

JAVAN RHINO COLLOQUIUM

BOGOR - CISARUA

1-3 July 1997

Organizers:

Directorate General Forest Protection and Nature Conservation (PHPA)

Ujung Kulon National Park (TNUK)

UNDP/GEF Sumatran Rhino Conservation Project

IUCN/SSC Asian Rhino Specialist Group (AsRSG)

International Rhino Foundation (IRF)

U.S. Fish & Wildlife Service Rhino and Tiger Conservation Fund (USFWS)

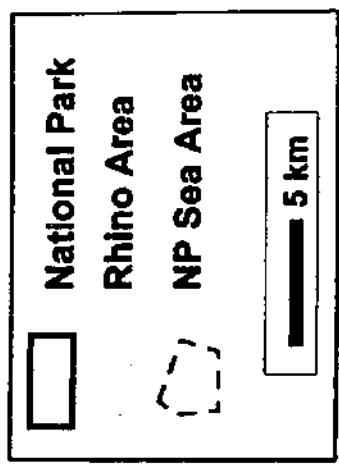
Indonesian Center for Reproduction of Endangered Wildlife (ICREW)

Yayasan Mitra Rhino (YMR)

Compilers: Tom Foose & Nico van Strien

Cover photograph: Alain Compost

TAMAN NASIONAL UJUNG KULON



Selat
Sunda

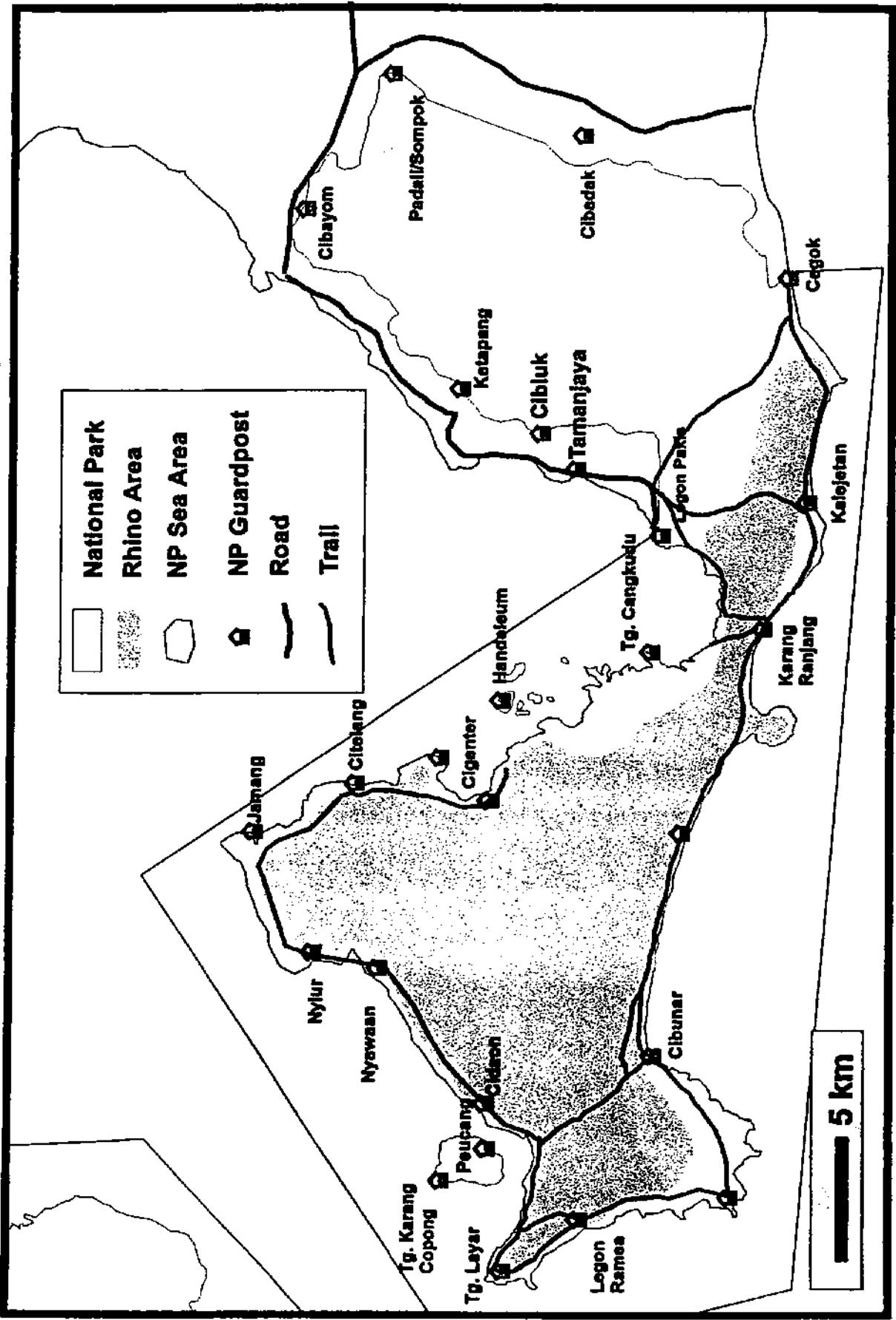
Pulau Panaitan

Gunung
Honje

Semenanjung Ujung Kulon

Samudera Hindia

UJUNG KULON NATIONAL PARK - Access and Guardposts



TUESDAY - 1 JULY 1997, Morning

08:00 - 09:00	Registration
09:00 - 10:00	Opening & Overview - Chairman: Dwiatmo Siswomartono
09:00 - 09:15	Opening Address by Director General PHPA - Dwiatmo Siswomartono on behalf of Ir Soemarsono
09:15 - 09:35	Priority Actions to Conserve the Javan Rhino in Ujung Kulon National Park - Agoes Sriyanto
09:35 - 09:50	Review of Javan Rhino Action Plans in Indonesian Rhino Conservation Strategy and AsRSG Action Plan - Dwiatmo Siswomartono & Nico van Strien
09:50 - 10:00	Objectives and Groundrules of Colloquium - Mohd Khan & Tom Foose
10:00 - 10:30	Coffee/Tea Break
10:30 - 13:00	Interest/Activity Group Presentations - Chairman: Tom Foose
	Population and Ecological Status of Javan Rhino:
10:30 - 10:40	Previous Photo Census of Javan Rhino In Ujung Kulon - Mike Griffiths
10:40 - 10:50	Recent Census - Agoes Sriyanto
10:50 - 11:00	Useful Insights from Recent Sumatran Rhino Photo Census in Way Kambas - Bastoni and Neil Franklin
11:00 - 11:10	Fecal DNA Population Monitoring Techniques & Research - Nazir Foead
11:10 - 11:20	Javan Rhino Ecology - Haruedin R. Sadjudin
11:20 - 11:35	Recent Javan Rhino Habitat Status and Trend - Harini Muntasib & Haryanto R. Putro
11:35 - 11:45	Dietary Overlap Between Javan Rhino & Other Herbivorous Animals in Ujung Kulon - Jito Sugarno
	Protection
11:45 - 11:55	Relevance of Experience from GEF Rhino Conservation Project - Muniful Hamid, Dwi Sutantohadi, Hariyo Wibosono, Arief Rubianto, & Philip Wells
11:55 - 12:00	Suggestions for Intensified Rhino Protection Units (RPUs) & Activity in Ujung Kulon - A. Hutabarat
12:00 - 12:10	AsRSG proposal for a Javan Rhino Sanctuary in Ujung Kulon - Nico van Strien
	Training
12:10 - 12:20	YMR Programs & Plans - Haerudin Sadjudin
12:20 - 12:30	Minnesota Conservation Officers Adopt a Warden Program & Plans - Gary Westby
	Community Relations
12:30 - 12:40	LATIN - Programs and Plans - Tri Nuroho
12:40 - 12:50	ALAMI Programs and Plans - Chairul Saleh
	Javan Rhino in Vietnam
12:50 - 13:00	Javan Rhino Conservation in Vietnam - Nguyen Nhu Phuong et al.
13:00 - 14:00	LUNCH

TUESDAY - 1 JULY 1997, Afternoon

Support Programs

14:00 - 14:10 Minnesota Zoo Adopt-A-Park, Ujung Kulon Program - Ron Tilson
14:10 - 14:20 American Association of Zoo Keepers, Program - Patty Pearthree
14:20 - 14:30 USFWS Rhino & Tiger Conservation Fund - Fred Bagley
14:30 - 16:30 *Plenary Session to Identify Major Problems, Objectives & Priorities and to Assess What Is Known and What Needs To Be Known Emerging From Previous Action Plans & Programs - Facilitated by Jito Sugardjito & Nico van Strien*

Examples of possibilities include:

- **Census of Rhino Numbers**
- **Intensified Protection of Rhinos**
 - **Rhino Protection Units (RPUs)**
 - **Facilities & Equipment**
 - **Training**
- **Habitat**
 - **Status, Change & Management**
 - **Numbers of Banteng & Other Herbivores & Their Impact on Rhino**
- **Carrying Capacity for Rhinos**
- **Population and Habitat Viability Assessment (PHVA) Considerations:**
 - **Target Population Size for Ujung Kulon**
 - **Establishment of a Second Population of Javan Rhino in Indonesia.**
- **Creation of Rhino Sanctuary within Ujung Kulon**
- **Community Interactions**

16:30 - 17:00	Coffee/Tea Break
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17:00 - 17:30	Formation of Working Groups in Major Areas of Problems, Priorities. Facilitator A.A. Hutabarat, Haryanto Putro & Tom Foose
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17:30 - 19:00	Working Group Sessions
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19:00 - 20:00	DINNER
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WEDNESDAY - 2 JULY 1997

08:00 - 10:00	Continued Working Group Sessions
10:00 - 10:30	Reports of Working Groups - Chairman Haerudin Sadjudin
10:30 - 11:00	Coffee/Tea Break
11:00 - 13:00	<i>Plenary Session to Develop First Draft of Revised Action Plan for Javan Rhino in Ujung Kulon - Facilitators Dwiatmo Siswomartono, Effendy Sumardja & Tom Foose</i>
13:00 - 14:00	Lunch
14:00 - 16:00	Working Group Sessions (including possible formation of additional working groups).
16:00 - 16:30	Coffee/Tea Break
16:30 - 17:00	Discussion of Possible Coordination of Indonesia and Vietnam Programs for Javan Rhino - Facilitators Fred Bagley & Shantini Dawson
17:00 - 19:00	<i>Plenary Session to Develop Second Draft of Revised Action Plan for Javan Rhino in Ujung Kulon - Facilitators Dwiatmo Siswomartono, Effendy Sumardja & Tom Foose</i>
19:00 - 20:30	DINNER

THURSDAY - 3 JULY 1997

08:30 - 10:00	<i>Plenary Session to Formulate Third Draft of Action Plan with Schedule of Actions, Actors, Budgets, Resources, Commitments: Facilitators Dwiatmo Siswomartono, Effendy Sumardja & Tom Foose.</i>
10:00 - 10:30	Coffee/Tea Break
10:30 - 12:30	<i>Consensus Adoption and Finalization of Action Plan for Javan Rhino in Indonesia with Possible Recommendations also Relating to Vietnam - Facilitators Dwiatmo Siswomartono, Effendy Sumardja & Tom Foose</i>
12:30 - 13:00	CLOSE
13:00 - 14:00	LUNCH
14:00 - 17:00	<i>Working Session of Report Production Committee to Prepare Final Recommendations and Report Adopted in Meeting.</i>

The Javan rhino (*Rhinoceros sondaicus*) is a critically endangered species. Fewer than 70 Javan rhino are believed to exist in only 2 known populations: < 15 in Cat Loc Nature Reserve in Vietnam; 50-60 in Ujung Kulon National Park in West Java, Indonesia.

In Ujung Kulon, there has been and continues or proposes to be considerable activity on the Javan Rhino but the efforts are largely uncoordinated and, perhaps as a consequence not maximally effective.

Some examples of this activity are:

- A Population and Habitat Viability Analysis (PHVA) Workshop conducted in 1989 and a more general Indonesian Rhino Conservation Workshop conducted in 1991 to formulate action plans for the Javan as well as the Sumatran Rhino.
- As a result of these workshops, both an Indonesian Rhino Conservation Strategy and AsRSG Action Plan which provide recommendations for Javan Rhino conservation.
- The approximately \$ 25,000/year through the Adopt a Park Program initiated by the Minnesota Zoo and being supported now by the Bowling for Rhinos Program of the American Association of Zoo Keepers. By the end of 1996, this investment will probably be in excess of \$ 150,000.
- The numerous WWF projects over the years, notably the photographic survey conducted by Mike Griffiths.
- The major project (several hundred thousand dollars) conducted by the Government of New Zealand on Park Development.
- The Adopt-A-Warden program by the Minnesota Conservation Officers who have been to Ujung Kulon multiple times over the last several years.
- The habitat assessment work over the last 6 years by Institut Pertanian Bogor, reflected in two proposals submitted to RTCF from Biodiversity Conservation Indonesia.
- The assessment of conservation of the Javan Rhino in Ujung Kulon conducted by the AsRSG in 1995.
- An eco-tourism concession already conferred on a group of previous DG's of PHPA. Their programs and projects need to be integrated into any future plans in this area.
- At least 8 proposals relating to the Javan Rhino in Ujung Kulon that have been submitted to the USFWS RTCF.
 - 36 Education Conservation for the Communities - Yayasan Alam Mitra Indonesia.
 - 42 Population and Habitat Viability Analysis of Javan Rhino in Ujung Kulon National Park - Indonesian Institute of Sciences and Fauna and Flora International (LIPI-FFI).
 - 51 Role of Palm Civet in Langkap Invasion of Ujung Kulon N.P. - Biodiversity Conservation Indonesia (BCI)
 - 52 Javan Rhino Food and Faeces - BCI
 - 53 Comparative Study on Langkap Invasion - Bogor Agricultural Univ. (IPB)
 - 54 Analysis of Habitat Utilization of Javan Rhino - Bogor Agricultural Univ. (IPB)
 - 57 Javan Rhino Training Course - Yayasan Mitra Rhino (YMR)
 - 59 Adopt-a-Warden - Submitted by Minnesota Conservation Officers Association
- Substantial inputs from national and international donors for a great number of years including extensive training of all kinds for Park personnel.

Despite this considerable investment and activity,

- There is incomplete information on the size and structure of the rhino population.
- The rhino population has not increased in size for at least a decade.
- Javan rhino continue to be lost to poachers in Ujung Kulon.
- There still are not sufficiently intensive anti-poaching patrols conducted according to an effective schedule with good evaluation of performance or with satisfactory population monitoring techniques.
- Major habitat changes appear to be occurring, including proliferation of vegetation not utilized by the rhino and increase in the population of potentially competing herbivores, especially the banteng.
- The rhino population continues to be subject to the risks that imperil small, isolated or unique, populations, for example epidemic disease, natural disasters, human-caused catastrophes.

The ultimate goal of the conservation program for the Javan Rhino should be to ensure long-term viability. Principles of conservation biology, especially the process of population and habitat viability analysis (Lacy et al. 1995), recommend certain target population sizes, distributions and growth rates to avoid the demographic, genetic, stochastic and other environmental risks that confront small and fragmented populations. An earlier PHVA on the Javan Rhino in Indonesia (Seal & Foose 1989), the Sumatran Rhino in Indonesia (Soemarma et al. 1994) and Malaysia (in prep, 1997); the Indian Rhino in India (Molur et al 1995); the Black Rhino in Kenya (Foose et al 1995); and the Northern White Rhino in Zaire (in prep 1997) have generated a number of major and common conclusions concerning the size, distribution, and growth of rhino populations:

1. Any rhino population under 10 individuals is at high risk of extinction even under ideal conditions.
2. Populations in the range of 10 - 75 individuals may also be at significant risk if threats such as poaching or habitat constraints are operating.
3. To maximize probability of survival under all kinds of risks, individual populations of 100 or more or populations that can be expanded rapidly to 100 or more individuals are advisable.
4. Growth rates of 5%/year seem desirable for population to be able to sustain itself or recover from periodic losses.
5. To avoid the risks of having "all the eggs in one basket", at least 5, or better more, populations of 100 or more individuals are recommended for rhino species or subspecies.
6. For long-term viability, a total metapopulation (i.e., the individual populations that are managed or interact collectively) of 2,000 - 3,000 individuals is highly desirable.

Since the biological parameters and to some extent the risks are similar for all rhinoceros species, these previous PHVA analyses provide a good foundation for conservation recommendations on the Javan rhino.

The current size and distribution of both the Indonesian (*Rhinoceros sondaicus sondaicus*) and the Vietnamese Javan Rhino (*Rhinoceros sondaicus annamiticus*) are far from these target goal recommendations.

Therefore, it seems critical that there be some attempt to develop a more effective, integrated and coordinated plan for Javan Rhino conservation in Ujung Kulon.

ORIGINATION OF THE COLLOQUIUM

Discussions among PHPA, the AsRSG, and the USFWS generated the concept of a colloquium to assemble the parties that are actually or proposing to be operative in Javan rhino conservation to discuss relative needs and interests and produce an ad hoc plan that would:

- affirm priorities;
- propose specific actions;
- identify parties who would implement actions thereby coordinating and reconciling the various initiatives and interests;
- develop a work plan and time table.
- consider of mechanisms for long-term financial sustainability of Javan rhino conservation in Ujung Kulon, beyond dependence on external donors like the RTCF.

The colloquium would commence with an opportunity for each participant individual, institution, and organization to present a statement of their activities and interests. There will then be intensively facilitated sessions wherein consensus is developed on a draft plan for conservation action will be produced during the meeting representing a consensus of all participants. The draft will be immediately distributed to participants. After editorial refinements, the final plan will be submitted formally to PHPA for their endorsement. Meanwhile the document will be available to organizations and institutions interested and involved in support of conservation for the Javan Rhino in Ujung Kulon, e.g. the USFWS.

Anticipated Benefits and Outputs of the Colloquium therefore are:

- A more effective and coordinated action plan for Javan rhino conservation in Ujung Kulon.
- Better guidance for funding agencies in assessing priorities and proposals.

Personnel and Organizations Involved

The colloquium is a collaborative effort among the PHPA, Ujung Kulon National Park, the IUCN/SSC Asian Rhino Specialist Group (AsRSG) and YMR (Yayasan Mitra Rhino - Friends of Rhino Conservation). Major financial support for the Colloquium is being provided by a grant (Contract Number 14-48-98210-97-G27) from the Rhino and Tiger Conservation Fund of the United States Fish & Wildlife Service. The International Rhino Foundation (IRF) is providing financial, administrative back-up. The auspices of and modest support from the USFWS RTCF will be most beneficial, perhaps critical.

AsRSG is coordinating the GEF Project on Sumatran Rhino Conservation for UNDP. The AsRSG maintains an office in Indonesia. The International Rhino Foundation acts as the official financial agent for the AsRSG through a Memorandum of Agreement with IUCN (copy attached) and provides AsRSG with program office support. Hence the IRF would be the actual contractor for the Project. PHPA has authorized AsRSG/IRF to act as agents for Indonesia rhino conservation with international donors.

OBJECTIVES of COLLOQUIUM on JAVAN RHINO & UJUNG KULON

- To assemble all the principle parties involved or interested in conservation efforts for the Javan Rhino in Ujung Kulon to better delineate and coordinate interests, activities, needs
- To attempt to arrive at a consensus plan of action for conservation of the Javan rhino in Ujung Kulon, that would include:
 - consensus on goals and objectives;
 - affirmation of relative priorities;
 - detailed proposals effective actions;
 - identification of parties who would implement actions thereby coordinating and reconciling the various initiatives and interests;
 - formulation of a work plan and time table.
 - consideration of mechanisms for long-term financial sustainability of Javan rhino conservation in Ujung Kulon.
- To integrate and prioritize various kinds of conservation activities, i.e.:
 - protection
 - management
 - research
- To provide guidance and priorities for funding agencies
- In summary, to advance effective actions to conserve the Javan rhino in Ujung Kulon.

GROUNDRULES FOR CONDUCT OF COLLOQUIUM

- The Goal is to Complete a Draft of Revised Action Plan & Recommendations By the End of Meeting.
- Every Problem, Idea, Option, Plan, Belief, Interest, Need Can Be Examined and Discussed.
- Every One Participates as an Equal; No One Dominates.
- Good Intent and Will is Assumed.
- Agreement on Recommendations Will Be By Consensus
- If Consensus Not Available, Dissenters Can Submit Written Minority Opinions for Inclusion in Workshop Report.
- There will be No Change in Recommendations After Consensus with Minority Opinions Accepted at Workshop.
- Facilitators Can Call a "Time Out".
- Process and Schedule Will Be Adjusted to Achieve the Goals and Objectives.

LIST OF INVITEES TO JAVAN RHINO COLLOQUIUM

1-3 JULY 1997

ORGANIZATION / Name	Function
Directorate General Forest Protection and Nature Conservation (PHPA)	
Soemarsono	Director General Forest Protection and Nature Conservation
Dwiatmo Siswomartono	Director Flora & Fauna Conservation & Nature Reserves.
Pudji S. Pratiyo	Indonesian Rhino Conservation officer. <i>Convenor</i>
	Division of Flora & Fauna Conservation
Ujung Kulon National Park (TNUK)	
Agoes Sriyanto	Kepala (Head)
Muhti Muamar	Kepala Seksi Pemanfaatan
Tedi Sutedi	Kepala Seksi Penyusunan Program
UNDP/GEF Sumatran Rhino Conservation Project	
A.A. Hutabarat	Project Manager.
Philip Wells	Field Operations Consultant
Muniful Hamid	National Field Operations Consultant
IUCN/SSC Asian Rhino Specialist Group (AsRSG)	
Mohd Khan bin Momin Khan	Chairman. Co-convenor
Effendy Sumardja	Deputy Chairman
Nico van Strien	Program Officer. Facilitator
International Rhino Foundation (IRF)	
Thomas J. Foose	Program Officer AsRSG/IRF. Project Manager and Facilitator
U.S. Fish & Wildlife Service Rhino and Tiger Conservation Fund (USFWS)	
Fred Bagley	Program Officer
Indonesian Center for Reproduction of Endangered Wildlife (ICREW)	
Jansen Manansang	Director. Facilitator
Yayasan Mitra Rhino (YMR)	
Haerudin R. Sadjidin	Program Officer. Facilitator
Bogor Agricultural Institute (IPB)	
E.K.S. Harini Muntasib	Teamleader Javan Rhino Habitat Management Project
Haryanto R. Putro	Executive Director Biodiversity Conservation Indonesia
Lembaga Alam Tropika Indonesia (LATIN)	
Tri Nuroho	Social Conservation
WWF-Indonesia	
Ron Lilley	Species Conservation Program
Nazir Foad	Javan Rhino Research Program
Darmawan Liswanto	Species Conservation Program
Minesota Zoo, Adopt-A-Park Program for Ujung Kulon	
Ron Tilson	Director Conservation
American Association of Zoo Keepers (AAZK)	
Patty Pearthree	Coordinator Bowling for Rhinos
Ed Hansen	Executive Director
Adopt-A-Warden Minesota Conservation Officers Association	
Gary Westby	Project Leader
Yayasan Alam Mitra Indoensia (ALAMI)	
Chairul Saleh	Staff Specialist

LIST OF INVITEES TO JAVAN RHINO COLLOQUIUM

1-3 JULY 1997

ORGANIZATION / Name	Function
Sumatran Rhino Sanctuary Project (SRS)	
Marcellus Adi	Curator
Rhino Trust	
Anne Merz	Founder
Flora and Fauna International (FFI)	
Mark Rose	Director
Indonesia Institute of Science (LIPI)	
Jito Sugarjito	Staff Specialist/Coordinator LIPI/FFI Indonesia Program
USAID Indonesia Mission	
Holly Ferrette	Rural Environmental Management Office
Ketut Djati	Protected Areas and Biodiversity Conservation Program
Indonesian Wildlife Fund (IWF)	
	[Representative]
Asosiasi Pengusaha Hutan Indonesia (APHI)	
	[Representative]
Wanawisata, Ujung Kulon ecotourism operator	
	[Representative]
Vietnam delegation	
Nguyen Nhu Phuong	Nature Reserve and Environment Unit, Head
Nguyen Xuan Dang	Fauna Unit, Head
Vu Ngoc Lan	Cat Loc Nature Reserve, Director
Do Quang Tung	Vietnam GEF Project Office
Resource persons	
Widodo Ramono	Javan Rhino Specialist and former Rhino Conservation Officer for Indonesia
Tony Sumbampau	Taman Safari Indonesia, Director
Mike Griffiths	EU Gunung Leuser Development Project; Leader previous Ujung Kulon Camera Survey
Dwi Sutantohadi	Coordinator Kerinci-Seblat NP, GEF Sumatran-Rhino Project
Arief Rubianto	Coordinator Way Kambas NP, GEF Sumatran Rhino Project
Hariyo T. Wibisono	Coordinator Bukit Barisan Selatan NP, GEF Sumatran Rhino Project
Mal Claphrough	Former Park Management Adviser, New Zealand Government
Neil Franklin	Director Way Kambas Tiger Project
Philip Nyhus	Community Conservation Coordinator
Bastoni	Remote camera census specialist
Douglas Sandstrom	Minnesota Conservation Officer
Michael Doubet	Minnesota Conservation Officer
Donald Slinger	Minnesota Conservation Officer
Shantini Dawson	Conservation Consultant, Vietnam

UJUNG KULON NATIONAL PARK

Priority Actions to Conserve Javan Rhino in Ujung Kulon National Park

Representatives: Agoes Sriyanto & Tedi Sutedi

Abstract

The javan rhino (*Rhinoceros Sondaicus Desmarest*) population in Ujung Kulon National Park has not changed considerably and tend to level off at about 50 individuals for recent twenty years. The population become critical to environment change, habitat destruction, intra species competition, genetic degradation, epidemic and human disturbance when they live concentrated in limited area, Ujung Kulon Peninsula.

Management experience suggests that on going protection and guarding efforts are not enough to conserve successfully. The increased attention and effort to their population and natural habitat management, the availability of update data and information, and comprehensive and systematic research activities on biology and ecology of Javan rhino are in badly needed for further management in addition to tested and systematic management actions operationally retaining and developing the population at the rate safe to extinction.

INTRODUCTION

Ujung Kulon National Park is still under succession ecosystem of low land tropical rain forest. Javan Rhinos (*Rhinocerus sondaicus Desmarest*) is the most important part and interrelated to the other components of this ecosystem. Hence, every changes of ecosystem due to natural or human activities will affect the existence of the Javan rhino.

Conservation of Javan rhino is considered insufficient and has not been recently supported by complete data and information. It has only concentrated activities to protect their population and habitat definitely. Experience suggests that systematic and comprehensive research support and tested conservation management actions are badly need in well rhino conservation.

For further, Javan rhinos conservation, it not only needs the actions for population and habitat protection, but also needs actions for population and habitat management propped by research activities operationally that can retain and develop Javan rhino population at the rate safe to extinction.

CONSERVATION PROBLEMS

In the execution of Javan rhino conservation, the sustenance of the rhinos is threatened by some problems as follow :

- a. Distribution of Javan rhinos. They live concentratedly in Ujung Kulon peninsula the peninsula covers only areas of 30,000 hectares. This condition leads the rhinos critical to possible extinction caused by environment change, habitat destruction, intra species competition, genetic degradation, epidemic, and human disturbance such as poaching, encroaching, illegal cutting, etc.
- b. Poaching of Javan rhinos. It has even decreased for the last decade. however caution to poaching threat must remain to be kept to anticipate if illegal trade of rhino horn and other parts still exists. And then low capability of our park guards/rangers to patrol and to prevent illegal rhino and other parts trade is also contributing problem to Javan rhino conservation effort.

- c. Succession process and ecological dynamic of the forest. The succession process and ecological dynamic still continuous and is complemented with fast spread of the Langkap species (*Arenga obtusifolia*) over the peninsula. This fast Langkap distribution can retard the growth of rhino food plants. In addition, decreased quality of habitat in Ujung Kulon peninsula also threatening rhinos preservation seriously.
- d. Grazing areas. Existing grazing areas have yet to managed well and are used only by small number of Banteng. This condition poses the Banteng live spread over the forest claimed as rhino habitat and causes competition for space and food between the rhinos and the Banteng threatening the rhinos survival.

PRIORITY MANAGEMENT ACTIONS TO CONSERVE JAVAN RHINO

In consideration of the facing problems to Javan rhino conservation, long-term objectives of Javan rhino conservation program are formulated :

1. to maintain Javan rhino population at the rate which can ensure the long-term survival of the species through conservation management practices.
2. to increase natural carrying capacity of Javan rhino habitat in Ujung Kulon National Park.

To achieve the objectives, population and habitat monitoring is absolutely required to ensure the availability of updated date and information as the basis for decision making process of the park management. Nothing that Ujung Kulon is an island habitat under succession process since Krakatau eruption in 1883 which has not yet reached climax community, ecological dynamic could be dangerous to the rhino survival.

As a national park and one of the natural world herigate site, the management of Ujung Kulon is not only exclusively dealt with Javan rhino but also inclusively with a whole biodiversity management, conservation education and ecoturism development. Within this frame work, management actions with many different specific objectives and hierarchy should be formulated and carefully designed to prevent the negative impacts to the Javan rhino survival.

- a. The draft of guideline for javan rhino habitat management based on Langkap cutting has been formulated and discussed through a workshop held on March 18th, 1997 in Bogor. As far as known, Langkap dominance will decrease the availability of Javan rhino food plant. However, before a large scale implementation of Langkap cutting, there are need of research support concerning : (a) Langkap ecology, both synecology and autecology (under study), including some comparative studies outside Ujung Kulon National Park; (b) Common Palm Civet population and behavior as seed disperser of Langkap in Ujung Kulon National Park; and (c) increase in data accuracy on Javan rhino population through improved methodology.
- b. The most recent and on going research carried out by IPB team in collaboration with the park management including : (a) Pilot project on Javan rhino habitat management (FY 1991/1992 - 1996/1997); (b) Langkap invasion and its role in Javan Rhino habitat degradation (FY 1996/1997 - 1998/1999); (c) Competition between Javan rhino and Banteng (FY 1997/1998 - 1999/2000); (d) Javan rhino consensus organized by the park management (FY 1994/1995 - 1996/1997); and (e) Some socio-economic and cultural studies by LATIN and WWF - Indonesia Programme (FY 1991/1992 - 1996/1997), can be used as primary information to formulate some further management actions.

In the final analysis, priority actions to conserve Javan rhino can be formulated as follow :

- a. To update the Population and Habitat Viability Analysis (PHVA) for the Javan rhino to determine proper specific actions and revise Indonesian Rhino Conservation Strategy.

- b. To install automatic climate station in three sites, namely Codaon/Peucang, Cibunar and Jarangranjang. Climate instability could be a strong factor affecting habitat dynamic of Javan rhino.
- c. To formulate computerize management information system or data base, including Geographic Information System based on systematic monitoring. Considering the present human resources in Ujung Kulon National Park, the development of participative monitoring system is required.
- d. To properly manage grazing areas to prevent risk of intensive competition of Banteng with Javan rhino. It is assumed that good quality of grazing areas will attract Banteng and concentrate their population in the grazing areas.
- e. To strengthen institutional capacity to improve safeguarding system. A study on ranger commitment and behaviour, supported by analysis of poaching history and installation of semi or automatic alarm system may be required to improve safeguarding system. It should be noted that increasing incentive is not automatically increase effectiveness of safeguarding against poaching and other illegal activities in the park.
- f. To improve management facilities and equipment.
- g. To develop conservation education materials and nature interpretation tracks.
- h. To evaluate all species present in Ujung Kulon National Park.

The current researches have performed some important need for future management of Ujung Kulon National Park. However, other researches of top priority have been identified as follow :

- a. Comparative study of census methods to gain more accurate data on Javan rhino population. Two options were proposed : (1) Increase intensity of camera trapping methods; and (2) Reveal the optimum transect distance in track count methods.
- b. Comparative study on Langkap ecology outside Ujung Kulon National Park. Recommended study sites are : Nias Island, Cikepuh Nature Reserve, Siberut Island and along Rokan River-Riau (one proposal has been submitted to Rhino and Tiger Conservation Fund).
- c. Study on the population and behavior of Common Palm Civet (*Paradoxurus hermaphroditus*) in Ujung Kulon National Park (one proposal has been submitted to Rhino and Tiger Conservation Fund).
- d. Javan rhino genetic mapping as basic consideration of more accurate PHVA and building of second population (will be carried out by WWF-Indonesia Programme).
- e. Policy study on Ujung Kulon National Park, especially addressing to clarify the status of Ujung Kulon as a natural world heritage site (ranger commitment and behaviour).
- f. Evaluation of Javan rhino ecology and behaviour especially resources utilization and movement pattern and fecal analysis (including identification of reproduction status). Observation rhino behavior is proposed to be carried out through canopy track or Rhino sanctuary in small area (two proposals have been submitted to Rhino and Tiger Conservation Fund).

CONCLUSION AND SUGGESTION

1. To conserve Javan rhino, it is not only carried out through protection and safeguarding effort for their population and habitat but also needs pro-active efforts to manage population and habitat of Javan rhino comprehensively and integratedly.
2. Javan rhino conservation needs support of the availability of complete data and information, the systematic and comprehensive research, and the integrated, systematic and tested management actions.

3. Priority actions to conserve Javan rhino include updating of Population and Habitat Viability Analysis (PHVA) for javan rhino with further actions, installing climate stations, computerizing data and information, managing grazing areas property (ranger commitment and behaviour), furnishing facilities and equipment, developing rhino conservation education materials and evaluating the present of conserved species.
4. Priority necessary researches to support Javan rhino conservation include study on census method, study on Langkap ecology, study on population and behaviour of Common Palm Civet, mapping of Javan rhino genetic, study on management policy, and evaluation of behaviour and ecology of Javan rhino.

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WWF-Indonesia**FECAL DNA ANALYSIS. What Does It Offer To Save Javan Rhino?****Representative: Nazir Foead**

Since 1978 the Javan rhino population has shown no significant rise and seems have leveled off at somewhere between 50 and 60 individuals. To save the animal from extinction, establishment of a second population is needed. But the 1993 Javan Rhino Conservation Strategy established the prerequisite of increasing the population to 80-100 individuals before establishing a second population. Four possible causes of the population stagnation are (1) the carrying capacity of the habitat is reaching its limit with further assumptions on Arenga-foodplant competition and rhino-banteng competition, (2) poaching, (3) the population structure of the Javan rhino does not allow an increase, and (4) the population fitness is low owing to genetics problems. Attempts to test the validity of causes 1 and 2 above have been carried out and the data are being analysed. Meanwhile, no effective effort is being made to obtain information on the Javan rhino population. Additionally, accurate data on the population size is not available as indicated in the Indonesian Javan Rhino Conservation Strategy. The National Park staff admit that information on the Javan rhino population is minimal. The main obstacles to population studies are the difficulty of observing Javan rhinos because of their tendency to avoid humans, their sparse distribution and their dense habitat in Ujung Kulon. Development in biotechnology over the last decade has unveiled a new dimension in species conservation. Information from DNA analysis can be used to obtain population information such as population size, sex ratio, population structure and relatedness among individuals or even home range besides the genetic map, genetic variability, gene flow and inbreeding pressure. The strength of this method lies in the accuracy of the individual marker of the DNA fingerprint. This enables biologists to model populations and develop strategies to enhance species conservation, by overcoming inbreeding for instance.

DNA analysis also offers valuable information for supporting the reintroduction scheme. Individuals needed for the founder population can be easily chosen based on genetic characteristics that are representative of the mother population. The effect on the mother population of translocating these animals can also be assessed. Furthermore, DNA information is very useful in estimating the minimum viable population or genetically effective population size because genetic variation is necessary for evolutionary adaptation to a changing environment. It can even be used in determining the genetic effects of habitat alteration (degradation) if ecological information is available.

However, DNA analysis usually involves trapping, sedation or anaesthesia which potentially impose risks to and stresses on the individual or even other group members. Fecal DNA analysis is a worthy trade-off since it does not entail trapping and tranquilizing but only collecting the faeces. DNA information is extracted from epithelial cells sloughed from the inside of the intestinal wall. Then each individual's DNA fingerprints can be produced. To make full use of the DNA information, the fieldwork also needs to record ecological data: where the faeces is collected, the occurrence of footprints, urine and foodplants. Combined with this organized data, a comprehensive database of individual Javan rhino can be produced.

The first step is to find the most efficient method for collecting and preserving the faeces to meet laboratory analysis requirements. Certainly the genetic marker of Javan rhinos should be identified beforehand. Once this is prepared, intensive faeces collection in Ujung Kulon is needed. The longer the collection period and the more faeces collected, the more information can be secured. The data then can be analysed for many management applications.

Bogor Agricultural Institute (IPB)

SUMMARY OF JAVAN RHINO STUDIES BY BOGOR AGRICULTURAL UNIVERSITY (IPB)

Representative: Haryanto R. Putro

The Department of Forest Resources Conservation, Faculty of Forestry, Bogor Agricultural University (IPB), Indonesia has a team which has been working on the Javan rhino since 1991 and will continue the work until 2000.

There are three different research projects:

- (1) Pilot Project on Javan Rhino Habitat Management in Ujung Kulon
- (2) Invasion of Langkap (*Aranya obtusifolia*) and Its Role in Javan Rhino Habitat Degradation
- (3) The Competition of Banteng and Javan Rhino in Ujung Kulon National Park.

The team consist of 6 persons having expertise in: habitat management, forest ecology, wildlife management, reproductive biology, wildlife nutrition, animal behavior.

The IPB Javan Rhino Team is also preparing a book in Bahasa Indonesia on (English translation): Ecology, Management and Conservation of Javan Rhino in Ujung Kulon National Park.

LIPPI-FFI JOINT PROJECT FOR RHINO**DIET SELECTION OVERLAP BETWEEN JAWA RHINO AND HERBIVOROUS ANIMALS WITHIN THE RHINO HABITAT****Representative: Jito Sugarjito**

Studies conducted by the IBP team revealed there is a possibility of overlap use in the habitat between the rhino and the banteng (*Bos indicus*). As rhino tend always to be in the losing position, this may give some negative effects for the existence of the rhino. Firstly, the movement activities of banteng is far wider than the rhino. Banteng can pass through the rhino territory but in reverse for the rhino. Secondly, suitable habitat conditions is more rigid for the rhino than for the banteng. Thirdly, in general, the banteng population is higher than for the rhino, thus overtaking the habitat in a certain point would probably lead to the diet competition between the two animals. Besides the banteng, the TNUK accommodates other herbivorous animals, which up to now have never been assessed for their presence upon the threat to the rhino existence from the diet selection point of view. Thus, there is need in understanding the diet selection behavior between rhino and other herbivorous animals resent in the rhino habitat.

The present study is aimed to understand feeding behavior between rhino and other potential threat herbivorous animals within the concentrated rhino population habitat. The study will be focused on determining the degree of performance of similar plants which are selected by rhino and other herbivorous mammals, nutritional quality of plan parts selected by the animals and the ability of animals in digesting the plants through microbial activities via faecal evaluation. From this study it is hoped that such management based on the feed status within the rhino habitat can be gained in order to increase the survival of the rhino within the well established area.

The study will be conducted in conjunction with other participants, particularly the team which are going to collect faeces for DNA fingerprint purposes and the team which aimed to understand the population status of banteng in the rhino habitat. The parties responsible for this study will be from the physiologist, botanist, and ecologist.

The timetable will be at least in three occasions (pre-monsoon, mid-monsoon, and post-monsoon).

Cost consists of:

Chemical Analyses	US\$ 7,500
Disposable Items	US\$ 1,500
Travel (2-3 scientists & 4 field workers per visit)	?

UNDP/GEF Sumatran Rhino Conservation Project**ITS APPLICABILITY TO THE UJUNG KULON NATIONAL PARK****Representative: Muniful Harnid****Introduction**

This paper will examine how the experience of, and system used by the UNDP/GEF Rhino Conservation Project can be applied to the Ujung Kulon. Not all aspects of the project are examined here only those parts deemed relevant to the park and species in question.

Background

The UNDP/ GEF Rhino Conservation Project is an in situ programme executed by the Directorate General Forestry Protection and Nature Conservation (PHPA). The project is administered through Yayasan Mitra Rhino (YMR) with a project manager and director appointed by the PHPA, and overview provided by the AsRSG. The objectives are:

1. To enhance the capabilities of the PHPA to arrest the decline of rhinoceros due to poacher activity and habitat disturbance.
2. To develop more involvement by the local human communities in the vicinity of the rhino habitat.
3. To develop a comprehensive and sustainable funding plan for rhino conservation.
4. To increase exchange of information and expertise between Indonesia and Malaysia on rhino conservation matters.

The projects objectives and sub-objectives were formulated from the Indonesia Rhino Conservation Strategy(1991), the AsRSG Action Plan(1990), Sumatran Rhino PHVA(Population and Habitat Viability Analysis, Lampung, 1993), and numerous discussions between the PHPA, AsRSG, YMR, field researchers and other government bodies. An offer to apply for a \$ 2 million grant was made at the end of 1992 by the GEF. Following the Sumatran Rhino PHVA (1993) which indicated that the Sumatran rhino had now become critically endangered, it was decided to exclude the Javan rhino from this funding whilst leaving the option open to carry out conservation activities if the opportunity arose. In 1995 the project was started with funds being shared equally between Malaysia and Indonesia, with counterpart funds from both countries.

For the field element of the project 9 rhino protection units (RPU) have been created each containing one forest ranger (PHPA) and three local people. In addition to this four people making up the management team each with their own specialisation reflecting the field objectives:

1. Patrolling
2. Research and Monitoring
3. Community Outreach
4. Law Enforcement

Each member has undergone an intensive six week training programme to provide the basic skills to carry out the necessary tasks, acting independently, as part of a larger operation, or in conjunction with other government agencies and national park authorities.

UNDP/GEF Sumatran Rhino Conservation Project**PATROL ACTIVATION THROUGH TRAINING PROGRAMME AND POSSIBILITIES FOR INVOLVING LOCAL COMMUNITIES AROUND UJUNG KULON NATIONAL PARK.****Representative: A. A. Hutabarat**

Ujung Kulon National Park (TNUK) is located an a peninsula on the Southwest tip of Java. This park lies in the district of Pandeglang of the province of West Java, about 153 Km west of Jakarta. The total area of the park is about 76.000 ha of land area and about 44.000 ha of sea. The terrestrial part consists of Ujung Kulon peninsula, Peucang island, Panaitan island, and North and South Gunung Honje.

Ujung Kulon National Park is considered to be the last shelter for the native fauna of Java's lowland rain forest which is characterized by the Javan (single-horned) Rhino (*Rhinoceros sondaicus*). Because of the uniqueness of the Javan Rhino and its habitat, and considering the present status of the Javan rhino, Ujung Kuon Nationa Park was declared as a Indonesia's first World Heritage Site by UNESCO in 1991, meanwhile the Javan Rhino has been declared as a World Heritage Mammal.

Although the Javan rhino population in the Ujung Kulon National Park in West Java seems to be holding at about 60 individuals, yet the threat of poaching still remains (Agoes Sriyanto, 1995). The loss of rhinos has become a matter of global concern.

Saving the remaining population needs further alternatives. There is should be a series of efforts to protect the remaining population by re-activated rhino patrol and strengthening its anti-poaching activities, until poacher activity and habitat destruction is reduced to the point of elimination. Providing a good training programme for Jagawana (park rangers) and more involvement of local people to save the park, is one of the alternatives.

Yayasan Mitra Rhino (YMR)**JAVAN RHINOCEROS CONSERVATION TRAINING COURSE AND FIELD WORK
IN UJUNG KULON NATIONAL PARK, WEST JAVA, INDONESIA****Representative: Haerudin R. Sadjudin**

Javan Rhinoceros Conservation Training Course and Field Work need to be done periodically for recruiting news rangers and or Rhino Protection Unit with community surrounding the park. After 25 years, Schenkel initiated these non formal training course to protect the Javan rhinoceros from extinction.

The Javan rhinoceros as a "key" or "flagship" species is very important for the protection of other species and rich biodiversity in Ujung Kulon National Park. The project will provide training to strengthen capabilities of rangers in these areas, and to increase manpower skills along with training and field work in conservation education.

The training center will be established in Legon Lame or Taman Taya on the northern boundary close to the park. The building facility is already there. The participation of other partners will be set up from the Forestry Department, University, and community.

In Service Training will be conducted with lecturing on conservation (habitat/ecosystem management, surveys and monitoring, protected area/reserve management, and sustainable development in conservation education (wildlife infections, law enforcement and forensic skills, and practice in using field equipment and tools for Javan rhinoceros observation) The field equipment which will be lectured on includes GPS (Geographical Position System), camera trap and radio communication with theory and practice in the use of each piece of equipment. The field work will be done with the time to conduct Javan rhinoceros census.

The project will be scheduled during period of three months , first month for preparing and coordination with others institutions, the second for conducting class meetings and field practice, plus field work to census of Javan rhinoceros in the reserves and the last third month for evaluation and report writing. Follow up the out-put of the project is to conduct the new long term project.

Adopt-A-Warden Minnesota Conservation Officers Association**"WARDENS HELPING WARDENS AROUND THE WORLD"****Representative: Gary Westby****Interests**

Minnesota Conservation Officers are interested in the conservation management and protection of natural resources. Officers are becoming increasingly aware of their global inter-relatedness and responsibilities for the sustainability of our world's resources and in this case specifically the Javan Rhino. Conservation officers have developed a kinship, a mutual respect for comrades who choose to protect these natural resources, often at the expense of their own lives and welfare. Within Minnesota and throughout North America thousands of conservation officers exchange information and support in order that they might assist each other in their pursuit of their common goals. We are interested in making the game wardens of Indonesia and specifically the park guards of Ujung Kulon aware that by mere virtue of their choice of occupation and endeavors, that they inherently are members of this same fraternity. We believe we can help guards of Ujung Kulon deter poaching by supporting them with equipment, training and encouragement. We would like to help to develop an understanding of their important role in their countries environmental future. In return we will cultivate a mutual appreciation of our diverse cultures and an awareness that our unique environmental issues may not be as unique as we once thought.

Objectives and Initiatives

- To help equip and train park guards according to the needs and priorities defined by the park personnel so they can effectively deter poaching and protect the natural habitat of the Javan Rhinos and all the other plants and animals.
- To provide encouragement and improve the stature and respect for park guards.
- To promote a system that will lead to self reliance i.e. ecotourism, legalized hunting and education.
- To establish an ongoing program of joint training/patrol missions each year.
- To establish the necessary system of equipment delivery and accountability.
- To pursue with our Indonesian counterparts and other organizations methods for developing culturally appropriate education programs that will not only support conservation methods but enhance their local economies.
- To promote understanding of our cultures, their diversities as well as our many similarities.

Activities

Conservation Officers have supplied hand cuffs, radios, backpacks, furniture and first aid materials. They have participated in joint patrols with park guards. Officers have conducted training in radio and hand cuffing procedures, officer safety training, defensive tactics training and first aid. Funds associated with the Rhinoceros and Tiger Conservation Fund will provide for one sixteen to eighteen foot patrol boat fully equipped, park guard patrol items, one water well, handcuffs, radios, and transportation costs for training officers and educational specialists and support staff. Future instruction can be offered in additional defense tactics, pain compliance, mace, knife defense, navigation, first aid, interview and interrogation, and watercraft operation. Extensive training could be offered in the use of firearms if permission was secured from the Indonesian Government. Our project has generated considerable publicity because of its grass roots nature. It is an unique effort of field wardens helping field wardens with the assistance of citizens. People appreciate this basic effort in conservation. The program has been featured in scores of newspaper articles and radio shows. We have conducted slide presentations in schools, churches, civic and sportsman's groups. We have financed our previous

efforts through fund raisers and private donations. The Safari Club International has been our most generous supporter.

The Minnesota Indonesian Society has been a long time supporter as well as the American Museum of Asmat Art, American Association of Zoo Keepers, the Minnesota Zoo and the Minnesota Department of Natural Resources. A most recent development is the expressed interest from the children of the schools where we have given slide presentations. They are requesting more information from children from Indonesia. They would very much like to communicate with children from Ujung Kulon and develop friendships. The recently formed Gamelon Society of Minnesota is eager to participate in this need for cultural exchange.

Resources

Minnesota and North America have excellent training officers, radio technicians and contacts for supplies and equipment. We have access to an ever expanding communication network. The program has generated enormous enthusiasm and desire for participation from a variety of sources.

Needs

- * Long term financial support
- * To develop a system of accountability to ensure continual participation by past and future contributors
- * Assistance with expediting equipment shipments, i.e. mining companies
- * Facilitate the exchange of cultural information and developing friendships between children of our countries.
- * Interpreters, guides and transportation
- * Facilitate/promote the concept of park guards traveling to Minnesota for training and promotional efforts.

Lembaga Alam Tropika Indonesia (LATIN)

COMMUNITY-BASED JAVAN RHINO CONSERVATION

Representative: Tri Nuroho

Issues of javan rhino conservation started growing and attracting attention since the end of 1980s. The existence of the javan rhino population seems to be risky to be maintained in Ujungkulon National Park. This leads to proposal of how to reproduce them in other places.

In the end of 1991, LATIN tried to do overview on Ujungkulon National Park to figure out detailedly the javan rhino conservation-related problems. LATIN then found that the social economic issues are the most important aspects to be considered in the javan rhino conservation in future.

LATiN firstly hesitated to involve furthermore in following up the findings as it was a newly-established NGO without well capacity and experience. Considering that there are still lack of research and studies on social and economic aspects of the javan-rhino conservation, LATIN started following up the findings by carrying out an indepth study on social economic issues in Rancapinang Village. It was the benchmark of LATIN to take part in efforts of the javan rhino conservation in Ujungkulon National Park by conducting a project of Community-based Javan Rhino Conservation.

The main objective of this project was to establish and/or develop a condition where there is a harmonious relationship between local people and the national park. It was found that the interaction existing so far was not balanced. It tended to disturb processes of the ecosystem balance which eventually threatened the habitat of the javan rhinos either directly or indirectly.

In a broader context, harmonization of the interaction is the most important prerequisite for maintaining the interaction processes themselves which have to be mutual, in balance and sustainable. Eventually the interaction harmonization does not only guarantee the javan rhino conservation and even their reproduction in long term, but also support objectives of the national park management in general.

Yayasan Alam Mitra Indonesia (ALAMI)**Representative: Chairul Saleh**

Alam Mitra Indonesia (ALAMI) Foundation is a non governmental organization which was established on September 1994. This organization was founded to assist the government in obtaining information including data in order to formulate the strategies on the management of the natural resources in Indonesia.

GOAL

To develop and increase the participation of the people in striving for conservation and sustainability of the natural resources in Indonesia.

OBJECTIVE

To collect ideas, opinions and informations to increase the conservation work and utilization of the natural resources.

To provide informations and ideas to the government to be considered in deciding the Indonesian policy on the sustainability management of the natural resources.

To provide assistance in proposing the ecotourism development programs in Indonesia.

To disseminate informations on natural resources and conservation in Indonesia.

COMMUNICATION, INFORMATION AND EDUCATION PROGRAM

In order to success the aims of organization program will be carried out a good network and collaboration with the NGOs and institutions both nationally and internationally concerning the activities of natural resources and conservation. All information and result of research which is collected would be disseminated through the Seminars, Symposia, Workshops, Scientific and popular journals press conference as well as electronical media. Providing education of conservation and ecotourism training center program.

WILDLIFE RESEARCH PROGRAM

Carrying out wildlife research program on biodiversity independently or in collaboration with national or international institution. The members of the organization have expertise in Ethology, Forest and Aquatic Ecology, Education and Ecotourism. Planning and conducting ecotourism program and making video movie on wildlife and conservation.

SEVERAL WORKS THAT HAVE BEEN DONE BY ORGANIZATION ARE AS FOLLOWS:

April 1995 : Training and Education Conservation Program at Alam Dharmapala Nature Club Akademi Pimpinan Perusahaan (APP), Jakarta.

May 1995 : Collaboration with WWF Indonesia Program for Training of Local Guides at Taman Jaya, Ujung Kulon National Park.

July 1995 : Collaboration with Taman Safari Indonesia (Indonesia Safari Garden) for Education Conservation.

July 1995 - present : Consortium ALAMI-Bogor Agricultural Institute (IPB)- Wildlife Preservation Trust International (WPTI) preparing environmental education for teachers.

August 1995-present: Consortium ALAMI-Conservation International (CI)-Gunung Gede Pangrango National Park- Pinaesaan Bank for designing and establishing The Conservation Education and Training Center at Gunung Gede Pangrango National Park (GGPNP), Bogor. The partnership is promoting the park as a site for training, education, and for developing environmentally sound microenterprises in the community surrounding GGPNP.

October 1995-present: Collaboration with Directorate General of Forest Protection and Nature Conservation (PHPA)-GEF-UNDP Project, and Yayasan Mitra Rhino (Friend of Rhino Foundation), as a Consultant of Community Outreach Program, Sumatran Rhinoceros Conservation, in Bukit Barisan Selatan National Park and Kerinci Seblat National Park.

June 1996 : Training for Conservation and Ecotourism Guide Program for community surrounding Gunung Halimun National Park. Collaboration with Biological Science Club (BScC) and BCNAE16.

August 1996 : Publishing Guide Book: How To Guiding Ecotourism in Indonesia, collaboration with Indonesian Ecotourism Network (INDECON).

CONSERVATION EDUCATION FOR LOCAL COMMUNITY AT UJUNG KULON NATIONAL PARK

SUMMARY

INTRODUCTION

The Sumatran and Javan Rhinos are the last remaining rhino species in Indonesia. They are among the rarest and most threatened mammal species in the world. The Javan Rhino population remains stable but dangerously low. According to the 1993 census, only forty seven individuals are left in Ujung Kulon National Park. During the last decade, however the Sumatran Rhino population has declined by 50 %. The major declines in both species have been caused by human pressures such as habitat loss and illegal hunting for rhino horn.

Poaching activities appear to be related to low income and a lack of information within the local community. The prospect of a fast financial return attracts both local people, and those from further afield, into this illegal trade despite the risk.

Rhino conservation programmes can only succeed if they are supported at all levels of the community. Local people can play a key role in preventing poaching and encroachment into the rhino habitats. Experience elsewhere has shown that by working with local people, conservation agencies can significantly improve the effectiveness of protection programmes. By developing action plans that help local people and the rhino, levels of awareness and understanding should increase. The Alami Foundation wish to develop a community conservation education programme in Ujung Kulon National Park to address this need.

OBJECTIVES

To improve levels of information and an understanding of the need for the rhino conservation within the local community

To stop poaching and other illegal activities in the rhino's habitat through the active participation of local people

To provide local communities with the skills to develop alternative forms of sustainable income generation

PROGRAMMES

The initial stages of developing a Community Conservation Education Programme requires the active participation of local people. Through a series of workshops we hope to develop a full understanding of the problems faced by all sectors of the local human population, not just the village leaders. Women are often the key to the successful implementation of such a project and need to play an active role from the outset. Once local problems have been identified, solutions can then be sought.

The actual programmes used in Ujung Kulon National Park will obviously depend upon the needs and wishes of local people. However, for the purposes of budgeting we have had to make some assumptions are based on similar work we are conducting in Sumatra.

Developing the Buffer Zone

The buffer zone around the park could be developed to provide fuelwood, fruit, vegetables, honey or medicinal plants in any required combination.

Ecotourism

Ecotourism could be exploited within the park.. Some local guides do exist, but further training would increase their skills and numbers. Other awarness could include : accomodation, transport, food + refreshments, and handicrafts.

Education Programme

An education programme targeted at the whole community from elementary school through to the village leaders will need to be an integral part of any Community Conservation Education Programme. The actual methods and target audience will dependent upon the preliminary work with the community. We will probably need to develop some teaching materials and information such as leaflets, posters and storybooks. We hope to use local knowledge and language in the preparation of these materials.

Yayasan Alam Mitra Indonesia (ALAMI FOUNDATION) Jl.H. Samali No. 10 H , Jakarta 12740 Indonesia. Tel/Fax: 62-21-7975280/ E-Mail: alami@cbn.net.id

Minnesota Zoo's Adopt-A-Park Program**UJUNG KULON NATIONAL PARK PROGRAM****Representative: Ronald Tilson**

The Adopt-A-Park program is an *in situ* conservation initiative of the Minnesota Zoo, located in Ujung Kulon National Park, that operates at the invitation of the Directorate general of Forest protection and nature conservation (PHPA). The goal of the program is to provide assistance directly to Ujung Kulon staff to enable them to be more effective in their role as primary stewards of the park.

The idea of a zoo conservation partnership with Indonesia originated at an IUCN Species Survival Commission meeting for Indonesian rhinos in 1989. An unpublished report on Javan rhinos in Ujung Kulon concluded that "the most critical conservation issue in the park [is] the lack of a communication and transportation system necessary for effective anti-poaching activities by park staff." This need formed the impetus for the Minnesota Zoo to develop its Adopt-A-Park initiative. The program was launched in September 1990 when the zoo entered into an agreement with PHPA to work together to protect the ecological stability of Ujung Kulon National park. Priorities for programs, equipment, and guard post improvements are set exclusively by the Chief of the Park and his staff, and all projects supported by the Adopt-A-Park program are approved and administered by them. After discussions of park needs with PHPA, this focused on providing them with improved transportation and communication links, better housing and equipment, and training in law enforcement.

In the first three years, Adopt-A-park funds were used for transportation and communication links for park staff by purchasing two diesel marine engines and ordering a boat to be built locally (christened *The Minnesota*) to ferry park staff and supplies to remote guard posts, canoes for patrolling inland rivers, field bikes for patrolling roads on the eastern side of the park (where the peninsula connects with the mainland) and elements of a field communication system (two-way radios, antennas, cables, batteries, and solar power generators) for several guard posts.

In the second and third years, in partnership with the New Zealand Department of Nature Conservation with some support from the World Wildlife Fund (WWF) Indonesia Programme, the program focussed on the renovation or construction of more modern guard posts (including living quarters and office space for three or four guards, water well, water tower, toilet and bath, information signs, and solar-powered two-way radios). New conservation partnerships were begun in 1994 with the American Association of Zoo keepers (AAZK's) *Bowling for Rhinos* program and the Minnesota Conservation Officer's Adopt-A-Warden program. The program will continue until the rhinos are considered safe.

To date, the Adopt-A-park program has funded projects and donated equipment to Ujung Kulon valued at about US\$ 150,000. In the last two years, this has included: the construction of two guard posts, one of which serves a visitor information center at the edge of the park; the renovation of six other guard posts or wells; a new hull for the *Minnesota*, and a second larger PHPA boat (named the *Minnesota II*).

The participating conservation organizations besides the Minnesota Zoo and their contributions are listed below:

AAZK *Bowling for Rhinos*

- In 1995, the American Association of Zoo Keepers (AAZK) *Bowling for Rhinos* donated \$ 6,475 to Ujung Kulon National park to construct a well, pump, and water tower at the Karangrangjang guard post,

- In 1996, the AAZK *Bowling for Rhinos* donated another \$ 20,600 used for completion of a second PHPA boat.
- For 1997, the AAZK has donated \$ 49,250 to improve the radio communication system for park guards and other projects to be decided upon.

Minnesota Conservation Officers (MCOA)

- In 1994, the Minnesota Conservation Officers (MCOA) donated 14 reconditioned hand-held radios, complete with rechargeable batteries, chargers, speakers, and cords, and carrying case (valued at \$ 3,500 plus \$ 400 shipping by the Minnesota Zoo's Adopt-A-Park program).
- In 1995, the MCOA donated eight reconditioned mobile radio units to Ujung Kulon as part of their Adopt-A-Warden program (valued at \$ 4,000 plus \$ 800 shipping by the Minnesota Zoo's Adopt-A-Park program).
- In 1996, the MCOA provided law enforcement training for all park guards and rangers, and equipment donations of two mobile and four hand-held reconditioned radios and handcuffs were presented (valued at \$ 1,500 plus \$ 250 shipping by the Minnesota Zoo's Adopt-A-Park program). An additional donation of \$ 2,000 from the MCOA was also presented to Ujung Kulon park guards to purchase backpacks.

International Rhino Foundation (IRF)

- In 1995, the International Rhino Foundation (IRF) contributed \$ 3,750 (from the Chicago Zoological Society, the Los Angeles Zoo, and the Greater Baltimore Chapter of the American Association of Zoo Keepers) to Ujung Kulon National Park to complete construction of the PHPA boat.

Rhino Trust

- In 1996, the Rhino Trust transferred \$ 400 from the American Zoo Docents Association to the Adopt-A-park Project at Ujung Kulon National Park.
- In 1997, the Rhino Trust donated another \$ 1,500.

Ujung Kulon National Park Project, a Bilateral Development Assistance Project between the Governments of Indonesia and New Zealand**Representative: Mal Clarbrough**

Ujung Kulon National Park Project is a Bilateral Development Assistance Project between the Governments of Indonesia and New Zealand that was undertaken by the Department of Conservation, NZ. under contract to the Ministry of Foreign Affairs & Trade, NZ.

The project commenced on 1 January 1990 with the primary goal of the project being to improve the management of Ujung Kulon National Park. The project staff working alongside the park chief and his staff on a day to day basis. On 1 July 1996 the project entered a 2 year phase of Continuing Links through the Development Programme Manager, NZ Embassy, Jakarta and DoC. ended its involvement with the project.

Although no longer involved with an interest/activity group, my interests in this colloquium is as a resource adviser with 6 years on-site experience in Ujung Kulon and some insight into the infrastructure, facility development, management planning and training activities in the Park.

In regard to management planning the park is managed in accordance with the Ujung Kulon National Park Management Plan and in this document it is accepted that the Javan rhino has high priority in Ujung Kulon. Consequently the sanctuary zone of the park reflects the perceived survival needs of the species and its habitat for the next two decades.

Taking this into consideration the current management plan has a the sanctuary zone which includes the core areas of, the peninsula, the isthmus and the Honje range. Access is by permit and only given for research or survey purposes.

To allow for public access in the park, the coastal strip of the peninsula and isthmus is zoned wilderness and to allow for access across sanctuary zone, eg. from the northern to the southern coastline corridors of wilderness zone have been established along the lines of existing tracks ie from Cidaon to Cibunar, from Tanjung Lame to Karang Ranjang, from Legon Pakis to Kalejetan and from Cikawung to Cegog.

If is true, that the Javan rhino are extremely shy, avoid any contact with humans and also avoid areas where humans have been or passed for up to 8 days. One of the many question to be answered is, do the trails across the sanctuary zone act as invisible barriers to the rhino and inhibit any natural spread from the peninsula onto and across the isthmus to the southern Honje? If so a recommendation from the colloquium could be to seek changes to the management plan to restrict public access in certain areas, especially the crossing of the isthmus.

The management plan policies however must also take into consideration the other purposes of the national park, such as; tourism, recreation, research, education, spiritual fulfilment and the interests of management, user groups, concessionaires and local people, on occasions, these are incompatible and may develop into conflict situations.

I believe that the recommendations that come from this colloquium will have some impact on other user groups therefore we must work together to educate and wherever possible accommodate other user groups into the overall strategy for the management of the Javan rhino.

Mal Clarbrough - Ujung Kulon National Park Project Leader (1993-96); Tourism Development Officer (1990-93)

**ASIAN RHINOS Status Survey and Conservation Action Plan, IUCN/SSC
Rhino Specialist Group, 1997****General and Javan Rhino summary**

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EXECUTIVE SUMMARY

There are three species of Asian rhino: the Indian or Greater One-Horned Asian Rhino (*Rhinoceros unicornis*); the Javan or Lesser One-Horned Asian Rhino (*Rhinoceros sondaicus*); and the Sumatran or Asian Two-Horned Rhinoceros (*Dicerorhinus sumatrensis*).

All three species are threatened with extinction, two critically so as assessed by the new IUCN Red List Categories.

- The Javan Rhino is the rarest of all rhino species with fewer than 100 individuals estimated to survive, most in a single protected area in Indonesia; a few in an unprotected area in Vietnam.
- The Sumatran Rhino is the most critically endangered of all rhino species with a population of 250-450 distributed fragmentarily in Sumatra, Peninsula Malaysia, and Sabah. Remnants may survive in Sarawak, Thailand, Myanmar, and Laos but their existence is unconfirmed and the viability of any populations unlikely.
- The Indian Rhinoceros is the success story in Asian rhino conservation with over 2000 individuals in India and Nepal. This population has recovered from very low numbers comparable to the current situation for the Sumatran and even Javan. However, threats to this species are significant and only continued and increased protection will enable survival.

The critical situation for Asian rhinos is emphasized by the fact that the number of all 3 Asian species combined is approximately equal to or perhaps slightly fewer than the rarer of the two Africa rhino species, the black rhino which has received much more publicity over the last decade.

As in Africa, poaching for the horn is the major threat to Asian rhinos. However, habitat degradation is also a significant threat, more so than for the African rhinos since two of the Asian species are denizens of tropical rainforest which continues to decrease in extent.

Immediately, the major requirement for Asian rhino conservation is increased protection *in situ* through core areas similar to the intensive protection zones and sanctuaries that have been successful in Africa.

Managed breeding remains a potential tool for Asian rhino conservation and is successful for the Indian rhino. However, traditional captive propagation methods have not succeeded for Sumatran rhino and have not been tried for Javan rhino. Attempts are under development to establish managed breeding centers in native habitat at least for the Sumatran and perhaps for the Javan rhino to assist in their protection and conservation.

Ultimately, major requirements for rhino conservation are:

- cessation of the illegal trade in rhino horn and products
- stabilization, extension, and improvement of rhino habitat
- support of local communities for and hence benefit to local communities from rhino conservation.

Significant funds are required both from governmental and external sources if Asian rhinos are to be conserved from extinction. A rigorously defined set of projects with estimated costs has been prepared to indicate the actions and support required. The total cost of these projects is approximately US\$ 33 Million for the period 1996-2000.

1. INTRODUCTION**1.1 Background of the Asian Rhino Specialist Group (AsRSG) and Its Action Plan**

This Action Plan is an update of the 1989 version of Asian Rhinos: An Action Plan for Their Conservation edited by AsRSG Chairman Mohd Khan bin Momin Khan who has led the Asian Rhino Specialist Group since 1984.

American Association of Zoo Keepers (AAZK)

Representative: Patty Pearthree

Interests

The American Association of Zoo Keepers (AAZK) is interested in providing financial support to Ujung Kulon in order to allow for the protection of Javan rhinos in the wild. We rely on the staff of Ujung Kulon and Adopt-A-Park Program to inform us of the priority needs at the park and then we cover as many of these needs as our funds allow.

Objectives

AAZK strives to have 100% of monies raised through BFR (Bowling For Rhinos) used directly in the field on top priority projects that save rhinos and their habitat.

Intentions

This is a long term commitment that we intend to support as long as the funds are still needed and used properly.

Activities

AAZK began raising funds to support Ujung Kulon in 1994. \$5,000 US was sent to Ujung Kulon in 1994, \$6,475 in 1995, \$20,600 in 1996 and \$49,250 in 1997. This was a total of \$81,325 US funds.

These funds have been used to:

- Purchase hand held radios for park guards (1994 funds)
- Paid for a well, pump and water tower at the Karangranjang guard post (1995 funds)
- Completion of a new patrol boat (1996 funds)
- Plans are being finalized for the use of 1997 funds but part of these funds will be used to purchase more radios.

Resources (financial / technical)

AAZK raises funds through a National "Bowl-a-thon" held in 50-60 locations throughout the US and Canada March-July of each year. This raises \$100-150,000 annually. AAZK supports 3 parks. The first \$100,000 goes to the Lewa Wildlife Conservancy in Kenya. Any amount raised above \$100,000 each year is split between Ujung Kulon and Bukit Barisan Selatan National Park in Sumatra (through the IRF). Funds are raised during one season and then are sent to respective locations during the following year. This means funds raised during the 1997 Bowl-a-thon may not be distributed to Ujung Kulon and Bukit Barisan until as late as March of 1998.

AAZK can provide parks with personnel to care for rhino in semi-captive situations if the need arises.

Needs

AAZK has signed Memorandums of Understanding with The Adopt-A-Park Program. We provide financial assistance as long as AAZK is provided with the proof that these funds are being spent as specified. AAZK would like to be provided with slides to show progress of projects to the Association at National meetings held each September / October.

Rhinoceros and Tiger Conservation Fund, U.S. Fish and Wildlife Service**Representative: Fred Bagley****Mission**

The Rhinoceros and Tiger Conservation Fund (RTCF) supports conservation programs of nations whose activities directly or indirectly affect rhinoceros and tiger populations.

Despite protection under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the national laws of many countries whose activities affect tigers and rhinoceros, these species continue to decline throughout much of their range. Concern over dramatic reductions in their populations prompted increased support for their protection in the U.S. Congress throughout the 1980's and early 1990's. During this time period, the Congress utilized CITES as a mechanism to employ stricter controls on the sale and trade of rhinoceros and tiger products.

In 1994 the U.S. Congress passed the Rhinoceros and Tiger Conservation Act to provide financial resources, through the Rhinoceros and Tiger Conservation Fund (RTCF), for conservation programs of nations whose activities affect rhinoceros and tiger populations. The U.S. Fish and Wildlife Service's Office of International Affairs now works with other collaborators within and outside the Service to coordinate disbursement of RTCF funds through a small grants program.

The objective of the Service in this program is to increase conservation of rhinoceros and tigers through strengthening habitat/ecosystem management; surveys and monitoring; conservation education; wildlife inspection, law enforcement and forensic skills; protected area/reserve management; sustainable development in buffer zones surrounding tiger/rhinoceros habitat; management of human behavior and livestock to decrease conflicts with tigers/rhinoceros; and use of substitutes for tiger/rhinoceros products in oriental medicine. Grantees include natural resource agencies in Asia and Africa, and range country and international nongovernment organizations.

The funds financial resources are appropriated by the U.S. Congress annually. Approximately \$600,000 was available for the first funding cycle which is now nearing completion. The amount of funding available will vary from year to year according to the appropriations of Congress.

Utilizing approximately \$600,000 in fiscal year 1996/97 funding the RTCF has done the following:

- Supported the training and equipping of anti-poaching patrols at Indonesia's Way Kambas National Park to protect a newly discovered population of the Sumatran rhino;
- Provided equipment for use in law enforcement by forest guards at Way Kambas;
- Contributed to development of the infrastructure for the Sumatran Rhino Sanctuary at Way Kambas;
- Supported a conservation education program for villagers living near Sumatran rhino habitats in Sabah, Malaysia;

Provided equipment, through the Adopt-A-Warden program, to forest guards to strengthen their ability to thwart poaching of Javan rhino at Ujung Kulon National Park and supported planning efforts to identify critical conservation needs for the species;

Strengthened Indian rhino conservation efforts in Assam by providing field equipment (sweaters, boots, backpacks, raincoats and walkie-talkie radios) to forest guards protecting rhinos;

Supported conservation education programs in Assam to better inform villagers of the need to conserve rhinos and assist in the anti-poaching effort;

Funded efforts to strengthen prosecution of rhino poaching cases in Assam;

Contributed to strengthening black rhino conservation by supporting production of training materials to assist scouts in black rhino population monitoring in Africa;

Funded training and equipment for community game guards in Kenya;

Supported aerial monitoring of northern white rhino in Garamba National Park, Congo, for security purposes and information on population dynamics;

Supported conservation education in India for villagers living in the vicinity of tiger habitats and investigations into poaching and illegal trade of wild tigers;

Assisted with assembling tiger biologists from range countries in Nepal to discuss, and work toward, standardization of field survey techniques;

Supported a conservation education program for villagers living in the vicinity of tiger habitat at Indonesia's Way Kambas National Park; and

Funded a socio-economic study of the status and needs of Cambodian villagers living in tiger habitat.

The RTCF seeks well developed proposals for high priority rhinoceros and tiger conservation actions which will strengthen the host country's capacity to manage these species. Proposals must be in English, have government endorsement, and a commitment of local resources to be used along with grant funds. For a current RTCF Request For Proposals contact the Chief, Office of International Affairs, U.S. Fish and Wildlife Service, 4401 North Fairfax Drive, ARLSQ 860, Arlington, VA 22203-1622 USA (Telephone : 703-358-1754; Fax: 703-358-2849; e-mail: fred_bagley@mail.fws.gov).

The foundation for the earlier action plan was prepared by Professor Ruedi Schenkel, and his wife Lotte, at the Bangkok meeting of the IUCN/SSC Asian Rhino Specialist Group (AsRSG) in 1979. As the first AsRSG Chairman, Dr. Schenkel was instrumental in creating the interest for the intensive surveys, studies, and conservation activities that have since been carried out.

The AsRSG conducted its second meeting in Frazer's Hills, Malaysia, in 1982, where, for the first time, a critical analysis of Asian rhino distribution, numbers and conservation requirements was conducted.

In October 1984, a further meeting convened in Singapore under auspices of the Species Survival Commission of the IUCN. Its major purpose was to formulate a plan to develop captive breeding of Sumatran rhino as a component of the conservation strategy for this species. As a result, 3 separate projects were initiated in Peninsula Malaysia, Sabah, and Indonesia.

The need still existed to develop a comprehensive conservation action plan for all three species of Asian rhino, in which captive breeding could be placed within the overall conservation objectives for each species. This need was emphasized by controversies over the aspects of the proposed captive breeding plans, especially protests from Malaysia over export of their rhino to non-range states.

The AsRSG therefore convened again in Jakarta in 1986 and then in Kuala Lumpur in 1987. The 1989 version of the AsRSG Action Plan was the result.

A number of regional workshops have also been conducted under AsRSG auspices to assess conservation status and to develop action plans: Javan Rhino in Indonesia in July 1989; Rhino Conservation Strategy and Action Plan in Indonesia in September 1991; Rhino Conservation Action Plan in Malaysia in May 1993; Indonesian Sumatran Rhino Population and Habitat Viability and Analysis Workshop in Indonesia in November 1993; Population and Habitat Viability Analysis Workshop for Indian Rhino in India December 1993; Malaysian Rhino population and Habitat Viability Analysis Workshop in Malaysia in November 1995.

Among significant developments from these regional workshops were:

- (1) the revelation that numbers of Sumatran rhino had declined significantly by 50% or more during the 1980s and 1990s and
- (2) the realization that the traditional captive programs for Sumatran rhino were not succeeding.

Since then, there have been efforts:

- (1) to intensify in situ protection particularly through a major grant from the Global Environment Facility (G.E.F.) through the United Nations Development Programme (UNDP) with the support of the United Nations Environment Programme (UNEP) and the facilitation and coordination of the AsRSG
- (2) to reorient this program toward managed breeding centers located in natural habitat, i.e. Sumatran Rhino sanctuaries.

The AsRSG as well as many representatives of Asian rhino range states participated in the two UNEP Conferences Between Rhinoceros Ranges States, Consumer States, and Donor Nations on Financing Rhinoceros Conservation in December 1992 and June-July 1993.

Another full meeting of the AsRSG was conducted at Jaldapara Wildlife Sanctuary in December 1993. This meeting was the first AsRSG session to occur on the Indian Subcontinent. One important development at this meeting was a change in the orientation of the Group. In general, it was observed that until that time the AsRSG, like other Specialist Groups traditionally, had concentrated on technical information and advice. There was agreement that in the future the AsRSG needs to assume a more active role in advocacy and fund-raising for Asian rhino conservation. It was also determined that facilitating development of a long-term funding strategy emphasizing self-sufficiency was of paramount importance. The GEF/UNDP (Global Environment Facility/United Nations Development Programme) Project for Rhino in South East Asia that the AsRSG has facilitated and is now coordinating is a prime example of this kind of activity.

A draft revision of the Action Plan was formulated at the December 1993 Jaldapara Meeting. However a number of factors delayed publication of the Action Plan. Nevertheless, there has been much AsRSG activity in the last two years. Hence, it was decided that another full review of the draft revision by the AsRSG membership in an interactive session was required. Moreover, there has recently been indication that the UNEP Elephant and Rhino Conservation facility would assume a more active role in recruiting resources for Asian rhino conservation. Toward this end they have requested preparation of a continent-wide strategy for Asian rhinos. This need again seemed to necessitate

an interactive formation by the AsRSG membership. Hence, finalization of the Action Plan was achieved at the AsRSG Meeting conducted in Sandakan, Sabah, Malaysia 29 November - 1 December 1995.

Finally, it should be recognized that all the rhino range states have developed their own rhino conservation strategies and action plans since 1989. These country plans have been guided by the AsRSG Action Plan. Reciprocally, this revision of the AsRSG Action Plan reflects much feedback from these national plans and the experience acquired in their implementation. It is envisioned that the AsRSG and national action plans will continue to be iteratively, interactively and adaptively revised in response to the changing situation for Asian rhinos.

1.2 Strategic Foundations of the AsRSG Action Plan

This Action Plan is intended to recommend both general strategies and specific measures to protect and manage the 3 species of Asian rhinos: the Indian; the Javan; and the Sumatran.

Basically, as discussed in detail in Chapter 2, all 3 species of Asian rhinoceros are in a demographic crisis caused:

- (1) primarily by over-exploitation through poacher for rhino horn and other products and
- (2) secondarily by loss of habitat due to expanding and developing human populations

As a consequence, the paramount and immediate goal of Asian rhino conservation is to arrest and reverse the decline of rhino numbers due to poaching. This goal will require much more intensive protection of rhino *in situ*. Moreover, the protection must entail surveillance and patrols specifically related to rhino protection not just general maintenance of the protected areas the rhino inhabit. Rhinos are spectacular examples of species that are disappearing much more rapidly than their habitat. The recent cost-effectiveness study of rhino conservation (Leader-Williams 1996) has demonstrated that development of intensive protection zones or sanctuaries has proven one of the, perhaps the, most successful method of conserving rhinos. Hence, the identification and defense of such core areas has become the goal of Asian rhino conservation strategies and action plans. The objectives and recommendations of the Action Plan concentrate on development of such improved and intensified protection.

The cost-effectiveness overview analysis (Leader-Williams 1996) also indicates that the amount of funds allocated to these intensive protection areas is also a critical factor in determining success or failure. As of 1995, it appears that at least US\$ 1,000/ sq km may be required for success. Of perhaps equal importance is the density of active and effective rhino protection staff/sq km. In the protected areas of India and Nepal that have been successful in conserving rhinos this staff density is on the order of 1 person/sq km. It may not be feasible or necessary to achieve these densities in tropical forest areas. However, a higher density of guards than has previously occurred is needed.

As a consequence of these considerations, implementation of the various recommendations in this Action Plan and in the related range state action plans will require greater efforts and significant funds.

Protection of both animals and their habitat is necessary, indeed imperative, for conservation programs for Asian rhino. However, over the long-term such protection is unlikely to be sufficient. The combined pressures of habitat destruction and poacher activity are both reducing and fragmenting rhino populations in the wild. When populations become small and fragmented, they become vulnerable to extinction for genetic and demographic reasons, in addition to the direct threats of habitat disturbance and poaching. Moreover, the smaller the population, the greater these genetic and demographic threats become.

Therefore, it becomes essential to maintain or recover some target population size or sizes that will be viable in terms of demographic, genetic, and catastrophic challenges. Target numbers of rhino also imply minimum areas necessary to accommodate populations of the specified sizes. Determination of what MVP and area are required is a central problem for the emerging science of conservation biology.

This action plan for Asian rhino has been formulated with reference to the principles of conservation biology and especially through the process of population and habitat viability analysis (PHVA) (Lacy et al 1995). Thus, many of the goals, objectives and recommendations are oriented to the maintenance or attainment of genetically and demographically viable populations of rhino.

Details of the conservation biology considerations and PHVA analysis are provided in the reports from the various PHVA workshops that have been conducted on rhino: Seal and Foose 1989; Foose et al 1993; Soemarmo et al 1994; Molur et al. 1995.

Some of the major and common conclusions of the PHVA process for various rhino species are:

- (1) Any rhino population under 10 individuals is at high risk of extinction even under ideal conditions;
- (2) To maximize probability of survival under all kinds of identifiable risks, populations of 100 or populations that can be rapidly expanded to 100 or more individuals, seems advisable;

- (3) To avoid the risks of having "all the eggs in one basket", at least 5 or more populations of 100 or more individuals are recommended for each regional variety of rhino considered distinct enough to be conserved as a separate taxon.
- (4) For long-term viability a total population of at least 2,000 to 3,000 rhino of each taxon seems highly desirable.

The 1989 version of the AsRSG Action Plan had placed great emphasis and expectation on *ex situ* programs for Asian rhinos. The captive program for the Indian rhino has indeed been very successful and provides an important back-up for the wild populations. (Foose 1992; Foose & Reece 1996). However, traditional captive methods and programs have proven unsuccessful for the Sumatran rhino despite investment of considerable time and effort. (Foose 1996). A major part of the problem has been attributed to the unnatural conditions: e.g. diet; size and complexity of enclosures; social configuration of the sexes; climate including protection from excessive sunlight, especially ultraviolet. Despite these problems, managed breeding under intensively protected conditions still seems an important component of the conservation strategy for the Sumatran and ultimately for the Javan rhino because of the difficulties and uncertainties of conserving these species in the wild. However, there are now efforts to reorient the captive programs for these species toward managed breeding centers in natural habitat. These centers are being described as sanctuaries. The usage of this term differs from how it has been used in African rhino conservation in that the Sumatran rhino centers will initially be somewhat smaller and the rhino more intensively managed than in the African sanctuaries. However the ultimate goal with the Sumatran rhino sanctuaries is to evolve into the African model with the rhino being in larger areas under less management albeit still inside fences and under intensive protection.

Ultimately, major requirements for rhino conservation are:

- cessation of the illegal trade in rhino horn and products
- stabilization, extension, and improvement of rhino habitat
- support of local communities for and hence benefit to local communities from rhino conservation.

Hence, efforts in all 3 of these areas are integral to the AsRSG Action Plan and to the range state action plans.

1.3. The Continental (Asian) Strategy:

Considering the strategic foundations, a continental strategy for rhinoceros in Asia has been formulated by the range states through the AsRSG.

- 1.3.1. Concentrate efforts and funds on the 5 major range states of India, Nepal, Indonesia, Malaysia, and Vietnam (until or unless new information indicates significant rhino populations still survive elsewhere.)
- 1.3.2. Arrest further decline in the Sumatran and Javan rhinos in Indonesia, Malaysia, and Vietnam as the most critical need in Asian rhinoceros conservation.
 - 1.3.2.1. Provide intensive protection of *in situ* nuclei as the paramount action required at this time.
 - 1.3.2.2. Develop managed breeding centers in native habitat. In Asia, these managed breeding centers are being designated "sanctuaries", a slightly different definition than pertains in Africa although the goal of the Asian sanctuaries will be to expand in size and diminish in management until they converge on the African "sanctuary" concept, i.e. an intensively protected area of native habitat delimited by a fence.
- 1.3.3. Reinforce the continuing recovery of populations of Indian rhinoceros in India and Nepal.
- 1.3.4. In the major range states, accord priority to populations with the highest probability for recovery to viability.
- 1.3.5. Establish as scheduled objectives for each of the species:

5 Year Objectives

Sumatran	No further decline in numbers.
Javan	Increase of 25% in numbers in Indonesia.
Indian	No further decline in Vietnam. Achievement of target numbers.

10 Year Objectives

Sumatran	Increase of 20 % in numbers.
Javan	Increase of 50% in numbers in Indonesia.
Indian	Increase of 25% in Vietnam. Stabilization at target numbers.

1.4. Taxonomic Approach of the Strategy

Much interest and investigation continues on the taxonomy, classification, and conservation units of Asian Rhinos (Groves 1967; Amato et al 1995; Melnick and Morales 1996). Currently the AsRSG strategy and all of the range state action plans continue to recognize 3 species and within these species 3 conservation units for the Sumatran (*Dicerorhinus sumatrensis sumatrensis* in Sumatra, Peninsula Malaysia, and Thailand; *Dicerorhinus sumatrensis harissoni* on Borneo; and *Dicerorhinus sumatrensis lasiotis* in Myanmar) and 2 for the Javan (*Rhinoceros sondaicus sondaicus* in Java and *Rhinoceros sondaicus annamiticus* in Vietnam). Recently it has also been suggested that there are possibly two conservation units justifiable for the Indian rhino, i.e. a western population in Nepal and an eastern population in West Bengal and Assam. The captive programs are respecting these units for the Sumatran Rhino but not for the Indian; there are no Javan rhino in captivity. There have been recent arguments that the demographic crisis for Sumatran rhino argues for managing all populations as a single conservation unit. At this time, the AsRSG and range states do not believe there is an imperative to merge. However, the principle is acknowledged and this proposal will continue to be an option if the demographic crisis in the managed breeding population deteriorates.

2. THE ASIAN RHINOS: THREE SPECIES ON THE BRINK OF EXTINCTION**2.1. Overview.**

The three species of rhino in Asia are among the most remarkable animals on earth and are of great cultural importance in Asia. Two of the species, the Indian and Javan are closely related to each other, being placed in the same genus. However, the Sumatran rhino is quite distinct and may be more closely related to the African than to the two one-horned Asian species. The Sumatran is related to the woolly rhino and the rather unicorn-like elasmotheres of the Pleistocene. The Indian rhino inhabits riverine grasslands of the Terai and Brahmaputra Basins. The Javan and Sumatran are denizens of the tropical rainforest, although the Javan like its relative the Indian, prefers proximity to watercourses.

The three species of Asian rhinos once ranged widely across southern and southeastern Asia (Figure 2.1). Through the middle of the 19th century, and in some cases beyond, they were quite abundant.

For example, during the last century the greater one-horned or Indian rhinoceros was killed for sport. The Maharajah of Cooch Bihar alone killed 207 rhinos between 1871 and 1907. This provides an idea of the former abundance of the species. Similarly, the Sumatran rhino was so abundant that it was described as a garden pest in the journals of some of the 19th century residents of the area.

Tragically, today all three species of Asian rhinoceros are among the rarest and most endangered species of animal in the world, reduced to small pockets across their former range.

- The Javan Rhino is the rarest of all rhino species with fewer than 100 individuals estimated to survive, most in a single protected area in Indonesia; a few in an unprotected area in Vietnam.
- The Sumatran Rhino is the most critically endangered of all rhino species with a population of 250-450 distributed fragmentarily in Sumatra, Peninsula Malaysia, and Sabah. Remnants may survive in Sarawak, Thailand, Myanmar, and Laos but their existence is unconfirmed and the viability of any populations unlikely.

- The Indian Rhinoceros is the success story in Asian rhino conservation with over 2000 in India and Nepal. This population has recovered from very low numbers comparable to the current situation for Sumatran and Javan rhino. However, the threats to this species are significant. Only continued and increased protection will enable their survival.

An overview of the current numbers and target populations of Asian Rhino species by Country is presented in Table 2.1. More detailed estimates of numbers by area are presented in Tables 2.3. to 2.5.. In the detailed tables, two sets of estimates are presented for each species: the numbers presented at the 1993 AsRSG meeting in Jalapara, India and the numbers reported at the 1995 AsRSG meeting in Sandakan, Sabah, Malaysia. For the Indian Rhino, the difference in numbers is believed to represent real changes in the numbers of rhino. For Javan Rhino, the 1993 numbers represent the results of a photographic population estimation method; the 1995 figures a more traditional ground survey methodology. For Sumatran rhino, the difference in the population estimates from the two reporting years is greater than for the other two species. It is not clear to what extent, these differences represent real changes (i.e. further decline) in numbers and how much represents improved information (in the case of Indonesia) or different methodology in population estimation (in the case of Peninsula Malaysia). Further surveys are in progress in Peninsula Malaysia to clarify if methodology is causing a significant change in the population estimates for various areas.

TABLE 2.1.: OVERVIEW OF CURRENT AND TARGET POPULATIONS AND PROTECTED AREAS FOR ASIAN RHINOS

COUNTRY	<i>Rhinoceros unicornis</i> Indian/Nepalese Rhino				<i>Rhinoceros sondaicus</i> Javan Rhino				<i>Dicerorhinus sumatrensis</i> Sumatran Rhino			
	Current Population	Target Population	Current Number/Size km ² Areas	Target Number/Size km ² Areas	Current Population	Target Population	Current Number/Size km ² Areas	Target Number/Size km ² Areas	Current Population	Target Population	Current Number/Size km ² Areas	Target Number/Size km ² Areas
Indonesia					~ 60	500	1 / 300	3 / 1,500	~ 200	2,000	5 / 22,000	5 / 30,000
Malaysia					0	100	0	2 / 500	< 100	400	4 / 8,000	4 / 10,000
Peninsula									< 75	200	2 / 2,000	4 / 4,000
Sabah									~ 10	100	1 / 600	1 / 1,000
Sarawak												
Vietnam					< 15							
Thailand										200	2 /	2 / 2,000
Myanmar										200	2 /	2 / 2,000
Laos										200	2 /	2 / 2,000
India	~ 1,600	2,200+	9 / 2,000	10 / 2,500								
Nepal	~ 500	800+	2 / 1,000	2+ / 1,000								
Pakistan												
ASIA	~ 2,100	3,000+	10 / 3,000	12 / 3,500	< 75	2,100			< 400	3,300	10 / 37,000	20 / 50,000

The newly published IUCN Red List Categories (IUCN 1994) have been applied to Asian rhino taxa. The results appear Table 2.2. and indicate that of the 7 taxa maximally recognized: 1 is probably extinct, 4 are critically endangered, and 2 are endangered. In terms of the 3 species, 2 are critically endangered and 1 is endangered. Copies of the IUCN Red List Categories are available from IUCN Headquarters.

The decline of Asian rhinos is in part related to habitat destruction and fragmentation, more so than for the African rhino species. However, all these species have been declining for several centuries due to over-exploitation for both sport-hunting and horn-trade. The rhino represents a case of one of the least sustainable uses of a resource in human history. Poaching continues at a high level.

In the particular case of the Indian Rhino the over-hunting combined with agricultural conversion, teak plantations and other developments to respond to the needs of the rapidly expanding human population resulted in extensive losses of rhino habitat. These pressures on the species brought it to the brink of extinction. By 1908 there were only a handful of animals remaining, mainly in Kaziranga in Assam, India. The Chitwan Valley in Nepal was facing similar situation in 1960s. In order to save the species, Kaziranga was established as a forest reserve in 1908 and a wildlife sanctuary eight years later, and was essentially closed to the public until 1938.

As a result of these and similar other conservation activities in rhino-bearing areas supported by proper legislation, the Indian rhinoceros is now considered to be the least threatened of the Asian rhinos. Numbers have increased and the species has been translocated successfully to establish new populations within its former range (though additional translocations would be most desirable). The total population is estimated to be more than 2,000 animals,

and the Indian and Nepalese authorities deserve much credit for bringing the situation under control, though continuing strict conservation measures will be needed for some time.

The Javan rhinoceros formerly occurred through most of South East Asia, but has disappeared from almost all of its former range in Assam, Burma, Thailand, Indochina, Malaysia, Sumatra, and Java. Only two populations are known to survive, one in Java and the other in Vietnam. The animals on Java are restricted to the Ujung Kulon National Park, where, as a result of strict protection, the population increased from about 25 animals in 1967 to an estimated 54-60 animals in 1984. There are an estimated 8-15 rhino in the Dong Nai area of Vietnam; the rhino are reported to be in the Cat Loc Nature reserve but this area is not effectively protected. The status in Laos is unknown; the species is presumed extinct in Cambodia. The cause of decline is mainly attributable to the excessive demand for rhino horn and other products for Chinese and allied medicine systems.

The Sumatran rhinoceros occurs more widely than the other two species in highly scattered and fragmented populations. All known animals occur in Peninsula Malaysia, Sabah and Sumatra. On Sumatra there are perhaps 100-250 rhino (185-259 estimated at 1993 PHVA Workshop; 103-151 estimated at the 1995 AsRSG Meeting). The largest populations are located in Gunung Leuser, Way Kambas Barisan Selatan, North Aceh (Gunung Abongabong and Lesten-Lokop) and Kerinci Seblat. In Malaysia, the latest estimates are 100-150 rhino distributed more or less equally between Peninsula and Sabah. The main populations in Peninsula Malaysia are in Endau Rompin State Park(s) (the portion in the State of Johore gazetted; the part in the State of Pahang not), Belum Wildlife Reserve, the Selama area, and Taman Negara National Park. The main populations in Sabah are in the Yayasan Sabah Forest Concession Area (which includes Danum Valley), the Tabin Wildlife reserve and the Lower Kinabatangan area. Rhinos had been reported from Sarawak in the 1980s but their continued survival has not been recently confirmed. The possibility of a few survivors in Kalimantan is being explored.

A recent survey suggests that the species may still survive in Thailand in extremely low numbers. The latest surveys in Myanmar, especially in the northern part of the country where the possibility of survival was considered most probable, have indicated no recent evidence of rhino.

TABLE 2.2.: ASSESSMENT OF ASIAN RHINO SPECIES BY IUCN RED LIST CRITERIA

IUCN CRITERIA *	JAVAN RHINO		SUMATRAN RHINO			INDIAN RHINO	
	<i>Rhinoceros sondaicus sondaicus</i> JAVA	<i>Rhinoceros sondaicus annamiticus</i> VIETNAM	<i>Dicerorhinus sumatrensis sumatrensis</i> SUMATRA, MALAYSIA	<i>Dicerorhinus sumatrensis sumatrensis</i> BORNEO	<i>Dicerorhinus sumatrensis lesiotis</i> MYANMAR, THAILAND	<i>Rhinoceros unicornis</i> Eastern pop. ASSAM, W. BENGAL	<i>Rhinoceros unicornis</i> Western pop. NEPAL
A. Population Reduction	VU	CR?	CR	CR	-	VU	VU
B. Extent of occurrence	EN	EN	EN	EN	-	EN	EN
C & D. Population estimate	CR	CR	CR	CR	-	VU	VU
E. Probability of extinction	EN?	CR?	EN?	CR	-	VU	VU
OVERALL RATING	CR	CR	CR	CR	EX?	EN	EN

* Revised IUCN Categories and Criteria, approved by the 40th Meeting of the IUCN Council, 30 November 1994
EX = Extinct CR = Critically Endangered EN = Endangered VU = Vulnerable

2.2. The Great One-horned or Indian Rhinoceros

[Not Included]

2.3. The Javan Rhinoceros

The principle surviving population of the Javan rhinoceros is located on the Ujung Kulon peninsula, which forms the westernmost extremity of the island of Java. An estimated 54-60 animals now live in the area. Another,

smaller, and ineffectively protected population occurs in and around the Cat Loc Nature Reserve in the Dong Nai region of Vietnam.

The species was once widespread throughout the Oriental Realm from Bengal eastward to include Burma, Thailand, Cambodia, Laos, Vietnam and southwards to the Malay Peninsula and the islands of Sumatra and Java. About 150 years ago the species occurred as three discrete populations. The first, belonging to the subspecies *inermis* (now almost certainly extinct) was found from Bengal to Assam and eastwards to Burma. The second subspecies *annamiticus* occurred in Vietnam, Laos, Cambodia, and the easternmost part of Thailand. The third subspecies, the nominate form, was found from Tenasserim, through the Kra Isthmus into the Peninsula and Sumatra and in the western half of Java. All these populations have disappeared, except for in Ujung Kulon and some scattered remnants surviving in Indochina. The Javan rhino has the distinction of being the rarest large mammal in the world.

The latest estimates of populations numbers for Javan Rhino by country and locality are presented in Table 2.4. The past and present distributions are illustrated in Figures 2.1. and 2.3.

The 54-60 Javan rhinos in Ujung Kulon are in a national park and the population size is probably limited to the effective carrying capacity of the area. One danger to these animals comes from disease, which could potentially wipe out the entire population. In 1981-1982, this threat became a reality when an unknown disease actually killed at least five animals in Ujung Kulon. In addition, any such small population of rhinos faces a permanent threat from poachers. There are no Javan rhinos in captivity.

It is suggested that the situation facing this species be looked at very closely to see if recommendations to translocate some animals into other areas, such as Way Kambas or southern part of Bukit Barisan Selatan National Park in Sumatra should not be seriously considered. A single small population is always extremely vulnerable. It must be kept in mind that the Ujung Kulon peninsula is on the Sundaic edge volcanic line and that during the Krakatau eruption in 1883, the entire peninsula was affected by tidal waves and ash rains which destroyed much of its terrestrial life.

2.4.: WILD POPULATION ESTIMATES OF THE JAVAN RHINOCEROS

Country Location	Estimated Number of Rhino		Habitat Availability (sq km)		Protection Status	Potential Carrying Capacity
	AsRSG Meeting 12/1993	AsRSG Meeting 12/1995 Known/Probl/Posbl	Presently	Potentially		
INDONESIA Ujung Kulon	47-60	23 / 31 / 6	761	761	National Park	100+
CAMBODIA Various	?	0	?	?	Not Known	?
LAOS Various	?	0	?	?	Not known	?
VIETNAM Dong Nai near Nam Cat Tien	Small (<10)	8 / 4 / 3	350	?	National Park	?
TOTAL	< 100	31 / 35 / 9 = 75				

A second approach is that the Indonesian authorities should also consider bringing some animals into a "sanctuary" situation, i.e. managed breeding center located in natural habitat.

The Javan rhino in Vietnam are in a nature reserve but this area does not receive effective protection. The rhino area is close to the Cat Tien National Park and inclusion of the Javan rhino area in this protected area has been strongly recommended as imperative to survival of the species in this country.

Better exploration of the situation in Vietnam, Laos and Cambodia also needs to take place, with the option of a "sanctuary" again being considered. Such information might become available as fieldwork on the kouprey *Bos sauveli* conservation program get underway.

24. The Sumatran Rhinoceros*(Not included)***ACTION PLAN SUMMARY (chapter 7 of original document)**

This Chapter summarizes the goals presented in Chapters 3, 4, and 5 on the Indian, Javan, and Sumatran rhinoceros and Chapter 6 on the individual range state action plans.

1. Preserve and manage the Indian, Javan, and Sumatran rhino as species and as components of their ecosystems.
2. Therefore, maintain viable populations *in situ* of all evolutionarily significant units of the three species against the pressures of poacher exploitation and habitat degradation.
3. To achieve this goal, arrest any further decline of existing populations. To this end, the highest priority is effective anti-poaching efforts. Sanctuaries representing intensive protection, and in the case of the Javan and Sumatran rhinos, intensive management and indeed managed breeding zones, are recommended.
4. As a secondary but almost as high a priority, prevent any further loss of habitat.
5. Once accomplished, commence recovery of the species. The recovery goal is to develop secure populations of 2,000 to 3,000 of each species distributed over at least 5 separate protected areas, each of which should be capable of accommodating a minimum of 100 rhino, preferably more. (A population of 100 has been determined by population simulations on all 5 rhino species to represent a population viable in terms of demographic and genetic stochasticity with a minimum of management.) It is highly desirable to have 2 or more protected areas that can accommodate at least 400-500 rhino each.
6. For Javan and Sumatran rhino in particular, Goal 5 will entail substantially expanding existing populations and establishing additional sanctuaries. For all 3 species, a total population larger than the minimum (i.e., 2,000) and more than 5 protected areas capable of accommodating viable populations (>100 rhino) are highly desirable.
7. Isolated rhino outside of populations of reasonable viability or areas of feasible protectability (i.e., what were defined as "doomed" in the 1989 action plan) should be translocated to sanctuaries or managed breeding centers.
8. Develop managed breeding populations of at least 150 for the Indian rhino and 50 each for the Sumatran and Javan rhino. For the Indian rhino, traditional captive programs seem to be successful. For Sumatran and presumably for Javan, emphasis should be on managed breeding centers in native habitat.
9. Encourage and assist efforts to reduce further the trade in rhino horn. Specifically:
 - There needs to be more enforcement of laws against internal trade in rhino horn and products. Poachers need to be swiftly prosecuted and severely penalized.
 - Actions to prevent international commerce in rhino horn. Export of horn from Sumatra, India, and probably Borneo needs particular attention.
10. Implement public awareness and education campaigns in the vicinity of *in situ* rhino populations to direct attention of local communities to the value of rhino and therefore to mobilize public opinion in support of their conservation.
11. Continue training programs in wildlife training and management with a particular emphasis on developing capacity in the range states to monitor and manage wild rhino populations.
12. Continue and intensify protected area management.
13. Develop long-term funding strategies that emphasize self-sufficiency especially through eco-tourism.
14. Continue efforts to investigate status of rhino in less well known areas such as Indochina, Kalimantan, Sarawak, Thailand, and Burma.

**ASIAN RHINOS Status Survey and Conservation Action Plan, IUCN/SSC
Rhino Specialist Group, 1997****Javan (Lesser One-Horned) Rhinoceros Action Plan**

[Reformated from the original]

4.0 JAVAN (LESSER ONE-HORNED) RHINOCEROS ACTION PLAN**4.1 Introduction**

The only easily accessible and well known population of the Javan rhinoceros occurs in the Ujung Kulon National Park in West Java where there are an estimated 54-60 according to the latest census. A small population estimated at 8-15 rhino was discovered in the Dong Nai area of Vietnam, in the Cat Loc Nature reserve, near to, but not included in, Nam Cat Tien National Park. The situation in Laos and Cambodia is unclear, but the probability of survival is considered higher in Laos than in Cambodia where all rhino are presumed extinct.

This species probably has the distinction of being the rarest large mammal in the world. The greatest threat to the species is poaching. In Indochina, there might also be the threat of habitat destruction (it being an inhabitant of tropical lowland forest).

In Indonesia, the Javan Rhino has been legally protected since 1931. Ujung Kulon National Park was set aside for the conservation of the species. The area is managed by PHPA (Perlindungan Hutan dan Pelestarian Alam) a Directorate General within the Ministry of Forestry.

In Vietnam, the rhino are not currently in an effectively protected area although there are proposals to gazette the area and create a corridor to the nearby Nam Cat Tien National Park.

4.2 Objectives

1. To preserve the remnant populations in the wild.
2. To locate and/or establish other populations in the wild.
3. To develop a managed breeding or "sanctuary" program to reinforce this species in the wild, but in a way that minimizes the demands on the tiny wild population.
4. To continue efforts to close down the trade in rhino products.

4.3 General Recommendations

1. Continue and intensify the surveys in Ujung Kulon National Park, Java, to determine more precisely the size and composition of the population surviving there. The intensive survey should be conducted by competent ecologists. These surveys should be conducted by the rhino protection units proposed for the Park. Highly recommended are: standardized surveys and estimates; training for and implementation of intensive patrols; provision of additional equipment and facilities for the Rhino Conservation Units; and concerted research and monitoring.
2. Determine what resources are currently available, and those that are additionally required, to provide adequate protection for the population in Ujung Kulon. This should include a consideration of human needs in the buffer-zone outside the park.
3. Investigate further the status of Javan rhino in Vietnam and Laos (and perhaps) Cambodia. This investigation might be conducted in conjunction with the Kouprey Conservation Programme.
4. Develop as soon as possible managed breeding or "sanctuary" programs, based on information obtained by intensive survey of Ujung Kulon and the explorations in Vietnam.
5. Formulate guidelines, and perhaps conduct a search, for a site to establish additional wild populations in South East Asia. Animals should be generated for reintroduction from the managed breeding or "sanctuary" programs.

8. Introduce and enforce strict measures to ban the use of Javan rhino products in all countries, especially in Laos, where internal consumption is still permitted. More severe measures against poachers and traders are needed.

4.4 Indonesia (Java): Specific Recommendations

The situation of the Javan rhino is an emergency, and only a broad, integrative conservation program is likely to save it from extinction. Because of the uncertainty of the situation in Indochina, initial efforts must be directed to the animals in Ujung Kulon National Park. With such a small population, and continuing incidences of poaching, the following actions are necessary

1. **Conduct an intensive survey of the species in Ujung Kulon National Park.**

This is an essential pre-requisite to recommending further conservation action. The survey is of such importance that it should be led by top quality ecologists and the proposed rhino protection units. The survey should concentrate on the size, composition and habitat preferences of the population occurring there, and should assess the principal threats to its continued survival. Standardized surveys should be conducted annually thereafter.

2. **Determine what resources are currently available, and those that are additionally required, to provide adequate protection in Ujung Kulon.**

This should lead to a comprehensive management plan for the entire area, which should include:

- strong anti-poaching measures, including the establishment of a Javan Rhino protection unit;
- training of PHPA staff at all levels in wildlife and protected area management;
- an extensive public education and awareness program among local people as to the unique importance of Ujung Kulon National Park and its rhinos;
- initiation of appropriate forms of development in a buffer-zone outside the park to enable local people to derive tangible economic benefits from the park.

3. **A specific application of this recommendation is not relevant to Indonesia as there is no evidence to justify investment of resources in search for further remnant populations.**

4. **Develop as soon as possible a Javan Rhino "Sanctuary", i.e. an intensive protection zone and perhaps managed breeding center in native habitat.**

Such a development is essential to improve protection and conservation of the Javan rhino in Ujung Kulon National Park where poaching does continue with loss of rhino as recently as 1994. A "sanctuary" program could also facilitate production of rhino for possible expansion of the Ujung Kulon population in areas of the Park not currently utilized as well as translocation to new sites. The population in Ujung Kulon is not large enough, and perhaps never could be under current conditions, to be viable in genetic and demographic terms. The best possibility to facilitate rapid expansion of the population, and thereby reduce the risks of demographic failures and arrest the continuing loss of genetic variation, is to develop a managed breeding or "sanctuary" program. Such a program should be developed as a collaboration between the Indonesian Government and international organizations/institutions. The program will need to consider where the initial "sanctuary" should be located and how to expand the population as quickly as possible, and yet minimize demands on the wild population.

5. **Formulate guidelines, and perhaps conduct a search, for a site in which to establish additional wild populations in South East Asia.**

This is a very high priority, which should emanate from the managed breeding program. The area to be selected should be within the historical range of the species, with suitable habitat for the animals to survive at a relatively high density, of sufficient size to support a viable population, and with good security against poachers.

6. **Enforce strict measures to prohibit the use of Javan rhino products in Indonesia. This is to include the application of the strongest possible penalties against poachers and traders.**

4.5 Vietnam: Specific Recommendations:

Implement immediate measures to improve protection of the remnant population in the Cat Loc Nature Reserve in the Dong Nai area near Nam Cat Tien National Park including:

- more intensive anti-poaching patrols and surveys;
- incorporation of the Don Nai area into Nam Cat Tien National Park;
- possible development of a managed breeding center in native habitat ("sanctuary") at or near Dong Nai or Nam Cat Tien.

4.6 Laos and Cambodia: Specific Recommendations

Because of the very uncertain situation of this species in Indochina, only recommendations number 4.3.3 and 4.3.6. apply at this stage. Surveys should be coupled with the Kouprey Conservation Programme.

4.7 Conclusion

An international recovery program for the Javan rhinoceros is one of the most pressing species conservation priorities in the world. The loss of this species would be a supreme act of negligence by the conservation community.

INDONESIAN RHINO CONSERVATION STRATEGY, PHPA, YMR, IWF, IUCN, WWF, Jakarta 1993**Conservation Strategy**

(Reformatted from the original)

INTRODUCTION

Indonesia covers only 1.3 percent of the Earth's land surface, yet it harbours 10 percent of all flowering plants, 12 percent of the world's mammals, 16 percent of the world's reptiles and amphibians, 17 percent of all birds and more than a quarter of all marine and freshwater fish.

This richness can be attributed to the fact that Indonesia spans two major biogeographical realms, Indomalaya and Australia and can be divided into seven distinct biogeographic regions. The 17,000 islands of the archipelago support a wide range and variety of habitats from lowland rain forests and mangroves to savanna grasslands, swamp forests, limestone hills, montane forests, alpine meadows and snow-topped mountains. These varied habitats support a rich flora and fauna.

These habitats and species are now threatened by developments in logging, mining, shifting agriculture and other changing land uses as Indonesia's economy expands to meet the needs of its increasing population. Lowland habitats and wetlands are particularly threatened since these are the areas most accessible for agricultural developments.

Recognizing the need to conserve its rich biological resources, the government of Indonesia has made a commitment to protect 10 percent of the land area and eventually 20 million hectares of coastal and marine habitats as conservation areas. Although *in-situ* conservation must be the first priority, the protected area network alone will not be sufficient to secure all of Indonesia's biodiversity for future generations.

The Biodiversity Action Plan for Indonesia sets out a strategy for action under four main headings : *in-situ* conservation in terrestrial parks and protected areas; *in-situ* conservation outside the protected area network (production forests, wetlands, agricultural lands); *in-situ* conservation of coastal and marine resources; and *ex-situ* conservation.

Much loss of biodiversity in Indonesia, as elsewhere, is due to economic policy distortions that encourage rapid exploitation of biological resources rather than sustainable use. Slowing the rate of biodiversity loss will require policy and institutional reform as well as institutional strengthening for effective action in all four areas.

The active participation and support of local communities will also be essential for *in-situ* conservation for they are the *de facto* managers of forest, wetland and marine resources. The plan calls for greater collaboration between government agencies and local communities and NGOs to work together as partners in biodiversity conservation.

Two endangered species of Indonesian rhinos, the Javan Rhino (*Rhinoceros sondaicus* Desmarest, 1822) and the Sumatran Rhino (*Dicerorhinus sumatrensis* Fischer, 1814) are recognized as "key species" in biodiversity conservation. Their conservation will help to protect other wildlife and a range of habitats in lowland to montane areas in Java, Sumatra and Kalimantan. The Javan Rhino is of particular significance, because the sole surviving population is the "flag ship" of the Ujung Kulon National Park.

The government of Indonesia is signatory to the Convention on Biological Diversity and the Convention on Trade in Endangered Species of Fauna and Flora (CITES). The Indonesian Rhino Conservation Strategy was developed by the national conservation authority of the Republic of Indonesia, the Directorate General of Forest Protection and Nature Conservation (PHPA) in the Ministry of Forestry. It is based on the Action Plan of the Asian Rhino Specialist Group of the IUCN-The World Conservation Union.

The Action Plan and Conservation Strategy have been recommended and endorsed by the government of Indonesia, the IUCN, and the World Wide Fund for Nature (WWF). The Indonesian Rhino Conservation Strategy will also contribute significantly to the high priority placed on rhino conservation by the United Nations Environment Programme and CITES. It outlines immediate and attainable priorities for conservation action and suggestions for further studies on policy and funding mechanism to strengthen the Indonesian Rhino Conservation Strategy.

BACKGROUND

As recognized by the recent UNEP/CITES initiatives and the intensifying IUCN and WWF programs, there is a global crisis for the conservation of rhinos. All five species are threatened with extinction.

Fewer than 12,000 rhino of all kinds survive on the planet. The situation is even more severe when it is observed that half (6,000) of these 12,000 rhino are of the Southern White Rhino (*Ceratotherium simum simum*), which is currently the most secure, but still very vulnerable, species.

Recently, the decline has been most spectacular for the African Black Rhino (*Diceros bicornis*), whose population (now 2,500) has decreased 95 % in the last 20 and perhaps 30 % in the last 3 years. It is fortunate that relatively secure and reproductively prosperous nuclei of both Black and White Rhino exist in a few sanctuaries in Africa and in captivity outside Africa.

In comparison, the two species of South East Asian Rhino (*Dicerorhinus sumatrensis*) the Sumatran Rhino, and (*Rhinoceros sondaicus*) the Javan Rhino, are the rarest of rhinos and among the most threatened mammals in the world. Fewer than 1,000 Sumatran Rhino survive, distributed over at least 35 localities in Indonesia and Malaysia. Fewer than 100 Javan rhino exist, mostly in a single protected area in Indonesia (Ujung Kulon National Park) with a remnant population recently rediscovered in Vietnam.

Both the Javan Rhino and the Sumatran Rhino are threatened with extinction, in Indonesia and world wide. The current populations are small, scattered and most are threatened by illegal hunting and loss of habitat. Even without any further losses, the present populations are so small that they are vulnerable to environment catastrophes and demographic and genetic flaws typical of small populations.

The Javan Rhino formerly occurred through most of South-East Asia, but has disappeared from almost all of its former range in Assam, Burma (Myanmar), Thailand, Malaysia and Sumatra, and is currently restricted to Java, with scattered populations still surviving in Cambodia, Laos and Vietnam. The cause of decline is mainly attributable to the excessive demand for rhino horn and other rhino products for Chinese and allied medicinal practices.

The animals on Java are restricted to the Ujung Kulon National Park, where, as a result of strict protection, the population increased from about 25 animals in 1967 to about 50 in 1993. The status of the species in the Indochinese countries is not yet adequately known.

The Sumatran Rhino occurs more widely than the Javan Rhino, in highly scattered and fragmented populations. Little is known about the current status of the population restricted to northern Burma. Most animals probably occur in Sumatra and peninsular Malaysia. On Sumatra there are perhaps a few hundred animals, with viable populations possibly surviving in Gunung Leuser, Kerinci Seblat, North Aceh (Gunung Abongabong and Lesten-Lukup) and Barisan Selatan. The status of Sumatran Rhino in Kayan Mentarang National Park on Borneo is not yet known.

The ARSG held a meeting in Frazer's Hills, Malaysia, in 1982, where, for the first time, a critical analysis of Asian rhino distribution, numbers and conservation requirements was carried out. This led to the October 1984 meeting in Singapore, at which a strategy for captive breeding of the Sumatran Rhino in Malaysia, Indonesia, and European and North American zoos was endorsed. However, captive breeding should be set within the overall conservation objectives for each species.

The ARSG met again in Jakarta in 1986 and Kuala Lumpur in 1987, for further refinement of the Action Plan. In addition to the decisions taken at these meetings, the plan has also benefitted from much useful advice received from ARSG members and others. Now much remains to be done in the implementation of the various recommendations, especially for the Indonesian Rhino Conservation Strategy.

The disappearance of more and more of the remaining populations and eventually the extinction of the species is inevitable unless specific actions are carried out to restore the populations to adequate levels and to safeguard the rhinos and their habitat.

Indonesia harbours virtually the whole remaining world population of the Javan Rhino in Ujung Kulon National Park, and the largest remaining populations of the Sumatran Rhino in two National Park in Sumatra, possibly comprising 70 percent or more of the total world population. The responsibility for the global survival of these two unique species therefore rests principally in the hands of the Indonesian State.

CONSERVATION STRATEGY

Conservation and preservation of nature has been established in Government policy for many years in Indonesia. With the growing world-wide concern for conservation of nature, formulated into The World Conservation Strategy,

Indonesia adopted it into its recent Conservation Strategy, in which conservation is based on the protection of life support system, preservation of genetic resources and sustainable-use of living natural resources.

Act No. 4/1982 on the Management of the Living Environment and Act No. 5/1990 on Conservation of Living Natural Resources and their Ecosystems provide a strong commitment to the conservation of nature.

As instrumental inputs to the development of conservation management of the country, the Act and Conservation Strategy direct the development of the Indonesian Rhino Conservation Strategy. The Rhino Conservation Strategy was formulated at the Indonesian Rhino Conservation Workshop of PHPA-IUCN-WWF held in 1991 and was subsequently endorsed by the Government of Indonesia as a document to guide conservation of Indonesian rhinos.

1. OBJECTIVE

To create conditions conducive to the long-term survival of viable populations of the Javan Rhino (*Rhinoceros sondaicus*) and the Sumatran Rhino (*Dicerorhinus sumatrensis*) in the wild in Indonesia.

2. CURRENT STATUS

Both the Javan Rhino and the Sumatran Rhino are threatened with extinction, in Indonesia and world-wide. The current populations are small, scattered and most are threatened by illegal hunting and loss of habitat. Even without any further losses, the present populations are so small that they are vulnerable to environmental catastrophes and demographic and genetic flaws typical of small populations.

The disappearance of more and more of the remaining populations and eventually the extinction of the species is inevitable unless specific actions are carried out to restore the populations to adequate levels and to safeguard the rhinos and their habitats.

Indonesia harbours virtually the whole remaining world population of the Javan Rhino in the Ujung Kulon National Park, and the largest remaining populations of the Sumatran Rhino in two National Parks in Sumatra, possibly comprising 70 percent or more of the total world population. The responsibility for the global survival of these two unique species therefore rests principally in the hands of the Indonesian State.

3. AIMS

To meet the objective, the strategy aims at establishing large and safe populations of both species throughout their natural range.

To establish such populations the following actions have to be considered:

- (1) Rigorous protection of existing wild rhino populations and their natural habitat,
- (2) Expansion of existing wild populations, by natural population growth and, where appropriate, with animals translocated from elsewhere,
- (3) Re-establishing rhino populations in suitable areas within the natural range with animals derived from the wild or from captive stock,
- (4) Strengthening of captive breeding programmes to develop into a significant source of animals for re-introductions,
- (5) Strengthening of the general conservation base through public awareness and education in combination with good legislation and strict enforcement by a dedicated force,
- (6) Acquisition of the knowledge needed for monitoring, management and preservation of rhino populations and their habitat,
- (7) Providing training for those involved in development and implementation of the programmes.

3.1 Preservation of large wild populations.

Small and isolated populations are very vulnerable to accidental loss or poaching, to localized catastrophes like floods, fires, cyclones, and they can also suffer declining vigour or vitality through steady loss of genetic diversity.

To maintain adaptability, resilience and genetic vitality, a minimum population of 100 to 500 animals, depending on the reproductive pattern of the species, is necessary for survival of the population for 10 or more generations, or, in the case of the Rhino, for the next century. In all the main areas of the species natural range in Indonesia, i.e. Java and Sumatra for the Javan Rhino and Sumatra and Borneo for the Sumatran Rhino, populations of at least several hundreds of animals must be maintained.

Currently all existing populations, with the possible exception of the Sumatran Rhino in Kerinci Seblat, are far below this minimum level.

It should be stressed that the figures given above are minimum requirements, only providing for the preservation of the steady state. For survival and development of the species over an evolutionary significant timescale, and for further evolution of rhino lineages, entirely different conditions will be necessary in the more distant future.

3.2 Expansion of existing wild populations.

Large herbivores, such as Rhinos, living in a habitat that has abundant, but low-grade and very diverse fodder, must be able to utilize a large area throughout their lifetime. Also their social life and behavioural patterns lead to wide spacing of individual animals over large areas. Each rhino therefore needs 5 to 10 square kilometres or more of natural tropical forest, depending mainly on the nature of the terrain.

The possibilities for the expansion of the existing populations to the levels required for continued survival depends primarily on the amount of habitat available. Some conservation areas, like Gunung Leuser and Kerinci Seblat, are large enough to have rhino populations of the required size. In these areas, good protection of the rhinos against poaching will allow the population to expand naturally. The process could be speeded up by the release of rhinos from elsewhere in parts of these reserves where rhino have been exterminated.

In other areas, such as Ujung Kulon and Barisan Selatan, the available safe habitat is more limited and consequently the rhino populations these areas can support will be of limited size. In such areas any further loss of habitat should be prevented. In some areas additional land could be added to increase the size, or the habitat could be manipulated so that more rhinos could be supported.

In some areas the rhino population and the amount of available habitat are so small that there is no realistic hope for continued survival in that particular place. Such animals could be used to supplement other populations, in the wild or in captivity.

3.3 Re-introduction within the natural range.

Where rhinos have been exterminated from large areas of their natural range, as is the case with the Javan rhino in Sumatra and through most of mainland Southeast Asia, and with the Sumatran rhino in Kalimantan and throughout the mainland, except Malaysia and possibly Myanmar, re-introduction could be attempted. For the Javan rhino this is the only way that could lead to a significant expansion of the world population, because the possibilities for expansion in Ujung Kulon are very limited.

Re-introduction can be useful for strengthening previously depleted populations and for the re-establishment of rhinos in areas where they are exterminated.

Re-introduction has to be very carefully planned to maximize the chances for success, because, aside from the considerable costs involved, it is not without risks for the animals involved and will always entail a loss of animals from the parent population. Only animals that are in a hopeless situation and cannot be conserved in the wild, or animals from healthy and safe populations that are able to sustain the loss of a number of animals, should be used for re-introduction programmes. In the future progeny from captive breeding programmes could also be used.

3.4 Captive breeding programmes.

Captive breeding programmes, if successful, should be a source of animals for supplementation or re-introduction programmes, and would provide a last resort refuge for the species should conservation in the wild fail. Considering the long time span needed for such programmes to produce tangible results and the possible difficulties of re-introducing captive-born rhinos to the conditions of life in the wild, captive breeding programmes can only be supplementary to other rhino conservation programmes.

A captive breeding programme provides a sensible destination for animals that cannot be saved in their original homes or that cannot be moved to a safer place. Such animals would be lost for the world population anyway.

3.5 Public awareness and law enforcement.

Conservation of nature cannot be successful without understanding of the need for, and the acceptance of the costs of, conservation at all levels of the society. But awareness and understanding alone are not sufficient. Good and fair conservation legislation, a proper demarcation of the boundaries of land set aside for nature, and a dedicated, well-trained and well-equipped force to serve the common interest, are equally important.

Public awareness and understanding should be developed through a variety of formal and informal education programmes, but an earnest, professional force that carries out the government's programmes with zeal and dedication will also have a significant, beneficial impact on public opinion.

For rhinos, which are not only suffering a loss of living space, but which are also threatened by trade in their horns and other parts, general conservation enforcement will have to be supplemented by special programmes to curtail the trade in rhino products and to provide specific protection in the field.

3.6 Research and training.

Wildlife management programmes should be based on accurate data on the composition of the populations and on a good understanding of the species' biology and their roles in the natural ecosystem. Therefore research on the rhinos' ecology and behaviour in the wild, and regular surveys to monitor the status of the rhino populations, are of utmost importance for the success of all other programmes.

Monitoring of rhino populations should be an ongoing process and it will be necessary to improve monitoring techniques, both for specific scientific purposes and for the regular and continuous monitoring of the rhino populations. Recruitment of an adequate number of suitable personnel and training in surveying techniques and appropriate census methods will be needed.

Research on rhino reproduction, genetics and physiology carried out on the captive population will deepen our understanding of rhinos, their role in the forest ecosystem, and will aid in developing proper husbandry techniques. Exchange of expertise in these fields is important for all involved.

4. PRIORITIES

4.1 Short-term

- (1) Maintain and protect the Indonesian Rhino sanctuaries (*in-situ* conservation).
- (2) Develop and establish a specialist task force within PHPA (Indonesian Rhino Unit).
- (3) Start a public education and awareness programme aimed at all levels of the society.
- (4) Strengthen efforts to stop the illegal trade in rhino products.
- (5) Reinforce the captive breeding population of Sumatran Rhino.

4.2 Long-term.

- (1) Expand the number of Indonesian Rhino populations and sanctuaries through translocation and re-introduction.
- (2) Develop and use captive breeding populations for re-introduction and as an insurance (*ex-situ* conservation).
- (3) Provide knowledgeable, well-trained personnel to manage and protect rhino populations.

ACTION PLANS

The recommendations are expressed in Action Plans that provide both a review and specific prescriptions for action.

The Action Plans presented below are based on the draft Indonesian Conservation Strategy and on the recommendations made during the Workshop on Indonesian Rhino Conservation, Bogor, 3-5 Oct 1991.

For practical reasons separate, but overlapping, Action Plans for the two species are presented.

On the basis of these Action Plans, Five-year Development and Investment Plans for the conservation of the Javan and the Sumatran Rhino should be developed.

It is essential that these Action Plans receive the maximum possible financial and practical support from the Indonesian Government and from international conservation and development assistance agencies.

INDONESIAN RHINO CONSERVATION STRATEGY, PHPA, YMR, IWF, IUCN, WWF, Jakarta 1993**Javan Rhino Action Plan**

[Reformulated from the original]

1. CONSERVATION OF THE JAVAN RHINO IN UJUNG KULON

The Ujung Kulon National Park is the only place, except for a small population just outside the Nam Bai Cat Tien National Park in Vietnam, where the Javan Rhino is known to survive. The Ujung Kulon peninsula is a long established conservation area and its topography makes protection of the rhinos comparatively easy. The area is too small for a large population of Javan rhinos and it cannot be expanded.

Since it is the only source of animals for the establishment of other populations, protection of this unique resource has the highest priority. Immediate actions should be directed towards achieving the best possible protection for this population.

1.1 Strengthening of Park management and administration unit.

It is recommended that the management structure of the Park be re-examined and that a strategic planning exercise be carried out to ensure the effective deployment of staff. Special attention should be paid to:

- (1) The location of the Park Headquarters.
- (2) Implementation of activities in the Park.
- (3) Time demands on the Park Superintendent.
- (4) The need for an Operations Manager.

1.2 Park protection and intensive patrolling.

A good patrolling system to prevent poaching and to monitor the rhino population should be developed. Guards should be trained in monitoring techniques.

1.3 Law enforcement.

Regulations should be amended or developed to empower Park guards to enforce the law when apprehending offenders. Serious consideration should be given to provision of fire arms to make this possible. The establishment of an efficient communications network both within the park and its head office, and between head office and Jakarta, is essential for good and efficient management of the Park.

1.4 Education and awareness programme.

Education (formal or informal, but involving schools and children) and awareness (informal, aimed at the broad public, mainly adult) campaigns are a vital part of the Park work and implementation should begin at a very early stage.

Specific education programmes should be developed for:

- (1) School level (village, public and private schools)
- (2) Park level. Interpretive plans need to be designed for each rhino area.
- (3) Zoos and Safari parks.

Park interpreters need to be given support and training to provide information to villagers and park visitors.

Conservation awareness programmes should be developed for all levels of society:

- (1) Central Government level especially aimed at the legislature and the law-enforcement authorities.
- (2) Regional Government level with specific reference to:
 - (a) Obtaining the support of the Bupati of Pandeglang.
 - (b) Providing an information kit for the use by the Park Superintendent when meeting with other government departments such as agriculture, fisheries, etc.
- (3) Local communities. Develop support materials for use with local communities and conduct an awareness programme in conjunction with law enforcement and buffer-zone activities.
- (4) Tourists. Develop an interpretation programme for tourists. This should be broad-based but have rhino conservation as a major component. It should also:
 - (a) Be bilingual (Bahasa Indonesia and English).
 - (b) Be integrated with a system of bilingual guides.
 - (c) Be pro-actively distributed to the tourism servicing industry.
- (5) Private sector. Prepare information materials to attract funding from the private sector.

1.5 Rhino units.

The rhino protection units will primarily operate in Sumatra for the protection of the Sumatran rhino (see Sumatran Rhino Action Plan). Special rhino units are not necessary in Ujung Kulon, but the regular guards should receive training in rhino protection and monitoring.

1.6 Wildlife tourism.

Tourism will enable the Park to realize certain economic benefits.

For the development of tourism it is necessary to conduct an evaluation of how tourism can be managed within the constraints of the long-term interests of the conservation of the species and habitat within the park.

1.7 Development of Gunung Honje as Javan Rhino habitat extension.

The size of the rhino population in Ujung Kulon is limited by the comparatively small size of the National Park. Some habitat could be made available by the expansion of the rhino population into the Gunung Honje part of the Park, part of which is suitable for rhinos.

The Gunung Honje area is under heavy pressure from the communities living around the Park and buffer zone development and other programmes will be needed for the consolidation of the conservation status of this area.

Park boundaries should be resurveyed and clearly delineated around Gunung Honje and the degree of protection provided by the Park guards should be increased.

A survey and evaluation of the Gunung Honje area should be conducted to assess its potential and needs for the re-establishment of rhino habitat.

"Traditional use" zones within the Park boundary and in the vicinity of villages should be identified. These zones would be for the controlled use of minor forest products (non-timber) by the villagers.

Agricultural extension work should be carried out in the villages of the buffer zone surrounding the park. This work should promote the establishment of intensive, settled and profitable agriculture. Full use must be made of the environmental services provided by the Park.

Families living inside the park boundary should be identified. Their situation can be reconciled either by relocation and compensation, or by re-aligning the park boundary. Arbitration can be carried out on a case-by-case basis.

It is recommended that Gunung Honje be re-populated by rhinos through natural migration and increased protection, rather than by a managed translocation.

1.8 Research programme for Ujung Kulon.**1. Population survey and trend of Javan Rhino in Ujung Kulon National Park.**

For the future management of the Javan rhino population in Ujung Kulon and for the preparation for the translocation of rhinos from Ujung Kulon it is of vital importance to know the composition of the rhino population and to be able to monitor the population trend.

Before any translocation programme can commence the current status of the Ujung Kulon rhino population must be known. Current data on the rhino population in Ujung Kulon are not sufficiently accurate and consistent to form a basis for an evaluation of the effects of removal of rhinos for a translocation programme.

Therefore the new survey technique being carried out in Ujung Kulon with automatic photo registration should be continued and expanded, until a satisfactory result has been obtained. The current census programme could be speeded up and refined by the use of more equipment and by using other census techniques in conjunction with the photo registration¹.

For the continuity of the population monitoring a standardized census should be done yearly by the Park Staff. The census techniques to be used should be simple, accurate and consistent, aiming at continuity of existing methods to enable long-term comparison of data, while incorporating new techniques to improve accuracy with time.

Guards should be trained to carry out the censuses and staff at Headquarters should be trained in the evaluation of the results.

2. Research on biology and ecology of Javan Rhino in Ujung Kulon.

Research on the ecology of the Javan rhino will provide the baseline information for management decisions and for the preparation of the education and awareness programmes. It will also enhance the profile, credibility and importance of the Park.

Based on a thorough review of available information and identification of needs, baseline studies on the Javan Rhino and its habitats should be undertaken to give a comprehensive picture of the ecology of the species. The following is a non-exclusive list of some priorities :

- (1) Habitat preferences and carrying capacity.
- (2) Feeding studies (available resources and opportunities for supplementation of preferred habitat).
- (3) Population structure and dynamics.
- (4) Competition and social interactions.
- (5) Sociobiology (daily range through radio-tracking, effective sex-ratio, breeding behaviour, etc.).
- (6) Monitoring the distribution of vegetation types and changes over time.
- (7) Studies on other important plant and animal species.
- (8) Study of the competitive interactions (if any) between the Javan Rhino and the banteng.

The mechanism for this research should be a Rhino Research Coordination Desk, established as part of the Rhino Unit based in PHPA, which would draw upon personnel and expertise both from Indonesia and from overseas. One of the tasks of such a desk could be the production of a comprehensive annual report on research activities in Ujung Kulon and in other rhino areas, in conjunction with the education and awareness programme.

For aspects of Javan Rhino biology relevant to Population Viability Analysis (PVA)

2. TRANSLOCATION OF JAVAN RHINO TO ESTABLISH A SECOND POPULATION

The recommendations are based on PHPA's decision that the first additional population will be established through translocation to a secure natural habitat within the species' former range.

¹

The photo registration programme has recently been completed and the results have been communicated to PHPA.

No analysis has been carried out of the relative merits of captive breeding versus translocation as the optimum means for establishing the second Javan Rhino population (see the 1989 PVA report).

2.1 Preconditions.

These preconditions relate to information required before making a final decision to proceed with a translocation programme. They refer to the situation in the source site, as well as those in the receiving site.

Both the receiving site and source population should be fully secured as National Parks with well established boundaries. Specifically, Way Kambas should be legally gazetted as a National Park. Park staff should receive adequate resources to carry out their duties.

The behaviour, diet and habitat of the Javan Rhino in Ujung Kulon, and the habitat in the proposed release site should be studied in depth before any rhinos are moved.

Genetic management of the translocated population should be planned carefully to ensure that sufficient founders are represented (if necessary through staggered releases).

1. Source population - Ujung Kulon.

A thorough investigation into the source population's size and structure, the habitat and food sources of the rhinos, based on a literature review and field surveys, and an evaluation of the potential risks of removal of animals should precede any translocation operation.

The expert panel should also consider the recommended number of rhinos, specified to gender and age, that should remain in UK to ensure the survival there.

2. Potential areas for translocation.

Potential areas for the first translocated population and other sites for subsequent translocation were evaluated according to criteria of suitability and security.

In comparison to the other sites reviewed, Way Kambas emerged as the best site for the first translocation. Way Kambas has the potential to hold more rhinos than Ujung Kulon, is relatively accessible for transporting rhinos, and its current level of protection and potential for future improvements are better than any of the other sites. Barisan Selatan, Berbak, and Seberida were considered as possible sites for re-introductions in the future.

Based on the information available Way Kambas is the best site for the first translocation of Javan rhinos, pending the results of necessary feasibility studies. It is recommended that steps be taken immediately to prepare Way Kambas as a potential site for translocation. These include a detailed study of the suitability of Way Kambas and a survey of for evidence of an existing Sumatran rhino population.

3. Feasibility study on suitability of habitat at re-introduction area/site.

Suitability of an area for re-introduction of Javan rhinos should be evaluated in a feasibility study. The feasibility study should investigate the suitability of the area both from a biological and a managerial perspective. The area should not only be able to provide sufficient food, water, wallows, etc for a large population of rhinos, but it should also have management structures that ensure the safety of the rhinos and their habitat.

4. Develop the management structures for a second population.

Increased protection should be put in place for Way Kambas as a matter of priority on the basis of a well developed coherent management plan that included buffer zone development.

Increased protection should begin for other potential re-introduction sites, particularly Berbak and Barisan Selatan, and surveys should be carried out to assess the possible survival of Javan rhinos in these and other areas on Sumatra.

2. Javan Rhino capture management programme.

Translocation and re-introduction of rhinos is a costly and risky undertaking. The entire capture and translocation operation needs to be supervised by the most experienced personnel.

Once the preconditions for the extraction from the source population have been met and the preparations needed for the release have been done, a capture programme can be started. Capture should be selective, to attain a balanced sex-ratio in the founder population and to avoid the unnecessary harassment of unsuitable animals. Unwanted animals should be equipped with telemetry devices and be released immediately at the capture site.

The animals that are to be moved should be closely supervised by experienced personnel and all necessary personnel and equipment should be available at all times. The animals should be carefully conditioned before being transported and the duration of the transport should be as short as possible. In the receiving site appropriate enclosures and all necessary personnel and equipment should be prepared beforehand.

Animals should only be released after a sufficient acclimatization in the new area and they should be closely monitored by radiotelemetry after release.

It should be noted that acclimatization hasn't proven necessary in the Nepalese translocation of Indian rhinos. A long period of acclimatization would require more expenses and personnel and would have a taming effect on the rhinos, making them more vulnerable for poaching. It is probably best to keep the period between capture and release as short as possible, to avoid complicating situations. Information on the behaviour of the rhinos during capture, transport and after release in the Nepalese translocation would be very useful to decide on the best strategy.

**INDONESIAN RHINO CONSERVATION STRATEGY, PHPA, YMR, IWF, IUCN,
WWF, Jakarta 1993****Javan Rhino Action Plan, Appendices**

[Reformulated from the original]

1. STATUS OF THE UJUNG KULON RHINO POPULATION.

Year to year census counts have been presented in different forms in different published materials. The method used is to count the number of animals with different footprint sizes. There are questions as to what the census data actually indicate, especially with regard to whether the population in Ujung Kulon is presently at or near carrying capacity. There is also some question as to whether the census results are comparable over the period 1967 to present.

The counts vary from year to year. But, even with consistent year-to-year census data, the currently used technique cannot determine whether the population is at carrying capacity. As rhino population density increases, and more rhinos with approximately the same size of footprint will occur in the same area, the current census technique will increasingly underestimate the total count. The result is a flattening out of a curve of the census results over time regardless of whether or not the population is still increasing or whether carrying capacity is being approached.

2. NOTES ON JAVAN RHINO BIOLOGY AND POPULATION VIABILITY ANALYSIS.

Based on a review of evolutionary relationships, general habitat preferences, feeding behaviour, social structure and size relationships between the species, the Javan and Sumatran rhinos are more likely to share ecological characteristics with black rhinos than with Indian and white rhinos.

The ecological similarities between Javan rhinos and black rhinos has implications for assumptions made on unknown parameters used in the PVA model:

- (1) Javan rhinos are likely to be monomorphic which implies no sex-specific differences in mortality as opposed to what was included in the PVA model at the June 1989 meeting.
- (2) Home range sizes in male and female Javan rhinos are likely to be similar, as in the case of the black rhinos, hence the opportunity for one male to monopolize several females for breeding is reduced for Javan rhinos. For the purposes of the PVA we should assume that any one male will have the opportunity to breed with 2 or 3 females and that any female will breed with 2 or 3 males. Again for model purposes, this is more analogous to a facultatively monogamous breeding situation than was used in the June 1989 PVA.
- (3) The June 1989 PVA assumed high levels of juvenile mortality, based partly on Indian rhino data. It is likely that juvenile mortality will be lower in Javan rhinos due to lack of predation on infants by tigers.

Six general types of catastrophes can be considered for inclusion in the PVA: volcanic eruption, forest fires, drought, disease, accidental poisonings, and poaching.

- (1) Volcano - for the purposes of the PVA the probability of this event was assumed to be zero.
- (2) Forest fires - fire, while a possible event, was determined to be of no possible impact to the population for the PVA.
- (3) Drought - again, for the purposes of the PVA, assumed to have zero impact.
- (4) Disease - the 1962 disease event was associated with a year of high rainfall. It is possible that the disease was spread as animals congregated in higher densities than normal. At one extreme the PVA should model a disease event at the frequency of exceptionally wet years. At the other extreme, the PVA should model disease events at a frequency of one per 60 years, the actual rate observed since 1930. Disease severity should be examined at 10 percent mortality (the known rate in 1982) and 20 percent mortality (a possible high range for the 1982 disease event).
- (5) Poaching - two approaches for investigating poaching were suggested. One, using data on actual rates of poaching since 1929, model a frequency and severity equal to the value obtained by looking at the total number poached over the years versus the total number available to be poached. Second, model the population under the assumption of absolute protection and a poaching level of zero.

Some worst-case scenarios should be included in the PVA analysis to help develop a strategy of least regrets. The PVA process should be used to examine various scenarios from worst-case to optimistic.

It is recommended that the PVA simulation should be run at a range of possible carrying capacities for the Ujung Kulon population (50, 70, 100, and 200).

There are no strong indications that competition with banteng is a significant factor in Javan rhino ecology, but further studies on this issue are recommended.

3. RESEARCH PREREQUISITES FOR SOURCE POPULATION - UJUNG KULON.

Before attempts to capture and translocate Javan rhinos from Ujung Kulon are started, a comprehensive literature study and field survey should be carried out including:

- (1) A population survey to assess:
 - (a) Numbers in Ujung Kulon.
 - (b) Age structure of population in Ujung Kulon.
 - (c) Sex ratio.
 - (d) Home-range (this would require a high density of cameras in a portion of the park and kept in place for a longer period of time, preferably in combination with track studies).
- (2) A vegetational survey in both receiving and source sites to determine comparability of habitat.
- (3) A study on possible competitive interactions between rhinos and banteng in Ujung Kulon to assess potential impact of removals.
- (4) A thorough literature review on other experiences with rhino translocation to help determine optimal/minimal numbers for successful release.
- (5) Modelling work, using PVA, to determine the potential effect of removals on the source population and the likelihood of success of translocated populations of various sizes (for example: extractions of minimal number required for re-establishment (3.7 ?), 1.5x, 2x minimal number, sex-ratio variations, etc, from populations of 56, 70, 90 and 120).

The studies listed above should be started as soon as possible. An ad-hoc advisory panel should be established to review the results of the photo-survey project and the other field surveys in Ujung Kulon, the literature review of rhino translocation, and the results of modelling exercises, to make recommendations on optimal numbers of rhinos to be removed from Ujung Kulon and under what timetable. The panel should comprise the following expertise:

- (1) Rhino biologists.
- (2) Translocation experts (India/Nepal).
- (3) Population biologists with expertise in computer modelling.
- (4) Site managers for Ujung Kulon and Way Kambas.

4. POTENTIAL AREAS FOR TRANSLOCATION.

Potential areas for the first translocated population and other sites for subsequent translocation were evaluated according to the following criteria:

- (1) Is the site within the natural historic range of the Javan rhino?
- (2) Is the site likely to contain appropriate habitat?
- (3) Does the site have a year-round supply of water?
- (4) Is the site protectable from the point of view of both habitat and rhinos?
- (5) Is the site large enough to sustain a potentially viable population (> 100 animals)?
- (6) Is there evidence that Javan rhino currently occur in the site?
- (7) What is the ease of translocating animals to the site?
- (8) What is the degree of separation of the release site from the source population?

- (9) What is the present management capacity in the site?
- (10) What is the potential management capacity (including the ability to attract outside funding)?
- (11) What is the degree of local government commitment to the conservation of the site?
- (12) How much potential is there to develop eco-tourism at the site?
- (13) What is the potential for local community education and extension?

The considerations (1) - (5) are considered absolute requirements for any translocation site.

The sites considered are:

- (1) Gunung Honje
- (2) Pulau Panaitan
- (3) Way Kambas
- (4) Barisan-Selatan
- (5) Berbak

The scoring for some of these sites is given in the table below. Pulau Panaitan was ruled out of consideration because it failed to meet three of the absolute criteria (outside historic natural range, no year-round water supply, and not large enough to sustain a viable population).

Gunung Honje was not selected because it was considered that its suitable habitat could be repopulated with natural migration and increased protection. Also, it would not provide the added benefits of a second distinct population, free from the effects of catastrophes acting on Ujung Kulon.

	Pulau Panaitan	Way Kambas	Berbak	Barisan Selatan
Natural range	N	Y	Y	?
Suitable habitat	Y	Y	Y	Y
Year-round water	N	Y	Y	Y
Protectable	Y	Y	Y	?
Viable population	N	Y	Y	?
Evidence of Javan Rhino	N	?	?	?
Ease of transport	3	2	2	1
Separation	2	3	3	3
Present Management	1	2	1	0
Potential Management	2	3	2	2
Local Government support	3	3	2	1
Tourism	3	3	2	1
Education/Extension	1	3	2	1

In cases where a numerical score is given: zero is the worst score and three is the best. Scoring is relative between the sites and not an absolute score on an objective basis.

5. RELEASE AREA HABITAT REQUIREMENTS.

Areas for the release of Javan and Sumatran rhinos to establish additional populations should meet the following criteria:

- (1) Preferably within the historic range of the species.
- (2) Size: should be large enough for minimum 100 animals carrying capacity, (assume 15 sq. km per rhino). The establishment of small numbers of translocated animals in an area where no MVP is possible, can be accepted for the purpose of testing management procedures. However, this small area approach may lead to problems of animals wandering out.

- (3) Food resources meeting diet requirements.
- (4) Assessment of area as suitable habitat: NB Ujung Kulon may not be typical of historic Javan range. The Viet Nam range may provide a useful guide.
- (5) Carrying capacity estimates for area.
- (6) Adequate water, wallows, saltlicks.
- (7) Low human population densities adjacent to release area.
- (8) Assessment of predation risk on young.
- (9) Status of re-introduction area. Minimum legal status is National Park or Nature Reserve with level of protection of a National Park.
- (10) Integrity of release area: absence of livestock, and to avoid disease transmission, no hunting, logging, firewood collection.
- (11) Security of area must reach pre-determined levels before any deliberate capture starts or any isolated animal moved there.
- (12) Extension efforts with local communities must be well established, with re-introduction project providing employment if possible.
- (13) Assessment of threats to the release area through e.g. loss of habitat to forestry, pollution from outside, etc.
- (14) Release site must have good communications and access.

6. CAPTURE MANAGEMENT PLAN FOR RHINO TRANSLOCATION SCHEMES.

6.1 Catching effort.

Assume that for a successful re-establishment 3 males and 7 females (3.7) are minimal.

Javan Rhino:

Catching effort in Ujung Kulon is directed to 3.7. Individuals in excess of 3 males or 7 females are released in Ujung Kulon, following exhaustive taking of samples and fitting radio-collars.

6.2 Capture methods

There are very few options, as immobilization is not feasible for either species. Animals must catch itself, either by surface trap or pit. Latter is preferred for Sumatran rhino as it is very highly strung on capture, but tames within 12 hours.

Ujung Kulon photo-trapping is seen potentially to allow very selective pit-trapping for desired sex/age. This in contrast to the Sumatran rhino which in disturbed habitat may rarely use specific trails. In undisturbed habitat, a Sumatran rhino patrols each path every 4-5 weeks, a common capture time. On capture every animal must be checked for injury and disease. Every effort must be made to minimize capture and handling stress, using drug therapy as necessary.

6.3 Biomedical monitoring

A veterinary protocol should be developed to capture as much biomedical information as possible from wild rhinos captured for translocation. This is imperative to establish norms for future reference regarding health problems. The protocol should include

- (1) internal (blood and faecal) and external parasite screening.
- (2) blood norms (hematocyte, packed blood volume, etc), and
- (3) blood and tissue samples for genetic analysis.

All arrangements for the analysis should be in place, so the materials are not lost, misplaced, spoiled or otherwise wasted. The work should preferably be done in Indonesia and a qualified vet should confirm the adequacy of the facilities and personnel in advance.

A computerized database should be established in Indonesia, and duplicate files and records should be stored in a second location.

6.4 Management for Release

All rhinos, irrespective of origin, type and size of movement and destination will be held in a pen at the release site. This is to allow (1) recovery from travel, and (2) development of site fidelity. Each will then be released singly into a "5-acre" enclosure, bounded by a solar electric fence, with cut line kept clear. This will allow the rhino to feed to some extent on natural vegetation and be monitored closely. At some stage after release from enclosure, all installations can be removed and used at a new site.

The use of electric fencing to confine rhinos needs more thought and study. Its use on all sides of rhino enclosures may frighten the animals and result in injury.

Only one rhino will be released at each site. The aim is to develop a patchwork of well-spaced animals with release area attachment.

Any captive bred rhino returning to the wild will follow the same procedures, hopefully using great experience in Indonesia by then. Management will be modified as necessary, but much more detailed protocols as regards the learning processes of the animals will be necessary. The likely time scale allows no greater specification.

Good communications between each field site and park/project headquarters is essential.

6.5 Monitoring of translocated animals

Observation and monitoring is an essential component of any translocation. Apart from collecting data, it is useful to allow intervention so that acclimatization and release are as soft as possible.

Minimally the following attributes should be monitored both pre- and post-release:

- (1) Location, every released animal must be radio-collared.
- (2) Feeding observations.
- (3) Sexual/reproductive activity.
- (4) Behavioral interactions/social behaviour.
- (5) Ranging behaviour.
- (6) Condition and health by visual observation.
- (7) Use of habitat.

Monitoring will require at each release area full-time researchers, who are pre-trained and experienced.

6.6 Timing and Scheduling

Given the realities of forest habitat dynamics on Sumatra the following sequence must start as soon as possible:

- (1) Decide to establish second population
- (2) Identify location of release area
- (3) Carry out feasibility study
- (4) Implement pre-requisites identified in feasibility study
- (5) Schedule capture to start according to number (4)

Goal: In 3 years have pre-requisites implemented, hence be ready to translocate.

- there should be a long term systematic monitoring program based on plaster casts of tracks. This should be an ongoing program for several years and should be incorporated with the patrolling work
- it may be possible to include some camera trap work to correlate track casts and measurements with individuals photographed and identified.

4. Begin preparing a translocation site for the development of a second population.

Before any translocation is even contemplated the security of the receiving area must be guaranteed. The security of both Ujung Kulon and the relocation site could be tested by independent agencies.

5. When the population is proved to be increasing and the security of Ujung Kulon guaranteed then a staged translocation to form a second population can be contemplated. This would follow a long period of research, and practice in techniques of monitoring, selection , capture and release. and proof-of-safety demonstrations.

UJUNG KULON NATIONAL PARK Javan Rhino Status and Protection**Nico J. van Strien & Haerudin R. Sadjudin****IUCN SSC Asian Rhino Specialist Group Report, June 27, 1997***[Reformated from the original]*

1. Background

The Javan (or lesser one-horned) Rhino (*Rhinoceros sondaicus*) is the rarest Rhino species. World wide only about 70 individuals survive, 50 of which in UKNP, the remainder in Vietnam.

Ujung Kulon National Park is a long established conservation area and its topography makes protection of the rhinos against poaching comparatively easy.

The Javan Rhino has found a safe refuge in UKNP for many years, but the area is too small for a large population, and the Park cannot be expanded on the densely populated island of Java.

To enhance the long term survival of the Javan Rhino the world population should be allowed to expand, which can only be done through the establishment of other populations within the historical range of the species.

Since UKNP it is the only source of animals for the establishment of other populations, protection of this unique resource has the highest priority. Achieving the best possible protection for this population is the primary objective of the Javan Rhino conservation strategy.

UKNP is one of the most famous conservation areas in Southeast Asia. The Javan Rhino and the pristine landscape of UKNP, located near one of the fastest growing population centres of SE Asia, are very valuable assets and should be utilized sustainable to generate income for conservation through ecotourism development.

Northwestern Java is rapidly developing into a centre of industry with many new population centres, and a highway link to Jakarta. The East coast of Java is being developed for beach recreation on a very large scale, with several very large resorts currently under construction.

These developments will lead to a growing number of tourists and recreants that are interested in visiting UKNP, and the prospects for revenue generating ecotourism are very good. Well-guided ecotourism development could become a major source of income for the Park.

2. Observations and Recommendations**Observation****Recommendation****Rhino Conservation Coordination**

As recommended in the Rhino Strategy the Indonesian Government has appointed a Rhino Conservation Officer(RCO) from PHPA staff in 1994. The position is mainly titular, without a functional and structural embedding in PHPA structure.

The RCO has no formal presence in the management structure of the various Rhino Conservation Areas.

To improve the effectiveness of the RCO position, establishment of a functional and structural complement at an appropriate level within the regular PHPA structure.

Establishment of a formal link between the RCO and the Management of the Rhino Conservation Areas, with participation in meetings and workshops, and with exchange of reports and workplans.

Observation

The Rhino Strategy recommends the establishment of 'The Advisory Board of the Indonesian Rhinoceros Foundation' [= YMR]. An Advisory Board has been incorporated in the statute of YMR, but the Board has not yet been inaugurated.

Recommendation

Establishment of the YMR Advisory Board as prescribed in the Statutes. Nominated members to be invited for a inauguration meeting.

Javan Rhino Status

The comprehensive population survey of the Javan Rhino in UKNP with photo registration, conducted by WWF Indonesia Program, has been completed in 1993. The study estimated the number of rhinos present to be between 37 and 58, with a median of 48 and approximately even sex ratio. The carrying capacity was estimated to be 80.

Since the photo census no regular track count census has been conducted, though one is planned in the current financial year.

The JAVAN RHINO ACTION PLAN was drafted in 1991. Some of the recommendations, with respect to studies and management of the existing UKNP, have been implemented. On others limited action has been taken.

The small size of the population and the lack of further data on the population trend since early 1993, precludes a translocation program at present. Removal of 5 to 10 animals from the population would be considered to be an unacceptable drainage of the founder population.

Nevertheless the problem of a too small population in too small an area is real and the international conservation community needs to continue to look for realistic and practical solutions

A Javan Rhino Population Viability Analysis was last conducted in 1989. The recommendations, including the removal of 18-28 individuals from UKNP, were not well received.

The track measurement technique currently employed and the evaluation method could be refined to improve accuracy. A workshop with national and international experts, followed by a field test and training session, is recommended to design the improved standard census method.

Monitoring of the Rhino population should be done minimally on a bi-annual basis, using standard procedures and techniques.

Evaluation of the effect of the strategies, policies and action plans, and assessment of the progress made to achieve the objectives are essential elements in the conservation planning process.

It is recommended to review the Action Plan during the AsRSG Meeting to evaluate the progress to-date.

As an alternative to direct translocation to a new site, the establishment of a JAVAN RHINO SANCTUARY (JRS) in UKNP can be considered. The presence of the sanctuary would enhance the protection of the Rhinos, would allow expansion of rhino population in a part of the Park that is currently under-utilized, and could produce offspring for translocation, with minimal risks for the founder population.

During the AsRSG Meeting in Sandakan, Malaysia, the PVA analysis should be reviewed, using the most recent figures for the UKNP population, and including the JRS option.

Observation**Recommendation****Javan Rhino Population and Poaching**

The available data on the size of the rhino population in UKNP indicate a stabilization of the population at a level of about 50, since the mysterious disease episode of 1982. Before 1982 the population increased gradually to a number of 65 or even more. The population appears to recover not or poorly from the setback in 1982.

The perceived poor recovery of the population could be caused by a number of factors like: inaccuracies and inconsistencies in census methods; continued poaching; habitat changes; imbalance in sex and/or age structure; disease, etc. None of these can be indicated as the sole or leading cause.

It is recommended to encourage research programmes on the rhino in Ujung Kulon and to intensify monitoring of the population. Also more accurate census methods should be developed.

Poaching of Javan rhino in UKNP has occurred over the past years. The most recent case, that became known, occurred in 1994. At least one rhino was killed and its horn was sold, and there have been numerous cases of illegal entry into the Park. No illegal entry and poaching of rhino have occurred in 1995.

It is still possible for the determined poacher to enter the UKNP unobserved and to operate inside the Park undetected. The current system of guard posts and patrols is not sufficient to eliminate illegal entry and needs reinforcement.

A (unknown) number of rhinos has been lost to poaching over the last 10 years, certainly contributing to the bad recovery of the population. Nevertheless the improved infrastructure and management of UKNP appears to succeed in reducing the poacher's chances.

A healthy, expanding population in UKNP is required for the fulfillment of the long-term action plans, in particular for the establishment of new populations elsewhere. Emphasis should be placed on:

- Elimination of poaching;
- Habitat management after thorough pilot studies;
- Expansion of available habitat in Honje area.

Factors that are important in the control of rhino poaching are:

(A) Access to the Park via

- (1) the Isthmus between UK and the mainland;
- (2) the Selamat Datang bay between UK and the mainland;

(B) Limited presence of guards in the area most vulnerable to poaching (the southeastern quarter);

(C) The availability of locally produced guns and ammunition.

To improve the protection of the rhinos against poaching the following programmes are recommended:

- 1- **Isthmus Protection Zone**, to prevent access over land;
- 2- **Coastal Zone Monitoring System**, to prevent access over sea;
- 3- **Intensive Patrol Zone**, to Control the main poaching area;
- 4- **Gun Control and Law Enforcement**, to reduce the availability of firearm for potential poachers, and to ensure prosecution of offenders.

Details of the 4 programmes are given below.

It appears that poachers, usually from villages near to the Park, prefer to enter the reserve over land across the isthmus. Though the isthmus is less than two km wide, it is heavily forested and poachers can easily avoid the guardpost.

Better protection of the isthmus, and the potential rhino habitat in the Honje area, has the highest priority. Because protection measures will have ecological consequences for the habitat and the rhinos, three options, providing varying degrees of protection, in combination with other benefits, are proposed.

Observation

Cases of rhino poaching are rarely brought to justice. Even the last case in 1994, where Park staff collected abundant evidence in the form of a large amount of rhino bones, was not followed by a prosecution.

Recommendation

Lax law enforcement and leniency towards poachers will encourage new ventures. Park staff, with assistance of the legal departments of PHPA and Forestry, should press for charges against poachers, whenever possible.

Observation**Park Management and Infrastructure**

Park Headquarters are located in Labuan, several hours travelling from the Park. Although radio communications are excellent, the large distance limits the possibilities for the Management Staff to be present in the Park for guidance and supervision.

Recommendation

To improve communications between field and HQ staff and to intensify guidance and supervision it is recommended to establish a Mobile Team (MT), from among the senior staff of the UKNP. The MT would function directly under the Head of the National Park and would be his 'eyes, ears and voice'.

The MT could consist of three persons with complementary expertise. The MT members would be stationed fulltime in the Park, be free to travel in all areas inside and outside the Park, and be responsible to the Head of UKNP only. The RCO will provide technical assistance to the MT.

Several new Guardposts have been established in recent years, and facilities in the locations are gradually brought up to standard. In the area of concern only the Cangkuda guardpost has not yet been established. In general the facilities for the guards have improved greatly.

For a better protection of the rhino area the establishment of the Cangkuda guardpost is urgently needed.

Recently the Park boundary in the bay between UK and the mainland has been relocated to a new location further away from the shore (See the map on page 14). Part of the boundary has been marked with a light and boys. Control of the sea boundary is mainly the task of the post on Handeuleum island. The post is equipped with a fast boat, but there are no night time patrols.

There is still illegal fishing, including dynamite fishing, inside the Park boundary, usually at night. Also poachers can easily cross the bay at night.

Therefore it is necessary to increase the capability to monitor traffic inside the sea boundary, especially at night time. Fast patrol boats should be on standby 24-hours to prevent illegal entry across the seaward boundary.

Patrol trails exist around most of the peninsula. But in the area where rhino poaching and illegal entry is most likely to occur (between Cigenter and Cibandawoh) there is no patrol trail. (See the map on page 9)

To be able to patrol the rhino poaching area more effectively it is recommended to establish a new patrol trail between Cigenter and Cibandawoh as part of the development of the Intensive Patrol Zone.

There are currently 118 employees in UKNP, of which 31 are stationed in Labuan (Park HQ). The office/field ratio is 1:2.7, very good in comparison with other Parks in Indonesia. Facilities are adequate to good in most locations and the field staff receives considerable incentives in the form of hardship and field allowances.

There is a danger that the new, spacious office in labuan will be a stimulus for increase in HQ staffing. It is recommended to increase the number of field staff and to decentralize facilities and responsibilities as much as is possible. Ideally the office/field ratio could be 1:5 or better.

Observation**Recommendation**

The functional status of the majority of the field personnel is still comparatively low. So far only two guards have attained the highest grade (PPNS). Two more are in process of being upgraded.

It appears that work attendance at the guardposts is less than optimal. Officially each post is manned with 5 employees, but during the survey the number actually present at the duty station varied between 2 and 0. The other were absent on assignments outside their area of duty or were on scheduled or unscheduled leave.

The communications system between HQ and the field posts is excellent, and gradually all stations are being converted to solar power.

Patrols are seen as the main duty of the personnel at the various guardpost, and in theory each week two to three days are spent on patrols. Though the guards are obviously much more active outside the guardpost compound than previously, patrolling is still largely routine, following the existing patrol trails. Checks of randomly chosen blocks or of areas vulnerable to poaching, are not carried out.

There are only two functioning firearms in UKNP and it is difficult to obtain ammunition.

Rhino poaching and game hunting is done with locally made front-loader guns. Confrontations of armed poachers and unarmed guards have taken place.

It is recommended that the training of guards is accelerated. Ideally each guardpost should have at least one fully authorized guard.

It is recommended that guardposts are properly manned at all times (minimal 3 at any time), to enable the guards to carry out their patrols. Good rosters for leave and holidays and strict controls are essential to control absenteeism.

Patrols can only be effective if they cover all the vulnerable areas, and are not limited to walking along the well-known trails. It is recommended to establish a good patrolling roster, with a random selection of areas to be covered, both near and far from the posts and trails. Priority should be given to the area most vulnerable to poaching, the Intensive Patrolling Zone

Game guards should be able to carry arms, when they are likely to encounter armed intruders.

It is recommended that the Park acquires a sufficient number of light guns and ammunition to issue to patrols when needed.

Ecotourism

Currently small-scale ecotourism is being developed and run by a private company that is operating under an informal agreement. Though reporters did not make an in-depth study of all the facilities it appears that:

- (a) the full potential of UKNP is not being developed; and
- (b) there is no direct benefit for the Park in the form of sharing of revenues.

It is recommended to evaluate the effects, the benefits and the institutional basis of the current ecotourism development. The AsRSG could be requested to carry out an independent review.

Observation	Recommendation
The new beach resort development on the west coast of Java will vastly increase the number of tourists and recreants, and therewith the number of potential visitors to UKNP.	The Park and the investors should anticipate the increased demand and produce a comprehensive ecotourism development plan, aiming at sustainable high-class developments and a high return of earnings for conservation and resource management. It is recommended to involve a reputable international ecotourism developer to ensure that the planned developments can compete on the international market.
There is a vast potential for sustainable ecotourism in UKNP, but more attention should be given to development with direct financial benefit for the Park. Only then will development be sustainable and beneficial for conservation.	If accepted the JRS could be developed in a similar fashion as the Sumatran Rhino Sanctuary in Way Kambas, in partnership with national and international conservation bodies, and with dedicated ecotourism facilities to enable financial self-support.
The JAVAN RHINO SANCTUARY, proposed as one of the options for the Isthmus Protection Zone (See page 15) could become a major attraction and generator of revenues for rhino conservation.	

3. Development Options

To improve the protection of the rhinos against poaching the following programmes are recommended:

- 1 **Isthmus Protection Zone**, to control access over land;
- 2 **Coastal Zone Monitoring System**, to control access over sea;
- 3 **Intensive Patrol Zone**, to monitor the main poaching area;
- 4 **Gun Control and Law Enforcement**, to reduce the availability of firearm for potential poachers, and to ensure prosecution of offenders.

3.1 Isthmus Protection Zone

Better protection of the isthmus, and the potential rhino habitat in the Gunung Honje area, has the highest priority. Any protection measure in the Isthmus area will have ecological consequences for the habitat and for the rhinos. Therefore three options, providing varying degrees of protection, in combination with varying ecological consequences and side-benefits, are proposed.

Also combinations of elements of the options could be considered, though the ones presented here appear to be the most practical and cost-effective solutions.

The proposed protection measures for the Isthmus Protection Zone are:

- 1 Establishment of a **GRAZING GROUND** across the peninsula, with a watch tower at a strategic location.

The grazing ground will make it more difficult for intruders to cross the Isthmus unnoticed. Everyone crossing will be clearly visible for the guards and the animals on the grazing area will assist with alarm calls when people are entering.

A large watch tower will have to be made somewhere in the middle, overlooking the whole grazing ground. Most intruders will try to enter at night and 24-hour guarding will be necessary. The guards should be equipped with binoculars and with appropriate night vision equipment.

Protection will depend largely on the continuous presence of guards, and it will be difficult to maintain a good levels of vigilance, especially during the night shift.

Opening of a strip of forest between the Indian Ocean coast and the Selamat Datang Bay will allow the strong ocean winds to blow across and this could have serious consequences for the vegetation around

the grazing area and for the bay ecology. This effect could be reduced by designing the grazing area in an angle.

2. Erection of an **ELECTRIC FENCE** across the peninsula, with a small grazing-ground in the middle, with a watch tower, to allow animal movement.

An electric fence, with circuit-break alarm, will form a very good deterrent for potential poachers. A totally closed fence would restrict all wildlife, including rhino, movements over the Isthmus. Therefore somewhere in the centre an opening of about 100 m should be left to allow wildlife movement.

To be able to guard the wildlife gate the vegetation in the area should be opened and provided with a small watchtower and lights. Alternatively video cameras could be used to monitor wildlife and human traffic through the gate.

The small gate is easier to monitor than the large grazing area, and it will be much less demanding for the personnel on duty.

3. The establishment of a **JAVAN RHINO SANCTUARY** in the area east of the Isthmus, enclosing the good rhino habitat east of the Isthmus.

The Javan Rhino Sanctuary concept would provide excellent protection of the rhinos in UKNP, with a double electric fence, and would allow the establishment of other Javan rhino populations, with minimal influence on the existing population. A large area of under-utilized rhino habitat in the Gunung Honje area (two possible areas are shown on the map) would be enclosed by electric fences. One across the Isthmus, the other further east between the bay and Indian Ocean beach, with a 4-wd patrol track.

Unobserved entry into UK over land would be almost impossible, but the rhinos confined inside the Sanctuary would be easier prey for poachers. Therefore the outside fence needs to be patrolled and the rhinos inside need to be monitored closely.

Rhinos occasionally still move over the Isthmus. The Isthmus fence and capture yards are meant to confine rhinos that move naturally towards the Gunung Honje area. The funnel shaped fence will force the rhinos to enter the capture yard. The capture yard need to be monitored by (night vision ?) video.

Once a rhino is inside the outside gate closes and the rhino, if wanted for the Sanctuary, is allowed to move into the habituation and observation yards (ca 30 Ha each).

To allow monitoring of the rhinos it is important to habituate them to the presence of humans. This can occur while in the observation yard. During that period it can be decided whether the rhino has the right age, sex and character to be allowed into the Sanctuary proper.

Initially a small number of rhinos (2-4 females, 1-2 males) would be allowed into the Sanctuary to breed. Offspring can be used, depending on the circumstances and needs, be kept in the Sanctuary, released back into UK, or be used for a translocation program.

After some time the founders could be released back into UK and other animals taken into the Sanctuary, to increase the genetic basis of the sub-population.

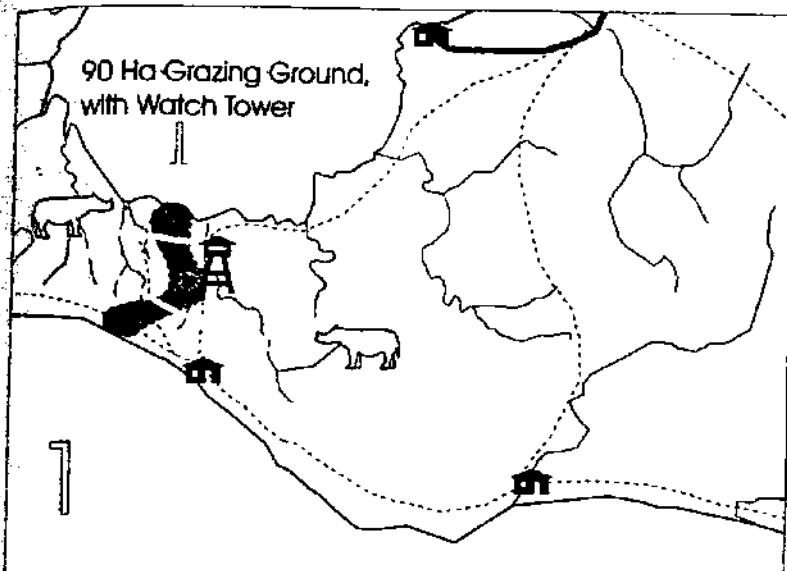
The Sanctuary concept would allow the staged establishment of new populations, without draining the gene pool of the founder population, and with minimal risks and stress for the founder animals. No animals will be captured and no animals will be taken out permanently from the UKNP population.

Once established with habituated rhinos the Sanctuary, or parts of it, could be used for viewing of Javan rhinos in natural habitat. This would form a major tourist attraction and will increase the potential of UKNP for sustainable development of ecotourism.

The establishment and running of the Sanctuary will require substantial financial inputs for at least 20 years, and therefore it is recommended to establish the Sanctuary in the same fashion as the Sumatran Rhino Sanctuary in Way Kambas NP. Ecotourism with a direct link, also financially, to the Sanctuary would ensure the long-term sustainability of the Javan Rhino conservation programme.

	1 Grazing Ground	2 Electric Fence	3 Javan Rhino Sanctuary
Protection for rhino in UK	Modest. Depending on guard's vigilance.	Good. Less dependant on guards.	Very good. Double barrier.
Expansion of rhino area	Natural expansion unobstructed	Natural expansion unobstructed	Expansion stimulated in secure area
Protection for rhino in Honje area	None	None	Very good. Large high security area
Expansion of rhino population	Reduced poaching	Reduced poaching	Reduced poaching and potential breeding enhancement
Biological effects on rhino	None	None	Temporary gene pool reduction
Habitat effects	Considerable change in vegetation, with effects on bay ecosystem (strong winds)	Small change in vegetation	Only natural effects of increased rhino population on forest
Manpower requirements	Large. Short-term for development and maintenance. Additional guards for 24-hour guarding.	Modest. Additional guards for 24-hour guarding.	Large. Considerable staff requirements for guarding and management.
Investment costs	Modest. Opening of area, watchtower, night vision equipment	Moderate. Electric fence, watchtower, night vision equipment	Very large. Long fences, telemetry equipment, management facilities
Ecotourism benefits	Wildlife viewing	None	Viewing rarest rhino; potential for high-class facilities
Javan Rhino Action Plan implementation	Increased protection of UK rhinos	Increased protection of UK rhinos	Greatly increased protection of UK rhinos. Highly secure sub-population for managed breeding for re-introduction.

ISTHMUS PROTECTION ZONE Suggested Development Options



OBJECTIVES:

- Restriction of poacher access.
- Expansion of Rhino area.
- Expansion of Rhino population
- Wildlife (Rhino) viewing.

1

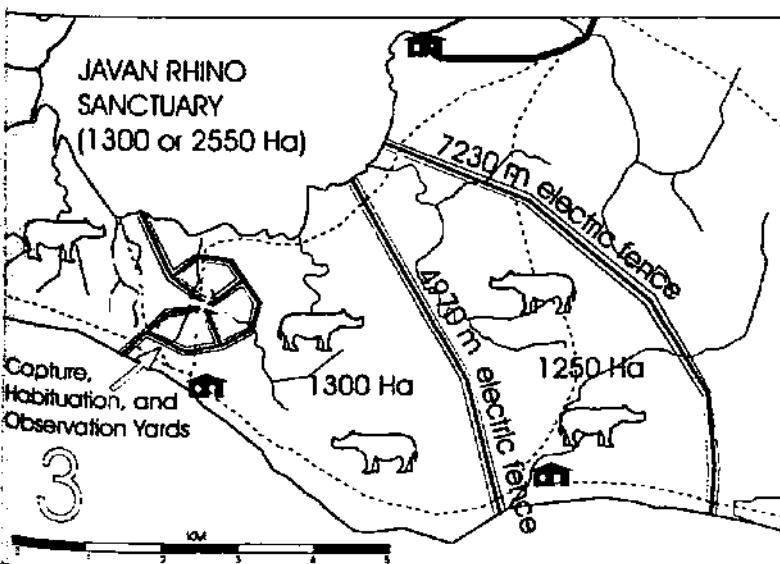
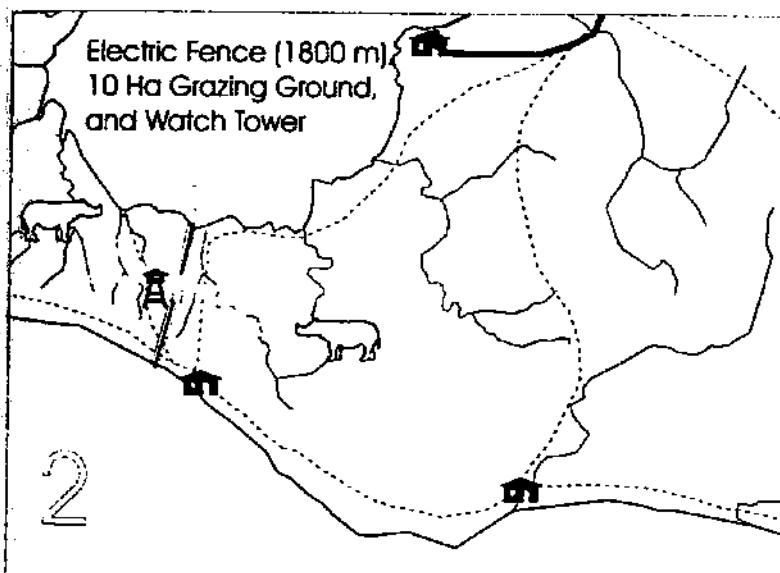
Opening of a grazing area in the Isthmus, with a watch tower (24-hour guarding with night vision equipment) will make it more difficult for poachers to enter the rhino area. Movement and natural re-population of the area East of the Isthmus can occur. The grazing ground would provide good opportunities for wildlife viewing.

2

An electric fence across the Isthmus would provide good security and would be easy to manage. A small opening in the fence, with a watchtower, on a grazing ground in the centre would allow free rhino movement. No opportunities for wildlife viewing and no added protection for rhinos East of the Isthmus.

3

Construction of a JAVAN RHINO SANCTUARY in the area East of the Isthmus, with two electric fences enclosing a large area of good rhino habitat, would provide maximum security. Rhinos moving naturally across the Isthmus will be contained, after habituation, in the SANCTUARY, providing a safe expansion of the rhino area and population. Offspring of the Rhinos in the Sanctuary could be used to start the establishment of other Javan Rhino populations, with minimal stress for the animals and without draining the founder population. The Rhinos in the SANCTUARY would provide good opportunities for wildlife viewing and could become a valuable source of revenue for future management and development.



1. Intensive Patrol Zone

Access to the area most vulnerable to poaching, the southeastern quarter of UKNP between Cigenter and Cibandawoh, for preventive patrols is limited, because there is no patrol trail through this area. Therefore guards seldom, if ever, patrol this area, giving free play to the poachers.

To increase the frequency of the patrols in the Intensive Patrol Zone, and to allow guards to move swiftly to all parts of the Zone, the establishment of a permanent patrol trail between Cigenter and Cibandawoh, roughly following the Cibandawoh, is highly recommended.

With regular patrols in the area, and increased vigilance on the entrance areas, there is no danger that the new trail will in fact benefit the poachers.

Patrolling of the IPZ will be mainly the task of personnel of the Resorts of Karangranjang and Cigenter, but it may be beneficial to establish a special patrol core-team of three experienced forest surveyors, working full time in the IPZ, with assistance of the Resort guards.

The patrol(s) should have GPS, hand radios, cameras and firearms. The patrol leader should be fully qualified to arrest intruders. The MT and the RCO will provide technical assistance.

Besides patrolling the IPZ teams should also carry out continuous monitoring of the rhinos in the area, using standardized techniques. Team members will need to be trained in observation and monitoring.

2. Coastal Zone Monitoring System

The three guardposts on the Selamat Datang Bay side of the UKNP need to be better equipped to monitor to traffic across the sea boundary of the Park, especially during night time. There is still illegal fishing inside the park boundaries and rhino poachers can sail across the bay at night.

In all three posts a tall watchtower need to be constructed that offers a good view over the bay. There should be a 24-hour watch, with binoculars during daytime, with night vision equipment during night time.

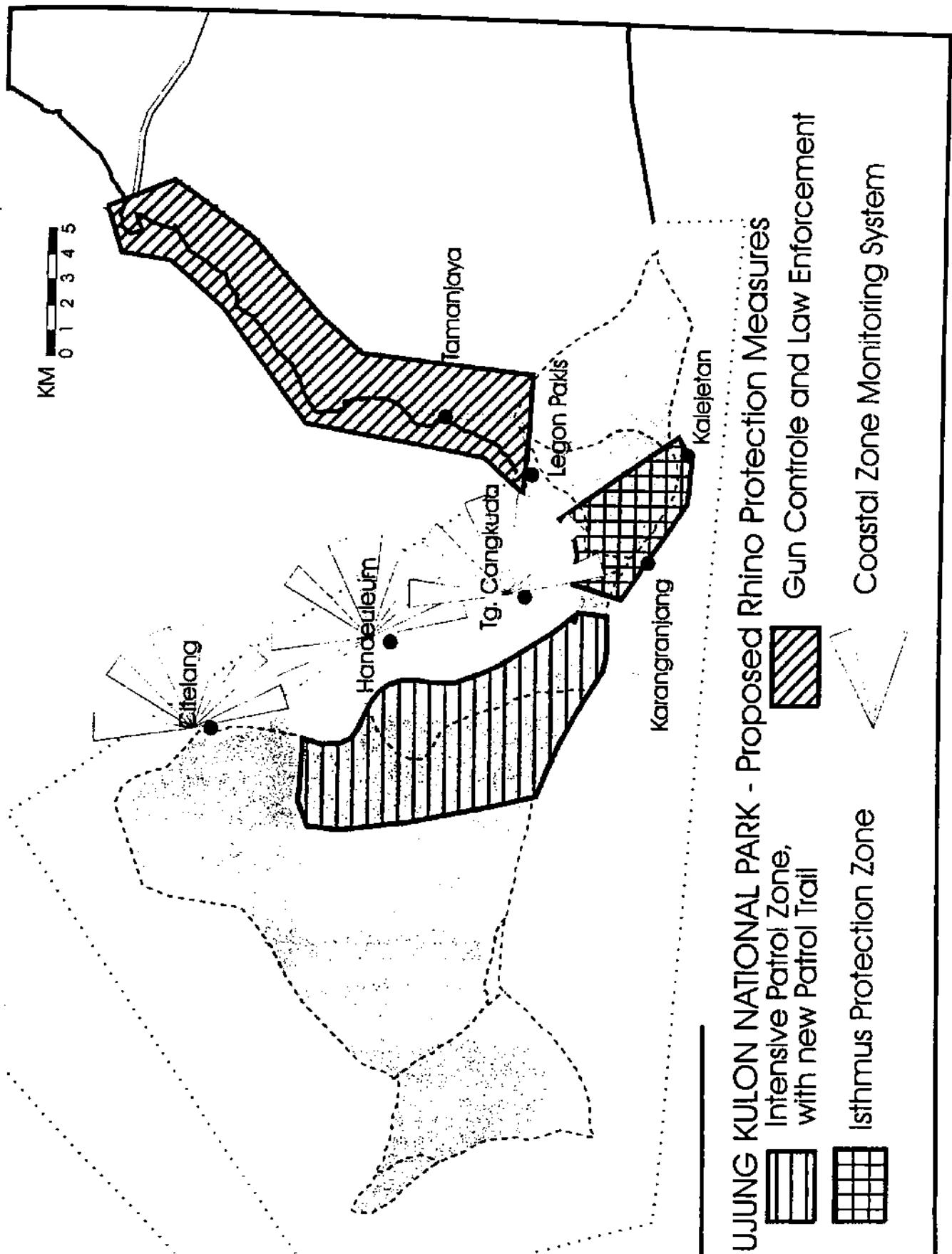
All vessels observed to cross the sea boundary, that is clearly marked with buoys, should be stopped and instructed to leave by guards with a fast patrol boat. The patrol boats and crew need to be on 24 hours stand-by. All posts will need a fast patrol boat and sufficient personnel for a 24-hour roster.

3. Gun Control and Law Enforcement

Rhino and game poaching is usually done with locally made front-loader guns. These guns are widely available and are made in a village called Situpotong, near Binuangan.

It is recommended to liaise with the internal security agencies at a high level, to develop a cooperative effort to stop the production of guns and to make a programme for the confiscation of guns available in the villages around UKNP.

A small compensation for those that voluntarily hand in their guns during a grace period, could be considered. After the grace period PHPA should work together with the security agencies to collect the remaining guns and to prosecute holders of illegal firearms.



Appendix 1: Cost Estimates

Below a preliminary estimate of investment costs for the various programmes and options. Costs are in 1000 Rp, and do not include costs for regular personnel salaries and allowances and for housing and office facilities.

ISTHMUS PROTECTION ZONE**Option 1 - Grazing ground**

Opening of grazing ground (~90 Ha)	4,000
Watchtower	20,000
Binoculars, radios, night vision	15,000
TOTAL	39,000

Option 2 - Electric fence

Fence (~1880 m @ 60,000/m), power	120,000
Watchtower and lights	20,000
Optional: Video equipment	10,000
TOTAL	150,000

Option 3 - Javan Rhino Sanctuary

Fence and gates - Isthmus	600,000
Fence and track - outside	350,000
Video equipment	10,000
Telemetry	15,000
Management facilities	100,000
TOTAL	1,075,000

INTENSIVE PATROL ZONE

Clearing patrol trail (~10 km)	1,500
Regular field equipment	500
GPS, radio, camera, gun	5,000
TOTAL	7,000

COASTAL ZONE MONITORING SYSTEM

Watchtowers(3)	60,000
Binoculars, night vision, radios(3X)	45,000
Patrol boats(3)	90,000
TOTAL	195,000

GUN CONTROL AND LAW ENFORCEMENT

Operational	20,000
Compensation	3,000
TOTAL	23,000

JAVAN RHINO CONSERVATION PROJECT Cat Loc Nature Reserve - Lam Dong Province, Vietnam**Background Information**

Until about 1940, Javan rhinos (*Rhinoceros sondaicus*) were widely distributed in the northern, central and southern regions of Vietnam. Since then, their range and numbers declined drastically due to poaching, conversion of habitat and habitat destruction. The last observation of rhino tracks in the northern province of Son La was in 1964, and between 1952 and 1976, a large number of Javan rhinos were killed by poachers and soldiers in the central and southern regions of the country.

At present, Javan rhinos are restricted to a small area in the districts of Cat Tien and Bao Loc in Lam Dong Province. This forest area is known as Cat Loc Nature Reserve since it stretches across the two districts. Only about 9-15 animals are estimated to occur in this area and as such the Javan rhino population in Vietnam is among the most seriously endangered populations of large mammals in the world. The long-term survival of these Javan rhinos in their natural habitat must therefore be a top priority for national and international conservation agencies.

Throughout the world, there are only two known populations of the Javan rhino: one in Indonesia and the other in Vietnam. None exist outside these areas, not even in zoos. The total world population is estimated to be less than 100 and as such, the species is extremely endangered. The Javan rhino's survival in southern Vietnam despite the ravages of the war is proof of its resilience. Protection of the rhino population in Cat Loc Nature Reserve will not only enhance survival of the Javan rhinos but also other endangered large mammals such as the gaur (*Bos gaurus*) and banteng (*Bos javanicus*) which are sympatric with the rhino.

Previous WWF work in Cat Loc Nature Reserve

A field survey for Javan rhinoceros (*Rhinoceros sondaicus*) was undertaken in March-April 1993 by Indonesian field biologists Moh. Haryono (Deputy Chief of Ujung Kulon National Park) and Dr. Jito Sugandjito (WWF) in collaboration with Lam Dong provincial authorities and the Cat Tien People's Committee. Also participating were Vietnamese scientists from the Ministry of Forestry (MOF), the Forest Inventory and Planning Institute (FIFI) and the Institute for Ecology and Biological Resources (IEBR). This served as a continuation of the earlier survey and planning work which WWF supported in 1991. That work, which was led by Dr. Charles Santiapillai, resulted in a draft management plan for the Cat Loc Rhinoceros Sanctuary-Nam Cat Tien National Park integrated protected area.

The 1993 survey verified, by measuring numerous footprints, the existence of a small population of 9-15 Javan rhinos in Cat Loc Nature Reserve, an area which covers 30,635 hectares of primary and secondary forest. The most significant finding was that at least three of the individuals are sub-adults, meaning that adults in the population are still breeding and that young animals which have not yet reached breeding age could help re-generate the population in coming years if proper protection is provided. In response to this finding, the joint Vietnamese/Indonesian/WWF survey team prepared plans for the immediate protection of this small population since poaching is the most serious threat to its continued survival.

Related to these efforts are the protected area management planning process which WWF has been coordinating with the Forest Protection Department and provincial authorities in Lam Dong, Dong Nai and Song Be. These efforts should secure the long-term protection of the Greater Cat Tien sanctuary, however that does not eclipse the need for the immediate actions provided for in this WWF grant.

This project grant of \$20,050 by WWF to the Lam Dong Forest Protection Department supporting protection activities at Cat Loc is a direct outcome of the joint WWF/MOF field survey and its findings.

Project Objectives

The long-term goal of this project is to conserve Cat Loc Nature Reserve and the Javan Rhinoceros Population living there. Specific short-term objectives are to:

1. Reduce the hunting threat to the Javan rhino population in Cat Loc Nature Reserve through an enhanced forest guard force.
2. Discourage illegal settlement in Cat Tien District by establishing and demarcating clear nature reserve boundaries.
3. Increase awareness amongst residents of the need to conserve Cat Loc Forest and the Javan Rhinoceros.

Project Activities

Protection activities in the project are not seen as an end in themselves. Rather, they form an important bridge until larger international funding is secured for the management and protection of the greater Cat Tien National Park, incorporating Nam Cat Tien National Park and Cat Loc Nature Reserve. The activities of this grant focus on four areas:

1. Purchase of Equipment

Although forest guards, almost all local ethnic minority villagers, have been stationed in Cat Loc for several years, they have been working with almost no radio support equipment or transportation. This stifles their ability to patrol effectively the home range of the Javan rhino. Patrol Support Equipment: 2 motorcycles; Radio transmission system; 1 jeep.

2. Construction of Guard Stations

At present, the forest guards have no "home base". They simply live in their village homes and go out on periodic patrols. With this grant, two forest guard stations will be built in appropriate areas within the Cat Loc Reserve.

3. Increased Patrolling

Not only do the forest guards lack proper gear for patrolling, they also in the past have not had the budget for supplies and food necessary to undertake periodic patrols which would keep them abreast of the situation surrounding the rhino population. This activity will supply each of the 16 forest guards with necessary field gear while the Lam Dong Forest Protection Department will support the costs of their field patrols as a match to this grant. Forest guard gear; 2 uniforms per guard (16 guards); 2 pair of hiking boots per guard; 1 raincoat per guard.

4. Demarcating the Nature Reserve Boundaries

To assist the forest guards in instructing the villagers about the location of the nature reserve and where hunting and other encroachment activities should be limited, a series of 50 small sign boards and 6 large sign boards will be installed at various trails and roads leading into the nature reserve and along the river front on the north side of the reserve.

A fifth activity relating to the protection of the Javan rhino population in Cat Loc, focusing on public awareness through publication of a Javan rhino poster, information brochure and bumper sticker, has already been supported by a WWF Action Grant "Javan Rhino Awareness Campaign" with funding of \$4,075.

CURRENT STATUS JAVAN RHINO

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**A CURRENT STATUS
OF THE JAVAN RHINOCEROS POPULATION
IN UJUNGKULON NATIONAL PARK**

by

Agoes Sriyanto, Agus Priambudi, Moch. Haryono, Djarkasih and Amir Hasan

UJUNGKULON NATIONAL PARK

Labuan, 1995

Introduction

Javan rhinoceros (*Rhinoceros sondaicus*) is a large mammal in which its future survival is recognised critical to extinction. The population of this species is known only to exist in two habitats, i.e. one population in Vietnam for about 10 - 15 individuals (Schaller, *et al.*, 1990), and another is in Ujungkulon peninsula reserve, Ujungkulon National Park (UKNP), Indonesia, for about 50 rhinos. Its population in Vietnam may be more critical due to very small size of population and lacks of protection and law enforcement, while heavier poaching for rhino horn remains unbeatable (Schaller, *et al.*, 1990; M. Haryono, *pers. comm.*). The current population in UKNP and its protection, on the other hand, probably present more opportunity to survive them for longer term. Despite the fact poaching is a chronic threat which takes place at all time of every year, it appears to be restrained on certain areas. Therefore, current protection efforts on its population in this habitat seem to be easier by strengthening the efforts on these vulnerable areas. Other threats which may include disease outbreak and competition for food plants with other large mammals living together in the reserve are circumstantial. Thus, if these threats can be missed out, an increase in its population size in UKNP would occur according to the carrying capacity of the reserve.

It was unknown about the number of the Javan rhinoceros population when Ujungkulon peninsula is issued as a reserved area (Hoogerwerf, 1970). This author also noted that during political unrest in mid sixties, poaching of this species were mounting. In 1967, when the first census by counting their tracks applied, its population size was estimated to be about 25 individuals (Schenkel and Schenkel-Hulliger, 1969). Its population was then increased by 6.2 %, as in 1980 using the same method resulted in 52 individuals (Ammann, 1985). Results of the census during the last decade show that the population size fluctuates around 50 individuals. Meanwhile, Griffiths (1993) speculates that Ujungkulon would be able to support 80 up to 160 rhinos. Therefore, the recent fluctuating size questions whether or not this is due to its carrying capacity achieved, or its population would increase as the carrying capacity of the reserve, needs to be clarified. Otherwise, one could take a caution on the actual population size it self, rather than the estimated sizes which were speculated in previous censuses.

This paper describes a result of a rapid assessment of the status of the Javan rhinoceros population and its habitat in Ujungkulon peninsula reserve, UKNP. This assessment was carried out on 6 - 10 November 1995, by a census counting its track and recording its habitat where the recorded track presents.

Study Area

The Ujungkulon peninsula reserve is included in the conservation management of Ujungkulon National Park, West Java, Indonesia. This reserve measures about 39.120 hectares which consists of mostly lowland forest on eastern parts and a smaller mountainous range of Gunung Payung on the south-western. The vast majority of

lowland areas was destroyed when Krakatau eruption took place in 1883, but was not for higher ranges of Gunung Payung. Thus, the lowland areas of the reserve is now a secondary forest which is leading to a climax forest.

Patches of habitat in the reserve utilised by Javan rhinoceros population are widely distributed, and these appear to cover the large extent of the reserve. This may optimally cover about 30,000 hectares, which include lowlands from eastern foot of Gunung Payung east and north-east parts up to the lower south parts of the Gunung Honje. In this habitat, it is suggested that not all parts of the habitat are similarly preferred by the species, as it has specific food plants and watered parts which occur in patches of the forests (Schenkel and Schenkel-Hulliger, 1969; Ammann, 1985; Hommel, 1983). This may induce rhinos concentrated in some groups of rhinos. It is also considered about the occurrence of competition on food plant species between Javan rhinos versus other existing large mammals, i.e. banteng (*Bos javanicus*), kijang (*Muntiacus muntjak*), rusa deer (*Cervus timorensis*), wild pig (*Sus scrofa*), but this is merely speculative in which this description requires further clarifications. Nevertheless, this indicates that Javan rhinos in the reserve distributes in concentrated areas, where their requirements are available and risks of life strategy are least.

It may be important to view human activities in the reserve which are increasingly taking place. Tourists activities appear to remain a small factor affecting the habitat and distribution of the Javan rhinos. But, frequent use of trails by a number of tourists in the reserve might have been an influential factor of being concentrated distribution of the species. Another human activities is the presence of poachers. They enter secretly during idles of protection efforts by guards through mostly the isthmus at nights, or their presence might be by camouflaging as fishermen who strand their wood boats on west or north coats of the reserve. Taken together, the current habitat of the reserve utilised by Javan rhinos appears to be determined by availability of their requirements (food plants and waters) and their concentrated distribution on certain parts of the habitat may be due to the presence of competition with other large mammals and of human activities in the reserve.

Methods

Census method

The method used in this census of the Javan rhinoceros population and its habitat was based on track counts with individual identification of the species. This method was modified from Schenkel and Schenkel-Hulliger (1969), BPPSI (1989), Santiapillai, *et al.* (1990), and this was employed by a consideration of field information that a current distribution of rhinos in Ujungkulon reserves which concentrated on certain areas of the reserve. Thus, it was impractical to census rhinos' tracks in all parts of the reserve. This census used six concentration areas of the reserve (Fig. 1). Six teams were formed in which each team consisted of 5 experienced guards and 1 licensed and trained local

guide. Each team cruised each plotted transect and identified rhinos' tracks along the transect line. The identification of the presence of the species also accounted for its other signs, e.g. dung, urine, bitten foodplants, or any possible plant which was affected by its presence. In addition, once the team found the track, or any other sign, they recorded the distance and time of transect cruised, the occurrence of a vegetation type, the topographical feature and any other wild animal which direct, or indirectly, existed.

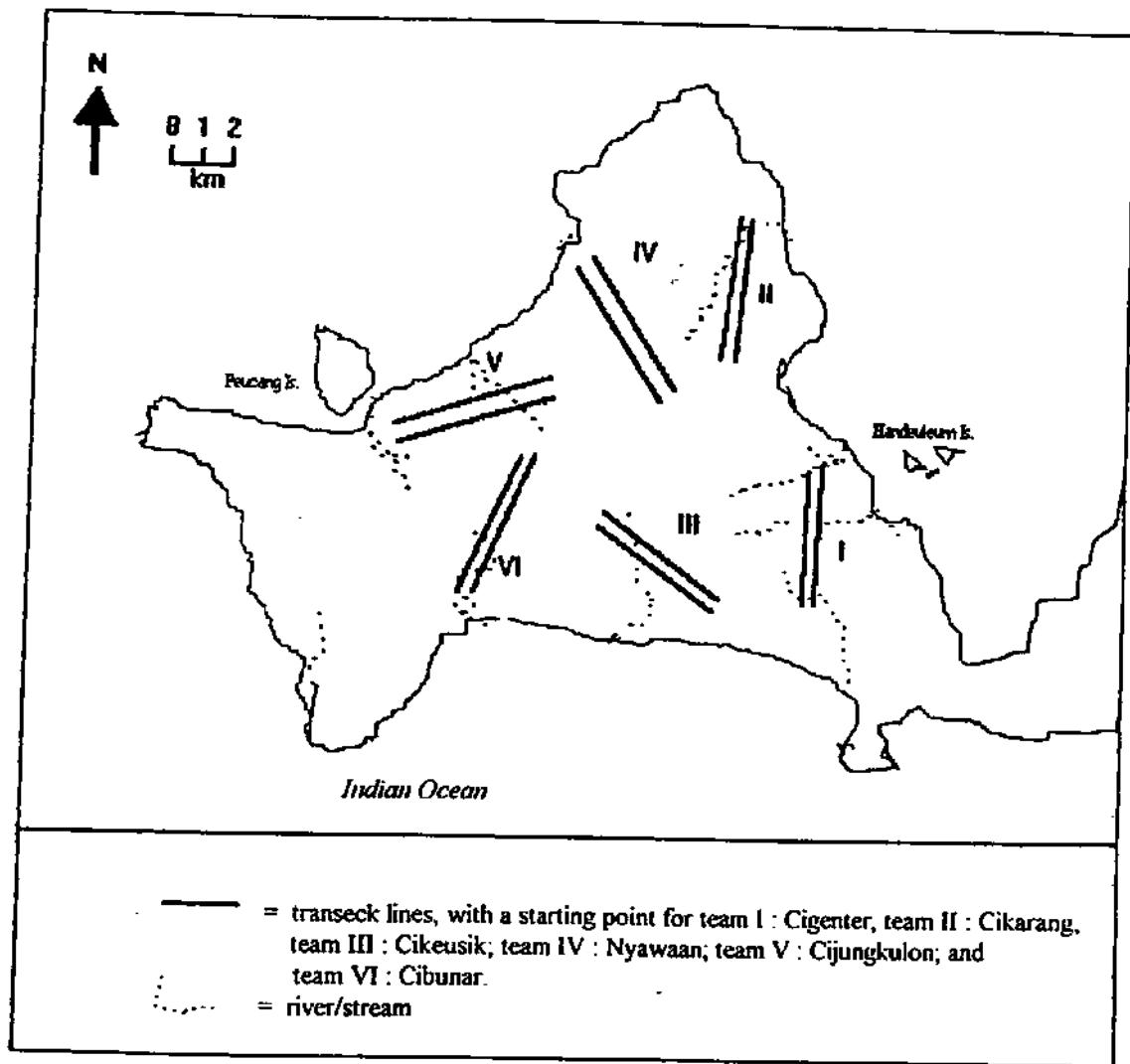


Figure 1.
The locations of transect lines on six concentrated areas surveyed in Ujungkulon reserve, Ujungkulon National Park, West Java, Indonesia

The rhino track measurement

Each track was measured by the average of the width of fore and hind foot in centimeter. The direction of the found track were recorded in degree by assessing the

serial tracks where the rhino went further. The track found was also assessed in its age. If the track was less than 1 day old, it was included in the positive track, and if it was 2 - 3 days old, it was the alternative track. The track which was more than 3 days was also recorded as a secondary datum.

Rhino Population Analysis

Age classes in the population structure of the Javan rhinoceros was estimated as in Santiapillai, et al. (1990) and TNUK (1992). Class I is juvenile (less than 6 months), class II is larger juvenile (6 months up to 1 year), class III is 1 - 2 year rhino old, class IV is adult females and sub-adult males and class V is adult males and oldest females.

The population size of Javan rhinoceros was estimated by using a formula which was once used by BPPSI (1989), that is

$$N_e \text{ min, max} = CF \times N_t \text{ min, max}$$

where : $N_e \text{ min, max}$ = estimated minimum population, or maximum population

$N_t \text{ min, max}$ = a number of positive tracks (minimum), or alternative tracks (maximum)

CF = a corrected factor, which is derived from :

$$CF = \frac{\text{the utilised habitat in Ujungkulon} \times \% \text{ effective area}}{\text{total observation areas}}$$

and

$$\% \text{ effective area} = \frac{\text{total transects where tracks were found}}{\text{total observation transects}}$$

Results

Population size

Total number of positive tracks measured was 23 individuals and number of alternative tracks was 27 individual (Table 1). As the percentage of effective areas covered was about 75 % and total areas observed was about 9.600 hectares, a corrected factor for 30.000 hectares utilised by rhinos was 2.34. Therefore, minimum and maximum estimated population was about 54 and 60 rhinos, respectively.

Table 1.

Numbers of positive and alternative tracks and their classes in the six concentration area

Track size (cm)	Number of track in												Total number of track	
	CA 1		CA 2		CA 3		CA 4		CA 5		CA 6			
	PT	AT	PT	AT	PT	AT	PT	AT	PT	AT	PT	AT	PT	AT
30 - 29	-	-	-	-	-	-	1	-	-	-	-	-	1	-
29 - 28	-	-	-	-	1	-	-	-	1	1	-	-	2	1
28 - 27	1	2	-	-	-	-	1	1	1	1	-	-	4	5
27 - 26	1	2	-	-	1	-	1	2	-	1	-	1	3	6
26 - 25	1	-	-	-	1	-	1	2	-	-	-	1	2	4
25 - 24	1	3	-	-	1	-	-	2	-	-	-	-	5	4
24 - 23	2	1	-	-	-	1	1	-	-	-	2	-	2	2
23 - 22	1	2	-	-	-	-	-	1	-	-	-	-	1	3
22 - 21	-	1	-	-	-	1	-	-	-	-	-	-	-	1
21 - 20	-	1	-	-	1	-	-	-	-	-	-	-	-	1
20 - 19	-	-	-	-	-	-	1	-	-	-	-	-	-	-
19 - 18	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18 - 17	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17 - 16	-	-	-	-	-	-	1	-	-	-	-	-	-	-
TOTAL	7	12	-	1	4	1	7	7	2	3	3	3	23	27

Notes : CA = concentration area
 PT = positive track
 AT = alternative track

Population Structure

The structure population based on the age of the tracks shows that both estimated minimum and maximum population were different (Fig. 2 a and b). It appears that the minimum population represented all categorised age classes of rhinos, whereas the maximum population, except for none of juveniles, the four older age classes was shown.

Rhino preference and distribution

The distribution of rhinos in Ujungkulon reserve appeared to be concentrated in the central reserve, particularly around streams of above Cigenter and Cikarang. Most of tracks in these parts and other parts of the reserve found were associated with riverine forest. Vegetation type where the tracks measured were commonly dominated by rattan, *Arenga sp.* shrublands (Table 2). Within these areas, rhinos preferred some species of vegetation, i.e sulangkar (*Leea sambucina*), kilaja (*Polyalthia odorissima*), cente (*Iantana camara*), Jambu kopo (*Eugenia suriageriana*), Gempol (*Nauclea orientalis*) and secang (*Caesalpinia sappa*), as these plants species were observed to be bitten by several rhinos. However, there was a few tracks around parts of the north (Nyawaan - Nyiur) and north-east reserve (Balagadigi - Cikarang) where many of these parts are salt and fresh water swamp forests.

Figure 2.

The structure of minimum (a) and maximum (b) population of the Javan rhinoceros

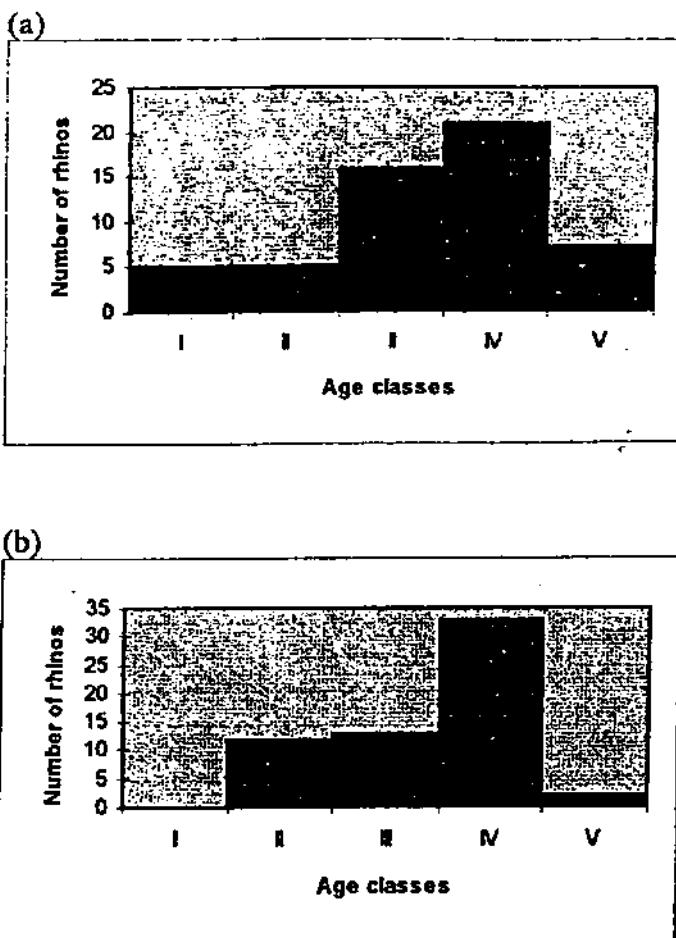


Table 2.

Number of positive and alternative tracks on vegetation types of the reserve.

Vegetation type *	Positive tracks	Alternative tracks
Evergreen hill forest	2	1
Salt swamp forest	-	-
Fresh water forest	-	1
Arenga dominated forest	2	4
Rattan shrub lands **	12	10
Mixed giant bamboo forest	1	2
Salacca dominated forest	3	3
Dunc forest	4	7

Notes : * Types adapted from Hommel (1983)

** Mostly associated with riverine forests

Discussion

It is clear from the present result that the population of Javan rhinos in Ujungkulon reserve remains viable and shows a chance of regeneration. This result confirms previous census using camera trapping (Griffiths, 1993) which identified the presence of calves and nursing females and the population size around 50 individuals. The finding of 1 positive nursing female (27 - 28 cm) with 1 positive calf (16 - 17 cm) in a stream of above Cikarang river in the present census should be physiologically considered very valuable for the long-term survival of its population. The result could also count the lower rhino old with nursing calves, as found a size of 15 - 16 cm width with 28 - 29 cm width of tracks, but these tracks was categorised to age more than three days. These two track size might prove that the animals really utilised this patches at that time. However, due to the age of the tracks, they were excluded from the estimation. This case indicates one of limitations of the method, which calculates the tracks of 1 - 3 days old. Overall, this rapid assessment results in an important outcome and should be respected for conservation management of its population and habitat in the reserve.

One could question about the sophistication of the method and analysis used in the present assessment. Some previous results, as well as the present estimation, were constrained by errors in the estimation of population size and structure, so these results actually fail to inform precisely what is provided. Errors of the method were discussed in Ammann (1985) and were experienced by previous results using this method, such as BPPSI (1989), Santiapillai, *et al.* (1990) and TNUK (1992). One error which often occur is failure to detect calves, as their tracks are not deeply printed on soil. This could take place in the present census, so the estimation was lower than the real count. The present census was also puzzled with the existence of rhinos on forest floors which were covered by thick litters of leaves. In this case, the tracks were very hard to count, as they were not clearly printed, despite other evidence suggesting the inclusion of positive, or alternative tracks. In addition, another possible error is when two or more tracks of the same size exist separately within two kilometres in distance. As the rule, these tracks are included as the same rhino. It appears that this rule does not consider any overlap in home range among individuals. Meanwhile, there is strong evidence of overlapping among adult males and between sub-adult and adult males, but small possible overlap among adult females (Griffiths, 1993). This indicates that two or more different rhinos with the same size of tracks could utilise the same patches, so this case and the rule should be evaluated further to improve the method. Taken together, in some extent on the base of errors occurred, the present result and also previous census could have made an underestimated population size. However, Ammann (1985) argues that the underestimation could have been compensated by another overestimated counts. His argumentation is based on rhino's solitary behaviour which might range between 2 - 4 kilometres. Within this distance, one rhino may range, but surveyors often record their tracks as two different animals. Previous census with at least 13 transect lines of 2 km apart might have experienced that case, but the present census appears to be a small possibility to meet it, as the distance between one census area and another area was more than 2 km.

The present result shows the population size of the Javan Rhinoceros in the reserve about 54 up to 60 animals. This result is probably underestimation, as mentioned above and the extent of areas surveyed. In the present census which covered about 9.600 hectares of concentrated areas surveyed may be reliable for the findings of 23 positive tracks, or of 27 alternative tracks. Therefore, the estimated minimum population which was about 54 rhinos may be sufficiently valid. This estimation could be well accounting for some mis-detection of tracks within the transect lines and together with possible tracks around 20.400 hectares uncovered in this census, which was adding with some 31 positive tracks for the minimum population. This result should, however, be interpreted with caution, since the maximum population estimated gives its awkward population structure, especially by the absence of juveniles (Fig. 2b). The use of a formula for population size analysis was once used by BPPSI (1989) and is never tested. It should be, nevertheless, realised that any formula which use probabilities has limitations. One limitation is probably occurred in the present maximum population, despite the fact that it results in a reliable population. Thus, the result of structure in estimated maximum population is clearly presenting unreliability of the formula, and so may not be reliable information.

Within the reserve, individuals of this rhinos appear not to be restrained by any topographical feature (Table 2). This confirms previous hypothesis (Griffiths, 1993), which ruled out about impossibilities of rhinos ranging over hilly and swampy areas (Schenkel and Schenkel-Hulliger, 1969; Hommel, 1983). The present result also found that rhinos were mostly centrally concentrated in riverine patches of the reserve, from above east Cihandeuleum, above east Cikeusik and Citadahan along the north up to above Cikarang and Cinogar streams. This may be caused by easier accessibilities to their requirements, i.e. the abundance of foodplant species and available streamlines as branches of the above rivers. The result, however, fails to find previous hypothesis that historically many rhinos utilise dune forests in the south reserve. This area was shown to be the high density of rhinos in some previous census (Griffiths, 1993). One could assess about the current distribution, which is related to the more presence of poachers within the south reserve, rather than viewed from ecological sound. The recent case of poaching in 1994, as found bones which might be from two rhinos killed around this area, is very likely to be one evidence that have affected the current distribution. Rhinos might have used their experience of human disturbance to go away from dune forests. Given such a case, poaching might have restricted rhinos' ranges, and this has concentrated them around central and north reserve. However, whether rhinos' ranges have been disrupted by the presence of human activities, or not, comprehensive studies, including effects of human activities and habitat trends should be carried out to get more understandings

Conclusion and Recommendation

1. The current estimated population size of the Javan rhinoceros in Ujungkulon reserve, UKNP, were 54 up to 60 animals. This result is similar to previous results of the census, which show a fluctuating population during the last decade. This result appears to be

underestimated, since it was likely due to errors of the method used in the census. This deserves further works to standardise the method prior to the implementation of next censuses. The six concentrated areas surveyed in the present census are well represented for rhino's population and habitat in the reserve, so the next census is recommended to use them to check the present result. The addition of concentrated areas is allowed to complete areas where were not covered in the present census.

2. The population structure of its population presents well representative individuals for the growth of this species. The regeneration of its population would clearly be occurred, as shown by the positive finding of one nursing female and one calf. This suggests that the reserve remains able physiologically to support the life of Javan rhinoceros in the current and probably future survival.

3. It may has been happening shifts of rhinos' range in which they appear to concentrate around the central reserve. However, these shifts of home range are not an absolute change in which individuals voluntarily remain to range on historical patches throughout the reserve, without constraints of topographical features and human activities. Poaching has been a chronic threat to its population in the reserve. Therefore, strengthening protection efforts on areas vulnerable to poaching must be undertaken by field guards. The south reserve, where dune forests have been historically patches most preferred by rhinos, need to be cleared out from any human activities, at particular poachers. This area must be monitored at all time, and any human entry, including tourists, needs to be checked for official permits.

4. In relation to whether any effect of human activities on the distribution of rhino population, a study should be carried to understand the extent of the effect. The study should also be aimed to relate to the trend of habitat changes. It may be, based on the result of the study, required a management of habitat to provide adequately requirements of rhinos.

5. The method of track count often used in the census of the Javan rhinoceros has errors, so it must urgently be developed to be a standardised method. This is critical to obtain more accurate data of its population from the standardised method. The results would be more reliable if the census is completed by using camera trapping method, as Griffiths did (1993). The use of a formula in the present analysis of rhino's population is not compulsory, as the result presenting unreliable outcomes.

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JAVAN RHINO (*Rhinoceros sondaicus*)

