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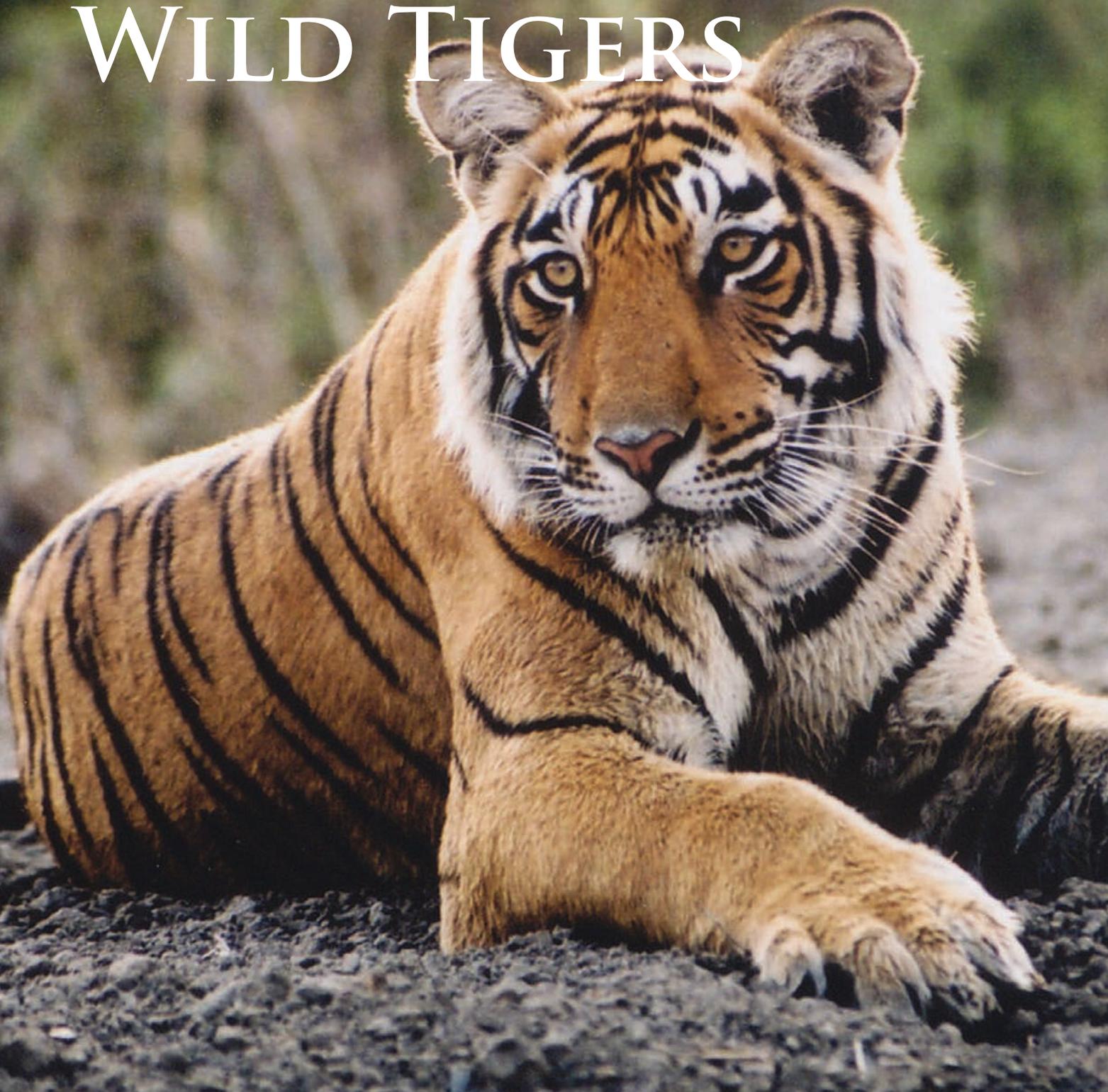
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A FUTURE FOR

44064

WILD TIGERS



THE WORLD BANK



A Future for Wild Tigers



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National Zoological Park

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TABLE OF CONTENTS

Acknowledgements.....	i
Acronyms	iii
Executive Summary	1
Chapter 1. Introducing the Problem	5
I. Introduction.....	5
II. Why Are Wild Tigers in a Precarious State?.....	6
III. The Tiger Trade.....	8
IV. Conclusions.....	9
Chapter 2. The Current State of Tiger Conservation: Challenges and Opportunities 11	11
I. Introduction.....	11
II. The Conventional Approach to Wildlife Management: “Fences and Fines”	12
III. Is Funding for Protected Area Management Adequate and Effective?	14
IV. An Assessment	15
V. From Punitive to Participatory Approaches: Integrated Conservation and Development Projects.....	17
VI. Conclusions	17
Chapter 3. Options for the Way Forward.....	20
I. Introduction.....	20
II. Creating Direct Incentives: Environmental Service Payments.....	21
III. Ecotourism.....	22
IV. Strengthened and Cost-Effective Management of Protected Areas.....	24
V. Biodiversity-Sensitive Infrastructure: Are Trade-Offs Inevitable?	27
VI. The Trafficking of Wild Tigers.....	28
VII. Conclusions	28
Chapter 4. Conclusions	30
I. An Action Plan	30
II. The Role of the World Bank.....	31
Annex 1: List of World Bank Projects	33
Map	35
References	36

LIST OF FIGURES, TABLES, AND BOXES

Figure 1.1. Historic and Present Distribution of Tigers.....	6
Figure 1.2. A Summary of Habitat and Population Trends	7
Figure 1.3. The Differential Impacts of Poaching.....	7
Figure 2.1. Review of the Tiger Reserve Assessment Report.....	16
Table 2.1. Penalties for Poaching Tigers	13
Table 2.2. Number of Tigers and Leopards Reported Killed in Four Tiger-Range States.....	13
Table 2.3 Expenditure on Protection in Selected Tiger-Range States	14
Box 1.1. The Gir Lions and the Poaching Contagion.....	9
Box 2.1. Tiger Conservation Landscapes	12
Box 2.2. Not by Money Alone: Management-Effectiveness Assessment of Indian Tiger Reserves.....	16
Box 2.3. Examples of ICDPs.....	18
Box 2.4. Terai Arc Landscape: A Successful Model.....	19
Box 3.1. The Amur Tiger: A Rare Success.....	20
Box 3.2. Can Carbon Markets Save the Sumatran Tigers and Elephants?	23
Box 3.3. Adapting the Chitwan Model of Community-Based Ecotourism Development.....	24
Box 3.4. Harapan: New Model to Support Conservation of Tiger and other rain-forest species	24
Box 3.5. Nam Theun 2 Hydroelectric Project	27
Box 3.6. Economic and Social Drivers of Wildlife and Related Trade-Control Efforts	24
Box 4.1. The World Bank’s Natural Habitats Policy.....	32

Acronyms

ASEAN	Association of Southeast Asian Nations
CBNRM	Community-Based Natural Resource Management
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CWM	Community Wildlife Management
DPL	Development Policy Loan
EAP	East Asia and Pacific
ECA	Europe and Central Asia
FEANTFP	Far Eastern Association of Non-Timber Forest Producers
ICDP	Integrated Conservation and Development Projects
IUCN	International Union for Conservation of Nature
MEAF	Management Effectiveness Assessment Framework
PA	Protected Areas
SAR	South Asia Region
TAL	Terai Arc Landscape
TCL	Tiger Conservation Landscape
TCM	Traditional Chinese Medicine
WCMS	World Federation of Chinese Medicine Societies
WCS	Wildlife Conservation Society
WEN	Wildlife Enforcement Network

Executive Summary

Tigers are the religious and cultural icons of Asia, serve as the national animal in some countries and figure prominently on the flags of others. Their charismatic appeal is used to sell everything from gasoline to sporting goods and confectionary. Yet, paradoxically, wild tigers are on the brink of extinction. Tigers are an umbrella species and symbolize the plight of wildlife across Asia. Poised as they are at the top of the ecosystem, loss of tigers indicates ecosystems under stress.

Within a century wild tiger numbers have plummeted from over 100,000 to below 4,000 animals. The existing wild populations inhabit fragmented and isolated patches of land constituting a meager 7 percent of their historic range. If current trends persist, tigers are likely to be the first species of large predator to vanish in historic times. Tiger subspecies and populations have already disappeared from Java, Bali, and Central Asia and throughout much of China. The only region in which populations have recovered is the Russian Far East, where habitats are secure and poaching pressures are modest.

The suite of pressures on tigers includes depletion of their prey, degradation of habitats, fragmentation and conversion of habitats, and poaching of tigers. Habitat degradation and prey poaching is largely driven by the subsistence needs of resource-dependent communities in the densely populated landscapes of South and East Asia. On the other hand, habitat fragmentation is typically a consequence of expanding economies that have converted forests to plantations, arable land, and mine sites, often along roads that become progressively wider.

It is tiger poaching, however, that has emerged as the most urgent and immediate threat to tigers in the past five years. Tigers are killed for the flourishing illegal trade in tiger organs for traditional oriental medicines. The international trade in tiger products has been banned since 1975 through the

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The illegal international trade in wild tigers remains highly profitable, well structured and has close links to other organized crime. The World Chinese Medicine Society has declared that tiger parts are not necessary in traditional medicines. Legitimate traditional medicine practitioners no longer use tiger products, but there remains a persistent and growing illegal market. Poaching has become so intense that entire tiger populations have been eliminated from what were once deemed to be secure reserves throughout Asia.

The challenges of conserving tigers are daunting. Protected areas, the stronghold of tiger conservation efforts in South and East Asia, are rarely large enough to ensure their survival, and the animals must also be protected from poaching. Not only is it necessary for tigers and their prey to disperse between small reserves, but conservation efforts must seek to expand tiger and prey populations in all core areas and encourage breeding between tiger populations through habitat recovery.

With the multiple pressures of poaching, prey depletion, forest degradation, and habitat loss, tigers have become an enforcement-dependent species. To secure their future in the wild, they must be given protection from poaching and adequate land with sufficient prey. This requires financial and material resources and a strong policy commitment to conservation.

To save the tiger, it must be turned from an economic liability into a living wild asset. With large and permeable forest boundaries, an exclusive reliance on punitive approaches and planning will not suffice. The evidence suggests that a conservation model that resists development and growth will be overwhelmed and undermined by the forces it opposes. A new paradigm for conservation must recognize that those who live with the tiger determine its fate.

Learning how this can be achieved remains a formidable challenge.

The good news is that there still remain blocks of habitat that could sustain wild tigers. These are the seventy-six Tiger Conservation Landscapes (TCLs) that have been identified by scientists, in 13 tiger-range countries. The challenge is that many of these areas are in densely populated countries with vast infrastructure needs and where the conversion of forests to plantations and agricultural lands has accelerated over the last decade.

Most tiger-range countries have introduced legislation aimed at protecting tigers and other biodiversity, but there is an enforcement deficit. The prescribed penalties for poaching tigers are typically harsh and often punitive. But in practice enforcement is weak, and poachers and traders are seldom brought to justice. Wildlife agencies frequently lack the very basic resources needed for effective management — personnel, communication equipment, and transport — while the legal institutions needed to convict offenders are often overstretched and under resourced. Economic pressures have overwhelmed the virtuous intent of policy. Despite the designation of “reserve status” to forests the erosion and fragmentation of habitats continues due to encroachments and intrusive development.

There is an accompanying resource deficit. Conservation of endangered species vulnerable to poaching is an especially costly exercise. As a point of comparison, in the United States the federal budget for conservation is approximately \$20 per hectare. In contrast, expenditure on protection in Indonesia is as low as \$1 per hectare and about \$2 to \$3 per hectare in India. Conservation of biodiversity is a global public good and hence calls for international support and cooperation to finance the costs of protecting endangered species. Greater funding through existing overseas development-aid channels would be desirable but may not be forthcoming, given the many competing demands on these resources. It is necessary to look to alternative and novel avenues for generating resources for safeguarding biodiversity.

The inconvenient truth is that under current management systems, wild tigers are silently slipping away. Well-intentioned international, national, and regional support for tiger conservation over the last decade has not reversed the decline in tiger populations. In many of the tiger-range countries, the political will to address these concerns is limited, and conservation remains under funded and a low policy-priority.

The immediate and most urgent priority is to improve protection on the ground to address the poaching crisis. This will require considerable strengthening of human resources and surveillance, enhanced intelligence, and improved incentives and accountability of forest staff. Enhanced enforcement is essential and can help win isolated battles, but it may not win the war against extinction. Addressing the threats against tigers calls for new and innovative interventions that tackle the root causes of the problem — the incentives to convert and destroy habitats and to poach tigers.

There is no “one-size-fits-all” solution to tiger conservation. The precise mix and type of policies necessary will vary across countries, reflecting local opportunities and pressures. The conservation model appropriate in the sparsely populated landscapes of the Russian Far East would not suit the densely populated and accelerating economies of East and South Asia. To address the root causes of the decline in tiger populations, the approaches taken would need to blend incentives for conservation (carrots) with deterrence and enforcement (sticks). While this report cannot provide a detailed solution for each country, it does suggest the broad contours of a new conservation paradigm that could be tailored to local conditions. Global experience suggests that the chosen instruments could include some combination of the following options:

- **Cash Transfers for Conservation.** Many natural habitats provide global services far more valuable than their commercial uses, but continue to be destroyed because of the lack of incentives for conservation. Environmental service payment schemes are often used to address this problem. They provide transfers for the

preservation of habitats, to encourage changes in land-use practices, or to protect a particular species. Although seldom used in tiger-range countries, these transfers have the potential to become valuable instruments for promoting conservation, creating a local constituency for tigers and simultaneously addressing poverty problems. Environmental service payments will not be appropriate across the entire tiger landscape. They are most suitable when the profits from unsustainable activities are relatively low (as in many low productivity landscapes in the Terai) or where the value of the environmental service provided is high (often the case with watershed benefits or for addressing climate change, if the market for carbon sequestration develops further).

- ***Ecotourism in the tiger-range states is largely underdeveloped and under managed.*** Ecotourism is among the fastest growing industries in the world and has been widely used to generate resources for conservation and to share benefits with local inhabitants. It remains largely underdeveloped in tiger-range states partly because of the remoteness of many tiger landscapes and the difficulties of seeing tigers in dense tropical rain forest, the primary tiger habitat in South East Asia. But where opportunities exist, ecotourism should provide a valuable source of revenue and an opportunity to generate and share benefits directly linked to the presence of tigers. The most successful models for tiger tourism are found in Nepal, where a community-based tourism model has been developed that strongly emphasizes benefit sharing, turning poachers into tour guides and allowing the regeneration of degraded forests. Ecotourism potential varies considerably across tiger-range countries. In the remote Russian Far East, where tiger densities are low (often less than one tiger per 100 square kilometers), tiger tourism is unlikely to be viable; in other countries the potential is either unrealized or has been inadequately managed, often leading to overcrowding and environmental damage.

- ***Joint management approaches allow agencies to play to their comparative advantages.*** Where institutions are weak or under-resourced, joint management between the government and other actors can improve cost-effective conservation efforts. Joint approaches are widely used in other areas of government enterprise (public-private partnerships in health, education, and infrastructure, for example). These arrangements recognize that ultimate sovereignty over resources rests with governments but that other agencies can contribute skills that may not be readily available in government institutions. In the tiger-range states, few attempts have been made to enlist the support of non-governmental actors, but such management agreements are not uncommon in Latin America and parts of Southern and Eastern Africa. South Africa is where the strongest and most successful conservation models have emerged. An advantage of these arrangements is that they can address the many obstacles that constrain government management of protected areas, such as the difficulties of investing in protection, sharpening incentives, and providing adequate salaries.

- ***Biodiversity-sensitive development and infrastructure must be part of the solution.*** The tiger-range countries have vast infrastructure needs that continue to overlap with tiger habitats. There are numerous examples of good infrastructure projects that minimize the negative footprint through sound design and improve environmental outcomes by providing resources for conservation. These need to be documented and scaled up.

- ***Tackling the illegal trade in tiger parts calls for a global approach.*** The trade in tiger parts transcends countries and cannot be resolved by unilateral national actions. Despite the immense scale of the illegal trade, there is only scant understanding of either the complex underground web of suppliers or the factors driving the demand for wild tiger products. Responses that tackle both the demand

and the supply side of the illegal market are needed. On the supply side, immediate actions are needed to break the supply chain by preventing poaching, and, through global efforts to control cross-border trafficking. Interventions on the supply side need to be accompanied by vigorous efforts to tackle the root cause of the problem — the demand for tiger products. History has shown that laws do not and cannot alter desires and demands. This is especially true for products with a demand rooted in history. Consequently, trade bans and supply-side interventions can only have a limited impact. Mechanisms to reduce demand are clearly needed, but appropriate approaches have yet to be defined on a broad scale because little is known about the demographics and motivations of users and the associated retail dynamics.

The Role of the World Bank

The World Bank has a broad mandate that includes the stewardship of global public goods. The Bank's growing engagement in environmental protection is consistent with its wider historical evolution and commitment to sustainable development. The Bank has a considerable investment in environmental protection, including in tiger and biodiversity conservation. The outcomes of most tiger projects have been mixed. The greatest accomplishments have been in the Russian Far East. But success elsewhere has often been elusive, undermined by poaching and the unrelenting erosion of habitats driven by poverty and other economic pressures.

- **With its broad experience in development and conservation the World Bank is well placed to learn lessons from the past.** With its global reach, the World Bank is among the few organizations that can respond at the scale needed to help address the illegal trade in tiger parts. Its presence in most tiger-range countries can allow it to facilitate partnerships among international NGOs, governments, and the scientific community to assist countries in developing sustainable conservation solutions — regardless of whether these lead to specific projects. Actions by the World Bank or any country in isolation will not be adequate to save tigers and a genuine commitment and partnership is needed to achieve this objective. To implement this vision of tiger conservation, the Bank proposes to facilitate a global alliance to develop more effective conservation strategies in consultation with country experts and governments, and tackle problems that transcend national boundaries.

Conclusion

The challenge of saving wild tigers has become a global one and calls for a global solution and commitment. The successful conservation of wild tigers and the natural capital that sustains them are among the key indicators of sustainable development and require greater global resources and attention.

Chapter 1. Introducing the Problem

“An environment in which animals and plants become extinct is not safe for human beings either.” — Indira Gandhi, former prime minister of India¹

I. Introduction

1. Tigers are an umbrella species and symbolize the plight of wildlife across Asia. They are the religious and cultural icons of Asia, serve as the national animal in some countries and are a prominent figure on the flags of others. Their charismatic appeal is used to sell everything from gasoline to sporting goods to confectionary. Yet, paradoxically, wild tigers are on the brink of extinction.

2. Within a century their numbers have plummeted from over 100,000 to below 4,000 animals.² The existing wild populations inhabit fragmented and isolated patches of land that constitute a tiny fraction of their historic range (Figure 1.1). If current trends persist, tigers are likely to vanish from the wild. Poised as they are at the top of ecosystems, the loss of tigers indicates that ecosystems are under stress. There is danger that if tigers are eliminated from forests the life-sustaining ecosystem services they provide will erode. As a top predator, tigers play some unexpected but nevertheless crucial roles in sustaining ecosystems and building their resilience.³



Photo Courtesy: Michael J. Vickers

¹ Inaugural Address, Inaugural Function, April 12, 1972, National Committee on Environmental Planning Commission, Vigyan Bhavan, New Delhi, India.

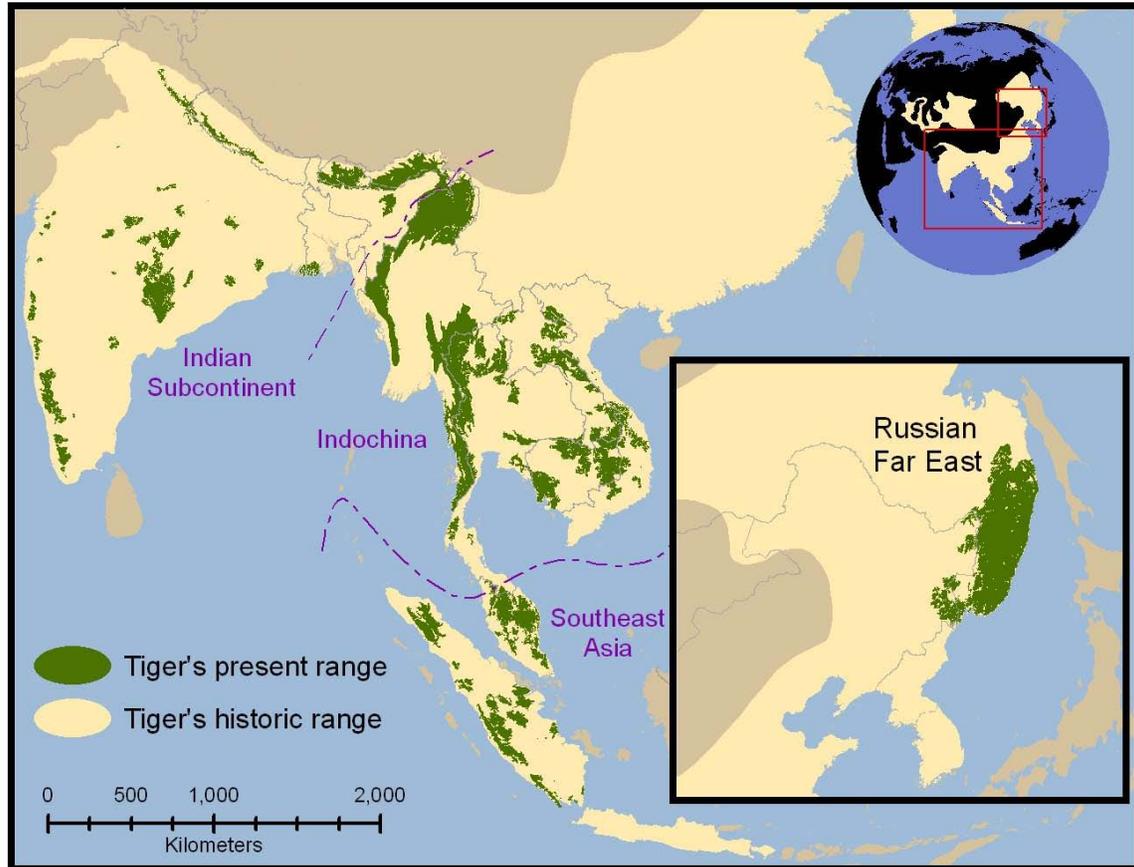
² J. Seidensticker, B. Graticke, and M. Shrestha, in press.

³ G. Chapron, H. Andren and O. Liberg, 2008.

II. Why Are Wild Tigers in a Precarious State?

3. **A vulnerable top predator.** Tigers are large carnivores and have evolved as highly specialized predators of large animals (such as deer, pigs, and wild cattle). The tiger is never found far from water and displays remarkable resilience to temperature, with a range that spans from freezing alpine meadows to sweltering tropical mangrove swamps. Because of its size and specialized biological niche the tiger is highly vulnerable.⁴

Figure 1.1. Historic and Present Distribution of Tigers



Source: Dinerstein et al 2007

4. **To survive, tigers require abundant prey and ample space.** The carrying capacity of tigers in a given area is determined by the availability of prey animals. In the prey-rich tall-grass savannahs of Kaziranga in India tiger densities have been as high as twelve per 100 square kilometers, whereas in the prey-poor forests of the Russian Far East tiger densities are as low as about one tiger per 200 square kilometers.

5. **Why do tigers require so much prey and space?** To survive, a tiger must feed on a deer-sized mammal approximately once a week, consuming about 50 animals per year. Tigers crop about 10 percent of the available prey base, which broadly corresponds to the rate at which the prey population grows.⁵ The implication is that a prey population of about 500 deer-sized

⁴ J. Seidensticker, S. Christie, and P. Jackson, eds., 1999.

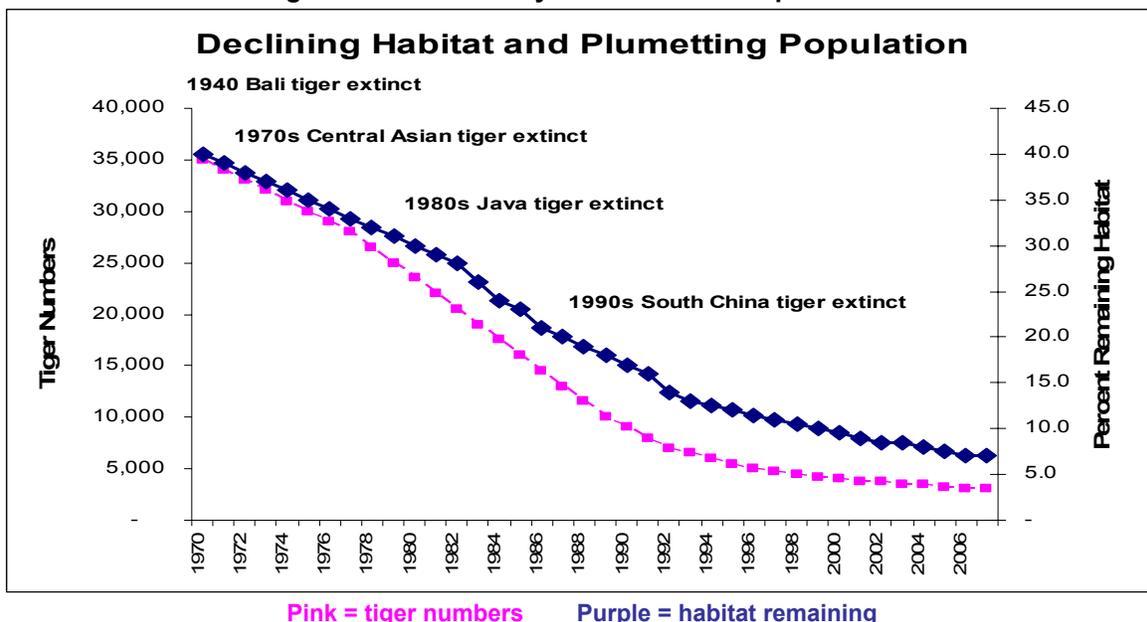
⁵ The reason for this is closely linked to the need for biological sustainability of both tigers and their prey. For the prey population to sustain itself, the off-take of prey (predation rate) cannot exceed the prey's reproduction rate. The prey population typically grows at about 10 percent, and in equilibrium, this "excess" is consumed by predators.

animals is needed to support a single tiger. Consequently, in prey-rich tropical forests, tiger densities are higher than in the prey-poor landscapes of the Russian Far East.

6. Tigers occupy only 7 percent of their original range. Tigers once ranged in an arch stretching from the southern reaches of the Caspian Sea to the Indonesian islands of Sumatra, Java, and Bali. Their habitat encompassed the Russian Far East, Eastern and Southern China, Southeast Asia and the Indian subcontinent (including the Indus River Valley in Pakistan) (Figure 1.1). Tiger subspecies from the extreme ends of the distribution — the Caspian area, Java, and Bali — are now extinct. In the last decade habitat collapse has accelerated, and the tiger-occupied area has shrunk by 40 percent. The precipitous decline in tiger populations mirrors the reduction in their habitat (Figure 1.2).⁶

7. Habitat erosion is driven by both poverty and prosperity. The expanding economies and populations of South and East Asia have led to the conversion of habitats for agriculture, plantations, mines, and other uses. Simultaneously, subsistence needs and a high degree of resource dependence in some poor and densely populated landscapes have compounded these problems, leading to further degradation of habitats.

Figure 1.2. A Summary of Habitat and Population Trends



Tigers are solitary animals that inhabit semi-exclusive ranges. The amount of forest required to sustain a tiger depends on the availability of prey.
 Source: Wikramanayake et al., in press.

8. Poaching is the most urgent and immediate threat to tigers. The consequences of poaching are particularly damaging in degraded habitats with a depleted prey base, where tigers are few in number and face a high risk of starvation. Most tiger populations fall into this category: they are small (numbering less than 30 individuals), completely isolated, and face a bleak future. These intrinsically fragile population clusters are especially vulnerable to the consequences of poaching (Figure 1.3).

Figure 1.3. The Differential Impacts of Poaching

⁶ E. Sanderson, et al., 2006.

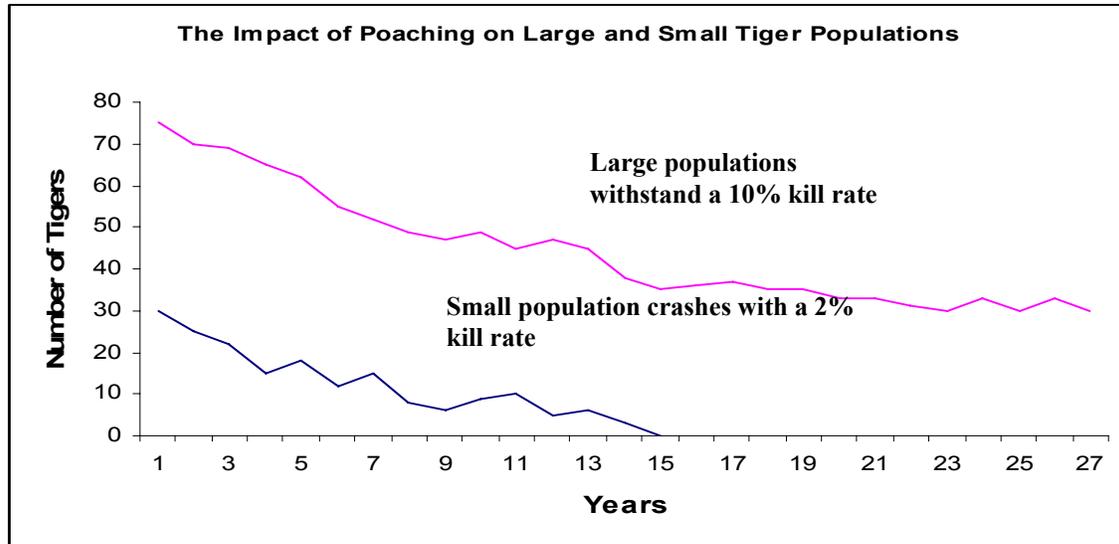


Figure 3 summarizes simulations from the Damania-Karanth-Stith model⁷ of tiger demography. Small populations are fragile, unstable, and vulnerable to extinction. Modest amounts of poaching induce extinction here. This is the norm — most tiger populations are small. A larger population can sustain losses of 10 percent a year or more.

III. The Tiger Trade

9. **Why are tigers poached?** While trade in tiger parts and derivatives has been banned around the world for more than a decade and law-abiding practitioners of traditional Chinese medicine (TCM) now use alternatives, the illegal trade continues. Poachers mainly operate to satisfy a stubborn demand for tiger bones to make health tonics and for tiger skins to use as décor or clothing. Recent reports identify a growing illegal market for tiger meat as an exotic cuisine. Most tiger products appear to be destined for markets in East Asia, where the average per-capita GDP is rising, leading to an expanding market for illegal tiger parts. The legal international trade in tiger products has been banned since 1975 through the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Nonetheless, the illegal trade in wild tigers persists and remains highly profitable, well structured, with close links to other organized crime.

10. The World Federation of Chinese Medicine Societies (WFCMS) has declared that tiger parts are *not necessary* for human health care and that alternatives are plentiful, affordable, and effective. The WFCMS recognizes, however, that more public outreach will be necessary to change attitudes and convince consumers who self-prescribe illicit products such as tiger-bone wine.

11. **How are tigers poached?** Poaching is usually undertaken by skilled forest inhabitants who generally work on behalf of a trader. The techniques used to kill tigers are simple and lethal: typically, a reusable steel trap, cable snare, or poisoned bait. The costs of poaching a wild tiger are thus small and unlikely to exceed \$100 to \$200, even when the opportunity costs of time and the expected penalties for poaching are factored into the calculations.⁸

12. The carcass is sold to traders who capture the bulk of the profits by smuggling tiger parts to retail markets in the urban centers of East Asia.⁹ All parts of a tiger — the penis, paws, teeth, bones, and fur — can be traded, with a total retail value in the region of \$10,000 up to \$70,000

⁷ R. Damania, et al., 2003.

⁸ See Damania, et al., 2003.

⁹ The market structure and marketing chain is complex. First, a large number of poachers operate under near open-access conditions. They sell to a small number of traders who by virtue of their market power set the prices paid to poachers and demanded from sellers. This portion of the market exhibits the features of an oligopoly. The products are finally sold by a large number of retailers in various locations. Depending on the precise parameters of the market, this can have troubling consequences for controlling the trade through such economic instruments as legalization. Stated simply, traders can adjust their margins to accommodate changes in competition or demand at the retail end of the market and thus frustrate attempts to diminish incentives to poach (Bulte and Damania, 2005).

per adult male. Products derived from some tiger parts, especially tiger-bone wine, are diluted to increase the value exponentially through the trade chain.

13. Though legislation is in place to protect tigers, wildlife agencies frequently lack resources for effective enforcement of laws. The penalties for poaching are often harsh, but the likelihood of apprehension remains low and that of a conviction even lower. Even in

Box 1.1. The Gir Lions and the Poaching Contagion

Having depleted wild tiger populations, poachers have recently turned to the last remaining Asiatic lion: the Gir lion living in the Gir Forest of the Indian state of Gujarat. This subspecies is biologically and behaviorally

India, with its well-developed institutional structure for conservation, a mere ten tiger poachers have been convicted in the past five years, and not a single trader has been penalized.

14. Tiger poaching has become contagious. Having depleted tiger populations, commercial poachers have turned to the other Asian big cats: Asian lions, leopards, snow leopards, and clouded leopards. The Gir lions are the only survivors of what was once an extensive population of Asian lions that ranged from Greece to India (Box 1.1). Within a two-week period poachers killed 10 percent of the population of this rare subspecies of lion. Having poached tiger populations in Cambodia, Myanmar, and Thailand, commercial poachers have intensified and focused their efforts in Malaysia, and now tigers and other wildlife there are under heavy pressure.

IV. Conclusions

15. With the twin pressures of poaching and habitat loss, tigers have become an enforcement-dependent species. To secure their future in the wild they must both be protected from poaching and given adequate land with sufficient prey. This requires financial and material resources and a strong policy commitment to conservation. Ironically, there are more tigers, of a non-wild variety, in captivity than in the wild. Reintroducing captive-bred tigers is neither feasible nor cost effective. Rather, the only practical option is to protect and allow existing wild populations to survive and expand.¹⁰ Consequently, potential habitat must be secured to permit the existence and expansion of viable populations.

16. The inconvenient truth is that under current management systems wild tigers are slipping away. Well-intentioned international, national, and regional support for tiger conservation efforts over the last decade has clearly been inadequate to halt the decline in tiger populations. The most urgent problem is to find effective strategies to control the poaching of tigers and their prey. In the medium term, the fragmentation and degradation of habitats needs to be addressed by developing a conservation model that enlists the forces of development and turns a species often viewed as an economic liability into an asset living in the wild.

¹⁰ S. Christy, Zoological Society of London, personal communication.

unique and distinct from the more common African lion. Just one small population (of 300 to 350 individuals) of the Asiatic lion remains.

Lion bones and claws are essentially indistinguishable from those of tigers, and appear to be traded in lieu of tiger products. The Asiatic lions are conditioned to share their habitat with humans and make easy prey for poachers. Within a short two-week period (between April 28 and May 13, 2007), sixteen lions were killed by poachers, despite the arrest of one of the poaching gangs. Poaching at this scale will rapidly extirpate the population, with negative consequences for globally significant biodiversity and the rural economy of Gir, which depends heavily on its lions as a tourist draw- card.

Chapter 2. The Current State of Tiger Conservation: Challenges and Opportunities

“Tigers...are predestined by their perch at the top of the food web to be big in size and sparse in numbers. They live on such a small portion of life’s available energy as always to skirt the edge of extinction.” —E. O. Wilson¹¹

I. Introduction

1. The challenges of conserving tigers are daunting. Protected areas, the stronghold of tiger conservation efforts in South and East Asia, are rarely large enough to ensure the tigers’ survival, and they must be protected from poaching as well. Not only must tigers and their prey be able to disperse between small reserves, but conservation efforts must also seek to expand tiger and prey populations in all core areas and encourage breeding between tiger populations through habitat recovery.

2. The good news is that there still remain blocks of habitat capable of sustaining wild tigers. Seventy-six Tiger Conservation Landscapes (TCLs) have been identified by scientists in 13 tiger-range countries.¹² Each TCL is a connected habitat sufficient to harbor at least five tigers and where tigers have been confirmed in the last decade (Box 2.1). The problem is that these remaining habitats are being rapidly fragmented and converted to other uses and the synergistic impacts of both prey and tiger poaching have led to the collapse of populations.

3. The central problem of wild tiger conservation is therefore also the overriding economic problem of maintaining forest size, productivity, and the full assemblage of biodiversity capable of generating life-sustaining ecological services. The decline and loss of tigers, a sentinel animal, are strong indicators of deteriorating environmental quality and point to a risk to our own future well-being. A better understanding of the strengths and deficiencies of the past can be a useful guide to developing new conservation approaches for the future. This chapter provides a brief

overview and assessment of gaps and good practices in current approaches to wildlife and tiger management.



A wild tiger with ribs visible. To survive, tigers need to feed at least once a week on a large deer-sized mammal.

Photo Courtesy: Sangay, Ministry of Agriculture, Bhutan – WWF / Save The Tiger Fund

¹¹ E. O. Wilson, 1993, *The Diversity of Life* (New York: W. W. Norton), 36.

¹² See Map 1 in Annex 1, in Dinerstein, et al., 2006. The tiger-range countries include India, Nepal, Bangladesh, Bhutan, Myanmar, Thailand, Cambodia, Vietnam, Laos, Malaysia, Indonesia, China, and Russia.

Box 2.1. Tiger Conservation Landscapes

As a territorial top carnivore, tigers require large spaces. The key insight scientist gained from thirty years of field studies of tiger demography and conservation genetics is that small reserves alone are inadequate to allow recovery of tigers; the tiger's recovery and resilience in the face of change require a landscape-scale approach. Many of the current protected areas are too small to harbor ecologically, demographically, and genetically viable populations of tigers over the long term. In response, biologists have identified tiger conservation landscapes in which protected areas that harbor tiger subpopulations are linked by dispersal corridors, enabling the subpopulations to be managed as meta-populations. Although knowledge about the tiger's persistence outside protected areas is inadequate, such corridors will permit behavioral and ecological traits, such as sub-adult dispersal from natal areas, and allow genetic exchange and maintenance of social structure to persist. These landscapes often cross political boundaries, reflecting the transboundary nature of tiger habitat requirements.

Conservation scientists have identified seventy six Tiger Conservation Landscapes (TCLs) across the tiger's current range. Each landscape was classified by measuring its contribution to current tiger conservation and was further prioritized in terms of its contributions to the representation of tigers across the range. Global and regional priority landscapes were identified in all major regions in which tigers occur. Investing in these global and regional priorities will ensure conservation of not just tigers but also of other biodiversity and essential ecological services.

Source: From Dinerstein, et al., 2006.

II. The Conventional Approach to Wildlife Management: “Fences and Fines”

4. **The “fences and fines” approach.** As with other enforcement-dependent species, the conservation of tigers requires a considerable investment in their protection through laws, resources, and an effective institutional architecture that deters wildlife crimes and retains sufficiently large habitats. Recognizing these needs, all tiger-range countries have introduced legislation aimed at protecting tigers and other biodiversity. Efforts rely on regulations to restrict undesirable land uses and intrusions into protected areas (the “fences”) and on fines to penalize breaches of these laws. Most countries have established the requisite institutional architecture to implement such laws, typically through the forestry services.

5. **Penalties are available, but they are seldom applied.** The prescribed penalties for poaching tigers are typically harsh and often punitive. Imprisonment is mandatory for people convicted of poaching, and the fines are severe by local standards (Table 2.1). But the enactment of protective legislation or the designation of reserve status can achieve little without effective enforcement, and in practice poachers and traders are seldom brought to justice. In Indonesia, between 2004 and 2006, 12 cases of tiger poaching or possession came to court. The most severe penalty was a jail term of 14 months and a fine of \$110 for the possession of two tiger skins and one skull.¹³ In North Sumatra, TRAFFIC has provided intelligence to the authorities about retail outlets and urban dealers in tiger products, but no enforcement action had been taken against the dealers one year later. Even in India, with its sophisticated system of forest protection and a generally strong legal system, a mere ten poachers have been convicted in the past five years,¹⁴ representing a very small proportion of the likely actual number of offences.

6. **The magnitude of poaching is large, but little reliable information is available.** Table 2.2 summarizes the record of known tigers and leopards poached since 2000 in India,

¹³ J. Ng and Nemora, 2007.

¹⁴ Personal communication, Wildlife Protection Society of India.

Nepal, Indonesia, and Malaysia. What is certain is that these figures do not reflect the real extent of the problem. To reach an estimate of the likely magnitude of poaching, Indian customs authorities multiply known offences by a factor of ten. In other countries illegal wildlife trade experts estimate known offences by a multiple of 70. A calculation based on predator-prey ratios suggests that in the absence of poaching, India's tiger population might have doubled. The virtuous intent of protective legislation or the declaration of protected areas has done little to stem the tide of poaching.

Table 2.1. Penalties for Poaching Tigers ¹⁵

Country	Minimum Sentence	Maximum Sentence
Cambodia	5 years in prison	20 years in prison
Nepal	5 years in prison and/or \$700 fine	15 years in prison and/or \$1400 fine
Bangladesh	6 months in prison and/or \$12 fine	14 years in prison*
China	\$120 fine	10 years in prison and/or \$1,200 fine
Myanmar	7 years in prison or \$2000 fine	7 years in prison and \$2000 fine
India	3 years in prison and fine of \$220	7 years in prison and \$550 fine
Vietnam	No minimum	7 years in prison
Laos	3 months in prison and \$24,000 fine	5 years in prison and \$24,000 fine
Bhutan	\$1100 fine	5 years in prison and/or \$4,500 fine
Malaysia	No minimum	5 years in prison and/or a fine of \$4,200
Thailand	No minimum	4 years in prison and/or \$1,000 fine
Indonesia	No minimum, usually 6 months in prison	3 years in prison
Russia	4-6 months in prison or \$400 fine	2 years in prison or \$11,500 fine

* The Wildlife Preservation Act 1974 prescribes a maximum of one year in prison and/or a \$24 fine, but in 2003 a tiger poacher was sentenced to 14 years in prison under Section 15 (1) of the Special Power Act, 1974.

Table 2.2. Number of Tigers and Leopards Reported Killed in Four Tiger-Range States

Year	Number of Tigers and Leopards Killed			
	India ¹	Nepal ²	Malaysia ³	Indonesia ⁴
2000	52 tigers, 1,278 leopards	NA	0	65
2001	72 tigers, 166 leopards	NA	3	38
2002	46 tigers, 89 leopards	NA	2	48
2003	38 tigers, 148 leopards	NA	6	NA
2004	38 tigers, 123 leopards	12 tigers, 8 leopards	2	NA
2005	46 tigers, 199 leopards	7 tigers, 37 leopards	1	NA
2006	37 tigers, 160 leopards	2 tigers	0	23
2007	27 tigers, 122 leopards	8 tigers, 5 leopards	NA	NA

1. From all records and reports compiled by Wildlife Protection Society of India.

2. Personal communication, Mahendra Shrestha.

3. Malaysian Tiger Action Plan.

4. Sumatran tigers known to have been killed or removed from the wild (C. Shepherd and N. Magnus, 2004, *Nowhere to hide: the trade in Sumatran tigers*, [TRAFFIC Southeast Asia]; J. Ng and Nemora, 2007).

¹⁵ The current minimum and maximum penalties for people convicted of illegal hunting or trafficking of tigers or endangered animals in tiger-range states, ranked by the severity of the maximum possible prison sentence. Fines are presented in US\$ equivalents.

III. Is Funding for Protected Area Management Adequate and Effective?

7. **The protection of species vulnerable to poaching is a costly exercise.** The example of the African elephant is instructive. During the high point of the African poaching crisis of the 1980s, losses were concentrated in four states with wildlife management budgets ranging from \$0.05 to \$0.15 per hectare of protected areas.¹⁶ In contrast, elephant populations stabilized in South Africa and Zimbabwe, where budgets were \$43 and \$4.75 per hectare, respectively.¹⁷ South Africa is where the strongest and most successful wildlife management model has emerged.

8. **Funding for tiger conservation varies considerably between countries, but it is typically low.** Expenditure on conservation in the tiger countries reflects country priorities, differing pressures on their resources, and fiscal capacity (Table 2.3). As a point of comparison, the U.S. federal budget for the management of protected areas exceeds \$2 billion a year, or \$20 per hectare. Expenditure on protection in Indonesia is as low as \$1 per hectare, about \$2 to \$3 per hectare in India,¹⁸ and as much as \$25 per hectare in Nepal.

Table 2.3 Expenditure on Protection in Selected Tiger-Range States

Country	Extent of Protected Area or Tiger Reserve (ha)	Expenditure per Hectare (US \$)
Nepal ^a	500,000	26
Bangladesh ^b	577,000	2 – 3
India	3,776,100	1 (2005), 2 – 3 (2006)
Bhutan	1,119,500	3 – 4
Malaysia ^c	4,343,500	2
Thailand ^d	2,200,000	5
Indonesia: Gunung Leuser	2,500,000 ^e	1
Kerinci-Seblat	1,330,000 ^f	3.7
Russia ^g	651,900	4.0–5.8

- a. TAL expenditures by government and NGOs, including expenditure on army patrols in PAs.
- b. Sundarbans.
- c. Taman Negara National Park.
- d. Includes donor funding and expenditure on non-enforcement activities such as workshops and travel.
- e. Gunung Leuser Ecosystem.
- f. Kerinci-Seblat National Park (not including NGO investment in tiger patrols).
- g. Russian government allocation plus NGO investment.

9. These figures should be interpreted with caution. Expenditure classifications vary between countries, and the countrywide aggregates mask significant variations within countries. Many reserves lack the funds needed for the very basic tools of wildlife management — personnel, vehicles, communications and other equipment — while others, even within the same country, are well equipped. A further problem is that even when funds have been allocated at the central level of government, they may not be disbursed or made available to wildlife managers on the ground.

10. India and Nepal are exceptional among the tiger-range countries and deserve further comment. Nepal uses its defense personnel to patrol important protected areas. This effort is combined with mechanisms to share the benefits from ecotourism with the local communities around the protected areas. Community-managed buffer zones have resulted in the recovery of forests and tiger populations. India too has responded forcefully to the poaching crisis: the

¹⁶ These countries collectively suffered a loss of more than 700,000 elephants in a decade. Note that these figures are in nominal terms and are not adjusted for inflation for precise comparison with current values. A. Kontoleon and T. Swanson, 2002, *The WTP for property rights for the giant panda: Can a charismatic species be an instrument for conservation of natural habitat?* (China Council for International Cooperation on Environment and Development), last read May 17, 2008 at http://www.ucl.ac.uk/cserge/Kontoleon%20and%20Swanson_Rome_2002.

¹⁷ The costs of conservation are known to vary considerably across countries and ecosystems — with a scale of variation over seven orders of magnitude. Assessments suggest that conservation costs increase with population density and the density of economic activity but decline with size of protected area. The latter simply reflects economies of scale in protecting areas with fewer edges and boundaries (Blamford, et al., 2003).

¹⁸ The total allocation in 2006 is Rs 329 (\$8) million, spread over 37,761 km², or an averages of Rs 87.13 (\$2) per ha.

planned allocation for tiger protection will soon be increased to about \$150 million over five years. This is equivalent to approximately \$20,000 annually per living tiger or about \$8 per hectare and amounts to a three- to fourfold increase in the available budget. India, with its long history of tiger protection, also has in place an elaborate system of forest monitoring and protection. There is provision in the budget for regular patrols through protected areas with a forest guard assigned on average to every three to five square kilometers of tiger reserve. In reserves with vigorous monitoring and enforcement, there has been some success in limiting the level of forest encroachment and poaching. In other places, protection has been less effective, with unfilled vacancies in the forest department and limited supervision of patrol activities.¹⁹

IV. An Assessment

11. Investment in protection is essential and without it the tiger will not survive. Forest, wildlife, and park services stand on the front lines between tigers and poachers, and they must be adequately equipped to deal with the unprecedented and rising pressures they face. Modern surveillance and intelligence techniques, a considerable strengthening of human resources, and high-powered incentives for improving staff performance and morale are required.²⁰ All of this can only be achieved with adequate financial commitments from governments.

12. But funding for protected-area management alone will not suffice. Improvements in enforcement can give breathing space to wild tigers, but they do not address the real cause of the poaching problem — the demand for tiger parts. In the 1970s and 1980s, when demand was low, the prevailing enforcement models were effective. Protected area, site-based protection, seemed to contain the problem.²¹ The first wave of poaching on a commercial scale occurred in the late 1980s and early 1990s, unleashed by a significant demand for tiger products for traditional medicines. The major policy response was to secure more stringent bans on the illegal trade and to increase protection capacity in some areas.²² Demand has accelerated yet again for reasons that are poorly understood, and it has overwhelmed and undermined the protection infrastructure. Given the magnitude of the problem, a strategy for controlling the illegal trade calls for interventions along the entire market chain: in the tiger reserves where poaching occurs, in the intermediate trade, at the retail level, and most importantly, at its source — the demand for tiger products.

13. People who live with tigers ultimately determine their fate. They must see the species as a living asset if they are to allow its continued coexistence. A further challenge is that enforcement is especially costly in the absence of support from the local community. Effective wildlife management must aim to make landscapes *with* tigers worth more than those without. This is especially important in the densely populated and rapidly expanding economies of Asia.

14. The funding gap has been exacerbated by uncertainty about the effectiveness of conservation expenditure (Box 2.2). Reluctance to invest in species protection has in part been driven by the perception that such investments have not yielded results. There is a risk of donor and community fatigue when faced with seemingly insoluble conservation woes. Many other areas of policy offer mechanisms to evaluate performance and learn lessons based on objective and quantifiable criteria. In this regard conservation policy has lagged behind many other fields (notably health) and generally relies on case studies and narratives that do not provide the comparative evaluations needed to define priorities and identify success. Frequently missing from funding models is a robust assessment of needs with transparent and verifiable criteria for success and mechanisms to reward success and remedy failure.²³

¹⁹The Nepalese experience has been mirrored in northern Sulawesi, Indonesia, where military personnel have been hired to protect Nantu Reserve and, as a result, wildlife densities have increased. See A. Belford, 2006.

²⁰ *High-powered incentive* is a term used in economics to describe systems that adequately reward desirable behavior and penalize undesirable actions.

²¹ J. Seidensticker, 1997.

²² J. Mills and P Jackson, 1994.

²³ P.J. Ferraro and S.K. Pattanayak, 2006.

Box 2.2. Not by Money Alone: A Management-Effectiveness Assessment of Indian Tiger Reserves

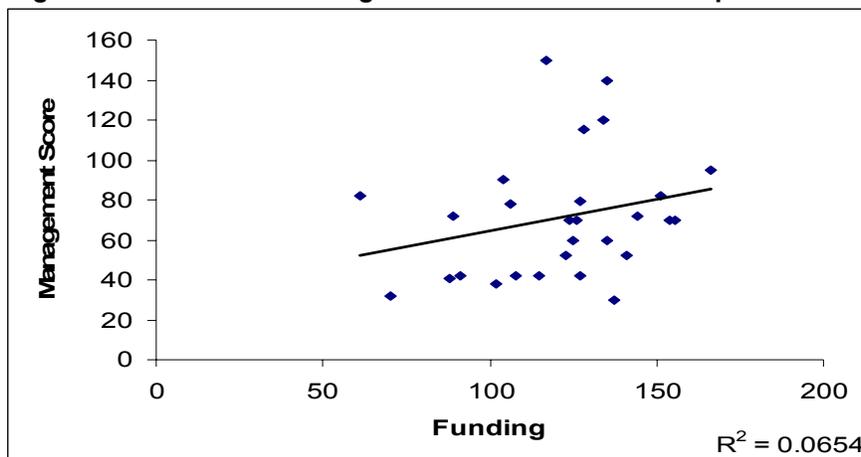
How effective is conservation spending? To answer this and other questions, in July 2004 the Project Tiger Directorate in India appointed eight monitors to undertake an independent assessment of its 28 tiger reserves. The monitors were selected based on their professional backgrounds, expertise, absence of conflict of interest, and independence from the Ministry of Environment and Forests. The assessment utilized the Management Effectiveness Assessment Framework (MEAF), an approach developed by the IUCN World Commission on Protected Areas. A total of 45 parameters were used to arrive at an aggregated score to rate each tiger reserve's management effectiveness.

A cluster analysis of the tiger reserve scores gives an indication of the management characteristics of the reserves that could predict success or failure, as determined by changes in tiger numbers. This approach allows wildlife managers to identify areas most at risk of management failure. What is surprising is that the lower cluster of reserves predicted to be at risk and to require immediate remedial action includes many well-known reserves, such as Ranthambore, that are prominent on tourist itineraries.

Above-average management score	Mid- to upper- range management score	Below-average management score
Bhadra; Bandipur; Buxa; Corbett; Dudhwa; Kalakad; Kanha ; Palamau; Periyar; Sunderban; Valmiki	Bandahavgarh; Satpura; Melghat Panna; Pench (Maha); Pench (MP); Simlipal; Tadoba	Dumpa; Indravati; Manas; Nagarjun; Namdapha; Nameri; Pakke; Ranthambhore; Sariska

Even more surprising, there is no relationship between the resources provided for protection and management effectiveness. Figure 2.1 below plots the funds allocated to each tiger reserve against management effectiveness. It suggests there is no statistical relationship between the two. The implication is that funding, while necessary for protection, cannot assure the desired outcomes.

Figure 2.1. Review of the Tiger Reserve Assessment Report



Source: IUCN 2005 and Government of India 2005.

V. From Punitive to Participatory Approaches: Integrated Conservation and Development Projects

15. **The 1980s witnessed a radical change in conservation policy, with a shift toward community engagement.** The regulatory model of conservation was complemented by attempts to form partnerships with local communities. The most common of these approaches are Integrated Conservation and Development Projects (ICDPs), which combine biodiversity conservation with rural development objectives. The assumption underlying an ICDP is simple and appealing: subsidizing an alternative activity will draw labor away from more destructive forms of economic enterprise and so indirectly promote conservation. ICDPs soon became popular and seemed to offer the tantalizing prospect of simultaneously promoting conservation and rural development.

16. **ICDPs have been widely used in almost every tiger-range country, varying in size, scope, and design.**²⁴ Examples include the eco-development project in India, the TAL initiative of Nepal, an ICDP in Kerinci Seblat National Park, and another in the Russian Far East (see Boxes 2.3 and 2.4). The accumulated evidence suggests that success has been mixed.²⁵ In the worst cases, the schemes have failed to achieve either their environmental goals or their economic objectives. Others have succeeded in improving livelihoods but not conservation outcomes, or vice versa. This is not surprising since many of the schemes have had overly ambitious goals and have paid insufficient attention to the economic dimension of the problem, including the magnitude and type of incentives needed to alter behavior.

17. **Experience suggests that ICDPs can be a useful adjunct to the conservation toolbox, but they are not a panacea that can address and resolve all problems (Box 2.3 and 2.4).** Five key problems have emerged in the application of ICDPs. First, ICDPs are designed to address environmental problems that emerge from local livelihood practices. They cannot resolve problems from external sources, such as mineral extraction, plantations, agricultural policies, or the organized illegal wildlife trade. Second, and more fundamentally, the provision of alternative employment opportunities may not lead to improved conservation. The greatest challenges are in densely populated landscapes with surplus labor (underemployment) and in areas where profits from unsustainable activities are high (for example, growing cinnamon within Kerinci Seblat National Park in Indonesia). For an ICDP to succeed, its coverage must be wide enough to include adequate numbers of individuals within and across households. Third, the rewards must be sufficient to ensure that the new opportunities provided by the ICDP render environmental degradation unattractive. Finally, even when this occurs, there is a risk that the project may act as a magnet, drawing migrants to the area and thereby increasing the pressures on the protected areas. Consequently, property rights should be well established to ensure that rewards are targeted and do not lead to further pressures from migration. Another factor needed for success is a strong traditional local governance structure under which people largely abide by communal decisions.

VI. Conclusions

18. If current approaches to tiger conservation are not succeeding, what more needs to be done? One response is to expand the conservation toolkit to include the very force that is often blamed for biodiversity loss: economic growth and development. The challenge should not be underestimated. It calls for reorienting economic incentives in ways that shift the balance from degradation to conservation and for creating new institutional structures that facilitate this

²⁴ Their labels also differ: "People-Centered Conservation and Development," "Ecodevelopment," "Grassroots Conservation," "community-based natural resource management" (CBNRM), and "Community Wildlife Management" (CWM).

²⁵ Commentaries, however, abound and range from outright and at times unsubstantiated rejection to uncritical endorsement of ICDPs. There appears to be considerable support for ICDPs in countries such as Russia and Nepal, but much greater ambivalence in other countries, most notably India, where despite intense debate no independent statistical assessments of performance have been made.

transition. Often the biggest barrier is inertia and the failure to accept that new challenges demand fresh solutions. Two decades ago, it seemed implausible that an entire industry would develop around greenhouse gas purchases. Today the trade exceeds \$30 billion and is predicted to double in size within five years. An equally far-reaching approach is needed to secure the future of habitats and biodiversity.

Box 2.3. Examples of ICDPs

The Kerinci-Seblat

Kerinci Seblat National Park — the second-largest protected area in Indonesia — harbors an impressive array of endangered mammals: the Sumatran tiger, the Sumatran rhinoceros, the Malay tapir, and the clouded leopard. But it is also being degraded and fragmented by poaching, felling, encroaching agriculture, road development, and mining. Since 1996, ICDPs have been introduced to discourage unsustainable timber felling. How successful have these been?

A recent paper by Linkie et al (2008) explored whether the ICDP had lowered deforestation rates around focal villages. They compared ICDP villages with a subset of non-ICDP villages that had similar socioeconomic and physical features. Village participation in an ICDP was found to have no effect on deforestation rates. Instead, accessibility and proximity to areas with logging concessions were the key drivers of deforestation. The results suggest that the goals of the ICDP may not have been met and that greater emphasis needs to be placed on changing incentives to make deforestation less attractive.

India Eco-development Project

The India eco-development project sought to promote local development with alternative livelihoods. No quantitative assessments have been made of the project. Though not an unqualified success, the narratives suggest there have been both beneficial and negative impacts. On the positive side, tangible benefits accrued to local communities from ecotourism revenues (valued at over US\$ 110,000 in 2004) in Periyar Tiger Reserve, and in Kalakad Mundanthurai Tiger Reserve both livestock grazing (down from 22,000 to around 1,000 animals) and firewood collection (down from 3,000 to less than 200 head loads daily) were reduced. In other locations, such as Ranthambore, the outcomes were either ambiguous or less successful.

What then makes for a successful ICDP? MacKinnon (2000) lists five key issues that must be addressed for successful conservation through ICDPs.

Clear conservation goals. There is a concern that ICDP conservation objectives are often diluted by other concerns resulting in imprecise and conflicting objectives. Setting clear and realistic objectives is the first recommended step.

Participation and partnership. Participation and equity issues will affect incentives and influence how communities respond to conservation objectives. Local communities need to receive an adequate stake in conservation.

Incentives and linkages with development. ICDPs are designed on the premise that providing development opportunities to local communities will reduce pressure on park resources. Often this confidence is misplaced, and provision of alternative livelihood opportunities may not be sufficient to reduce dependence.

External forces. In many cases, the root causes of biodiversity loss and the threats to parks can be traced to factors such as government policies. ICDPs cannot address these pressures.

Training and awareness. These have often been some of the most successful aspects of ICDPs, helping to build local “ownership” and support for protected areas.

Sources: Linkie, et al., in press, Evaluating Biodiversity Conservation around a Large Sumatran Protected Area, Conservation Biology; K. MacKinnon, 2000, Integrated Conservation and Development Projects – Can They Work? Parks 11: 1-16.

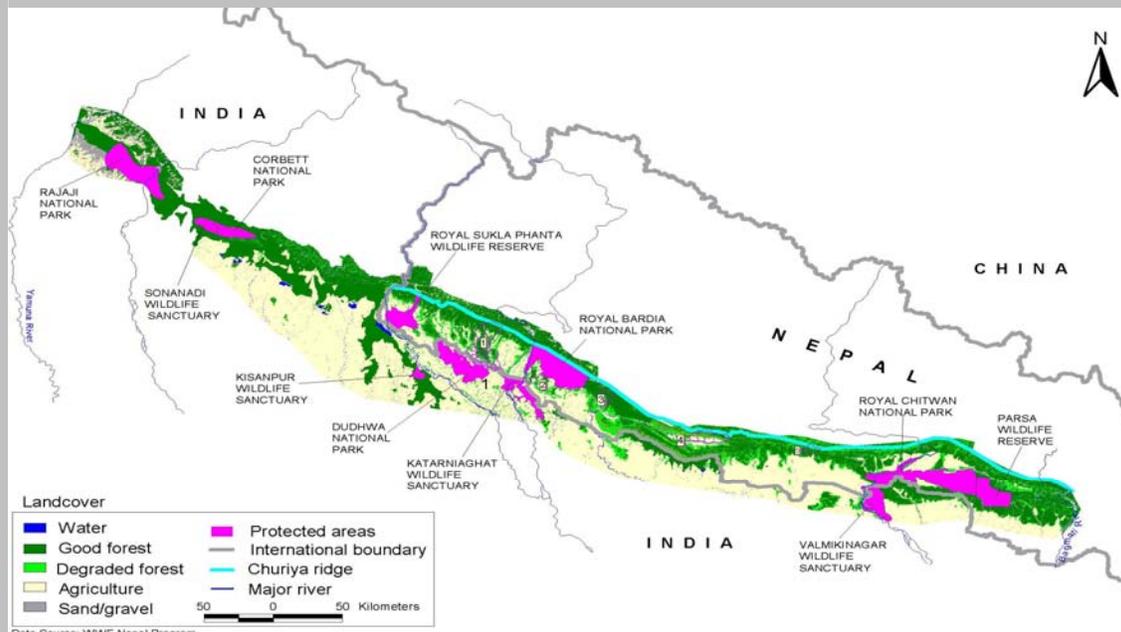
19. The accumulated experience suggests that there is no universal formula that can be applied to achieve this, but by understanding and tackling the root causes of the problem and by building on successful approaches, flexible strategies can be developed that suit local conditions. People save what they value, and the wild tiger is a valuable species, offering hope that the tiger’s future in the

wild can be secured by channeling this support. The following chapter suggests promising approaches that need to be considered to move forward.

Box 2.4. Terai Arc Landscape: A Successful Model

The overall gloomy trend in tiger numbers and habitat extent masks positive results in the recovery of tiger populations in a few landscapes. If replicated, for example, efforts to create the Terai Arc Landscape (TAL), which spans the base of the Himalayan foothills in northern India and southern Nepal could lead to range-wide recovery. Here, conservationists in the public and private sector are working to restore, reconnect, and manage the 11 wildlife reserves and national parks harboring wild tigers that are imbedded in the 49,000 square kilometer landscape. The goals are to manage tigers as a single metapopulation, the dispersal of which between core refuges can help maintain genetic, demographic, and ecological integrity, and to ensure that species and habitat conservation becomes mainstreamed into the rural development agenda.

Projects such as the TAL demonstrate that human communities can coexist alongside intact core tiger habitats. Social interventions, in the form of community-managed forestry programs that grant local people stewardship of critical areas within corridors, have provided the underpinning of this landscape-scale conservation initiative.



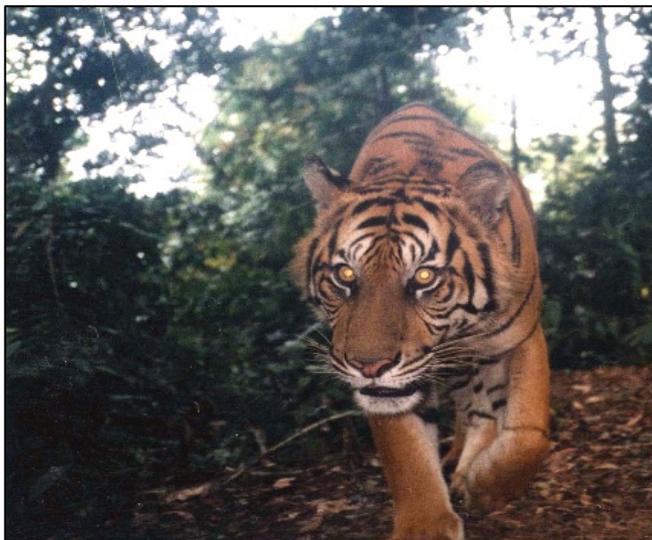
The Nepal TAL has benefited from scientific and financial assistance from government and nongovernmental sources. NGO investments were under US\$ 1.4 million between 2000 and 2002, for a cost of about US\$28 per square kilometer (annually ~US\$10 per square kilometer) to finance nongovernmental costs of supporting park management, antipoaching efforts, monitoring, research, and habitat restoration. These total NGO investments were about one-tenth the annual investment the Nepalese government earmarked for conservation of the region in 2004. The long-term impacts of these efforts on tigers, while encouraging, have yet to be fully assessed; in particular, there needs to be systematic monitoring of the tiger populations. The target outcome is for the TAL forests and tall-grass savannas to support at least 500 adult tigers by 2020, which would be among the highest tiger density in Asia.

Source: Dinerstein, et al., 2007; Seidensticker, et al., in press.

Chapter 3. Options for the Way Forward

I. Introduction

1. A conservation model that embraces development would blend incentives for conservation (carrots) with deterrence and enforcement (sticks). The value of live tigers is considerably greater than that of dead or captive tigers. A key challenge is to find better ways to channel this value for conservation and to enlist the support of a broader range of interested parties: the communities who rely on forest resources and must live with tigers; businesses that harvest minerals, timber, and other resources from forests; the broader public who enjoy the benefits of the environmental services provided by forests; and, crucially, the government that has ultimate sovereignty over all decisions.



Sumatran Tiger (WCS)
Photo Courtesy: WCS/ Save The Tiger Fund

2. Any solution would need to tackle three often intertwined problems: poaching and the trade that drives it, habitat fragmentation and conversion through intrusive activities, and the degradation of habitats through overuse (Box 3.1). The highest immediate priority is to devise strategies to address the poaching crisis. In the short term, the greatest need is to strengthen protection on the ground through improved financing, greater accountability, and scientific monitoring of results.

Box 3.1. The Amur Tiger: A Rare Success

The Amur (Siberian) tiger is the largest and one of the rarest subspecies of tigers. Almost all of the last remaining populations are found in the Russian Far East, in the Amur-Ussuri region of Primorsky and Khabarovsk Krays. Habitat loss, decline of prey species, and poaching had taken their toll, as elsewhere in the world, and by the mid 1980s it had been estimated that only about 250 remained. More recently, however, the combined efforts of governments, local and international NGOs and local communities have helped to reverse the decline, so that current populations approach about 500 individuals.

The government has established a number of different types of protected areas in the region, including strict reserves, nature reserves, ecological corridors, and areas of limited economic use, creating an integrated system of federal and local PAs. A medium-sized GEF grant (Strengthening Protected Areas Network for Sikhote-Alin Mountain Forest Ecosystems Conservation in Khabarovsk Krai, US\$ 750,000) supported the establishment of this diverse system of PAs, as well as a new Service for the Protected Areas and the Protection of Wildlife of the Khabarovsk Krai. The project, which was implemented by a local NGO in partnership with the regional government, also helped to improve efficiency of the PA network through preparation of management plans and provision of critical equipment and public awareness-raising and education efforts. A component for ecosystem and species monitoring support focused on the Amur tiger and three of its main prey species, both as indicator species for the Sikhote-Alin mountain forest ecosystems and as a means of increasing knowledge regarding the causes of changes in tiger populations and laying a solid foundation for development of recovery plans. Data collected from 2001 through 2005 at five sites (942,500 hectares in all) indicated a gradual improvement in habitat conditions and modest increases in all indicator species. Tigers observed increased from 20 to 31 individuals, while increases in primary prey species ranged from 12 percent (elk) to 400 percent (wild boar).

The IBRD-financed Sustainable Forestry Pilot Project (US\$ 60 million) also helped to protect the tigers' forest habitat by improving forest management through policy reforms, improved land-use management,

direct protection and regeneration of forest areas, and modernization of forest harvesting and processing technologies and utilization of non-timber forest products. Khabarovsk Kray, with a forested area of 43.6 million hectares, was one of three pilot areas covered by the project. The project focused on improving fire protection, regeneration of burned-over areas, protection of unique biodiversity values (including the Amur tiger), and development of wood and non-wood rural industries.

Despite the recent expansion, the PA system covers only 8 percent of the Amur tigers' habitat. Because the biomass of prey species is low in northern temperate forests, the tigers require large home ranges. An ongoing program of the Wildlife Conservation Society (WCS) aims to preserve tigers and tiger habitats outside PAs by strengthening the capacity of local Wildlife Management Organizations (groups of hunters who lease large areas of land and are responsible for managing hunting, controlling poaching, and monitoring wildlife populations in their leased areas) and by providing incentives to local communities. In 2005, together with the Far Eastern Association of Non-Timber Forest Producers (FEANTFP), WCS won a \$97,400 grant from the World Bank's Development Marketplace for a project on Linking Economic Development and Biodiversity.

3. In the medium term, solutions must be sought that harmonize development and conservation outcomes. There is no universal remedy, and the precise mix and type of policies will vary across countries, reflecting local opportunities and pressures. The appropriate conservation model for the sparsely populated landscapes of the Russian Far East would differ considerably from those suited to the densely populated economies of East and South Asia. Where high-quality habitats exist, incentives to encourage their retention could be made a priority. The links are most obvious where private profitability depends directly on the health of ecosystems, as in the case of ecotourism. Alternatively, where the returns on agriculture (the opportunity cost of land) are low, the potential to restore habitats may be a more cost efficient and effective strategy.

4. Tailored to local conditions, an effective and sustainable conservation paradigm would need to incorporate new instruments to address the root causes of the decline in tiger populations and their habitats: weak incentives, market failures, and institutional impediments. These would need to complement enforcement and protection measures. The approaches could include mechanisms to:

- a. Enlist the support of communities by creating incentives for conserving land as habitat and for reducing poaching;
- b. Develop ecotourism where appropriate as a strategy for sharing benefits and generating incentives for conservation;
- c. Strengthen and make cost effective the management of protected areas;
- d. Develop mechanisms to enlist the inevitable growth of infrastructure to the cause of conservation; and
- e. Tackle poaching, the demand for tiger products, and the illegal trade that delivers them.

II. Creating Direct Incentives: Environmental Service Payments

5. **Habitat fragmentation and degradation is largely a consequence of weak incentives for conservation.** Although many tiger habitats provide global services far more valuable than their commercial uses (mines, agricultural land, and so on), habitat conversion is individually rational, though it remains a global folly. The explanation lies in the "tragedy of the commons." Market-based economies excel at producing what people are willing to pay for. They do not perform well at preserving what may be priceless but is not rewarded. Much of the ongoing loss of biodiversity can be attributed to the lack of incentives and markets that provide compensation for the supply of essential environmental services, including water, breathable air, and biodiversity.

6. **Environmental service payments are a new conservation instrument designed to provide direct incentives for the preservation of habitats.** More than 300 such projects have been introduced in a variety of contexts and countries. There is now sufficient experience

with these schemes to suggest a way forward for tiger conservation. Most frequently, environmental service payments are made to encourage changes in land-use practices, such as reforestation, reductions in grazing pressures, or the retention of landscapes (Box 3.2). Cases of payments made for the protection of a particular species are rare, but this does not imply they are unfeasible or ineffective. This approach would be particularly important in landscapes in which poaching is the major threat and enforcement capacity is weak. It could include a scheme as simple as a conservation contract among communities living in or around a tiger reserve, with payments linked directly to the focal species. At the other extreme are more complex systems such as the Australian Bush-Tender program, which creates markets through sealed-bid auctions.

7. A key lesson that has emerged is that payment schemes directly targeting the desired environmental objective are more cost effective and efficient. If the objective is to reverse habitat degradation or promote habitat restoration, payments need to be conditional on measurable and verifiable indicators of habitat improvement. If the aim is to protect a focal species, rewards need to be linked to verified and credible evidence of population trends. Such schemes have the potential to become valuable transfer mechanisms that simultaneously promote rural development and conservation. A disadvantage is that payment schemes often require the creation of a new financing mechanism to gather and disburse funds. Developing effective institutions with credibility and transparency increases transaction costs and may not be feasible in countries where capacity and governance are weak.

III. Ecotourism

8. Ecotourism is big business and has been widely used to generate resources for conservation and to share benefits with local inhabitants. It is among the fastest growing industries in the world and has expanded by a factor of ten in the last two decades. Growth of the industry is linked not just to the tremendous demand for wildlife, but also to its scarcity. People pay large sums of money because of the rarity of charismatic species and habitats. For example whale watching generates \$1.1 billion annually for the United States and Canada, and wildlife tourism contributes to a significant proportion of GDP growth and export earnings in much of Africa, Australia, and the Galapagos.

9. Ecotourism in the tiger-range states is largely underdeveloped and under managed. This is partly due to the remoteness of many tiger landscapes and partly due to the difficulties of seeing tigers in dense tropical rain forest, the primary tiger habitat in South East Asia. But where opportunities exist, they should provide a valuable source of revenue and an opportunity to generate and share benefits that are directly linked to the presence of tigers.

10. The experiences of India and Nepal provide contrasting examples of both the challenges and the potential of tiger tourism. India, with its former stronghold of tigers and rising prosperity, has the largest tiger tourism industry in the world. More than 1.29 million tourists visit tiger reserves annually, and this number excludes perhaps another 2 million people who visit the reserves for pilgrimages. The average Indian reserve receives 60,000 tourists per year but collects little in revenues, largely due to low entry fees. It is no surprise that tourism is often viewed as an administrative and management burden on forest staff and a drain on their limited capacity and resources.²⁶ Hotels located outside the park boundaries benefit from the presence of tigers in the park but contribute little to the tigers' survival or management. Overcrowding in the reserves has caused many to view tourism as a drain on scarce conservation budgets. In contrast, Nepal has developed a community-based tourism model, with a strong emphasis on sharing benefits with locals and on the regeneration of degraded forests (Box 3.3). The approach has been successful in reducing poaching, restoring habitats, and creating a local constituency for conservation.

²⁶ The income from tourism varies tremendously, from close to zero in some reserves to about Rs 9 million (\$200,000) in Ranthambore (Government of India 2005).

Box 3.2. Can Carbon Markets Save the Sumatran Tigers and Elephants?

Riau Province in central Sumatra is exceptional. It boasts some of the world's most biodiverse ecosystems. It is host to the critically endangered Sumatran tiger and the endangered Sumatran elephant and has a higher floral diversity than any other tropical forest examined. In addition, Riau's forests are high-priority Tiger Conservation Landscapes. Yet Riau's tigers and elephants are in precipitous decline. Both species' populations are falling faster than the forest cover, likely due to the extreme fragmentation of their habitats. In the last quarter century, Riau's Sumatran elephant population declined by as much as 84 percent, to perhaps as few as 210 individuals in 2007, and the Sumatran tiger population declined by 70 percent, to 192 individuals in 2007.

Riau has lost 65 percent of its original forest cover and has among the highest rates of deforestation in the world, driven by conversion of native forest to pulpwood plantations; to industrial oil-palm plantations, undergoing rapid growth caused by the shift to biofuels; to agricultural use; and even to waste land without replacement by crops (17 percent). A business-as-usual scenario suggests that Riau's natural forest cover will decline from 27 percent today to only 6 percent by 2015.

All of this comes at a global cost. The average annual CO₂ emissions from deforestation in Riau exceed the emissions of the Netherlands by 122 percent and are about 58 percent of Australia's annual emissions. Between 1990 and 2007, Riau alone produced the equivalent of 24 percent of the targeted reduction in collective annual greenhouse gas emissions set by the Kyoto Protocol Annex I countries for the first commitment period of 2008–2012.

If the profits from marketing the environmental services of forests, such as avoided deforestation, soil and water protection, and biodiversity conservation, are comparable to those of marketing timber, concession holders will likely protect more natural forest, especially Riau's carbon-rich peat-land forests.

Can carbon trading can provide a new economic incentive to protect Riau's forests? Under the current system none of this is likely to occur. First, countries do not get rewarded for retaining forest canopy (avoided deforestation) — the emphasis is on afforestation. Second, although there are new programs under consideration that would provide incentives for conserving forests, there is a risk that the prevailing price of carbon may be too low to shift incentives from clearing for biofuels or pulp to conservation. Third, even if the price of carbon rises sufficiently, Riau may not get priority over other forests with higher carbon sequestration potential. The problem here is that the proposed new systems do not pay much attention to the biodiversity value of forests — so their futures may not be secured by the carbon markets.

As a counterexample, in parts of South Asia the returns (present value) of arable land are often as low as \$100 to \$150 per hectare. Clearing a hectare of tropical forest could release 500 tons of CO₂. At an extraordinarily low carbon price of even \$10 per ton of CO₂, an asset worth \$5,000 per hectare is being destroyed for a less valuable land use. A modest payment through the newly proposed avoided deforestation scheme would be sufficient to shift incentives in some of the unproductive arable land in South Asia.

Source: Y. Uryu, et al., 2008, Deforestation, Forest Degradation, Biodiversity Loss and CO₂ Emissions in Riau, Sumatra, Indonesia (Jakarta, Indonesia: WWF Indonesia Technical Report); and World Bank calculations.

11. Tiger tourism should be further refined and developed. Most importantly, receipts from tourism need to be invested in conservation, in the retention of landscapes, and in sharing benefits with local residents. Where tourist densities are high (as in many Indian reserves), recreational viewing needs to be expanded outside the park as a strategy both to relieve pressures within the park and to link habitat corridors. This is a common approach in Southern Africa where the merger of protected areas with wildlife-viewing buffer zones has created unfragmented habitats. Missing in South and East Asia is the policy will and mechanisms needed to facilitate an expansion of habitats through recreational activities. Finally, it needs to be recognized that tiger tourism is inherently more challenging than other forms of wildlife viewing. Tigers are solitary animals and generally hard to find, particularly in the dense forests of East Asia. There is a need to develop innovative approaches to address these challenges. An example is gorilla tourism, which has successfully attracted visitors and generated high revenues despite the remoteness of habitats, the difficult terrain, and regular periods of instability.

Box 3.3. Adapting the Chitwan Model of Community-Based Ecotourism Development

Mounting pressures on natural resources in the developing nations of Asia make conserving lands adjacent to protected areas an important goal. In Nepal's Chitwan National Park (an anchor of the Terai Arc Tiger Conservation Landscape) local communities were given the tools and the responsibility to regenerate degraded buffer zone areas, which then became tourist destinations. This generates income that is invested in community development, such as schools and health-care facilities.

Why has the tourism ecodevelopment project succeeded in Chitwan? The key, initial step was a policy change, enacted by the Government of Nepal that enabled communities to share in the revenues generated by tourism to the national park. This was the single most powerful tool for enhancing the success of community-based comanagement of the landscape. Chitwan is also an ecologically forgiving landscape — a flood plain habitat with high resiliency and moderate to potentially high integrity. Thus, the buffer-zone areas in the project regenerated rapidly, attracting both wildlife and tourists within a few years. Moreover, poaching pressure on tigers and prey was relatively low. Remarkably, the project continues to succeed despite the years of conflict and associated down-turn in tourism.

Dinerstein, et al., identified a distinct set of conditions essential for successful implementation of community-based tourism. These include:

- An accessible reserve with a well-protected core area containing charismatic megafauna that tourists can see;
- A fraction of buffer zone (or strips of land between the protected area and the agricultural frontier) remaining for regeneration;
- A secure land-tenure system to minimize immigration in response to the magnet effect of ecodevelopment projects;
- A stable privately-owned ecotourism industry that can serve as a precursor to a community-based approach and can absorb some of the initial costs;
- Policies that enable local people to participate in enterprise activities in buffer zones adjacent to protected areas;
- A cooperative working relationship between local people and protected-area officials; and
- Strong local institutions that enforce conservation rules, ensure equitable distribution of benefits from joint activities, and respond to changing economic conditions and new opportunities.

Source: Adapted from Dinerstein, et al., 1999.

IV. Strengthened and Cost-Effective Management of Protected Areas

12. Where institutions are weak, joint management between government and other actors can improve cost-effective conservation. Joint approaches are widely used in other areas of government enterprise and include a diverse range of activities such as public-private partnerships in health, education, and infrastructure. These arrangements recognize that, while ultimate sovereignty over resources rests with governments, other agencies bring resources and skills perhaps not readily available in government institutions.

13. Few attempts have been made in the tiger-range states to enlist support from non-governmental actors, but such management agreements are quite common in Latin America and parts of Southern and East Africa. Such arrangements are advantageous because they can address the many obstacles that constrain government management of protected areas. Especially important, for example, has been the ability to invest in protection and to provide adequate salaries. In addition, NGO relationships with surrounding communities would likely be of a different nature compared to those experienced by government. Box 3.4 provides an example of one such initiative in Indonesia, where a block of habitat has been released to a conservation trust.

Box 3.4. Harapan: A New Model to Support Conservation Species

The richest terrestrial ecosystems in Indonesia are the lowland forests, but these are also very valuable for timber. As a result, the protected areas tend to contain mainly higher elevation forest, with the lowland forests allocated to logging concessions, many of which have evolved into conversion forests for oil palm, rubber, and industrial timber estates.

Burung Indonesia, BirdLife International's partner in Indonesia, persuaded the Indonesian Ministry of Forestry to allow private organizations to manage logging concessions in the interests of nature conservation. In June 2004, the Ministry passed a decree on Forest Restoration in Production Forests enabling "production forest" already designated for clearance to be restored and managed for conservation. The legal framework created now makes it possible for other private organizations to manage logging concessions for the good of nature rather than for commercial profit.

With this important new policy agreed, BirdLife was able to acquire the rights to manage the 102,000 hectare Harapan Rainforest, which straddles the border between Jambi and South Sumatra provinces in Sumatra, as a model for forest restoration, wildlife conservation, and sustainable local development. This mosaic of primary and regenerating secondary forests will be the first restoration forest of its kind in Indonesia. Harapan appears to support some 10 to 15 Sumatran tigers and good populations of prey.

The partners (Burung Indonesia, BirdLife International, and the Royal Society for the Protection of Birds) are working hard to secure the financial sustainability of Harapan Rainforest by creating an endowment fund. Once the desired target of \$13 million is secured, the annual interest payments should be sufficient to cover conservation-management costs for the forest and sustainable livelihood projects for local communities.

The vision for the next 20 years is to:

- Halt destruction of habitat important to the survival of the twenty Sumatran tigers and 267 species of forest-dependent birds living in the forest;
- Restore and rehabilitate the forest to create prime wildlife habitat;
- Preserve elements of the forest-dwelling lifestyle previously enjoyed by the indigenous people who live in this area;
- Provide environmental education for local communities;
- Involve local communities in planning and offer job opportunities in sustainable forest management;
- Develop ecotourism and alternative income generation;
- Provide a model for forest ecosystem restoration, carbon sequestration, and sustainable management in Indonesia.

Source: Based on <http://www.birdlife.org/action/ground/sumatra/>



Tracking of tigers in the snowy tiger landscapes of the Russian Far East
Photo Courtesy: Save the Tiger Fund / Linda Kerley

V. Biodiversity-Sensitive Infrastructure: Are Trade-Offs Inevitable?

14. Infrastructure in tiger habitats has traditionally involved making difficult choices and trade-offs between conservation and development. It is no surprise that conservation, which is viewed as an economic burden, inevitably loses this struggle in rapidly expanding economies. The source of the problem often lies in inadequate planning and the failure to recognize that although infrastructure may impose an environmental cost, it also generates resources that provide opportunities for improving environmental outcomes. Capturing this potential requires new mechanisms to ensure that the final balance is not one of environmental loss.²⁷

15. The precarious state of tiger populations suggests the need to prioritize landscapes based on their conservation significance. Throughout many lower priority habitats it is inevitable that large infrastructure will overlap natural habitats. But these could provide opportunities to enhance conservation. Infrastructure brings benefits that could be used to leverage substantial and additional funds for promoting conservation that would otherwise not be available. Use of these funds could go beyond basic amelioration of impacts to advance conservation outcomes.²⁸

16. With careful attention to incentives, the development of sensitive infrastructure could be used as an opportunity to halt or even reverse the degradation of habitats. The precise mechanisms through which this objective could be achieved will depend upon institutional capacity. Where institutional structures are well developed and effective, project resources could be mobilized to further strengthen enforcement capacity, establish new protected areas, or reduce pressures from induced impacts. Where capacity is weak, it will be more costly to obtain the desired environmental outcomes. In this case, project resources could be used to develop highly targeted environmental service payments linked to focal species or other well-defined outcomes (Box 3.5).

Box 3.5. Nam Theun 2 Hydroelectric Project

Nam Theun 2 is a World Bank–supported 1070 MW transbasin hydroelectricity project. It was planned to flood about 450 square kilometers of a mosaic of logged forest, riparian forest, meandering river, anthropogenic wet-grasslands, and a rather small area of forest within the adjacent protected area. The mitigation measure acceptable to the World Bank — the offset — was the financial and institutional means of managing 4000 square kilometers of forested protected area in the watershed of the dam, including two new forest corridors linking the main protected area to adjacent established protected areas. All these areas are part of a major Tiger Conservation Landscape (Northern Central Annamites) judged to be a Regional Priority, even though the current tiger population is very small. A fully comprehensive watershed management plan sensitive to the needs of the minority communities living within the protected area was prepared before the project was approved.

The overall conservation package included:

- A specialized agency established to manage the program;
- Secure financing of US\$ 31.5 million for 30 years;
- Conservation programs that strengthen patrolling and monitoring, enforcement, biodiversity, and forest management and reduce cross-border threats;
- Livelihood development activities that enhance land- and resource-use rights, improve management of natural resources, provide better access to infrastructure and services, and provide compensation for any adverse impacts through livelihood and community development activities; and
- The set-up of a conservation trust fund.

²⁷ See Quintero 2008

²⁸ Though seldom recognized, this would also be consistent with the principles of sound economic development. Economics suggests that internalizing (i.e., correcting) externalities (unaccounted damages) is both efficient and necessary for promoting effective development.

17. With a plummeting tiger population, further fragmentation of high priority core habitats should be avoided. These core areas comprise a very small portion of the land area of any country where tigers are found. These are also the watersheds of countries and provide a host of other valuable environmental services. In India, the core tiger areas are less than 4 percent of the total land area. With such a small area devoted to conservation, it is unlikely that further fragmentation of these last habitats would resolve any economic problem that remains unsolved by access to the remaining 96 percent of the country. Instead, it is likely to be cheaper and economically more efficient to retain these core areas as suppliers of ecosystem services than it would be to re-create them.

VI. The Trafficking of Wild Tigers

18. The wildlife trade is a global problem that transcends national boundaries and hence requires international responses. With large and permeable national and park boundaries, the protection of habitats alone will not suffice to address the illegal trade. Responses are needed that tackle both the demand and the supply side of the illegal market. On the supply side, one of the most important and difficult areas has been the detection and arrest of dealers who organize the illegal trade in tiger parts. Intermittent seizures and occasional arrests of dealers do occur, but this has not been sufficient to control the trafficking. Responding to this problem, the ministers of the Association of Southeast Asian Nations (ASEAN) agreed to develop a Regional Action Plan on Trade in Wild Flora and Fauna and to expand the regional wildlife law enforcement capacity (Box 3.6). The result is ASEAN-WEN (Wildlife Enforcement Network),²⁹ which aims to improve the efficiency of customs law enforcement officers in the region by providing equipment and improved networking capabilities. This is a useful start, but China, considered an essential partner in curbing wildlife crimes in the region, should be encouraged to join, and India should be given observer status.

19. Interventions on the supply side need to be accompanied by vigorous efforts to eliminate the root causes of the problem — the demand for tiger products. Since the legitimate TCM industry stopped using tiger products in the early 1990s, demand for tiger parts has been largely linked to self-prescribed use of tiger bone, especially in wines considered health tonics. Another recent trend is consumption of tiger meat as an exotic cuisine in Vietnam, Malaysia, Taiwan, and China. Ornamentation also drives the market, and a flourishing market in tiger skins, claws, and teeth has been unearthed.

20. History has shown that laws do not and cannot alter desires and demands completely. This is especially true for products whose demand is rooted in history. Consequently, trade bans and supply-side interventions can only have a limited impact. Addressing demand calls for a high-level advocacy campaign to curb demand for these products and to raise awareness that the perceived medicinal benefits have no scientific foundation. Mechanisms to reduce demand are clearly needed, but appropriate approaches have yet to be defined on a broad scale because little is known about the demographics and motivations of users and the associated retail dynamics.

VII. Conclusions

21. The emerging experience with wildlife management indicates that incentives are a powerful policy tool for improving stewardship of undervalued natural assets and can be used to leverage support from a wider constituency of stakeholders and actors. The aim of this chapter has been to outline some of the strategies available for achieving this. These options attempt, in varying degrees, to address some of the root causes of biodiversity loss by creating a development-friendly conservation paradigm. There is clearly no universal formula for how this can be achieved, and determination of the most appropriate instruments depends on local and country circumstances.

²⁹ This is backed by grants from the U.S. Agency for International Development to nongovernmental organizations, Wildlife Alliance, TRAFFIC, and their local partners.

Box 3.6. Economic and Social Drivers of Wildlife and Related Trade-Control Efforts

Illegal and unsustainable trade in wildlife in Asia is threatening tigers and many other wild species with extinction despite significant investment to address both conservation and development. The effectiveness of these investments could be improved through better knowledge of the socioeconomic factors driving the trade in wildlife and of the conditions under which different interventions reduce illegal and unsustainable trade. This is the key to improved targeting and design of future interventions and therefore the likelihood of their success. Effective mechanisms have yet to be developed, however, for collecting and analyzing this information in a systematic fashion for either individual species, such as tigers, or for Asia's wildlife trade more generally. To help address this knowledge gap, TRAFFIC, with funding from the World Bank-Netherlands Partnership Program, canvassed experts on the trade in a wide variety of plant and animal-based wildlife products, including tiger products. This allowed the distillation of expert opinion on both the drivers of wildlife trade and the effectiveness of related interventions. The results of this review, which focused on trade from Cambodia, Lao PDR, Indonesia, and Vietnam, illustrate the complexity of wildlife trade chains, the range of approaches being applied to change wildlife-trade dynamics, and the variation in views of the effectiveness of different approaches. Several of the study's results in relation to the trade in tiger products, for which information was collected from 11 experts, are provided below. The full study, *What's Driving the Wildlife Trade?* will be published in 2008.

Regulatory approaches to prevent hunting and trade of tigers are, not surprisingly, believed to be the most widely used form of intervention, with most experts believing that CITES was at least somewhat effective at regulating trade and that, where they had been increased, national trade controls had also resulted in a reduction in the number of tigers harvested. Nevertheless, all but one respondent believed that hunting was taking place in protected areas. Furthermore, most believed that when an intervention was effective in addressing trade along one trade route, the trade merely shifted to a new route. This belief corresponds with the view held by most respondents that legal instruments were more effective in controlling trade when targeted as a series of interventions across the trade chain. The awareness campaigns aimed at consumers and designed to reduce consumption of tiger products were believed to have resulted in a decline in consumption in two out of five cases where they were noted. Awareness campaigns aimed at harvesters and traders were generally considered to have been successful in raising awareness but not in reducing poaching. Where they were targeted to control harvest, traditional norms were generally believed to be somewhat effective at reducing hunting of tigers.

The results of this initial compilation of expert beliefs cannot be viewed as definitive. Rather, they are a starting point from which a more comprehensive and site-specific assessment of the factors influencing tiger poaching and the trade in tiger products from these and other countries could be developed. Such an analysis could survey a much wider group of experts and incorporate available data on, for example, poaching rates, market availability, enforcement effort, human-wildlife conflict, and other factors believed to influence both poaching and trade.

Experience shows that poor people are disproportionately at risk of crime and violence and are under served, relative to more affluent populations, by police and public safety agencies. Crime, corruption, commercial fraud and high costs posed by vulnerability to crime and its consequences are also significant burdens on the economic enterprises on which growth depends. Over the last decade, starting with the Bali Ministerial Meeting on Forest Law Enforcement and Governance (FLEG), the World Bank, together with concerned governments, donor agencies and non government organizations has convened a series of international processes that have brought the previously ignored issues of prevention, detection, and suppression of forest and wildlife crimes into open discussion. The Regional FLEG Processes in East Asia, Africa and Europe and North Asia are helping to raise the level of international cooperation and professionalism in attacking these crimes, bringing in international enforcement agencies, including the U.N. Office on Drugs and Crime, Interpol, the Financial Action Task Force (FATF), the World Customs Organization, as well as national and regional authorities.

Chapter 4. Conclusions

I. An Action Plan

1. To achieve the ambitious goal of protecting tigers urgent and workable solutions are needed that translate the virtuous principles of conservation into sustainable outcomes. The most immediate short-term threat is the poaching crisis driven by the illegal trade in tiger parts, and it requires an emergency response through strengthened protection and a greater investment in controlling the illegal trade across the market chain. The history of conservation demonstrates that this must be complemented by approaches that tackle the root causes of the problem — the overwhelming economic incentives to convert and fragment habitats and poach tigers for the urban consumers of East Asia.

2. To create a more sustainable and effective model of conservation, priorities fall into four broad areas that address poaching and habitat challenges:

a. **Create and implement a conservation paradigm that enlists incentives.** A conservation paradigm that resists development and growth will be overwhelmed and undermined by the forces it opposes. It is those who live with the tiger who will ultimately determine its fate. Effective wildlife management must aim to make landscapes *with* tigers valued more than habitats without them. This report has outlined the core elements that might be included in such a framework. In general, knowledge of how this could be achieved is limited. The approaches would need to be tailored to specific local conditions and would vary across countries and even within countries. The initial steps in creating this paradigm are to:

- Identify the key threats and their drivers and create a consensus for a new approach in partnership with NGOs, governments, and the scientific community in the countries to develop appropriate country or regional strategies to influence public policy, gain community support, and promote the stewardship of tigers and other endangered biodiversity in tiger habitats;
- Identify focal areas to pilot these approaches in partnership with leading scientists, NGOs, multilateral agencies, governments, and the private sector to promote tiger conservation; and
- Shift conservation from being a special interest to occupying the mainstream of development and policy discourse. The Web and other avenues should be used to promote global awareness and seek innovative solutions.³⁰
- Use standardized, scientific means to monitor tiger and prey population distribution, numbers, and habitat integrity, and devise meaningful indicators of tiger conservation actions to allow for adaptive management approaches.

b. **Financial resources.** Funding for tiger conservation is inadequate. Conservation of biodiversity is a global public good and hence calls for international support and cooperation to finance the costs of protecting endangered species. Greater funding through the existing overseas development aid channels would be desirable but may not be forthcoming, given the many competing demands on these resources. Alternative and novel avenues for generating resources for biodiversity should be sought. Promising alternatives include (i) the establishment of a dedicated tiger conservation *Multi-donor*

³⁰ One such tool being considered by conservation NGOs is crowd-sourcing, a Web-based instrument to engender awareness.

- Trust Funds*, in which potential donors can pool resources that would be disbursed under strict and verifiable criteria to assure economic and effective use of funds; (ii) the introduction of *Green (Tiger) Bonds* as a way of tapping into the nascent ethical investment resource pool; (iii) *biodiversity auctions*, a new instrument being used to generate private funds for particular conservation initiatives; and (iv) *green lotteries*, a variant of the biodiversity auction which has been used successfully to raise funds for public causes.
- c. ***Biodiversity-friendly infrastructure.*** The countries where tigers range have vast infrastructure needs that continue to overlap with tiger habitats. Consequently, biodiversity-sensitive development and infrastructure must be part of the solution. Strategies need to be developed to ensure that the final balance is not always one of environmental loss. There are numerous examples of good infrastructure projects that minimize the negative footprint through sound design and improve environmental outcomes by providing resources for conservation. These projects recognize that sustainable economic growth requires adequately addressing negative externalities. A *biodiversity filter* developed to guide infrastructure development in the Tiger Conservation Landscapes can help achieve these outcomes.
 - d. ***Tackling illegal trade to control poaching.*** The trade in tiger parts transcends countries and cannot be resolved by unilateral national actions. Finding ways to address the poaching crisis is the most pressing and urgent need. Despite the immense scale of the illegal trade, there is only scant understanding of either the complex and underground web of suppliers or the factors driving the demand for wild tiger products. To gain a deeper traction in bringing the trade under control there is a need to:
 - Develop strategies in partnership with other organizations to address the root cause of the problem – the demand for tiger products. This will require a major global and country effort to raise awareness and alter consumer preferences. The challenge of this task should not be underestimated. Awareness must be raised regarding the negative impacts of the trade and the unfounded justifications for consumption of tiger parts, while sensitively handling beliefs often deeply rooted in cultural history and mythologies.
 - Tackle the trade throughout the entire supply chain simultaneously, and strengthen the role of global and regional enforcement agencies, including SAARC and ASEAN.

II. The Role of the World Bank

3. The World Bank has a mandate to improve the stewardship of global public goods and an important role to play in preventing species extinction and promoting global environmental governance. This growing engagement in environmental protection is consistent with the World Bank's wider historical evolution.

4. At its foundation, the World Bank had no explicit environmental policy, and its concerns were rooted in developing infrastructure in the aftermath of the Second World War. The 1980s ushered in the first wave of environmental policies – termed the safeguard policies – that seek to mitigate the footprint of infrastructure projects (Box 4.1). This was followed by more proactive interventions in the form of technical assistance to help countries develop environmental policies, implement environmental strategies, and build institutional capacity. In the 1990s an Environment Strategy was developed and implemented. More recently, environmental Development Policy Loans (DPLs) have aimed at promoting sound environmental governance. Other members of the World Bank group, IFC and MIGA, have developed environmental standards that have established the environmental benchmark for guiding responsible investments in the private sector. The World Bank has pioneered environmental concerns in its lending, and its new engagement in species protection is a natural extension of this trend.

Box 4.1. The World Bank's Natural Habitats Policy

The Operation Policy of Natural Habitats (OP4.04) was issued in 2001 after over a year of consultation. It still represents the most comprehensive policy of its type of any development bank or similar situation.

Its activity has not essentially modified the area's "primary ecological functions"; it determines that "the Bank does not support projects involving the significant conversion of natural habitats unless there are no feasible alternatives for the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project outweigh the environmental costs."

Certain natural habitats are defined as being "critical" if they are existing protected areas and areas officially proposed by government as protected areas, areas initially recognized as protected by traditional local communities, sites that maintain conditions vital for the viability of these protected areas, "or sites identified on supplemental lists prepared by the Bank or an authoritative source determined by the regional environment divisions." In this regard "the Bank does not support projects that, in the Bank's opinion, involve the significant conversion or degradation of critical natural habitats."

Institutional capacity of the implementing organization should be taken into account in deciding whether to support a project with potential adverse impacts and capacity-building activities should be included where needed.

In projects with natural habitat components, project preparation, appraisal, and supervision arrangements include appropriate environmental expertise to ensure adequate design and implementation of mitigation measures. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. The Bank expects the borrower to take into account the views, roles, and rights of groups, including local NGOs and communities, affected by Bank-financed projects involving natural habitats and to involve such people in planning, designing, implementing, monitoring, and evaluating such projects.

A considerable number of projects — and associated habitats and species — have benefited from the application of this policy. No major infrastructure project adjacent to tiger habitat has seen as comprehensive or beneficial use of OP4.04 as has the Nam Theun 2 Hydroelectric project (see Box 3.5),, a good example of how an infrastructure project can leverage habitat protection.

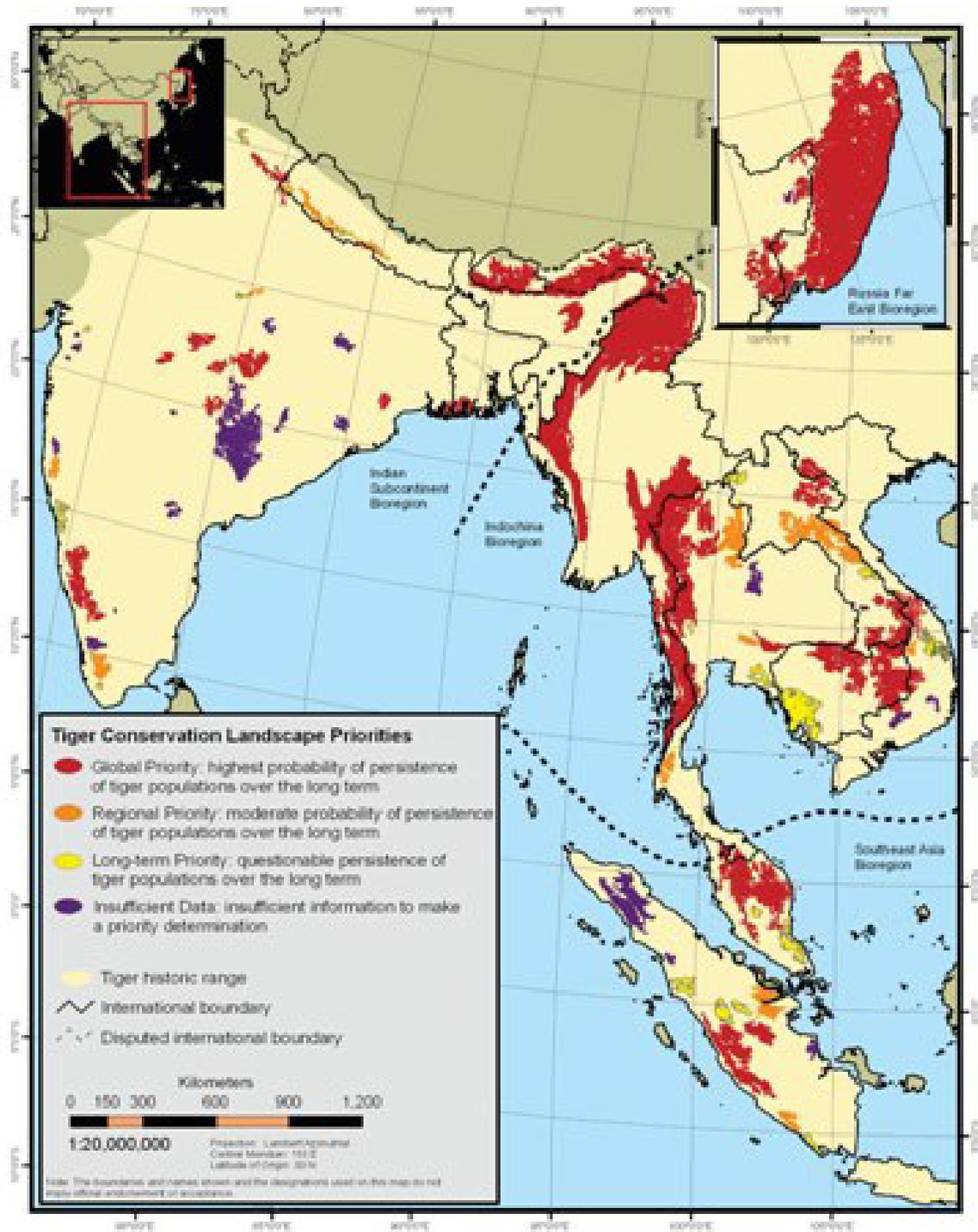
5. The World Bank has funded about 595 projects with biodiversity components in 122 countries (including 49 multi-country projects). Of these, nine have been in tiger-range countries. As with most other initiatives dealing with tiger conservation, the outcomes have been mixed. The documented successes have been in the Russian Far East. But as with other tiger conservation efforts, success has often been elusive. Conservation strategies have been undermined by the new and unprecedented challenge of poaching as well as the unrelenting erosion of habitats driven by economic pressures. The World Bank is therefore well placed to help learn lessons from its own development experience and from its conservation projects. With its global reach, the World Bank is among the few organizations that can respond at the scale needed to address the illegal trade in tiger parts. Its presence in most tiger-range countries allows it to facilitate partnerships with international NGOs, governments, and the scientific community to address the illegal trade and help develop sustainable conservation solutions. To implement this vision, the Bank proposes to facilitate a consensus building partnership. This would include actions such as a review of projects in tiger habitats to learn lessons from the past and share these with tiger-range countries; facilitating country workshops and other platforms of partnership with NGOs, governments, and the scientific community in countries to develop new models of conservation; assisting in strategies to address the illegal trade and the demand for tiger products, and explore alternative and new funding mechanisms for tiger conservation.

Annex 1: List of World Bank Projects

Project Background			Protected Areas and their Area		
Country	Project Name	Year	Fund Source	Habitat or Protected Area(s) where Projects were/are active	Total Area (km ²)
Bangladesh	Forest Resources Management Project	1992	IDA	Sunderbans	6000
Bhutan	Trust Fund for Environmental Conservation	1992	GEF	Jigme Singye Wangchuck National Park, Jigme Dorji Wildlife Sanctuary, Royal Manas National Park	7103
Cambodia	Biodiversity and Protected Area Management Project	2000	IDA/GEF	Virachey National Park	3325
China	Nature Reserves Management	1995	IBRD/GEF	Xishuangbanna Nature Reserve, Wuyishan Nature Reserve, Shennongjia Nature Reserve	3887
India	Maharashtra Forestry Project	1992	IDA	Gugamel and Tadoba National Parks, Nagzira and Koyna Wildlife Sanctuaries	1200
India	West Bengal Forestry Project	1992	IDA	Sunderbans	100
India	Andhra Pradesh Forestry Project	1994	IDA	Nagarjunasagar Srisailam Wildlife Sanctuary, Gundla Brahmeswara, Wildlife Sanctuary, Eturnagaram Wildlife Sanctuary, Nagasjunasagar	9125
India	Forestry Research Education and Extension Project	1994	IDA	Kalakad Tiger Reserve	223
India	Madhya Pradesh Forestry Project	1995	IDA	Satpura, Bandhavgarh, Sanjay, Perch, Panna, Kanha, Madhav, Bagdara, Phen, Nauradehi, Pachmari, Panpatha, Kuno, Ratapani, Sanjay Dubri, Singhori, Veerangna Durgawati, Panna	5716
India	Ecodevelopment Project	1996	IDA, GEF	Buxa, Nagarahole, Periyar, Pench, Palamau, Ranthambore, Kalakud Mudantharai	3883
India	Uttar Pradesh Forestry Project	1997	IDA	Corbett Tiger Reserve, Dudhwa National Park, Katerniaghat Wildlife Sanctuary	1500
India	Kerala Forestry Project	1998	IDA	Parambikulum Wildlife Sanctuary, Chinnar Reserve	375
India	Biodiversity Conservation and Rural Livelihoods Improvement Project	Pipeline	IDA, GEF	Western Ghats landscape, Satpura landscape, Danpa	15000
Indonesia	Integrated Swamps Development Project	1994	IBRD	Berbak National Park	1900
Indonesia	Kerinci-Seblat Integrated Conservation and Development Project	1996	IBRD, GEF	Kerinci-Seblat National Park	13750
Indonesia	Conservation of Elephant Landscapes in Aceh	1999	GEF MSP	Gunung Leuser National Park	9500

Project Background			Protected Areas and their Area		
Country	Project Name	Year	Fund Source	Habitat or Protected Area(s) where Projects were/are active	Total Area (km ²)
Indonesia	The Greater Berbak-Sembilang Integrated Coastal Wetlands Conservation	2000	GEF MSP	Berbak NP, Sembilang NP	3957
Indonesia	Critical Ecosystem Partnership Fund I (Sundaland)	2001	CEPF	Tesso Nilo, Kerinci-Seblat, Bukit Barisan Selatan, Bukit Tigapuluh, Leuser Ecosystem	38663
Indonesia	Integrating Environment And Forest Protection into the Recovery and Future Development of Aceh	2006	MDF	Ulu Masen National Park, Gunung Leuser National Park	17000
Lao PDR	Forest Management and Conservation Project	1994	GEF, IDA	Nakai-Nam Theun, Nam Ma MBCA, Phou Deng Din, Phou Xang He, Phou Xiang Thong National Biodiversity Conservation Areas	9589
Lao PDR	Nam Theun 2 Social and Environment Project	2005	IDA	Nakai-Nam Theun National Park	4056
Russia	Biodiversity Conservation Project	1996	GEF	Sikhote Alin Biosphere Reserve, Ussuriyskiy, Lazovskiy, Khankayskiy, Khinganskiy, Botchinskiy, Bolonskiy, Bolshekhkhtsirskiy, Bastak Reserves	12074
Russia	Sustainable Forestry Pilot Project	2000	IBRD	Southern and central parts of Khabarovsk region	82380
Russia	Khabarovsk Habitat Conservation Project	2001	GEF MSP	Northern part of the Sikhote-Alin Mountain Forest Ecosystem (Khabarovsk region)	2095
Russia	Linking Economic Development and Biodiversity Conservation	2005	DM	Selected sites of the Sikhote-Alin Mountain Forest Ecosystem (Primorsky and Khabarovsk regions)	1100
Vietnam	Forest protection and Rural Development	1997	IDA	Chu Mom Ray Nature Reserve, Cat Tien National Park	1304
Vietnam	Hai Van Range Green Corridor	2003	GEF MSP	Phong Dien Nature Reserve, Bach Ma National Park	1340
Vietnam	Forest Sector Development Project	2004	IDA, GEF	Country-wide	
Vietnam	Integrated Watershed and Biodiversity Management in Chu Yang Sin National Park	2005	GEF MSP	Chu Yang Sin	589

Map



References

- Belford, A. 2006. Guardians of the forest. *Jakarta Post Weekend Magazine* September 12, 2006, <http://old.thejakartapost.com/weekender/5profile.asp>.
- Blamford A, GK Gaston, S Blyth, A James, V Kapos 2003, Global variation in terrestrial conservation cost. *Proceedings of the National Academy of Sciences* 100,1046-1050.
- Bulte E and R Damania. 2005. Wildlife farming and conservation: An economic assessment", *Conservation Biology*,19: 1222-1233.
- Chapron, G., H. Andren, and O. Liberg. 2008. Conserving top predators in ecosystems. *Science* 32: 47.
- Damania, R., R. Stringer, K. U. Karanth, B. Stith. 2003. The economics of protecting tigers; linking household behavior to poaching and prey depletion. *Land Economics* 79: 198–216.
- Dinerstein, E., A. Rijal, M. Bookbinder, B. Kattell, A. Rajuria. 1999. Tigers as neighbours: efforts to promote local guardianship of endangered species in lowland Nepal. In Seidensticker, Christie, and Jackson, 1999, 316–33.
- Dinerstein, E., C. Loucks, A. Heydlauff, E. Wikramanayake, G. Bryja, J. Forrest, J. Ginsberg, S. Klenzendorf, P. Leimgruber, T. O'Brien, E. Sanderson, J. Seidensticker, and M. Songer. 2006. *Setting priorities for conservation and recovery of wild tigers: 2005-2015; a users' guide*. Washington, D.C., and New York: WWF, WCS, Smithsonian, and NFWF-STF.
- Dinerstein, E., C. Loucks, E. Wikramanayake J. Ginsberg, E. Sanderson, J. Seidensticker, J. Forrest, G. Bryja, A. Heydlauff, S. Klenzendorf, P. Leimgruber, J. Mills, T. O'Brien, M. Shrestha, R. Simons, and M. Songer. 2007. The fate of wild tigers. *BioScience* 57:508-514.
- Ferraro, P.J., and S.K.Pattanayak. 2006. *Money for nothing?* <http://www.icuc-ivmi.org/files/Publications/Ferraro%20counterfactuals.PDF>.
- India, Government of. 2005. *Joining the dots*. Ministry of Environment and Forests.
- Mills, J., and P. Jackson. 1994. *Killed for a cure*. TRAFFIC International.
- Ng, J., and Nemora. 2007. *Tiger trade revisited in Sumatra, Indonesia*. Southeast Asia, Petaling Jaya, Malaysia: TRAFFIC.
- Sanderson, E., J. Forest, C. Loucks, J. Ginsberg, E. Dinerstein, J. Seidensticker, P. Leimgruber, M. Songer, A. Heydlauff, T. O'Brien, G. Bryja, S. Klenzendorf, and E. Wikramanayake. 2006. *Setting priorities for conservation and recovery of wild tigers: 2005-2015; the technical assessment*. Washington, D.C., and New York: WCS, WWF, Smithsonian, and NFWF-STF.
- Seidensticker, J. 1997. Saving the tiger. *Wildlife Society Bulletin* 25:6-17.
- Seidensticker, J., B. Gratwicke, and M. Shrestha. In press. How many wild tigers are there? An estimate for 2007. In *Tigers of the World: The science, politics, and conservation of Panthera tigris*, 2nd ed., ed. R. Tilson and P. Nyhus. Norwich, NY: William Andrew Press.
- Seidensticker, J., S. Christie, and P. Jackson, eds. 1999. *Riding the tiger: tiger conservation in human-dominated landscapes*. Cambridge: Cambridge Univ. Press,.
- Wikramanayake, E., E. Dinerstein, J. Forrest, C. Loucks, J. Seidensticker, S. Klenzendorf, E. Sanderson, R. Simons, A. Heydlauff, J. Ginsberg, T. O'Brien, P. Leimgruber, M. Songer, and G. Bryja. In Press. Road to recovery or catastrophic loss: How will the next decade end for wild tigers? *Tigers of the World: The science, politics, and conservation of Panthera tigris*, 2nd ed. ed. R. Tilson and P. Nyhus. Norwich, NY: William Andrew Press.



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