

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, 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

¹³ J. Ng and Nemora, 2007.

¹⁴ Personal communication, Wildlife Protection Society of India.

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

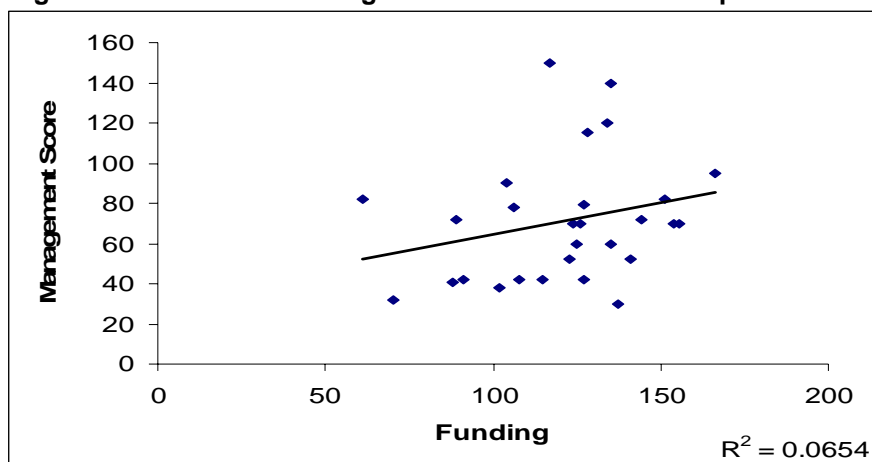
How effective is conservation spending? To answer this and other questions, in July 2004 the Project Tiger Directorate in India appointed eight monitors to undertake an independent assessment of its 28 tiger reserves. The monitors were selected based on their professional backgrounds, expertise, absence 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; Ranthambore; 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.

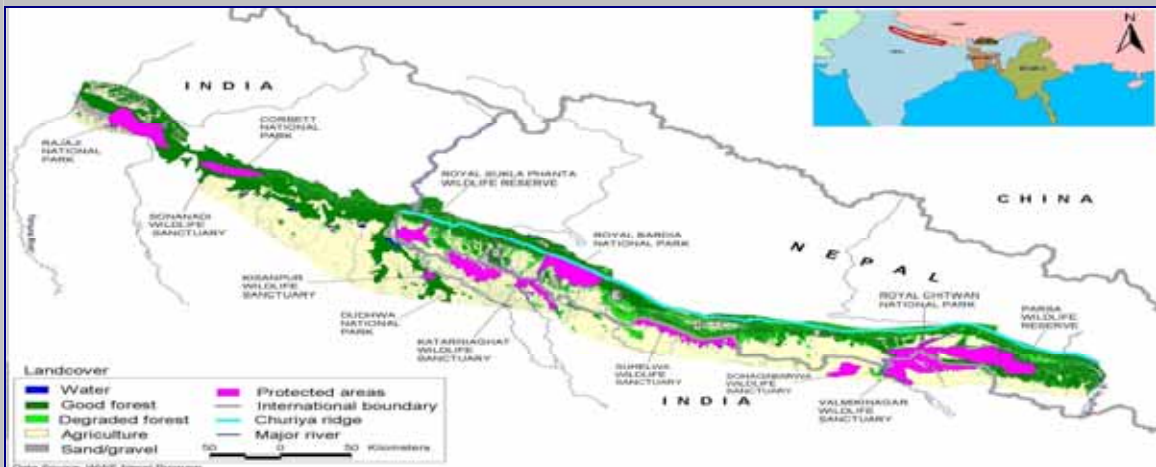
19. The accumulated experience suggests that there is no universal formula that can be applied to achieve this, but by understanding and tackling the root causes of the problem and by building on successful approaches, flexible strategies can be developed that suit local conditions. People save what 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.