

vultures, seasonally appearing Bengal Florican, tiger. Data on direct sighting and pugmarks of tiger, group size, sex and age class of ungulates, python numbers and sites; elephant numbers, age and sex classwise are also monitored.

Communication

- (i) Each mahout guard and forester on monitoring duty be provided with walkie talkie sets so that they are always in contact while conducting monitoring.
- (ii) A road will be built along the inner side of the entire fence to facilitate patrolling & fire management. This will be continuation of the road along the southern perimeters.

Eco development and buffer management

- (i) All the villages along the southern fringe of the RRA to be included in Eco-development programme.
- (ii) The buffer areas of Gulra block to be managed intensively to ensure that people do not venture into the RRA.

Conservation Programs for Sumatran and Javan Rhino in Indonesia and Malaysia

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Abstract

There is an intensive and international program in progress to try to conserve the two most endangered Rhino species: the Sumatran Rhino and the Javan Rhino, both occurring in Southeast Asia. The effort is employing a diversified and integrated strategy that is attempting (1) to protect the species in the wild using anti-poaching teams known as Rhino Protection Units (RPU's) and (2) to breed the species under managed conditions in breeding centers in native habitat.

Background

Of the five extant Rhino species, the Sumatran (*Dicerorhinus sumatrensis*) and Javan (*Rhinoceros sondaicus*) rhino of South East Asia are the most endangered and acutely threatened with extinction. The third Asian species, the Indian Rhino (*Rhinoceros unicornis*) is more secure in India and Nepal, where it has recovered through good conservation and protection to viable levels. Nevertheless the three Asian rhino species together number fewer than the rarest of the African Rhinos, the Black Rhino (*Diceros bicornis*), while the most numerous African species, the White Rhino (*Ceratotherium simum*) is three times more numerous than all other species combined (See Table 1 below).

As recently as the early 20th century, both the Sumatran and Javan species were widespread over South Eastern Asia from eastern India through Indochina, the Malay Peninsula and selectively on Sumatra (the Sumatran and the Javan), Java (the Javan), and Borneo (the Sumatran, and Javan until about 12,000 years ago).

Today, the only confirmed, significant populations of Sumatran rhino survive in three geographically distinct areas of two range states: in Indonesia on Sumatra; in Malaysia, on the Peninsula; and in the Malaysian State of Sabah on the island of Borneo. Recent evidence suggests that some Sumatran rhino still exist in Thailand along the border with Malaysia, in northern Myanmar, and perhaps in India on the border with Myanmar, but the significance and validity of these reports has yet to be confirmed (See Map 1).

About 300 Sumatran rhino are estimated to survive worldwide. Although not as rare as the Javan rhino, poaching pressure is more intense on the Sumatran rhino, whose populations have declined considerably in the last decades, almost entirely due to poachers. The remaining populations are fragmented and small, with not a single area that has more than about 50-75 animals. Thus, the Sumatran Rhino is considered the most critically endangered species of rhino by the IUCN/SSC Asian Rhino Specialist Group (AsRSG).

The Javan Rhino is confirmed in only two populations: about 50-60 in Ujung Kulon National Park on the western tip of Javan in Indonesia and another 5-8 in the Cat Loc area

that is now part of Cat Tien National Park in southern Vietnam. Hence, there are fewer than 70 Javan rhino alive on the planet. However, the Indonesian population at least is consolidated in a relatively well protected Park and the population has remained unchanged in numbers for the last two decades (See Map 2).

The predominant cause of decline of both of these rhino species is poaching for the horn. Considerable habitat loss has occurred throughout their ranges as ever more forest is destroyed for timber or converted to agriculture, but the AsRSG estimates that there is still enough habitat for at least several thousands of both species, even within the two range states of Indonesia and Malaysia. Consequently, while habitat and ecosystem conservation are vital for long-term viability, direct protection of rhinos from poachers is much more critical over the short term.

In response to this crisis, the action plan for conservation of these two species in Indonesia and Malaysia emphasizes two major components:

- (1) Anti-poaching teams known as **Rhino Protection Units (RPU)**s for both Sumatran and Javan Rhino, and
- (2) **Managed Breeding Centers in Native Habitat**, currently for Sumatran Rhino but eventually perhaps for the Javan as well, both to propagate the species as a back-up for wild populations and to serve as centerpieces for a conservation tourism program that can generate funds to support the RPU's and other *in situ* efforts for the rhino.

RHINO PROTECTION UNITS (RPU's)

Under the conditions that have prevailed in Indonesia and Malaysia over the last five years, Rhino Protection Units (RPU's) appeared to be the best method to effectively protect tropical forest rhinos. The current RPU program in Indonesia and Malaysia was initiated with and catalyzed by a grant from the Global Environment Facility (G.E.F.) through the United Nations Development Programme (UNDP). The International Rhino Foundation (IRF) and the IUCN/SSC Asian Rhino Specialist Group (AsRSG), for which IRF operates as the financial and administrative agent under an M.O.U. with IUCN-The World Conservation Union, coordinated and facilitated the GEF Project.

To supplement the GEF funds during the initial three years and particularly to continue the program after the expiration of the GEF grant in December 1998, the International Rhino Foundation (IRF) and the IUCN/SSC Asian Rhino Specialist Group (AsRSG) have contributed funds and recruited a number of other donor partners.

Under the IRF/AsRSG-initiated program, RPU's have been formed in all areas where Sumatran rhinos exist. As of late 1998, RPU's have also been formed for Javan rhino as a result and at the recommendation of a Javan Rhino Colloquium organized by the AsRSG and IRF. There are a total of 41 RPU's (including a few Tiger and bufferzone units) operating in Indonesia and Malaysia under the two auspices described above.

In Indonesia and Malaysia, each RPU usually consists of 4-5 persons and is engaged in anti-poaching patrol and intelligence operations. The RPU's are attempting to create intensive protection zones (IPZs) for the rhino in each area. The emphasis for the RPU's is to patrol in the Rhino core areas, to destroy traps and snares, and to interdict intruders. The RPU's also engage in community outreach efforts as well as intelligence operations to

identify poachers in the local area. In all cases, the RPU's coordinate closely with the existing staff of the National Park but are concentrating specifically on anti-poaching in Rhino core areas.

Table 1:

		WILD	CAPTIVE
African Rhinoceros			
Black Rhino	<i>Diceros bicornis</i>		
South-central Black Rhino	<i>Diceros bicornis minor</i>	>1,450	>65
Eastern Black Rhino	<i>Diceros bicornis michaeli</i>	>500	>175
South-western Black Rhino	<i>Diceros bicornis bicornis</i>	>750	0
North-western Black Rhino	<i>Diceros bicornis longipes</i>	>10	0
	TOTAL	>2,700	>240
White Rhino	<i>Ceratotherium simum</i>		
Southern White Rhino	<i>Ceratotherium simum simum</i>	~10,400	10
Northern White Rhino	<i>Ceratotherium simum cottoni</i>	30	>730
	TOTAL	~10,430	>740
TOTAL AFRICAN RHINOS		>13,100	>980
Asian Rhinoceros			
Indian Rhino	<i>Rhinoceros unicornis</i>		
Eastern population	(Assam & West Bengal)	~1,800	
Western population	(Nepal & Uttar Pradesh)	~670	
	TOTAL	~2,470	~140
Javan Rhino	<i>Rhinoceros sondaicus</i>		
Southern Javan Rhino	<i>Rhinoceros sondaicus sondaicus</i>	50-60	0
Indochinese or	<i>Rhinoceros sondaicus</i>	5-10	0
Eastern Sumatra Rhinos	<i>annamiticus</i>		
Northern Javan Rhino	<i>Rhinoceros sondaicus inermis</i>	0	0
	TOTAL	55-70	0
Sumatran Rhino	<i>Dicerorhinus sumatrensis</i>		
Southern Sumatran Rhino	<i>Dicerorhinus sumatrensis sumatrensis</i>	~250	13
Bornean or Eastern	<i>Dicerorhinus sumatrensis</i>	~50	2
Sumatran Rhino	<i>harrissoni</i>		
Northern Sumatran Rhino	<i>Dicerorhinus sumatrensis lasiotis</i>	0?	0
	TOTAL	~300	15
TOTAL ASIAN RHINOS		~3,830	~155
TOTAL WORLD RHINO SPECIES		~16,000	~1,100

IRF and its partner organizations provide the funds for RPUs in Ujung Kulon NP, Way Kambas NP, Bukit Barisan Selatan NP in Indonesia and for Taman Negara NP, Endau Rompin NP, and several smaller areas in Peninsula Malaysia. In Gunung Leuser NP, where probably the largest number of Sumatran rhinos survive, RPUs are organized by the Leuser Development Program with financial support from the EU and technical assistance from the IRCP. RPUs also operated during the GEF sponsored phase in the Tabin Wildlife Reserve and the Danum Valley Conservation Area in Sabah, and currently they are being re-established with support from SOS Rhino.

The RPUs have been effective over the last three years. Poaching has been eliminated or drastically diminished in areas where the RPUs have been operating. The current political and economic uncertainties in Indonesia have increased the pressure on the natural resources and also the rhino poachers appear to be encouraged by the deteriorating security situation. Recently two cases of rhino poaching, in which one rhino was unfortunately killed, have been detected in Bukit Barisan Selatan NP in areas guarded by the RPUs and the anti-poaching efforts may have to be further intensified in some areas.

The major problem with the RPU program is the high costs of deploying a sufficient number of RPUs to provide adequate coverage of the total area of the Parks. The RPUs have the objective of protecting the other large mammals as well as the rhino in the Parks, but have to restrict their activities to areas where rhinos occur. In most areas rhinos occur in only a small part of the conservation area, and therefore large parts of the Parks remain unprotected. Recently with supplementary grants a few units have been added to cover bufferzones in Taman Negara in Malaysia and important tiger areas in Bukit Barisan Selatan in Sumatra, which are outside the rhino areas.

The RPU program is costly as it involves much personnel and currently there is about one person employed for every 1-2 rhinos protected and costs per rhino are above \$ 1000 per year. The financial sustainability of the program is an ongoing concern, as it is not likely that the demand for rhino horn and therewith the pressure for poaching of rhino will diminish or disappear in the near future. The RPU program will need to continue for as long as rhinos need protection, and that might be for many more years. If such a program cannot be sustained because of lack of funds rhino poaching will intensify immediately and the former RPU members may not be able to resist the temptation of providing services to poachers.

Managed breeding centers in native habitat for sumatran rhino

The second major component of the conservation program for Sumatran and Javan rhinos are Managed Breeding Centers in Native Habitat. Currently, these centers are being developed only for Sumatran rhino, but if successful they may be extended to Javan rhino in the future.

The managed breeding centers have two major components:

I. Biological Component

The breeding centers for Sumatran rhinos are attempting to propagate this species under managed conditions as a back-up to the *in situ* protection efforts. Since protection *in situ* has proven so challenging, a back-up through managed breeding could be critical. On this premise and in response to the dire status of this species, an *ex situ* captive propagation program was initiated in 1984 as an integral component of the conservation strategy for

this species under auspices of the Species Survival Commission (SSC) of the IUCN using rhinos in areas where they could never be protected or be part of a population large enough to be viable.

Three separate captive programs were initiated in the major and geographically disjunct regions where appreciable populations of Sumatran rhino still survive: Indonesia, Peninsular Malaysia, and Sabah (on the island of Borneo). The Indonesian program was the most international of the programs with rhinos rescued being placed in captive facilities in Indonesia, the United Kingdom, and the United States.

Unfortunately, traditional captive methods have not worked for the Sumatran rhino. The Sumatran rhino has proven a much more formidable challenge than anticipated. Since 1984, 40 rhino have been collected from the wild. However, mortality has been high: 25 of the 40 have died (~65%). Today only 15 (5 males and 10 females) survive in 4 captive facilities. Moreover, to date no reproduction has occurred although a female in the USA is currently pregnant.

A number of reasons have been proposed for the problems with the captive program:

- ▶ Many of the mortalities seem consistent with nutritional difficulties.
- ▶ Mortalities may also be related to the size and configuration of captive enclosures.
- ▶ The small size and configuration of enclosures may also be inhibiting the breeding.
- ▶ The reproductive biology of the species causes it to be one of the most difficult that captive managers have ever tried to reproduce.
- ▶ A final cause of problems that has been strongly suggested is stress due to exposure, both to human activities and to environmental factors, especially intense sunlight (especially its ultraviolet component), for these normally deep forest animals.

The conclusion from consideration of the program performance and suspected problems has been a recommendation that the surviving rhinos in captivity be consolidated in the most spacious enclosures and natural conditions possible consistent with continuation of the intensive protection and management believed necessary because of the precarious situation in totally free-ranging situations in the wild. By providing much larger enclosures and more natural conditions in a managed breeding center in natural habitat, the hope is that propagation can succeed.

Three managed breeding centers in native habitat are already in operation:

(1) The Sumatran Rhino Sanctuary/Suaka Rhino Sumatera (SRS) in Way Kambas National Park, Sumatra, Indonesia.

The SRS complex comprises 10,000 hectares (25,000 acres) within Way Kambas National Park, divided into two parts: a Rhino Conservation Zone of 9,000 hectares and a Conservation Tourism Zone of 1,000 hectares.

Within the conservation zone, the first set of enclosures has been completed and encompasses 250 acres (100 hectares) in native forest.

Three rhino from zoos in the UK and Indonesia were moved to the SRS in January 1998. The rhino have re-adapted well to their native environment after many years in captivity. An old unproductive female died early 2001 and the remaining pair comprise all but three of the five surviving rhino of the 18 (7 males and 11 females) originally

captured in Indonesia as part of the effort to establish a captive propagation program for this species. The other 3 surviving Sumatran rhino from Indonesia in captivity are in zoos in the United States.

The IRF provided the initial capital (about \$ 500,000) for development of the rhino facilities and is supporting operation of the biological program (about \$ 50,000/year)

(2) The Sumatran Rhino Conservation Center - Sungai Dusun (SRCCSD) at Sungai Dusun Wildlife Reserve in Peninsula Malaysia.

This center is currently smaller in size than the SRS in Way Kambas but has more rhino: two males and five females. The original facilities consisted of a barn with seven yards. With funds from and through the IRF, a larger enclosure of four hectares contained by electric fence has been constructed to extend the facilities into the adjacent forest. A project by the Malaysian government has enclosed another 40 hectares of forest by the end of 1999.

The IRF and AsRSG have now an assumed joint financial and managerial responsibility with the Department of Wild Life and National Parks of Peninsula Malaysia for this center. An objective is to manage the two breeding centers at Way Kambas and Sungai Dusun in as integrated and interactive a way as possible. It is likely that there may be some movement of rhino between the Way Kambas SRS and the Sungai Dusun Center to manage the surviving rhino as a single population to maximize propagation.

(3) The Sepilok Sumatran Rhino Breeding Center in Sabah.

This is the smallest of the three centers and has just a pair of Sumatran rhino currently. The centre is currently being upgraded with support of SOS Rhino.

Conclusion

The Conservation Programs for Southeast Asian rhinos are of vital importance for the survival of two species of Rhinoceros. These programs are complementary to the long-term efforts for preservation of wildlife and biodiversity that are ongoing in the Rhino Range States and include protected areas, legislation, law enforcement, public awareness, education, and fund raising by the Range State Governments and National and International Conservation Agencies.

The Rhino Conservation Program has been supported by the International Rhino Foundation (IRF) and its member institutions (including especially the Howard Gilman Foundation and the Walt Disney Company Foundation), World Wide Fund for Nature - Indonesia (WWF-I), the Rhino and Tiger Conservation Fund of the US Fish and Wildlife Service (RTCF), AAZK Bowling for Rhinos, and the Anna Merz Trust.

Anesthesia Management in White Rhinos for Reproductive Evaluation, Semen Collection and AI - a Team Approach

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Extended Abstract

In order to elucidate the problems of poor reproductive performance in captive white rhinoceros (*Ceratotherium simum*),⁸ the EEP committee has encouraged intensive and serial reproductive monitoring in this species. Although the reasons for these problems have not been identified definitively, a multi-disciplinary, multi-institutional research proposal aims to work on possible solutions. The overall objectives of this project are to use an integrated approach to enhance breeding of southern white rhinoceroses in the EEP. Focus is placed on older non-breeding animals (F0 and F1). These older animals are targeted in order to conserve their genetic potential within the breeding program. Our combined approach to enhance breeding and overcome reproductive problems includes endocrine monitoring, transfer of animals to enhance natural breeding, and the development of artificial insemination (AI) techniques (see Schwarzenberger et al. these proceedings).

The transfer of animals between institutions requires only minimal applications of chemical restraint. Although several authors have demonstrated that ultrasonographic evaluation of the genital tract and semen collection are possible on unrestrained animals,^{4,6,7,9} this requires the commitment of a minimal training program and zoo management/keeper compliance. Presently with exception of the Salzburg Zoo,⁹ no rhino chutes are available within the EEP. Various authors have described anesthetic procedures in white rhinos.^{1,2,3}

During the period March 1999 to July 2001 a total of 53 elective anesthetic events were performed on 14 male and 28 female animals. Using the experience gained with the combination of Detomidine-HCL (Domosedan®, Orion Corp. Farnos Finland) and Buthorphanol (Turbagesic®, Fort Dodge Animal Health, Iowa, USA) in the standing sedation of white rhinos, and the experience with this combination and additional Ethorphine-Acepromazine (Large Animal Immobilon® C-Vet Veterinary Products, Lancs, UK) in Przewalski's Horses (*Equus przewalskii*)¹⁰ we elected to apply this combination in the white rhinoceros.

Following a pre-anesthesia evaluation questionnaire (institution veterinarian and Rhino keeper) all animals (estimated weight range 2000 - 3100 kg) were initially sedated with a combination of Detomidine-HCL 10 - 15 mg; and Buthorphanol 10 - 15 mg. This combination was injected into the neck muscles caudo-ventral to the ear using a dart pistol and 3.5ml plastic darts with a 60-mm needle (Dan-inject International Gelsenkirchen, Germany).

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A Research Update on Elephants and Rhinos

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