservation (DNPWC) has launched several projects, in the periphery of protected areas, to address conservation and community needs.

Historically, tigers were distributed continuously across the lowland forests. At present, three isolated populations (CNP, BNP and SWR) remain in Nepal. In these three populations, the tiger census of 1995-1996, minimum tiger populations was found to be 48-49, 30-32 and 15-16 breeding animals, respectively.

In Nepa1, conservation efforts, so far, have focused on establishing and managing protected area systems. Unfortunately, protected areas, by themselves, are not large enough to sustain viable tiger populations. For the long-term viability of tiger populations, it is important to consider a landscape approach to management, by treating the entire tiger population as a single management unit. Lack of detailed information, on the spatial location of tigers, is one of the impeding factors for a landscape approach to tiger conservation. Furthermore, wildlife conservation is not a priority for the management and administration of forest areas outside the parks. This requires cooperation among various governmental and non-governmental organizations, and the local communities.

To achieve forementioned goal, five major sets of objectives has been devised, which includes: Tiger and Prey Information, Habitat management, Conflicts Resolution, Anti-poaching and Anti-trafficking operations, and Transboundary cooperation.

Many of these recommended activities are already being carried out in the field. They need strengthening

and systemization, however. The natural history of tiger is given in the Appendix, to provide general information on the tiger and its biology.

For the implementation of the Action Plan, the existing human resources of the government and the partner organizations will be mobilized. The community based organizations will also be mobilized where applicable as outlined under various activities of the tiger conservation action plan. The programs pertinent to tiger conservation will be coordinated at three levels of implementation, namely center, landscape and protected area.

The total budget for the action plan for the period of five years is estimated to be US$ 1,150,000 of which 31% budget has been set aside for anti-poaching and anti trafficking operations, 33% in conflict resolutions, 18% habitat management, 12% tiger and prey information and 6% trans-boundary cooperation. The financial resources that will be available under various programs will also be mobilized as complementary to the tiger conservation.

Considering the areas of interests and scopes of the partners, resources for the action plan could be generated from various sectors including government, donors, international nongovernmental organizations, private sectors, local governments (DDCs and VDCs) as well as the Buffer Zone organizations.

PART A CONTEXT

1.1 INTRODUCTION AND BACKGROUND

1.1.1 Nepal Perspective

In Nepal, tiger habitat has been protected since 1846, when the first Rana Prime Minister ordered that the rhinoceros and its habitats, primarily in the Rapti and Reu Valleys of Chitwan, be saved (Caughley 1969, Shrestha 1998). Early in the 19th Century, the government of Nepal discouraged settlement and agriculture in the lowlands, or the Terai, in order to form a buffer of malarial forests, as a defense for invading armies (Gurung 1983, Mishra and Jefferies 1991). Human disturbance was minimal; the few settlements primarily consisted of small patches of jungle, cleared by the Tharu people the oldest inhabitants of Chitwan, who were believed to have developed immunity against malaria (Philips 1925). With the collapse of the Rana regime in 1951, however, much of the wildlife habitat in Chitwan suffered heavy destruction (Talbot 1959, Gee 1959, Spillet and Tamang 1967).

In the 1950s, the government enacted a malaria eradication campaign and a resettlement program, which dramatically altered Chitwan's human population distribution and density, and profoundly impacted land use patterns (Gurung 1983). Although resettlement programs were intended to provide land for people with no land holdings, many individuals (of varied economic statuses and ethnic backgrounds) moved into the Chitwan Valley, from the hill districts. Population in the Chitwan District increased from 42,800 in 1954 to 194,000 in 1971, and dramatically altered forest cover (Gurung 1983). Between 1961 and 1977, 65 percent of the forests in Chitwan were destroyed, and the land was converted to cultivation (Gurung 1983, Mishra and Jefferies 1991).

Most of the immigrants to the Chitwan Valley settled along the Rapti River, destroying tall grasslands and riverine forests, home to a variety of wildlife. In 1964, the late King Mahendra declared the southern part of the valley, across the Rapti River, as the "Mahendra Mriga Kunja"; more than 22,000 people were moved out of the park (Willan 1965, Upreti 1973, Shrestha 1998). In 1973, to protect the remaining forest lands and wildlife from further degradation, the government enacted the National Parks and Wildlife Conservation (NPWC) Act, 2029; and the park was declared to be the Chitwan National Park (CNP), the first national park formally established in Nepal. Parallel to the establishment of CNP, the Tiger Ecology Project was initiated in the early 1970s as a joint venture of the Government of Nepal, the Smithsonian Institution, and World Wildlife Fund to conduct research on the tiger. Based on the recommendations of Tiger Ecology Project, the park boundaries were extended in 1977, to its current size of 932 km^2 (Mishra and Jefferies 1991, Shrestha 1998). Furthermore, as an extension to CNP, the Parsa Wildlife Reserve (PWR) was established in 198?, to maintain the continuity of habitats, based on the ecosystem management approach.

Concurrently, a network of protected areas (national parks and wildlife reserves) was established throughout the country. The establishment of protected areas undoubtedly protected important wildlife habitat. It also initiated conflict, however, between park authorities and local people, because they were denied easy access to protected areas, where they attained basic needs such as fodder, firewood. In recognition to the public outcry, the government decided to open protected areas in the Terai to collect thatch grass (Thatch grass and grass reeds are used as local roofing and building materials).

Community participation, in natural resources management, has been widely recognized in Nepal. We are the pioneers in combining conservation goals to meet the needs of the local people. Such indigenous systems now form the basis for users' group management of the forests, watersheds and buffer zones; these systems also support wildlife conservation.

In support of the public sentiments, the fourth amendment of NPWC Act, 1993 provisioned buffer zones in and around the national parks and wildlife reserves. Accordingly, 30 to 50 percent of the total revenue of the protected areas could be plowed back for conservation and community development. Following the formulation of the Buffer Zone Management Regulations (BZMR) 1996 and Buffer Zone Management Guidelines (BZMG) 1999, buffer zones were first declared in CNP and BNP. The buffer zone program has brought a revolutionary change in the management concept of protected areas allowing local communities to organize themselves for management of natural resources and biodiversity conservation.

Apart from the ecological significance, tiger is culturally reflected in the philosophies of *Sanatan* Hinduism and Buddhism.

1.1.2 Global and National Scenario

The tiger, one of the world's most magnificent mammals, is highly endangered and faces extinction in the near future, if the present trend of poaching and habitat degradation continues. Two of the eight tiger subspecies, the Balinese and Caspian, are already extinct; and the Javan tiger is thought to have disappeared in the 1980s (**Table 1**). A drastic rise in tiger poaching was first noticed in 1990; by 1992, there were reports of severe poaching from across the tiger's range, strongly impacting all five remaining subspecies.

The primary consumers of tiger products are Chinese communities throughout the world, where tiger parts-in the form of tiger bone wine and tiger plasters-are used as a traditional medicine. The sale of these products has been documented in every major Chinese community that has been examined. If the present rate of poaching continues, many tiger populations might be extinct in near future.

The Royal Bengal tiger *(Panthera tigris tigris)* was once widespread across south Asia. Great hunts were organized by the Rana rulers in 19th Century-to honor European royal visitors and Indian princes where several hundred tigers were killed at a time. Despite this, there was little effect on the general tiger population: there were significant intervals between hunts; these hunts were held over large spans of high quality habitats, which contained an abundance and variety of prey species. Hence, the tiger population was able to recover rapidly, even after such losses.

As human populations converted the rich alluvial plains to agricultural lands, however, tigers gradually became confined to the protected forest areas. By 1906, the tiger was exterminated in Pakistan (Roberts 1977), but there was still an estimated 40,000 tigers on the Indian subcontinent at that time (Gee 1963). The clearing of forests accelerated sharply after World War II, however, resulting in extensive loss and fragmentation of forest lands.

Table 1. The Status of the Tiger *(Panthera tigris)* in the World

Tiger Sub-species	Range Countries	Population
Royal Bengal Tiger *Panthera tigris tigris*		**3,176 – 4,556**
	Bangladesh	62-362
	Bhutan*	67-81 (adults)
	India	2500-3750
	Myanmar, Western	124-231
	Nepal*	93-97 (adults)
Caspian Tiger *P. tigris virgata*	Formerly: Afghanistan, Iran, Chinese Turkestan, Russian Turkestan, Turkey	**Extinct 1970s**
Amur Tiger *P tigris altaica*	China, North Korea, Russia*	**360-406**
Javan Tiger *P. tigris sondaica*	Java, Indonesia	**Extinct 1980s**
South China Tiger *P. tigris amoyensis*	China	**20 – 30**
Bali Tiger *P. tigris balica*	Bali, Indonesia	**Extinct 1940s**
Sumatran Tiger *P. tigris sumatrae*	Sumatra, Indonesia	**400 – 500**
Indo-Chinese Tiger *P. tigris corbetti*	Cambodia, China, Laos, Malaysia, Eastern Myanmar, Thailand, Vietnam	**1,227 -1,785**
Totals		**5,183- 7,277**
Rounded Totals		**5,200- 7,300**

* Note: Most estimates are educated guesses, based on the reports from range countries. Estimates for Bhutan,

Nepal, and Russia provided more reliable numbers.
Figures for Bhutan, Nepal, and Russia are for the adult breeding tigers counted. Tiger specialists consider such figures more realistic, because many cubs are unlikely to survive to maturity.
Source. WWF-World Wide Fund for Nature 1999

Furthermore, since 1990, reports from across the tiger's range indicate that there has been a sudden, drastic, Asia-wide increase in tiger poaching (Jackson 1993); an estimated 25 % of Russian tigers have been poached since 1992 (Miquelle et al. 1993). Sanderson et al, 2006 studied current tiger distribution in its historical ranges and reported that tiger may have vanished in as much as 40 % of their remaining habitat in last 10 years, but some areas, including Terai Arc Landscape and Russian Far East, have stable or even increasing tiger numbers.

The Royal Bengal tiger now occurs only in small, isolated protected areas. Most of these areas are not large enough to sustain long-term, viable populations. To address issues such as forest fragmentation, habitat degradation, and poaching-conservationists and resource mangers must shift their scale of management, from individual parks and wildlife reserves/ sanctuaries, to larger scale units that encompass entire tiger populations (Smith et al. 1998). This requires management to bridge several jurisdictions and ultimately address, not only the needs of tigers, but also the needs of local people.

1.2 Status and Distribution

Historically, tigers were distributed continuously across the lowland Himalayan forests. Surveys, between 1987 and 1997, documented that only three isolated tiger populations remain in Nepal (Smith et al. 1998) (**Figure 1**).

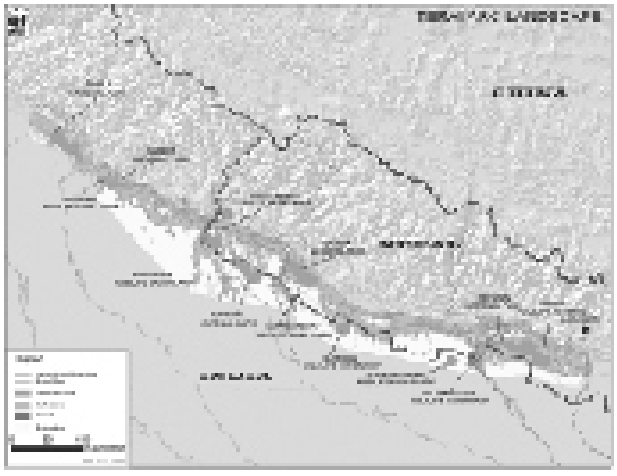


Figure 1. Tiger Conservation Landscapes in Nepal

The Chitwan population occupies the largest area (2,543 km^2); 75 percent of the population lives within the protected areas, while the remaining 25 percent lives outside. The Bardia population, 180 km west of Chitwan, occupies a land base of 1,840 km^2; Bardia National Park (BNP) encompasses 51 percent of this land base. Between 1987 and 1997, tigers west of the Karnali River became increasingly isolated from the core of the Bardia population. Without habitat restoration, this area is currently too small, and does not have the prey density to support a separate, viable tiger population. The third population resides in Shuklaphanta in western Nepal. The land base is only 320 km^2, but the prey density is high. The Shuklaphanta population was formerly connected to tiger habitat in India, but is now becoming isolated. The tiger census of 1995-1996, in the protected areas of Chitwan, Bardia and Shuklaphanta, estimated tiger populations to be 48-49, 30-32, and 15-16 breeding adults respectively.

The estimated population of tigers was between 98 and 123 breeding adults as per the census carried out in 1999/2000. In addition to this, seven tigers were reported from the Barandabhar forest in 2005 using camera traps and other indirect methods (KMTNC. 2005). The preliminary findings of the recent research on tigers outside the protected areas have revealed that the potential habitats in Kailali, Jhapa and Trijuga

Table 2. Status of Tiger Populations in Nepal				
Location	1999/2000		2005	
	Adult	Total	Adult	Total
Chitwan National Park*	50 to 60	173 to 209	50 to 60	173 to 209
Barandabhar*	-	-	-	7
Bardia National Park**	32 to 40	111 to 139	32 to 40	111 to 139
Shuklaphanta Wildlife Reserve	16 to 23	56 to 80	16 to 23	56 to 80
Kailali, Trijuga and Jhapa***	5 to 7	-	5 to 7	20
Total	98 to 123	340 to 350	103 to 130	360 to 370

* Due to different techniques used in census, total number of tigers could not be estimated.

** Based on the results of camera trapping in the Karnali flood plain.

*** Not included in the total tiger population

Sources: DNPWC. 2006. National Report on Status of Tiger in Nepal. DNPWC, MFSC, May 2006 (draft only); Karki. JB. 2006

(Gurung et 2006 claims no tiger east of Bagmati River) could hold certain number of tigers (**Table 2**).

1.3 Efforts and Achievements

1.3.1 Conservation Policy

Since the preparation of the tiger conservation action plan for Nepal in 1999, several efforts have been made and some positive results have been achieved to date. In the policy front, the 2002 Nepal Biodiversity Strategy has stipulated for the keystone species conservation plan. The plan stresses upon the population surveys, monitoring, protecting key habitats, and relocation and restoration of certain species (NBS 2002). Similarly, the Nepal Biodiversity Strategy Implementation Plan which was finalized in 2004 contains project outlines on two major activities as follows:

1. Implement the Tiger Action Plan 1999 (survey and monitoring, habitat improving, public awareness, community development, anti-poaching, trans-boundary cooperation and networking), and
2. Upgrade the baseline information on tigers and its prey base outside protected areas.

The anti-poaching operation strategy has been drafted out and is in the process of approval at the Ministry of Forests and Soil Conservation. The strategy addresses the three key aspects of tiger conservation, such as i. patrolling, ii. information collection, and iii. operations and CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) implementation in towns and cities.

1.3.2 Management Plans

Tiger conservation is one of the priority activities outlined in the management plans for the lowland protected areas namely Parsa and Shuklaphanta Wildlife Reserves, and Chitwan and Bardia National Parks. The target of the management plan is to increase tiger population by 10 % within the five year period of plan. The major activities include monitoring of tigers using camera-trap and pugmark, special arrangement to handle aged and man-eaters. Participation of buffer zone community is a strategy adopted in the management plans.

In the WWF Global Tiger Conservation Strategy Workshop (September 4-8, 2000, Indonesia), the Terai Arc was identified among the seven focal tiger landscapes[1], where the chances of long-term tiger conservation were best and its involvement would be most valuable (WWF International. 2002). On the basis of the Tiger Dispersal Model, six Tiger Conservation Landscapes-TCLs[2] have been identified in TAL, such as follows:

- Three Level I- TCLs: Chitwan–Parsa–Valmiki, Bardia–Banke, and Rajaji–Corbett;
- Two Level II - TCLs: Dudhwa–Kailali and Suklaphanta–Kishanpur; and
- One Level III -TCLs: Dang–Churia.

The 11 protected areas[3] within Terai Arc Landscape provide the critical habitats for the tigers (WWF 2004). Along with the improvements of the protected areas management, the immediate objectives of TAL-Nepal include:

- Restoration of key corridors connecting protected areas;
- Elimination of poaching in wildlife corridors and protected areas ; and
- Strengthening community-based anti-poaching efforts along critical forest corridors in Basanta and Khata, and buffer zones of lowland protected areas (WWF. 2004).

1.3.3 Global Commitments

Nepal's global commitments for tiger conservation have been much reflected in various national and international programs including the Global Tiger Forum, CITES, CBD and other conservation programs. Considering the overall achievements in conservation including tiger conservation, Nepal's lowland protected areas have been internationally recognized. The 5th World Parks Congress held in South Africa in September 2003 recognized the Chitwan National Park as the best managed park. The Terai Arc Landscape (TAL) has been selected as one of the ten field learning sites for the Protected Areas Learning Network (PALNet). In fact, the fundamental concept of TAL was strategically adopted at the WWF Global Tiger Conservation Strategy Workshop held in Anyer, Indonesia in September 2000.

1.3.4 Human Resource Development

Existing human resource for tiger related research and monitoring has been priority; which is reflected in ongoing monitoring and research work conducted by protected areas staffs.

While assisting in the tiger research activities and participating in training programs, the park personnel learned tiger survey techniques especially camera trapping, tracking pugmarks and other signs. In the training need assessment of the DNPWC personnel, the topics tiger and its prey were identified as priority areas of learning (DNPWC. 2003). These observations indicate that capacity of DNPWC personnel has been enhanced in the recent years.

At the landscape level, major research work has been completed in November 2004. The research was on relative ungulate abundance in a fragmented landscape with the implications for tiger conservation (Shrestha. 2004). Similarly, multidisciplinary research work on tiger-human conflict has been conducted in protected areas involving PAs staff (Gurung et al 2006). Similarly, study on Tiger-Prey Relationship was also completed in Chitwan National Park in 2005 (Bagale. 2005).

1.3.5 Field Implementation

During the ten years period of 1994-2004, twenty persons have been prosecuted on the crimes pertinent to tiger poaching in Chitwan alone. The total seizure of tiger bone was 48.8 kg, of which 5.8 kg was presumed to be from India. During the period of July-October 2004, four tigers were poached in Chitwan. During the period of January 2004 and September 2005, nineteen persons were arrested for the tiger related cases in Kathmandu and elsewhere. The confiscations of items include 21 pieces of tiger skins (DNPWC 2006).

Handling of man-eating tiger was a major task during the period between 2001 and 2005. During that period, 30 people were killed by tigers outside the protected area and were compensated with Rs 0.75 million. While, 17 injured persons were also compensated with Rs 0.06 million for the treatment. Criteria for compensation and treatment disbursement have been outlined by the park authorities in cooperation with the buffer zone representatives.

The relief fund has been established in Bardia National Park with amount totaling Rs. 1.3 million of which only the interest will be used for the treatment, cremating the dead bodies, and livestock depredation. So far a total of Rs. 0.28 million has been compensated during the period 2001-2005.

In Suklaphanta Wildlife Reserve, tiger human conflict has been minimal since there has not been any case of human casualty. However, there are a few reports of cattle lost to tigers inside the reserve for which no compensation will be given.

1.3.6 Institutional Strengthening

Buffer zones have been declared in all the four tiger range protected areas (PWR, CNP, BNP and SWR).

[1] Russian Far East (Russia), Terai Arc (Nepal and India), Satpuda-Maikal range (India), Sundarbans (Bangladesh and India), Lower Mekong Forests (Cambodia, Lao, and Vietnam), Taman Negara-Belum-Halabala (Malaysia and Thailand), and Kerinci Seblat/ Bukit Barisan Selatan (Indonesia)

[2] previously known as Tiger Conservation Units

[3] **Nepal 4**: Parsa Wildlife Reserve, Chitwan National Park, Bardia National Park, and Shuklaphanta Wildlife Reserve; **India 7**: Valmikinagar Wildlife Sanctuary, Sohelwa Wildlife Sanctuary, Katarniaghat Wildlife Sanctuary, Dudhwa National Park, Kishanpur Wildlife Sanctuary, Corbett National Park, and Rajaji National Park

Following the extension and education programs launched by the conservation organizations, several local groups of conservationists have come forward to save tiger and other wildlife. There are a few examples of how the local groups like Rhino Tiger Conservation Society, youth's anti-poaching groups and others have been involved at the community level against poaching and for wildlife rescue. Similarly, biodiversity conservation subcommittee has been formed in Chitwan which awards a letter of appreciation for contributing in rescuing of tiger as well as operates relief fund mechanism.

1.4 Challenges and Opportunities

Threats and challenges to the tigers in Nepal can be viewed from five different aspects, such as: i. Tiger and Prey, ii. Habitat, iii. Conflicts with Humans, iv. Antipoaching and anti-trafficking, and v. Transboundary.

1.4.1 Tiger and Prey

1.4.1.1 Status

Considering its endangered status, tiger is in Appendix I of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), and Appendix I (List of Protected Species) of the National Parks and Wildlife Conservation Act (1973) of Nepal. The total population of Royal Bengal Tiger throughout its range has been estimated around 3,176- 4,556 individuals. In Nepal, its estimate population is around 123 adults and 350 individuals. A ratio of 2.8 cubs and sub adults per breeding adult has been used to calculate the number of tiger population (Smith et al 1998). (See **Chapter 1.2 Status and Distribution of Tigers**).

1.4.1.2 Distribution

Historically, tigers were distributed continuously across the lowland forest. It is now only occurs in small, isolated protected areas in Nepal. The protected areas are not large enough to sustain long-term, viable tiger populations. The tiger population in Nepal is decreasing due to various reasons. Surveys between 1987 to1997 documented that only three isolated populations that remained in the country are Chitwan-Parsa complex, Banke-Bardia complex, and Shuklaphanta-Kailali complex (Poudel N. 2000, Gurng et al 2006). Sporadic distribution of tigers has been recorded in outside protected areas in corridors and connectivity of Terai Arc Landscape.

1.4.1.3 Density

Tiger density is positively related to prey abundance particularly wild ungulate (Smith 1998; Karanth & Smith 1999; Sunquist et.al 1999 cited in Shrestha M. 2004). Thus, information on habitat quality as measured by prey abundance is critical for guiding tiger conservation action from local management interventions to regional conservation planning in the focal landscape (WWF 2002).

1.4.1.2 Prey base

A threshold of prey abundance that indicates poor and good quality habitat and intimately reflects potential for presence of breeding tiger is important for developing necessary conservation action (Smith et. al 1998; Smith et. al 1999 cited in Shrestha, M. 2004).

Based on comparison of number of pellet groups Chital, a medium sized tiger prey species, was dominant among the ungulates in the Terai landscape. Sambar was an important prey species in protected areas (12%) but much less common in national forests (3%). Wild pig, barking deer, blue bull, langur/monkey, and livestock were more abundant in national forests and buffer zone than in protected areas. Swamp deer and hog deer were recorded only in protected areas. The distribution of blue bull was very restricted; this species was found only in the dry scrub forest. Domestic livestock (cow, water buffalo) contributed 26% to the total ungulate composition outside protected areas. Sambar and barking deer were more abundant at higher elevations with rugged terrain than in lower elevations (Shrestha. 2004).

1.4.2 Habitat

1.4.2.1 Shrinkage

The tiger habitat today has shrinked to just 7 percent of the historic range and the biggest tiger landscapes now are in the Russian Far East and northeastern China and along the Nepal-India border, according to a comprehensive scientific study of tiger habitat jointly released by the World Wildlife Fund, the Save the Tiger Fund and the Wildlife Conservation Society (2005). According to the report, the tigers have 40 percent less habitat than they did a decade ago. In an average, a single tiger requires nearly 50 km^2 of good quality forests. In Nepal, the figure seems to be much less. The Bardia and Chitwan populations are estimated to have one tiger in 37 km^2, and the Shuklaphanta population to have one tiger in 20 km^2 (Smith et al 1987).

1.4.2.1 Degradation

Establishing protected areas is not enough for tiger conservation. The potential tiger habitat outside the PAs do not support adequate size the population of tigers to ensure long-term viability (Smith et. al 1998; Smith et al. 1999 cited in Shrestha M.2004). In many parts of tiger's range, ungulate assemblages with no large or medium sized prey (*cervides* or *bovids*) support low tiger density and reproduction rate declines in an impoverished habitat with low prey base (Karanth & Smith 1999 cited in Shrestha M.2004). Decline in prey base as a result of habitat degradation and widespread poaching has limited land base that can support tigers.

The first threat is the loss and degradation of its habitat. This is due to the conversion of forests to agricultural lands, and the resulting excessive human and livestock pressure. These, in turn, increase competition for food, resulting in low prey availability.

1.4.2.3 Fragmentation

The second threat is the fragmentation of its habitat. This causes habitat islands, which, in turn, creates a fragmented population. The small habitat means limited dispersion of new individuals, which results in high competition for the available habitat. With this limited dispersion also comes the risk of inbreeding.

Fragmentation of the tiger habitats are the major concerns identified in the 1999 Tiger Action Plan. If populations are connected, population viability should be increased. Under the Terai Arc Landscape programs, attempts are underway to restoring forest habitats linking the protected areas.

1.4.3 Conflict with humans

As human populations expand and natural habitats shrink, people and animals are increasingly coming into conflict over living space and food. The impacts are often huge. People lose their crops, livestock, property, and sometimes their lives. The animals, many of which are already threatened or endangered, are often killed in retaliation or to 'prevent' future conflicts. Human-wildlife conflict is one of the main threats to the continued survival of many species, in many parts of the world, and is also a significant threat to many local human populations. And, if solutions to conflicts are not adequate, local support for conservation also declines.

Over the last quarter of century 88 people have been killed by tigers in and around Chitwan National Park. The trend of human loss has been increased significantly from an average of 1.5 person per year (1979-1998) to 8.25 per year since 1999. The increasing trend of people killed was significant in the buffer zone than inside the park. On the other hand, a total of 37 tigers were involved in killing 88 people. Of these, 17 were removed due to such man eating behavior (Gurung et. al. 2006).

The park personnel in cooperation with the buffer zone representatives developed a set of management criteria for relief and compensation fund for tiger related incidents (DNPWC. 2006).

In Asia, tigers are suffering not only from significant loss of habitat but also from a decline in their prey species. As a result, there has been increase competition for limited food by which more and more tigers are forced to search for food among the domestic livestock that many local communities depend on heavily for their livelihood. When livestock predation occurs, tigers are often captured, killed in retaliation or actively persecuted in an effort to prevent similar events happening in the future. Sometimes the carcasses of livestock killed by tigers are baited in order to poison the tiger when it returns to its kill, also killing any other animal that chooses to opportunistically feed on the carcass. Tiger prey species are also killed by villagers in retaliation for destroying essential crops, further exacerbating the problem by reducing the availability of the tiger's natural source of food.

1.4.4 Anti-poaching and Anti-trafficking

1.4.4.1 Poaching

During the period 2004-05, poaching incidents as are few in the protected areas, only four reported case of tigers being killed by poachers was found in Chitwan National Park. However, magnitude of seizure across the country including the capital city of Kathmandu indicated that poaching could be high in the country (**Table 3**). During the period from January 2004-September 2005, 19 persons have been arrested on the charge of poaching. Similarly, during the period 1994 - 2004, 20 persons were prosecuted on the cases related to tiger poaching, and 48.8 kg of tiger bone was also seized from them (DNPWC. 2006).

During the period (1988-2005), Bardia National Park attested 20 casualties of tigers (8 M, 10 F, and 2 U). Of them, one poaching case, and nine cases were fighting, and the remaining 10 cases were either due to natural death, flood or others (BNP. 2006).

Table 3. Poachers Arrested and Tiger parts Confiscated

SN	Date	Location	Persons Arrested	Wildlife Parts Confiscated
1	January 9, 2004	Kathmandu	2	Tiger skin and bones
2	April 18, 2004	Banke	1	Six pieces of tiger skins
3	April 26, 2004	Chitwan	2	Tiger and rhino skins
4	June 12, 2004	Kathmandu	2	219 pieces of tiger bones (4kg)
5	July 12, 2004	Kathmandu	1	Two tiger skins, eight leopard skins, five sacks of wildlife bones
6	July 18, 2004	Nawalparasi	2	Two pieces of tiger skins
7	June 5, 2005	Chitwan	2	Tiger skin trading
8	June 17, 2005	Kathmandu	1	One tiger skin and one leopard skin
9	August 11, 2005	Chitwan	1	
10	September 1, 2005	Rasuwa	5	Five tiger skins, bones 113.5kg, leopard skins 36, otters skins 238 pieces
11	2006		2	2- Tiger Skin
12	2007*		2	11 kg tiger Bones and 5 Leopard Skin
13	2004-2007		26	25-Tiger Skin; 128.5 kg Tiger Bones

Source: DNPWC. 2007; *As on 31/03/2007

1.4.4.2 Illegal trade

In the early 1990s, it became evident that medicinal trade in Tiger bone threatened to drive the already endangered Tiger to extinction in the wild.

Nearly every part of the Tiger has a value. It is believed that at least one tiger is killed daily for its use in traditional Chinese medicine. An increased demand for endangered tiger parts exists throughout the world. The rising demand for tiger parts and rapid increase in price of tiger bone continues to be an irresistible incentive to poachers. Poaching and smuggling of tiger parts are interrelated cases. A series of layers of networks play their roles from luring the local shooters to middle men to international smugglers to illegal sellers and finally the consumers.

Nepal obviously is a transit country for the illegal trade between India and China, and also a country of origin of tiger parts. The Environment Investigation Agency's (EIA) recent report The Tiger Skin Trail described Kathmandu as a "staging point" for illegal skins brought in from India to be sent to Tibet. Available information indicates that although Nepal is no longer the hub for skin trade that it was in the early 1990s (EIA 2004), it is used as a transit point for illicit trafficking of wildlife parts and derivatives.

Kathmandu is believed to be one of a transit point for the underground trade centers in the region. Commodities include Shahtoosh, fur, musk pods, bear bile, tiger skin and bones, ivory, rhino horn, leopard parts and live animals (turtles, birds). Recent seizures of wildlife parts also indicate that Nepalese territory is increasingly being used to transport these goods to the end users in Tibet/China, East Asia and even to the west.

There is a well-connected nexus for smuggling these commodities linking Nepal with China and India. Further, Nepal's porous border and its extensive international airline connections have made it an easy flow area (Wright and Kumar 1997). A single case of a poacher named Sansar Chand reveals the magnitude of volume of illegal trade in wildlife parts especially tiger parts, and also its network across the international borders.

At the 12th conference of the parties to CITES (November 2002 in Santiago), the resolution was passed to replace word 'tigers´ by ´Àsian Big Cats (Tiger, Snow Leopard, Clouded Leopard, Common Leopard and Asiatic Lion). The Resolution noted the impact of illegal trade in these species and calls for a number of measures including legislation and enforcement controls, and

recommends the Secretariat to expand the remit of the CITES Tiger Enforcement Task Force to include all Asian Big cat species and calls upon governments, intergovernmental organizations, international aid agencies and non-government organizations to provide funds and other assistance.

1.4.5 Transboundary Cooperation

1.4.5.1 Global Tiger Forum (GTF)

Following the international symposium on tiger held at New Delhi in February 1993 the Global Tiger Forum was created in March 1994 by 11 tiger range states and others. So far, seven tiger range countries viz. Bangladesh, Bhutan, India, Cambodia, Myanmar, Nepal and Vietnam have become members of GTF by ratifying its statutes and regulations. In addition, United Kingdom has formally joined the Forum and the Government of Canada is seriously considering the issue of joining the Forum. Of the international nongovernmental organizations (NGOs), WWF-International and International Fund for Animal Welfare (UK/USA) have also joined the Forum.

As decided at the 8th meeting of the Executive Committee meeting of the GTF, an international symposium on tiger was convened in Nepal on 16th-20th of April 2007. On the occasion, the 4th General Assembly of GTF was also held along with 9th and 10th Executive Committee meeting. At present, Nepal is a chair of GTF.

1.4.5.2 Nepal India transboundary meetings

The past three national transboundary meetings[4] between the senior officials of the Governments of India and Nepal from the past seven years were aimed to provide a forum for an extensive interaction on areas of common interest and possible cooperation between PA managers, conservationists and officials of the two countries. The meetings were outstanding covering all aspects of trans-frontiers conservation, it had vision to effect CITES legislation, conserve, protect, regulate trade, share information and development networks to control illicit wildlife trade in international boundaries. The benefit of such would be to conserve and protect wildlife beyond national territories and complement protected areas for enhancing movement of wildlife.

As a follow up to the national level transboundary meetings, the park authorities from Nepal and India exchanged their reciprocal visits to the transborder protected areas of the two countries in the local level now also involving local stakeholders.

1.4.5.3 Tripartite Meeting

The very nature of the illegal trade demands for closer transboundary cooperation between the countries for the control of illegal trade in tiger parts. Delegates from Nepal, India and China met in Beijing on June 22, 2006 to discuss ways to work together to control the growing cross-boundary trade on wildlife species and products including Chubas.

1.5 Strengths and Capacities

The tiger has become an icon of biodiversity conservation in Nepal. In the recent years, with the changed political environment, it is most likely that tiger conservation will continue to be a national priority.

The four protected areas with the key tiger habitats (PWR, CNP, BNP and SWR) are managed in planned manner by implementing management plans. These PAs form the core parts of the Terai Arc Landscape. Tiger conservation has been explicitly mentioned as a priority in the management plans, as well as in the Nepal Biodiversity Strategy 2002 and its Implementation Plan 2006. These four protected areas are managed by 13 professionals, 312 subordinate staff and 152 *hattisares*, and augmented with over 1,700 army personnel.

Buffer zones have also been in full operation in these PAs with 77 VDC in 10 districts, thus, paving a clear way to mobilize the local communities. The BZ institutions in the four PAs have created a biodiversity trust fund of Rs17.5 million.

Research activities on tiger have been encouraging in the last five years. DNPWC, NTNC, WWF, ITNC (International Trust for nature Conservation) have continued their joint efforts of camera trap monitoring in the three major protected areas, Chitwan, Bardia and Shuklaphanta. Under the joint efforts of DNPWC, NTNC, and WWF, 94 individuals (37 males and 57 females) have been trapped in the three locations between April 2000 and December 2001.

Along with the government bodies, a number of nongovernmental organizations like NTNC, WWF and IUCN have emerged in the last few years for tiger conservation.

The other conservation efforts that eventually become favorable for tiger conservation are the

[1] The First Transboundary meeting took place in Kathmandu, 3-5 January 1997, the second in Suraj Kund, near New Delhi, India from 28 February-1st March, 1999, and the Third in Budanilkantha, Kathmandu from 13-15 September 2002.

successful community forests and sustainable livelihoods in the lowlands. The number of forest user groups is increasing in Terai districts with 1,477 till February 2005.

A network of village-rangers was successfully established for mapping the meta-population structure of tigers throughout Nepal (Gurung, B. 2002). There is a growing interest among the youths in conservation of tiger and other wildlife. Some youth groups have carried out research works, habitats maintenance and even antipoaching operations. These self emerged groups have become change agents in the local communities through their public awareness campaigns for saving tigers.

The Community Based Anti-Poaching Operation (CBAPO) has been formed and institutionalized in Khata and Basanta corridors of the TAL Nepal. Local communities organized in the CBAPOs regularly patrol the community and national forests to control illegal activities such as illegal logging, encroachment, poaching etc. Similar efforts have been initiated in Chitwan and other PAs.

PART B ACTION PLAN

2.1 NEPAL'S TIGER CONSERVATION ACTION PLAN OUTLINE

Considering the ecological phenomena, it has been felt important to shift management from protected areas to ecosystem or landscape management (Grumbine 1994), so that entire tiger populations are treated as a single management unit (Dinerstein, et al. 1996). This large-scale perspective will identify the areas where habitat restoration will achieve the greatest positive effect. Prior to the landscape approach, conservation efforts used to focus on establishing and managing protected area systems. Unfortunately, in Nepal and across most of the tiger's range, PAs, by themselves, are not large enough to support viable tiger populations. Additionally, forested and wild areas, outside the PAs, are often not administered and managed for wildlife conservation.

2.2 GOAL

The goal of this Tiger Conservation Action Plan is to preserve, recognize, restore, and increase the effective land base that supports the Royal Bengal tigers *(Panthera tigris tigris)* in Nepal, in order to maintain a viable tiger population. The Government of Nepal (GoN) will expand conservation efforts, beyond existing protected areas, and recognize the entire Terai and Siwalik forest areas as tiger habitat. A broad-scale, land use approach to conservation is critical, not only for tigers, but also for the restoration and maintenance of intact ecosystems, upon which biodiversity depends, and which determine the quality of human life.

The ecosystem management, with an emphasis on building partnerships with local people, is crucial for maintaining tiger habitats outside protected areas because:

1. the existing protected areas, by themselves, are not large enough to maintain viable tiger populations
2. there are extensive forest lands outside protected areas where tigers currently occur
3. forests outside protected areas are often degraded and need ecological restoration
4. the key to restoring habitat outside protected are as is the inclusion of local people as stakeholders, who directly benefit through conservation actions, and contribute to management decisions.

On the basis of Nepal's tiger conservation efforts and achievements, and the challenges, strengths and opportunities as discussed in the foregoing chapters, the following five specific objectives have formulated to the meet the overall goal of the action plan:

1. **Tiger and Prey Information:** Establish sound scientific information base for management of tigers and prey base.
2. **Habitat management:** Manage tiger habitats at the landscape level
3. **Conflicts Resolution:** Minimize tiger human conflicts
4. **Anti-poaching and Anti-trafficking operations:** Protect the tigers and their prey base from poaching, retaliatory killing and illegal trade.
5. **Transboundary cooperation:** Enhance transboundary cooperation for combating illegal trade in wildlife, maintaining ecological integrity in the tiger landscapes, and promoting tiger tourism.

For each of the objectives, key issues, strategies and activities have been identified on the basis of the information gathered from various sources such as review of the 1999 Tiger Action Plan and literature survey of the recently published materials on tiger conservation, field and central level consultation meetings, international tiger expert meeting, coordination meetings of the tiger conservation action

plan revision task force. Over 70 individuals participated in the three consultation meetings, one central level in Kathmandu (May 21, 2006), two field levels in Chitwan-Parsa (May 31-June 2, 2006), and Bardia Shuklaphanta (June 13, 2006). Information was also gathered from the recent field observations made by the task force members on various occasions. The task force is chaired by DNPWC senior official, and is composed of the representatives of MFSC, WWF, NTNC and an facilitator.

2.2.1 Objective 1. Tiger and Prey Information

To establish a sound scientific information base for management of tigers and prey species

Issues

Tiger Population

- In critical tiger habitats (CTH) within TAL, harboring reproducing tiger populations, particularly in protected areas, their population dynamics including demographic patterns are not fully understood;
- Inadequate studies of tiger behavior and of adverse human impacts on them in critical habitats;
- Inadequate monitoring of tiger based on standardized monitoring protocol;
- Inadequate human resources, technical skills and physical capacity to gather and process the necessary information on tigers.

Prey base

- Inadequate information on prey population dynamics, human impacts of these (in particular impacts of livestock, and hunting) in CTH;
- Poor understanding of human and livestock implication of diseases on prey population at high densities areas;
- Negative impact of any flood-control measures on critical habitats are not fully understood;
- Increase use of chemical poisons, home-made explosives etc to kill ungulates in agricultural landscapes outside core areas.
- Inadequate human resources and physical capacity to gather and process necessary information on prey base.

Strategies

- Enhance knowledge and information base on tigers and its prey base on the basis of scientific works using tested methods on regular intervals using landscape level approach linking academic/ conservation institutions
- Strengthen necessary human and physical capital in the PAs management system / government and civil society institutions for enhancing continues works on tigers

Activities

1. Compile all available scientific information on tigers and prey species in Nepal and make it available widely to government and civil society institutions. However, the focus of information collection should be on ecological, methodological and human impacted topics that have management relevance.
2. In critical tiger habitats, develop rigorous protocols and methods for measuring demographic parameters (abundance, survival, dispersal, source-sink dynamics etc) in tigers, and, abundance and demographic structure for ungulates, on an annual basis.
3. For TCL as a whole, once every 3 year, conduct sign surveys to estimate habitat occupancy patterns and changes in these, for both tiger and prey species.
4. At CTH on an annual basis, a variety of surveys should be designed and implemented to tap sources of information such as government law enforcement records, village informant surveys and direct surveys of human impacts (snares, fires etc.). At the landscape level, during the 3-year surveys, questionnaire surveys of human impacts should be carried out.
5. Given the huge capacity needs for the monitoring activities outlined above, it is essential to create sufficient technical/human resources for carrying out joint monitoring involving government staff, conservation NGOs, Universities, buffer zone user groups, and other civil society institutions. These capacity building needs are to be prioritized particularly for the central and PA management levels of the management system.
6. Some of the detailed information needs that require high levels of scientific skills, should be conducted by reputed Universities and research institutions in Nepal and from outside, with active encouragement of the government.
7. Develop a feedback mechanism to incorporate all the above information to both create and update PAs/ forest management plans for critical tiger habitats and the TCL as whole.

8. Improve the existing physical infrastructure and equipments in PAs for tiger and prey base monitoring

2.2.2 Objective 2. Habitat Management

To maximize high quality, well connected tiger habitat using best management practices across the entire terai arc landscape.

Issues

Shrinkage

- Incomplete tiger habitat shrinkage data considering global figures of habitat shrinkage to 7% of the historical area and 40% decline in the last decade;
- Once luxuriant subtropical lowland forests (*Char Koshe Jhadi*) in the Bhabar region have been mostly restricted to the PAs, restricting most current tiger habitats;
- The potential habitats outside the PAs are under immense pressure from human activities including expanding infrastructures development.

Fragmentation

- Forest corridors between PAs are under pressure from human activities making dispersal of tigers difficult ;
- The expanding physical infrastructures (canal systems, high-tension electrical lines, highways, settlements etc) including traditional rights of ways are the major barriers against the dispersal, gene flow among tiger populations and fragmenting intact habitat.

Disturbances

Collection of forest resource (NTFP, grasses, fuel wood), livestock grazing, forest fire, religious visits, tourism, highways and infrastructure related disturbance (including headwater repair and maintenance) and natural disaster (flood,erosion etc) causes disturbances in CTH.

Degradation

- **Wetland Management**: Continued pollution intake in Rapti and Narayani River including siltation & encroachment in natural wetland in Pas (like Rani Tal in SWR). Equally serious phenomenon is the encroachment of wetlands and waterholes by the invading species like Water hyacinth, *Cyperus* sp., *Trapa* sp., etc.
- **Grassland Management**: Decrease in grassland habitat by Natural Succession in PAs. This in turn has effect on prey base population. Management of Invasive species is becoming threat in the present times as *Mikania micrantha* is a major problem in Chitwan, whereas *Lantana camara* is a serious problem in western Nepal.
- **Human Related Wastes**: Some of key habitat for tigers has been become dumping grounds for human related wastes particularly non biodegradable wastes.

Management

- In most of the cases, PA boundary is open and unfenced. Thus, intentional or unintentional intrusions are frequent.
- The management of the PAs and the forest outside are inadequately equipped with resources and equipment. The staff mobility is restricted due to severe shortage of resources as well as equipment.
- Entry of local people for annual grass cutting events in PAs is not well regulated or done in a way that benefits tigers.
- Shooting range practice by Nepal Army inside PAs causes disturbances and unintentional fires.

Strategies

- Develop landscape approach of habitat management to restore the remaining historical tiger habitats from being further loss, and to maintain the critical corridor connecting the major chunks of habitats to stop further fragmentation and increase amount of suitable habitat for tigers and prey base;
- Work with local community stakeholders (CBOs, NGOs, CFUG and other forest management modes) to ensure their activities in tiger habitats are sustainable and not causing disturbance or habitat degradation and explore economic incentives to benefit local communities for conserving tigers;
- Proposed Infrastructure Developments must include thorough Environmental Impact Assessment that takes into consideration that impact on tigers and mitigates the impact to the tiger Habitat

Activities

2.1 Develop landscape approach

- Restore vegetation and water hole in the geographical connections and forest corridors between the PA's of TAL for safe dispersal of tigers.

- Manage the grassland habitats and waterholes to maintain a healthy population of tiger prey species.
- Monitor habitat quality, both potential and priority, using the DNPWC-MIS formats for ground verification, data validation and management implications such as to maintain grasslands.
- Update digital database maps using latest topo sheets, satellite imageries and aerial photographs for updating tiger information.
- Prepare land use plans for critical habitats of tigers outside PA's and manage them on the basis of land use plans.

2.2 Develop alternative resource

- Manage grasslands in the PAs by involving buffer zone residents with incentives of grass and firewood collection generated during habitat management
- Construct/maintain cattle pool (a fenced enclosure for the illegally entering cattle) to control livestock grazing in the tiger habitats
- Construct/maintain fire lines for fire control
- Construct/maintain watchtower for habitat inspection
- Plant indigenous tree species in the open areas or implement the enrichment plantation of degraded forest areas.
- Develop program and activities to the local residents in lieu of grazing of livestock, such as improved cattle breeds, stall-feeding, biogas plants, and forming dairy cooperatives.

2.3 Strengthen coordinated efforts

- Conduct coordination meetings of the PA managers and forest officials
- Prepare operational guidelines for the user groups and committees of the buffer zone and community forests on the habitat management activities in the potential tiger habitats, such as grazing control, sewage control and garbage management
- Review/integrate tiger conservation in CFOPs and district forest management plans
- Prepare operational plans for the restored areas by involving local communities.
- Establish and operate veterinary services for the livestock in the buffer zones
- Arrange study tours for the representatives of the CBOS to the sites of successful forest management leading towards tiger habitats
- Discontinue hunting license in tiger occurring districts in favor of tiger conservation

2.2.3 Objective 3. Conflicts Resolution

Minimize tiger human conflicts

Issues

Resource demand

- Local people rely on the natural resources (fire wood, fodder, grass, etc) available in the PAs due to increasing demands and the nearby forests in spite of potential threats from the wildlife including tiger. Main reasons for this pressure on the tiger habitats are the supply of natural resources.
- Local people chose the readily available resources in the surrounding forests since the alternative resources such as biogas are not easily available for them.
- Grazing is restricted in the buffer zone habitat to conserve BZ Community Forests and subsequent increased pressure on park
- Sharing of natural resources in the existing community forests is found to be not judicial. Hence the deprived people have to rely on the other forests for their needs.
- **Resource demands**: gravel (construction materials), fishing, NTFP both outside and inside the PAs (although illegal) is increasing the conflicts.

Co-existence

- Humans and tigers share the same area for several reasons and this can be termed as co-existence; for example, tigers and humans often use common paths and trails during their movements.
- For various reasons including supply of basic needs, rituals etc, human beings use tiger habitats such as grasslands, forests, and water holes.
- Human beings regard tigers a source of inspiration, strength, encouragement and attraction. Tigers are the major icons of the festivals and religious activities of the Nepalese traditions. However, these traditional festivals and modern conservation programs are not interrelated for the overall benefit of tiger conservation. The recreational values of this magnificent animal have not been cashed for its overall conservation in the wild; and
- Poor Facilities for the management of Orphan Tigers.

Compensation

- Arrangement of compensation for the tiger related damage is not legally defined, as also discussed in

the warden seminar 2006. However, the government provides compensations to the sufferers on the basis of human judgments based on degree of damage made by the tigers. Government contribution in the form of annual budget needs to be explored;

- Even if compensation is made available, it used to be very late. Thus involvement of council/user committees/groups has to be established;
- A wildlife damage compensation fund has been created in the buffer zone, but not a separate one especially to address the cases pertinent to tiger related damage. Similar funds need to be established for the conflict outside the PAs;
- Actual reporting and field verification mechanism needs to be established;
- Experience from the other tiger range countries needs to learnt and incorporated in future

Incidents

- Human casualties and killings are the most unfortunate side of the human-tiger conflicts and sometime more intensified. The loss of livestock to tiger is equally important and the number of such incidents has been increased in the recent years;
- The indirect, yet very sensitive issue is loss of agricultural crops by ungulates ;
- Retaliatory killing of tigers is related to aforementioned conflicts; and
- Poor documentation of conflict incidents

Awareness

- A frequently asked question, 'What is the benefit of saving the tigers' has not been satisfactorily answered at the community level. Even the users who are participating in the tiger conservation programs are not fully aware of the benefits of tiger conservation.
- Incidents related to common leopard has been frequently mixed with tiger, thus, creating a mass misunderstanding.
- Weak awareness program is also causing conflicts.

Strategies

- Develop alternatives for natural resource base for the local communities so that the local people do not have to rely on the potential tiger habitats for the supply of natural resources.
- Develop safety measures while exercising traditional rights including rights of ways, resource collection, festivals etc.
- Develop a transparent community based mechanism of appropriate and timely compensation for the tiger related damage.
- Develop a community awareness program to address the issues pertinent to tiger-human conflicts
- Database management and research to understand the causal factors and for planning (incidents)

Activities

3.1 Develop alternatives for natural resource base

- Identify and hand over community forests in the buffer zones as well as CFs outside PAs
- Restore the degraded forests in the buffer zone/ national forests and CFs outside PAs by artificial or natural regeneration
- Prepare operational plans for the buffer zone community forests/CFs for sustainable harvest of natural resources
- Develop community plantations, by mobilizing local resources and labor, so that local people need not collect their fodder and firewood from tiger habitats.
- Alternative energy sources such as biogas installations
- Reduce livestock number by encouraging High Yielding Varieties

3.2 Develop safety measures

- Erect signs of warning to the passersby in the major rights of ways, resource collection sites and shrines.
- Conduct awareness meetings at the local level during tiger marauding seasons
- Monitor tigers around the human activity areas with local community engagement and database management
- Take a 'man-eater' tiger under control immediately (for which a clear policy will also be developed and circulated)
- Help desk will be established in all tiger range PAs
- Establish field rescue team with necessary equipment
- Conduct awareness meetings
- Erect sign and posts for awareness

3.3 Develop a community based mechanism of compensation

- Review conservation policies to incorporate compensation schemes

- Establish community funds for the families of tiger victims.
- Establish the Help Desk and appoint responsible staff
- Establish Field Rescue Team equipped with vehicles, communication sets and treatment gear
- Establishment of relief fund
- Explore for the community based human and livestock insurance against wildlife accidents
- Establish field verification mechanism system

3.4 Develop a community awareness program

- Conduct seminars and interactive programs, to emphasize on the co-dependency of humans and the Terai ecosystems; i.e., the health of such ecosystems is important, not only for biodiversity, but also for sustaining the ecosystem processes, upon which local people and development depend.
- Develop a curriculum for school children, which portrays tigers as part of the ecosystem, rather than as an object for human exploitation.
- Develop audiovisual programs, for local people, which focus on tiger biology; they should be entertaining, as well as educational.
- Develop information centers, where problems faced by tigers are publicized; information should be in the form of photos or display cards in local languages.
- Make tiger documentary films and exhibits in awareness program
- Publicize the fact that a strong economic link, between tourism and biodiversity, benefits both local people and conservation efforts.
- Prepare guidelines and awareness materials on the sales, distribution and application of toxics such as pesticides, insecticides, poisons etc.
- Conduct interaction meetings with the government line agencies (e.g. agriculture, livestock, and drug administration), nongovernmental and private sectors at the grassroots level on the control of sales, distribution and application of toxic materials such as pesticides, insecticides, poisons etc.

3.5 Database management and research

- Establish Database on tiger-human related conflict in all tiger occurring PAs;
- Conduct research on man eater tiger and their behaviors; and
- Develop strategy on managing orphan tigers

2.2.4 Objective 4. Anti-poaching and Anti-trafficking Operations

Protect the tigers and their prey base from poaching, retaliatory killing and illegal trade.

Issues

Illegal trade

- Although the number of poaching incidents was found to be comparatively low in the PAs, the volume of tiger parts seizure was comparatively high.
- In 2004-05, the number of tiger killed by poachers was four, whereas over 19 pieces of tiger skins were seized mostly in Kathmandu and Chitwan, and as far as Rasuwa near the Nepal China border.
- Since all parts of tiger are consumed in various possible forms of medicines, poachers may collect almost everything of their 'kill' leaving virtually no evidences for the PA guards.
- Growing affluent populations in Asia and elsewhere have created high demand on the tiger body parts in various traditional medicines. Increased accessibility with modern transportations has helped illegal trade in tiger body parts.
- Apart from the traditional Chinese medicine for which much criticism has been made in various forums. The other side of social demands for tiger skins is related to the conservative mind, luxury, power and imitation.
- Nepalese territory has been increasingly used to transport the wildlife body parts to the consumers in Tibet/China, East Asia and even to the west

Law enforcement

- Poaching poses a significant threat to tigers and their prey. No amount of habitat restoration will result in successful tiger conservation, if high poaching levels continue. Efforts to prevent poaching must be made on a landscape scale, to protect tigers, both inside and outside protected areas.
- Army patrolling is limited to protected areas and is very expensive.
- Control over tiger poaching has not been effective due to armed conflicts in the field
- Direct compensation to the affected people has not been materialized, due to various practical reasons such as reporting, valuation and authentication.

- Due to inadequate security, people are unwilling to cooperate with the management by identifying the poachers, helping the management arrest the poachers, providing the management with information
- The NPWC Act is flexible, since the range of fines and punishment vary from the minimum of Rs 50,000 to the maximum of Rs100,000, and similarly imprisonment ranges from the minimum of 5 years to the maximum of 15 years. (The price for tiger bones is estimated between Rs 10,000 and Rs 30,000 per kilogram, and in average poachers gather 10 kg of bones from a single tiger.)
- Political commitment of the government plays a vital role in combating poaching and illegal trade. The arrested poachers and smugglers were found using theirs network penetrating in the political circles to exert on the decision makers on their favor.
- There are informal reports that powerful personalities were found involved in the offense and protection of the poachers

Incentives

- Attractive awards have been announced from time to time for the informers who bring valuable information pertinent to tiger conservation. But there are community complaints that these awards had great discrepancies in words and deeds.
- Communities who are directly involved in tiger conservation are not directly benefited from the tiger conservation programs.
- There are community resentments towards tigers and wildlife conservation. Efforts to minimize such resentments are inadequate as well as misrepresented. The needy and genuine communities have been treated in general.

Coordination

- Several government agencies are responsible for tiger conservation within their boundaries, such as the District Forest Offices and National Park/Wildlife Reserve Offices. Coordinated efforts have been felt essential for the successful operations of antipoahcing.
- Considering the network of the poachers and smugglers, it has been experienced that involvement of the police organization would be indispensable. However, the police organization has been involved more in social problems rather than in wildlife conservation.
- Illegal trade in wildlife products has been possible due to various reasons such as porous boundary between Nepal and its neighbors, less informed custom officials on the wildlife products.
- Coordination among the varied organizations is a major challenge for the DNPWC whose expertise is mainly to manage the protected areas and protect wildlife.
- Information sharing among the national and international organizations has been found to be inadequate on the issues of tiger related cases. Only few research works have been initiated in the fields of tiger poaching and illegal trade.
- The Nepal Army serves as a major protection unit in the protected area. They are stationed in a particular protected area for about two years. The men are unaware of conservation responsibilities. Conservation organizations (namely DNPWC, NTNC, WWF etc) conduct orientation programs for them. But, by the time they are knowledgeable and used to the terrain, they are transferred to another protected area.

Capacity

- The strength of the civil servants in the four protected areas (Parsa, Chitwan, Bardia and Shuklaphanta) is 325 compared to 1,748 men of the Nepal Army stationed in these areas totaling over 4,700 km^2 land base. Legally both the army men and civil servants operate their activities within the protected area boundary.
- The antipoaching units of the civil guards are equipped with the subsistence facilities such as field gear. Field equipment such as binoculars, communication sets have been either lost to the insurgents during conflict days. Their mobility depends on their foot, and sometime supported by elephants and vehicles.
- The antipoaching operations are under funded with the regular budget. The DNPWC has to rely on the external sources for the urgent and unprecedented activities. Ideas of establishing endowment fund for antipoaching operations have been limited to the conceptual level only. The conservation fee collected at the PAs has been left unused.
- Nearly 500,000 populations are organized under the buffer zone management system in the tiger conservation landscapes. They are organized in various community based organizations such as User Groups and User Communities. Over 3,660

User Groups have been formed under the aegis of the Participatory Conservation Program. However, their only strength is their voice and work force. Against the fully equipped poachers, their unarmed force becomes helpless.

- The local youths have also taken initiatives by forming antipoaching groups in the Nawalparasi and Chitwan districts. However, their activities are limited mostly to public awareness and intelligence networks.
- Villagers can easily identify suspicious activities like poaching; past experience shows that local undercover informants are very effective in helping to identify and apprehend poachers.
- Poverty and unemployment have also been linked with poaching and illegal trade in wildlife parts. Local individuals are found to be lured with a handsome money for 'little' crime. The poor youths take high risks of conducting crime when their family members are taken care of by the concerned parties.
- The buffer zone policy of recycling park revenue has been linked with community development. However, the policy does not lay any terms and conditions for antipoaching operations.

Awareness

- The confiscated items are mostly stored under the government custody. At times with special decisions, some degraded items have been destroyed by fire. On the want of clear policy on such confiscated items, the concerned government is under constant threats of loss or theft.
- Samples of tiger parts could be displayed in the museums and visitors centers for educational purposes, and to be used for scientific research purposes.

Strategies

- Strengthen institutional network and coordination for CITES enforcement to control illegal trade in wildlife and its derivatives with special reference to tiger body parts.
- Strengthen antipoaching efforts in and around the protected areas by also mobilizing the civil societies for the effective implementation of law enforcement to save tigers in the wild
- Enhance public awareness programs by considering cultural sentiments and values related to poaching of tiger and trade in tiger parts

Activities

4.1 Strengthen institutional network

- Enact CITES bills
- Strengthen CITES units in management and scientific authorities
- Conduct CITES implementation training for the management and scientific authorities, government officers at the custom, police, and other relevant agencies. The topics will include identification of wildlife and their derivatives especially tiger body parts, forensic procedures, national and international laws on the control of illegal trade and poaching.
- Conduct transboundary meetings with the neighboring countries focusing on the cooperation for the control of illegal trade in wildlife and their derivatives.
- Prepare updated reports for the national, regional and international meetings pertinent to CITES, GTF, IUCN, TRAFFIC, WCPA, WTO and others as appropriate.
- Participate in the national, regional and international meetings, conferences and seminars that are pertinent to the control of illegal trade and poaching.
- Maintain records of incidents related to poaching, illegal trade, confiscation etc on tiger and other wildlife species
- Identify key customs for CITES enforcement
- Prepare a status report on the rights and duties of stakeholders who are directly or indirectly responsible for the protection of tigers in the wild.
- Conduct coordination meetings to review on the status of tiger, issues of poaching and smuggling tiger and its body parts.
- Conduct feasibility survey for the need to have cooperative agreements between enforcement agencies and transport companies (air, rail, bus, freight, express courier)
- Organize awareness interactions with the transport media on the illegal trade issue.
- Review the current strengths of the antipoaching capacity of the PAs such as human resources (number of scouts, guard posts and the protection unit); physical facilities (field gear, vehicles, elephants, communication systems, reporting systems); intelligence network (reporting, database on poachers and smugglers, coordination with the authorities of forest, police, custom, postal service

etc.); and financial aspects (government budget, incentives, rewards, emergency fund, conservation fee) and others

- Conduct regular training programs for the antipoaching units
- Equip the antipoaching units with the field gear and basic equipment (binoculars, communication sets, GPS, kitchen sets etc)
- Procure physical resources to enhance antipoaching activities, such as four wheel drive vehicle, raft, motorboat, elephant, motorcycle, bicycles etc.
- Train DNPWC professional staff to take responsibility as a tiger authority
- Conduct series of thematic training workshops for the key individuals and/ or civil servants-such as district administrators, customs officials, postal workers, security personnel, etc. regarding threats to tigers, illegal trade, and the identification of tiger parts.
- Study on the feasibility of mobilizing buffer zone community based organizations including youth groups in antipopaching operations
- Prepare case studies on the arrested poachers and smugglers to find out the socio-economic and psychological factors and alternatives to the wildlife crimes (such as poverty, unemployment, temptation, compellation etc.)

4.2 Strengthen antipoaching efforts

- Harmonize (review, gap analysis, consistency, complement) anti-poaching efforts together with Rhino Conservation Action Plan
- Prepare antipoaching operation plans at the tiger conservation landscape level
- Review the existing management plans for the protected areas including buffer zones from the perspective of tiger conservation
- Conduct orientation training and Anti-Poaching Training for Army (or in joint with A/P units) programs for the protection unit deployed in the protected areas.
- Review the post-conflict scenario for tiger conservation
- Prepare/update guidelines on reporting, valuation and authentication of the tiger related incidents for direct compensation to the affected people
- Establish a network of candid informers that will eventually lead to arrest poachers and smugglers who handle tiger body parts.
- Review and Amend the NPWC Act
- Increase the prevailing minimum ceiling of the punishment against wildlife crimes as per the discretionary power of quasi-judicial under NPWC Act
- Organize interaction meetings with the civil societies to discuss on enhancing political commitment in combating poaching and illegal trade.
- Conduct advocacy and lobbying activities during strategic events (wildlife week, environment day, biodiversity day, regular campaigns) at a high political level as a means of awareness to garner political will to address tiger conservation, poaching and illegal trade.
- Conduct feasibility survey of establishing a sustainable mechanism of providing appropriate incentives for the informers
- Organize interaction meetings at the community levels to finalize on the mechanism of incentives
- Establish an endowment fund for incentives
- Re-establish Anti-poaching Units
- Restore Security Guard Posts
- Buffer Zone Community Training to support A/P units
- Establish Dialogue with Minister of Forests and Soil Conservation and/or Police Headquarter to develop Kathmandu based Investigation Cell
- CITES/Wildlife Crime Training for Police, Customs, DNPWC, MFSC etc
- Post-Poaching/Investigation Training for Selected Police, Customs, DNPWC, MFSC, etc
- Human Rights Training

4.3 Enhance public awareness programs

- Conduct nature conservation workshops and seminars, to provide basic knowledge; increase awareness-for game scouts, forest guards, rangers, and officers of their role in tiger and biodiversity conservation.
- Bring out public notice on the importance of tigers, and legal fines against the tiger related offenses in the buffer zones and potential areas of illegal trades
- Incorporate tiger conservation information and fines against tiger related offenses in the school level textbooks in the buffer zones
- Install kiosks on the importance of tigers, and legal fines against the tiger related offenses at the major tourist arrival-departure locations such as airports,

visitors information centers, immigration offices, protected areas entry fee collection centers etc.

- Design, produce and distribute educational materials (posters, booklets, websites) based on the scientific background of tigers (ecological importance, balance in nature etc), cultural values (Bagh Bhairav, Namo Buddha, Dasain festival etc), and messages of social leaders and celebrities
- Prepare national communications plan for promoting tiger conservation with support of private sector communications experts.

2.2.5 Objective 5. Transboundary Cooperation

Enhance transboundary cooperation for combating illegal trade in wildlife, maintaining ecological integrity in the tiger landscapes, and promoting tiger tourism.

Issues

Administration

- The protected areas authorities in the two sovereign countries have different working styles and power of attorney. They are unable to officially meet and exchange information without formal approval of the central/federal government bodies.
- At places there are border disputes creating additional obstacles for wildlife conservation matters.
- Wildlife issues (illegal trade, transient, migration etc) are rarely priority agenda in the border coordination meetings.
- The present governmental structure does not allow DNPWC authorities, or other governmental agencies, to accept foreign funds, without first passing through bureaucratic hurdles.
- There is unanimity on the issues of wildlife conservation including tiger right from the central to the local levels. However, the transboundary initiatives are beyond the scope and limitations of the field level authorities.

Ecology and international boundary

- Tiger habitats are not connected between India and Nepal properly, either through protected areas or national forest lands; thus, tiger management units may extend across international borders.
- Wildlife species including tigers have not free and unobstructed movements along these corridors linking the two countries.
- In order to maintain viable tiger populations, cooperation between neighboring countries is necessary.
- Tiger conservation is ultimately a global issue, one that requires support from both local and international agencies and research institutions.
- Tigers have been the symbol of marketing for the tourism entrepreneurs operating business in the tiger landscapes. Even before the creation of national parks, tiger tourism has been a flourishing business in Chitwan. However, there are observations that tourism did not actually contribute significantly towards protected area management or enforcement
- Tiger sightings in Nepal's tiger landscapes are very promising, yet potential are under utilized

Strategies

- Strengthen transboundary cooperation at the central and field levels to complement the efforts of controlling poaching of wildlife and smuggling of wildlife body parts
- Maintain ecological integrity of the wildlife habitats focusing on the tigers and the other flagship species that used to cross international borders.
- Promote tiger tourism that will benefit the local communities and eventually be a conservation strategy for tigers and their prey base

Activities

5.1 Strengthen transboundary cooperation

- Prepare guidelines for holding transboundary meetings at the field levels. This will include identification of issues, alternatives solutions, commitments on the part of Nepal.
- Exchange annual reports, newsletters and other relevant documents between the field level authorities
- Organize an international symposium on tiger will be convened in Nepal in second half of April 2007

5.2 Maintain ecological integrity

- Develop regional strategies for monitoring illegal wildlife trade along the borders with India and China.
- Organize regional media tours on tiger conservation
- Prepare protocol for joint research activities on the transient wildlife species that frequently cross the international borders.

- Organize interaction meetings with the South Asian Association for Regional Cooperation (SAARC) secretariat to explore the possibility of using SAARC as a forum for wildlife conservation, antipoaching and control of illegal trade in wildlife
- Include Tiger and other conservation agendas in the district level Joint Indo-Nepal Friendship meetings
- Establish and ensure habitat connectivity for tigers in the following six zones in India-Nepal TAL Valmiki-Chitwan zone, Suhelwa? Katernia Ghat Wildlife Division – Bardia NP, Dudhwa (Belrayan Range) – Basanta Forest, Kishanpur WLS, Sharada River, Lagga Bagga – Shuklaphanta, Shuklaphanta East, Churiya Hills (Talla Pani) – Maha Kali (Sharada) and Champawat Forest Division
- Co-ordination between India and Nepal to improve the habitat condition for tiger and prey species

a. Persuade Indian Government to activate community forestry program in and around Valmiki TR to reduce pressures on Chitwan NP and vice versa

b. Gather more information on forest and wildlife north of Suhelwa in Nepal

c. Bardia – Katernia Ghat zone – Pressure from Nepal side, east of Geruwa River on Nishangada range of Katernia Ghat, Survival of Katernia Ghat WL Division?

d. Basanta – Dudhwa (Belrayan) – Creation of the corridor

e. Kishanpur, Sharada, Laggabagga – Work with Indian Government to control poaching and dependency on the forest

f. Suklaphanta East – Sharada, wildlife use of the area . On Indian side Nandhour-Ladhiya Conservation Reserve and Nandhour Valley NP

5.3 Promote tiger tourism

- Review tourism plans from the perspectives of tiger tourism
- Assess impacts of existing tourism facilities in PAs
- Train the local guides on tiger tracking and monitoring who will also be accompanying with the visitors as appropriate
- Prepare a marketing strategy for tiger tourism in the tiger landscapes (e.g. Adopt a tiger scheme).

2.2.6 Logical Framework

Goal	Objectively Verifiable Indicators[5]	Means of Verification	Assumptions
Preserve, recognize, restore, and increase the effective land base that supports the Royal Bengal tigers (*Panthera tigris tigris*) in Nepal, in order to maintain a viable tiger population	•Tiger population in Nepal maintained at 350 - 375 individuals •XX ha of critical tiger habitats outside protected areas maintained or restored		
Purposes **1. Tiger and Prey Information:** Establish sound scientific informati on base for management of tigers and their prey base.	•All breeding tigers will be recorded through camera trap and other surveys •Population trend of prey base maintained or increased in PAs and critical tiger habitats outside PAs	•Census Report •Office Report •GIS data	
2. Habitat management: Maximize high quality, well connected tiger habitat using best management practice across the entire terai arc landscape	•Increase in suitable habitat for prey base under effective management (CF, BZ, Collaborative, LF, protected forest??)	•Progress reports •Field Research Report •Office record	•No big scale calamities occur (flood, epidemics)
3. Conflicts Resolution: Minimize tiger human conflicts	•50% Decrease in retaliatory killing of Tigers with respect to baseline of 2006 •50% decrease in events of tiger-human conflicts with respect to baseline of 2006	•Species monitoring data •Tourists feedbacks	•Political stability and security situation remain normal
4. Anti-poaching and Anti-trafficking operations: Protect the tigers and their prey base from poaching, retaliatory killing and illegal trade.	•Decrease in number of poaching and smuggling incidents as a result of illegal trade control measures •Number of voluntary information leading towards arrest of poachers and smugglers increased	•Meeting minutes	
5. Transboundary cooperation: Enhance transboundary cooperation for combating illegal trade in wildlife, maintaining ecological integrity in the tiger landscapes, and promoting tiger tourism.	•Joint regular transboundary efforts (meetings, information sharing) increased		

[1] The time frame applies for five years during 2007-2011, unless specified.

1. Tiger and Prey Information

Result/Output	Objectively Verifiable Indicators	Means of Verification	Assumptions
1.1 Enhance knowledge and information base •Compile the available informat on tigers and prey species in Nepal •Develop a rigorous protocol for tiger and prey base monitoring •Conduct sign survey for habitat occupancy pattern and change in these for tigers and prey base once every three years •Conduct variety of survey on human disturbance impact ; village information survey on •Conduct high skill scientific tigers and other information survey by universities and research institutions •Capacity building of PAs staffs and conservation NGOs, universities, buffer zone user groups and other civil society institutions •Develop feedback mechanism for PAs/forest management for critical tiger habitat •Improve the existing physical infrastructure and equipment in PAs for Tiger and prey base	•Central database on scientific informati on of tigers operational and updated •At least one scientific studies conducted annually •Increased number of regular monitoring and studies by trained human resource •At least one tiger expert trained and retained in each partner conservation organization •At least 10 sets of functional survey and monitoring equipments maintained in each protected areas		

2. Habitat management

Result/Output	Objectively Verifiable Indicators	Means of Verification	Assumptions
2.1 Develop landscape approach •Upgrade the central GIS lab •Organize capacity building programs •Restore vegetation and water hole •Manage the grassland habitats and waterholes •Monitor habitat quality •Update digital base maps	•50%habitat in Barandabar, Khata and Basanta forest corridor restored •Regulations and guidelines required for forest corridor management formulated		
2.2 Develop alternative resource •Manage grasslands •Construct/maintain cattle pool •Construct/maintain fire lines •Construct/maintain watchtower •Plant indigenous tree species •Provide grant facilities	•Area of grasslands in the protected areas increased •Number of illicit grazing animals decreased		
2.3 Strengthen coordinated efforts •Conduct coordination meetings •Prepare operational guidelines for community forests •Review/integrate tiger conservation •Prepare operational plans for local communities •Establish and operate veterinary services •Arrange study tours for the community based organizations	•Tiger related activites included in the forest management plans in TAL districts		

3. Conflicts Resolution

Result/Output	Objectively Verifiable Indicators	Means of Verification	Assumptions
3.1 Develop alternatives for natural resource base •Identify/hand over community forests •Restore the degraded forests •Prepare operational plans for community forests •Develop community plantations	•Area of community forests, restoration of degraded forests and plantation increased by xx hectare		
3.2 Develop safety measures •Erect signs of warning •Conduct awareness meetings •Monitor tigers around the human activity areas •Take a 'man-eater' tiger under control	•Number of human and livestock incidents decreased by at least 50%		
3.3 Develop a community based mechanism of compensation •Review conservation policies •Establish community funds •Establish the Help Desk •Establish Field Rescue Team •Establishment of relief fund	•Compensation mechanism in place		
3.4 Develop a community awareness program •Conduct seminars and interactive programs •Develop a curriculum for school •Develop audiovisual programs •Develop community plantations •Develop information centers •Encourage people to develop/ manage sewage/irrigation canals •Make tiger documentary films and exhibits •Publicize on tourism and biodiversity •Prepare guidelines and awareness materials on toxics •Conduct interaction meetings	•Local participation in tiger conservation activities increased by at least 20 %		

4. Anti-poaching and Anti-trafficking operations

Result/Output	Objectively Verifiable Indicators	Means of Verification	Assumptions
4.1 Strengthen institutional network •Conduct CITES implementation training for the management and scientific authorities •Conduct transboundary meetings •Prepare updated reports •Participate in the meetings, conferences and seminars •Maintain records of incidents •Identify key customs •Prepare a status report •Conduct coordination meetings •Conduct feasibility survey on cooperation of transport companies •Organize awareness interactions with the transport media •Review the current strengths of the antipoaching capacity •Conduct regular training programs •Equip the antipoaching units •Procure physical resources •Train the professional staff of DNPWC •Conduct training workshops for customs officials, postal workers, police, etc •Study on mobilizing buffer zone community •Prepare case studies on poachers and smugglers	•Functional network for illegal trade network in place		
4.2 Strengthen anti-poaching efforts •Prepare antipoaching operation plans •Review the existing management plans •Conduct orientation training programs for the protection unit •Review the post-conflict scenario •Prepare guidelines on reporting, valuation and authentication •Establish a network of candid informers •Review the existing NPWC Act •Organize interaction meetings with the civil societies •Conduct advocacy and lobbying activities •Conduct feasibility survey •Organize interaction meetings •Establish an endowment fund for incentives	•Public participation in anti-poaching efforts increased by at least 10%		
4.3 Enhance public awareness programs •Conduct workshops and seminars •Bring out public notice •Incorporate tiger conservation in school textbooks •Install kiosks •Design, produce and distribute educational materials	•Number of voluntary information leading towards arrest of poachers and smugglers increased		

5. Transboundary Cooperation

Result/Output	Objectively Verifiable Indicators	Means of Verification	Assumptions
5.1 Strengthen transboundary cooperation •Prepare guidelines on transboundary meetings •Exchange annual reports, newsletters and other relevant documents •Organize an international symposium in April 2007	•Frequency of meetings and number of participants increased		
5.2 Maintain ecological integrity •Develop regional strategies for monitoring illegal wildlife trade •Organize regional media tours •Prepare protocol for joint research activities •Organize interaction meetings with SAARC **5.3 Promote tiger tourism** •Review tourism plans •Train the local guides •Prepare a marketing strategy •Number of tiger visitors increased	•GTF support to Nepal increased		

2.3 BUSINESS PLAN

2.3.1 Human resources

DNPWC is organized with its Headquarters in Kathmandu and field offices in the 14 protected areas. It is led by the Director General with the support of the Deputy Director General and the seven section chiefs. The sections of Administration, Account and Computer are headed by the Gazetted Class III officers under the direct supervision of the Director General, and the technical sections of Management, Monitoring and Evaluation, Planning, Ecology and Conservation Education are headed by the Gazetted Class II officers under the direct supervision of the Deputy Director General. Although all the sections have their respective responsibilities towards tiger conservation in one way or another, the Ecology Section is considered to be primarily responsible for the task.

The human resources of the DNPWC are 1,050 personnel of whom 41 are engaged in the headquarters, and the rest 1,011 are deputed in the 14 field offices. The total number of the field staff in the tiger range protected areas is 543 including 14 officers, 312 nongazetted staff and 217 *hattisares*. Similarly, the Government of Nepal has deployed over 3,900 Nepal Army personnel in 11 protected areas, and their strength is over 1,700 men in the four tiger range protected areas (**Table 4**).

Table 4. Staff Positions in the Tiger Habitat Protected Areas

SN	Protected Area	Civil Administration				Nepal
		Gazetted	Non Gazetted	*Hattisare*	Total	Army
1	Parsa WR	2	41	32	43	239
2	Chitwan NP	6	135	63	141	792
3	Bardia NP	3	89	33	92	478
4	Shuklaphanta WR	2	47	24	49	239
5	Total	13	312	152	325	1,748

Source: DNPWC. 2006, and DNPWC. 2003

Under the umbrella of the buffer zone system, over 487,000 buffer zone residents are spread in three municipalities and 74 Village Development Committees (VDC) in ten District Development Committees (DDC). They are organized into various user committees and user groups (**Table5**). These community based organizations will be mobilized where applicable as outlined under various activities of the tiger action plan.

Table 5. Buffer Zone Communities in the Tiger Habitat Protected Areas

SN	Protected Area	Year	Area sq km	Districts	VDCs	Population	Households Trust (Rs)	Biodiversity
1	Parsa WR	2005	298.17	3	11	43,228	7,228	4,030,820
2	Chitwan NP	1996	750.0	4	37	223,260	36,193	5,894,636
3	Bardia NP	1996	328.0	2	17	120,000	11,504	3,616,353
4	Shuklaphanta WR	2004	243.5	1	12	100,953	17,006	3,985,200
5	**Total**	**-**	**1619.67**	**10**	**77**	**487,441**	**71,931**	**17,527,009**

Source: DNPWC. 2006

The Tiger Action Plan will be implemented under the framework of the current management plans of the protected areas. The existing human resources of the government authorities and the partner organizations such as NTNC, IUCN, WWF have been considered adequate to implement the programs as outlined in the action plan. However, capacity enhancement of both the government authorities and the buffer zone communities will be promoted as explained under various activities.

2.3.2 Financial requirements

DNPWC had over Rs17 million budget for the year 2004/2005, of which 28 percent (Rs4,890,000) was for development activities, and the remaining (Rs12,398,422) for general administrative cost. The average annual revenue generated at the headquarters for the period 2000-2005 was over Rs11 million. The Chitwan NP generated average annual revenue of nearly Rs45 million compared to its annual budget of Rs15.6million. Among the four protected areas, Parsa WR generated only nearly Rs400,000 annual revenue which comes out to be only 10% of its annual budget (**Table 6**).

2.3.3 Physical resources

Under the respective management plans, various activities that can be grouped into five major programs, namely conservation, habitat management, species management, religious area management and infrastructure development. The special activities include Buffer Zone Management, Participatory Conservation Program, Terai Arc Landscape, and Tourism for Rural Poverty alleviation Program. In general, overall protected areas management is geared towards conservation of endangered species like tiger. Summary of the programs with proposed budget that are identified in the specific protected areas management plans are given in the **Annex 2**.

Table 6. Annual Budget, Expenditure and Annual Average Revenue (in Rupees)

Protected Areas	Annual Budget 2004/2005	Expenditure (2004/2005)	Average Annual Revenue (2000-2005)	Percent of Revenue Budget
DNPWC Headquarters	17,288,422	16,061,422	11,485,378	66
Chitwan NP	15,600,000	15,597,000	44,974,109	288
Bardia NP	8,975,000	8,718,000	5,149,444	57
Shuklaphanta WR	6,400,000	5,689,000	1,119,514	17
Parsa WR	3,845,000	3,661,000	395,557	10

Since the fiscal year 2001-2002, the revenue generation has been declining in the tiger protected areas (Table 7) as well as in the DNPWC headquarters.

Table 7. Revenue Generation in the Tiger Habitat Protected Areas (Rs)

SN	Protected Area	2000-01	2001-02	2002-03	2003-04	2004-05
1	Parsa WR	354,153	258,501	421,860	563,698	379,575
2	Chitwan NP	74,302,801	38,887,119	30,831,199	40,060,770	28,137,909
3	Bardia NP	9,821,784	4,376,586	2,777,655	3,710,147	182,186
4	Shuklaphanta WR	2,419,215	1,552,950	631,871	523,770	469,765
5	**Total**	**87,197,953**	**45,075,156**	**34,662,585**	**44,858,385**	**29,169,435**

Source: DNPWC. 2006

2.3.4 Partners identification

The Department of National Parks and Wildlife Conservation (DNPWC) is the major stakeholder for tiger conservation programs. The other major government agency that is involved in the field activities is the Department of Forests. Similarly, NTNC has been involved in various aspects of tiger conservation especially research and antipoaching programs ever since it was established in 1982 under the legislative act. One of the prime roles of the Nepal Army deployed in the protected areas is to protect the wildlife including

tigers. The other government agencies that are indirectly involved are district administration, police, custom etc.

In all the tiger range protected areas, Buffer zone has been declared, and consequently community based organizations have been organized (**Table 2**). Apart from the user groups organized under the Buffer zone system, the local youths have also formed various clubs and nongovernmental bodies to protect tiger and other wildlife in their neighborhood.

Apart from the PA personnel and representatives, there are numerous potential stakeholders within the country. They include tourism entrepreneurs (hoteliers, lodge owners, nature guides), development organizations personnel (members, project staff), and teachers and students in the fields of forestry, biological science etc.

There are three major institutions namely the Institute of Forestry in Pokhara and Hetauda, the Institute of Agriculture and Animal Sciences in Rampur, and the Natural History Museum in Swayambhu, Kathmandu. These institutions can be strategic partners to jointly develop and conduct research programs. In fact, Natural History Museum is the scientific authority of CITES in the country.

Since the beginning of the modern conservation history of the country, DNPWC has been receiving generous supports from various conservation organizations worldwide. It has been realized that it is necessary to streamline the supports of partners and at the same time enhance strategic partnership for the symphonic actions and synergetic results in conservation.

The major organizations that are involved in conservation programs of the tiger range protected areas and their scopes are as follows:

- DFID (Department for International Development) /SNV (Netherlands Development Organization) / UNDP: revise management plan and prepare buffer zone management plan and tourism plan and support buffer zone program
- Frankfurt Zoological Society: Gharial breeding centre
- GEF (Global Environment Facility) /UNDP: biological corridor linking CNP, ICDPs in CNP buffer zone
- ITNC: antipoaching, tiger monitoring
- IUCN: CITES implementation, World Heritage Site monitoring, wetland policy, and capacity building
- NTNC: staff training, community development, research in CNP, BNP, SWR (Shuklaphanta Wildlife Reserve) and elsewhere
- London Zoological Society: community development in CNP
- Smithsonian Institute: wildlife research
- UNDP: community development and conservation in CNP
- UNESCO (United Nations Economic, Scientific and Cultural Organization) World Heritage Support is there for renovation of Kasara Darbar and developing it as a Conservation Education Centre
- WWF: wildlife conservation in TAL

The countries affiliated with the CITES, IUCN and other conservation conventions are also potential stakeholders for tiger conservation efforts in Nepal.

2.3.5 Coordination mechanism

Coordination for tiger conservation has been conceived at three levels: protected areas, Terai Arc Landscape, and center. The coordination mechanism designed in the protected area management plans will be the basis for coordinating programs and actions for tiger conservation. The protected areas offices will also coordinate with their respective buffer zones.

The TAL strategy will be considered as the basis for coordination at the landscape level. The Ecology Section of the DNPWC will be the key player for this level of coordination works.

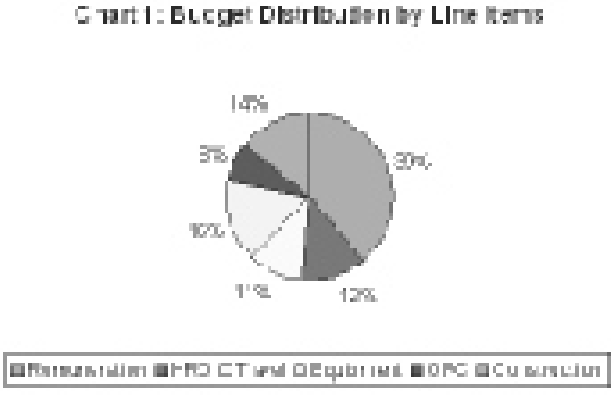
At the central level, the MFSC/DNPWC will play a key role in coordinating the line ministries for mobilizing sector services such as forests, police, custom etc. Coordination with the international organizations, research academies, media, donors and the protected areas will also the responsibility of the MFSC/DNPWC (**Table 11**). The Director General of the representative of DNPWC will be the facilitator to maintain central level coordination.

Table 11. Coordination Mechanism

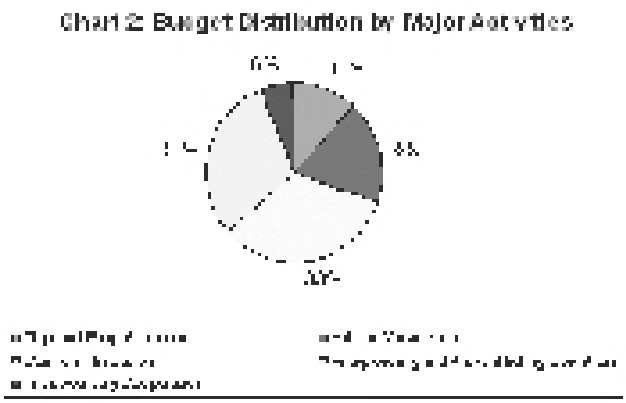
Level of coordination	Protected Areas	Landscape Level	Center
Key Players	NP/WR Offices	Ecology Section of DNPWC	MFSC/DNPWC
Partners	Protection unit, BZ Institutions through BZMC, Range posts, Guard Posts, district line agencies, respective DDCs, district line agencies, projects and NGOs	CNP, BNP, SWR and PWR, Regional forest directorates – Central Western, Mid-Western and Far-Western Development Regions, TAL office, regional level projects	Departments of Forests, Police, Customs, International organizations, Research academies, Nepal Army, Media, Donors
Fequency	Weekly, monthly	Trimesterly	Six-Monthly
Main agenda	Daily and weekly updates, field monitoring, procurement, construction, maintenance, field budget and programs, mail runners, field staff issues	Trimester updates, regional programs, DDC programs and budget, regional priority, government circulars, public awareness, coordination	Six-monthly updates, national budget and program, staff issues, national priority, donors policy, media coverage, supervision, coordination, government circular

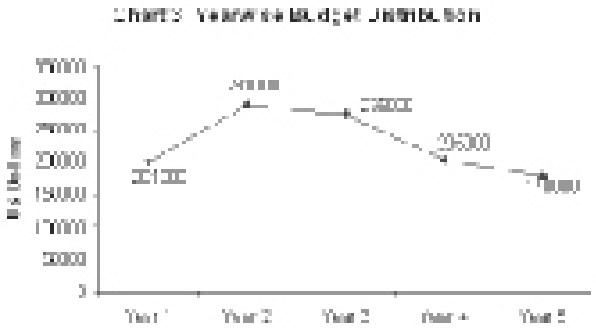
2.4 BUDGET

The total budget for the action plan for the period of five years is estimated to be US $ 1,150,000 of which 39% will be spent for remuneration, and 16% for equipment and 12 % for human resources development, 14% for construction, 11% for travel and 8% for the office running cost (**Chart 1**). In terms of activities, 31% budget has been set aside for antipoaching and anti-trafficking operations, 33% in conflict resolutions, 18% habitat management, 12% tiger and prey information and 6% transboundary cooperation (**Chart 2**). In the first year the total amount will be US$201,000, and US$178,000 in the fifth year. The maximum amount US$291,000 has been allocated in the second year (**Chart 3**). Detail breakdown by each activity is given in the **Annex 3**.



It is revealed form the figures that the total average annual revenue of the fours protected areas (SWR, BNP, CNP and PWR) amounts to approximately Rs52 million.





Of this, the buffer zone communities receive 50% under the buffer zone policy. The remaining revenue (Rs26 million) goes to the national treasury. The total average annual budget set aside by the government for these four protected areas is approximately Rs35 million. Thus, the revenue and budget gap is over Rs9 million per year. However, the amount invested in the buffer zone directly or indirectly helps support tiger conservation. Considering this scenario, it is clear that additional sources of funding will be required for the implementation of the tiger action plan.

Considering the areas of interests and scopes (**Subchapter 2.3.4**), donors and international nongovernmental organizations could be considered the potential sources of funding. The private sectors such as tourism entrepreneurs and business houses could be involved various activities of tiger conservation. The local governments (DDCs and VDCs) as well as the Buffer Zone organizations will be equally potential sources of funding.

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Annex 1: Natural History of the Tiger

Typical Characteristics

- Tigers are one of the largest living cats; great range in size between sub-species and sexes.
- Male can be 3 meters long and weigh around 200 kg.
- Tigers are normally solitary, except for females with cubs.
- Tigers are territorial and occupy relatively large habitats: size usually depends on the prey density.
- Lifespan of tigers in the wild is not well known, but some have lived up to 17 years.

Breeding Habits

- Mating takes place all year round.
- Gestation is around 103 days and an average litter is two or three cubs.
- Cubs reach independence between 18 and 28 months.
- Females being breeding at age 3 and continue until age 9 or 10.
- They usually reproduce every two years.
- Males start to breed when they are four or five years old.

Prey

- Tigers feed predominately on large deer species and wild boar.
- Occasionally, they will kill larger species such as wild cattle, elephant and rhino calues.
- They are also opportunistic and will kill monkeys, birds, reptiles and fish as well as more unusual prey such as crocodiles and leopards.
- Males have been known to kill cubs fathered by other tigers.

Distribution

Tigers have existed on the Asian sub-continent since prehistoric times. Various records and descriptions about tigers are found in century-old literature and monuments. The tiger is revered in many cultures and religions of the world. It is the carrier of the Goddess Durga in the Hindu religion. Beautiful murals depicting tigers are found in many, century-old Hindu temples and Buddhist monasteries.

Of the eight tiger subspecies found in the world, the Royal Bengal Tiger *(Panthera tigris tigris) is* found on the Indian sub-continent i.e., the countries of Bangladesh, Bhutan, India, Western Myanmar, and Nepal (Table 1). This subspecies accounts for approximately 60 percent of all the subspecies remaining in the world today; it, therefore, has the best chance of long-term survival.

Until the 1950s, tigers were found all along the forests of lowland Nepal, South of the Himalayan Range. Tiger distribution, in Nepal, is not documented for elevations higher than the Churia Hills (Siwalik) i.e., approximately 1500 m.; although its presence is recorded above 4000 m. in Bhutan (McDougal and Tshering 1998). Absence of the tiger, in Nepal, from higher elevations, may be attributed to: (1) the loss and fragmentation of its habitat, (2) high human density and its resulting pressure on the forest, and (3) depletion of the natural prey base.

Currently, the tiger distribution is more or less restricted to the protected areas, and the adjoining forests. There are still some forest areas, outside protected areas, however, where tigers stilt occur. Conservation of these forests is important for maintaining the available land base for tigers, and for maintaining the corridors between habitats for their dispersal.

When tiger census surveys are conducted, local people are interviewed to verify field results. Confusion sometimes occurs because, in many places in Nepal, both tigers and leopards are called by the same word, *bagh*. These animals can be differentiated easily, however, based on their body size and coat pattern. The tiger has black stripes on its body and face, against a pale, yellowish coat. Stripe patterns are distinctive in every tiger. The leopard is smaller than the tiger, and has spots on its coat, which is also a pale, yellowish color.

Size

The tiger, the largest of the cats, is the ultimate land predator. It is capablc of killing animals several times its own size. The average size of a male Bengal tiger is slightly less than three meters; that of a female is about 2.5 m. The average weight of a male tiger is 180-230 kg., rarely exceeding 250 kg.; whereas, the female weighs about 135-185 kg. (Prater 1971).

Habitat

The tiger is a territorial animal. It occupies a relatively large habitat, depending on the availability of the prey species. Its ideal habitat includes forests, with tall

alluvial grasslands that have water. Prime habitat provides sufficient cover for concealment, for stalking its prey, and for hiding its kills.

The tiger is the top predator in the food pyramid of an ecosystem. As such, it is also an indicator of the health of that ecosystem. The tiger is an opportunistic hunter, preying upon animals of all sizes, ranging from the adult Gaur *(Bos gaurus),* to the Langur *(Presbytes entellus),* to birds. To be more economical, however, it normally preys upon large ungulates, weighing on average between 50 - 100 kg. (McDougal and Tshering 1998, WWF 1998). The tiger will occasionally kill elephant and rhino calves. (Males have been known to kill cubs sired by other male tigers, to ensure their territorial superiority and genetic inheritance.) A tiger makes 40 to 50 kills a year, representing approximately 3,000 kg. of prey (McDougal and Tshering 1998).

In Nepal, specifically, the tiger preys upon a wide variety of prey species, including the Sambar deer*(Cervus unicolor),* swamp deer *(C. duvauceli),* spotted deer *(Axis axis),* hog deer *(Axis porcinus),* barking deer *(Muntiacus muntjac),* and wild pig (Sus *scrofa).* The Sambar deer is the most preferred prey species (Seidensticker and McDougal 1993).

Domestic livestock are also preyed upon, if they are found in the tiger habitat. In sub-optimal habitat, where natural prey is limited, tigers can survive, occasionally, by preying upon domestic livestock, as a supplement to their diet of natural prey. Tigers eventually disappear from areas where natural prey is depleted, even though livestock is available as an alternative prey.

Tigers rarely approach human settlements. A normal tiger always avoids contact with human beings. They do not constitute a part of the tiger's natural prey. Hunger, though, is the most likely factor that overrides the tiger's aversion to man (McDougal 1987). There are certain circumstances when a tiger will kill human beings. The incidence of man-eating cases has been associated with: an incapacitated tiger; the escalation of competition among males; a disturbance in the natural predator-prey balance, due to increased human interference; tigers pushed to a marginal habitat; and dispersing individuals. There are many man eating cases that are without any clear explanations.

Social Dynamics

The tiger is a solitary animal. The most frequent social interaction is between a female and her young. An adult male and female are associated briefly, for 2-3 days, for mating. This association fades, once the cubs are born. Adults of the same sex rarely associate.

Female tigers compete for resources, whereas males compete for females. Females establish and maintain resource-based territories, large enough to maintain themselves and to raise their offspring. Both tiger density and the home range size are directly related to the habitat quality (availability of prey and cover). In prime habitat, which contains an abundance and variety of ungulates such as the alluvial grasslands of CNP, BNP, and SWR-the home range of a female tiger may be only 20 km^2, or even less (Smith 1993). In the Russian Far East, however, a female requires 450 km^2 (Miquelle, D. G., et al 1999).

The territorial size for female tigers is also influenced by the territorial turnover rate. When an old female dies, its vacant territory is often occupied by a young female (usually one of her daughters). Otherwise, females holding the territory in the adjoining area, may expand their territory to include the vacant area. The female maintains a mutually exclusive, non overlapping territory; whereas, a male tiger's home range may encompass the home ranges of two to seven adult females.

Tigers may defend their territories from intruders by fighting and chasing them away. In general, they defend their territories by spraying urine (scent) on trees and bushes; and by marking their traveling route (by making scrapes on the ground), while patrolling. Tigers mark more heavily at their territorial boundaries, rather than in the interior of their territories. Spraying and scraping are used interchangeably, depending on the habitat types. Scrapes are common in the grasslands, where there are very few trees for urine spray; whereas, in a forested area, urine spray on a tree stump is more common (Smith et al. 1989).

Population Dynamics

Tigers have a polygamous mating system. Mating takes place all year round; many tigers prefer, however, to mate after the rains. The gestation period is short, only 102-105 days (i.e., 15-16 weeks). The litter size is normally three. Cubs are generally born between the months of February and May. A female with small cubs keeps a low profile; the cubs spend most of their time in and around the liar. When the cubs are about 6 months old, they start accompanying their mother on her hunting trips.

Cub mortality, during that first year, reaches almost 34 percent; whereas, during the second year, the mortality lowers to 17 percent (Smith and McDougal 1991). Consequently, when females with cubs are recorded in the wild, generally, there are just two cubs accompanying their mother.

Male tigers attain maturity at the age of four years, while females start breeding at three years of age. In prime habitat, a tigress may give birth to cubs every two years, until she is ten years old. The average reproductive life of a female is just about six years; whereas, that of male is less than three years. The life span of a tiger in the wild is estimated to be less than 20 years (WWF 1998).

Dispersal

Cubs become independent of their mother, between 19 and 28 months (Smith 1993). At this age, these cubs, or sub-adults, leave their natal area and attempt to seek areas for establishing their own territories. This is the most critical and dangerous period for their survival. The mortality rate for dispersing sub-adult males is 40 percent in CNP

Generally, male sub-adults travel long distances from their natal areas. Females, on the other hand, settle adjacent to their mother; the latter often shifting her territory slightly, to accommodate her daughters. Even if territory is not available near their mother, female tigers disperse shorter distances than males, and rarely settle in marginal habitat.

The shrinkage of habitat limits the dispersal opportunities for tigers. Many of the protected areasin the Terai have already reached saturation, with a high density of residents. This situation causes intense competition for areas that contain the best breeding habitat. Consequently, frequent fights erupt between individuals of the same sex, particularly males. Hence, the turn-over rate becomes very rapid, shortening the breeding lives in a population (McDougal and Tshering 1998).

While seeking a place to settle, dispersing male sub-adults must pass through areas already occupied by territorial males, and are often pushed to marginal habitat on the periphery of the parks. Due to this high competition among males, and the unavailability of suitable habitat, these dispersing male sub-adults are likely to kill livestock, as part of their diet. This increases livestock depredation, which in turn, puts the tiger in direct conflict with the local people. The resulting villager retaliation may eventually lead to the poisoning of the livestock carcass, causing the death of the tiger.

Legal Status

Considering its endangered status, the tiger is listed in Appendix I of CITES (Convention on International Trade of Endangered Flora and Fauna), which bans international trade of the tiger or its parts. The tiger is also protected by Nepal's National Parks and Wildlife Conservation Act 2029, and is listed in its Appendix I. According to the Act, the penalty for a person-involved in the poaching of a tiger, or in the trading of its parts-is a fine of Rs. 50,000 - 100,000, or imprisonment of S-15 years, or both. Despite such stringent penalties, some poaching and trade in tiger parts is still taking place, because of the high demand for tiger parts in the international market.

The bones of an adult male tiger may weigh up to 15 kg., and those of a female about 10 kg. In an international market in the Far East, tiger bones may fetch a thousand dollars a kilogram (McDougal and Tshering 1998). All parts of the tiger-such as its bone and skin; and some of its organs, such as its penis, canine teeth, and claws-have a market, due to certain traditional beliefs that have no scientific evidence. It is difficult to track down a tiger-poaching case in the field, because nearly all of the parts are taken by the poachers; whatever remains can be disposed of easily.

The establishment of anti-poaching units (APUs) in protected areas, with the cooperation of local people and various organizations, have curtailed the rate of poaching and trade in tiger parts. The provision of a reward to informants-whose information leads to the apprehension of culprits involved in such illegal activities-has been effective. The APUs in Nepal are supported by the International Trust for Nature Conservation (ITNC) and the WWF Nepal Program.

Annex 2: Summary Programs and Budget in the Tiger Range Protected Areas
Shuklaphanta Wildlife Reserve and Buffer Zone

(Amount in thousands NRs.)

Program Activities	Cost
Biodiversity Conservation	
Species Conservation Activities (6)	12,250
Habitat Management Activities (8)	32,390
Anti-Poaching Operation Activities (5)	13,830
Human Resource Development Activities (7)	2,565
Conservation Education Activities (9)	4,930
	66,015
Buffer Zone Development	
Community Development Activities (7)	21,645
Community Forest Management Activities (7)	3,520
Skill Development& Income Generating Activities (9)	3,100
Institutional Development (7)	3,215
Extension Program Activities (2)	1,080
Alternate Energy Promotion Activities (2)	14,100
Women Development & Empowerment Activities (8)	4,640
	49,610
Eco-Tourism Management	
Ecotourism Promotion Activities (6)	5,685
	5,685
Infrastructure Development	
Infrastructure Development Activities (14)	12,550
Infrastructure development to *Hattisar* Activities (8)	4,820
	17,370
Reserve Management	
Fulfill vacant positions	44,480
Recruit additional staff	23,910
	68,390
Operation Modalities and Evaluation	2,595

Bardia National Park and Buffer Zone
(Amount in thousands NRs.)

Management Plan 2001-2005	**Total Cost**
1. Human Resource Development	**45,000,000**
2. Infrastructure and Equipment	
2.1 Building construction	18,000,000
2.2 Building upgrade and renovation	300,000
2.3 RTCPA operation and maintenance	300,000
2.4 Electrification	300,000
2.5 Water supply	700,000
2.6 Road and Trails	8,000,000
2.7 Equipment	10,000,000
2.8 Transportation	10,000,000
3. Ecological information	
3.1 Baseline information	500,000
3.2 Research through RTCPA	20,000,000
4. Development Projects	500,000
5. Encroachment of government land	200,000
6. Natural Resource management	500,000
7. Extension of Buffer zone	200,000
8. Park people relation	15,000,000
9. Antipoaching operation	10,000,000
10. Information dissemination	500,000
11. Corridor connectivity	15,000,000
12. Park zonation	1,000,000
13. Monitoring and Evaluation	500,000
14. Review and update of management plan	1,000,000
Total	**157,500,000**

	Tourism Plan 2001-2006	**Total Cost**
1.	Attraction Management Programs	14,500,000
2.	Tourism Facilitation Programs	48,300,000
3.	Community Benefit Programs	12,700,000
	Total	**75,500,000**

Chitwan National Park and Buffer Zone
(Amount in thousands NRs.)

	Total Cost
Park Management	
Management Zones	420
Grassland Habitat Conservation	16,784
Wetland Habitat Conservation	5,820
Forest Habitat Conservation	5,720
Wildlife Species Conservation	18,810
Cultural Heritage Conservation	3,215
Conservation Education	14,420
Resource Sharing and Access	1,550
Law Enforcement	12,810
Institutional Strengthening	189,492
Hattisar Management	50,876
Physical Infrastructures and Logistics	70,278
Coordination and Inter-sector linkages	10,410
Research and Development	12,740
Monitoring and Evaluation System	5,340
Tourism Management	8,640
Total	**427,325**

Barandabhar Forest Corridor

	Buffer Zone	1,720
	Grassland	1,250
	Wetland	3,230
	Wildlife	1,720
	Fringe Area Management	2,720
	Community Development and	
	Income Generation	3,975
	Tourism Development	900
	Support to Institutional Strengthening	2,075
	Sub total	17,590
	Program Administration Cost (20% of Program Cost)	3,518
Total		**21,108**

Buffer Zone Management	Total	Park ManagementOthers	
Community Development	44,042.513	17,986.988	26,055.525
Conservation Program	43,552.096	17,793.988	25,758.108
Income Generating	17,668.442	11,835.992	5,832.450
Conservation Education	8,497.746	5,881.496	2,616.250
Sub total	113,760.797	53,498.464	60,262.333
Program Administration	5,375.000	5,375.000	-
Total	119,135.797	58,873.464	60,262.333

Parsa Wildlife Reserve and Buffer Zone

(Amount in thousands NRs.)

WILDLIFE HABITAT CONSERVATION	
Activities	Total Cost
Reserve Boundary Demarcation	850
Resettlement of human enclaves	10,075
Strengthening habitat protection	16,660
Waterhole management	2,220
Forest habitat management in the Reserve	–
Grassland management	1,570
Habitat conservation in BZ, corridor	3,450
Sub-total	34,825
SPECIES CONSERVATION	
Baseline Survey and action plan	6,250
Establish wildlife welfare services	1,730
Minimize environmental hazards	170
Mgmt Research and Information	4,765
Sub-total	12,915
INSTITUTIONAL CAPACITY ENHANCEMENT	
Reserve infrastructure enhancement	9,700
Skill enhancement of Reserve staff	4,400
Enhancing *Hattisar* capacity	6,175
Strengthening BZ institutions	10,920
Inter-sector linkages	1,100
Gender main streaming and women	1,930
STG empowerment	505
Conservation education & interpretation	4,975
Involvement of public and private sector	125
Monitoring and Evaluation	1,450
Sub-total	41,280
BUFFER ZONE MANAGEMENT/COMMUNITY DEVELOPMENT	
Ownership development	1,000
Alternative resource development	3,790
Livelihood improvement	1,510
Minimizing crop damage	1,950
Alternative to forest resources	2,095
Infrastructure development	5,750
Ecotourism development	7,145
Sub-total	23,240
OFFICE AND STAFF MGMT	
a. Reserve office and Staff mgmt.	47,200
b. *Hattisar* office and staff mgmt.	15,625
Sub-total	62,825
Total	175,085

Annex 3: Programs and Budget Breakdown for the Tiger Action Plan 2006

Line Items Summary Budget Breakdown

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
2.2.1 Objective 1. Tiger and Prey Information	25000	26000	22000	39000	17000	10000	139000
2.2.2 Objective 2. Habitat Management	***26000***	***40000***	***16000***	***28000***	***17000***	***85000***	***212000***
2.1 Develop landscape approach	9000	21000	9000	18000	8000	25000	90000
2.2 Develop alternative resource	7000	3000	0	0	6000	55000	71000
2.3 Strengthen coordinated efforts	10000	16000	7000	10000	3000	5000	51000
2.2.3 Objective 3. Conflicts Resolution	199000	42000	76000	114000	35000	72000	375000
3.1 Develop alternatives for natural resource base	36000	0	16000	20000	0	0	36000
3.2 Develop safety measures	25000	1000	10000	5000	5000	4000	25000
3.3 Develop a community based mechanism of compensation	6000	9000	5000	10000	7000	30000	67000
3.4 Develop a community awareness program	102000	22000	22000	29000	16000	13000	102000
3.5 Database Management and Research	30000	10000	23000	50000	7000	25000	145000
2.2.4 Objective 4. Anti-poaching and							
Anti-trafficking Operations	***358000***	***79000***	***65000***	***80000***	***60000***	***74000***	***358000***
4.1 Strengthen institutional network	223000	42000	37000	51000	40000	53000	223000

4.2 Strengthen anti-poaching efforts	91000	28000	17000	17000	14000	15000	91000
4.3 Enhance public awareness programs	44000	9000	11000	12000	6000	6000	44000
2.2.5 Objective 5. Transboundary Cooperation	***66000***	***20000***	***18000***	***9000***	***11000***	***8000***	***66000***
5.1 Strengthen transboundary cooperation	19000	12000	3000	2000	1000	1000	19000
5.2 Maintain ecological integrity	30000	5000	7000	5000	8000	5000	30000
5.3 Promote tiger tourism	17000	3000	8000	2000	2000	2000	17000
Grand Total	**674000**	**207000**	**197000**	**270000**	**140000**	**249000**	**1150000**

Yearly Summary Budget Breakdown

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
2.2.1 Objective 1. Tiger and Prey Information	16000	46000	35000	26000	16000	139000
2.2.2 Objective 2. Habitat Management	14000	70000	51000	41000	36000	212000
2.1 Develop landscape approach	4000	28000	24000	17000	17000	90000
2.2 Develop alternative resource	5000	18000	18000	15000	15000	71000
2.3 Strengthen coordinated efforts	5000	24000	9000	9000	4000	51000
2.2.3 Objective 3. Conflicts Resolution	72000	92000	100000	67000	44000	375000
3.1 Develop alternatives for natural resource base	0	16000	20000	0	0	36000
3.2 Develop safety measures	1000	10000	5000	5000	4000	25000
3.3 Develop a community based mechanism of compensation	20000	15000	13000	11000	8000	67000
3.4 Develop a community awareness program	22000	22000	29000	16000	13000	102000
3.5 Database Mangement and Research	29000	29000	33000	35000	19000	145000
2.2.4 Objective 4. Anti-poaching and Anti-trafficking Operations	79000	65000	80000	60000	74000	358000
4.1 Strengthen institutional network	42000	37000	51000	40000	53000	223000
4.2 Strengthen antipoaching efforts	28000	17000	17000	14000	15000	91000
4.3 Enhance public awareness programs	9000	11000	12000	6000	6000	44000
2.2.5 Objective 5. Transboundary Cooperation	20000	18000	9000	11000	8000	66000
5.1 Strengthen transboundary cooperation	12000	3000	2000	1000	1000	19000
5.2 Maintain ecological integrity	5000	7000	5000	8000	5000	30000
5.3 Promote tiger tourism	3000	8000	2000	2000	2000	17000
Grand Total	**201000**	**291000**	**275000**	**205000**	**178000**	**1150000**

Line Items Detail Budget Breakdown for Objective 1 Tiger and Prey Information

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
2.2.1 Objective 1. Tiger and Prey Information	***25000***	***26000***	***22000***	***39000***	***17000***	***10000***	***139000***
1.1 Enhance knowledge and information base	*19000*	*23000*	*16000*	*27000*	*13000*	*0*	*98000*
• Develop a protocol for tiger and prey base monitoring	1000	1000	1000	0	1000	0	4000
• Develop minimum impact code to							

maintain undisturbed environment for tiger and its preys	1000	2000	1000	0	1000	0	5000
• Develop a priority list of tiger related research works	1000	1000	1000	0	1000	0	4000
• Conduct studies on the population dynamics of tiger and prey species	2000	3000	1000	5000	1000	0	12000
• Continue camera trap monitoring of tiger in the TCLs	2000	2000	2000	5000	1000	0	12000
• Conduct tiger survey by looking for tiger signs , ungulate pellets, deer browse; responses of the local people	2000	2000	2000	5000	1000	0	12000
• Conduct survey for presence and absence of tigers	1000	2000	1000	2000	1000	0	7000
• Conduct prey base survey to estimate relative abundance	2000	2000	2000	5000	1000	0	12000
• Maintain the tiger database using the camera traps	2000	2000	1000	5000	1000	0	11000
• Explore for the cooperation on tiger research with the academic institutions	1000	2000	1000	0	2000	0	6000
• Review the current management plans from the perspective of tiger and prey base conservation	2000	2000	1000	0	1000	0	6000
• Develop a project in the TCLs to enhance understanding of dispersal corridors and the survival of dispersing tigers outside protected areas	2000	2000	2000	0	1000	0	7000
1.2 Strengthen human and physical resources	*6000*	*3000*	*6000*	*12000*	*4000*	*10000*	*41000*
• Conduct on-the-job training for the protected area personnel on tiger and prey base monitoring	2000	2000	2000	2000	1000	0	9000
• Improve the existing physical infrastructure of protected area management on tiger monitoring	1000	0	1000	0	1000	10000	13000
• Equip the existing biodiversity database focusing on tiger and prey base for efficient outputs	1000	0	1000	10000	1000	0	13000
• Feasibility survey for developing tiger orphanage and alternative captive management facilities	2000	1000	2000	0	1000	0	6000

Yearly Detail Budget Breakdown for Objective 1 Tiger and Prey Information

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
2.2.1 Objective 1. Tiger and Prey Information	***16000***	***46000***	***35000***	***26000***	***16000***	***139000***
1.1 Enhance knowledge and information base	*15000*	*38000*	*17000*	*14000*	*14000*	*98000*
• Develop a protocol for tiger and prey base monitoring	4000	0	0	0	0	4000
• Develop minimum impact code to maintain undisturbed environment for tiger and its preys	0	5000	0	0	0	5000
• Develop a priority list of tiger related research works	4000	0	0	0	0	4000
• Conduct studies on the population dynamics of tiger and prey species	0	6000	0	6000	0	12000
• Continue camera trap monitoring of tiger in the TCLs	0	3000	3000	3000	3000	12000
• Conduct tiger survey by looking for tiger signs , ungulate pellets, deer browse; responses of the local people	0	3000	3000	3000	3000	12000
• Conduct survey for presence and absence of tigers	4000	3000	0	0	0	7000
• Conduct prey base survey to estimate relative abundance	0	0	6000	0	6000	12000
• Maintain the tiger database using the camera traps	3000	2000	2000	2000	2000	11000
• Explore for the cooperation on tiger research with the academic institutions	0	3000	3000	0	0	6000
• Review the current management plans from the perspective of tiger and prey base conservation	0	6000	0	0	0	6000
• Develop a project in the TCLs to enhance understanding of dispersal corridors and the survival of dispersing tigers outside protected areas	0	7000	0	0	0	7000
1.2 Strengthen human and physical resources	*1000*	*8000*	*18000*	*12000*	*2000*	*41000*
• Conduct on-the-job training for the protected area personnel on tiger and prey base monitoring	1000	2000	2000	2000	2000	9000
• Improve the existing physical infrastructure of protected area management on tiger monitoring	0	3000	10000	0	0	13000
• Equip the existing biodiversity database focusing on tiger and prey base for efficient outputs	0	0	3000	10000	0	13000
• Feasibility survey for developing tiger orphanage and alternative captive management facilities	0	3000	3000	0	0	6000

Line Items Detail Budget Breakdown for Objective 2 Habitat Management

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
2.2.2 Objective 2. Habitat Management	***26000***	***40000***	***16000***	***28000***	***17000***	***85000***	***212000***
2.1 Develop landscape approach	*9000*	*21000*	*9000*	*18000*	*8000*	*25000*	*90000*
• Upgrade the central GIS lab in DNPWC and link with the field-based labs	2000	2000	1000	10000	2000	5000	22000
• Organize, in cooperation with NTNC-BCC, capacity building programs for the protected area and forestry personnel	2000	15000	2000	2000	2000	0	23000
• Restore vegetation and water hole in the geographical connections and forest corridors	1000	0	1000	1000	1000	10000	14000
• Manage the grassland habitats and waterholes to maintain a healthy population of tiger prey species.	1000	0	1000	1000	1000	10000	14000
• Monitor habitat quality, both potential and priority	2000	2000	2000	2000	1000	0	9000
• Update digital base maps	1000	2000	2000	2000	1000	0	8000
2.2 Develop alternative resource	7000	3000	0	0	6000	55000	71000
• Manage grasslands in the protected areas	1000	1000	0	0	1000	5000	8000
• Construct/maintain cattle pool to control livestock grazing in the tiger habitats	1000	0	0	0	1000	5000	7000
• Construct/maintain fire lines for fire control	1000	0	0	0	1000	10000	12000
• Construct/maintain watchtower for habitat inspection	1000	0	0	0	1000	10000	12000
• Plant indigenous tree species in the open areas or implement the enrichment plantation of degraded forest areas.	2000	1000	0	0	1000	10000	14000
• Provide grant facilities to the local residents for alternatives in lieu of stall-feeding of livestock, such as biogas plants, purchasing buffaloes, forming dairy cooperatives.	1000	1000	0	0	1000	15000	18000
2.3 Strengthen coordinated efforts	10000	16000	7000	10000	3000	5000	51000
• Conduct coordination meetings of the protected area managers and forest officials on identifying priority and potential tiger habitats and implementing adaptive management interventions	2000	3000	2000	0	1000	0	8000
• Prepare operational guidelines for the user groups and committees of the buffer zone and community forests on							

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
the habitat management activities in the potential tiger habitats, such as grazing control, sewage control and garbage management	2000	2000	1000	0	0	0	5000
• Review/integrate tiger conservation in forest management plans	2000	2000	1000	0	0	0	5000
• Prepare operational plans for the restored areas by involving local communities.	2000	2000	1000	0	0	0	5000
• Establish and operate veterinary services for the livestock in the buffer zones	1000	1000	0	10000	1000	5000	18000
• Arrange study tours for the representatives of the community based organizations to the sites of successful forest management leading towards tiger habitats	1000	6000	2000	0	1000	0	10000

Yearly Detail Budget Breakdown for Objective 2 Habitat Management

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
2.2.2 Objective 2. Habitat Management	***14000***	***70000***	***51000***	***41000***	***36000***	***212000***
2.1 Develop landscape approach	*4000*	*28000*	*24000*	*17000*	*17000*	*90000*
• Upgrade the central GIS lab in DNPWC and link with the field-based labs	0	15000	7000	0	0	22000
• Organize, in cooperation with NTNC-BCC, capacity building programs for the protected area and forestry personnel	3000	5000	5000	5000	5000	23000
• Restore vegetation and water hole in the geographical connections and forest corridors	0	2000	4000	4000	4000	14000
• Manage the grassland habitats and waterholes to maintain a healthy population of tiger prey species.	0	2000	4000	4000	4000	14000
• Monitor habitat quality, both potential and priority	1000	2000	2000	2000	2000	9000
• Update digital base maps	0	2000	2000	2000	2000	8000
2.2 Develop alternative resource	*5000*	*18000*	*18000*	*15000*	*15000*	*71000*
• Manage grasslands in the protected areas	0	2000	2000	2000	2000	8000
• Construct/maintain cattle pool to control livestock grazing in the tiger habitats	0	4000	3000	0	0	7000
• Construct/maintain fire lines for fire control	0	3000	3000	3000	3000	12000

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
• Construct/maintain watchtower for habitat inspection	0	3000	3000	3000	3000	12000
• Plant indigenous tree species in the open areas or implement the enrichment plantation of degraded forest areas.	2000	3000	3000	3000	3000	14000
• Provide grant facilities to the local residents for alternatives in lieu of stall-feeding of livestock, such as biogas plants, purchasing buffaloes, forming dairy cooperatives.	3000	3000	4000	4000	4000	18000
2.3 Strengthen coordinated efforts	*5000*	*24000*	*9000*	*9000*	*4000*	*51000*
• Conduct coordination meetings of the protected area managers and forest officials on identifying priority and potential tiger habitats and implementing adaptive management interventions	1000	2000	2000	2000	1000	8000
• Prepare operational guidelines for the user groups and committees of the buffer zone and community forests on the habitat management activities in the potential tiger habitats, such as grazing control, sewage control and garbage management	0	5000	0	0	0	5000
• Review/integrate tiger conservation in forest management plans	0	5000	0	0	0	5000
• Prepare operational plans for the restored areas by involving local communities.	0	5000	0	0	0	5000
• Establish and operate veterinary services for the livestock in the buffer zones	2000	5000	5000	5000	1000	18000
• Arrange study tours for the representatives of the community based organizations to the sites of successful forest management leading towards tiger habitats	2000	2000	2000	2000	2000	10000

Line Items Detail Budget Breakdown for Objective 3 Conflict Resolution

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
2.2.3 Objective 3. Conflicts Resolution	***42000***	***52000***	***29000***	***16000***	***21000***	***70000***	***230000***
3.1 Develop alternatives for natural resource base	*12000*	*12000*	*8000*	*0*	*4000*	*0*	*36000*
• Identify and hand over community forests in the buffer zones	3000	3000	2000	0	1000	0	9000
• Restore the degraded forests in the buffer zone by artificial or natural regeneration	3000	3000	2000	0	1000	0	9000
• Prepare operational plans for the buffer zone community forests for sustainable harvest of natural resources	3000	3000	2000	0	1000	0	9000
• Develop community plantations, by mobilizing local resources and labor, so that local people need not collect their fodder and firewood from tiger habitats.	3000	3000	2000	0	1000	0	9000
3.2 Develop safety measures	*5000*	*8000*	*4000*	*1000*	*2000*	*5000*	*25000*
• Erect signs of warning to the passersby in the major rights of ways, resource collection sites and shrines.	1000	1000	1000	0	0	5000	8000
• Conduct awareness meetings at the local level during tiger marauding seasons	2000	5000	1000	0	1000	0	9000
• Monitor tigers around the human activity areas	1000	1000	1000	0	0	0	3000
• Take a 'man-eater' tiger under control immediately	1000	1000	1000	1000	1000	0	5000
3.3 Develop a community based mechanism of compensation	*6000*	*9000*	*5000*	*10000*	*7000*	*30000*	*67000*
• Review conservation policies to incorporate compensation schemes	1000	2000	1000	0	0	0	4000
• Establish community funds for the families of tiger victims.	0	2000	1000	0	2000	15000	20000
• Establish the Help Desk and appoint responsible staff	1000	1000	0	0	1000	0	3000
• Establish Field Rescue Team equipped with vehicles, communication sets and treatment gear	2000	2000	2000	10000	2000	0	18000
• Establishment of relief fund	0	0	0	0	1000	15000	16000
• Explore for the community based human and livestock insurance against wildlife accidents	2000	2000	1000	0	1000	0	6000

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
3.4 Develop a community awareness program	*19000*	*23000*	*12000*	*5000*	*8000*	*35000*	*102000*
• Conduct seminars and interactive programs, to emphasize on the co-dependency of humans and the Terai ecosystems; i.e., the health of such ecosystems is important, not only for biodiversity, but also for sustaining the ecosystem processes, upon which local people and development depend.	2000	5000	2000	0	1000	0	10000
• Develop a curriculum for school children, which portrays tigers as part of the ecosystem, rather than as an object for human exploitation.	3000	3000	1000	0	1000	0	8000
• Develop audiovisual programs, for local people, which focus on tiger biology; they should be entertaining, as well as educational.	5000	1000	2000	0	1000	0	9000
• Develop information centers, where problems faced by tigers are publicized; information should be in the form of photos or display cards in local languages.	2000	3000	2000	5000	1000	15000	28000
• Encourage people, at the community level, to develop and manage sewage and irrigation canals.	1000	2000	1000	0	1000	0	5000
• Make tiger documentary films and exhibits in awareness program	2000	1000	1000	0	1000	10000	15000
• Publicize the fact that a strong economic link, between tourism and biodiversity, benefits both local people and conservation efforts.	1000	3000	1000	0	0	0	5000
• Prepare guidelines and awareness materials on the sales, distribution and application of toxics such as pesticides, insecticides, poisons etc.	2000	2000	1000	0	1000	10000	16000
• Conduct interaction meetings with the government line agencies (e.g. agriculture, livestock, drug administration), nongovernment and private sectors at the grassroots level on the control of sales, distribution and application of toxic materials such as pesticides, insecticides, poisons etc.	1000	3000	1000	0	1000	0	6000

Yearly Detail Budget Breakdown for Objective 3 Conflict Resolution

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
2.2.3 Objective 3. Conflicts Resolution	***43000***	***63000***	***67000***	***32000***	***25000***	***230000***
3.1 Develop alternatives for natural resource base	*0*	*16000*	*20000*	*0*	*0*	*36000*
• Identify and hand over community forests in the buffer zones	0	4000	5000	0	0	9000
• Restore the degraded forests in the buffer zone by artificial or natural regeneration	0	4000	5000	0	0	9000
• Prepare operational plans for the buffer zone community forests for sustainable harvest of natural resources	0	4000	5000	0	0	9000
• Develop community plantations, by mobilizing local resources and labor, so that local people need not collect their fodder and firewood from tiger habitats.	0	4000	5000	0	0	9000
3.2 Develop safety measures	*1000*	*10000*	*5000*	*5000*	*4000*	*25000*
• Erect signs of warning to the passersby in the major rights of ways, resource collection sites and shrines.	0	2000	2000	2000	2000	8000
• Conduct awareness meetings at the local level during tiger marauding seasons	1000	2000	2000	2000	2000	9000
• Monitor tigers around the human activity areas	0	1000	1000	1000	0	3000
• Take a 'man-eater' tiger under control immediately	0	5000	0	0	0	5000
3.3 Develop a community based mechanism of compensation	*20000*	*15000*	*13000*	*11000*	*8000*	*67000*
• Review conservation policies to incorporate compensation schemes	4000	0	0	0	0	4000
• Establish community funds for the families of tiger victims.	4000	4000	4000	4000	4000	20000
• Establish the Help Desk and appoint responsible staff	3000	0	0	0	0	3000
• Establish Field Rescue Team equipped with vehicles, communication sets and treatment gear	5000	5000	5000	3000	0	18000
• Establishment of relief fund	2000	3000	3000	4000	4000	16000
• Explore for the community based human and livestock insurance against wildlife accidents	2000	3000	1000	0	0	6000

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
3.4 Develop a community awareness program	*22000*	*22000*	*29000*	*16000*	*13000*	*102000*
• Conduct seminars and interactive programs, to emphasize on the co-dependency of humans and the Terai ecosystems; i.e., the health of such ecosystems is important, not only for biodiversity, but also for sustaining the ecosystem processes, upon which local people and development depend.	2000	2000	2000	2000	2000	10000
• Develop a curriculum for school children, which portrays tigers as part of the ecosystem, rather than as an object for human exploitation.	2000	2000	2000	2000	0	8000
• Develop audiovisual programs, for local people, which focus on tiger biology; they should be entertaining, as well as educational.	1000	2000	2000	2000	2000	9000
• Develop information centers, where problems faced by tigers are publicized; information should be in the form of photos or display cards in local languages.	5000	10000	10000	3000	0	28000
• Encourage people, at the community level, to develop and manage sewage and irrigation canals.	1000	1000	1000	1000	1000	5000
• Make tiger documentary films and exhibits in awareness program	5000	0	5000	0	5000	15000
• Publicize the fact that a strong economic link, between tourism and biodiversity, benefits both local people and conservation efforts.	1000	1000	1000	1000	1000	5000
• Prepare guidelines and awareness materials on the sales, distribution and application of toxics such as pesticides, insecticides, poisons etc.	3000	4000	4000	5000	0	16000
• Conduct interaction meetings with the government line agencies (e.g. agriculture, livestock, drug administration), nongovernment and private sectors at the grassroots level on the control of sales, distribution and application of toxic materials such as pesticides, insecticides, poisons etc.	2000	0	2000	0	2000	6000

Line Items Detail Budget Breakdown for Objective 4 Anti-poaching and Anti-trafficking Operations

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
2.2.4 Objective 4. Anti-poaching and Anti-trafficking Operations	***67000***	***127000***	***61000***	***42000***	***36000***	***25000***	***358000***
4.1 Strengthen institutional network	*40000*	*76000*	*41000*	*37000*	*29000*	*0*	*223000*
• Conduct CITES implementation training for the management and scientific authorities, government officers at the custom, police, and other relevant agencies. The topics will include identification of wildlife and their derivatives especially tiger body parts, forensic procedures, national and international laws on the control of illegal trade and poaching.	5000	10000	2000	2000	1000	0	20000
• Conduct transboundary meetings with the neighboring countries focusing on the cooperation for the control of illegal trade in wildlife and their derivatives.	3000	6000	6000	0	2000	0	17000
• Prepare updated reports for the national, regional and international meetings pertinent to CITES, GTF, IUCN, TRAFFIC, WCPA, WTOand others as appropriate.	5000	2000	2000	0	1000	0	10000
• Participate in the national, regional and international meetings, conferences and seminars that are pertinent to the control of illegal trade and poaching.	2000	2000	10000	0	1000	0	15000
• Maintain records of incidents related to poaching, illegal trade, confiscation etc on tiger and other wildlife species	2000	2000	2000	0	1000	0	7000
• Identify key customs for CITES enforcement	2000	2000	2000	0	1000	0	7000
• Prepare a status report on the rights and duties of stakeholders who are directly or indirectly responsible for the protection of tigers in the wild.	2000	1000	1000	0	1000	0	5000
• Conduct coordination meetings to review on the status of tigers in the wild as well as on the issues of poaching of tigers and smuggling tiger body parts.	2000	2000	1000	0	1000	0	6000

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
• Conduct feasibility survey for the need to have cooperative agreements between enforcement agencies and transport companies (air, rail, bus, freight, express courier)	2000	1000	1000	0	1000	0	5000
• Organize awareness interactions with the transport media on the illegal trade issue.	1000	2000	1000	0	1000	0	5000
• Review the current strengths of the antipoaching capacity of the protected areas such as human resources (number of scouts, guard posts and the protection unit); physical facilities (field gear, vehicles, elephants, communication systems, reporting systems); intelligence network (reporting, database on poachers and smugglers, coordination with the authorities of forest, police, custom, postal service etc.); and financial aspects (government budget, incentives, rewards, emergency fund, conservation fee) and others	2000	2000	2000	0	1000	0	7000
• Conduct regular training programs for the antipoaching units on techniques of intelligence works, use of equipment and other relevant fields.	2000	10000	2000	5000	2000	0	21000
• Equip the antipoaching units with the field gear and basic equipment (binoculars, communication sets, GPS, kitchen sets etc)	0	1000	0	15000	5000	0	21000
• Procure physical resources to enhance antipoaching activities, such as four wheel drive vehicle, raft, motorboat, elephant, motorcycle, bicycles etc.	0	1000	1000	15000	5000	0	22000
• Train DNPWC professional staff to take responsibility as a tiger authority	2000	10000	2000	0	1000	0	15000
• Conduct a series of training workshops for the key individuals and/ or civil servants-such as customs officials, postal workers, police, etc. regarding threats to tigers, illegal trade, and the identification of tiger parts.	3000	15000	3000	0	1000	0	22000

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
• Study on the feasibility of mobilizing buffer zone community based organizations including youth groups in antipopaching operations	2000	5000	1000	0	1000	0	9000
• Prepare case studies on the arrested poachers and smugglers to find out the socio-economic and psychological factors and alternatives to the wildlife crimes (such as poverty, unemployment, temptation, compellation etc.)	3000	2000	2000	0	2000	0	9000
4.2 Strengthen antipoaching efforts	*20000*	*39000*	*14000*	*5000*	*3000*	*10000*	*91000*
• Prepare antipoaching operation plans at the tiger conservation landscape level	2000	2000	2000	0	1000	0	7000
• Review the existing management plans for the protected areas including buffer zones from the perspective of tiger conservation	2000	2000	1000	0	0	0	5000
• Conduct orientation training programs for the protection unit deployed in the protected areas.	3000	15000	2000	0	1000	0	21000
• Review the post-conflict scenario for tiger conservation	2000	1000	2000	0	0	0	5000
• Prepare guidelines on reporting, valuation and authentication of the tiger related incidents for direct compensation to the affected people	2000	1000	2000	0	0	0	5000
• Establish a network of candid informers that will eventually lead to arrest poachers and smugglers who handle tiger body parts.	2000	5000	2000	5000	1000	0	15000
• Review the existing NPWC Act in respect to the changing national and international perspectives so that criminals and potential criminals will be grossly discouraged.	1000	1000	0	0	0	0	2000
• Organize interaction meetings with the civil societies to discuss on enhancing political commitment in combating poaching and illegal trade.	1000	2000	0	0	0	0	3000

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
• Conduct advocacy and lobbying activities during strategic events (wildlife week, environment day, biodiversity day, regular campaigns) at a high political level as a means of awareness to garner political will to address tiger conservation, poaching and illegal trade.	2000	6000	2000	0	0	0	10000
• Conduct feasibility survey of establishing a sustainable mechanism of providing appropriate incentives for the informers	1000	1000	1000	0	0	0	3000
• Organize interaction meetings at the community levels to finalize on the mechanism of incentives	1000	2000	0	0	0	0	3000
• Establish an endowment fund for incentives	1000	1000	0	0	0	10000	12000
4.3 Enhance public awareness programs	*7000*	*12000*	*6000*	*0*	*4000*	*15000*	*44000*
• Conduct nature conservation workshops and seminars, to provide basic knowledge; increase awareness-for game scouts, forest guards, rangers, and officers of their role in tiger and biodiversity conservation.	2000	5000	2000	0	1000	0	10000
• Bring out public notice on the importance of tigers, and legal fines against the tiger related offenses in the buffer zones and potential areas of illegal trades	0	1000	1000	0	1000	0	3000
• Incorporate tiger conservation information and fines against tiger related offenses in the school level textbooks in the buffer zones	1000	2000	1000	0	0	0	4000
• Install kiosks on the importance of tigers, and legal fines against the tiger related offenses at the major tourist arrival-departure locations such as airports, visitors information centers, immigration offices, protected areas entry fee collection centers etc.	2000	2000	1000	0	1000	10000	16000

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
• Design, produce and distribute educational materials (posters, booklets, websites) based on the scientific background of tigers (ecological importance, balance in nature etc), cultural values (Bagh Bhairav, Namo Buddha, Dasain festival etc), and messages of social leaders and celebrities	2000	2000	1000	0	1000	5000	11000

Yearly Detail Budget Breakdown for Objective 4 Anti-poaching and Anti-trafficking Operations

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
2.2.4 Objective 4. Anti-poaching and Anti-trafficking Operations	***79000***	***65000***	***80000***	***60000***	***74000***	***358000***
4.1 Strengthen institutional network	*42000*	*37000*	*51000*	*40000*	*53000*	*223000*
• Conduct CITES implementation training for the management and scientific authorities, government officers at the custom, police, and other relevant agencies. The topics will include identification of wildlife and their derivatives especially tiger body parts, forensic procedures, national and international laws on the control of illegal trade and poaching.	4000	4000	4000	4000	4000	20000
• Conduct transboundary meetings with the neighboring countries focusing on the cooperation for the control of illegal trade in wildlife and their derivatives.	2000	3000	4000	4000	4000	17000
• Prepare updated reports for the national, regional and international meetings pertinent to CITES, GTF, IUCN, TRAFFIC, WCPA, WTO and others as appropriate.	2000	2000	2000	2000	2000	10000
• Participate in the national, regional and international meetings, conferences and seminars that are pertinent to the control of illegal trade and poaching.	3000	3000	3000	3000	3000	15000
• Maintain records of incidents related to poaching, illegal trade, confiscation etc on tiger and other wildlife species	2000	1000	1000	1000	2000	7000

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
• Identify key customs for CITES enforcement	3000	0	2000	0	2000	7000
• Prepare a status report on the rights and duties of stakeholders who are directly or indirectly responsible for the protection of tigers in the wild.	2000	0	2000	0	1000	5000
• Conduct coordination meetings to review on the status of tigers in the wild as well as on the issues of poaching of tigers and smuggling tiger body parts.	2000	0	2000	0	2000	6000
• Conduct feasibility survey for the need to have cooperative agreements between enforcement agencies and transport companies (air, rail, bus, freight, express courier)	1000	1000	1000	1000	1000	5000
• Organize awareness interactions with the transport media on the illegal trade issue.	1000	1000	1000	1000	1000	5000
• Review the current strengths of the antipoaching capacity of the protected areas such as human resources (number of scouts, guard posts and the protection unit); physical facilities (field gear, vehicles, elephants, communication systems, reporting systems); intelligence network (reporting, database on poachers and smugglers, coordination with the authorities of forest, police, custom, postal service etc.); and financial aspects (government budget, incentives, rewards, emergency fund, conservation fee) and others	2000	0	2000	0	3000	7000
• Conduct regular training programs for the antipoaching units on techniques of intelligence works, use of equipment and other relevant fields.	3000	4000	4000	5000	5000	21000
• Equip the antipoaching units with the field gear and basic equipment (binoculars, communication sets, GPS, kitchen sets etc)	1000	5000	5000	5000	5000	21000
• Procure physical resources to enhance antipoaching activities, such as four wheel drive vehicle, raft, motorboat, elephant, motorcycle, bicycles etc.	2000	5000	5000	5000	5000	22000

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
• Train DNPWC professional staff to take responsibility as a tiger authority	5000	0	5000	0	5000	15000
• Conduct a series of training workshops for the key individuals and/ or civil servants-such as customs officials, postal workers, police, etc. regarding threats to tigers, illegal trade, and the identification of tiger parts.	3000	4000	4000	5000	6000	22000
• Study on the feasibility of mobilizing buffer zone community based organizations including youth groups in antipopaching operations	2000	2000	2000	2000	1000	9000
• Prepare case studies on the arrested poachers and smugglers to find out the socio-economic and psychological factors and alternatives to the wildlife crimes (such as poverty, unemployment, temptation, compellation etc.)	2000	2000	2000	2000	1000	9000
4.2 Strengthen antipoaching efforts	*28000*	*17000*	*17000*	*14000*	*15000*	*91000*
• Prepare antipoaching operation plans at the tiger conservation landscape level	2000	0	2000	0	3000	7000
• Review the existing management plans for the protected areas including buffer zones from the perspective of tiger conservation	2000	2000	1000	0	0	5000
• Conduct orientation training programs for the protection unit deployed in the protected areas.	3000	3000	4000	5000	6000	21000
• Review the post-conflict scenario for tiger conservation	5000	0	0	0	0	5000
• Prepare guidelines on reporting, valuation and authentication of the tiger related incidents for direct compensation to the affected people	2000	2000	1000	0	0	5000
• Establish a network of candid informers that will eventually lead to arrest poachers and smugglers who handle tiger body parts.	3000	3000	3000	3000	3000	15000
• Review the existing NPWC Act in respect to the changing national and international perspectives so that criminals and potential criminals will be grossly discouraged.	0	2000	0	0	0	2000

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
• Organize interaction meetings with the civil societies to discuss on enhancing political commitment in combating poaching and illegal trade.	1000	0	1000	0	1000	3000
• Conduct advocacy and lobbying activities during strategic events (wildlife week, environment day, biodiversity day, regular campaigns) at a high political level as a means of awareness to garner political will to address tiger conservation, poaching and illegal trade.	2000	2000	2000	2000	2000	10000
• Conduct feasibility survey of establishing a sustainable mechanism of providing appropriate incentives for the informers	3000	0	0	0	0	3000
• Organize interaction meetings at the community levels to finalize on the mechanism of incentives	3000	0	0	0	0	3000
• Establish an endowment fund for incentives	2000	3000	3000	4000	0	12000
4.3 Enhance public awareness programs	*9000*	*11000*	*12000*	*6000*	*6000*	*44000*
• Conduct nature conservation workshops and seminars, to provide basic knowledge; increase awareness- for game scouts, forest guards, rangers, and officers of their role in tiger and biodiversity conservation.	2000	2000	2000	2000	2000	10000
• Bring out public notice on the importance of tigers, and legal fines against the tiger related offenses in the buffer zones and potential areas of illegal trades	1000	0	1000	0	1000	3000
• Incorporate tiger conservation information and fines against tiger related offenses in the school level						
textbooks in the buffer zones	1000	1000	1000	1000	0	4000
• Install kiosks on the importance of tigers, and legal fines against the tiger related offenses at the major tourist arrival-departure locations such as airports, visitors information centers, immigration offices, protected areas entry fee collection centers etc.	3000	6000	6000	1000	0	16000

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
• Design, produce and distribute educational materials (posters, booklets, websites) based on the scientific background of tigers (ecological importance, balance in nature etc), cultural values (Bagh Bhairav, Namo Buddha, Dasain festival etc), and messages of social leaders and celebrities	2000	2000	2000	2000	3000	11000

Line Items Detail Budget Breakdown for Objective 5 Transboundary Cooperation

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
2.2.5 Objective 5. Transboundary Cooperation	***15000***	***22000***	***15000***	***0***	***14000***	***0***	***66000***
5.1 Strengthen transboundary cooperation	*3000*	*6000*	*2000*	*0*	*8000*	*0*	*19000*
• Prepare guidelines for holding transboundary meetings at the field levels. This will include identification of issues, alternatives solutions, commitments on the part of Nepal.	1000	1000	0	0	0	0	2000
• Exchange annual reports, newsletters and other relevant documents between the field level authorities	0	0	0	0	5000	0	5000
• Organize an international symposium on tiger will be convened in Nepal in second half of April 2007	2000	5000	2000	0	3000	0	12000
5.2 Maintain ecological integrity	*7000*	*8000*	*11000*	*0*	*4000*	*0*	*30000*
• Develop regional strategies for monitoring illegal wildlife trade along the borders with India and China.	2000	2000	3000	0	1000	0	8000
• Organize regional media tours on tiger conservation	1000	2000	5000	0	1000	0	9000
• Prepare protocol for joint research activities on the transient wildlife species that frequently cross the international borders.	2000	2000	1000	0	1000	0	6000
• Organize interaction meetings with the South Asian Association for Regional Cooperation (SAARC) secretariat to explore the possibility of using SAARC as a forum for wildlife conservation, antipoaching and control of illegal trade in wildlife	2000	2000	2000	0	1000	0	7000

Activities (Amount in US Dollars)	Remuneration	HRD	Travel	Equipment	ORC	Construction	Total
5.3 Promote tiger tourism	*5000*	*8000*	*2000*	*0*	*2000*	*0*	*17000*
• Review tourism plans from the perspectives of tiger tourism	1000	1000	0	0	0	0	2000
• Train the local guides on tiger tracking and monitoring who will also be accompanying with the visitors as appropriate	2000	5000	1000	0	1000	0	9000
• Prepare a marketing strategy for tiger tourism in the tiger landscapes (e.g. Adopt a tiger scheme).	2000	2000	1000	0	1000	0	6000

Yearly Detail Budget Breakdown for Objective 5 Transboundary Cooperation

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
2.2.5 Objective 5. Transboundary Cooperation	***20000***	***18000***	***9000***	***11000***	***8000***	***66000***
5.1 Strengthen transboundary cooperation	*12000*	*3000*	*2000*	*1000*	*1000*	*19000*
• Prepare guidelines for holding transboundary meetings at the field levels. This will include identification of issues, alternatives solutions, commitments on the part of Nepal.	1000	0	1000	0	0	2000
• Exchange annual reports, newsletters and other relevant documents between the field level authorities	1000	1000	1000	1000	1000	5000
• Organize an international symposium on tiger will be convened in Nepal in second half of April 2007	10000	2000	0	0	0	12000
5.2 Maintain ecological integrity	*5000*	*7000*	*5000*	*8000*	*5000*	*30000*
• Develop regional strategies for monitoring illegal wildlife trade along the borders with India and China.	0	4000	0	4000	0	8000
• Organize regional media tours on tiger conservation	3000	0	3000	0	3000	9000
• Prepare protocol for joint research activities on the transient wildlife species that frequently cross the international borders.	2000	0	2000	0	2000	6000

Activities (Amount in US Dollars)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
• Organize interaction meetings with the South Asian Association for Regional Cooperation (SAARC) secretariat to explore the possibility of using SAARC as a forum for wildlife conservation, antipoaching and control of illegal trade in wildlife	0	3000	0	4000	0	7000
5.3 Promote tiger tourism	*3000*	*8000*	*2000*	*2000*	*2000*	*17000*
• Review tourism plans from the perspectives of tiger tourism	2000	0	0	0	0	2000
• Train the local guides on tiger tracking and monitoring who will also be accompanying with the visitors as appropriate	1000	2000	2000	2000	2000	9000
• Prepare a marketing strategy for tiger tourism in the tiger landscapes (e.g. Adopt a tiger scheme).	0	6000	0	0	0	6000

CHAPTER 10

TIGER ACTION PLAN

RUSSIA 1996

Государственный комитет Российской Федерации по охране окружающей среды
State Committee of the Russian Federation for the protection of the environment

Российская Академия наук
Russian Academy of Sciences

СТРАТЕГИЯ СОХРАНЕНИЯ АМУРСКОГО ТИГРА В РОССИИ

STRATEGY FOR CONSERVATION OF THE AMUR TIGER IN RUSSIA

Фото на обложке А. Каменцев
Photo on the cover page by A. Kamentsev

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The proposals were summarised and the text edited by E.N. Matiushkin. English text edited by P. Jackson.

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The Strategy for Conservation of the Amur Tiger in Russia was agreed by the Academician, Secretary of the Division of General Biology of Russian Academy of Sciences V.E. Sokolov and approved by the Minister of the Russian Federation for the protection of the environment and natural resources V.I. Danilov-Danilyan.

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FOREWORD

Among the species and subspecies which are of concern to humanity today, one of the central places belongs to the Amur Tiger, which has become a symbol of the almost extinct <<primeval>> nature. The appearance and distinctive features of this subspecies indicate the features of its life under extreme conditions at the limit of the species' penetration to the north. This is the only large cat of the genus *Panthera* adapted to survival during the continuous severe snowy winters. It is distinguished by its large size and fluffy fur of a comparatively light colour.

Amur tigers are the component of the biome of coniferous and broad-leaved forests of moderate latitudes of Eastern Asia. This biome is distinctive for its high biological diversity, where flora and fauna combine both southern and northern elements, including many endemic species. Analogous biomes of other regions and continents, which became a cradle for the European type of civilization (Western and Central Europe, East Coast of North America, Japanese Islands), have lost or heavily damaged their groups of large predators. **The Russian Far East and partly adjacent countries have coniferous and broadleaved forest ecosystems represented in their completeness, which is manifested by the existence of tigers, predators at the very top of the trophic pyramid.** This exotic looking cat, which has no competitors in power and size in the world fauna, living in the northern coniferous and broad-leaved forests, is a unique natural phenomenon, a true pearl of the biosphere.

Tiger conservation, as well as that of other rare species, achieved great world-wide importance long ago. However, the general conservation principles are put into practice in different ways according to the particular conditions of different countries. It depends upon the state of the protected objects, natural peculiarities of the territories, character and intensity of anthropogenic impact on ecosystems, legislative regulations, and public ecological movement. Effective species conservation, both at world and regional levels requires a comprehensive theoretical basis. The priorities should be defined and the particular measures arranged in a unified system. Some countries, which maintain their tiger populations, have already elaborated such systems, which are reflected in the relevant documents (e.g. India's <<National Tiger Action Plan>> adopted in 1994). Similar actions are urgent now for Russia.

The aim of this document is to summarise the half-century experience in conservation and study of Amur Tigers in Russia; to define the fundamental principles; and to put forward a comprehensive system of long-term measures for their conservation. The document is viewed as a basis for departmental programs, short-term action plans, and the urgent steps in this field. It expresses the joint position of the large group of Russian experts who have studied tigers in their natural habitats for many years. The Strategy should also make the current state of the problem and the prospects for its solution clear to many people engaged to some extent in the conservation of tigers and other rare plant and animal species native to the south of the Far East. Both the authors' personal data and numerous published data were used in this document. Its form, however, did not accommodate multiple references in the next.

1. RESPONSIBILITY OF RUSSIA FOR TIGER CONSERVATION

In Russia, the Amur tiger is considered one of the most valuable objects of the national natural property. This status was approved lately by the Decree of the Russian Government of 7 August 1995 no. 795 "On conservation of Amur tigers and other rare and endangered wild animal and plant species on the territory of Primorskiy and Khabarovsk regions".

Initially, not more than a third of the territory inhabited by the Amur tiger belonged to Russia. In the course of the population decline and habitat destruction this ratio changed, and **by now the basic habitat of the Amur tiger (80 – 90% of the entire population) is registered to the Russian Far East.** Outside Russia there are few dozens tigers left as a maximum.

Russia has the unconditional priority in establishing the legislative protection of tiger: hunting was absolutely prohibited in 1947, when other countries within the limits of its range did not adopt any analogous protection measures for their tigers. This hunting ban was promoted by K.G. Abramov, the famous Far Eastern tiger researcher. Officially, only the limited catching of tiger cubs was conducted. It sometimes produced considerable negative effects on the population but generally did not threaten population growth. Moreover, due to efficiency of catching methods use in Russia, the zoos of the world have created and maintained the flourishing Amur tiger population, which exceed the natural one (604 animals by the end of 1993), and guarantees preservation of the Amur tiger in captivity.

Activities in the Russian Far East demonstrated the possibility of restoration of a large Amur tiger population amounting to several hundred animals over several decades, based on a few dozens of tigers inhabiting small isolated areas.

Scientific grounds for Amur tiger conservation were based on intensive research by Russian zoologists, starting with the pioneer work of L.G. Kaplanov (1948). He was the first to follow a tiger trail with the aim not to kill the animal, but to study it. Many Russian specialists applied the same tracking and census procedure afterwards. Such data is most fully surprised in the unique book by A.G.Yudakov and I.G.Nikolayev (1987). A new understanding of some features of tigers' mode of life and their population structure, in the snow-less seasons in particular, was revealed by joint radiotelemetry research by Russian and American zoologists which has yet to be completed.

Currently, there is no direct threat of extinction of the Amur tiger, but the species' future is of serious concern. The area of contemporary tiger range is not large and has almost no prospects for increase. The damage caused by poachers is crucial. Prey resources for tigers have been substantially reduced in many regions. Economic impact on tiger habitats increases. The Khabarovsk–Nakhodka highway, which is at present under construction, will cross the whole range of tigers from the north to the south in the immediate future. Radical changes in socio-economic conditions of land use, and increase of commercial assaults on nature have become the source of new threats. Motivation for poaching has increased due to new opportunities for illegal export of tiger bones and hides, which did not exist earlier. This situation is worsened by the overall socio-economic and political crisis in the country, and by the poor control of observance of laws and administrative decrees.

Facing these newly arising and inherited problems, Russia is still carrying on, and will carry on in the future, its responsibility for conservation of the Amur tiger, based on profound traditions and great practical experience in this field.

2. HISTORICAL, BIOGEOGRAPHICAL AND ECOLOGICAL GROUNDS FOR TIGER CONSERVATION

2.1 Range and Number Dynamics: Experience of the Past

2.1.1. Sequence of changes

In the course of the past 100 years, the dynamics of tiger population in the Russian far East had various trends. There were periods of decline, stabilization, growth, and comparatively fast or slow changes. Decline in population numbers was usually accompanied by the shrinkage of inhabited territory and by fragmentation of habitat. The growth of population was accompanied by opposite processes, although there is no direct relationship between these two groups of changes. Since the early 1940s, the population dynamics of the Amur tiger have been monitored by special inventories. They were conducted both in main tiger zapovedniks (reserves) – annually since the early 1970s – and in the whole Primorskiy region or in the entire range of the animals (1958 – 59, 1969 – 70, 1978 – 79, 1984 – 85). High precision in the results could not be achieved during particular censuses (the minimal admissible data were used), but these activities revealed the significant trends in the changes, their scale, and their main stages.

The following periods can be distinguished:

a) **The last decades of the 19th century, when the general tendency towards decline in numbers was clearly visible. The overall population number of the Amur tiger was not yet much smaller than the average annual number, which corresponded to the ecological capacity of the habitats.** The range of the tigress extended up to 50° – 51° N along the left bank of the Amur River and maintained its natural outlines. Tigers inhabited not only the mountain forests, but also the forest meadow habitats of the foothills, valleys of the Ussuri and Amur rivers, and the Prikhankayskaya lowland. The total tiger population within Russia must have exceeded 1,000 individuals.

b) **Between the beginning of the 20th century and the late 1930s: the period of steady and profound decline in numbers, accompanied by fragmentation of the range.** The animals almost deserted the plains (the valleys of the large rivers and the Prikhan-kayskaya lowland), the heavily populated areas along the Khabarovsk – Vladivostok railroad and urban surroundings. This resulted in almost total isolation of the fragments of the range in the Sikhote-Alin and East – Manchurian Mountains. On the west bank of the Amur River, a restricted area inhabited by tigers was left in the Lesser Khingan range. **By the late 1940s, even in the Sikhote–Alin, the sole refuge for the Amur tiger, the animals inhabited only isolated areas, and the overall population did not exceed 30 – 40 individuals. No more than 50 tigers were left in the whole Russian Far East. The prospect of the loss of the Amur tiger as a part of theRussian Fauna became quite real.**

c) **From 1940s to the early 1960s: the critical period, when the long-term decline in numbers stopped. The population groups of tigers remained isolated, but became stabilized and began to increase slowly in numbers.** The "blank spots" in the structure of the range started slowly to fill up, though the focal distribution of the tigress was partly preserved even in the Sikhote–Alin. For example, tigers did not, at that time, permanently inhabit the present territory of the Lazovskiy (formerly Sudzukhinskiy) zapovednik, which later became one of the basic tiger reserves. **However, tiger population in the Far East at least doubled compared to the lowest point of decline.**

d) **From the mid-1960s to the mid-1980s: the tendency of population growth and dispersal of tigers, very rapid in several places in some years, prevailed in most of the range.** According to particular evaluations, the population increased in numbers by 3% on average annually. Some local depressions were observed at the beginning of this period, e.g. in the Sikhote-Alinskiy zapovednik in 1964 – 66. Tigers almost disappeared there then, but reinhabited that territory by the late 1960s. The population tended later to increase in numbers almost everywhere south of the Amur River valley. The unity of the range was almost completely restored in the Sikhote-Alin, and the status of isolated foci inhabited by tigers in the East-Manchurian mountains improved. The only negative factor at the beginning of this period was the final loss of tiger group in the Lesser Khingan; this group had earlier been separated from the main range. **The total population of tigers in the Russian Far East reached at least 250 individuals, which considerably exceeded the minimum of the early 1940s.**

e) **During the period between the mid – 1980s and early – 1990s, population numbers stabilised at a comparatively high level. No major changes were recorded later on.** At the beginning of this period, the animals unusually often visited the farm lands and peoples' dwellings. Tigers appeared then even in the outskirts of Valdivostok, though they were not observed there later. The mortality rate due to various reasons increased. Cases of cannibalism when adults killed their cubs became more frequent. The process of resettlement in long-abandoned sites (the north-east of Primorie, the Khabarovsk Kray, and the Aniuy and Botchi river basins) continued up to the late 1980s.

The anthropogenic impact (poaching in some regions) on tiger population abruptly increased in 1991 – 1992. After that, protective measures became more active and the losses were restored. **The total population number remained relatively stable and reached by the min-1990s a minimum of 400 animals, including youngs. Tigers still inhabit most of the forested territory of the Primorie and comparable habitats in the Khabarovsk Kray.** They are constantly observed now in the Bolshekhekhtzirskiy zapovednik near Khabarovsk, the largest city in the Far East. **Within the Sikhote-Alin, the range remains unbroken; the fundamental traits of its inner organization established earlier are still stable.**

Considering the century-old situation as the initial level, we can assess the current situation as follows: the range of the Amur tiger on the territory of Russia has shrunk by approximately one third. Its peripheral parts

(the west bank of the Amur River including the Lesser Khingan), along with the previously existing wide strip of temporarily visited by tigers to the north-west and north up to Yakutia were lost. Territories in the plains subjected to intensive agricultural development also disappeared from the habitat. The population groups of the Sikhote-Alin and East-Manchurian mountains remain isolated. The latter are less populated and located in small border sites in the south-west of Primorie. They can be significant for tiger conservation only if they are protected by joint efforts by Russia and China on both sides of the state border. At the same time, **the unity of the Sikhote-Alin part of the habitat is still maintained, being the main habitat area for the Amur tiger. All hopes for preservation of this subspecies are connected with this extensive area.**

2.1.2 General Pattern of Population Dynamics and Lessons for the Future

The division of population dynamics into periods, outlined above, reveals the main events in the recent past of the Amur tiger population. The results of an analysis are not only of historic, but also of prognostic significance.

a) **Tendencies in changes in tiger numbers in any period were similar in the whole range or in the major part of it within Russia.** Differences among particular territories, if any, were in the advance or delay of corresponding phases of the same process. The sole exception is fate of completely isolated population groups, such as the Lesser Khingan group. It was dying out simultaneously with the growth of the Sikhote-Alin population. Internal dynamic interrelations were obviously maintained in the Sikhote Alin focus and ensured its integrity, despite the fact that it had also undergone a stage of partial fragmentation.

b) This main habitat had been almost isolated from the nearest Chinese one, located in the East – Manchurian Mountains, and its outposts on Russian territory before tiger population declined to its lowest point. This fact indicates that **the restoration of the Sikhote-Alin population in 1960 – 80s was due to its own reserves, i.e. it occurred on the basis of a few dozen animals. It means that the Sikhote –Alin population once passed through a <<bottle-neck>> with possible losses in genetic diversity.**

c) During the first decades of the 20th century, the range of the Amur tiger shrank from its periphery to the inner areas and from the lowlands and river valleys to the mountain ranges. **The vast territory of the Sikhote-Alin highlands and the difficult access to its innermost areas were important for the preservation of the Amur tiger. The uniform character of the distribution of the population also favoured its survival.** The risk of extinction would have been much higher in the case of a band-type structure, which is vividly illustrated by the fate of the Turan tiger.

d) Available census data indicates no short-term changes in the population number over the whole range of tiger or in its extensive parts. The long-term processes are reduced to two tendencies: rapid decline in the population number in the first half of the present century, and the growth of population in the second half. It is noteworthy that the fast population growth started only in the 1960s, while the situation remained uncertain in 1940s and 1950s. **The population experienced an almost 10-fold increase in numbers in the course of 30-40 years. The period of the most intensive growth lasted for about 15 years (from the mid – 1960s to the late 1970s).** Restoration of the initial structure of the range in the Primorie and in the adjacent part of the Khabarovsk Kray was completed earlier (by the beginning of 1970s). The territory inhabited by tigers there at least doubled compared to the period of its greatest reduction.

These processes developed significantly faster in the smaller parts of the territory. In the Lazovskiy (Sudzukhinskiy) zapovednik, where no tigers were observed after the mid-1930s, about 15 years passed between their first appearance and re-establishment of a settled population group in the mid-1960s. In the Sikhote-Alinskiy zapovednik, less than 10 years passed after the depression of the mid-1960s before tigers finally settled in the protected and adjacent territories.

e) The character of these changes can be used in some way to consider the main factors which influenced the population dynamics during the last 100 years. **No conjunction of the long term dynamics with any natural processes was revealed.** Frequent natural and natural-anthropogenic catastrophes in the south of the Far East (typhoons accompanied by floods, abnormally great amounts of snow, and forest fires) have not yet noticeably influenced tiger population. Anthropogenic factors, undoubtedly, determined the most dramatic events in the fate of the Amur tiger population in the present century.

Which were the most crucial forms of this impact? There are no grounds to consider the destruction of tiger

habitat related to the total human onslaught against nature as the leading factor in the rapid and profound decline in the numbers of tigers in the first decades of the century. Broad-scale industrial forestry activities in the south of the Far East had not yet started. Industrial development of remote regions was only beginning and the road network in the Sikhote-Alin was almost undeveloped. At the same time, the low local population was spread rather evenly through the territory and highly qualified hunters could penetrate even the areas most difficult of access. **The Amur tiger was pushed to the verge of extinction by direct pursuit which was probably aggravated by the undermining of its prey resources in some regions.**

On the other hand, the population growth in the 1960 – 80s occurred against the background of the abrupt intensification of industrial development in the forest and mountain regions (large-scale lumbering, road construction, etc.) and was not held back by this development. In the past, human-induced changes in tiger habitats in the Sikhote-Alin inner areas were evidently below the threshold of hazardous effects of the anthropogenic factor.

The hunting of Amur tigers was officially prohibited in 1947. This act appeared efficient, and, probably, was the principal factor in positive changes. Most of the hunters were engaged in the Great Patriotic War (1941 – 1945), which added to the improvement of situation. The remote harvesting areas were abandoned because of the abrupt decline in numbers of sables. Zapovedniks also promoted the restoration of the population, though their influence was limited.

The protected territory of Sikhote-Alinkiy zapovednik had abruptly shrunk in the 1950s and it practically lost its population by the mid – 1960s. Its present tiger population was formed of newcomers. There were no tigers in the Lazovskiy (Sudzukhinskiy zapovednik, which was restored after it had been closed. The group of animals inhabiting it now was also established by newly-arrived tigers. These facts clearly indicate that the network of tiger reserves needed to ensure necessary protection of animals, should be much more developed than it was formerly and is now. The principal task is to protect this network from destructive administrative interference. It is even more vital now, when the ratio of factors affecting the population has altered. Rapid negative environmental processes are accompanied today by commercial poaching.

2.2. Biological Peculiarities of the Amur Tiger

2.2.1. Features of Biology and Behaviour Reducing the Resistance of the Population to the negative effects

a) **Tigers prey on ungulates. The latter cannot be consistently replaced by other prey of similar or different size in tiger's diet, which is often possible for many carnivore species.** The exceptions are connected with local or limited seasonal situations (preying on bears, badgers etc.). Not, only trophic relations determine tiger's associations with ungulates. In the snowy regions in the north of the range, the successful wintering of tigers, young in particular, depends to a great extent on the availability of boar trails. They make migration of the carnivores easier. For lack of the basic prey species (wild boar, red deer, sika deer and roe deer) in the natural habitats, tigers have to hunt cattle and come closer to farms and settlements, which results in their being killed. Tigers are inclined to attack dogs, and these attacks often prove fatal for tigers.

b) Tigers are very conservative in the use of their home ranges: they move along the same routes, return to their old prey, and are often seen in the same places. It helps in finding them when there is a special search. Tigers prefer to move along trails, leaving and renewing their marks on trees and soil, thus risking being trapped or snared. They readily appear on roads and highways, where they can be shot from a car. The situation is also aggravated by the fact that tigers, especially males, are sometimes careless in their encounters with people. That is why the extension of the road network abruptly increases the risk to tigers.

c) **Young tigers are very vulnerable in the critical period when becoming independent, settling in their own home ranges, and mastering of hunting methods. It is this age group that is subjected to the greatest losses.** Tiger cubs are frequently attacked by brown bears. Some of them become victims of cannibalism, being killed by adult males.

2.2.2. Features of Biology and Behaviour Providing for the Increased Viability and Stability of the Population

a) Amur tigers, being a component of ecosystems of coniferous/broad-leaved and broad-leaved forests of Primorie and Priamurie, do not avoid secondary forests or other partly disrupted habitats. High density of the species' population is maintained, for example, in some localities in the coastal part of the eastern Sikhote Alin slope. Almost no primeval forests are left there and the

forest stands in the river valleys and depressions near the lakes alternate with open meadows. **The wide choice of biotopes is an important condition for preservation of the continuous spatial structure of the population in regions with a patchwork of primeval forests and glades.**

b) Although the tigers' basic prey species are few, the animals show no preferences for a certain type of prey. They can easily switch from one type of prey to another. The local tiger groups in the south of the Far East, for example, live on boars, or on red deer, or on sika deer (in the south-east of Primorie), or on two or three of these species at a time in various periods. **The absence of the distinct prey specialisation increases the tiger's chances for survival, because the deer and boars react differently to the replacement of the primeval forests by young deciduous forests.** Species with which tigers compete permanently or seasonally (wolf, brown bear) cannot suppress tiger population.

c) Amur tigers have a distinctive territorial feature. The basic unit of the spatial structure of a population is the combination of adjoining or close home ranges of 2 – 3 tigresses (with or without cubs) overlapped by the territory of a male. Young tigers, at the onset of their independent life, often stay for a long time near the borders of the home ranges of the adult males. The position of home ranges may not change for many years.

This settled way of life increases the efficiency of local protection measures (establishment of reserves). It must be taken into consideration, that a territory of about 1,000 sq.km. is required for conservation of a single population unit with sufficient food supply. Data from winter tracking and radio-telemetry show that tigresses occupy territories of 300 to 500 sq.km., while the home ranges of the males are much larger. To be of full value, a tiger reserve should include several population units.

Though the basic part of the population is settled, there are always reserves for dispersal of young and wandering animals to vacant territories.

d) The reproductive capacity of tiger population is enough to maintain the relative stability of population, even under moderate anthropogenic pressure. The average litter size, according to various data, ranges from 1.5. to 2.5 cubs. Tigresses reach reproductive age at 2 – 4 and produce progeny once in 2 years or more often. **Under favourable conditions, the reproductive potential ensures a rapid increase in numbers and restoration after declines which happened several times in the past.**

e) **Amur tiger are distinctive in their considerable behavioural ability.** The animals quickly get used to new anthropogenic elements of the environment (road etc.) and to unusual smells and sounds. Without persistent pursuit, they can live in close proximity to humans.

The high adaptive capacity of Amur tigers compensates for those biological and behavioural characteristics which increase the vulnerability of the animals to various <<factors of risk>>. There are no natural reasons for the inevitable <<programmed>> extinction of tiger unless it is brought about by human negligence or criminal activities. All above-mentioned factors considered, the responsibility of mankind for the preservation of this magnificent animal is even higher.

2.3 Problems of Proximity of Tigers and Humans

2.3.1. Direct and Indirect Human Impact on tiger Population

According to an analysis of tiger numbers in the past and the current situation, **the following hierarchy of negative anthropogenic factors affecting tiger population can be put forward: direct pursuit (poaching) which is often well organized; decline in numbers of ungulates which reduces the food resources; and lumbering and road construction, which destroy tiger habitats.** Even though the latter factors must be fairly broad-scale to threaten tiger population, they have already reached their critical level in some parts of the range and are moving towards it in the much larger parts.

The limiting role of the decline in numbers of ungulates is more pronounced. **The successful existence of tigers is ensured by 400 to 500, but no fewer than 300 ungulates (total of red deer, sika deer, roe deer and boars) per adult tiger. In some regions, however, there is a notable imbalance in the numbers of carnivores and their potential prey. The actual indices are often considerably lower, which indicates the urgency of special measures aimed at increasing ungulate numbers.** The tactics of utilisation of the ungulate populations should take into consideration the presence of tigers in the area, especially taking into account mostly or only sport hunting observed in the

region with the exception for subsistence harvest by indigenous people.

Poaching is a matter of particular concern. Only direct losses to poaching (several dozen tigers annually) are close to the growth of the population and even exceed it in some regions.

2.3.2. Tigers as Neighbours of Humans Who Live and Work in the Forests: Peaceful Coexistence is Real

Tigers can significantly damage cattle and other domestic animals; they may even be dangerous to humans in particular circumstances. Unlike Indian tigers, no truly specialised man-eaters have been recorded among Amur tigers. This is partly determined by genetically fixed differences of these subspecies in defensive and predatory behaviour, but mostly by the different character of interactions between carnivores and humans, by different frequency of their contacts, different armament of the local people, etc. However, non-provoked attacks by tigers on people have been recorded in the Russian Far East, though such cases are extremely rare. Along with them, many cases of peaceful coexistence of tigers and humans are known. Wandering tigers have stayed near forest settlements for a long time and visited them regularly, but never attacked people. **Comparison of the frequency of human encounters with tigers (or tiger encounters with people, since the latter are often unaware of an animal in the close vicinity) and the statistic of tigers' aggressiveness shows that the probability of a fatal end of such encounters can be estimated as parts per thousand and even per ten thousand.**

A stable <<peaceful coexistence>> with tigers can be ensured by a number of preventive rather than post factum measures.

3. STRATEGIC PRIORITIES AND MEASURES FOR AMUR TIGER CONSERVATION

3.1 Legislative Grounds, Management and Financing

The only large natural population of Amur tigers in the world, the Sikhote-Alin population, is preserved in Russia. Being considered as one of natural protected objects of world-wide importance, it is also the valuable national property of Russia. The Amur tiger has always occupied an unfortunate place of honour among the rare and endangered mammals listed in the IUCN Red Data Book and Red Data Books of the Soviet Union and Russia.

Insurance of the welfare of the Amur tiger population in the Primorie and Priamurie, and its future survival is the task of the entire state rather than of local agencies and particular departments. The government bodies of both the Primorskiy and Khabarovsk Krays and the Russian Federation share the responsibility for its fulfillment. The relevant legal rules are defined in the federal laws of the Russian Federation (<<On the fauna>> and <<On the especially protected territories>>) and by the International Agreements signed by Russia (<<Convention on the Conservation of Biological Diversity>> and <<Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)>>).

The following activities are fundamental for Amur tiger Conservation:

- the Federal Program (Specified in the Decree no. 795 of the Government of the Russian Federation of 7 August 1995) for the conservation of the Amur tiger and other rare and endangered species of wild fauna and flora in the territories of the Primorskiy and Khabarovsk Krays must be adopted and gradually put into practice;
- more detailed plans of regional (Kray) activities specifying the items of the Federal Program must be elaborated;
- the responsibilities of the Kray and Federal government bodies of the Russian Federation in the management of natural resources must be clearly defined; the land in the regions inhabited by tigers must remain Federal property;
- activities of all interested departments, institutions, and social organizations (state authorised agencies engaged in protection of the environment and fauna, legal agencies, departments responsible for the utilisation of the natural resources in the regions inhabited by tiger, nature protection societies, scientific research institutions, expert councils, and working groups) must be coordinated at Federal and regional levels by the special joint Councils;
- sufficient funds must be provided for the fulfillment of planned tasks, both from non-budget sources and the state budget, with priority for the latter;
- the finances provided by both the Russian non-budget and foreign sources must be accumulated in a united <<Amur Tiger Fund>> managed by the council of experts responsible for the various trends in tiger conservation.

3.2. Role of International Cooperation

The Russian Federation is particularly responsible now for the conservation of the Amur tiger in it natural environment. However, the future of this species depends also upon the situation in the adjacent countries (Chinese People's Republic and Korean Democratic Peoples Republic). Russian tigers cross the state borders and add to the stock of the small Chinese groups and those in the northern regions of Korea. **Joint efforts by the neighbouring states are necessary to evaluate the rate of degradation and prospects for part restoration of the natural range of tiger and to estimate the total number that can be maintained in the wild.**

The following trends are the most reasonable for the development of international

Cupertino in this field both within and outside the region:

- *Interaction with international organizations and national nature protective agencies of various countries in order to exchange experience in the conservation of tigers and all large predators, coordination of legislative provisions, strategies and action plans in this field and unification of census techniques and methods of population monitoring;*
- *to initiate the elaboration of bilateral and multilateral agreements for coordinated activities of Russia, China, South Korea, and North Korea for conservation of the Amur tiger and other rare animal, including the development of unified approaches to the methods of use of nature in their habitat areas;*
- *to design international border zapovedniks for conservation of the Amur tiger and the Far Eastern Leopard, giving priority to the Borisovskoye (Shufanskoye) Plateau;*
- *to evaluate the possible prospects for reintroduction of tigers into the areas formerly inhabited by them but deserted after their destruction;*
- *to coordinate activities aimed at stopping illegal export and trade in the products of poaching of tigers and other rare animal species;*
- *to coordinate scientific research programs and direct Cooperation among experts from different countries in studies of the Amur tiger.*

3.3. The Future of the Amur tiger in the Context of Regional Ecological Policy - Ecosystem Basis for its Conservation

The welfare of the tiger population symbolises the general ecological well being of the southern region of the Russian Far East, because a single species, especially the one at the top of the trophic pyramid, cannot be saved without maintaining the normal productive characteristics and balance of ecosystems as a whole. This particular case concerns the ecosystems of the dark coniferous taiga of the Far East. They are distinctive in their unique biological diversity and represent a focus of the residual populations of many rare plant and animal species. **By preserving these forests, together with all their inhabitants, we also conserve the Amur tiger. Measures for protection of the tiger therefore form a natural complex with similar activities aimed at the conservation of other species.** In the south-west of the Primorie, for example, protective measures for Amur tigers are closely associated with those for Far Eastern leopards.

Long-term conservation of the rare species of large animals can be ensured only by strictly conforming to ecological priorities in the economic development of the region (stipulated by the „Ecological Program of the Primorskiy Kray", 1992) and by consecutive implementation of the tactics of sustainable use of nature. **Any plans to rescue the tiger will be unsuccessful unless comprehensive regional ecological programs and relevant projects of economic development are implemented.** Economic chaos, loss of efficient control to ensure observance of environment legislation, and ecological policy based only on declarations of goodwill, increase the probability of the worst scenarios for the fate of the Amur tiger.

The following measures will prevent the rapid deterioration of the habitats of the rare animals and new threats for their conservation:

- *expert and control functions of the Kray Nature Protection Committees, especially in the development of long-term projects for utilisation of natural resources, must be extended; temporary groups of independent experts must be formed in the Committees from the leading specialists in the relevant problems, the members of the International Group for Tiger Rescue among them;*
- *comprehensive examination of nature use in the Primorskiy and Khabarovsk Krays must be performed and the long-term tendencies of economics exploitation assessed from the point of view of their impact on populations of tigers and other rare animal and plant species;*
- *thresholds of the destruction of ecosystems and alteration of the habitats of the rare species, the Amur tiger among them, must be determined (above which deterioration of*

populations may become irreversible); utilization of natural resources must be regulated according to these thresholds.

3.4. Maintenance of the Self-regulating Population in the United Range - Differentiation of the Protective Measures According to the Different Parts of the Range

Amur tigers readily occupy very different habitats, those considerably affected by humans among them. **Despite the intensive economic exploitation of the Sikhote-Alin, tigers inhabit (or regularly visit) almost the whole region except for the extensive agricultural areas and dense dark coniferous taiga. Unlike many rare species driven into the local "rescue islets", the population of the Amur tiger can be conserved in a fairly extensive united range. Interactions of local population groups are maintained by the unity of the range.**

It is this unity that ensures the ability for self-regulation of the entire Sikhote Alin population of the Amur tiger, which occupies a vast territory. The traditional trends in the economic development of the Primorie and Priamurie, and the character of the differences in economic impact on ecosystems within the region, imply a favourable forecast for dozens of years in the future. Moreover, if the utilisation of natural resources does not become more intensive, the population of the Amur tiger in Russia may reach 500 to 600 adult individuals in number with 300 – 350 breeding females in it. This is the desirable number of the population to ensure its high viability and minimal risk of loss of genetic diversity in the near and distant future.

Direct human influence on such a self-regulating population must be reduced to the removal of animals with individual behavioural deviations acknowledged as especially dangerous by the experts, and those settling on economically-developed lands where they are able to live only on livestock. Human regulatory interference is, therefore, to deal only with <<problem>> individuals.

Although the principles of tiger conservation are the same for the entire range, tactics must inevitably be modified in the various parts. A territorially differentiated approach implies the following activities:

- Control for the unity of the range with particular attention to regions of expected gaps and isolation of "tiger foci", which have not occurred at all in the past;
- Special zoning of Primorskiy Kray and the southern part of Khabarovsk Kray. At least three land categories must be distinguished within the Krays. The first category is the territories included in the "nucleus" of population with the highest protective status. The second one is the densely populated territories, which lack the necessary conditions for permanent tiger presence (farming lands, surroundings of large towns, recreation sites, etc.). The third category is intermediate and includes the territories occupying most of the range and requiring the most flexible tactics in using nature.

3.5 Development of Network of Tiger Reserves

The nucleus of the tiger range is comprised of the specially protected territories of different status (zapovedniks with their buffer zones, nature refuges and national parks) and adjacent territories with limited use of nature (ecological-ethnic and other). **The chain of reserves connected by "ecological corridors" should extend from the north to the south along the Sikhote-Alin mountain range. After the chain is completed, it will form a united system of associated interdependent links, which will be a sanctuary for more than one-third of the total tiger stock** (if population numbers and the structure of the range remain as they are). The threat of transformation of the zapovedniks into "ecological islands" will be prevented. All zapovedniks, from the Lazovskiy and Ussuriyskiy to the Sikhote-Alinskiy and Botchinskiy will be the basic links of the chain.

It is necessary to undertake the following measures to create the safe nucleus of the range:

- to enlarge the territory of the Lazovskiy zapovednik to 310,000 ha (including the areas on the right bank of the Chernaya River, the basins of the Krivaya River and the left tributaries of the Partizanskaya River, and the costal areas from the Kievka Bay to the Nakhodka Bay). To expand the territory of the Sikhote-Alinskiy Zapovednik up to 450,000 ha.
- to allocate extensive buffer zones along the borders of zapovedniks, provide them with sufficient protection and ban the harvesting of ungulates in them.
- to complete the establishment of the Verkhne-Ussuriyskiy and Kema-Amgu National Parks.
- to establish a system of "ecological corridors" (nature refuges and territories of limited use of nature, those

included in the biosphere territory of the Sikhote-Alinskiy zapovednik among them) between the basic tiger reserves. The regime of the corridors would eliminate the undermining of tigers' prey stock and pronounced destructive effects on their habitats (extensive road network and clear-felling).

3.6 Prey Stock of Tigers-modes of Hunting and Forest Exploitation, Preventing its Depletion

Regardless of the development of the system of specially protected territories and territories of limited nature use (<<tiger stronghold>>), **the basic part of tiger range will remain within the territories involved in more or less intensive economic exploitation. The vital factor for tiger's survival there is the supply with food, i.e. the maintenance of sufficient ungulate numbers.** The latter depends firstly on proper management of hunting and forestry and economic interests of the hunters, both for rational, sustainable utilization of the ungulate stock and for conservation of tigers. The impact of forest exploitation on tiger habitats is contradictory. It causes a decline in numbers of boars, but results at the same time in an increase in numbers of red deer, sika deer and roe deer. The total population density of these species can be 1.5-2-fold higher than that existing, and can be maintained at the level of 10 to 15 individuals per 10 sq.km in many regions of the Russian Far East.

The following measures for hunting and forest exploitation are aimed at conservation of tiger:

- close coordination of the forestry and game industries. The interests of the latter must be taken into account when the volumes and methods of timber cutting are determined. The negative impact of forest exploitation on the numbers of game animals must be minimal. The ban on cutting Korean pine must be strictly observed;
- special control over the territories covered with deciduous forests, which are valuable foraging areas of red deer, sika deer and roe deer;
- partial closing (by barriers or other means) of the haulage roads which are not being used, because they facilitate deep penetration into the forests by poachers;
- insertion of regulations determining the responsibility of land users for conservation of tigers and other documents concerning land use. Fines and other sanctions, up to cancellation of the lease, should be established for failure to observe such obligations. Land users should get bonuses and be partly or completely relieved of the rent for their efforts to conserve tigers;
- establishment of the most flexible system of regulation of the ungulate harvest, with detailed territorial differentiation. It should provide for the obligatory isolation of the large reproductive areas and urgent banning of hunting in areas with an abrupt decline in ungulate numbers for the period necessary for the restoration of the populations. The regulations for removal and the terms of hunting should be more strictly defined;
- strengthening of control over the issue and use of licenses for shooting ungulates. Local people, except for those prosecuted for violation of hunting terms and regulations, should be the first to be provided with the licenses. Privileges should be provided for hunters actively engaged in nature conservation;
- maximum suppression of wolf numbers in the regions inhabited by both wolves and tigers, because the former is the food competitor of the latter. In the north of the Primorskiy and Khabarovsk Krays heavier hunting pressure on the brown bears, potential enemies of young tigers, is required;
- enforcement of the existing ban on the use of leg traps, which often cause injuries to tiger's paws.

3.7 Prevention of Conflicts between Tigers and Humans

Tigers are not considered bloodthirsty beasts any more. **We must not exaggerate the danger tigers pose to cattle and, moreover, to humans. However, this danger should not be neglected and the interests of people living within tiger range should be taken into account.** The prevention of conflicts is more important than urgent action to deal with the consequences.

The future growth of the human population, stimulated by the intensive utilization of nature resources, is inevitable in the Primorie and Priamurie. The following measures should be undertaken to achieve a stable compromise between the progressive development of the region and the existence of a large natural population of tigers:

- elaboration and wide publicity of rules of human behaviour in the regions inhabited by tigers. People should not provoke critical situations (attempt <contact>> with animals, feed them, approach cubs and fresh prey, etc.);
- prohibition of collecting the remains of tiger victims, especially in zapovedniks, where such activities should be regarded as the violation of the regime;
- adoption of special regulations for cattle breeding

in the regions permanently inhabited by tigers. Farms should be fenced and free grazing in forest areas prohibited;

- financial compensation for losses of livestock to tigers, if the above-mentioned regulations have not been not violated;
- control over the fences in reindeer breeding farms to prevent the penetration of tigers and leopards into the enclosures;
- control the use of hounds. The presence of dogs provokes encounters with tigers and attracts the latter to houses and shelters;
- development of scare methods; testing of new methods and introduction into wide practice of old ones which appeared to be successful in scaring tigers and preventing their visits to roads, farms and settlements;
- supplying local people with the available individual safety devices (aerosol repellents, pyrotechnic devices, etc.);
- regulated trapping of wandering tigers, who have left their home ranges and settled in the vicinity of towns and settlements, on farmlands, and in recreation areas. Cubs which have lost their parents should also be trapped and placed in zoos, nurseries and reintroduced, if possible. The appropriate actions should be unified and approved by the international organizations coordinating the activities of the zoos and nurseries of rare animals and controlling the international trade in endangered species of wild flora and fauna (CITES Secretariat) [1];
- urgent removal of tigers representing a real danger to humans regardless of their location within the range. Strict regulation for such removals should be elaborated. They should control the decisions by the relevant Kray agencies on the basis of expert assessments, control over the removal by the relevant patrol groups for tiger conservation formed by the Kray Nature Protection Committees. The hides, skulls, and complete carcasses of the harvested animals are of great scientific value. They must be placed in the largest regional and Russian storage of zoological collections (in Vladivostok, Moscow, and St. Petersburg).

3.8 Prevention of Poaching

The fight against poaching, particularly that of an organized character, remains the main task in tiger conservation. **The first priority is the development of a centralized system of the patrol groups monitoring the regions of particular concern. The second is to the provision of all possible support for local rangers, game and nature protection inspectors. The resident network of game inspectors should be strengthened.**

It is necessary to undertake the following measures to improve the efficiency of the relevant agencies and services:

- to ensure social guarantees for the employees of the special agencies for protection of the environment and natural resources; their status should correspond to that of police officers;
- to allow the employees of the special agencies for protection of the environment and natural resources to have and use firearms when on duty;
- to increase the number of patrol groups to 10 (8 in Primorskiy Kray and 2 in Khabarovsk Kray). The groups should be equipped with all-terrain vehicles, modern communication equipment, and other reliable devices;
- to maintain fines for illegal harvest of specially protected natural objects at levels several times higher than the selling cost of poached products;
- to ensure the prosecution for all investigated crimes concerning the Amur tiger and other rare animal and plant species; to initiate applications to the Prosecuting bodies of the Primorskiy and Khabarovsk Krays in order to promote strict control over the investigation of such cases and their timely conveyance to the court.

3.9 Suppression of Sales of Poached Products

The removal of commercial motivation from poaching by means of reliable barriers to sale of illegal products is of principal importance for tiger conservation today.

[1]Certain steps in this direction have been already stipulated by the plan of activities on the Amur tiger adopted by the EEP Meeting in Moscow on 2-3 November 1995.

The following measures should be undertaken:

- establishment of coordination Centres working in close contact with the administrations of the Primorskiy and Khabarovsk Krays. The Centres should bring together representatives of the legislative bodies and other interested departments,

tiger experts and public representatives. The activities of the Centres should be aimed at effective discovery and control over methods of transportation and places of storage of illegal products, the registration of changes in this sphere, and prompt reaction to them;

- insurance of coordinated activities aimed at stopping the purchase, sale, and export of tiger bones and pelts and other wildlife products falling within the realms of the Convention on International Trade of Endangered Species of Flora and Fauna (CITES) signed on 3 March 1973. The joint activities of the relevant departments of the Ministry for the Protection of Environment and Natural Resources, Department of Game Resources of the Ministry of Agriculture, Ministry of Domestic Affairs, Ministry of Communications, State Customs Committee, and Federal Security Service of the Russian Federation should be coordinated at both regional and Federal levels;
- Cooperation with the customs services of the adjacent states in order to stop attempts to export illegally harvested tigers and other rare animal and plant species native to the south of the Russian Far East.

3.10 Coordination of Measures Aimed at Conservation of Tigers (Wild and captive)

The number of Amur tigers presently kept in zoos and nurseries considerably exceeds their number in the wild. Zoo specialists have accumulated great experience in captive breeding of tigers, veterinary and genetic control over the population, and keeping of breeding records. These activities are conducted on the basis of wide international Cooperation and coordinated by particular plans. **The efforts of conservationists and breeders must be combined in all possible spheres.** The following items of their joint work are particularly important:

- to determine the possibility and approximate volume of regular enrichment of zoo tiger stocks by animals trapped in the wild (<<problem>> adults and cubs without parents; see III.7);
- to conduct experiments to evaluate the prospects for possible reintroduction of trapped tigers and their temporary keeping in nurseries;
- to apply the results of population genetic control over the captive tiger stock to the assessment of the viability of the natural populations.

3.11 Monitoring of Population and Scientific Research

Tendencies threatening the future of any rare animal species should be promptly revealed if it is to be successfully conserved. **Constant monitoring of the natural population of the Amur tiger and regular scientific studies (recording the dynamics of its numbers, changes in the age and sex structure, and new biological and behavioural traits) are necessary.** The threat of decline in the genetic diversity in the natural tiger population groups must be constantly considered.

The following components should comprise the scientific support for tiger conservation:

- annual census of the animals in zapovedniks and other areas of permanent observation. No fewer than 10 counts should be performed over the entire range;
- annual registration of tiger litters throughout the entire range (with the help of numerous correspondents);
- census of tigers throughout the inhabited territory of Primorie and Priamurie once every 5 years or even more often (at any time of unforeseen urgent situations); reappraisal of the state of the specific range and its inner structure;
- Analysis of the changes in tiger habitats by distant observation (aerial and space photography);
- studies of tiger ecology and behaviour should succeed the long term observations in particular areas (e.g. zapovedniks) and comparative studies should be carried out in the territories of different anthropogenic impact;
- combining of traditional effective methods (winter tracking) and comparatively new procedures (radio telemetry and identification of the individuals by odor) for studying tigers' mode of life. Radio-telemetry is still unsafe for the animals, which sometimes get injured when trapped and immobilized. That is why the application of this procedure is restricted to no more than 10% of the regional stock (simultaneous marking with radio collars) in no more than 3 localities outside zapovedniks. These procedures should be performed only by experienced specialists.
- regular publication of express information about the status of tiger population and efficiency of conservation measures;
- preparation of fundamental scientific proceedings on the results of the long term study period.

3.12 Popularisation of Tiger Conservation Measures

Successful conservation of tigers is impossible without active public support of the relevant measures. The support of local people is particularly important. **People should realize that the Far Eastern <<Great Forest>> is worth preserving, not only because of its natural resources, but also because of its aesthetic and educational value. The Amur tiger, a magnificent inhabitant of this <<Great Forest>>, personifies the image of vanishing primeval nature.** The opportunity to see and sense the environment, where powerful carnivores have been preserved till the present, to dip into the <<tiger world>>, to observe tigers' tracks and, if lucky enough, the animals themselves is very attractive to many amateur naturalists. **Realisation of this opportunity may represent a particular form of the rational use of tiger population by humans**. The following measures should be undertaken in the ecological education sphere:

- To develop educational tourism and establish tourist routes within the territories of the national parks, buffer zones of zapovedniks, and ecological-ethnic areas inhabited by tigers;
- to consider the possibility of allocating special sites for the observation of tigers in natural conditions. These sites should be appropriately equipped with towers, shelters, baiting points, etc. Photography should be specially regulated;
- to elaborate the project of a Tiger Park with extensive enclosures for the animals in forest areas closely corresponding to natural tiger habitats. It could be not only the basis for public educational tourism, but also the center for experimental research;
- to add comprehensive ecological courses to the educational programs of secondary and high schools of the Primorskiy and Khabarovsk Krays. The goals and methods of conservation of tigers and other rare plant and animal species native to the south of the Russian Far East and the unique nature of the region as a whole should be explained in such courses;
- to advertise and explain the conservation measures in newspapers, on radio and TV; to issue relevant brochures, booklets, leaflets, postcards, stamps and badges;
- to put expressive posters along the roads of the Primorie and Priamurie. The roadside posters should be designed according to modern requirements and briefly and vividly explain the goals of tiger conservation and the rules of human behaviour in encounters with tigers, on the roads in particular.

N.B. The present document defines the principal trends in tiger conservation in the Russian Far East. The changing situation will inevitably require additional corrected and detailed measures. That is why the plans of activities in this sphere should be revised and renewed every three years.

A <<strategy for Conservation of the Amur Tiger in Russia>> was discussed and adopted at a meeting of a working group responsible for its preparation in Moscow on 26-28 September 1995. Representatives of the State Committee for the Protection of the environment and Natural Resources), the Administration of the Primorskiiy and Khabarovsk Krays, WWF Russian Office, IUCN Cat Specialist Group, and Hornocker Wildlife Research Institute (USA) tok part in the meeting.

CHAPTER 11

TIGER ACTION PLAN

THAILAND 2004

Prepared by

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This plan honors the memory of the late Mr. Mark Graham for his efforts in developing this plan and raising money for tigerconservation in Thailand.

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Finally, the DNPWPC also acknowledges the NGOs, government organizations and Thai citizens that have worked to help conserve tigers in Thailand.

FOREWORD

The tiger (*Panthera tigris*) is one of the world's most significant animals. Classified as endangered on the IUCN Red List of Threatened species, tiger faces widespread extinction in the near future if poaching, habitat loss, and prey depletion continue. Approximately 33% of total land area of Thailand is forested and nearly all of these forested lands are under formal protection. Currently, 15 tiger populations exist in protected area complexes composed of national parks, wildlife sanctuaries and non-hunting areas.

To conserve tigers in Thailand, the Department of National Park, Wildlife, and Plant Conservation (DNPWPC) under the Ministry of Natural Resources and Environment (MONRE) was carried out in consultation with other government agencies, academics, and NGOs. Its goal is to encourage and to guide the actions of the citizens of Thailand and the international community at a critical time for tiger conservation. This document consists of two parts. The first is a review of the ecology and conservation status of tigers in Thailand and a discussion of the conservation challenges that tigers face. The second part is a detailed description of the goals of the plan and recommended actions for achieving those goals.

The MONRE would like to thank the Hongkong and Shanghai Bank and the SeubNakhasathien Foundation for funding. Special thanks to Dr. James L.D. Smith and Mr. Peter Cutter from the University of Minnesota, Mr. Peter Jackson from IUCN and the late conservationist, Mr. Mark Graham for help in formulating this plan. Finally, the MONRE also acknowledges the NGOs, government organizations and Thai citizens that have worked to help conserve tigers in Thailand. Their involvement and commitment to conserve tiger in Thailand is deeply appreciated.

(Suwit Khunkitti)

Minister of Natural Resources and Environment

EXECUTIVE SUMMARY

Classified as endangered by the IUCN Red List of Threatened Species tiger is facing widespread extinction in the near future if poaching, habitat loss, and prey depletion continue. Across its range, a significant number of local populations have gone extinct in the last 25 years and many others are on the verge of extinction. Although tigers in Thailand face similar threats to those in other range countries, tigers still occur throughout the country. What is thought to be the world's second largest population extends along the Tenasserim mountain range straddling the border of Thailand and Myanmar. Additionally, there are as many as 14 other tiger populations in Thailand, each extending over several protected areas.

The Department of National Park, Wildlife, and Plant Conservation has formulated this National TigerAction Plan in consultation with other government agencies, academics, and NGOs. It consists of two parts. The first is a review of the ecology and conservation status of tigers in Thailand and a discussion of the conservation challenges that tigers face. The second part is a detailed description of the goals of the plan and recommended actions for achieving those goals.

Actions are divided into the following four topics: 1) direct conservation action and enforcement, 2) capacity building, 3) information acquisition, management, and analysis, and 4) education and public participation. The plan builds on current efforts in each of these areas so key achievements to date are summarized to provide context.

The success of this plan rests on the effective implementation of the recommended actions as well as periodic review of its goals and actions as circumstances change and new information becomes available.

Abbreviations used in the text:

CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DANIDA	Danish Agency for Development Assistance
DNPWPC	Department of National Park, Wildlife, and Plant Conservation
IUCN	World Conservation Union
MONRE	Ministry of Natural Resources and Environment
NGOS	Non-Government Organizations
TCU	TigerConservation Unit
WWF	World Wide Fund for Nature
WCS	Wildlife Conservation Society
WEFCOM	Western Forest Complex Ecosystem Management Project

SECTION I

BACKGROUND

1. INTRODUCTION

Tiger (*Panthera tigris*) is one of the world's most magnificent animals. Classified as endangered on the IUCN Red List of Threatened species (IUCN 1996 amended by Cat Specialist Group 2001), tiger faces widespread extinction in the near future if poaching, habitat loss, and prey depletion continue. In the last 25 years, a significant number of local populations have gone extinct across its range and many others are on the verge of extinction.

Although tigers in Thailand face similar threats to those in other range countries, they still occur throughout the country. Many Thai people respond with disbelief when they hear that there are still tigers in Thailand and it is difficult to mount a conservation program for a species that people have given up as lost. Given this situation, the most important message of this Action Plan is that tigers do occur in Thailand. Furthermore, what is thought to be the world's second largest population resides along the Tenasserim Range between Thailand and Myanmar (Smith and Cutter 2003). This population most likely extends from Thailand's Western Forest Complex in the north through Myanmar to south of Thailand's Kaeng Krachan National Park. There are potentially 14 other tiger populations in Thailand, most extending over several protected areas. Despite this good news, both the range and number of tigers are declining in Thailand due to relentless human pressures such as illegal hunting and land encroachment within protected areas. Based on a recent visual interpretation of Thematic Mapper (TM) satellite data, 33% of Thailand is forested (Royal Forest Department 2002) and nearly all of these forested lands are under formal protection (i.e. part of a national park, wildlife sanctuary or non-hunting area). With over 18% of its land area under protection (Prayurasiddhi et al. 1999), Thailand exceeds both world and Asian averages (World Resources Institute 2003). National parks and wildlife sanctuaries have been grouped into 19 forest complexes; 17 are composed of forest habitat and 2 are marine and coastal habitats (ICEM 2003 and Prayurasiddhi et al. 1999)

The publication of this plan is an important conservation initiative of the Department of National Parks, Wildlife, and Plant Conservation (DNPWPC); its formulation was carried out in consultation with other government agencies, academics, and NGOs. The purpose of the plan is to encourage and to guide the actions of the citizens of Thailand and the international community at a critical time for tiger conservation. Thailand has a pivotal role in global tiger conservation because it is at the geographic center of tiger's distribution; subspecies in Russia, India, Malaysia and Indonesia radiated from this region. The tiger is also a fitting symbol for broader conservation efforts to stimulate national pride in conserving Thailand's unique biological heritage.

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33% of Thailand is forested and nearly all of these forested lands are a national park, wildlife sanctuary or non-hunting area

This document consists of two parts. The first is a review of the ecology and conservation status of tigers in Thailand and a discussion of the conservation challenges that tigers face. The second part is a detailed description of the goals of the plan and recommended actions for achieving those goals. Actions are divided into the following four topics:

1) Direct conservation action and enforcement, 2) capacity building, 3) information acquisition, management, and analysis, and 4) education and public participation. The plan builds on previous and current efforts in each of these areas so key achievements to date are summarized to provide context.

To be successful, this plan will need significant commitment from a wide range of stakeholders, political resolve from the Thai government and a renewed interest among Thai citizens.

2. WHY IS IT IMPORTANT TO SAVE THE TIGER?

- As the top predator in Asia, tigers require extensive habitat and thus serve as an umbrella for the conservation of many other species and the last remaining large forested landscapes
- Tigers, as the largest carnivores, have an important functional role in Thailand's forest ecosystems
- Enhancing and saving the natural ecosystems required by tigers provides many benefits to humans:
  - o Extensive forest cover provides reliable rainfall
  - o Watershed conservation ensures water for agriculture and drinking;
  - o Tropical forests reduce greenhouse gasses
- The wild lands that protect the tiger provide opportunities for aesthetic, social and recreational renewal for an increasing urban human population;
- For millennia, the tiger has played a significant role in cultural and spiritual aspects of nearly every Asian society. Today, people throughout the world are inspired by tiger's grace, beauty and power.

3. WHY IS IT DIFFICULT TO SAVE TIGERS?

The tiger is endangered because of its competition with humans, who:

- Convert the wild lands that tigers need to agriculture, urban areas, reservoirs and roads
- Take its prey for food
- Kill tigers for trophies and medicines.

4. STAKEHOLDERS

To be successful, tiger conservation in Thailand must be a national effort, involving government agencies, non-governmental organizations (NGOs), the private sector, the academic community, and the citizens of Thailand. This plan outlines the responsibilities of:

The Ministry of Natural Resources and Environment **is responsible for environmental and biodiversity policy and planning. The Department of National Park, Wildlife and Plant Conservation (DNPWPC) is the lead implementing agency for tiger conservation. Its responsibilities include: management activities within the forests and protected area system in Thailand; implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); control of illegal wildlife trade within the country; and educational outreach to the citizens, business leaders and government organizations of Thailand. The DNPWPC receives its mandate from the Wildlife Protection and Preservation Act B.E. 2535**

and the National Park Act B.E. 1961. Under the Ministry, the Department of Environmental Promotion and the Royal Forest Department also have important roles in protecting biodiversity and educating the public about conservation.

The Ministry of Agriculture and Cooperative's **policies on livestock husbandry adjacent to protected areas have a direct impact on the tiger and prey populations. Promotion of irrigation and burning of agricultural residue influences watersheds and forests within protected areas.**

The Ministry of Interior **supervises provincial governors and district and sub-district officials. These senior government officials have a strong impact on conservation through their influence on road building and the types of tourism development near protected areas.**

The Ministry of Tourism and Sports**, through wise promotion of ecotourism in cooperation with local villagers and DNPWP, can provide economic incentives for village communities that currently hunt within protected areas.**

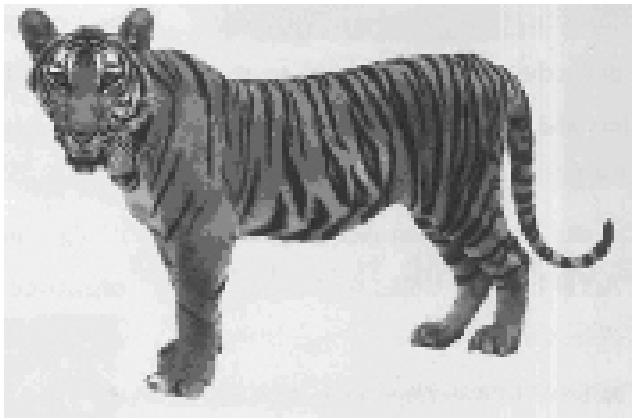
The Ministry of Education **has an important role to ensure that basic concepts of tiger's ecological and cultural significance become part of Thailand's standard curriculum at several educational levels and also to support research that contributes to our understanding of tiger ecology and conservation**

NGOs**, local community leaders and village groups organized to address issues related to natural resources and the environment have an important contribution to make to the conservation of the tiger in Thailand. They represent the public will. NGOs raise funds for conservation projects, develop educational programs and publicize the plight of tiger, support the government's efforts, fund ranger training and research, and act as watchdogs. Citizen support and participation in decision making is still modest and needs to be expanded.**

5. THE NATURAL HISTORY OF THE TIGER

The tiger is the world's largest cat species with wild populations occurring from the Far East of Russia to the rainforests of Indonesia. Tigers are largely solitary and territorial: they represent the top of the food chain in all areas where they occur.

Although wild tigers have historically been grouped into subspecies, (Thailand's tigers are typically classified as *Panthera tigris corbetti* current genetic, taxonomic and distributional data argue for a stronger emphasis on populations and metapopulations. Across the tiger's range are approximately 200 tiger populations. If they become completely isolated from each other, each one is on its own trajectory. Efforts to maintain metapopulations of inter-conected populations, on the other hand, provides the potential for populations, especially larger ones, to rescue other populations.



Tigers are largely solitary and territorial; they represent the top of the food chain in all areas where they occur

Data from recent field studies of wild caught animals suggest there is variation in body size. For example, the largest male tigers in Nepal weigh in excess of 250 kg and measure over 3.20 m long (Smith 1984); tigers in Thailand are probably much less massive. According to the eminent Thai naturalist, Dr. Boonsong Lekagul, the largest tiger ever accurately measured in Thailand was 2.82 m between pegs (from nose to tail in a straight line). Its weight was not recorded.

Unlike in South Asia, where frequent encounters between humans and tigers have resulted in many instances of man-eating, Thailand has few records of man-eaters. Isolated cases have occurred in the past, with the most recent record in Khao Yai National park

in 1976. After it was shot, the tiger was found to be old, with damaged teeth and other debilitating wounds rendering it incapable of killing its normal prey. Tigers in Thailand usually avoid human contact and livestock depredation is rare because domestic animals are less dependent on forest grazing than in South Asia. If tigers are present in an area, they leave overt evidence: scrapes, scats and pugmarks (tracks) on trails, stream beds, and ridge tops, and claw marks on trees. Tigers spray urine on trees and shrubs or scrape and deposit urine on the ground to delineate their territories. These scent marks leave an unmistakable odor that may last for several days. When fresh, it is detectable by humans up to 5 m away (Smith et al. 1989).

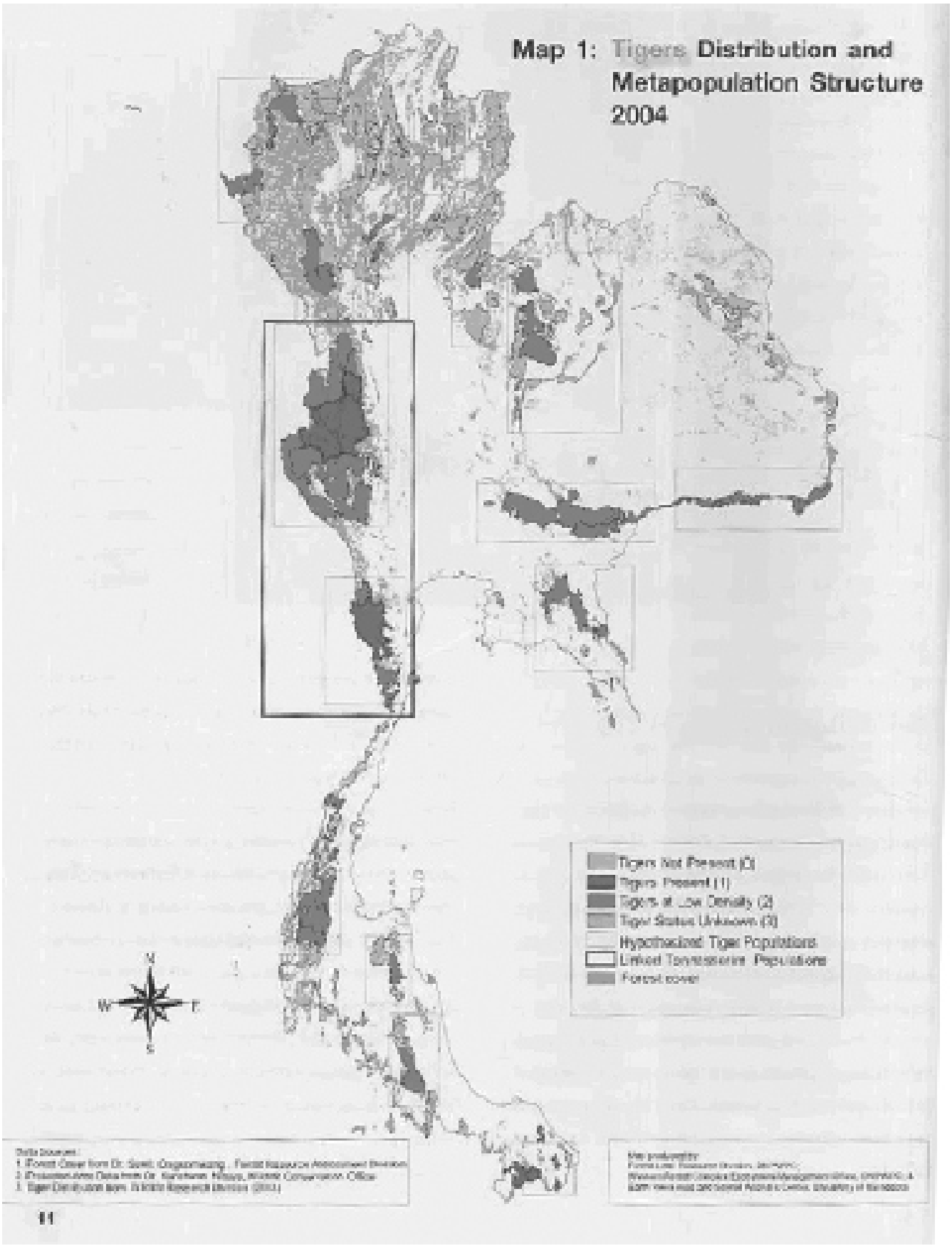
Of the many sounds a tiger is capable of emitting, the most likely to be heard is the awesome moaning, 'aa-oo-mh,aa-oo-mh', used during the mating season. This call carries over considerable distance, attracting the resident male to the estrous female. Other vocalizations, which may be heard at close range, include low growling, snarling and coughing grunts. The angry roar of a tiger is unforgettably terrifying.

When tigers mate, they usually remain together from 2 to 3 days, copulating every 15 to 20 minutes day and night. After 102 to 105 days, the female dens in dense vegetation and produces on average 3 cubs. During the first 2-3 days after birth, the female remains at the den for up to 23 hours a day; she gradually leaves for longer periods until the den is abandoned when the cubs are about 2 months old. For the next 2-3 months, the female moves the cubs from place to place, but they still remain hidden most of the day.

Until they are several months old the cubs go to a kill only after it has been made (Smith 1993). By 6-7 months of age they begin to accompany their mother on hunts but the final stalk and kill is by the mother alone. At 11-13 months the milk canines begin to protrude, pushed out be erupting adult canines that are fully erupted at 16-17 months.

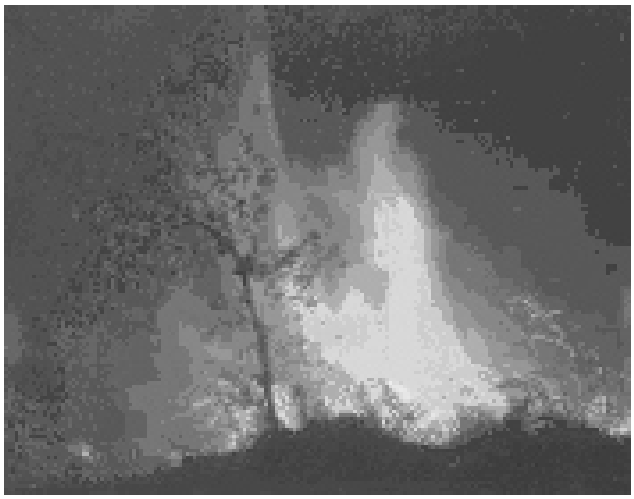
Even though they have the "equipment" to kill prey, young tigers require 2 to 3 additional months to learn to kill efficiently on their own. They gradually become independent from their mother but continue to hunt within the security of her territory. From 19 to 24 months after her previous litter, a female may give birth to her next litter. Two months later, when she and the cubs abandon the den site, aggression between the female and her previous litter marks the onset of dispersal. The young leave the territory where they were born and raised and face the most critical period in their lives over the next few months of early independence. Approximately 40 % of young males die during the dispersal periods (Smith 1993).

Tigers are territorial. Females protect their area from others of the same sex; males, which have territories overlapping those of 2-7 females, do likewise. Dispersing young face a gauntlet of resident animals guarding their territories and are often forced to reside temporarily in suboptimal habitat at the edge of protected areas where they may come into conflict with humans and their livestock. For females, the dispersal stage usually lasts about 1 year. About 50% of daughters settle next to their mother, who will often shift her territory slightly to accommodate a daughter. However, by the time the daughter is fully established as a resident, there is little overlap with her mother's territory. For males the task of establishing a breeding territory is more arduous and dangerous. It may take more than 2 years and involve a series of aggressive encounters with resident males that can lead to serious, even incapacitating wounds and sometimes even death.


Map 1: Tigers Distribution and Metapopulation Structure 2004
Tigers Not Present (0)
Tigers Present (1)
Tigers at Low Density (2)
Tiger Status Unknown (9)
Hypothesized Tiger Populations
Linked Tiger Metapopulations
Forest cover
N
W
E
S

6. THE STATUS OF TIGERS IN THAILAND

Tigers in Thailand are protected by the Wildlife Protection and Preservation Act B.E. 2535. To provide baseline information on the status of tigers in Thailand, the DNPWPC carried out a review of current available information on tiger occurrence within the country's terrestrial protected areas in early 2004. To provide context, general information on the level of survey effort carried out in these areas was also compiled. Information was sought from a wide range of conservation practitioners and field biologists and all occurrence data have been referenced to available published data or an individual. Based on recent survey, tigers are present or probably present in at least 50 protected areas. In many of these national parks and wildlife sanctuaries tigers are extremely rare; nevertheless, tigers still occur widely in Thailand. Tiger habitat is abundant and tiger and prey numbers can be restored. Currently there are an estimated 15 populations occurring in contiguous protected areas (Map 1). The largest tiger population resides along the Tenasserim Range between Thailand and Myanmar border.



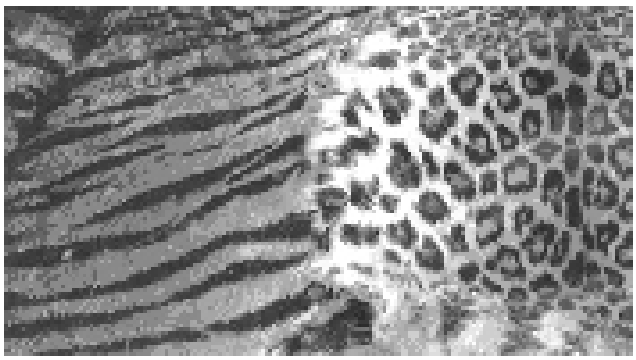
7. THREATS TO THE TIGER

The tiger acts as an umbrella species for other species that share its habitat but do not have its visibility or symbolic significance. Extinction of the tiger from any of the forest complexes where it currently resides will have unforeseen, cascading impacts on these species and ecosystems.

The most important threats to tiger survival in Thailand are: habitat loss and degradation, low prey density and poaching. These same issues are the primary causes of population decline elsewhere in tiger's global range.

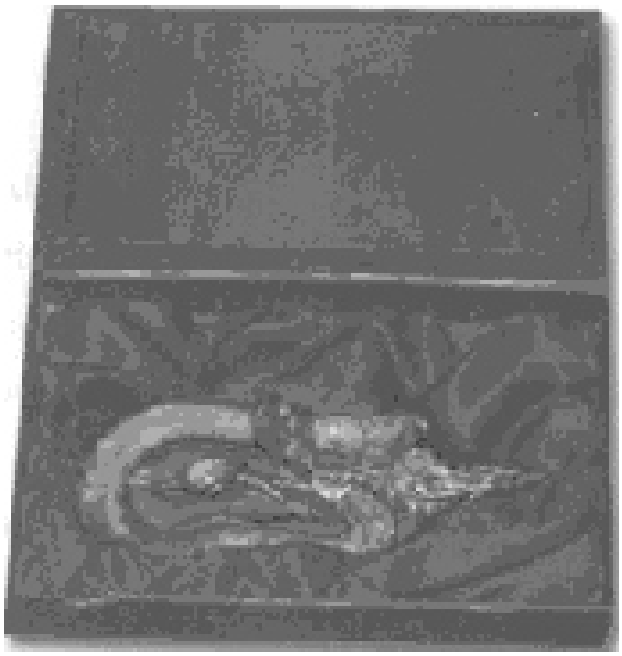
The gradual conversion of forest cover over this past century has resulted in fragmented forest habitat in Thailand that has created isolated populations. Many of these populations are too small to have long-term viability unless current habitat is protected, the amount of habitat increased, and habitat fragments connected by corridors (Smith et al. 1998 and Wikramanayake et al. 1998).

Prey depletion is an equally important threat to tigers (Karanth and Sunquist 1995). Poaching of prey species is intensive in many protected areas in Thailand. Reversing the decline of prey populations within otherwise suitable habitat has the potential to rapidly increase the number of tigers.



In the early 1990s, tiger poaching increased dramatically throughout tiger's range. The scope of the problem is range wide. The public became acutely aware of the problem in India in 1992 with the arrest of a poacher in Ranthambhore Tiger Reserve. Tiger numbers in this reserve declined from an estimated 43 in 1989 to 20 in 1993. At a 1995 Indian regional meeting of the IUCN Cat Specialist Group, it was agreed that, despite 3 years of strong effort by the Indian government, tiger poaching was still extensive. It is estimated that 80 tigers (~ 25%) of the population was poached in Russia from 1992-1993. In Nepal, tiger poachers were captured in Chitwan National Park and 4 boxes of bones were found at a Nepalese post office high in the Himalayas. At a 1995 tiger conference in Hanoi, Vietnam, participants from Cambodia, Laos and Vietnam reported that tiger poaching was widespread in all 3 countries. Recent reports indicate that tiger poaching continues unabated in India. Although there has been success in stemming poaching in some localities, it continues unabated in Thailand and throughout most of tiger's range. The

primary consumers of tiger products are Chinese communities throughout the world who use tiger parts (such as tiger bone wine for general well being their reputed medicinal benefits. The sale of these products has been documented in every major Chinese community that has been examined. Some conservationists believe that, if the present scale of poaching and worldwide illegal trade continues, many tiger populations may be extinct within the next 25-50 years (Kenney et al. 1995).



Extinction of the tiger, the largest and strongest of the world's cats, and one of it's most unique and dramatic predators would be a tragic loss.

There are at least two other significant factors hindering the survival of the tiger.

The first is a lack of rigorous techniques for the evaluation of many tiger population parameters and a comprehensive understanding of the status and threats to vulnerable populations.

Prey depletion is an equally important threat to tigers.

Without baseline data on tiger populations there is no way to measure the success of management efforts. Until such measures are developed, it will be difficult to understand the nature of the problems that threaten the tiger's survival and to take appropriate actions to prevent its drift towards extinction. The second is the lack of community involvement in tiger conservation. The full support of the people of Thailand and cooperation across institutions and jurisdictional boundaries is vital to securing a sufficient land base for tigers in Thailand.

SECTION II

ACTION PLAN

8. ACTION PLAN GOALS

1. Direct Conservation Action and Enforcement

1.1 Promote tiger conservation efforts at the scale of entire tiger populations (e.g. forest complexes and corridors).

1.2 Support local communities in developing sustainable economies that reduce dependence on forest resources.

1.3 Encourage community participation and cooperation in protected area conservation activities.
1.4 Increase the suppression of wildlife crimes- especially as they relate to tigers and tiger prey.
1.5 Increase national and international efforts to suppress the production, trade, and consumption of products that contain tiger parts.
1.6 Facilitate regional cooperation in tiger conservation efforts.
1.7 Support national and international efforts to responsively manage captive tigers.

2. Capacity Building

2.1 Develop and support appropriate human resources.
2.2 Develop an effective tiger conservation decision-making and policy-making structure.
2.3 Procure other key resources such as funding mechanisms and equipment.
2.4 Implement strategic planning and adaptive management at all levels of protected area management with more frequent reviews and evaluation.

3. Information acquisition, management and analysis

3.1 Implement a permanent, nation-wide system for monitoring tigers, their prey, and the ecosystems in which they live
3.2 Undertake research that contributes to our understanding of tiger ecology and conservation.
3.3 Support efforts that increase our understanding of the production and use of products that contain tiger parts.
3.4 Ensure that all relevant information for tiger conservation can be managed and accessed in a systematic way.

4 . Education and Public Participation

4.1 Ensure that basic concepts of the tiger's ecological and cultural significance become part of the Thailand's standard curriculum at several educational levels.
4.2 Support efforts to convey tiger conservation-related messages to a diverse Thai public and involve them in the conservation process.
4.3 Encourage private sector support for tiger conservation efforts.

9. ACHIEVING THE GOALS

1. DIRECT CONSERVATION ACTION AND ENFORCEMENT

1.1 Promote tiger conservation efforts at the scale of entire tiger populations (e.g. forest complexes and corridors).

Challenges and Opportunities:

- The conservation of Thailand's biodiversity cannot be accomplished by a protected area system, even a large one, if each protected area is managed as an independent unit.
- Viable populations of large carnivores such as tigers require large landscapes that frequently extend beyond the boundaries of single parks. Furthermore, development and land use policies outside protected areas have multiple impacts on protected areas.
- Roads and dams, usually viewed as vital to the local economy, often fragment and have other adverse effects on wild areas.
- The WEFCOM project, which coordinates conservation planning and activities within and around the largest protected area complex in Asia (the Western Forest Complex) has demonstrated the relevance of complex-level management and is now working to facilitate ecoregional level management.

Action to Date:

- Building on the efforts of the late superintendent of Huai Kha Khaeng Wildlife Sanctuary, Seub Nakhasathien, the combined Huai Kha Khaeng and Thung Yai Naresuan Wildlife Sanctuaries were declared a World Heritage Site in 1990.

- At the 1994 International Tiger Conference held in Huai Kha Khaeng, the concept of ecosystem level management was proposed and it was initiated in 2000 with the establishment of the Western Forest Complex project.
- Plans are in place to expand the WEFCOM model to other forest complexes including the Dong Phayayen-Khao Yai Complex in 2004.

Recommended Actions:

1.1.1 Encourage administrators to expedite complex level management in forest complexes where tigers occur.

1.1.2 Initiate an evaluation of areas that could serve as corridors to connect otherwise isolated tiger populations and use the results to recommend specific conservation action in priority areas.

1.1.3 Convene a National Ecosystem Management seminar to review WEFCOM efforts to establish ecosystem and landscape scale management.

- Such a seminar would bring together DNPWPC decision-makers (e.g. division and bureau chiefs and technical personnel), university academics, NGOs and development organizations to discuss the efficacy of a broader approach to natural resource management. It will provide an opportunity to evaluate and learn from the Western Forest Complex Project. (See Section 1.6 regarding trans-boundary protected areas)

1.2 Support local communities in developing sustainable economies that reduce dependence on forest resources

Challenges and Opportunities:

- People adjacent to the park have little incentive to reduce their activities that degrade the park. Even though local people appreciate living near reserves, they often receive little benefit from them except through illegal activities.
- Ecotourism can be an effective means of providing economic incentives to local people. There are several models used globally where tourists are guided by local people and expected to participate in bird and mammal biodiversity surveys. The quality of these

Survey relies on the professional training and experience of the guide. At wildlife sanctuaries in Nepal and India, where guides are required, the local community benefits from the salaries of the guides and the guides become highly proficient naturalists. In Central America guides and tourists provide very effective monitoring of sea turtle colonies.

- Currently in many of the national parks and wildlife sanctuaries illegal activities have reduced large mammal abundance. Eco-tourism can provide an effective economic incentive for reducing hunting and habitat encroachment. However, past experiences with large facility development for tourism has made the DNPWPC cautious about the use of tourism as an economic incentive for conservation.

Action to date:

- The government of Thailand is exploring several initiatives to provide economic incentives to villagers (e.g. the One Tambon One Product Program (OTOP), the Revolving village Fund and the Small, Medium and Large (SML Program). These programs reduce pressure on natural areas by providing incomes not dependent of extraction from the forest.
- The DNPWPC is evaluating the merits of ecotourism in protected areas and other ways of increasing economic development in buffer zone communities.
- In many protected areas, the government has undertaken projects to establish forest villages with community forest plots
- The Western Forest Complex Project funded by DANIDA has several projects that provide support for community development efforts.

Recommended Actions:

1.2.1 Expand extension activities to help to communities near protected areas. Increased funding from the Thai government and international development and conservation sources is required to finance these activities.

1.2.2 Facilitate the development of community forestry projects in the vicinity of protected areas

1.2.3 Test site specific ecotourism plans at pilot sites. A key element of these plans will be to provide economic benefits for local communities, especially those individuals that currently hunt or harvest in protected areas.

1.2.4 Draft a comprehensive zoning plan for each protected areas so that ecotourism and other human activities can be effectively managed.

1.2.5 Schedule DNPWPC staff visits to protected areas in Thailand where ecotourism is successful.

1.3 Encourage community participation and cooperation in protected area conservation activities

Challenges and Opportunities:

• Local villager participation in protected area monitoring and patrolling is a global paradigm shift in conservation management. In Thailand increased participation of local villagers who have natural history knowledge of their area can help rangers to monitor and patrol more efficiently. Furthermore, their participation empowers villagers to contribute to joint management.

Action to Date:

• WEFCOM, World Wide Fund for Nature and the Seub Nakhasathien Foundation have been exploring a variety of ways of including local communities in the conservation process. WEFCOM has established regional conservation forums that coordinate local government agencies. WWF has worked at the level of local villages in or adjacent to protected areas by incorporating local people into ranger patrolling within protected areas. This approach develops community support at the lowest level and is effective in targeting commercial trophy poachers who come from outside of the region.

The merits of ecotourism in protected areas and other ways of increasing economic development in buffer zone communities are evaluated by DNPWPC.

Recommended Actions:

1.3.1 Increase local participation in patrolling and monitoring protected areas

• This action will increase ecological understanding among local communities. As individuals with wildlife skills are recognized for their expertise by members of the local village, local communities will gain a sense that they have the knowledge to contribute to joint management.

1.4 Increase the suppression of wildlife crimes- especially as they relate to tigers and tiger prey

Challenges and opportunities:

• There is still a large international market for the tiger and other endangered species products. This market continues to provide an incentive for tiger poaching in Thailand and neighboring countries.

• Rangers in protected areas lack adequate training in tactics for patrolling and for apprehending poachers.

Action to Date:

• In 2002-2003, the DNPWPC and Wild Aid have conducted training at Khao Yai National Park.

• In 2003-2004, the DNPWPC and the Forestry Police Division have increased confiscation illegally owned endangered species and its investigations of the production of animal products.

Recommended Actions:

1.4.1 Strictly enforce existing laws and policies that serve tiger conservation and increase personnel to enforce Thailand's existing wildlife laws.

1.4.2 Increase fines for wildlife-related crimes by amending the Wildlife Conservation Act of 2535 B.E.

1.4.3 Increase conviction rates for wildlife-related crimes by increasing the profile and transparency of legal proceedings

1.4.4 Require that all protected area managers develop and carry out specific patrol strategies that cover their entire area

1.5 Increase national and international efforts to suppress the production, trade, and consumption of products that contain tiger parts

Challenges and opportunities:

• Tigers are being privately raised in captivity in Thailand and this has caused international concern.

• Tiger products are still sold illegally in some parts of South-east Asia.

• Although the border police and DNPWPC are active in enforcement of CITES, a great deal remains to be done to eradicate the trade in tigers and other endangered species.

Action to Date:

• Thailand has established wildlife checkpoints at all major border crossing and international airports.

• The DNPWPC and WWF-Thailand have developed a brochure to warn all visitors to Thailand not to buy endangered species products. In addition this program has trained tour guides and hotel managers to discourage international visitors from buying these illegal products. WWF has also conducted training for customs agents.

Create regional meeting to address regional trade enforcement issues

• In 2003, the DNPWPC and Wild Aid have worked with the U.S. Fish and Wildlife Service to train its staff in identifying illegal animal products and it actively confiscates illegal animals and their products.

Recommended Actions:

1.5.1 Participate in an international effort to create a genetic database to identify the geographic origin of tigers and other endangered species.

1.5.2 Create an annual regional meeting to address regional trade enforcement issues.

1.6 Facilitate regional cooperation in tiger conservation efforts

Challenges and opportunities:

• Thailand is located at the bio-geographic crossroads of Southeast Asia and the distribution of 9 of 15 tiger populations in the country extends beyond Thailand's borders.

• Trade in tiger products is a trans-boundary issue. Coordination among tiger range states is needed to address regional tiger issues.

• As one of the most affluent societies in SE Asia, Thailand can provide regional leadership in tiger conservation efforts.

• The Tenasserim ecoregion straddles the Tenasserim Range along the border between Thailand and Myanmar and is home to the world's second largest tiger population. The Western Forest Complex is in the northern part of this eco-region and the Khaeng Krachan Complex is in the southern part. The entire ecoregion, including forest lands in Myanmar that link the complexes in Thailand and the entire region, supports the world's second largest tiger population. It is also the largest intact and most diverse ecoregion in all of southern Asia.

To initiate conservation over such a large area spanning 2 countries requires an "open conservation model" that encompasses government agencies of both countries as well as local and international NGOs and international development organizations. All potential stakeholders will be encouraged to cooperate in conserving this region. For the long-term conservation of tigers, focusing protection on the few very large populations, such as the Tenasserim population, is the best insurance that tigers will survive.

• Thailand hosted the 13th Conference of the Parties to the Convention on CITES (COP 13) in October 2004 and the World Conservation Congress in November 2004. This provides a unique opportunity to encourage regional cooperation in conservation efforts.

Action to Date:

• Thailand has taken on a leadership role in regional tiger conservation by organizing 2 International Tiger Conferences (October 1994 and January 1996) and serving as the regional representative to CITES.

• Thailand has actively supported the establishment of trans-boundary protection strategies with all its neighbors.

Recommended Actions:

1.6.1 Seek formal agreements on trans-boundary protection efforts in all trans-boundary areas that support tigers.

1.6.2 Designate the Tenasserim Ecoregion straddling the Thai-Myanmar border as a focal area for regional tiger and biodiversity conservation.

1.6.3 Establish a Southeast Asia chapter of the IUCN/SSC Cat Specialist Group to foster cooperation in regional tiger conservation.

1.7 Support national and international efforts to responsively manage captive tigers

Challenges and opportunities:

Tigers in captivity can play a positive role in tiger conservation by contributing to educational, research, and other efforts. The International zoo community has developed a detailed strategy and database to manage captive tigers to support tiger conservation in the wild.

Action to Date:

Currently, Khao Pratubchang Wildlife Captive Breeding Center and Khao Khiew Zoo are managing a population of wildcats especially tigers for research and conservation education and is using them to develop animal capture methodology.

Recommended Actions:

1.7.1 Adopt a strong and consistent legal framework for regulating the breeding of wild cats.

1.7.2 Require all captive tigers to be registered in a central database maintained by the DNPWPC.

1.7.3 Encourage all captive facilities to subscribe to established captive management guidelines.

2. CAPACITY BUILDING

Increase Thailand's capacity to monitor and conserve tigers, their prey, and the forest ecosystems in which they live:

2.1 Develop and support appropriate human resources

Challenges and Opportunities:

• Conserving Thailand's tigers will require a sustained commitment on the part of personnel at all levels.

• This commitment can only be realized when people can take pride in their work and receive respect and acknowledgement from colleagues and supervisors.

• Protected area staff-especially 'temporary employees'- receive relatively low compensation for demanding and sometimes dangerous work.

• Managing Thailand's extensive protected area network and surrounding areas that support tigers requires numerous specialized roles at virtually all levels of the conservation process.

• In consultation with a broad range of conservation practitioners in the region (including government and other representatives from Thailand), the ASEAN Regional Center for Biodiversity and Conservation (ARCBC) has recently produced a comprehensive and detailed inventory of recommended skills for protected area staff at all levels. These guidelines provide a consistent, well-organized approach to assessing, managing, and training personnel.

Action to Date:

• Centralized training and development centers have been established for both National Parks (at Khao Yai National Park) and Wildlife Sanctuaries (at Huai Kha Khaeng Wildlife Sanctuary).

• Khao Yai National Park, in cooperation with national law enforcement authorities, Wild Aid, and others, has hosted a wide variety of training courses for the regional conservation and wildlife law enforcement communities.

Recommended Actions:

2.1.1 Review and revise compensation and benefit policies for rangers.

2.1.2 Designate an annual "Ranger Appreciation Day" to celebrate, acknowledge, and publicize the important role that rangers play in safeguarding Thailand's natural heritage.

2.1.3 Broaden the official role of rangers to encompass the role of inventorying and monitoring of Thailand's biodiversity.

2.1.4 Require specific and achievable plan for training in protected areas' management plans.

2.1.5 Provide and/or otherwise support training opportunities for DNPWPC staff at all levels in information technologies including Geographic Information Systems (GIS).

2.1.6 Build on DNPWC's collaborative training efforts at Khao Yai National Park by approving the establishment of a regional training center for natural resource and wildlife law enforcement personnel.

2.2 Develop an effective tiger conservation decision-making and policy-making structure

Challenges and Opportunities:

• The Thai government has demonstrated its commitment to tiger conservation in numerous ways but to date, efforts have been in the absence of a single, coordinated strategy for action.

Action to Date:

• Increased patrolling to reduce the poaching of tiger prey has apparently increased tiger numbers in Huai Kha Khaeng Wildlife Sanctuary and Khaeng Krachan National Park.

Recommended Actions:

2.2.1 Use this National Tiger Action Plan as a specific road map for guiding the course of tiger-related conservation at all levels.

2.2.2 Form a DNPWPC Tiger Conservation Committee to coordinate tiger conservation efforts of the DNPWPC, other government agencies, NGOs, and academic units. The committee should be charged with periodically reviewing and updating this plan.

2.3 Procure other key resources for conservation such as funding mechanisms equipment.

Challenges and Opportunities:

• The list of needs for tiger conservation activities will likely always exceed available resources.

• **Currently, some protected areas are without a basic desktop computer with standard applications or basic data tools such**

Action to Date:

• The WEFCOM project, with the generous support of DANIDA, has worked to ensure that basic equipment resource needs are met throughout all protected areas in the complex.

Recommended Actions:

2.3.1 Ensure that every protected area headquarters office and every forest complex office is equipped with at least one desktop computer with a printer and basic software applications.

2.3.2 Ensure that in areas where tigers occur, these offices maintain the appropriate tools and equip- ment for gathering and managing information about tigers, their prey, and the forest ecosystems in which they live.

2.4 Implement strategic planning and adaptive management at all levels of protected area management with more frequent reviews and evaluation

Challenges and Opportunities:

• Currently, protected area management plans are revised only infrequently and in many cases are not used as tools for management.

• Planning and management activities often take place at the protected area scale without taking into account complex-level or regional issues and goals.

• Conditions in and around protected areas (e.g. wildlife population sizes, disease, patterns of human impact, etc.) can change rapidly. Managers must have mechanisms in place to detect these changes and be able to adapt their actions to changing conditions.

Action to Date:

• The strategic plan of the MONRE includes specific objectives to guide the formulation of more detailed plans at the level of forest complexes and protected areas.

• The WEFCOM project has developed a systematic approach to strategic planning at the landscape level.

• The DNP, various national and international NGOs, and others have established monitoring systems for various taxa and impacts in selected protected areas.

Recommended Actions:

2.4.1 Convene a national ecosystem management seminar to be attended by a range of conservation stakeholders

2.4.2 Require that management plans for protected areas be reviewed and updated every 3 years (maximum).

2.4.3 Draft strategic management plans for all forest complexes.

2.4.4 Require that protected area management plans specify how key indicators of biodiversity and threats will be monitored and how these data will inform the management process.

3. INFORMATION ACQUISITION, MANAGEMENT, AND ANALYSIS

3.1 Implement a permanent, nation-wide system for monitoring tigers, their prey, and the ecosystems in which they live.

Challenges and Opportunities:

• Much information is still required to develop effective tiger conservation plans on both national and local levels. Data on the following is urgently needed:

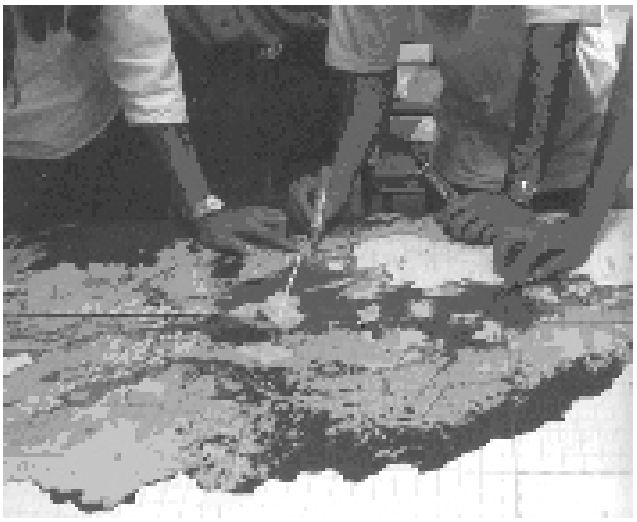
• Tiger distribution and extent of tiger occurrence and breeding habitat,

• The abundance and distribution of tiger prey within protected areas,

• The nature, distribution, and extent of threats to tiger

• For many populations, any further reduction in population size will increase the probability of local extinction due to demographic, genetic and environmental stochasticity.

• Numerous agencies and groups (for example DNPWPC, Mahidol University, Kasetsart University, WCS (Thailand), WWF-Thailand, the Smithsonian Institution, and the University of Minnesota) are



designing new approaches to scientific monitoring that will allow resource managers in Thailand and the region to measure the success of their conservation efforts.

Action to Date:

- During 1995-96 a series of 7 tiger conservation workshops was held at 3 locations: Huai Kha Khaeng, Taleban National Park, and Khao Yai National Park to gather and synthesize tiger conservation information and map tiger distribution on a national level.
- From 2001-present, extensive field surveys of the distribution of tigers and other large mammals in Thailand were conducted by a number of groups (e.g. DNPWPC/University of Minnesota Save the Tiger Project, WCS (Thailand) and the WEFCOM Biodiversity Team).
- A wide variety of relevant GIS data has been developed covering virtually all of Thailand at numerous spatial resolutions.

Recommended Actions:

3.1.1Draft a long-term monitoring strategy that engages protected area personnel and others in survey and monitoring activities for tigers and other large mammals throughout the year.

- The strategy should include a consistent protocol for combining patrolling and monitoring activities and suggestions on how managers can respond to various insights gained from monitoring.

3.1.2Form highly-trained, roving teams to travel to different protected areas and provide training and technical support to rangers as well as initiate and coordinate rapid biological assessment activities where needed.

3.2 Undertake research that contributes to our understanding of tigerecology and conservation

Challenges and Opportunities:

- Field studies of tigers have been carried out in two geographic regions where tigers occur (South Asia: Nepal and India and Northeast Asia: Russia), but not in Southeast Asia. Given the prey density in the region's monsoonal ecosystems and the size of these systems, Southeast Asia represents a large portion of the existing habitat for tigers and supports, in the Tenasserim Range, the second largest global tiger population. However, despite the importance of this region to the global tiger

population, little is known about the ecology and natural history of tigers of tigers here.

Action to Date:

- Important research and survey work on tigers has been carried out in many of the areas in Thailand where tigers occur. Most work has focused on basic surveys to document tiger occurrence and map general distribution.

Recommended Actions:

3.2.1 Initiate at least one long-term tiger ecology field project that employs radio-telemetry methods to provide high-resolution ecological data not available through other means.

3.2.2 Organize a regional tiger ecology conference to

exchange information on the ecology of tigers in dense, tropical forests.

3.3 Support efforts that increase our understanding of the production and use of products that contain tigerparts.

Challenges and Opportunities:

- The illegal production of and trade in products that contain tiger parts is often secretive and therefore difficult to study or otherwise assess.
- Surveillance, forensic science, and other techniques that have been developed in efforts to suppress the drug trade and other illegal activities can often be adopted to serve the cause of wildlife crime assessment and suppression.

Action to Date:

- The DNPWPC has established a 24 hour wildlife crime hotline (Tel. 1362) to allow anyone to anonymously report illegal or suspicious activity.
- Many local, regional, and international NGOs have provided high-quality data on illegal tiger-related activities.

Recommended Actions:

3.3.1 Work with law enforcement agencies to ensure that information relating to illegal use or trade in tiger products is combined in a single database so that the information can be seen in the broadest possible context.

3.4 Ensure that all relevant information for tiger conservation can be managed and accessed in a systematic way.

Challenges and Opportunities:

- Thailand has a large protected area system. Much of it, fortunately, is still largely roadless and inaccessible. However, the sheer size and remoteness of many protected areas demands an efficient system to monitor management activities.

Action to Date:

- In 2004, MONRE is currently updating forest cover information for the entire country using newly satellite imagery.

Recommended Actions:

3.4.1 Develop a standardized system of metadata for tiger information resources so that information can be efficiently managed and utilized.

3.4.2 Coordinate the collaboration of relevant

government offices and academic units to produce a set of maps that combine relevant tiger conservation information for all protected areas where tigers occur.

3.4.3 Support the establishment of standardized Geographic Information Systems (GIS) at the following levels: protected areas, forest complexes, country-wide, and trans-boundary.

4. Education and Public Participation

4.1 Ensure that basic concepts of tiger's ecological and cultural significance become part of the Thailand's standard curriculum at several educational levels.

Challenges and Opportunities:

- Public awareness of the following remains low.
  - o Tigers occur widely in Thailand
  - o Tigers can continue to survive in Thailand
  - o The largest tiger conservation unit (TCU) in southern Asia occurs along the Thai Myanmar

border

  - o Tigers are important indicators of ecosystem

health and integrity in the tropical forest of Thailand.

Action to Date:

• With funding from the Hongkong and Shanghai Bank, the DNPWPC sponsored a nation wide literary competition about tigers and conservation and held conservation weekends for business leaders. A poster was produced that shows the efforts to develop a spatial database on the distribution of tigers in Thailand.

• The SeubNakhasathien Foundation and the Green World Foundation have a diverse array of conservation education programs aimed at both rural and urban communities. Much of their efforts are focused on school children.

Recommended Actions:

4.1.1 Encourage the Ministry of Education to include specific, tiger-related learning goals in both primary and secondary standard curricula.

4.1.2 Work with the Ministry of Education to promote the inclusion of tiger-related material in university level conservation and natural resource management course offerings.

4.2 Support efforts to convey tiger conservation-related messages to a diverse Thai public and involve them in the conservation process.

Challenges and Opportunities:

• It is important that the citizens of Thailand learn about the tremendous biological diversity that still occurs within Thailand. The tiger is an important symbol of this biodiversity and its survival is an indicator that the tropical forest ecosystems of Thailand are healthy and intact.

Action to Date:

• DNPWPC's 'Saving Thailand's Tiger' campaign produced posters and t-shirts to publicize the importance of tiger conservation.

• Several NGO's have undertaken or sponsored efforts to convey the significance of the tiger through media such as brochures, public service television advertisements, and documentaries.

• Professionally produced Thai-language publications such as 'Feature' and 'Advanced Thailand Geographic' magazines have featured stories on tigers and other wild cats and the people who work to conserve them.

• A number of quality field guides that include useful information on tigers and other endangered mammals have been published in recent years.

Recommended Actions:

4.2.1 Support efforts to convey the importance of tiger conservation through a diverse range of media.

4.3 Encourage private sector support for tiger conservation efforts

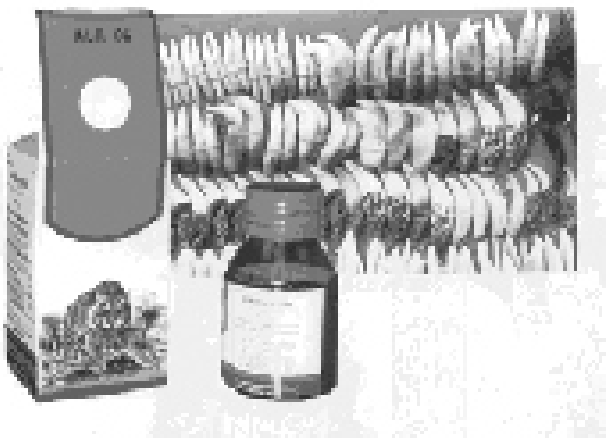
Challenges and Opportunities:

• Globally, the private sector plays a significant role in funding and promoting tiger conservation efforts.

• Strong economic growth in Thailand is resulting in higher levels of charitable contributions from private individuals and companies.

Action to Date:

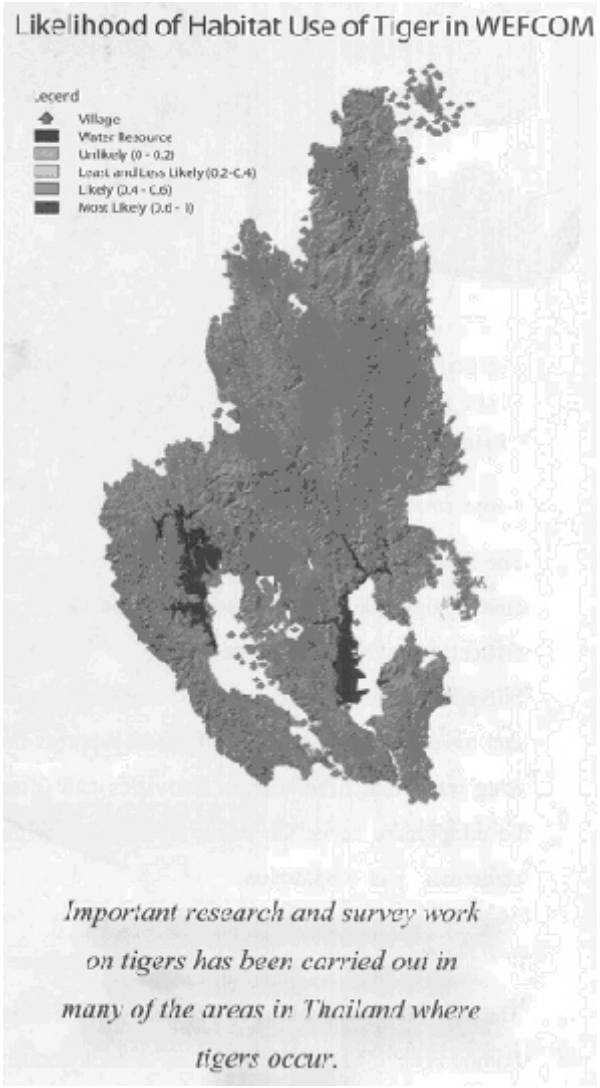
• Thai companies, such as the Hongkong and Shanghai Bank, already sponsor wildlife conservation efforts with benefits to conservation as well as to the company itself.



Recommended Actions:

4.3.1 The benefits of charitable contributions and support for conservation causes (e.g. tax benefits, publicity, etc.) should be communicated to businesses and prospective private donors.

4.3.2 The DNPWPC should adopt a policy of formal and informal public recognition of companies and individuals for their contributions. This can be achieved with little expense to the Thai government yet will increase the value to contributors significantly.



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Appendix 1. Tiger Distribution in Thailand

Data Categories and Codes

Protected Area Type:

WS = Wildlife Sanctuary
NP = National Park
NHA = Non-Hunting Area

Documented status. **The column labeled Smith et al (1999) and Schwann et al (2004) are provided as reference and indicates the status of tigers in protected areas as assessed in 1998. The numbers represent the following categories:**

0 = tigers not present
1 = tigers present
2 = tigers present in very low density
3 = tiger status unknown

Documenting evidence of tiger occurrence: **To ensure a consistent presentation of data, we have adopted the categories** confirmed **and** provisional **as set out by Duckworth and Hedges (1998). Furthermore, the following codes should be used to indicate the specific type of evidence being presented:**

Confirmed **records of occurrence leave no reasonable doubt that the information is credible and does, indeed, refer to tiger. The following situations qualify for this designation:**

Cd **= direct field sightings or photo-records from automated cameras;**
Cr **= physical remains where the origin (site and rough date of collection) is established;**
Cs **= Credible records of tiger tracks including photos where dimensions can be accurately established, plaster casts, or detailed records of tracks (preferably with measurements of track dimensions) where separation from other species and other sources of erroneous identification had clearly been considered carefully at the time of field identification. (*Although other forms of sign can, in some cases, provide evidence of the occurrence of tiger, existing protocols for assessing such evidence currently lack the necessary rigor for establishing tiger presence conclusively and so, are not considered here.*)**

Records should be designated as provisional **if they are:**

Po = presented as such by the original source;
Pv = reports from anyone lacking organized training in tiger and tiger sign identification and basic survey protocol;

Pid = signs where identification appears to be cursory or cavalier;
Ps = specimens lacking locality data even if identification is clear; and
Pr = reports or claims where the type of evidence is not specified.
Pa = records or reports where there is strong but potentially ambiguous evidence of tiger (e.g. livestock kill without clear tracks)

If no data relevant to either provisional or confirmed records is available, then these columns should be left blank.

Documenting the intensity of survey work:

Records of tiger occurrence can be interpreted more accurately if they are accompanied by information on what amount of survey effort was involved in generating them. Please use the following codes in filling out the Survey intensity column of the table:

Abbr.	Category	Definition
H	High	At least 15 days of focused surveys for large mammals by trained personnel in areas where tigers are most likely to occur have been carried out in the area over the last 5 years
M	Moderate	Less than 15 days of focused surveys for large mammals have been carried out in the area over the last 5 years but patrols have been carried out regularly in areas where tigers would be most likely to occur
L	Low	Neither focused surveys for large mammals nor regular patrols have been conducted in the last 5 years

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Table I: Tiger Distribution in Thailand

Reference #	Protected Area Name (Thai)	Protected Area Name (English)	Protected Area Type	Size of protected Area (km²)	Smith et al (1999)	Schnurrer et al (2004)	Survey Effort Score	Most Recent Provisional Evidence Class	Year	Most Recent Confirmed Evidence Class	Year	Exact Date of Observation (if available)	Reference/Remarks (Confirmed evidence)	Data/Voucher/Photo info
1	[illegible]	Tham Jao Ram	WS	339	0	1	N							
2	[illegible]	Khao Khiao, Khao Chomphu	WS	145	0	[illegible]	N							
3	[illegible]	Phu Wua	WS	186	0	1	N							
4	[illegible]	Doi Pha Muang	WS	584	0	1	N							
5	[illegible]	Khlong Phraya	WS	148	0	1	N							
6	[illegible]	[illegible]	WS	120	0	1	N							
7	[illegible]	Khao Sam Roi Yot	NP	125	0	1	N							
8	[illegible]	Ramkhamhaeng	NP	286	0	1	N							
9	[illegible]	Ao Phangnga	NP	411	0	1	N							
10	[illegible]	Si Satchanalai	NP	213	2	2	N							
11	[illegible]	Khao Phanom Bencha	NP	52	0	1	N							
12	[illegible]	[illegible]	NP	407	0	0	N							
13	[illegible]	Than Bok Khorani	NP	99	0	0	N							
14	[illegible]	[illegible]	NP	163	0	0	L							
15	[illegible]	Namtok Ngao	NP	667	0	0	M							
16	[illegible]	Mae Moei	NP	190	0	0	M							
17	[illegible]	Hat Wanakon	NP	31	3	0	L							
18	[illegible]	Hat Chao Mai	NP	347	3	0	L							
19	[illegible]	[illegible]	NP	[illegible]	3	0	L							
20	[illegible]	Mae Wa	NP	579	3	0	L							
21	[illegible]	Mu Ko Chumphon	NP	262	3	0	L							

Reference #	Protected Area Name (Thai)	Protected Area Name (English)	Protected Area Type	Size of protected Area (Km2)	Smith et al (1999)	Schwarz et al (2004)	Survey Effort Score	Most Recent Provisional Evidence Class	Year	Most Recent Confirmed Evidence Class	Year	Exact Date of Observation (If available)	Reference/Remarks (Confirmed evidence)	Data/Voucher/Photo info
121	[illegible]	Thung Yai Naresuan East	WS	1524	2	1	H			C1	2002		WEFCOM 2002	Photo of track with scale reference-WEFCOM Photobank
122	[illegible]	Thung Yai Naresuan West	WS	1572	1	1	H			C1	2002		WEFCOM 2002	Photo of track with scale reference-WEFCOM Photobank
123	[illegible]	Thong Pa Phum	NP	1236	1	2	M							
124	[illegible]	Maenam Phachi	WS	464	1	1	M			C4	1997		Pornchai Patumratanathan (Unpublished data)	Track records
125	[illegible]	Kaeng Krachan	NP	3027	1	1	H			C4	2004	2-Apr-04	Kekule (In prep)	Camera trap photos
126	[illegible]	Kui Buri	NP	969	0	2	M	Pv	2003					
127	[illegible]	Thung Raya-Nasak	WS	296	0	1	L							
128	[illegible]	Namtok Huai Yang	NP	160	1	6	L							
129	[illegible]	Sadet Nai Grom Luang Chumpon (South)	WS	334	1	2	L	Pv	2003				Kanchanasaka (unpublished data)	
130	[illegible]	Sadet Nai Grom Luang Chumpon (North)	WS	514	0	0	L							
131	[illegible]	Khlong Naka	WS	473	1	2	M							
132	[illegible]	Khlong Saeng	WS	1155	1	2	H							
133	[illegible]	Khlong Yan	WS	501	1	2	M	Pv	2003				Kanchanasaka (unpublished data)	
134	[illegible]	Kuan Yai Mon	WS	457	1	2	L							
135	[illegible]	Khao Sok	NP	690	1	2	M							
136	[illegible]	Khao Lam Pi - Hat Thai Mueang	NP	71	0	1	L							
137	[illegible]	Si Phang-nga	NP	244	1	2	L			C1	1999		Kanchanasaka (unpublished data)	Khlong Saeng Wildlife Research Station database
138	[illegible]	Khao Lak - Lamru	NP	124	0	0	L							
139	[illegible]	Kaeng Krung	NP	541	0	2	M	Pv	2002				Kanchanasaka (unpublished data)	
140	[illegible]	Khlong Phanom	NP	425	0	0	L							

Reference #	Protected Area Name (Thai)	Protected Area Name (English)	Protected Area Type	Size of protected Area (Km2)	Smith et al (1999)	Schwann et al (2004)	Survey Effort Score	Most Recent Provisional Evidence Class	Year	Most Recent Confirmed Evidence Class	Year	Exact Date of Observation (if available)	Reference/Remarks (Confirmed evidence)	Date/Voucher/Photo info
141	[illegible]	Khao Luang	NP	570	1	2	L							
142	[illegible]	Namtok Yong	NP	205	0	0	L							
143	[illegible]	Tai Rom Yen	NP	392	2	3	L							
144	[illegible]	Namtok Sikeot	NP	141	0	0	L							
145	[illegible]	Khao Banthat	WS	1243	1	2	L							
146	[illegible]	Tone Nga Chang	WS	183	0	0	L							
147	[illegible]	Thaleban	NP	200	0	0	L							
148	[illegible]	Khao Pu - Khao Ya	NP	706	0	0	L							
149	[illegible]	Khao Nan Khang	NP	221	3	3	L							
150	[illegible]	Chalerm Pra Kiat Somdej Phrathep	WS	201	0	0	L							
151	[illegible]	Bodo Sungai Padi (Khao Budo)	NP	190	1	2	M							
152	[illegible]	Budo Sungai Padi (Sungai padi)	NP	151	1	2	M			Cx	2004		Kanchanasaka (unpublished data)	
153	[illegible]	Bang Lang	NP	542	0	1	M			Cx	2004		Kanchanasaka (unpublished data)	
154	[illegible]	Hala Bala (Hala)	WS	312	0	1	M			Cx	2004		Kanchanasaka (unpublished data)	
155	[illegible]	Hala Bala (Bala)	WS	111	0	2	M			Cx	2003		Lynam (unpublished data)	

Reference #	Protected Area Name (Thai)	Protected Area Name (English)	Protected Area Type	Size of protected Area (km2)	Smith et al (1999)	Schwarm et al (2004)	Survey Effort Score	Most Recent Provisional Evidence Class	Year	Most Recent Confirmed Evidence Class	Year	Exact Date of Observation (if available)	Reference/Remarks (Confirmed evidence)	Date/Voucher/Photo Info
61	ภูสอยดาว	Phu Soi Dao	NP	258	0	0	L							
62	ทุ่งแสลงหลวง	Thung Salaeng Luang	NP	1269	2	2	M							
63	ภูหินร่องกล้า	Phu Hin Rong Kla	NP	305	2	1	M							
64	น้ำตกชาติตระการ	Namtok Chat Trakan	NP	542	3	2	M							
65	นาแห้ว	Na Haew	NP	106	0	0	L							
66	ภูเขียว	Phu Khieo	WS	1573	1	2	H							
67	ภูหลวง	Phu Luang	WS	917	1	2	H							
68	ซับลังกา	Sab Langka	WS	140	1	1	M							
69	ภูผาแดง	Phu Pa Daeng	WS	236	0	0	L							
70	ตาโบ-ห้วยใหญ่	Tabo Huai Yai	WS	699	0	1	M							
71	ภูกระดึง	Phu Kradung	NP	258	3	1	M							
72	น้ำหนาว	Nam Nao	NP	975	1	2	M							
73	ภูเรือ	Phu Rua	NP	120	1	2	M	Ps	2003				Sinchaisanee 2003 (Unpublished data)	
74	ตาดโตน	Tat Ton	NP	217	1	0	M							
75	ภูเก้า-ภูพานคำ	Phu Kao - Phu Phan Kham	NP	296	0	0	L							
76	ภูเวียง	Phu Wiang	NP	324	0	0	M							
77	ภูผาม่าน	Phu Pha Man	NP	359	0	1	M							
78	ไทรทอง	Sai Thong	NP	352	0	1	M							
79	ตาดหมอก	Tat Mok	NP	293	1	0	M							
80	[illegible]	Phu Poeng	WS	171	1	0	L							

Reference #	Protected Area Name (Thai)	Protected Area Name (English)	Protected Area Type	Size of protected Area (Km2)	Smith et al (1999)	Schamm et al (2004)	Survey Effort Score	Most Recent Provisional Evidence Class	Year	Most Recent Confirmed Evidence Class	Year	Exact Date of Observation (if available)	Reference/Remarks (Confirmed evidence)	Data/Voucher/Photo info
81	[illegible]	Nam Nao	NP	224	0	0	L							
82	[illegible]	Phu Pan	NP	766	0	0	M							
83	[illegible]	Huai Hua	NP	729	0	0	L							
84	[illegible]	Mukdahan	NP	31	0	0	L							
85	[illegible]	Phu Si Dok Bua	NP	229	0	0	L							
86	[illegible]	Phu Si Tan	WS	361	0	0	L							
87	[illegible]	Yot Dom	WS	218	2	2	M							
88	[illegible]	Khao Phanom Dong Rak	WS	338	2	2	M	Pv	2002				[illegible] 2002 (Unpublished data)	
89	[illegible]	Huai Sala	WS	350	1	2	M	Pv	2002				[illegible] 2002 (Unpublished data)	
90	[illegible]	Huai Tabtan-Huai Samran	WS	454	0	2	M	Pv	2002				[illegible] 2002 (Unpublished data)	
91	[illegible]	Kaeng Tana	NP	87	0	0	M							
92	[illegible]	Phu Chong-Na Yoi	NP	687	0	2	M	Pv	2002				[illegible] 2002 (Unpublished data)	
93	[illegible]	Pha Taem	NP	258	0	0	M							
94	[illegible]	Khao Phra Wihan	NP	118	0	0	M							
95	[illegible]	Dong Phayayen Khao Yai	WS	319	0	2	M	Cs	2003				[illegible] (Unpublished data)	Photo of track with scale reference-WEFCOM Photobank
96	[illegible]	Khao Yai	NP	2168	1	2	H	Pv		Cd	2002		Lynam 2003	
97	[illegible]	Khao Sam Lan	NP	32	0	0	M							
98	[illegible]	Thap Lan	NP	2234	1	2	M			Cs	2003		[illegible] (Unpublished data)	Photo of track with scale reference-WEFCOM Photobank
99	[illegible]	Pang Sida	NP	844	1	2	M	Pv	2002					
100	[illegible]	Ta Phraya	NP	422	0	2	M	Pv	2003				Kanchanasaka (unpublished data)	

Reference #	Protected Area Name (Thai)	Protected Area Name (English)	Protected Area Type	Size of protected Area (km2)	Smith et al (1999)	Schwann et al (2004)	Survey Effort Score	Most Recent Provisional Evidence Class	Year	Most Recent Confirmed Evidence Class	Year	Exact Date of Observation (if available)	Reference/Remarks (Confirmed evidence)	Data/Voucher/Photo info
121	[illegible]	Thung Yai Naresuan East	WS	1528	2	1	H			C1	2000		WEFCOM 2004	Photo of track with scale reference/WEFCOM Photobank
122	[illegible]	Thung Yai Naresuan West	WS	1872	1	1	H			C1	2000		WEFCOM 2004	Photo of track with scale reference/WEFCOM Photobank
123	[illegible]	Thong Pa Phum	NP	1230	1	2	M							
124	[illegible]	Mae Nam Phachi	WS	489	1	2	M			C1	1997		Pornchai Patumrattanaruk (Unpublished data)	Track records
125	[illegible]	Kaeng Krachan	NP	3022	1	1	H			Cd	2004	2-Apr-04	Kekule (in prep.)	Camera trap photos
126	[illegible]	Kui Buri	NP	969	0	2	M	Pv	2005					
127	[illegible]	Thung Rayah-Nasak	WS	294	0	1	L							
128	[illegible]	Namtok Huai Yang	NP	150	0	6	L							
129	[illegible]	Sadet Nai Krom Luang Chumpon (South)	WS	134	0	2	L	Pv	2005				Kanchanasaka (unpublished data)	
130	[illegible]	Sadet Nai Krom Luang Chumpon (North)	WS	614	0	0	L							
131	[illegible]	Khlong Nakha	WS	473	1	2	M							
132	[illegible]	Khlong Saeng	WS	977		2	H							
133	[illegible]	Khlong Yan	WS	500	0	2	M	Pv	2005				Kanchanasaka (unpublished data)	
134	[illegible]	Khuan Yai Mon	WS	457	1	2	L							
135	[illegible]	Khao Sok	NP	646	1	2	M							
136	[illegible]	Chao Lam Ru - Hat Tai Muang	NP	71	0	2	L							
137	[illegible]	Si Phangnga	NP	246	1	2	L			C1	1999		Kanchanasaka (unpublished data)	Khlong Saeng Wildlife Research Station database
138	[illegible]	Khao Lak - Lamru	NP	125	0	0	L							
139	[illegible]	Kaeng Krung	NP	547	0	2	M	Pv	2005				Kanchanasaka (unpublished data)	
140	[illegible]	Khlong Phanom	NP	421	0	2	L							

Reference #	Protected Area Name (Thai)	Protected Area Name (English)	Protected Area Type	Size of protected Area (Km2)	Smith et al (1999)	Schwann et al (2004)	Survey Effort Score	Most Recent Provisional Evidence Class	Year	Most Recent Confirmed Evidence Class	Year	Exact Date of Observation (if available)	Reference/Remarks (Confirmed evidence)	Date/Voucher/Photo info
141	[illegible]	Khao Luang	NP	376	1	2	L							
142	[illegible]	Namtok Yong	NP	209	0	0	L							
143	[illegible]	Tai Rom Yen	NP	380	2	3	L							
144	[illegible]	Namtok Sikeet	NP	341	0	0	L							
145	[illegible]	Khao Banthat	WS	1243	1	2	L							
146	[illegible]	Tone Nga Chang	WS	181	0	0	L							
147	[illegible]	Thaleban	NP	300	0	0	L							
148	[illegible]	Khao Pu - Khao Ya	NP	709	0	0	L							
149	[illegible]	Khao Nan Klang	NP	321	3	3	L							
150	[illegible]	Chaloem Pra Kiat Somdej Thep	WS	261	0	0	L							
151	[illegible]	Bodo Sungai Padi (Khao Budo)	NP	190	1	2	M							
152	[illegible]	Bodo Sungai Padi (Sungaipadi)	NP	151	1	2	M			Cs	2004		Kanchanasaka (unpublished data)	
153	[illegible]	Bang Lang	NP	242	0	1	M			Cs	2004		Kanchanasaka (unpublished data)	
154	[illegible]	Hala Bala (Hala)	WS	313	0	1	M			Cs	2004		Kanchanasaka (unpublished data)	
155	[illegible]	Hala Bala (Bala)	WS	111	0	2	M			Cs	2003		Lynam (unpublished data)	

CHAPTER 12

TIGER ACTION PLAN

VIETNAM 2005-2010

INTRODUCTION

The tiger in Vietnam, a member of the Indo-Chinese tiger sub-species (*Panthera tigris corbettii*), was widely distributed in forests throughout the country. It is now on the edge of extinction mainly due to its high economic value for its bones and fur and habitat destruction. In Vietnam there was no systematic survey on the number and distribution of the tiger up to now. However, according to the data of previous surveys and report from local sources, it is estimated that tigers occur in 20 provinces with a total population of not more than 150 individuals which are primarily distributed in the common border areas between Vietnam-Laos and Vietnam-Cambodia.

The effects of severe deforestation, overhunting, and trading for many decades on tigers and their prey have eliminated most tigers from their natural habitats and greatly reduced their number. The current populations of Vietnam's tigers survive in much deteriorated and fragmented habitats. And they often live in small groups of 2-5 individuals and there are only two populations of about 10 individual.

Since 1960, tigers have been legally protected. The species has been listed in E Category (highest category) of the Red Data Book of Vietnam and Category 1B "no exploitation and use" of the National Legislation. Vietnam established its first protected area as early as 1962. To date, over 100 protected areas have been established throughout Vietnam in most representative ecosystems and sites in many of which tigers inhabit. A number of training courses and awareness raising activities on tiger conservation have been conducted. In order to provide a legal frame work for management and conservation of wild fauna and flora in general and tiger in particular, Vietnam has promulgated various legal documents as laws, decrees, decisions, and directives on wildlife conservation.

Despite setting up a number of Protected Areas where tigers are distributed, tigers are now seriously threatened with extinction. Assessment of the present status and distribution of Vietnam's tiger population must be the highest priority in outlining, formulating and implementing a comprehensive action plan for conservation of the tiger and restoration of tiger habitat in the country.

2. GOAL

To ensure the survival of existing tiger populations and their habitats and prey as part of Vietnam's biodiversity conservation programmes.

3. OBJECTIVES AND ACTIVITIES

a. Surveys, Assessment and Monitoring

Surveys on tiger conservation and the animal's habitat and prey; detailed assessments of management, and monitoring of current tiger populations are to be conducted with reliable reporting on their status.

Activities	Timeframe	Estimated budget
1. Training scientists and staff at PAs in tiger and other large mammal surveys and monitoring techniques; procurement of crucial equipment to assess the current status/distribution; and in how to write reliable reports.	2005-2006	60,000 USD
2. Conducting different surveys and monitoring tiger populations and monitoring the development of these populations.	2007-2010	1,50,000 USD
3. Through surveys and monitoring of tigers and their prey, developing appropriate measures to conserve them.	2007-2008	20,000 USD

b. Capacity building

The management and enforcement capacities of PAs and relevant agencies responsible for tiger and other wildlife conservation are to be strengthened.

Activities	Timeframe	Estimated budget
4. Conducting capacity building need assessments at PAs and relevant agencies in order to outline different training courses.	2005-2006	30,000 USD
5. Developing suitable training materials and producing	2007-2008	60,000 USD
publications (e.g. identification guides for survey and monitoring of the tiger in Vietnam) .		
6. Conducting different training courses for staff who work with tiger conservation in PAs in different regions of Vietnam.	2008-2010	150,000 USD

c. Legal enforcement

The implementation of current legal documents relating to wildlife conservation and management of PAs to be effectively conducted.

Activities	Timeframe	Estimated budget
7. Managing adequately the PAs where tigers are found and to expand and to establish more new PAs to facilitate tiger and wildlife conservation efforts.	2005-2010	150,000 USD
8. Investigating, controlling, and eliminating the illegal trade on tigers and wildlife through intensive training programmes and law enforcement of both national and international legislation.	2005-2010	40,000 USD
9. Reviewing and completing existing legal documents to conserve and manage tigers, their natural habitats and prey.	2006-2008	20,000 USD
10. Investigating all methods and techniques of hunting of tigers and to implement effectively measures to prevent illegal tiger hunting.	2005-2006	30,000 USD

d. Awareness-raising

Awareness of policy-makers, consumers, traders, poachers, and communities on the conservation of wildlife especially tigers is to be enhanced.

Activities	Timeframe	Estimated budget
11. Publishing posters, leaflets, brochures and organizing contests relating to the tiger and tiger conservation in Vietnam.	2005-2010	200,000 USD
12. Organizing environmental education programs relating to the tiger and biodiversity conservation through mass media to targeted relevant groups including communities.	2005-2010	80,000 USD
13. Develop a series of meetings and seminars at community level to educate local people about the value of wildlife and environment and how to participate in wildlife and tiger conservation.	2006-2008	20,000 USD

e. International cooperation

Cooperation on controls of wildlife especially tigers transportation and trade; and establishment of Tran-boundary PAs, with neighboring countries and international organizations is expanded and effectively implemented.

Activities	Timeframe	Estimated budget
14. Promoting national cooperation with Cambodia, Laos, and China by conducting joint tiger surveys, establishing trans-boundary PAs for tiger conservation and developing regional tiger conservation strategies.	2005-2010	1 50,000 USD
15. Promoting collaboration between relevant agencies and PAs in tiger range countries.	2005-2010	20,000 USD
16. Organizing visits for staff from PAs and relevant agencies in neighboring tiger range countries to exchange experiences and discuss relevant issues relating to wildlife and tiger conservation.	2005-2010	80,000 USD
17. Participating in conferences and workshops organized by GTF to exchange the experience, and fundraising for conservation of the tiger in Vietnam.		90,000 USD

OTHER WTI PUBLICATIONS

A. OCCASIONAL REPORTS

Tribal Territories:
Impact assessment around the Jarawa tribal reserve, middle and south Andaman Islands

Jumbo Express:
A scientific approach to understanding and mitigating elephant mortality due to train accidents in Rajaji National Park.

Elephant in Exile:
A rapid assessment of the human-elephant conflict in Chhattisgarh

Against the Current:
Otters in the river Cauvery, Karnataka

Silent Stranglers:
Eradication of mimosa in Kaziranga National Park, Assam

Living at the Edge:
Rapid survey for the endangered Ladakh urial (*Ovis vignei vignei*) in Leh district of Ladakh Trans-Himalaya

Search for Spectacle:
A conservation survey of the Phayre's leaf monkey (*Tranchypithecus phayrei*) in Assam and Mizoram

Awaiting Arribadda:
Protection of Olive Ridley turtles (*Lepidochelys olivacea*) and their nesting habitats at Rushikuliya rookery, Orissa

Living with Giants:
Understanding human-elephant conflict in Maharashtra and adjoining areas

Crane Capital:
Conservation strategy for Sarus Crane (*Grus antigone*) habitat in Etawah and Mainpuri Districts, Uttar Pradesh

Carnivore Conflict:
Support provided to leopards involved in conflict related cases in Maharashtra

India at the International Whaling commission:
A policy document on India's involvement in the IWC 1981-2003

Sighting Storks:
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As an animal high on popularity charts, the tiger has fascinated and awed generations for centuries. However, with its range confined to 14 Asian countries today, its distribution has more than halved and so have its numbers. With the tiger facing a serious challenge in its entire distribution range, the Global Tiger Forum has compiled the Tiger Action Plans of 12 range states in this volume, giving scientists and conservationists an insight into the strategies adopted by governments to deal with the problem.

Wildlife Trust of India

10 Years in Service of Nature

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