

now a fundamental component of the Terai Arc recovery project (see the last section of this chapter).

In 1987 Shankar Choudhury, a forest ranger with the King Mahendra Trust, convinced local villagers, park officials, Department of Forestry officers, and a skeptical me that a very small seedling project could lead to a major program of local guardianship of endangered wildlife species and their habitats. Choudhury's hard work and conviction sustained the project through its infancy. The project evolved into the regeneration of the buffer zone, and the same idea is now a key component in the Terai Arc recovery program. The restoration of the buffer zone by using powerful economic incentives and local guardianship has quickly moved from a visionary approach to business as usual.

In 1995 Nepal's parliament enacted legislation that channeled as much as 50% of annual park revenues to local communities. Twelve years passed from proposal of the legislation until recycled revenues started to flow. But now that the legislation has become part of the everyday fabric of local development, conservation in Nepal can move forward at a much quicker pace.

A Comprehensive Strategy for Conserving Asia's Wildlife

The optimum strategy for the long-term viability of rhinoceros and other large mammals combines the following essential actions:

- *Design conservation landscapes with large core areas that conserve key biological resources and offer strict protection from poaching.* Protected areas are the cornerstone of biodiversity conservation (Noss, O'Connell, and Murphy 1997). These areas should include a core area, or an area that supports or could support a breeding population (one in which recruitment exceeds mortality) and has a high level of protection (Noss et al. 1999). Many Asian protected areas suffer from severe degradation along their boundaries, and some lack any core area undisturbed by humans. In Chitwan, breeding female rhinoceros and tigers cluster in the *Saccharum spontaneum* grasslands distributed along the edge of rivers and streams. Protection of these forage-rich grasslands is crucial to achieving the goal of expanding populations. The main reason that rhinoceros have rebounded

so strongly in Chitwan is the strict protection of the breeding population in these high-density core zones. Similarly, riparian habitats are key areas for tigers as dry-season refugia and for supporting their prey base; these should also be well represented in core protection zones.

Strict protection of core areas is essential for the recovery of Javan rhinoceros in Cat Loc and Nam Cat Tien in Vietnam and in Ujung Kulon National Park in Java. Gunung Leuser, Kerinci Seblat, and Barisan Selatan National Parks in Sumatra, Indonesia, and Taman Negara in Malaysia for Sumatran rhinoceros need to take similar measures. Strict protection of core areas set the stage for creative management experiments in buffer zones. These areas are easily repopulated by megafauna when an effective core area is nearby. Moreover, use of the buffer zones by ecotourism programs means that the effective core area can be extended because of the reduction of tourist traffic inside a park.

Some rhinoceros sanctuaries in Asia are very small and have no buffer zone. Consequently, the core area equals or is the same as the conservation unit. In such parks, intensive habitat management to increase densities of target species is essential. For rhinoceros, tigers, and other area-limited species, management activities should include maintenance of year-round wallows and stream flow, prescribed burns, maintenance of short grasslands and grazing lawns, and enrichment plantings of fruit trees for large frugivorous birds and mammals. Research in the Chitwan buffer zone has shown that the application of these management techniques can increase densities. Intensive management is critical in isolated, small reserves that are too fragmented to allow dispersal.

- *Introduce powerful economic incentives, new legislation, and public awareness campaigns.* The future of Asia's megafauna rests not with biologists or managers but with local people. Populations of large Asian mammals, especially those of rhinoceros and tigers, can be considered secure only when local residents view them as being worth more alive than dead. Our work in Chitwan has shown that, given the alternative, local villagers will make decisions that promote local guardianship of wildlife habitats and endangered species. The ultimate challenge for conservationists during the next few decades is to promote the extension of public stewardship of natural resources to more areas and at grander scales.

A common misunderstanding is that local villagers are indifferent to

the degradation of nearby habitats. The value of forest cover in riparian corridors became quite obvious to communities in the Chitwan Valley during the 1993 monsoon floods. Where riparian forests still stood, many houses were saved. Where the buffer-zone forests had been cut down, whole villages washed away. Beyond flood control, managed forests also provide access to fodder and firewood. Conservation of riparian forests, grasslands, and wetland habitats is a first major step to regenerating large landscapes in South Asia for the benefits of human populations and wildlife.

Ecotourism can become a powerful tool for convincing communities to respect the sanctity of core areas and to create effective buffer zones and corridors if the flow of revenues to local groups is rapid and substantial. Ecotourism is one of the fastest-growing industries in the world, and conservationists should use it as financial leverage whenever possible. Indigenous ecotourism is growing more rapidly than foreign tourism in Chitwan; the Nepalese are now the leading visiting nationality, followed by tourists from neighboring states in India. Inconceivable five years ago, South Asian tourism is important because it partially offsets the vagaries of international ecotourism. The middle class in India—a group awakening to the pleasure of visiting nature reserves in their own country and in neighboring Nepal—is larger than the entire population of the United States. Indian conservationists should push hard for adoption of legislation similar to Nepal's to allow for revenue from park entry fees and concessions to be plowed back into local development. Once incentives are in place, planned and unexpected developments will blossom more quickly and more effectively. This is not to suggest that reserves with fewer immediate or long-term prospects for ecotourism are a lost cause. Rather, we should take advantage of those reserves that have the infrastructure in place to promote ecotourism and find other mechanisms for reserves too remote to attract many tourists.

Public awareness is an essential part of promoting local guardianship. Nepalese living around Chitwan, particularly the younger generations, are aware of the unique status of greater one-horned rhinoceros and of the global importance of the park. In Chitwan extensive outreach by the Department of National Parks, the King Mahendra Trust, and others have increased local appreciation of the park's wildlife. Nationally, television and radio shows and nature documentaries filmed in Chitwan have encouraged wider support.

- *Organize effective antipoaching information networks and an antipoaching unit.* Even the most powerful economic incentives will not stop exploitation of species such as rhinos, if they command a high value on the commercial market. Currently, however, protection measures for rhinoceros populations are underfunded throughout Asia (Rabinowitz 1995). The use of incentives to conserve species, augmented by effective antipoaching information networks and antipoaching units, forms the backbone of a sound recovery strategy.

The invisible network of local people who form the antipoaching information network is as important as the visible presence of armed guards. Most rhino poaching during the 1990s occurred in the buffer zones, perpetrated by outsiders who are easily identified in surrounding villages. Under the antipoaching program in Chitwan, informing on poachers is more profitable than poaching a tiger or rhinoceros. The activities of informers can also make patrolling far more strategic and cost effective. Unfortunately, effective networks are more the exception than the rule across South Asia. Conservation donors and government agencies should give priority to funding these units, for these networks, combined with other incentives, have proved to be effective at quickly reversing the trajectory of declining populations.

Ecotourism programs also contribute to antipoaching efforts. Tourist lodges in Chitwan are dispersed throughout rhino habitat. Hotel owners, managers, and nature guides have a strong incentive to show rhinos living near their viewing areas. They are quick to alert park staff about the movements of suspicious individuals in their areas or of a poaching incident.

- *Identify bold leadership to rally the political will to carry out essential measures, such as translocations, redistribution of ecotourism revenues, and fair resettlement, and to promote landscape-scale conservation.* The conservation of Asia's megafauna is not for the fainthearted. Advocates and critics are everywhere, offering advice to officials in range states about how to save their indigenous species. Foreign groups and individuals play a valuable role in raising awareness and money to help local conservation efforts, but grassroots efforts to save wildlife and habitats have no peer. Conserving Asian megafauna does not require a majority vote but the passion and commitment of a few charismatic individuals. No individual in Asia did more to save wild tigers than Prime Minister Indira Gandhi. The royal family of

Nepal has propelled Nepalese conservation to the forefront and provided a basis for long-term efforts. Now, younger Asian conservationists must step forward to be a voice for the preservation of their natural heritage. The courage of government wildlife officials and local leaders, not the enthusiasm of foreigners, will determine the fate of Asia's megafauna. Local leadership is critical for the following types of action:

Translocation of rhinoceros. At least five areas that once contained large populations of greater one-horned rhinos — Corbett, Manas, Bardia, Dudhwa, and Jaldhpara — could be or are being repopulated with individuals from Chitwan and Kaziranga (see figure 3.2). Some smaller reserves, such as Sukla Phanta in western Nepal and Dudhwa in northern India, could support small breeding populations if managed intensively as part of a metapopulation. Sumatran rhinoceros populations that are widely scattered and difficult to protect should be translocated to form a few larger populations in several well-patrolled areas in Malaysia and Indonesia. Very soon, Indonesian wildlife officials must translocate a portion of the Javan rhino population from Ujung Kulon to Barisan Selatan National Park in southern Sumatra or another protected area.

The reluctance to translocate the Southeast Asian species of rhinos stems from the fears of wildlife officials about the effect of capture and translocation. However, these fears can also be an excuse for inaction. Our research program in Nepal shows that greater one-horned rhinos can be captured and transported safely using standard immobilization techniques (Dinerstein, Shrestha, and Mishra 1990). The recovery of Javan and Sumatran rhino populations clearly requires bold leadership for implementing essential translocation programs. Similar courageous acts from Assamese wildlife officials are essential to overcome local reluctance for translocation of rhinos to other reserves in Assam, West Bengal, Bihar, and Uttar Pradesh.

Asian and African wildlife officials and biologists need to meet to exchange their experiences in translocation. For example, when animals are transferred in several waves separated by several years, data from South Africa demonstrate the importance of moving adult rather than subadult animals in the subsequent translocations. Reintroducing subadults to areas where a rhinoceros population is already established can result in increased mortality (Jacques Flamand, personal communication, 1998).

Those who wish to maintain the purity of the putative subspecies of Southeast Asian rhinos sometimes block translocation programs. But hold-

ing out for the ideal source populations for translocation appears to be a case of the perfect's being the enemy of the good. Modern conservation biology may need shortcuts to achieve goals, and they may not entirely satisfy the needs of other disciplines, such as ungulate taxonomy and population genetics.

Redistribution of park revenues to local communities. In almost every country where tourists visit parks and protected areas, all or a substantial portion of the revenues generated goes to the central government. Nepalese government officials offered a sound argument for this arrangement: "Nepal's foreign tourists are not going to spend a rupee to visit a leper colony or a water supply project. The national parks are a source of revenue for the entire nation to improve the lives of its people." While this argument is certainly valid, it means little to the rural poor who live near or inside reserves that attract foreign currency. Now, through landmark legislation, the government of Nepal has found that tying the welfare of people living around parks to the parks themselves promotes the long-term survival of both. Moreover, the wide coverage of the park system means that, in theory, many villagers in remote areas could benefit from the redistribution plans currently in effect around Chitwan and Bardia. Some programs may reach those in buffer zones faster than will federal programs run from Kathmandu or district headquarters, where administrative delays are common. Rapid reinvestment of proceeds can strengthen the association between conservation and social welfare.

Changing national legislation to recycle park revenues is the single most powerful intervention that government officials and conservationists in other countries can implement to improve protection of endangered species. As chapter 9 shows, nature tourism, as practiced in Nepal, is an exploitative industry. Without this legislation, owners of tourist lodges would continue to benefit disproportionately. Without legislation to redirect a portion of profits to local development, villagers around Chitwan would have no incentive to support conservation.

Resettlement or land transfer. Some village areas occupy isolated enclaves within reserves. These groups have little or no access to markets, educational and job opportunities, or better health care because their isolation is the result of large flooding rivers, dense jungle, mountain ranges, and other barriers. Large and small herbivores — wild boar, deer, rhinos, monkeys, parakeets, and wild elephant — often threaten their crops (Milton and Binney 1980). In Chitwan, the 20-km² area known as Padampur is one such enclave.

Located on the southern bank of the Rapti River, the population of 14,000 individuals is largely cut off from the town and city centers of Chitwan District during the monsoon season. In some years, monsoon floods threaten to inundate all the croplands, as was the case in Padampur in 1993, prompting a wave of poor, landless refugees, seeking shelter and farmland elsewhere.

Not surprisingly, the people of Padampur agreed to move to an area near the Barandabar forest that had been set aside by the government for flood victims. By the summer of 1999, the land transfer was 40% complete. The government arranged to compensate farmers with a maximum of about 5 ha, a supplement in cash, and transportation of their belongings and disassembled houses to the new site. Villagers expressed some initial discomfort, especially concerning the distance to obtain water. However, a poll showed that overall satisfaction was much higher in Barandabar than in the old location.

Many people, including human rights activists and anthropologists, typically react strongly to any scheme that involves resettlement. For resettlement to be a valuable tool for landscape management and poverty alleviation, it must be creatively and equitably structured. First and foremost, resettled villagers should receive more amenities in their new location than they had in their old location. Bold leadership and vision on the part of local officials and village leaders are equally important.

The benefits to wildlife from resettlement can be considerable. The conversion of Padampur to wildlife habitat (figure 11.3) will likely expand the rhinoceros and tiger population in the park by at least 5%. Threatened grassland bird species, such as the Bengal florican, have already begun to use the recently vacated village areas. They could also be important for the experimental management of grasslands to benefit tiger prey species.

Voluntary land transfer in private lands surrounding megafauna reserves where ecotourism is popular is likely to become more common. In Chitwan some households along the park boundary area in the Bagmara area have sold their land to speculators from Kathmandu who see the park boundary as having great potential for ecotourism. The value of a hectare along the park boundary (and in the officially gazetted buffer zone) near Sauraha skyrocketed to \$30,000 in 1998. Consequently, villagers are now selling their land for huge profits and buying much larger parcels for farming in areas far away from the park boundary. Many of these people are subsistence farmers, so they increase their wealth dramatically instead of staying where farming is difficult because wildlife damage crops. The gov-

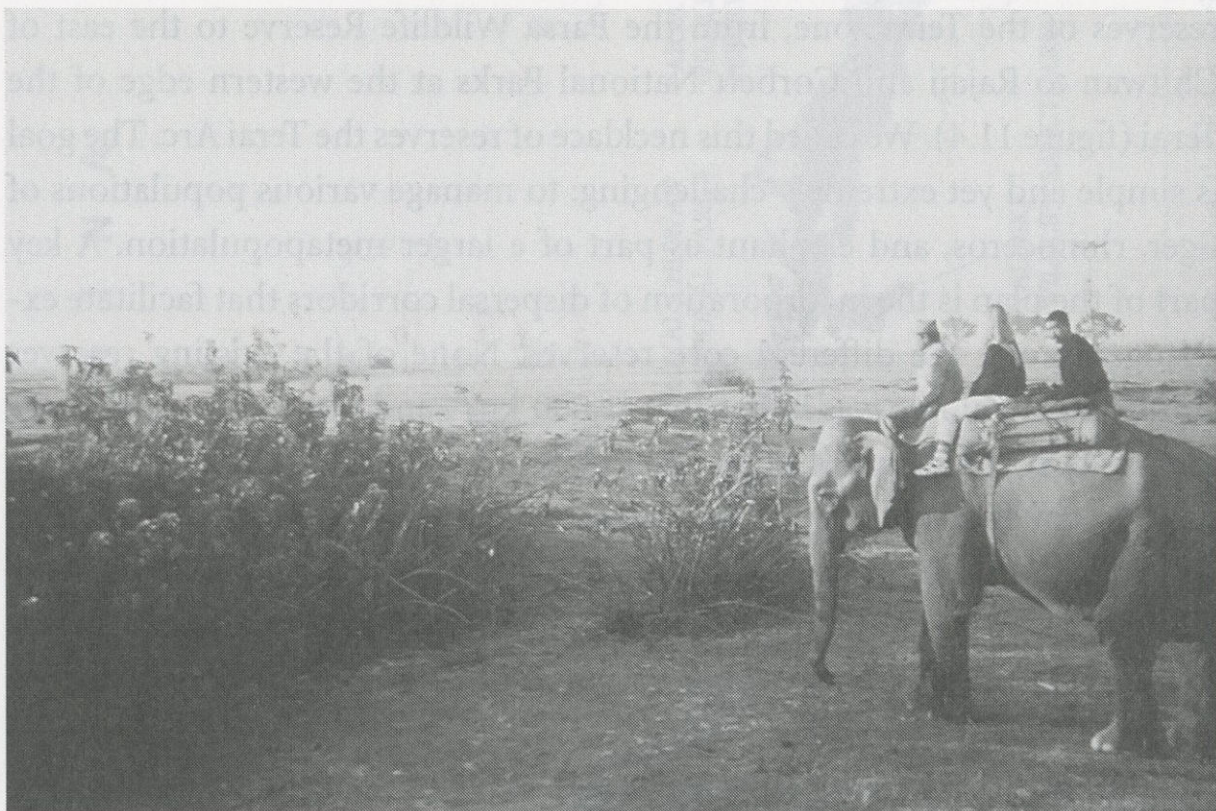


FIGURE 11.3 Resettlement is an essential tool for restoring landscapes for megafauna, particularly in areas that are enclaves within protected areas such as Padampur in Royal Chitwan National Park. Major flooding forced the evacuation of Padampur in 1996 to an area far from the ravages of monsoon floods. By March 1998, this section of Padampur had reverted to natural habitat and was used by rhinoceros, cervids, and the endangered Bengal florican. (Photo by Eric Dinerstein)

ernment should require land speculators who purchase buffer-zone farms to zone part of this property for regeneration. This would help resolve another problem for landscape conservation: the mitigation of “hard edges” where villages directly border park boundaries without a buffer zone.

At present, the Nepalese government is financing the entire Padampur resettlement effort on its own. Major foreign donors, a potential source of funding, are reluctant to participate in resettlement projects, fearing re-crimination. Major donor agencies need to step in where land transfer is in the best interests of people and wildlife.

Support for Landscape-scale Conservation: The Terai Arc

What began in 1987 as a native tree nursery rapidly evolved into a buffer-zone restoration program by 1990. The time was ripe to promote a more ambitious idea: we could use the existing forest corridors to link the eleven

reserves of the Terai zone, from the Parsa Wildlife Reserve to the east of Chitwan to Rajaji and Corbett National Parks at the western edge of the Terai (figure 11.4). We called this necklace of reserves the Terai Arc. The goal is simple and yet extremely challenging: to manage various populations of tiger, rhinoceros, and elephant as part of a larger metapopulation. A key part of the plan is the incorporation of dispersal corridors that facilitate exchange among the different core reserves. None of the existing reserves within the Terai Arc was larger than 1,000 km², and none contained more than sixty breeding adult tigers. By linking reserves and maintaining gene flow, we could create a much larger effective population size for tigers. The enormity of this restoration program seemed quixotic at the time, but in biological terms it is entirely sound. This is the scale of intervention needed to maintain the viability of large mammal populations, particularly those that are poor dispersers.

Empirical data from Indian reserves showed that, despite their large size, swimming ability, and propensity to move 20 km in a single night, tigers are averse to crossing gaps in natural habitat that are wider than 5 km (Ullas Karanth, personal communication, 1998). In contrast, rhinoceros and elephants will cross agricultural fields at night or follow watercourses to navigate through settled areas. We therefore designed the Terai Arc program around the dispersal requirements of tigers and mapped the bottlenecks within corridors—gaps in natural habitat wider than 5 km that required some degree of restoration. We have identified eight serious bottlenecks that must be bridged by 2010 (Joshi, Dinerstein, and Smith 2002). We plan to eliminate two or three of the most serious bottlenecks by 2004.

Aside from eliminating bottlenecks, the Terai Arc program contains other important elements. These factors include the successful restoration of two new rhinoceros populations of more than 100 individuals each at Bardia National Park and the Sukla Phanta Wildlife Reserve; the establishment of a trust fund to endow the corridor restoration program for the long term; and the commitment of the Indian and Nepalese governments to collaborate on transboundary conservation. Fortunately, sufficient forest remains between reserves to consider a restoration program on this scale. We expect to apply many of the techniques that encourage local guardianship and management of corridors and buffer zones to the Terai Arc as a whole. We may also experiment with new types of incentives, such as conservation performance payments (Ferraro 2001), as a substitute for eco-development

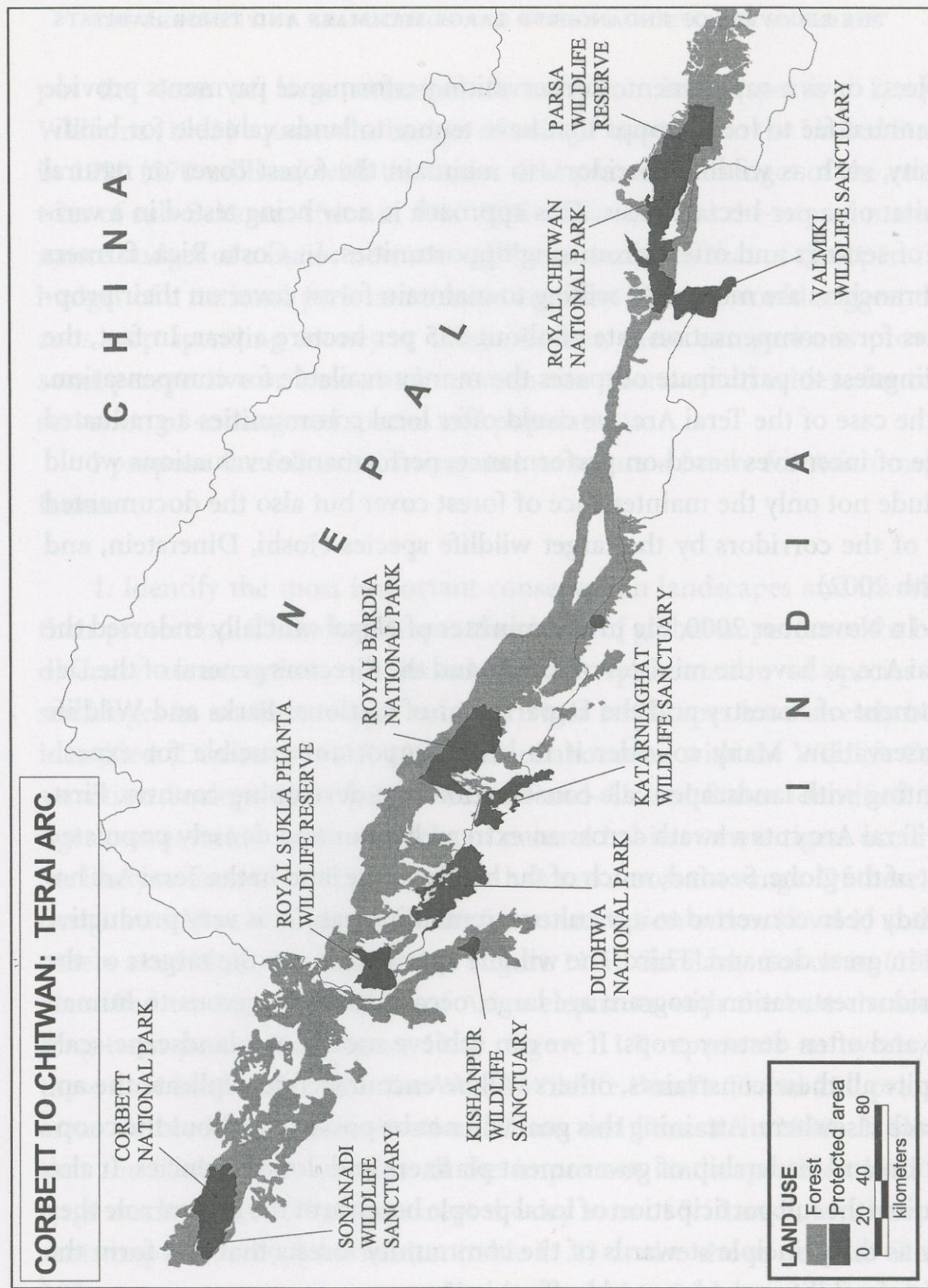


FIGURE 11.4 The Terai Arc is a landscape-scale program designed to maintain or restore connections among the eleven national parks and wildlife reserves found in the Terai zone of southern Nepal and northern India.

projects or as a supplement. Conservation performance payments provide an annual fee to local groups that have tenure to lands valuable for biodiversity, such as wildlife corridors, to maintain the forest cover or natural habitat on a per-hectare basis. This approach is now being tested in a variety of settings and offers promising opportunities. In Costa Rica, farmers and ranchers are more than willing to maintain forest cover on their properties for a compensation rate of about \$35 per hectare a year. In fact, the willingness to participate outpaces the money available for compensation. In the case of the Terai Arc, we could offer local communities a graduated scale of incentives based on performance; performance evaluations would include not only the maintenance of forest cover but also the documented use of the corridors by the target wildlife species (Joshi, Dinerstein, and Smith 2002).

In November 2000, the prime minister of Nepal officially endorsed the Terai Arc, as have the minister of forests and the directors general of the Department of Forestry and the Department of National Parks and Wildlife Conservation. Many consider it to be an important crucible for experimenting with landscape-scale conservation in a developing country. First, the Terai Arc cuts a swath across an extremely poor and densely populated part of the globe. Second, much of the highly fertile land in the Terai Arc has already been converted to agriculture; remaining habitat is very productive and in great demand. Third, the wildlife species that are the targets of the corridor restoration program are large, occasionally dangerous to human life, and often destroy crops. If we can achieve success at a landscape-scale despite all these constraints, others will be encouraged to replicate the approach elsewhere. Attaining this goal will not be possible without the cooperation and leadership of government planners and donor agencies. It also requires the full participation of local people because of the critical role they play as the principle stewards of the community forests that will form the basis of wildlife corridors and buffer zones.

Where will the money come from to support a strategy to conserve Asia's megafauna? Some of the most important conservation initiatives are within the budget of every Asian country. Enacting new legislation to promote the recycling of park revenues and local guardianship, authorizing the formation of antipoaching information networks, or involving local people in designing conservation landscapes is not costly. Other interventions—translocations, the regeneration of buffer zones and corridors, resettlement, and the recurrent costs of park protection—can be expensive. First, we can

put the costs of large mammal conservation in perspective. Leader-Williams (1993) equates the budget of a single large zoo in the United States in 1990 (\$70 million) with the entire field protection budget of the countries of sub-Saharan Africa in 1980 (\$75 million). Thus the annual maintenance budget of a major new zoo exhibit is similar to that of the operating budget of a national park in an Asian country. No one would suggest that zoos stop spending money at home. Rather, these comparisons provide some perspective on how much more in situ efforts could achieve for conservation of endangered species and populations.

I propose the following framework to secure a future for Asian megafauna:

1. Identify the most important conservation landscapes and invest in their protection. These landscapes should be of global importance for biodiversity conservation and include broad representation of species assemblages in a wide array of habitats. Tiger landscapes have already been identified (Dinerstein et al. 1997). In collaboration with the Wildlife Conservation Society, the World Wildlife Fund–United States identified 159 tiger conservation units—blocks of natural habitat where tigers occur or are likely to occur—in representative habitats across the range. Of these, we designated 25 as of highest priority for conservation action (level 1) and 24 others as of high priority (level 2) (figure 11.5). Similarly, Sukumar (1999) identified twenty populations of Asian elephants with the best chance of long-term persistence (figure 11.6). Figure 11.7 represents an overlay of these core landscapes with the World Wildlife Fund's Global 200 priority areas for biodiversity conservation (Olson and Dinerstein 1998). It shows that the Global 200 contains all the important landscapes identified for large mammal conservation, except the dry zone of Sri Lanka, which represents important elephant habitat (table 11.1). It also shows that the Global 200 ecoregions cover the range of habitat types in which large mammals are found. Therefore, in this part of the world the core landscapes for large mammal populations can serve as an umbrella for the conservation of many of the most biologically rich areas of Asia west of Wallace's Line. (Most of Asia's megafauna is limited to west of Wallace's Line.) Further refining this map would be possible by adding distributional data for primates, bears, and wild cattle. However, the landscapes already selected in the overlay presented here probably capture some of the most important areas for these other large mammal species.

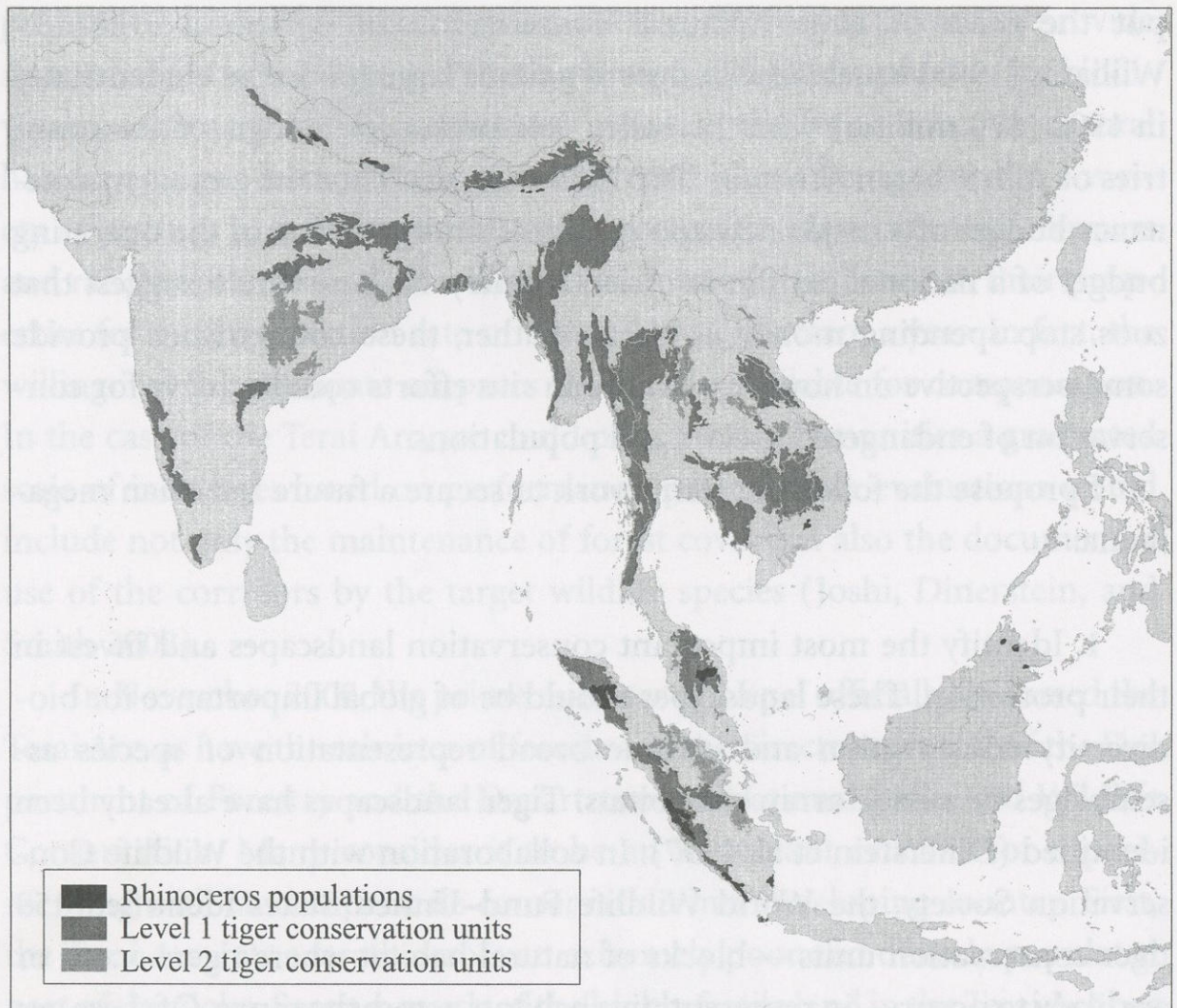


FIGURE 11.5 Extant rhinoceros populations and highest priority areas for tiger conservation in Asia. (Adapted from Dinerstein et al. 1997)

2. Identify the key activities needed to maintain and enhance large mammal populations in these areas. Much of this work has already been done through regional and national analyses.

3. Conduct a financial gap analysis to determine the extent to which donations match need and absorptive capacity. A good model already exists for Latin America and the Caribbean (Castro and Locker 2000).

4. Enlist the multilateral and bilateral funding agencies, international conservation organizations, foundations, individual philanthropists, international zoo community, and national governments to finance large-scale conservation for ten years. This would perpetuate new incentive-based approaches to conserving landscapes. Options include trust funds, carbon sequestration offsets, legislation to recycle park revenues, community-based

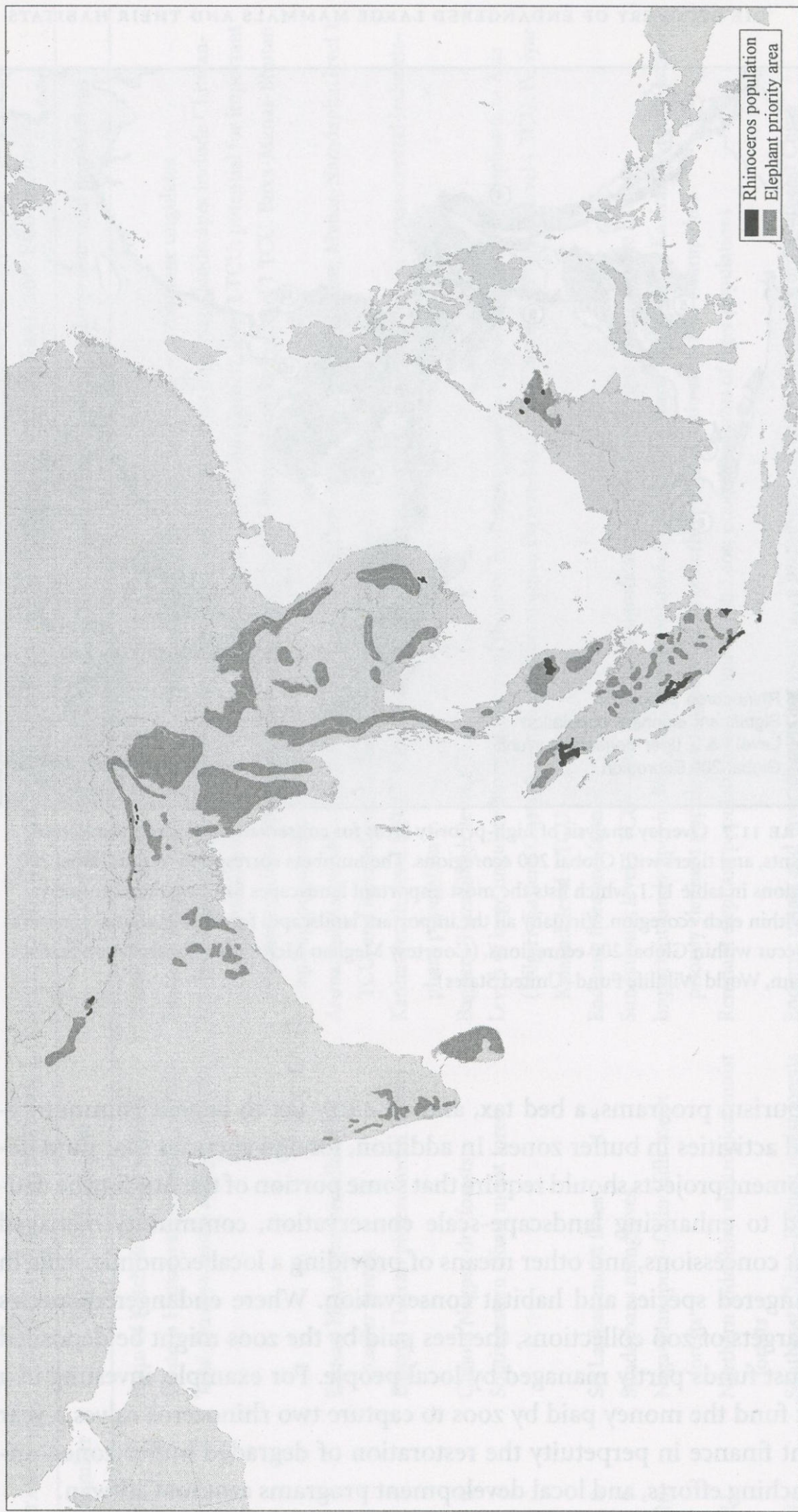


FIGURE 11.6 Extant rhinoceros populations and highest priority areas for wild elephant conservation in Asia. (Adapted from Sukumar 1999:47)

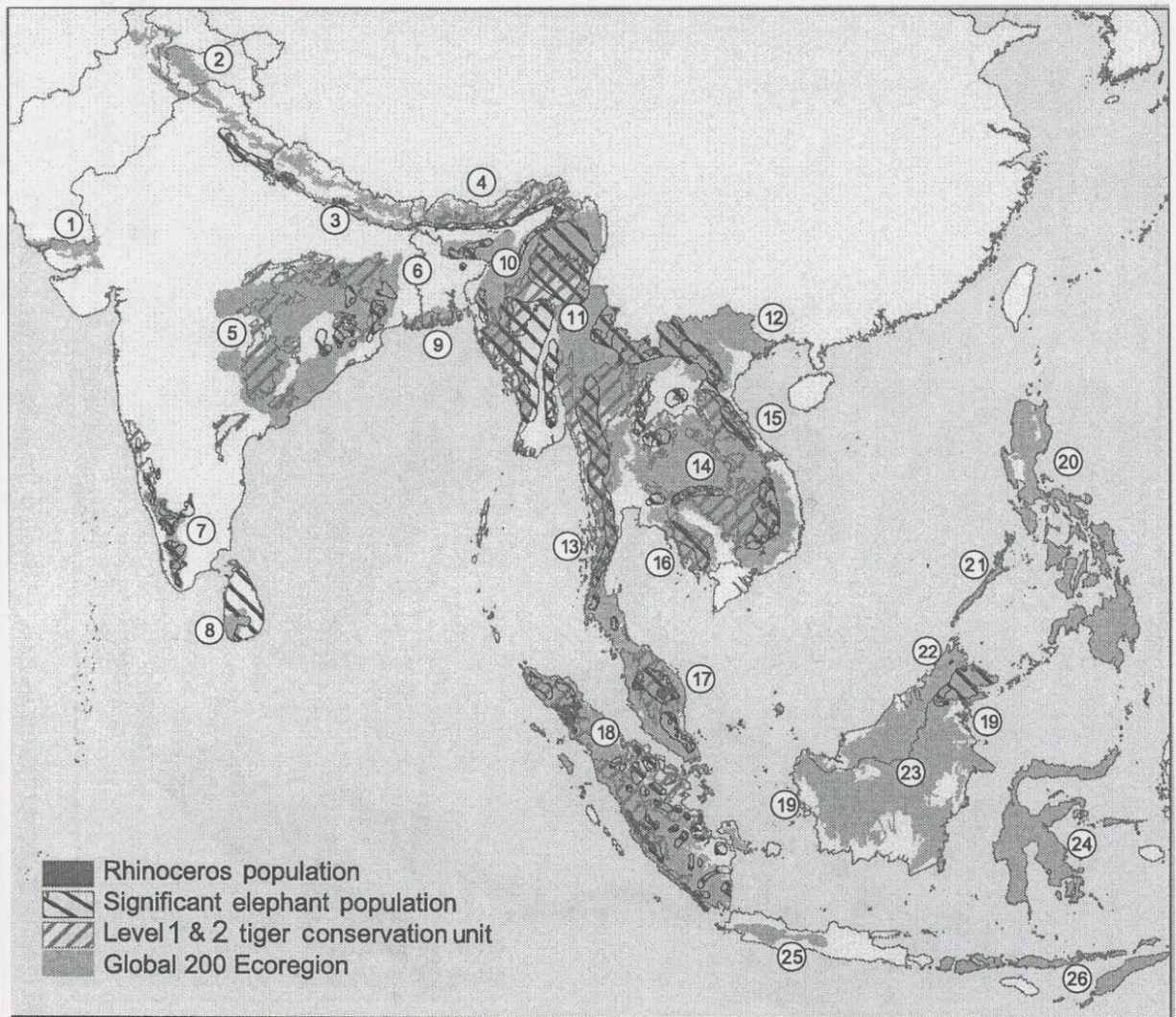


FIGURE 11.7 Overlay analysis of high-priority areas for conservation of Asian rhinoceros, elephants, and tigers with Global 200 ecoregions. The numbers correspond to the Global 200 ecoregions in table 11.1, which lists the most important landscapes for megafauna conservation within each ecoregion. Virtually all the important landscapes for large mammal conservation occur within Global 200 ecoregions. (Courtesy Meghan McKnight, Conservation Science Program, World Wildlife Fund–United States)

ecotourism programs, a bed tax, and an entry tax to benefit community-based activities in buffer zones. In addition, foreign agencies that fund development projects should require that some portion of the funding be dedicated to enhancing landscape-scale conservation, community-managed forest concessions, and other means of providing a local economic stake in endangered species and habitat conservation. Where endangered species are targets of zoo collections, the fees paid by the zoos might be deposited in trust funds partly managed by local people. For example, investing in a trust fund the money paid by zoos to capture two rhinoceros calves a year might finance in perpetuity the restoration of degraded buffer zones, anti-poaching efforts, and local development programs around Chitwan.

TABLE 11.1. IMPORTANT CONSERVATION LANDSCAPES FOR LARGE MAMMAL POPULATIONS WITHIN THE GLOBAL 200 ECOREGIONS

Number	Global 200 Ecoregion	Features of conservation landscapes identified as priority areas for large mammal populations
1	Rann of Kutch flooded grasslands	Home of last large population of Asian wild ass
2	Western Himalayan temperate forests	Home of healthy populations of a diverse assemblage of large carnivores and montane ungulates
3	Terai-Duar savannas and grasslands	Levels of large ungulate biomass that rival those of East African parks; important landscapes include Chitwan-Parsa-Valmiki, level 1 TCU*; Bardia-Banke, level 1 TCU; Rajaji-Corbett, level 1 TCU; potential for important elephant corridor between Corbett and Bardia; part of Manas-Namdapha, level 1 TCU; Buxa-Manas-Bhutan elephant population
4	Eastern Himalayan broadleaf and conifer forests	Arunachal-Assam-North Bank elephant population; Garo Hills elephant population; Manas-Namdapha, level 1 TCU, and isolated populations of wild water buffalo in foothills
5	Eastern Deccan plateau moist forests	Kanha-Pench, level 1 TCU; Kanha-Indravati corridor; Simlipal-Kotgarh, level 1 TCU; Orissa-central India elephant population
6	Chhota Nagpur dry forests	Bagdara-Hazaribagh, level 1 TCU
7	Southwestern Ghats moist forest	Levels of large ungulate biomass that rival those of East African parks; largest population of elephants in Asia (Nilgiri-Eastern Ghats, Anamalais-Nelliampathis, Periyar-Madurai); Dandeli-Bandipur, level 1 TCU; Periyar-Kalakad, level 1 TCU
8	Sri Lankan moist forest	Endemic flora and fauna
9	Sundarbans mangroves	Sundarbans, level 1 TCU—only potentially significant population of tigers in mangrove habitats
10	Naga-Manapuri-Chin Hills moist forests	Important landscapes include Kaziranga-Meghalaya TCU; Arakon Yoma, level 1 TCU; Kaziranga-Karbi Anglong priority elephant population; endangered large herbivore populations such as swamp deer
11	Northern Indochina subtropical moist forests	Remnant elephant population in Yunnan-north Laos; uncertain status of tiger populations
12	Southeast China-Hainan moist forests	Endemic plants and invertebrates but most large mammals have been extirpated from southeast China
13	Kayah-Karen/Tenasserim moist forests	Huay Kha Khaeng-Thung Yai Naresuan, level 1 TCU

TABLE CONTINUED

TABLE 11.1 CONTINUED.

Number	Global 200 Ecoregion	Features of conservation landscapes identified as priority areas for large mammal populations
14	Indochina dry forests	Largest tract of dry forest remaining in Indochina; Virachey–Xe Piane–Yok Don, level 1 TCU; large populations of gaur and possibly kouprey; remnant Javan rhino population in Cat Loc, Vietnam
15	Annamite Range moist forests	Hot spot of new discoveries of Asian mammals; remnant population of Asian elephants; Nam Theun Nakai–Vu Quang, level 1 TCU
16	Cardamom Mountains moist forests	Phnom Bokor–Aural, level 1 TCU; largely unexplored area that may hold new species of mammals similar to the Annamites; important elephant populations
17	Peninsular Malaysia lowland and montane forests	Large elephant population for Southeast Asia; Taman Negara–Belum–Halabala, level 1 TCU; stronghold of Sumatran rhinoceros in mainland Asia (Taman Negara National Park, Malaysia)
18	Sumatran Islands lowland and montane forests	One of last strongholds for Sumatran rhinoceros; preferred translocation sites for Javan rhinoceros; Gunung Leuser–Lingga Isaq, level 1 TCU; Kerinci–Seblat Seberida, level 1 TCU; Bukit Barisan Selatan–Bukit Hitam, level 1 TCU; Way Kambas, level 2 TCU; significant elephant populations in Aceh, Riau, and Lampung–south Sumatra
19	Greater Sundas mangroves	Important habitat for proboscis monkeys and other wildlife
20	Philippines moist forests	No native large mammal populations except endemic wild water buffalo (tamarau on Mindoro Island); elevated to Global 200 because of high endemism of plants and animals
21	Palawan moist forests	No native large mammal populations; elevated to Global 200 because of high endemism of plants and animals
22	Kinabalu montane shrublands	No native large mammal populations; elevated to Global 200 because of high endemism of plants and animals
23	Borneo lowland and montane forests	Only Asiatic elephant population (Sabah) and significant population of Sumatran rhinoceros (Sabah lowlands)
24	Sulawesi moist forests	Home of the babirusa and lowland and mountain anoa; highest bird and mammal endemism in Asia
25	Western Java montane forests	Abut Ujung Kulon National Park, home to largest population of Javan rhinoceros
26	Nusa Tenggara dry forests	Include islands of Komodo and Flores, home to Komodo dragons

* TCU, tiger conservation unit.

The collapse of several Asian economies in early 1998 suggests that it may be some time before they are able to allocate resources to conservation. The initiatives I have listed here buy time for Asia's megafauna until a strong conservation ethic to preserve species and their habitats evolves. Thus the reality is that citizens of wealthy nations who desire a world with large mammals must be willing to share the cost of conservation everywhere.

Is time running out for the conservation of Asia's large mammals? In a period of overall decline, I see rays of hope that will allow most species to persist in at least a fraction of their original range. Much of my optimism stems from field experiences in Royal Chitwan National Park, which in 1998 celebrated its silver jubilee. In 1991 it was inconceivable that Chitwan's wildlife populations and habitats would be in better condition in 2001. This experience demonstrates that, given adequate protection from poaching and provided with suitable habitat, even some of the largest and slowest-breeding mammals can recover quickly from episodes of near extinction.

Beyond Chitwan, parks throughout the Indian subcontinent offer hope. Large mammals are still holding on in many South Asian reserves, even in the face of poaching pressure and degradation of national parks. From Sri Lanka to India to Nepal, hunting reserves once set aside by maharajas or by colonial rulers became national parks. These parks still maintain a visible, if not vibrant, array of megafauna. The millennium could mark a new era of restoration for protected areas on the Indian subcontinent. Expanding and linking reserves (as the government of Bhutan has done), as well as translocating megaherbivores, are all possible, provided the leadership exists to push the programs forward.

The course of conservation, particularly in Thailand, Laos, Cambodia, and Vietnam, is quite different from what I have experienced on the Indian subcontinent. In Indochina wildlife reserves exist in name only; intense poaching has decimated the large mammal populations of this region. One is lucky to encounter tracks of large vertebrates in protected areas, let alone be blessed with an actual sighting. Why is this so? In stark contrast to the Indian subcontinent, Southeast Asia has no tradition of strict protection within nature reserves. But without strict protection, large mammals continue to disappear. With just a modicum of effective enforcement, these species could recover rapidly. We can only hope that conservation leaders in Indochina will take action before it is too late.

Some of the moments I cherish most came while observing large ani-

mals moving with grace and dignity in full freedom from human encroachment within national parks. Lately, I am thrilled to observe female rhinos with young calves, mugger crocodiles, and tigers in a buffer-zone area that, until recently, consisted of degraded scrub jungles and grasslands grazed to golf-course conditions. Now we walk through tall forests dominated by native *Albizia* trees, keeping a close eye out for a rhino, tiger, or leopard. We have accomplished what Michael Soulé and Reed Noss call "rewilding"—returning the land to the creatures that once flourished here. I hope that rewilding becomes the mantra of the next generation of Asian conservationists, as it takes root in other regions of the world.

As we embark on a new century, we are surrounded by examples of our own ingenuity and dominance as a species. We are sophisticated enough to capture a rhino or a tiger, fit it with a satellite telemetry collar, and let schoolchildren from around the world track its daily movements on the Internet. But a Web site cannot convey what it is like to watch a rhinoceros move through the grasslands of Chitwan, hear a tiger roar in the night, or listen to elephants rumble to one another in a subsonic language barely perceptible to our ears. The presence of large, potentially dangerous mammals connects us to something deep and primal and teaches us humility in a way that is unique and precious. Wild places where species leave footprints larger than our own must be part of the legacy we bequeath to future generations.