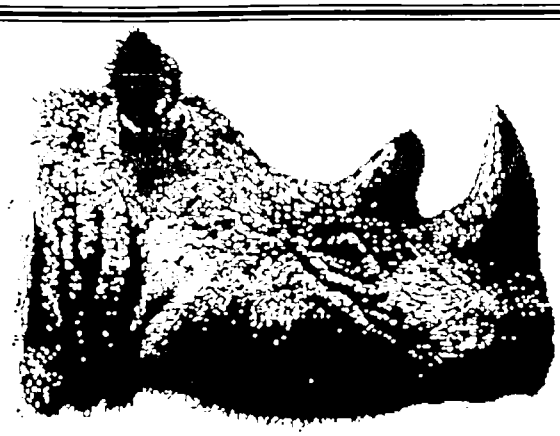
Photo Credit: A. Compost

Sumatran Rhinoceros

Dicerorhinus sumatrensis



Global Heritage Species Program

Conservation Action Plan Prototype

1 November 1990
IUCN/SSC
Captive Breeding Specialist Group

in collaboration with
Asian Rhino Specialist Group
PHPA- Indonesia
DWNP- Malaysia

CBSG

INTRODUCTION

The concept of a Global Heritage Species Program (GHSP) originated in 1988. The idea is to carefully select a group of ecologically significant, culturally important, and publicly charismatic species that can be used as flagship and umbrella taxa to attract support for conservation not only of the species themselves but also their ecosystems. Since then, GHSP has been the subject of much discussion and development. An important component that has been emphasized during preliminary development has been the need to base Global Heritage Species Programs on biologically sound conservation action plans.

In April 1990, the Captive Breeding Specialist Group (CBSG) was invited by the Chairman of the IUCN Species Survival Commission (SSC) to lead preparation of one or two proposals for conservation action plans that could be used as prototypes for the Heritage Species Program. Criteria considered to select candidates for the prototype development included:

(1) Candidates should be both umbrella and flagship taxa;
(2) They should be taxa for which there is already considerable background and foundation, including population viability assessments, for this kind of program;
(3) Hence, they should be taxa for which explicit and preferably quantitative goals and objectives can be formulated;
(4) They should be taxa whose survival definitely depends on both *in situ* protection/management and captive propagation so that both the field and zoo communities can be actively involved.

CBSG immediately proposed the Sumatran rhino (*Dicerorhinus sumatrensis*) as a species which eminently satisfied these criteria.

It had been the hope that a full proposal for the prototype could be prepared in time for the IUCN SSC meetings in Perth. Naturally, development of these types of conservation action plans must be collaborative endeavors with scientists and managers in the range states. Unfortunately, circumstances have caused some delays in the intended schedule for such collaboration with colleagues in Indonesia and Malaysia. Therefore, this document is currently only a skeleton of a prototype conservation action plan for the Sumatran rhino.

Flesh will be added to this skeleton over the next several months through several opportunities for collaboration with biologists from Indonesia and Malaysia: several biologists from range states have been invited to visit the CBSG Secretariat, CBSG personnel will visit range states; a major Rhino Conservation Workshop will be conducted in Indonesia in January 1991 (A copy of the tentative agenda is attached as Appendix 1). A full proposal for of a prototype action plan for this species will be completed by the Spring 1991 SSC Steering Committee meeting.

BIOLOGICAL PREMISES, GOALS, DESIDERATA

- Ideally, there should be linkage between the taxa selected for the Global Heritage Species Program and some strategic designation of the natural parts of the planet. In other words, there should be an attempt to preserve what might be generically referred to as "heritage areas" - with an explicit target, e.g. perhaps 10% of the natural areas of the planet with as much representation as possible of its ecosystems diversity.

- Therefore, the GHSP should select not only flagship (charismatic) species but also umbrella species, i.e. taxa for which the habitat required to sustain viable populations is sufficiently large to encompass appreciable parts of natural ecosystems.

- Further, GHSP candidates should be selected in such a way that the smallest number of taxa will encompass the greatest fraction of the natural areas of the planet. (As a consequence, megavertebrates may have preference; fortuitously, they may also be most charismatic and hence desirable in terms of promoting the program).

- For each heritage species, a conservation action plan must be developed based on population viability assessment and conservation biology principles.

- Many if not most candidates for GHSP will be characterized by small populations and as such will be vulnerable to stochastic problems that can endanger survival just as much as more deterministic threats of habitat deterioration and unsustainable exploitation. Environmentally, small populations can be devastated by catastrophes or decimated by less drastic fluctuations in the environment. Demographically, small populations can be disrupted by random failures in survivorship and fertility. Genetically, small populations lose heritable diversity needed for fitness and adaptability. Protecting endangered species from these problems entails development of populations that are sufficiently large and well distributed, i.e. intensively and interactively managed metapopulations that frequently have *ex situ* programs to reinforce *in situ* efforts. (Figure 1).

- Therefore, the conservation action plan should have specific quantitative objectives as countermeasures to the stochastic problems, e.g.

    - Insure 99% probability of survival and 95% preservation of diversity for next 100 years

    - Sustain 99% probability of survival and achieve recovery of evolutionary potential by end of next 100 years

- Consequently, attain and maintain populations of quantitatively specified size and distribution to achieve these objectives.

- Performance toward achieving objectives should be measurable.

- The action plans should be organized with modularized components and budgets, to facilitate implementation, funding, and evaluation.

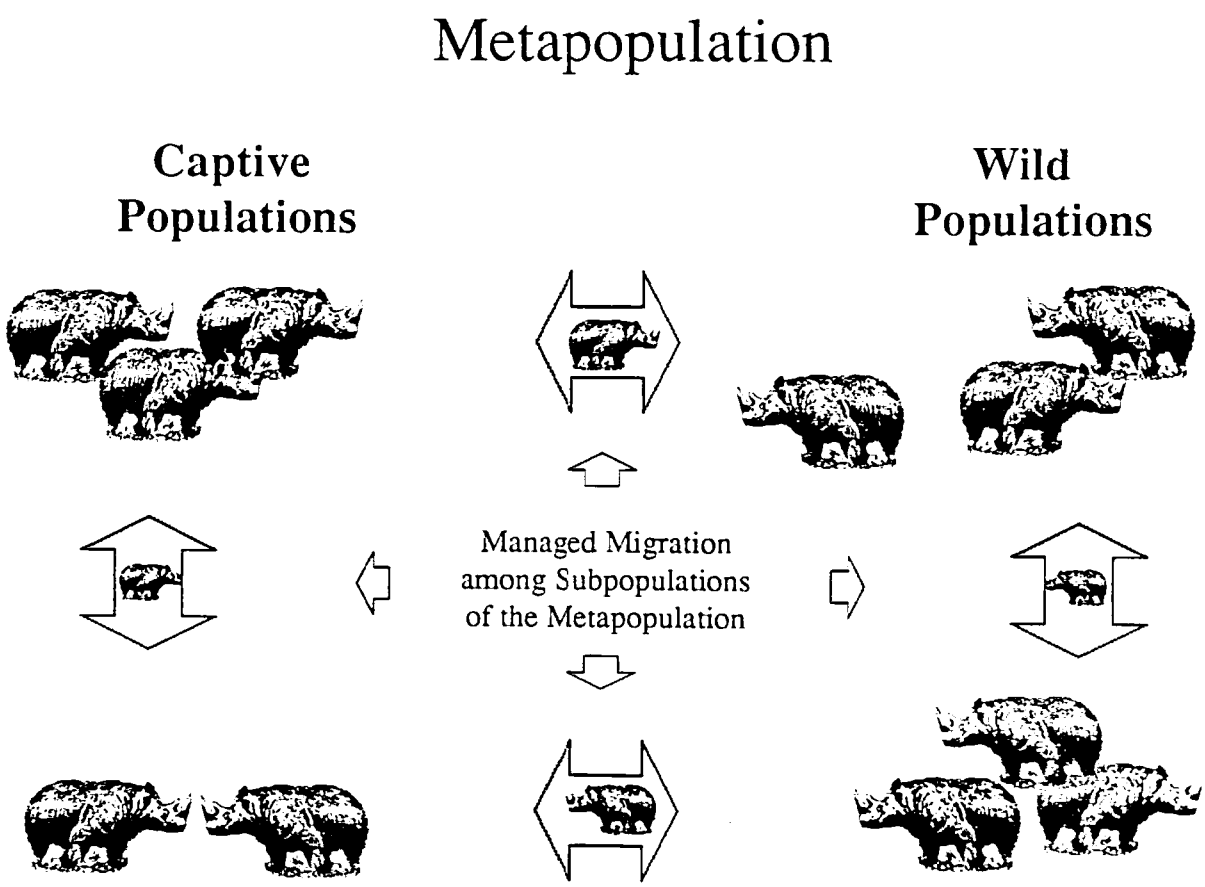


FIGURE 1

GENERAL BACKGROUND ON SPECIES

- The Sumatran rhinoceros is a species of the South East Asian rainforest.

- The species was formerly distributed over much of South East Asia from eastern India through Myanmar (Burma), Thailand, peninsular Malaysia, and the islands of Sumatra and Borneo.

- The current and former distribution (and therefore historic range that might be recovered) is depicted in Figure 2.

- The population is greatly reduced and fragmented. Approximately 500 to 1000 rhino are estimated to survive in 35 or more localities throughout South East Asia. The most significant known populations survive in Indonesia and Malaysia.

- The current distribution and estimated abundance as well as the potential carrying capacity of Sumatran rhino is presented in Table 1.

- Many of the individuals occur outside protected areas and viable populations (i.e. large enough to survive stochastic threats.

- Because numbers of this species has become so reduced and fragmented, it is subject to stochastic problems (environmental, demographic, and genetic) that can endanger survival of small populations. (Khan 1989; Seal & Foose 1989).

- Three subspecies have been described for the Sumatran rhino:

  Dicerorhinus sumatrensis: Sumatra, peninsular Malaysia, Thailand

  Dicerorhinus sumatrensis harrisoni: Borneo

  Dicerorhinus sumatrensis lasiotis: Myanmar (Burma) and eastern India

  Additionally, the Asian Rhino Specialist Group has expressed concern that the populations on Sumatra may differ significantly from the populations in peninsular Malaysia and Thailand. Current descriptions of subspecies are based on non-genetic taxonomic methods. There has not been a rigorous analysis to determine if the described subspecies and or geographical varieties represent evolutionarily significant units that should be conserved as separate entities.

- Among rhinos, the species seems particular attractive and charismatic being normally covered by a prominent coat of hair and exhibiting a very varied repertoire of vocalizations and behaviors.

DISTRIBUTION OF THE SUMATRAN RHINOCEROS
(Dicerorhinus sumatrensis)

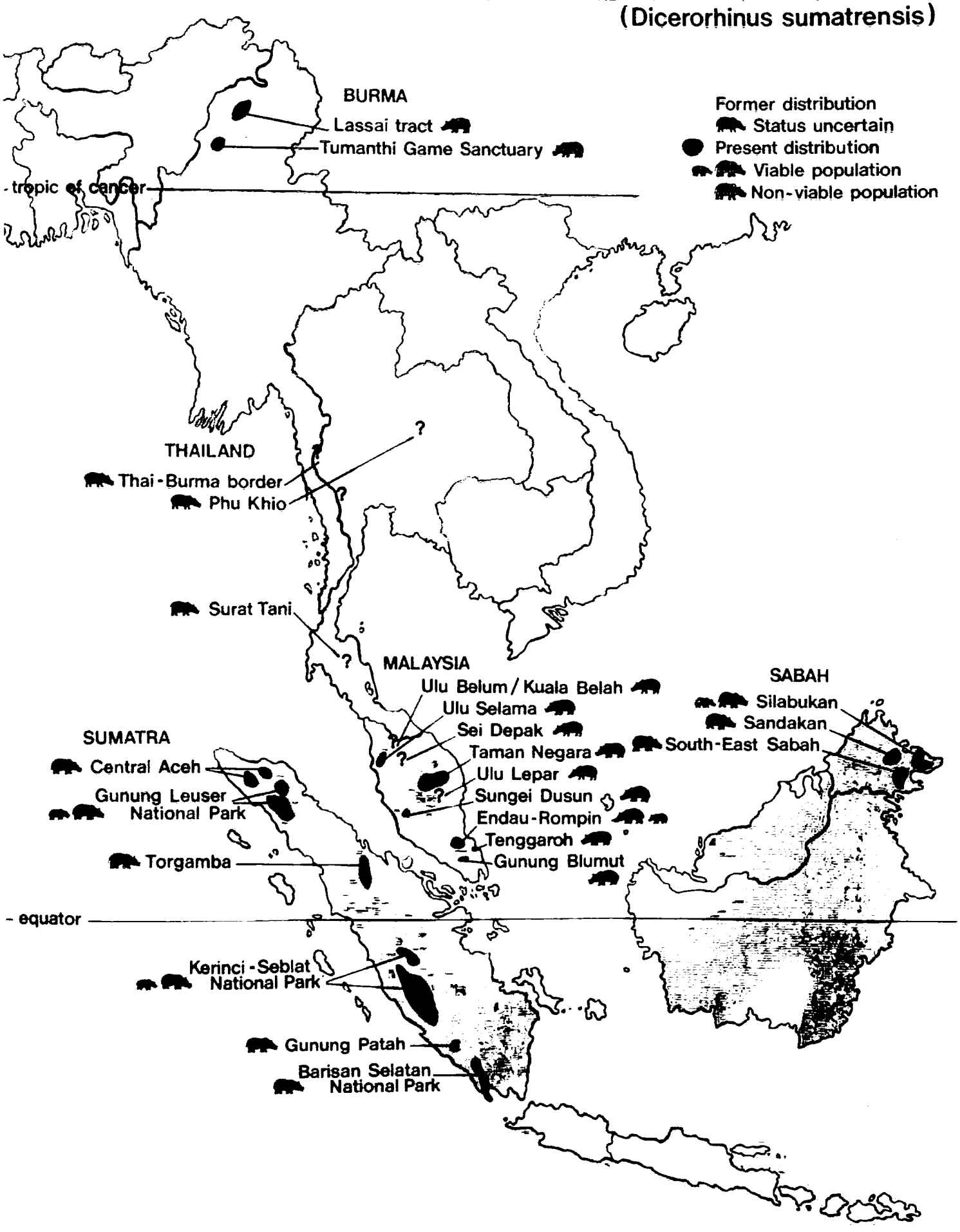


TABLE 1
DISTRIBUTION AND ABUNDANCE OF SUMATRAN RHINO
(From Khan 1989)

Country	Location	No of Rhino	Habitat Availability		Protection Status	Potential Carrying Capacity
			Presently (Km^2)	Potentially (Km^2)		
Burma	Schwe-u-daung	Perhaps survives	207	?	Game sanctuary	?
Burma	Tamanthi	Perhaps survives	2,150	?	Game sanctuary	?
Burma	Lassai tract	6-7	?	?	Unknown	?
Indonesia (Kalimantan)	near Sabah border	Perhaps survives	?	?	Unclear	?
Indonesia (Sumatra)	Gunung Leuser	130-200	1,400	8,000	National Park but disturbance & poaching	140-800
Indonesia (Sumatra)	Gunung Patah	Numbers unknown	400	500	No information	40-50
Indonesia (Sumatra)	Kerinci Seblat	250-500	5,000	10,000	Little protection proposed National Park	500-1,000
Indonesia (Sumatra)	Gunung Abong-abong and Lesten-Lukup	15-25	?	?	Not protected	?
Indonesia (Sumatra)	Berbak	Perhaps extinct	?	?	Nature Reserve	?
Indonesia (Sumatra)	Torgamba	Very few	?	?	Being deforested	?
Indonesia (Sumatra)	Barisan Selatan	25-60	700	3,600	National Park, deforestation occurring	70-360
Malaysia (Peninsula)	EndauRompin	10-25	1,600	1,000-1,600	Reserve, National Park proposed	110-160
Malaysia (Peninsula)	Taman Negara	22-36	4,400	4,400	National Park	220-440
Malaysia (Peninsula)	Sungai Dusun	3-4	40	140+	State Wildlife Reserve	15
Malaysia (Peninsula)	Gunung Belumut	3-5	230	230	Wildlife Reserve proposed	23
Malaysia (Peninsula)	Mersing Coast	5-6	?	Probably none	Being deforested	0
Malaysia (Peninsula)	Sungai Depak	2-4	?	Probably none	Being deforested	0
Malaysia (Peninsula)	Sungai Yong	3-5	?	Probably none	No information	0
Malaysia (Peninsula)	Kuala Balah	2-4	?	Probably none	Being deforested	0
Malaysia (Peninsula)	Bukit Gebok	2	?	None	Being deforested	0
Malaysia (Peninsula)	Krau Reserve	1	500	500	Insecure	50
Malaysia (Peninsula)	Sungai Lepar	2	1,000	0	Unprotected and being deforested	0
Malaysia (Peninsula)	Ulu Atok	1	?	?	No information	?
Malaysia (Peninsula)	Ulu Selama	6-7	?	?	Unprotected	?
Malaysia (Peninsula)	Ulu Belum	2-4	?	?	Insecure	?
Malaysia (Peninsula)	Bubu Forest	2	?	?	No information	?
Malaysia (Peninsula)	Kedah	1	?	?	Insecure	?
Malaysia (Sabah)	Tabin Reserve	20+	1,200	1,200	Perhaps protectable	120
Malaysia (Sabah)	Kretam/Dent Peninsula	8	1,000	0	Being converted to agriculture	0
Malaysia (Sabah)	Danum Valley	10	2,000	2,000	Perhaps protectable	200
Malaysia (Sarawak)	Limbang	5-15	600	600	Protection proposed	60
Thailand	Phu Khieo	Perhaps survives	1,560	?	Protected area	?
Thailand	Tenasserim Range	6-15	?	?	Insecure	?
Thailand	Khao Soi Dao Reserve	Perhaps survives	745	?	Protected area	?
TOTAL			536-962			1,548-3,278

RANGE STATES COMMITMENT, RESOURCES, INFRASTRUCTURE

- An Action Plan has been formulated by the IUCN SSC Asian Rhino Specialist Group. This Plan has been based on preliminary population viability assessments for the species. The Plan has specific and quantitative objectives for conservation action on the Sumatran rhino.

- National conservation strategies for the Sumatran rhino are being developed in both of the currently major range states: Indonesia and Malaysia.

- The Indonesian strategy provides for 3 major types of activities: *in situ* protection and management employing both resident and mobile rhino units; translocations; captive propagation.

- Activities and budgets to implement this Indonesian strategy are being formulated in a modules.

- Indonesia has organized a Friends of the Rhino Foundation to recruit support and coordinate activities for implementation of its rhino conservation strategy.

- Malaysia has already developed a very effective rhino unit for conservation of its rhinos. A similar kind of rhino unit is being contemplated for Indonesia.

- The Association of South East Asian Nations (ASEAN) provides the organizational infrastructure to facilitate multinational cooperation and coordination for conservation of this species.

BIOLOGICAL GOALS AND OBJECTIVES

- Preliminary population viability analyses for the Sumatran rhino recommend:

  - A total population of at least 2,000 to 3,000; an effective population size (N_e) of at least 500.

    Larger populations are desirable and may be necessary for viability if further studies validate each of the described subspecies and/or regional varieties as conservation units to be conserved separately.

  - Populations of 700-1000 in each of the major regions of the range Sumatra; Borneo; peninsular Malaysia; and Thailand; and Northern Myanmar (Burma)/eastern India.

  - Distribution of total population over at least 6 major sanctuaries.

  - Each sanctuary capable of accommodating a minimum of 100 rhino. Preferably, at least 2 sanctuaries capable of accommodating at least 400-500 rhino.

- These recommendations provide for a 99% probability of survival relative to demographic and environmental stochasticity and an genetically effective population size of 500 which should maintain adequate genetic variation to permit the evolutionary process to continue if the disjunct populations are managed interactively and intensively as a metapopulation.

  Examples and results of Population Viability Analyses are presented in Appendix 1.

- Attaining and sustaining viable populations of these sizes will require at least 20,000 to 30,000 sq. km. of tropical forest habitat. (Based on estimates by Sumatran rhino researchers of carrying capacity of 1 rhino/10 km^2. Because not all habitat within protected areas will be appropriate for the rhino, actual area required for for populations of these sizes is probably on the order of 40,000 to 60,000 km^2.

- Based on these analyses, The Action Plan recognizes 7, possibly 8, major existing sanctuaries and populations have been recognized as viable for the Sumatran rhino. The Action Plan recommends that field efforts at protection and management initially be concentrated on these sanctuaries. The major conservation action needed are anti-poaching activities and habitat protection, management, and rehabilitation. For each sanctuary explicit quantitative objectives can be established for the minimum sizes of the populations to be sustained and therefore the area of natural habitat to be protected and managed:

Country	Sanctuary	Area (km^2)	Current Population	Target Population
Indonesia	Gunung Leuser	8,000	130-200	400
	Kerinci Seblat	10,000	250-500	500
	Barisan Selatan	3,600	25-60	100
Malaysia				
Peninsula	Endau Rompin	1,600	10-25	100
	Taman Negara	4,400	22-36	200
Sabah	Tabin	1,200	20+	100
	Danum Valley	2,000	10	100
Sarawak	Ulu Limbang	1,000 *	5-15	100

* Will require enlargement of protected area from current 600 km^2

- These 7 sanctuaries contain much biological diversity that will also be conserved by protection/management actions implemented for the Sumatran rhino. (All are accorded "A" Priority by McKinnon & McKinnon (1986).

Sanctuary	Area	Mammals	Birds	Herps	Invertebrates	Plants

Information to be provided from species lists compiled by each country involved.

- Additionally, the Sumatran rhino formerly (and perhaps still precariously) occurred in another major sanctuaries to which the species could be restored by recolonization from captive propagation or translocations.

Country	Sanctuary	Area (km^2)	Current Population	Target Population
Indonesia				
Kalimantan				
Malaysia				
Peninsula	Krau Reserve	500	1	50
Thailand	Phu Khieo	1,500		100
	Khao Soi Dao	750		50
Myanmar (Burma)				

- These sanctuaries also contain much other biotic diversity that could and would be conserved by protection/management actions implemented for the Sumatran rhino.

Sanctuary	Area	Mammals	Birds	Herps	Invertebrates	Plants

Information to be provided from species lists compiled by each country involved.

- The Action Plan also recommends development of a captive population of at least 150-225 rhino, depending on the number of e.s.u.'s finally validated. A population of this size will preserve 90% of the average genetic diversity of the population for the next century and once the target size is attained produce 7-10 rhinos per year for return to the wild (assuming an annual growth rate of about 5%).

- The Action Plan recommends biochemical genetic studies as soon as possible to investigate if the subspecies or regional populations do represent e.s.u's.

PRIORITY ACTIONS

PHASE 1: Years 1990-2000

- Improve protection and management of the seven or eight sanctuaries for the actually or potentially viable populations. The goal will be to attain and sustain at least the target populations. Action required is more intensive anti-poaching measures as well as efforts to arrest and reverse habitat degradation.

Country	Sanctuary	Requirements	Cost
Indonesia:	All	Rhino Unit Coordinator	
		Mobile Anti-poaching Unit	

		- # Staff
		- Equipment
		  - Airplane
		  - Helicopter	

	Gunung Leuser	Resident Rhino Unit:
		- # Guard Posts
		- # Guards
		  - Salary
		  - Housing
		  - Health Care
		  - Training	

		Equipment: - Vehicles - Radios - Telephone - Faxes - Field Equipment	
		Operating Expenses	

Details and specifics, including costs to be provided by Indonesia

	Kerinci Seblat	Resident Rhino Unit: - # Guard Posts - # Guards - Salary - Housing - Health Care - Training - Equipment: - Vehicles - Radios - Telephone - Faxes - Field Equipment - Operating Expenses
	Barisan Selatan	Resident Rhino Unit: - # Guard Posts - # Guards - Salary - Housing - Health Care - Training - Equipment: - Vehicles - Radios - Telephone - Faxes - Field Equipment - Operating Expenses
Malaysia:	All	
Peninsula	Taman Negara	
	Endau Rompin	*Details and Specifics*
Sabah	Tabin	*to be provided by Malaysia*
	Danum Valley	
Sarawak	Ulu Limbang	

- Implement measures to reduce/reverse human encroachment and recover/rehabilitate habitat in these sanctuaries.

Country	Sanctuary	Requirements	Cost
Indonesia	Kerinci	Relocate settlers	
		Rehabilitate derelict land	
	Gunung Leuser		
	Barisan Selatan		
Malaysia			
Peninsula	Endau Rompin		
	Taman Negara		
Sabah	Tabin		
	Danum Valley		
Sarawak	Ulu Limbang		

- Finalize any uncompleted gazettment of major sanctuaries.

Country	Sanctuary	Action
Indonesia	Kerinci Seblat	
Malaysia		
Peninsula	Endau Rompin	
Sabah	Tabin	
	Danum Valley	
Sarawak	Ulu Limbang	

- Conduct more intensive surveys to verify the status of the Sumatran Rhino in Kalimantan, particularly along the border with Sabah and Sarawak, in Thailand, and in Myanmar.

Country	Area	Requirements	Cost
Indonesia	Kalimantan		
Malaysia			
Thailand			
Myanmar			

- Depending on results of survey, be prepared to institute specific *in situ* protection/management and or captive propagation programs oriented toward recovery of the populations.

Country	Area	Action	Cost

- Conduct the biochemical studies necessary to validate e.s.u.'s within the species.

- Conduct research to improve knowledge of the ecological characteristics and requirements of the species.

Research	Cost

- Translocate rhino as appropriate to achieve metapopulation strategy.

- Continue development of captive propagation programs both in range and non-range states. In range states, place emphasis on the captive propagation programs of the wildlife departments (PHPA in Indonesia and DWNP in Malaysia) especially at facilities developed within *in situ* sanctuaries. The goal will be to develop a self-sustaining captive population of at least 150-225 rhino which can then be used to produce animals for return to natural sanctuaries.

Country	Requirements	Cost
Indonesia	PHPA Rhino Breeding Center(s)	
Malaysia		
Peninsula	Sungai Dusun	
Sabah	Sepilok	
Sarawak	?	
Thailand		
North America		
Europe		
Australia		

- Conduct research in the reproductive biology of and technology for the species to facilitate intensive and interactive management of wild and captive populations.

- Provide training in both *in situ* and *ex situ* technologies.

Training	Activity	Cost

- Support public education programs at both national and local (i.e. neighborhood of sanctuaries) for rhino.

Country	Action	Cost
Indonesia	Local Extension Programs	
	TV Programs	
Malaysia	TV Programs	
Singapore	TV Programs	

- Assist specific efforts to reduce further the trade in rhino horn in both producer and consumer countries:

Country	Action	Cost
Indonesia		
Malaysia		
Singapore		
Hong Kong		
Taiwan		
China		
Japan		
Thailand		
Myanmar		
Laos		

PHASE 2: Year 2000 and Beyond

- Commence recolonization and recovery process in areas where the rhino has disappeared:

Thailand:

Myanmar:

Indochina:

India:

Indonesia:

Malaysia:

APPENDIX 1

WORKSHOP ON
INDONESIA RHINO CONSERVATION
BOGOR - 21-23 JANUARY 1991

MONDAY - 21 JANUARY 1991

8:00 - 8:30	WELCOME: Sutisna
8:30 - 9:00	OBJECTIVES AND OVERVIEW OF MEETING: Stuart
9:00 - 9:30	REVIEW OF ASIAN RHINO SPECIALIST GROUP ACTION PLAN FOR INDONESIA: Khan
9:30 - 10:00	DESCRIPTION OF NEW INDONESIAN RHINO FOUNDATION: Sutisna and Effendy
10:00 - 10:30	BREAK
10:30 - 12:00	REVIEW OF JAVAN RHINO PVA RESULTS AND RECOMMENDATIONS: Seal
12:00 - 13:00	LUNCH
13:00 - 15:00	DISCUSSION OF SPECIFIC POINTS AND CONCERNS ABOUT JAVAN RHINO PVA: Chair: Hails
15:00 - 15:30	BREAK
15:30 - 17:30	CONTINUED DISCUSSION: Chair: Stuart
17:00 - 18:00	ORGANIZATION OF GROUP TO PREPARE DRAFT OF PLAN FOR IMPLEMENTATION OF JAVAN RHINO PROGRAM: Stuart

TUESDAY - 22 JANUARY 1991

8:00 - 9:30 PROPOSAL FOR INDONESIAN RHINO CONSERVATION PLAN: Sukianto, Widodo, Muladi.

9:30 - 10:00 SUMATRAN RHINO CAPTIVE BREEDING MANAGEMENT PLAN: Effendy

10:00 - 10:30 BREAK

10:30 - 12:30 DISCUSSION OF INDONESIAN RHINO CONSERVATION PLAN: Chair: Khan

12:30 - 13:30 LUNCH

13:30 - 14:30 GLOBAL STRATEGY FOR SUMATRAN RHINO INCLUDING POSSIBILITY OF HERITAGE SPECIES PROGRAM: Rabb & Foose.

14:30 - 15:30 ORGANIZATION OF WORKING GROUPS TO DEVELOP INTEGRATED ACTION PLANS FOR RHINO CONSERVATION IN INDONESIA: Seal

15:30 - 16:00 BREAK

16:00 - 18:00 WORKING SESSIONS TO PREPARE DRAFTS OF INTEGRATED ACTION PLANS: Santiapillai

WEDNESDAY - 23 JANUARY 1991

8:00 - 10:00 WORKING SESSIONS TO DEVELOP FINAL DRAFT OF INTEGRATED ACTION PLANS: Chair: Seal

10:00 - 10:30 BREAK

10:30 - 12:00 WORKING SESSIONS CONTINUED: Chair: Seal

12:00 - 13:00 LUNCH

13:00 - 15:00 FORMATION OF & COMMITMENTS FROM COALITION TO IMPLEMENT ACTION PLANS: Chair: Stuart

15:00 - 15:30 BREAK

15:30 - 17:00 CONCLUSIONS AND SUMMARIES: Chair: Khan & Effendy

APPENDIX 2

POPULATION VIABILITY ASSESSMENT: SUMATRAN RHINO

To be included in final version

(Preliminary results available in Khan (1989) and Seal & Foose (1989).

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Map Credit:

Francesco Nardelli

DISTRIBUTION OF THE SUMATRAN RHINOCEROS
(Dicerorhinus sumatrensis)