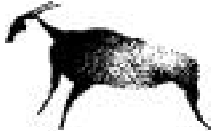


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CHAIRMAN'S REPORT: ASIAN RHINO SPECIALIST GROUP

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The IUCN/SSC Asian Rhino Specialist Group conducted a plenary meeting at Jaldapara Sanctuary, West Bengal, India, from 6-11 December 1993. (Note: The Asian Rhino Specialist Group designates itself the AsRSG to distinguish its acronym from the African Rhino Specialist Group which AsRSG designates AfRSG.) As part of this meeting, a population and habitat viability analysis (PHVA) workshop was also conducted to initiate this process as one of the tools for conservation of this species. The PHVA was conducted in collaboration with the Wildlife Departments of Assam and West Bengal and the Ministry of Wildlife of the Government of India.

Representatives from 10 countries including the four major range states(*) for Asian rhinos participated in these sessions: India*, Nepal*, Malaysia*, Indonesia*, Thailand, Singapore, Kenya, United States, United Kingdom, Switzerland. Unfortunately, representatives from Myanmar and Viet Nam were unable to attend. The major objectives of these sessions were to:

1. Review the status of all three species of Asian rhinos and compile the latest estimates of numbers in the wild.
2. Assess the activities and accomplishments of the AsRSG over the last six years and develop priorities and directions for the next three years.
3. Revise the AsRSG Action Plan which was originally developed in 1987.
4. Recommend changes in AsRSG structure and function for the 1994-1996 triennium.
5. Prepare a first draft of the southeast Asian Rhino GEF Project Programme Document which will provide US \$2,000,000 for rhino conservation in Indonesia and Malaysia over the next two years.
6. Commence formulation of a Strategic Funding Plan for Asian Rhino Conservation.

7. Initiate the PHVA process for *Rhinoceros unicornis*.

The latest estimates of Asian rhino numbers are presented in Tables I to 3. The most notable and unsettling fact from these figures is the revelation that numbers of the Sumatran rhino (*Dicerorhinus sumatrensis*) have now declined to no more than 500. Previous estimates had been 700 to 1,000. The decrease is attributable mostly to a 50% reduction in the numbers estimated for Sumatra in Indonesia. Although the Javan rhino is fewer in number and the African black rhino has perhaps decreased more precipitously over the last 10 years, the combination of low numbers and decline rate may render the Sumatran rhino now the most critically endangered of all rhino species.

There was also confirmation from the latest transect and photographic surveys in Ujung Kulon that the number of the Javan rhino is approximately 50, as previous censuses and estimates had contended.

The Indian/Nepalese rhino (*Rhinoceros unicorn is*) remains the success story among Asian rhinos with the total population in India at about 1,450 and in Nepal at about 440. However, levels of poaching in both countries are significant and intensifying. In Assam, still the stronghold for this species, poaching in most of the protected areas is estimated at around 5% per year. This level is approximately equivalent to the annual rates of population growth so that any further intensification may cause decline of the populations. Indeed, such decline has already occurred in at least two areas: the population in Laokhowa being completely annihilated in 1993 and the population in Manas reduced by at least 50%.

Another major topic of discussion at the Jaldapara meeting was the great concern expressed by most of the Asian rhino conservationists in attendance that these species do not receive their fair share of attention or resources from the international rhino conservation community. It was emphasized that despite the drastic

decline in African black rhino numbers over the last decade, the numbers of that species were probably still no lower than the total of all three Asian rhino species combined.

In terms of structure and function, the AsRSG extensively discussed:

1. The activities, accomplishments and problems over the last 10 years.
2. Future objectives, needs, and function of the group in relation to the challenges for Asian rhino conservation.

These activities and accomplishments include:

1984 • Mohd Khan bin Momin Khan became Chairman representing the first range national to occupy this position.

- A Conservation Strategy Session on Sumatran rhino was developed at a meeting in Singapore.
- The *ex situ* programme for Sumatran rhino was initiated concurrently in Malaysia and Indonesia.

1986 • A meeting of the AsRSG was conducted in Jakarta, Indonesia.

1989 • A PHVA workshop was conducted for Javan Rhino in Bogor, Indonesia.

1991 • A follow-up workshop in Bogor, Indonesia was co-sponsored by the AsRSG and PHVA to develop the Indonesian Rhino Conservation Strategy Workshop.

1992 • The first Programme Officer was appointed for AsRSG with financial support from the International Rhino Foundation (IRF).

- The AsRSG Programme Officer represented the AsRSG and the IUCN/SSC at the preparatory UNEP Rhino Conference.
- As a result of that Conference, the AsRSG initiated the development of a Global Environment Facility (GEF) Project for US \$ 2,000,000 to assist implementation of the conservation strategy for rhinos in Indonesia and Malaysia.

1993 • The AsRSG Programme Officer assisted with the preparation of the Rhino Conservation Action Plans for Malaysia and Indonesia through a grant from IJNEP.

- The AsRSG participated in the full UNEP Rhino Conservation Conferences in Nairobi, Kenya.
- In preparation for and as a product of this UNEP Rhino Conference, the AsRSG developed a continuing process of compiling overviews of priority actions and required funds for Asian Rhino conservation through the national rhino conservation action plans. This process will be the basis of a strategic funding plan developed by the AsRSG.
- The development of the GEF Project and grant of US \$ 2,000,000 on South East Asian Rhinos was continued.
- A full meeting of the AsRSG was held at Jaldapara, West Bengal, India.
- Technical and financial assistance was provided with population and habitat viability analyses (PHVAs) for Sumatran Rhino in Indonesia and Indian Rhino in India.

In general, it was observed that traditionally the AsRSG, like other Specialist Groups, had concentrated on technical information and advice. There was general agreement that in the future the AsRSG needed to assume a more active role in advocacy and fund-raising for Asian rhino conservation.

In particular, it was agreed that the AsRSG would initiate a newsletter to be published quarterly. It is intended to publish the first issue by the end of June 1994.

There was then much discussion of the future structure and leadership of the AsRSG to facilitate achievement of the objectives. The purpose was to develop recommendations which the Chairman of the AsRSG would submit to the Chair of the SSC in his consideration of appointments for the next triennium (which commenced in January 1994). A number of scenarios for Chairs, Deputy Chairs, and Programme Officers were considered.

There was strong agreement that the two major regions where Asian rhinos occur, the Indian Sub-Continent and South-East Asia, needed to be represented in the leadership of the AsRSG. Hence, there was strong agreement that there should be a Chairman and Deputy Chairman, with one position occupied by a person from South-East Asia and the other from the Indian Sub-Continent. There was strong support for Mohd Khan to continue as the Chairman and consensus for Mr. S.C. Dey to become the Deputy Chair.

It was also agreed that it would be useful to expand the Programme Officer's function into more of a secretariat. Currently, this function is provided by Dr. Tom Foose resident outside the range states. An objective for the next triennium will be to move this function to one or more Asians in one or more of the range states. In the meantime, it was recommended that a second Programme Officer, Dr. Nico van Strien, be appointed. A major activity of the Programme Officers will be to assist with fund-raising. Dr. Foose will concentrate on North America; Dr. van Strien on Europe. Other administrative and technical functions will be divided between Foose and van Strien by mutual agreement.

Objectives for the 1994-1996 triennium include:

Initiation of newsletter

It is intended that the first issue will be published by the end of June 1994.

Revision of the AsRSG Action Plan

A draft will be prepared by 15 May 1994 with publication of the final plan expected by mid-August 1994.

Activation of GEF project for S.E. Asian

It is expected that funds will be available and activities initiated by September 1994.

Development of a Strategic Funding Plan

As a first step toward development of a strategic funding plan, the AsRSG devoted time to improving definition of projects and estimation of their costs. These figures are presented in Tables 4 and 5. The

total cost estimated is approximately US \$ 57,000,000 with US \$ 35,000,000 required from external donors by the range states.

Better publicity for the plight of Asian rhinos

Establishment of a secretariat for the AsRSG

This process has largely been initiated with the appointment and operation of the Programme Officer. The addition of the second Programme Officer and initiation of the newsletter will advance this objective.

The concurrent workshop on Indian rhino initiated the PHVA for this species. The results of this PHVA are not yet ready to be reported but will be subject of a future article in *Pachyderm*. In the meantime, it should be noted that the PHVA was conducted at Jaldapara in West Bengal rather than at a site in Assam for two major reasons. One was to direct attention to the protected areas for rhino in West Bengal which had not been explicitly discussed in the previous edition of the AsRSG Asian Rhino Action Plan. These protected areas are limited in both rhino population and size of habitat but are nevertheless being well managed and are likely to be important for conservation of this species. A more important reason was to emphasize that the rhino in India occurs not just in one, but in three states, thus qualifying rhino conservation efforts eligible for financial support from the federal government. Current Government of India policy does not permit funds to be provided for species restricted to a single state. Assam had previously been receiving federal funds but they were discontinued when the new policy was enacted; restoration of federal support is vital if Assam and the other states are to respond successfully to the intensifying challenge of the poachers. Indeed, it is an objective of the PHVA workshop to provide support for development of a Project Rhino by the Government of India, analogous to Project Tiger which has been so critical to the conservation of that species in India.

*Anyone desiring further information on Asian rhino conservation or the work of the AsRSG is requested to contact the AsRSG Programme Officer, Dr. Tom Foose, International Rhino Foundation, 85 East Gay Street, Suite 603, Columbus, OH, 432 15, USA
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Table 1: Wild population estimates of the Indian/Nepalese rhino (*Rhinoceros unicornis*). 31 December 1993.

Country	Location	Number of Rhino	Habitat Availability km ²		Protection Status	Potential Carrying Capacity
			Presently	Potentially		
INDIA	Manas	50	391	391	National Park; World Heritage Site	>100
	Dudhwa	11	490	490	National Park	>100
	Kaziranga	1164 ± 134	430	490	National Park	1200+
	Laokhowa	0	70	70	Wildlife Sanctuary	50+
	Orang	90+	76	76	Wildlife Sanctuary	>100
	Pabitora	56	18	18	Wildlife Sanctuary	60+
	Pockets-Assam	25	508	508	Insecure	100+
	Jaldapara	~ 33	216	225	Wildlife Sanctuary	80+
	Garomara	13	8.6	66	Wildlife Sanctuary	20+
	NEPAL	Royal Bardia	39	968	968	National Park
Royal Chitwan		375-400	932	1200	National Park	500
PAKISTAN	Lal Sohanra	2	?	?	National Park	?
TOTAL		1870-1895 ±134	4100 +	4500 +		2600+
			1900			

Table 2: Wild population estimates of Javan rhinoceros (*Rhinoceros sondaicus*). 31 December 1993.

Country	Location	Number of Rhino	Habitat Availability km ²		Protection Status	Potential Carrying Capacity
			Presently	Potentially		
INDONESIA	Ujung Kulon	47-60	761	761	National Park	100+
VIETNAM	Nam Cat Tien	Small	350	?	National Park	?
	Bugiamap	Small	160	?	Reserve	?
	Various	?	?	?	Not known	?
CAMBODIA	Various	?	?	?	Not known	?
LAOS	Various	?	?	?	Not known	?
TOTAL		<100	1200+	1200+		

Table 3: Wild population estimates of the Sumatran rhinoceros (*Dicerorhinus sumatrensis*). 31 December 1993.

Country	Location	Number of Rhino	Habitat Availability km ²		Protection Status	Potential carrying Capacity
			Presently	Potentially		
INDONESIA						
Kalimantan	Sabah Border	Small	?	?	Unknown	?
Sumatra	Gunung Leuser	90-120	1400	8000	National Park	140-800
	Gunung Patah	10-15	400	500	Production forest	40-50
	Kerinci Seblat Gunung	64-77	5000	10000	National Park	500-1000
	Abong-Abong & Lesten-Lukup	5-10	?	?	Unprotected	?
	Berhak	1-2	?	?	National Park	?
	Torgamba	3-5	?	?	Production forest & oil palm plantation	?
	Barisan Selatan	25-60	700	3600	National Park	70-360
	Sungai Ipoh	6-7	10000ha	-	Production forest (corridor to Kernici Seblat)	50
	Gunung Batu Hitam Listen	3-5	?	?	Production forest	?
	Serbojadi	15-25	?	?	Production forest	?
	Lokop	3-5	300ha	?	Nature Reserve	?
	Batu Tapan	5	?	?	National Park	?
	Way Kambas	3-5	?	?	National Park	?
Subtotal		233-341	7500 +	22000		800—2200
MALAYSIA						
Peninsular	Endau Rompin	20-25	1600	1000—1600	State Park	110—160
	Taman Negara	22-36	4400	4400	National Park	200+
	Sungai Dusun	1-2	40	140	Wildlife Reserve /disturbed forest	15
	Gunung Belulut	3-4	230	230	Forest land	23
	Mersing Coast	3-5	?	?	Secondary forest	0
	Sungai Depak	2-4	?	?	Secondary forest	0
	Sungai Yong	3-5	?	?	Secondary forest	0
	Kuala Balah	2-4	?	?	Secondary forest	0
	Bukit Gebok	1-2	?	?	Secondary forest	0
	Krau	1-2	500	500	Wildlife Reserve	50
	Selama	10-15	?	?	Primary and secondary forest	?
	Belum	10+	?	?	Primary and secondary forest	?
	Bubu	-23	?	?	Primary and secondary forest	?
	Besut	3-5	?	?	Secondary forest	?
		Gunung Inas	2-4			
Subtotal (Peninsular)		85-126				

Table 3: Wild population estimates of the Sumatran rhinoceros (*Dicerorhinus sumatrensis*) (cont.).

Country	Location	Number of Rhino	Habitat Availability km ²		Protection Status	Potential carrying Capacity
			Presently	Potentially		
Sabah	Tabin	7-17	1200	1200	Wildlife Sanctuary	120
	Danum Valley	13-23	2000	2000	Secondary forest	200
	Kretam/Other Areas	20	1000	0	Deforestation	0
Subtotal (Sbh)		40-60				320
Sarawak	Limbang	10+	600	600	Primary & secondary forest	60
Subtotal (Srwk)		10+				60
Subtotal (Malaysia)		135-196	11000+	11000+		300
MYANMAR (Burma)						
	Tamanthi	Small	2150	?	Game Sanctuary	?
	Lassai Tract	6-7	?	?	Unknown	?
Subtotal		10+	?	?		
THAILAND	Hala-Bala	4+	?	?	Wildlife Sanctuary	?
	Khoi Soi Dao Reserve	2+	745	745	Wildlife Sanctuary	35
	Phu Khieo	4+	1560	1560	Wildlife Sanctuary	75
Subtotal		10+				
GRAND TOTAL		388-557	4000+	2000+?		110

Table 4: Asian rhino conservation in major range states. Total costs over next 5 years (US\$).

	CAPITAL	OPERATIONS	TOTAL
INDIA	21000000	15000000	36000000
NEPAL*	225000+	2500000	2755000
INDONESIA	3445000	6840800	10285300
MALAYSIA	4464000	4051000	8515000
TOTAL	13586000	10826000	57555000

* Information incomplete

Table 5: Asian rhino conservation in major range states. External funds needed over next 3 years (US\$).

	CAPITAL	OPERATIONS	TOTAL
INDIA	19000000	1000000	20000000
NEPAL*	255000	1000000	1255000
INDONESIA	3445000	4514000	7959000
MALAYSIA	2739000	1893000	4632000
TOTAL	26439000	7407000	33846000

* Information incomplete

RAPPORT DU PRESIDENT: GROUPE DE SPECIALISTES DU RHINOCEROS ASIATIQUE

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Le Groupe de Spécialistes du Rhinocéros Asiatique de l'UICN/SSC a organisé une réunion plénière au Sanctuaire de Jaldapara, dans le Bengale Occidental, en Inde, du 6 au 11 décembre 1993- (Note: le Groupe des Spécialistes des Rhinocéros d'Asie se désigne de la façon suivante, "GSRAs", pour distinguer son acronyme de celui du Groupe de Spécialistes des Rhinocéros Africain désigné comme suit "GSRAF". Dans le cadre de cette réunion, on a tenu un atelier sur l'Analyse de la Viabilité des Populations et des Habitats (AVPH) pour lancer ce processus comme l'un des outils destinés à la conservation de ces espèces. L'AVPH a été menée en collaboration avec les Départements de la Faune d'Assam et du Bengale Occidental et le Ministère de la Faune du Gouvernement indien.

Des délégués de 10 pays, y compris des quatre principaux pays de distribution (*) des rhinos asiatiques, ont participé à ces sessions : l'Inde*, le Népal*, la Malaisie*, l'Indonésie*, la Thaïlande, Singapour, le Kenya, les Etats-Unis, la Grande Bretagne et la Suisse. Malheureusement, les délégués de Myanmar et du Viet-Nam furent finalement empêchés de participer.

Les principaux objectifs de ces sessions étaient:

1. Réviser le statut des trois espèces de rhinos asiatiques et rassembler les dernières estimations de leur nombre en liberté.
2. Faire l'évaluation des activités et des réalisations du GSRAs au cours des six dernières années et mettre au point les priorités et l'orientation à prendre pour les trois prochaines années.
3. Réviser le Plan d'Application du GSRAs qui avait été mis au point une première fois en 1987.
4. Recommander des changements dans la structure et la fonction du GSRAs pour les trois années 1994- 1996.

5. Préparer une Première Ebauche de Document pour le Programme du Projet GEF pour les Rhinos du Sud-Est Asiatique qui va apporter deux millions de dollars US pour la conservation des rhinocéros en Indonésie et en Malaisie au cours des deux prochaines années.
6. Commencer la rédaction d'un Programme Stratégique de Financement pour la Conservation du Rhino Asiatique.
7. Lancer le processus d'AVPH pour *Rhinoceros unicornis*.

Les dernières estimations des nombres de Rhinos d'Asie sont présentées dans les Tableaux I - 3. Le fait le plus remarquable et le plus inquiétant à retirer de ces chiffres est la révélation que le nombre des Rhinocéros de Sumatra (*Dicerorhinus sumatrensis*) a maintenant baissé au point de ne plus dépasser 500. Les estimations précédentes les situaient entre 700 et 1,000 individus. Cette diminution est due surtout à une baisse de 50% du nombre estimé pour Sumatra, en Indonésie. Bien que le Rhinocéros de Java ait vu son nombre réduit et que le Rhinocéros noir d'Afrique ait peut-être diminué de façon plus précipitée au cours des dix dernières années, la conjonction du nombre réduit et du taux de diminution pourrait faire du Rhinocéros de Sumatra l'espèce la plus dangereusement menacée à l'heure actuelle de toutes les espèces de rhinos.

Nous avons aussi eu confirmation, par les dernières études par transects et photographiques à Ujung Kulon, que le nombre de Rhinocéros de Java est d'environ 50, comme l'avaient prétendu les recensements et les estimations précédents.

Le Rhinocéros d'Inde/du Népal (*Rhinoceros unicornis*) reste l'exemple heureux parmi les rhinocéros d'Asie, avec une population totale en Inde de près de 1,450 individus, et au Népal, de près de 440. Pourtant, dans

les deux pays, le taux de braconnage est significatif et va croissant. En Assam, qui est encore le bastion de cette espèce, le braconnage de cette espèce dans la plupart des aires protégées est estimé à près de 5% par an. Ce taux équivaut à peu près au taux annuel de croissance de la population, ce qui veut dire que toute intensification du braconnage peut causer le déclin de la population. En effet, on a déjà constaté un tel déclin dans deux régions au moins, la population de Laokhowa ayant été complètement anéantie en 1993 et celle de Manas ayant vu ses effectifs réduits d'au moins 50%.

Un autre sujet de discussion important à la réunion de Jaldapara fut l'inquiétude sérieuse exprimée par la plupart des conservacionnistes des rhinos asiatiques qui étaient présents, au sujet du fait de savoir si ces espèces recevaient bien de la communauté internationale responsable de la conservation des rhinocéros, la part qui leur est due d'attention et de ressources. On a insisté sur le fait qu'en dépit du déclin spectaculaire du Rhinocéros noir africain lors de la dernière décennie, les effectifs de cette espèce n'étaient probablement pas plus réduits que le total des trois espèces de rhinos asiatiques mises ensemble.

En matière de structures et de fonction, le GSRAs a discuté longuement:

1. Des activités, des réalisations et des problèmes des 10 dernières années.
2. Des objectifs, des besoins futurs et de la fonction du groupe face au défi que représente la conservation du rhino d'Asie.

Ces activités et ces réalisations comprennent :

- 1984 • Mohd Khan bin Momin Khan devient Président, le premier citoyen d'un pays de distribution, à occuper ce poste.
 - Une Session pour une Stratégie de Conservation pour le Rhinocéros de Sumatra est mise au point lors d'une réunion à Singapour.
 - Le Programme *ex situ* pour le Rhinocéros de Sumatra est lancé conjointement en Malaisie et en Indonésie.
- 1986 • Une réunion du GSRAs se tient à Jakarta, en Indonésie.

- 1987 • Le Plan d'Action pour le Rhino d'Asie du GSRAs est rédigé lors d'un atelier qui se tient à Kuala Lumpur, en Malaisie.

- 1989 • On réunit un atelier pour l'AVPH concernant le Rhinocéros de Java à Bogor, en Indonésie.

- 1991 • Un atelier de suivi est réuni à Bogor, en Indonésie, cosponsorisé par le GSRAs et PHPA pour préparer l'Atelier sur la Stratégie de Conservation du Rhinocéros indonésien.

- 1992 • Le premier Responsable des Programmes est nommé pour le GSRAs, avec le soutien financier de l'International Rhino Foundation (IRF).

- Le Responsable des Programmes du GSRAs représente celui-ci et l'UICN/SSC à la Conférence préparatoire du PNUE sur le Rhino.

- Suite à cette Conférence, le GSRAs entame la mise au point d'un Projet de Global Environment Facility (GEF), d'un montant de deux millions de dollars US, pour aider à la réalisation de la stratégie de conservation des rhinos en Indonésie et en Malaisie.

- 1993 • Le Responsable des Programmes du GSRAs peut assister à la Préparation des Plans d'Action pour la Conservation des Rhinos en Malaisie et en Indonésie, grâce à un subside du PNUE.

- Le GSRAs participe à l'ensemble des Conférences du PNUE sur la Conservation des Rhinocéros à Nairobi, au Kenya.

- En préparant cette Conférence du PNUE sur les Rhinos, et suite à celle-ci, le GSRAs met au point un processus permanent pour rassembler les vues d'ensemble et les fonds nécessaires pour la Conservation des Rhinos d'Asie grâce aux plans d'action nationaux de conservation des rhinos. Ce processus sera la base d'un programme de financement stratégique mis au point par le GSRAs.

- Poursuite de la mise au point du Projet GEF et de l'utilisation du subside de deux millions de dollars US pour les rhinos du Sud-Est Asiatique.

- Organisation et tenue d'une réunion

plénière du GSRAs à Jaldapara, au Bengale Occidental, en Inde.

Apport d'une assistance technique et financière lors de l'Analyse de Viabilité des Populations et des Habitats (AVPH) pour le Rhinocéros de Sumatra en Indonésie et le Rhinocéros indien en Inde.

En général, on a observé que traditionnellement, le GSRAs, comme les autres Groupes de Spécialistes, s'était concentré sur les informations et les conseils techniques. Il y a eu un accord général pour reconnaître qu'à l'avenir, le GSRAs devrait assumer un rôle plus actif en se faisant le porte-parole et le récolteur de fonds pour la conservation des rhinos d'Asie.

En particulier, on a accepté que le GSRAs lance un bulletin trimestriel. Le premier numéro est prévu pour la fin du mois de juin 1994.

Il y a eu alors d'intenses discussions sur les structures et la direction future du GSRAs, pour faciliter la réalisation des objectifs. Le but en était de préparer des recommandations que le Président de GSRAs pourrait soumettre à la Présidence du SSC lorsqu'elle étudierait les nominations pour les trois années suivantes, commençant en janvier 1994. On a étudié nombre de scénarios pour les Présidents, les Présidents Délégués et les Responsables des Programmes.

L'accord a été très unanime pour reconnaître que les deux régions principales où l'on rencontre les rhinos d'Asie, à savoir le sous-continent Indien et le Sud-Est Asiatique, devaient être représentées à la Présidence du GSRAs. Ensuite, on était tout à fait d'accord pour reconnaître qu'il faudrait un Président et un Président Délégué, un des postes étant occupé par une personne du Sud-Est Asiatique et l'autre par quelqu'un du sous-continent Indien. On a fortement insisté pour que M. Mohd Khan conserve son poste de Président, et il y a eu consensus sur la nomination de M. S.C. Dey au poste de Président Délégué.

Tout le monde reconnaissait aussi qu'il serait utile d'élargir la fonction de responsable des programmes à quelque chose de plus qu'un secrétariat. Actuellement, ce poste est occupé par le Dr. Tom Foose qui réside en dehors des pays de distribution. Un des objectifs des trois prochaines années sera de confier ce poste à un ou plusieurs Asiatiques dans les pays de distribution. De plus, on a conseillé de nommer un second responsable des programmes, le Dr. Nico Van Strien. Une des activités principales des responsables des programmes sera d'aider à la récolte de fonds. Le Dr. Foose

se concentrera sur l'Amérique du Nord, le Dr. Van Strien, sur l'Europe. Les autres fonctions administratives et techniques seront réparties de commun accord entre Foose et Van Strien.

Les objectifs pour les trois années 1994-1996 comprennent

Lancement d'un bulletin

L'émission du premier numéro est prévue pour la fin de juin 1994.

Révision du Plan d'Action du GSRAs

Un projet doit être prêt pour le 15 mai 1994, et la publication du Plan final est attendue pour la mi-août 1994.

Activation du Projet GEF pour le rhino

du S-E. Asiatique.

Il semble que les fonds seront disponibles et que les activités pourront commencer vers septembre 1994.

Mise au point d'un Programme Stratégique de Financement

Comme première étape vers la mise au point du programme stratégique de financement, le GSRAs a consacré un certain temps à améliorer la description des projets et l'estimation de leur coût. Ces chiffres sont présentés dans les Tableaux 4 et 5. On estime que le coût total avoisine les 57.000.000 de dollars US, avec 35.000.000 de dollars demandés par les pays de distribution à des donateurs étrangers.

Meilleure publicité faite au sort des rhinos Asiatiques

Etablissement d'un secrétariat pour le GSRAs

Ce processus a déjà été largement entamé par la nomination et la mise au travail d'un Responsable des Programmes. L'arrivée d'un second responsable des programmes et la parution du bulletin vont à la rencontre de cet objectif.

L'atelier conjoint sur le Rhino indien a lancé le processus d'AVPH pour cette espèce. Les résultats de cette AVPH



ne sont pas encore prêts à être rédigés mais ils feront l'objet d'un prochain article dans PACHYDERM. De plus, il faudrait remarquer que l'AVPH a été réalisée à Jaldapara, au Bengale Occidental, plutôt que quelque part en Assam pour deux raisons principales. Une d'elles était d'attirer l'attention sur les zones protégées pour les rhinos qui se trouvent au Bengale Occidental qui n'ont pas été explicitement discutées dans l'édition précédente du Plan d'Action pour les Rhinos d'Asie du GSRAs. Ces zones protégées sont modestes tant au point de vue du nombre de rhinos qu'en ce qui concerne la taille de l'habitat, mais elles sont néanmoins bien gérées et elles pourraient devenir importantes pour la conservation de l'espèce. Raison plus importante encore, il fallait insister sur le fait qu'en Inde, le rhinocéros ne vit pas seulement dans un mais dans trois états, ce qui rend les efforts pour sa conservation dignes de l'attention et du support financier du gouvernement fédéral. La politique actuelle du Gouvernement indien ne permet pas d'allouer des fonds

à des espèces qui se limitent à un seul état. Ainsi, l'Assam recevait auparavant des subsides fédéraux qui furent interrompus lorsque la nouvelle législation a été appliquée. La reprise du soutien fédéral est indispensable si l'on veut que l'Assam et les autres états répondent avec succès au défi sans cesse croissant du braconnage. C'est pourquoi un des objectifs de l'atelier d'AVPH est d'apporter son soutien à la mise au point d'un Projet Rhinos par le Gouvernement indien, analogue au Projet Tigres qui a été si crucial pour la conservation de cette espèce en Inde.

*Toute personne désirant de plus amples informations sur la conservation des rhinos d'Asie ou sur le travail du GSRAs est priée de contacter le Responsable des Programmes du GSRAs, le Dr. Tom Foose, International Rhino Foundation, 85 East Gay Street, Suite 603, Columbus, OH, 43215, USA.
Fax : 1-614-228-7210. Tél : 1-614-228-0402.*

Tableau 1: Estimations des populations de rhino d'Inde/du Nepal (*Rhinoceros unicornis*) en liberté. 31 Decembre 1993.

Pays	Endroit	Nombre de Rhinos	Surface Disponible en km2		Statut de Protection	Capacité potentielle
			Actuelle	Potentielle		
INDE	Manas	~ 50	391	391	Parc National; Site du Patrimoine Mondial	>100
	Dudhwa	11	490	490	Parc National	>100
	Kaziranga	1164 ± 134	430	490	Parc National	1200+
	Laokhowa	0	70	70	Sanctuaire de Faune	50+
	Orang	90+	76	76	Sanctuaire de Faune	>100
	Pabitora	56	18	18	Sanctuaire de Faune	60+
	Pockets-Assam	25	508	508	Incertain	100+
	Jaldapara	~ 33	216	225	Sanctuaire de Faune	80+
	Garomara	13	8.6	66	Sanctuaire de Faune	20+
	NEPAL	Royal Bardia	~ 39	968	968	Parc National
Royal Chitwan		375-400	932	1200	Parc National	500
PAKISTAN	Lal Sohanra	2	?	?	Parc National	?
TOTAL		1870-1895 ±134	4100+	4500+		2600+
		~ 1900				

Tableau 2: Estimations des populations de rhino de Java (*Rhinoceros sondaicus*) en liberté. 31 Decembre 1993.

Pays	Endroit	Nombre de Rhinos	Surface Disponible en km2		Statut de Protection	Capacité potentielle
			Actuelle	Potentielle		
INDONESIE	Ujung Kulon	47-60	761	761	Parc National	100+
VIETNAM	Nam Cat Tien	Petit	350	?	Parc National	?
	Bugiamap	Petit	160	?	Réserve	?
	Varié	?	?	?	Inconnu	?
CAMBODGE	Varié	?	?	?	Inconnu	?
LAOS	Varié	?	?	?	Inconnu	?
TOTAL		<100	1200+	1200+		

Tableau 3: Estimations des populations de rhino de Sumatra (*Dicerorhinus sumatrensis*) en liberté. 31 Decembre 1993.

Pays	Endroit	Nombre de Rhinos	Surface Disponible en km2		Statut de Protection	Capacité potentielle
			Actuelle	Potentielle		
INDONESIE						
Kalimantan	Sabah Border	Petit	?	?	Inconnu	?
Sumatra	Gunung Leuser	90-120	1400	8000	Parc National	140-800
	Gunung Patah	10-15	400	500	Forêt exploitée	40-50
	Kerinci Seblat	64-77	5000	10000	Parc National	500-1000
	Gunung Abong-Abong et Lesten-Lukup	5-10	?	?	Non protégé	
	Berhak	1-2	?	?	Parc National	?
	Torgamba	3-5	?	?	Forêt exploitée et plantation de palmiers à huile	?
	Barisan Selatan	25-60	700	3600	Parc National	70-360
	Sungai Ipoh	6-7	10000ha	-	Forêt exploitée (corridor_vers_Kerinci_Seblat)	50
	Gunung Batu Hitam Listen	3-5	?	?	Forêt exploitée	?
	Serbojadi	15-25	?	?	Forêt exploitée	
	Lokop	3-5	300ha	?	Réserve Naturelle	?
	Batu Tapan	5	?	?	Parc National	?
	Way Kambas	3-5	?	?	Parc National	?
Sous-total		233-341	7500 +	22000		800—2200
MALAISIE						
Péninsule	Endau Rompin	20-25	1600	1000—1600	Parc d'Etat	110-160
	Taman Negara	22-36	4400	4400	Parc National	200+
	Sungai Dusun	-12	40	140	Réserve de Faune /forêt_dérangée	15
	Gunung Belumut	3-4	230	230	Forêt	23
	Mersing Coast	3-5	?	?	Forêt secondaire	0
	Sungai Depak	2-4	?	?	Forêt secondaire	0
	Sungai Yong	3-5	?	?	Forêt secondaire	0
	Kuala Balah	2-4	?	?	Forêt secondaire	0
	Bukit Gebok	1-2	?	?	Forêt secondaire	0
	Krau	1-2	500	500	Réserve de Fauna	50
	Selama	10-15	?	?	Forêt primaire et secondaire	?
	Belum	10+	?	?	Forêt primaire et secondaire	?
	Babu	2-3	?	?	Forêt primaire et secondaire	?
	Besut	3-5	?	?	Forêt secondaire	?
	Gunung Inas	2-4			420	
Sous-total (Péninsule)		85-126				

Tableau 3: Estimations des populations de rhino de Sumatra (*Dicerorhinus sumatrensis*) en liberté. 31 Decembre 1993 (suite).

Pays	Endroit	Nombre de Rhinos	Surface Disponible en km2 Actuelle	Potentielle	Statut de Protection	Capacité potentielle
Sabah	Tabin	7-17	1200	1200	Réserve de Faune	120
	Danum Valley Kretam/Other	13-23	2000	2000	Forêt secondaire	200
	Areas	20	1000	0	Deforestation	0
Sous-total (Sbh)		40-60				320
Sarawak	Limbang	10+	600	600	Forêt primaire et secondaire	60
Sous-total (Sarawak)		10+				60
Sous-total (Malaysia)		135-196	11000+	11000+		800
MYANMAR (Birmanie)						
	Tamanthi	Petit	2150	?	Sanctuaire de Faune	?
	Lassai Tract	6-7	?	?	Réserve de Faune	?
Sous-total		10+	?	?		
THAÏLANDE	Hala-Bala	4+	?	?	Sanctuaire de Faune	?
	Khoi Soi Dao Reserve	2+	745	745	Sanctuaire de Faune	
	Phu Khieo	4+	1560	1560	Réserve de Faune	75
Sous-total		10+				
GRAND TOTAL		388-557	4000	2000+?		110

Tableau 4: Conservation des Rhinos d'Aise Principaux pays de distribution. Coût total pour les 5 prochaines années (US\$).

	CAPITAL	OPERATIONS	TOTAL
INDE	21000000	15000000	36000000
NEPAL*	225000+	2500000	2755000
INDONESIE	3445000	6840800	10285300
MALAISIE	4464000	4051000	8515000
TOTAL	13586000	10826000	57555000

* Information incomplète

Tableau 5: Conservation des Rhinos d'Aise principaux pays de distribution. Fonds extérieurs nécessaires pour les 3 prochaines années (US\$).

	CAPITAL	OPERATIONS	TOTAL
INDIE	19000000	1000000	20000000
NEPAL*	255000	1000000	1255000
INDONESIE	3445000	4514000	7959000
MALAISIE	2739000	1893000	4632000
TOTAL	26439000	7407000	33846000

* Information incomplète

CHAIRMAN'S REPORT: AFRICAN RHINO SPECIALIST GROUP

Martin Brooks

Natal Parks Board, PO Box 662, Pietermaritzburg 3200, South Africa

The second meeting of the African Rhino Specialist Group (ARSG), held in Mombasa, Kenya, from 23 - 27 May 1994, brought together 31 members and observers from 13 different countries.

The main aims of the meeting were to review the status and trends of the rhino populations throughout Africa, to assess the progress of those projects rated as priorities by the ARSG, to develop strategies through a number of working groups and to set priorities for the Group for 1994-95. This forum also provided an opportunity to learn about new developments in rhino conservation and to debate a number of pertinent issues. To this end, the first two days of the meeting concentrated on reports on rhino populations in the range states, and trade and related issues such as CITES, the Pelly Amendment and the US Rhino Conservation Bill.

RHINO POPULATION SIZE AND TREND

The 1993 population estimates for black and white rhino presented in the table indicate an encouraging overall trend.

The black rhino (*Diceros bicornis*) population appears to have remained fairly stable since 1992, with the population now estimated at about 2,550. This is extremely significant, representing as it does the first time that a population decline has not been recorded since population estimates were first available more than 20 years ago. This may be attributed to the fact that although poaching pressure remains intensive in many areas, most of the rhinos are now confined to populations which are fairly intensively managed. With the exception of Zimbabwe (381), the largest populations, which occur in Kenya (417), Namibia (583) and South Africa (897), all recorded increases. The northern white rhino (*Ceratotherium simum cottoni*) population increased from 31 to 32, while the southern white rhino (*C.s. simum*) increased from an estimated 5,789 in 1992 to 6,752 in 1993, of which

more than 6,300 occur in South Africa. While some of the increase of the latter subspecies can be attributed to improved accuracy of the estimates, it is clear that the population continues to grow in real terms.

PRIORITY PROJECTS

The progress achieved with the 25 projects rated as priorities was assessed, and although funding remained a problem for many, particularly good progress had been made with the projects earmarked for special ARSG attention during 1993.

Cameroon black rhino

An action plan for this threatened *D.b. longipes* population has been drawn up and funding secured. Implementation is scheduled for late 1994.

Tanzanian black rhino

An action plan has been drawn up and funding secured for some components of the programme.

ARSG Scientific/Programme Officer

Funds have been secured, and it is hoped to be operational by the final quarter of 1994.

African rhino survey techniques

This project remains unfunded.

Economics of rhino horn trade

This project began in early 1994 and should be completed by the end of the year.

CITES RESOLUTION ON RHINO CONSERVATION

The ARSG was requested at the 31st Standing Committee of CITES, held in Geneva in March 1994, to draft a resolution on the conservation of rhinos, incorporating the variety of available management options. This was achieved through one of the

Population estimates for black and white rhino for 1993.

COUNTRY	WHITE RHINO		TOTAL	TREND	BLACK RHINO				TOTAL	TREND
	<i>C.a. Simum</i>	<i>C.a. cottoni</i>			<i>D.b. bicornis</i>	<i>D.b. longipes</i>	<i>D.b. michaeli</i>	<i>D.b. minor</i>		
ANGOLA					5*			5*	10	?
BOTSWANA	18+		18+	Down				4	4	Down
CAMEROON						27*			27*	Down
ETHIOPIA							5*		5*	?Down
KENYA	87		87	Up			417		417	Up
MALAWI								2	2	New pop.
MOZAMBIQUE	Extinct ?		Extinct ?					45*	45*	Down
NAMIBIA	98		98	Up	583				583	Up
RWANDA							10*		10*	Down
SOUTH AFRICA	6376		6376	Up	23		34	840	897	Up
SUDAN		Extinct ?	Extinct ?							
SWAZILAND	33		33	Down				4	4	Down
TANZANIA							26	106*	132*	Down
ZAIRE		32	32	Up						
ZAMBIA	6		6	New pop				33*	33*	Down
ZIMBABWE	134		134	Down				381	381	Down
TOTALS	6752	32	6784	Up	611	27	492	1420	2550	Stable

* > 70% Guestimate
+ 50 - 69% Guestimate

working groups in Mombasa and the draft forwarded to the CITES secretariat for consideration. The ARSG firmly believes that standardized indicators of success need to be developed to measure the effects of illegal killing, and that trade bans alone will not eliminate poaching. The long-term goal for range states should be to become self-sufficient in rhino conservation.

NORTHERN WHITE RHINO STRATEGY

The ARSG Chairman chaired a meeting in Geneva, March 1994, at which various management options to enhance the survival of the northern white rhino were discussed with the conservation authority of Zaire. One of the working groups in Mombasa clarified the objectives of the initiative, identified some of the technical, political and economic considerations involved and drafted recommendations.

STRATEGY FOR RANGE STATES WITH SMALL POPULATIONS

It was agreed that interaction should be improved with those range states that are not currently represented on the ARSG, and that the group should encourage the undertaking of baseline surveys and the drafting of conservation plans where these are lacking.

FUNDING STRATEGY

It was agreed that the ARSG should not get directly involved in fund-raising, but rather that it should collaborate very closely with the newly-established Elephant and Rhino Facility at UNEP, one of the major tasks of which is to secure funding for these species.

At the formal meeting of the members on the final afternoon, recommendations for expanding the representation of range states on the ARSG and for including additional rhino experts were made, and goals set for 1994-95. The latter were to see the rhino programmes in Cameroon and Tanzania through to full implementation, to develop and facilitate the acceptance of a strategy for the northern white rhinos, to complete the rhino economics study, to complete a handbook on rhino survey techniques, to promote the principles inherent in the draft CITES resolution and to compile an Action Plan for African Rhinos.

RAPPORT DU PRESIDENT: GROUPE DE SPECIALISTES DE RHINOCEROS AFRICAIN

Martin Brooks

Natal Parks Board, PO Box 662, Pietermaritzburg 3200, South Africa

La seconde réunion du Groupe de Spécialistes de Rhinocéros Africain (GSRA) qui s'est tenue à Mombasa, au Kenya, du 23 au 27 mai 1994, a rassemblé 31 membres et observateurs venus de 13 pays différents.

Les objectifs principaux de cette réunion étaient de revoir le statut et l'évolution probable des populations de rhinos dans toute l'Afrique, d'évaluer les progrès réalisés par les projets que le GSRA avaient classés comme prioritaires, de mettre au point des stratégies dans un certain nombre de groupes de travail et de classer les priorités du groupe pour les années 1994-1995. Ce forum fut aussi l'occasion d'apprendre les nouvelles réalisations en matière de conservation des rhinos et de débattre au sujet d'un certain nombre de problèmes d'actualité. C'est pourquoi on s'est concentré, les deux premiers jours, sur les rapports sur les populations de rhinos dans les pays de distribution, sur le commerce et les questions qui s'y rattachent telles que la CITES, l'Amendement de Pelly et la Charte Américaine de Conservation des Rhinocéros.

TAILLE DES POPULATIONS DE RHINOS ET EVOLUTION PROBABLE

Les estimations des populations de rhinos noirs et de rhinos blancs réalisées en 1993 sont présentées au tableau et indiquent une tendance générale encourageante.

Les populations de Rhinocéros noirs (*Diceros bicornis*) semblent être restées plutôt stables depuis 1992, et l'on estime les effectifs actuels aux environs de 2.550. Ceci est extrêmement significatif car c'est la première fois qu'on ne signale pas de déclin de population depuis qu'on a commencé à disposer des premières estimations, il y a plus de 20 ans. On peut attribuer ceci au fait que, bien que la pression du braconnage reste considérable en bien des endroits,

la plupart des rhinos sont maintenant confinés dans des populations étroitement gérées. A l'exception du Zimbabwe (381), les plus importantes populations, que l'on trouve au Kenya (417), en Namibie (583) et en Afrique du Sud (897), sont toutes en augmentation. La population de Rhinocéros blancs du Nord (*Ceratotherium simum cottoni*) est passée de 31 à 32, tandis que le Rhino blanc du Sud (*C.s. simum*) a augmenté d'une estimation de 5.789 en 1992 à 6.752 en 1993, plus de 6.300 d'entre eux vivant en Afrique du Sud. Si on peut attribuer une certaine partie de l'augmentation de cette dernière sous-espèce à une meilleure précision des estimations, il est clair que la population continue à augmenter en chiffres réels.

PROJETS PRIORITAIRES

On a évalué les progrès réalisés par les 25 projets classés comme prioritaires, et bien que le financement reste un problème pour beaucoup, on a obtenu des progrès particulièrement bons dans les projets sélectionnés pour une attention spéciale du GSRA en 1993.

Rhino noir du Cameroun

On a arrêté un plan d'action pour cette population menacée de *D.b.longipes*, et son financement est assuré. La réalisation en est prévue pour la fin de 1994.

Rhino noir de Tanzanie

On a arrêté un plan d'action et assuré le financement pour certaines parties du programme.

Responsable Scientifique/des Programmes du GSRA

Le financement est assuré, et on espère qu'il sera opérationnel pour le dernier trimestre de 1994. Techniques d'études du rhino africain. Ce projet reste sans financement.

Les estimations des populations de rhinos blancs et noirs réalisées en 1993.

PAYS	RHINO BLANC		TOTAL	TENDANCE	RHINO NOIR				TOTAL	TENDANCE
	C.a. Simum	C.a. cottoni			D.b. bicornis	D.b. longipes	D.b. michaeli	D.b. minor		
ANGOLA					5*			5*	10	?
BOTSWANA	18+		18+	Baisse				4	4	Baisse
CAMEROUN						27*			27*	Baisse
ETHIOPIE							5*		5*	?Baisse
KENYA	87		87	Hausse			417		417	Hausse
MALAWI								2	2	Nouv. pop.
MOZAMBIQUE	Eteint ?		Eteint ?					45*	45*	Baisse
NAMIBIE	98		98	Hausse	583				583	Hausse
RWANDA							10*		10*	Baisse
AFRIQUE DU SUD	6376		6376	Hausse	23		34	840	897	Hausse
SOUDAN		Eteint ?	Eteint ?							
SWAZILAND	33		33	Baisse				4	4	Baisse
TANZANIE							26	106*	132*	Baisse
ZAIRE		32	32	Hausse						
ZAMBIE	6		6	Nouv. pop.				33*	33*	Baisse
ZIMBABWE	134		134	Baisse				381	381	Baisse
TOTAUX	6752	32	6784	Hausse	611	27	492	1420	2550	Stable

* > 70% Guestimate

+ 50 - 69% Guestimate

Aspect économique du commerce de la corne de rhino

Ce projet a démarré au début de 1994 et devrait se terminer à la fin de l'année.

RESOLUTION DE LA CITES SUR LA CONSERVATION DES RHINOS

Au 31 ième Comité Permanent de la CITES qui s'est tenu à Genève en mars 1994, on a demandé au GSRA de rédiger une résolution sur la conservation des rhinos en y intégrant toute la variété disponible de possibilités de gestions. Ceci a été réalisé par l'un des groupes de travail à Mombasa, et l'avant-projet a été présenté au secrétariat de la CITES pour considération. Le GSRA croit fermement qu'il faut mettre au point des indicateurs de réussite standardisés pour mesurer les effets de la chasse illégale et que la suppression du commerce ne pourra à elle seule éliminer le braconnage. Pour les pays de distribution, le but à long terme devrait être de devenir autonomes en matière de conservation des rhinos.

STRATEGIE POUR LE RHINO BLANC DU NORD

Le président du GSRA a conduit une réunion à Genève en mars 1994, lors de laquelle on a discuté avec les autorités zaïroises de la conservation différentes possibilités de gestions pour stimuler la survie du Rhino blanc du Nord. Un des groupes de travail de Mombasa a clarifié les objectifs de cette initiative, identifié certaines des considérations techniques, politiques et économiques dont il faut tenir compte, et rédigé des recommandations.

STRATEGIE POUR LES PAYS DE DISTRIBUTION AVEC DE PETITES POPULATIONS

On a reconnu qu'il faudrait améliorer les contacts avec les pays de distribution qui ne sont pas pour le moment représentés dans le GSRA, et que le groupe devrait encourager la réalisation de recherches élémentaires et la rédaction de programmes de conservation là où il n'y en a pas encore.

STRATEGIE DE FINANCEMENT

On a admis que le GSRA ne devait pas s'impliquer directement dans la récolte de fonds, mais qu'il devrait plutôt collaborer très étroitement avec le nouveau Service pour les Eléphants et les Rhinos établi par le PNUE, dont une des tâches principales est de garantir un financement pour ces espèces.

Lors de la réunion officielle des membres, le dernier après-midi, on a fait des recommandations pour élargir la représentation des pays de distribution dans le GSRA et pour des experts en rhinos supplémentaires, et on a donné les objectifs pour 1994-1995. Ces derniers consistaient à voir les programmes rhinos au Cameroun et en Tanzanie arriver au stade de complète réalisation, à mettre au point et à faire accepter une stratégie pour les Rhinos blancs du Nord, à achever la recherche sur l'aspect économique du rhino, à terminer un manuel sur les techniques d'études des rhinos, à promouvoir les principes qui s'y rattachent dans le projet de résolution de la CITES et de composer un Plan d'Action pour les Rhinos Africains.

CO-CHAIR REPORT: AFRICAN ELEPHANT SPECIALIST GROUP

Holly T. Dublin

WWF Regional Office, PO Box 62440, Nairobi, Kenya

From 27th May through the 1st of June 1994, members of the African Elephant Specialist Group met, greeted one another, watered, fed and relaxed together in Mombasa, Kenya. It was a traditional "meeting of the clan". Following the recent rains, the habitat was lush, green and fertile as new, familiar, young and old faces joined for a week of intense and close interaction characterized by a free flow of information-sharing. For the first time ever, this sharing of information was expedited and enhanced significantly through simultaneous translation in French and English.

All members present, and others by proxy, reported the status of elephant conservation and management initiatives in 20 range states across the continent. Formal sessions covered a wide range of relevant topics, from the genetics of free-ranging forest and savanna elephants, to the translocation of live elephants, to the development of national elephant conservation plans and management policies, to the impact of elephants on habitats under increasing confinement, to the diagnosis and prevention of disease and notably to the continuing quest for a general theory of elephants, forests and dung.

This year's plenary sessions and working groups focused on two main areas:

1. the interactions between people and elephants
2. the continued killing of elephants and illegal trafficking and trade in ivory.

A number of exceptional presentations (we hope to print many of these in future issues of *Pachyderm*) provided information from a broad geographical range and set the stage for lively and productive discussions in the working groups.

More than anything, the working groups confirmed the closely shared problems of African countries in each region of the elephants' range on the continent. In particular, the realization and acknowledgement of the ever-growing and widespread conflict between people

and elephants provided impetus for members to work together to develop new and innovative solutions. To this end, the members delved into the design and use of barriers, the development of chemical deterrents, the involvement of local communities in the conservation and management of elephants inside and outside formally protected areas, strategies for dealing with problem animals and methods of evaluating and assessing elephant damage to life and property. A concerted effort was made to identify areas where these conflicts currently exist, to review ongoing attempts to ameliorate the conflict and to develop means to predict where similar conflict may arise in the future. Finally, recommendations from each group were drafted and presented back to the plenary for discussion and debate.

Following this, the members re-arranged themselves and Settled into working groups targetted at:

1. developing simple techniques for law enforcement personnel in the field for systematically monitoring the illegal killing of elephants
2. examining the problems of monitoring and managing national and international trade in elephant products and the registration and marking of ivory stockpiles in African range states.

Using their combined experience, the meeting participants developed basic guidelines for collecting field-based information on illegal activities. Many members benefitted from the knowledge of others on the obligations of parties under CITES regarding international trade in ivory and the current regulations of the European Union and the United States of America on the import of elephant hunting trophies. There were also extensive discussions on national legislation controlling the sale of ivory in many range states. Concern was expressed by a number of members regarding the growth of government ivory stockpiles and their future security under widespread declines in law enforcement budgets across the continent.

During formal plenary sessions and working groups,



members met individually with the Manager of the African Elephant Database to update the status and distribution of elephants in their respective countries. Albeit exhausting and time-consuming for all those involved, this devotion of special time to the task was well worth the effort. Ways of making the AED work “for” the membership in the future were also discussed throughout the meeting with many good ideas brought to the floor.

Special attention was also devoted to defining the desired role of the AESG in helping to improve information gathering and its dissemination. These technical topics of broad interest among the membership included collecting and synthesizing data on illegal

killing, trade and trafficking; compiling guidelines for dealing with human— elephant conflict; and promoting, through networking, the sharing of expertise and information across the range states.

Like every meeting, this one had its high and low points. A low point was watching our comrades fall to elephantine intestinal ailments. The high points were infinite and just kept on coming. The AESG is growing in membership, in scope and in cohesion. I am intensely gratified to be surrounded by so many willing, able and knowledgeable colleagues. Looking back over the past three years and embarking on a new three-year term with AESG, I could not have hoped for a better vote of confidence.

RAPPORT DE LA CO-PRESIDENTE: GROUPE DE SPECIALISTES DE L'ELEPHANT AFRICAIN

Holly T. Dublin

WWF Regional Office, PO Box 62440, Nairobi, Kenya

Du 27 mai au 1er juin 1994, les membres du Groupe de Spécialistes de l'Éléphants Africains se sont rencontrés, salués, abreuvés, nourris et relaxés ensemble à Mombasa, au Kenya. C'était une "réunion du clan" traditionnelle. En raison des pluies récentes, l'environnement était luxuriant, vert et fertile comme au premier jour, cependant que des visages nouveaux ou familiers, jeunes ou vieux, se retrouvaient pour une semaine de dialogue intense et rapproché, caractérisé par un partage d'informations ouvert et ininterrompu. Pour la première fois, ce partage d'informations fut accéléré et significativement amélioré grâce à la traduction simultanée en français et en anglais.

Tous les membres présents, et les autres par procuration, ont rendu compte du statut des initiatives en matière de conservation et de gestion de l'éléphant dans les 20 pays de distribution du continent. Les sessions formelles ont couvert un large éventail de sujets intéressants, allant de la génétique des éléphants vivant en liberté en forêt et en savane à la translocation d'éléphants vivants en passant par la mise au point de programmes nationaux de conservation des éléphants et de politiques de gestion, par l'impact des éléphants sur des habitats en réduction constante, par le diagnostic et la prévention de maladies, sans oublier la recherche permanente d'une théorie générale sur les éléphants les forêts et les excréments.

Cette année, les sessions plénières et les groupes de travail se sont concentrés sur deux domaines principaux:

1. les interactions entre les hommes et les éléphants
2. le massacre d'éléphants et le trafic et le commerce illégaux d'ivoire qui se poursuivent.

Un grand nombre de présentations réellement exceptionnelles (nous espérons en publier beaucoup dans les prochaines éditions de *PACHYDERM*) ont fourni des informations provenant de régions géographiquement très éloignées et dressé le cadre pour des discussions animées et productives dans les groupes de travail.

Plus que tout, les groupes de travail ont confirmé le fait que les pays de distribution africains partagent des problèmes très semblables quelle que soit la région du continent où ils se situent. En particulier, le fait de réaliser et de reconnaître l'existence du conflit très répandu et sans cesse croissant entre les hommes et les éléphants a encouragé les membres à travailler ensemble pour mettre au point des solutions nouvelles et originales. Dans ce but, les membres ont cherché au niveau de la conception et de l'utilisation de barrières, de la mise au point de répulsifs chimiques, de l'implication des populations locales dans la conservation et la gestion des éléphants à l'intérieur et à l'extérieur des aires officiellement protégées, des stratégies pour traiter avec les animaux à problèmes et des méthodes pour évaluer et chiffrer les dommages causés par les éléphants aux vies et aux propriétés humaines. On a fait un effort concerté pour identifier les régions où ces conflits existent actuellement, pour revoir les tentatives en cours destinées à atténuer ces conflits et à mettre au point des moyens de prévoir où des conflits semblables pourraient surgir dans le futur. Enfin, chaque groupe a mis sur papier ses recommandations et les a présentées à la réunion plénière pour en discuter.

Ensuite, les membres se sont redistribués et répartis en groupes de travail dans le but de

1. mettre au point des techniques simples pour que le personnel chargé de faire respecter la loi sur le terrain contrôle systématiquement les massacres illégaux d'éléphants
2. aborder les problèmes que posent le contrôle et la gestion du commerce national et international des produits à base d'éléphant ainsi que l'enregistrement et le marquage des stocks d'ivoire dans les pays africains de distribution.

En réunissant leur expérience, les membres chevronnés du GSEA, en collaboration avec les autres, ont mis au point des directives de base pour la récolte sur le terrain d'informations sur les activités illégales. De nombreux



membres ont pu profiter des connaissances étendues des autres sur les obligations **des parties de la CITES en ce qui concerne le** commerce international d'ivoire et les réglementations actuelles de la Communauté Européenne et des Etats-Unis au sujet de l'importation des trophées de chasse à l'éléphant. Il y eut aussi des discussions approfondies et des éclaircissements apportés sur les législations nationales touchant la vente d'ivoire dans de nombreux pays de distribution. Beaucoup de membres ont exprimé leur inquiétude quant à l'accroissement des stocks d'ivoire gouvernementaux et à leur sécurité future au vu de la réduction presque généralisée des budgets consacrés à l'application des lois dans tout le continent.

Alors que les sessions plénières et les groupes de travail se poursuivaient, les membres rencontraient individuellement le Responsable de la Banque de Données sur l'Eléphant Africain pour remettre à jour le statut et la distribution des éléphants dans leurs pays respectifs. Bien que cela ait **été** fatigant et très prenant pour tous ceux qui étaient concernés, le temps qu'ils ont spécialement consacré à cette tâche en valait vraiment la peine. Tout au long de la réunion, on a aussi discuté différents moyens de faire travailler la BDEA pour l'adhésion de membres dans le futur et beaucoup

de bonnes idées ont **été** exposées. **On a aussi accordé une attention toute spéciale à la** définition du rôle que l'on souhaite voir le GSEA jouer pour aider à améliorer la récolte des informations et la distribution de dossiers techniques de grand intérêt auprès des membres. Ceci comprenait la récolte et la synthèse des données sur les massacres, le commerce et le trafic illégaux; la rédaction d'une liste des directives pour aborder les conflits hommes-éléphants et; la promotion, par la gestion d'un réseau, du partage de l'expertise et des informations techniques dans tous les pays de distribution.

Comme toutes les réunions, celle de Mombasa a connu des hauts et des bas. Ainsi, il a **été** pénible de voir nos camarades succomber à des problèmes intestinaux éléphantiques. Mais les aspects positifs sont innombrables et continuent à affluer. Le GSEA voit le nombre de ses membres s'accroître, ainsi que son rayon d'action et sa cohésion. Je suis merveilleusement récompensée d'être entourée de collègues aussi dynamiques, compétents et bien informés. Quand je regarde les trois années qui viennent de s'écouler, et avant d'entamer le nouveau bail de trois ans, je me dis que je n'aurais pas pu espérer un plus beau vote de confiance.

RAPPORT DU CO-PRESIDENT: GROUPE DE SPECIALISTES DE L'ELEPHANT AFRICAIN

Bihini Won wa Musiti

Gérant du Parc du Président Mobutu à N'sele, BP 16559, Kinshasa 1, Zaire

Le Groupe de Spécialistes de l'Éléphant Africain (GSEA) a tenu du 27 mai au 1er juin 1994 à Mombasa, Kenya, sa réunion, après celle de novembre 1992 organisée à Victoria Falls, Zimbabwe. La réunion de Mombasa, mieux que les précédentes, a non seulement connu une forte participation des pays de l'aire de répartition de l'éléphant d'Afrique, mais aussi doit son succès à l'utilisation, grâce à une traduction simultanée, de deux langues internationales à savoir l'anglais et le français.

Ont participé les pays suivants:

Afrique de l'Ouest:

Burkina-Faso, Côte d'Ivoire, Ghana et Togo

Afrique Centrale:

Cameroun, Congo, Gabon, R.C.A. et Zaïre

Afrique de l'Est:

Ethiopie, Kenya, Tanzanie et Ouganda

Afrique Australe:

Bostwana, Malawi, Mozambique, Namibie, République Sud Africaine, Zambie et Zimbabwe.

Les travaux de Mombasa ont permis aux différents délégués de se pencher en profondeur sur les questions de l'heure qui préoccupent la gestion des populations d'éléphants d'Afrique dans toute leur aire de répartition. Il s'agit notamment d'une part, des questions sur le conflit homme-éléphant dont les conséquences courantes sont: la déprédation des cultures, la destruction des propriétés, de nombreuses pertes en vies humaines et même l'abattage d'éléphants, et d'autre part, du commerce des produits et sous-produits de l'éléphant et de la chasse illégale.

Si la réunion a réussi à démanteler la problématique des grands agrégats de la conservation de l'éléphant,

les écarts entre la connaissance approfondie des populations d'éléphants dans les pays de l'Afrique de l'Est et Australe d'une part, et l'insuffisance des données relatives aux inventaires des populations d'éléphants de la région d'Afrique Centrale et de l'Ouest d'autre part, se sont fait. La forêt tropicale humide de l'Afrique Centrale particulièrement reste encore l'handicap majeur de toute tentative d'approche envisagée jusqu'ici pour le recensement des éléphants dans cette partie du continent. Le problème reste entier, le défi est de taille pour cette aire de répartition de l'éléphant.

C'est pourquoi, en vue d'une meilleur mise à jour permanente à l'échelle continentale de la banque des données, le Groupe de Spécialistes de l'Éléphant Africain (GSEA) voudrait, pour les années à venir, s'employer dans la perspective d'appuyer des solutions financières et scientifiques durables pour la mise en oeuvre, là où c'est nécessaire, des méthodologies d'inventaires rapides (échantillonnage) des éléphants en zones forestières au travers des micro-projets régionaux circonscrits sur base de la différenciation écologique.

Au fil des temps, les chercheurs et les aménagistes de la faune réalisent que la connaissance de l'éléphant ne peut guère se limiter à son dénombrement ni à l'étude de son comportement vis-à-vis de ses congénères. Mais il reste encore beaucoup à faire et à découvrir tant en ce qui concerne l'interaction homme-éléphant que pour la conception de la conservation et de l'utilisation rationnelle de ce pachyderme.

Enfin, préoccupés par l'insuffisance des moyens financiers au niveau du Secrétariat du Groupe et de la mise en oeuvre des projets de conservation de l'éléphant, les participants à la réunion ont lancé un cri d'alarme aux bailleurs de fonds, sollicitant le financement du Groupe.

CO-CHAIR REPORT: AFRICAN ELEPHANT SPECIALIST GROUP

Bihini Won wa Musiti

President Mobutu à N'sele Park, PO Box 16559, Kinshasa 1, Zaire

The African Elephant Specialist Group (AESG) held a meeting in Mombasa, Kenya from 27th May, 1994 to 1st June, 1994. This meeting was the first to be held since the one at Victoria Falls, Zimbabwe, in November 1992. The Mombasa meeting, which was better than previous meetings, was not only well attended by representatives of African elephant range states, but owes its success to the use of two international languages, French and English, thanks to the provision of simultaneous interpretation services.

The following countries were represented:

West Africa:

Burkina Faso, Ivory Coast, Ghana and Togo

Central Africa:

Cameroon, Congo, Gabon, C.A.R. and Zaire

East Africa:

Ethiopia, Kenya, Tanzania and Uganda

Southern Africa:

Botswana, Malawi, Mozambique, Namibia, Republic of South Africa, Zambia and Zimbabwe

The Mombasa meeting enabled various delegates to deliberate in depth on the important issues of the day concerning management of African elephant populations throughout their range. One particular issue discussed was that of conflict between man and elephant, the common consequences being: degradation of culture, destruction of property, killing of elephants

and even loss of human life. Issues related to trade in elephant products and illegal hunting (poaching) were also discussed.

If the meeting succeeded in tackling problems associated with elephant conservation, it also drew attention to the differences between having a relatively good knowledge about elephant populations in East and Southern African countries, and lacking sufficient survey data in Central and West African countries. In particular, the humid tropical forests of Central Africa are a major handicap to elephant census work and present a significant challenge in the region.

This is why the AESG would like to examine sustainable financial and scientific solutions to improve methods of updating data at the continental level and to enable, wherever necessary, rapid elephant survey work in forest zones.

With the passing of years, wildlife researchers and planners have realized that knowledge about the elephant can neither be limited to its numbers nor to the study of its behaviour, vis-à-vis its fellow creatures. There still remains much to be done and to be discovered, both in relation to man-elephant interaction and to the conservation and rational use of this pachyderm.

Finally, to support the Group's secretariat and to implement elephant conservation projects, participants at the meeting sent a passionate plea to donors, soliciting the necessary finances for the Group.

THE GREATER ONE-HORNED RHINO OF ASSAM IS THREATENED BY POACHERS

Lucy Vigne and Esmond Bradley Martin

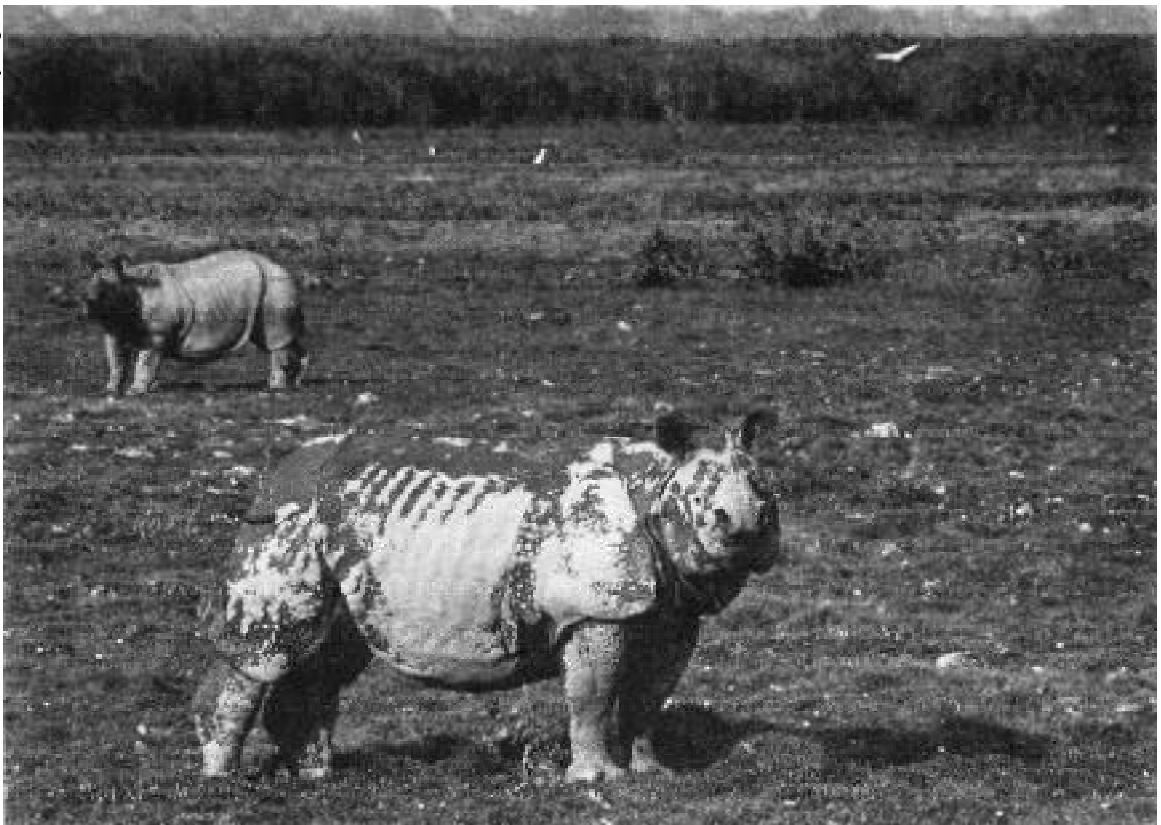
WWF Regional Office, PO Box 62440, Nairobi, Kenya

INTRODUCTION

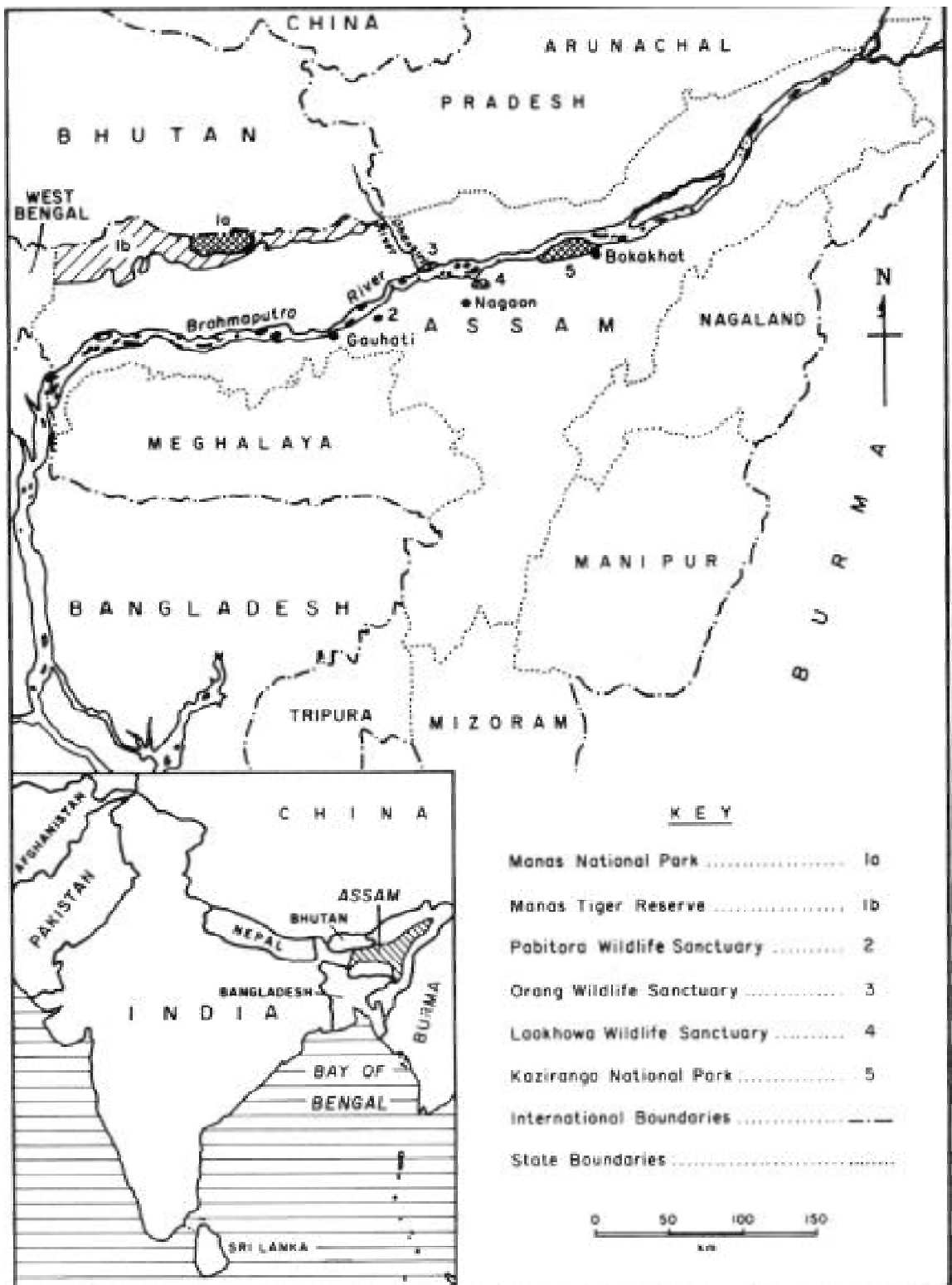
Assam in north-east India (see map) was once home to all three species of Asian rhinos. They inhabited most of the floodplain of the Indogangetic and Brahmaputra riverine tracts and the neighbouring foothills. Human settlement, habitat destruction for crops and hunting, however, led to the killing and loss of almost all of the rhinos by the start of the 20th century. While two of the rhino species disappeared in this region, *Rhinoceros unicornis* survived in a few small pockets and with protection from the early 20th century, their numbers gradually rose in Assam to the present number of about 1,450 (see Table 1) in 1993

despite the rhino's slow breeding rate. Assam's protection of its greater one-horned (or Indian) rhinos has been one of the great rhino success stories. An estimated 75% of the total number of this species now exists in this one small state of India. Recent funding cut-backs and political disturbances, however, led to increased poaching in 1992 and 1993, causing concern for the future of the rhino in this poor and backward state (see Tables 2, 3 and 4). S. Deb Roy, formerly Chief Conservator of Forests (Wildlife) Assam and formerly Inspector General of Forests (Wildlife) Government of India, believes that the challenge of saving the rhinos is probably much more intense at present than at any earlier time (Deb Roy, 1993).

Photo credit: Lucy Vigne



Greater one-horned rhinos may be very closely approached on elephant-back in Assam.



Map of Assam.

Table 1: Estimated wild populations of the greater one-horned rhino in India in 1993.

ASSAM		WEST BENGAL		UTTAR PRADESH	
Kaziranga National Park	1164	Jaldapara Wildlife Sanctuary	34	Dudhwa National Park	12
Manas National Park	60?	Garomara Wildlife Sanctuary	13		
Orang Wildlife Sanctuary	100				
Pabitora Wildlife Sanctuary	56				
Laokhowa Wildlife Sanctuary	5				
Other pockets	60				
Sub Total	1445	Sub Total	47	Sub Total	12
Total for India	1504				

Source: Forest Departments of Assam and West Bengal

Photo credit: Lucy Vigne



Kaziranga National Park provides excellent habitat for the greater one-horned rhinos.

Table 2: Number of known rhinos poached in Kaziranga and Manas.

YEAR	KAZIRANGA NATIONAL PARK	MANAS NATIONAL PARK
1962	-	1
1963	-	1
1964	-	0
1965	18	1
1966	6	0
1967	12	0
1968	9	0
1969	8	0
1970	2	0
1971	8	1
1972	0	0
1973	3	0
1974	3	0
1975	5	0
1976	1	4
1977	0	0
1978	5	1
1979	2	5
1980	11	0
1981	24	2
1982	25	1
1983	37	3
1984	28	4
1985	44	1
1986	45	1
1987	23	7
1988	24	1
1989	44	6
1990	35	2
1991	23	3
1992	49	11
1993	40	22
Total	534	78

Source: Forest Department of Assam

Table 3: Number of known rhinos poached elsewhere in Assam.

YEAR	ORANG WILDLIFE SANCTUARY	PABITORA WILDLIFE SANCTUARY	LAOKHOWA WILDLIFE SANCTUARY	OTHER AREAS IN ASSAM
1979	2	0	6	0
1980	3	0	1	3
1981	2	0	6	4
1982	5	0	5	8
1983	4	0	40	7
1984	3	4	0	6
1985	8	2	0	1
1986	3	0	0	4
1987	4	2	0	7
1988	5	4	1	9
1989	3	3	3	8
1990	0	2	0	6
1991	1	1	0	1
1992	2	3	0	2
1993	1	4	0	3
Total	46	25	62	69

Source: Forest Department of Assam

Table 4: Number of known rhinos poached in Assam from 1979 to 1993.

YEAR	NUMBER OF RHINOS POACHED
1979	15
1980	18
1981	38
1982	44
1983	91
1984	45
1985	56
1986	53
1987	43
1988	44
1989	67
1990	45
1991	29
1992	67
1993	70
Total	725

Source: Forest Department of Assam

KAZIRANGA NATIONAL PARK

Introduction

The first area in Assam gazetted for rhino protection was Kaziranga (see map) in 1908. At this time there were believed to be only a dozen or so Indian rhinos left there, but rhino numbers have now risen to an estimated 1,164 (see Table 5). The 430 km² of Kaziranga is ideal rhino habitat as two-thirds of the area is nutrient-rich grassland (Forest Department of Assam, 1993). As a result of its size and high carrying capacity, Kaziranga holds more rhinos than any other park or sanctuary in Asia.

Poaching, the illegal rhino horn trade, and anti-poaching needs

Poachers can enter Kaziranga easily as there is no natural barrier on the southern boundary of the Park. On the northern side, the two kilometre-wide Brahmaputra river acts as the boundary. Fishermen are allowed to fish there, however, even at night and sometimes they bring in

rifles (.303s and .315s) secretly and collude with illegal hunters. Most of the rhinos are killed with guns (see Table 6). Poaching gangs consist of around four to six people: two may carry guns, one cuts off the horn and perhaps another helper carries some food; there is also a field man, usually a local villager, who guides the gang in and out of the Park. The poachers are mainly Nagas (originally from Nagaland State), immigrants

Table 5: Number of rhinos in Kaziranga National Park.

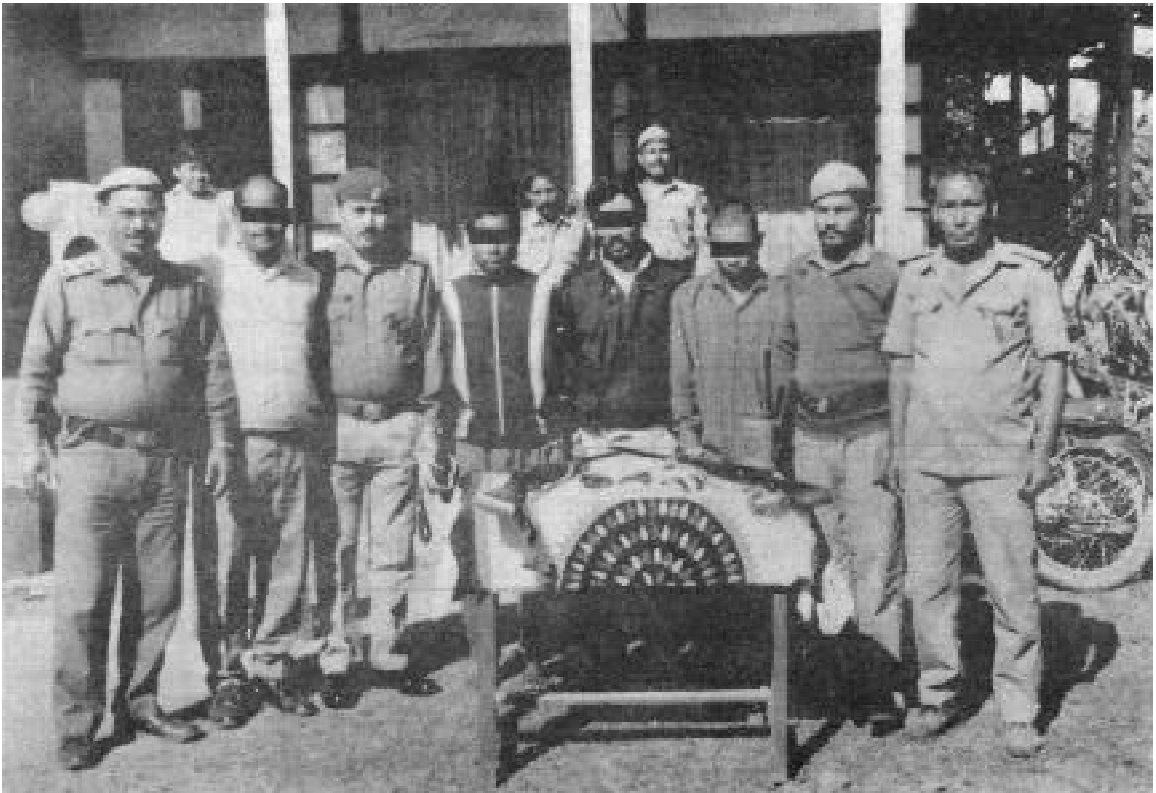
YEAR	NUMBER	COMMENT
1966	366	Census
1972	658	Census
1978	939	Census
1984	1080	Census
1991	1129	Census
1993	1164	Census

Source: Forest Department of Assam

Photo credit: Lucy Vigne



Poachers kill rhinos indiscriminately, often shooting the calf as well as the mother for the horn.



Government personnel are photographed with several poachers in Bokakhat next to Kaziranga National Park in December 1992. On the table are displayed two rifles and 13 rounds of ammunition which were confiscated from the poachers.

from Bangladesh and the Karbi tribe from the Karbi Anglong Hills on the southern side of the Park. They often enter the Park when it is dark. The poachers are indiscriminate, killing whatever rhinos they find first, including calves. They take the animal's horn, and occasionally the nails and tail. There is no time to take the meat. The gangs usually do not camp inside the Park because it is too risky and, after shooting a rhino, quickly leave with the horn.

There is a total of 437 field staff in Kaziranga, all engaged in anti-poaching work. About 284 forest guards and game watchers carry out foot patrols in rota in the Park during the day and night, usually in pairs, equipped with a gun and torch. Poachers are, however, rarely caught inside the Park, as it is easy to hide in long grass or forests.

There has been an increased availability of modern guns in Assam due to the political disturbances in the state, and thus pit poaching has become less common in Kaziranga since 1987 (see Table 6). Until 1980 most of the rhinos in Kaziranga were poached using pit traps,

whereby a rhino falls into a deep pit dug in a rhino's regular pathway (Martin, 1983). However, one pit poaching incident did occur in Kaziranga as recently as September 1993. This rhino must have fallen into a triangular pit, which had been covered with leaves, and the animal had its horn removed while it was still alive, and died later of starvation. Electrocuting from wires hooked to a power line (which runs along the Park's southern side) is another problem. This form of poaching was first seen in 1989 when three rhinos were killed in that year from the live wires which were suspended over the rhinos' pathways. Forest guards now patrol along the power line at night, thus reducing poaching by this method (see Table 6).

Poaching is most frequent during the dry season, in the first few months of the year, when every part of the Park is accessible. An organizer provides the guns and pays the shooters about \$320 (10,000 rupees) to \$640 and the others in the gang up to \$320 each for one horn weighing on average 722 grams; poachers are not usually paid by horn weight. Thus the average poaching gang received in 1993 the equivalent of \$1,550 to \$2,220

per kilo of rhino horn. The organizer sells the horn to the second trader for about \$6,008 to \$12,800 per kilo.

Poaching reached a peak in Kaziranga in 1992 with two rhinos killed in pits, two by electrocution and 45 by gunshots (see Table 6). This serious killing continued in 1993: 39 rhinos had been poached by early December, with 37 killed with guns and two in pits. The western sector of the Park has the greatest concentration of

rhinos, numbering over 600, and poaching in 1993 was acute here. For example, in February 1993 a villager guided three Naga poachers into this sector. When the gang came out of the Park an encounter took place with Park authorities. However, the forest guards are not allowed to kill poachers outside the Park. The guards instead wounded one person. The Nagas ran into the hills in the chaos and the local guide, who was holding the horn, took it to sell in the Nagaon area.

Table 6: Rhino mortality in Kaziranga National Park.

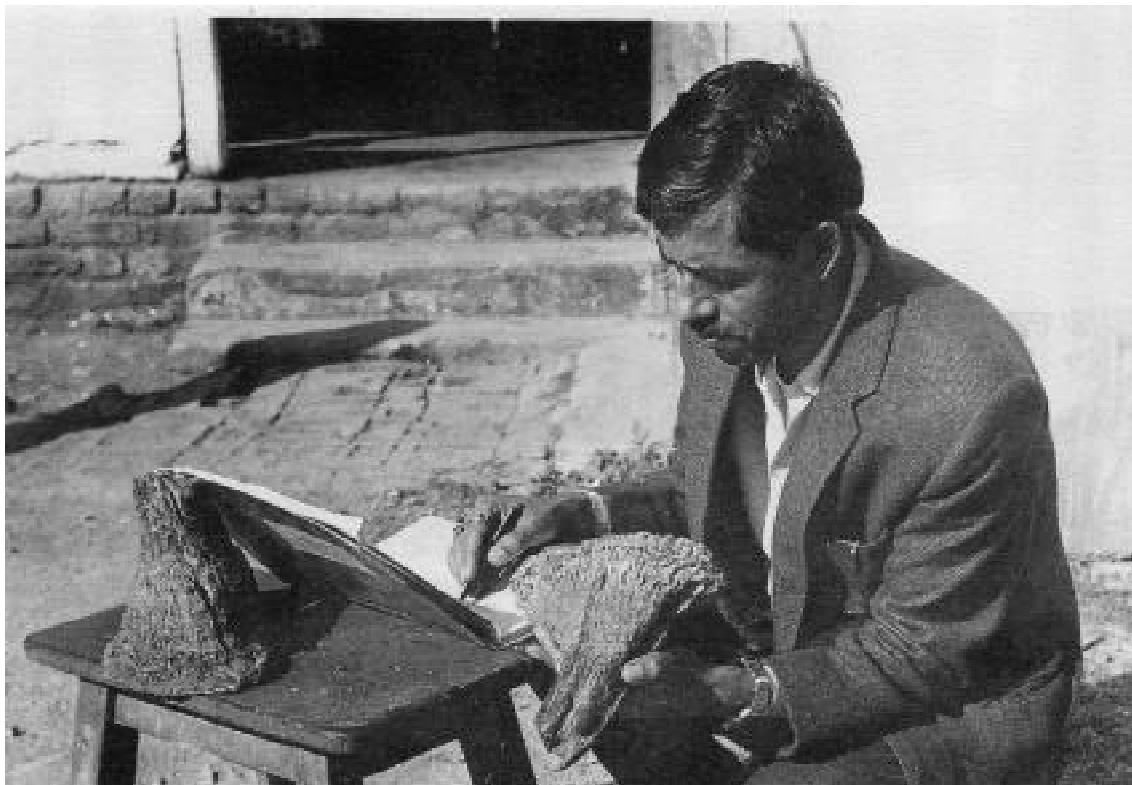
Year	Poaching			Total poaching	Natural death	Total mortality
	Pit	Gun	Electrocution			
1980	11	0	0	11	58	69
1981	22	2	0	24	39	63
1982	19	6	0	25	48	73
1983	31	6	0	37	46	83
1984	14	14	0	28	5	78
1985	23	21	0	44	37	81
1986	18	27	0	45	38	83
1987	6	17	0	23	41	64
1988	7	17	0	24	105	129
1989	12	29	3	44	54	98
1990	4	29	2	35	57	92
1991	4	18	1	23	79	102
1992	2	45	2	49	66	15
1993	2	37	0	39	54	93 (to 12 Nov)

Source: Sen 1993

Table 7: Encounters and raids in Kaziranga National Park.

Year	Number of poachers		Total arms recovered	Total ammunition recovered	Horns recovered
	Killed	Arrested			
1985	2	10	3	11	11
1986	2	43	5	0	9
1987	3	29	3	0	2
1988	3	13	1	7	1
1989	2	18	1	0	11
1990	3	49	11	104	6
1991	4	25	4	7	9
1992	9	58	9	96	9
1993	5	67	11	49	4

Source: Sen 1993



Rhino horns, which are recovered from poachers or from animals which die of natural causes, are registered at the Park headquarters before being transferred in locked containers to the state treasuries.

Police recovered four .315 guns and ammunition and arrested some people involved. They were released after only one-and-a-half months' imprisonment.

The most common way poachers are caught is through an informer. Although there is now virtually no money for an intelligence system, nor for informants, information does sometimes trickle in. During our visit, on 16 December 1993 a raid was conducted in the Karbi Anglong Hills by the Forest Department along with the police. These hills are a favourite refuge for poachers and guns as most areas cannot be approached by vehicle. The guns are all illegal, and come mainly from Nagaland, Burma and Bangladesh. Six people were arrested in possession of a US-made carbine, a 12-bore shotgun and a handmade pistol. The leader, a Bodo tribesman, escaped. He is known to have killed two rhinos in 1993. Such poachers, when caught, usually get bail after only about 15 days and do not go to prison for this particular incident again. Bail costs \$160 to \$320 and the advocates, who are often hired by the gang organizers, manage to spin out the court hearings for years. It is very difficult to prove legally that a person has killed a rhino. Furthermore, information extracted by force is not accepted by a magistrate.

Although, according to the Wildlife (Protection) Act 1972, a convicted poacher can get five years in prison, this never happens. Worse still, the traders are very rarely caught, although many names are known. In 1989 two people were apprehended carrying two rhino horns on a bus, but there has been no conviction yet. In practice, the law is not a deterrent to poaching. The real deterrent is the knowledge that poachers will be shot on sight in the Park (at least five were killed in 1993) or beaten up outside the Park in order to give information to the Forest Department (see Table 7).

In 1989, a well-known trader was murdered by the United Liberation Front of Assam (ULFA), a political organization which during its early days tried to protect the rhinos (Vigne & Martin, 1991). Although this illegal group of extremists has an official policy of not killing rhinos due to local pride in rhinos, there is evidence that certain members in the group have been involved recently in poaching and trading rhino horns in order to buy guns from Bangladesh and Burma. ULFA is less strong now, however, as some major arrests were made by the government and some members have surrendered.



Mr. S.K. Sen, Director of Kaziranga National Park inspects a forest guard camp on the northern boundary of the Park. Due to recent shortages of funds, the camp is in a state of disrepair. Plastic sheeting covers the leaking roof.

Poaching has definitely increased recently, and efforts must be made by the Police outside Kaziranga to break the trade links. The rhino horns are smuggled out through Calcutta, Siliguri in West Bengal, Nagaland, Burma and Bhutan; but details are not known as there is no money for an effective intelligence network.

More funding is urgently needed for Kaziranga's anti-poaching efforts. Presently there are inadequate wireless networks for the forest guards in the field. A further essential is for more modern guns. At present, Kaziranga has 170 .315 rifles and 47 12-bore shot guns, but not all are in working order. It has been suggested by an Army officer (WWF, 1993) that ex-servicemen should train the forest guards in the use of weapons, minor tactics and field-craft, including ambushes, and teach them how to maintain their guns and radio sets. The forest guards are presently no match for the poaching gangs.

The morale of the forest guards must be raised by improving their terms of service. They need new jerseys, boots, socks, raincoats, torches, knives and binoculars, as well as tents. Several men we saw on patrol were wearing tattered clothes and were barefoot. They should also be provided with free rations, especially since they have to run two households as their families have to live outside the Park. The camps are in disrepair and should have proper mosquito nets, blankets and tarpaulins for the leaking roofs. The staff need better medical facilities. Medicine and also a good veterinarian should be available for the 43 domesticated elephants in the Park.

Furthermore, the number of forest guards must be increased. Presently there are only three men per camp (there are 107 to 113 camps, all inside the Park). Two men patrol together all night and the third cooks and cleans leaving them barely time to sleep; in theory they are on duty 24 hours a day and are usually exhausted. Ideally there should be four men per camp allowing more time for rest. Out of the 437 field staff, at least 10% will be off sick and at least 10% on casual leave; the Director of Kaziranga, S.K. Sen, cannot afford to give them their much needed month's annual leave. Furthermore, life insurance cover plus adequate compensation for loss of life or disability should be provided by the government. Courageous work should be rewarded with 'decorations' leading to promotions (Deb Roy, 1993). The field staff on the whole are very good and hard-working and many have a great knowledge about rhinos, but they must be given respect and must have pride in doing their jobs; some of the men in the camps we visited complained to the Director about their poor working conditions and looked miserable. The Director's reply to their requests for rice and clothes was, "I will try". The field men are nevertheless dedicated and work diligently on patrol; but how much longer can this last as poaching gangs become more active?

The Director of Kaziranga believes that the best way to stop the poachers is to prevent them from entering the Park. The Director would like to build a minimum of 40 watch-towers along the southern Park boundary with

clear visibility from one tower to the next. A timber tower, 12 metres high, would cost about \$1,130. Surveillance towers would help to reduce the workload of the staff. On the northern boundary several speed-boats are needed for patrolling. Also, more jeeps (the Park has only five) and search-lights are required.

Probably the most cost-effective way of stopping the illegal rhino horn trade is by providing adequate funds for an intelligence network whereby informers are rewarded for their information. At present, funds for this are grossly inadequate; a mere \$1,450 was available for 1993. The Forest Department also needs more support from the police for law enforcement, as Forest staff can do little to stop poachers and traders beyond the Park boundaries.

Park maintenance and development requirements

Burning the dead, tall grass has always been the main management tool, enabling new shoots to grow and thus maintaining the grassland ecosystem. About 35% of the Park area is burned annually (Lahan, 1993). This requires little money. The creation of more highland for the rhinos is another requirement. During the monsoon, most of the Park is under water from the flooded Brahmaputra. In 1988 the flood was **so bad that 46 rhinos** died (Deb Roy, 1993). With increasing human settlement outside the Park on the

higher land, rhinos have nowhere to take refuge. Furthermore, road communication is reduced in the Park during the floods. Thus, raising the main roads would allow access to patrol vehicles during the rains and produce high ground for the animals. Bridges also must be maintained for mobility within the Park. During our visit these were collapsing, having remained unrepaired since the last flood due to lack of funds. In addition, many of the bodies of water need to be de-silted and cleared of exotic weeds, particularly water hyacinth, in order to improve the grasses, the main food for the rhinos.

There are seven Park extensions that have been agreed upon, six on the southern side, including highland areas, and one on the north, namely the Brahmaputra river section beside the Park and the islands within it, which will be a great asset in preventing fishermen from aiding poachers. Although some money has been paid, more funds are needed to complete the transaction. When finalized, the Park area will be 91 7 km² as opposed to the existing 430 km² (Lahan, 1993; Sen, 1993). A further improvement which will indirectly help the Park concerns assistance to the villagers on the Park fringes with development projects. The human population pressure around the Park has much increased. The number of people in North Bengal and Assam has more than doubled since Independence (Deb Roy, 1993). Although some people consider rhinos as an asset because of the revenue earned from tourism, others, especially many of the Bengali immigrants, do not like

Photo credit: Lucy Vigne



Kaziranga National Park needs much maintenance and development including (as shown -here in 1986) raising some roads to provide areas of highland for animals during floods.



The spongy, honey-comb-like appearance on the under-side of the horn from the greater one-horned rhino makes it difficult to produce realistic fake horns.

the Park as they get no legal benefits from it: no thatch, timber, firewood nor fish may be taken. There are too many restrictions on the local people which increase their antagonism towards the Park.

An ecological development programme was recently proposed by WWF India (WWF India, 1993). A main recommendation is to help more people get employment. Some casuals are at present employed in the Park at \$0.80 a day. Much more Park work is needed, which would help both Kaziranga and the villagers, if more money could be provided. The villagers also require tube-wells for clean water, proper medical facilities, education to improve conservation awareness, community afforestation projects and assistance to prevent crop losses. Crop damage, particularly by elephants, rhinos, buffaloes and wild boar, is the main cause of antagonism between the Park and the villagers. There is no compensation paid, unlike in the neighbouring state of West Bengal, but it should be, according to the Director of Kaziranga, who estimates that rhinos alone cause more than \$3,200 of damage a year. The Forest Department assists an underpaid and under-equipped 'crop protection squad', which needs to be improved (WWF India, 1993). If some villagers continue to suffer losses (including deaths from wild animals), and at the same time receive no legal benefits from the Park, they will be encouraged to harbour poachers. The Director of Kaziranga wants the fringe villagers to be the Park's second line of defence against

poachers. The villagers' support is absolutely essential to reduce poaching of the rhinos.

MANAS NATIONAL PARK

Introduction

Manas was gazetted a Wildlife Sanctuary in 1928 and elevated to the status of a National Park in 1990. The Park is 500 km² in size, running in a strip along the Bhutan/Assam border (see map). Only the southern boundary is close to villages; a buffer zone consisting of adjacent reserve forests extends the area to 2,837 km² in India plus an additional 439 km² of National Park, also called Manas, in Bhutan (Lahan, 1993). There are more than 20 endangered species in Manas and several are endemic, including the golden langur and pygmy hog. Manas became a Tiger Reserve in 1974 and a World Heritage Site in 1985. In 1990, Manas had 85 to 100 rhinos (see Table 8), although it could sustain 200 to 300, according to S.C. Dey, Director of Wildlife Preservation for the Government of India (pers. comm.). About two-thirds of the Park is ideal habitat for the species (Deb Roy, 1991). However, R.N. Hazarika, Chief Conservator of Forests (Wildlife) for Assam, fears rhino numbers could have halved since the 1990 estimate due to a great increase in poaching (pers. comm.). Officially, for 1993 the number of rhinos remaining is 60, a figure

Table 8: Number of rhinos in Manas National Park.

Year	Number	Source
1966	15	Estimate by Gee and quoted by Spillett (1966)
1976	40	Estimate by A. Laurie (1978)
1986	75—80	Estimate by Assam Forest Dept.
1989	85	Estimate by Assam Forest Dept.
1990	85—100	Estimate by Assam Forest Dept.
1992	80	Estimate by Assam Forest Dept.
1993	60	Estimate by Lahan, Director of Manas Park

which is not obtained from a census but is an estimate by the Park Director, P. Lahan. Personnel from a WWF project in Bhutan's Manas Park (where no rhinos are resident) have noticed that rhinos crossing over at night into Bhutan for grasses and minerals (and returning to the Indian side in the morning) have declined in number sharply from early 1992 to late 1993 (pers. comm.). No rhino carcasses have been found in Bhutan, however, although Indians do come across to poach deer and take timber illegally.

Rhino poaching

Since 1987, the All Bodo Students' Union has been demanding from the government a separate state of Bodoland, which would encompass Manas. The leaders want their own state in order to protect their culture, language and identity. In 1989, political strife increased; Bodo tribal terrorists killed over 100 villagers and invaded Manas, killing three wildlife employees. The Sanctuary became a Bodo refuge and 120 forest guards had to be removed until the agitation stopped (Vigne & Martin 1991). Manas has continued to be a hide-out for Bodos, who can easily escape from there into Bhutan. Whenever law and order breaks down due to the political disputes, Manas becomes open to all poachers who create havoc in the Park, poaching rhinos and other animals and cutting down trees.

In October 1992, Bodos burned down anti-poaching camps and ambushed patrol parties; two staff members were killed in this incident, making a total of six field staff killed by Bodos since the strife started.

Rhino poaching increased again.

On 3 March 1993 there was an attack on the Bashbari Range Office by suspected extremists. The Range Officer was stabbed almost to death, and nine rhino horns weighing over six kilos were stolen from the strongroom. Administration weakened and staff morale fell; 13 rhinos were poached in the same month (Hazarika, pers. comm.).

In 1990 there were 54 guard posts and three range headquarters in Manas (Lahan, pers. comm.). Camps which were not destroyed in the early 1990s despite repeated attacks, and those camps which have been rebuilt, are all occupied by forest staff (Lahan, pers. comm.). Many guards are reluctant to work in the remote areas of the Park, however, because of the insurgency (Hazarika & Lahan, pers. comm.). There are four platoons of the state police to help at Manas and more are being sent. The Chief Conservator of Forests (Wildlife) Assam hopes paramilitary forces will be given by the Central Government. No rhino has been poached from May to early December 1993 because Bodo agitations have decreased.

The Bodos are the only insurgents around Manas; they are involved in rhino poaching and trading in the horns in order to buy guns. Some horns are sold in Bhutan. A Bhutanese princess named Dekichoden Wangehuk was arrested at Taipei airport in September 1993 with 22 Indian rhino horns weighing 14.9 kilos. At a meeting with Jonathan Loh of Traffic Taipei she admitted to having bought these horns over a period of one or two years. She had purchased them from a trader (not a poacher) who had probably obtained them from Assam, she explained. The princess paid up to \$6,666 a kilo, and was hoping to sell the horns in Taiwan to pay off a business loan. One of her companies is based in the town of Phuntsholing in southern Bhutan not far from Manas; thus Manas is probably where most of the horns originated. According to officials in both West Bengal and Assam, the trade in horn to Bhutan has been active since the mid-1980s. One official told us that Bodos from Manas have been regularly going to Phuntsholing with horns from Manas and Kaziranga to sell to several traders. Indians are able to go to Phuntsholing without a visa or even a passport, but if they go farther into the country they need special permission. In order to reduce the poaching pressure on the remaining rhinos in Manas this Bhutanese trade connection must be severed.



Elephants destined for anti-poaching work and for tourist rides are trained at an early age as shown here in Orang Wildlife Sanctuary

Maintenance and development of the Park

The Central Government is becoming disillusioned about putting money into Manas to re-build bridges and buildings time and again, but it is essential that the government does allocate the necessary funds in order to keep a presence in Manas, or this important Park will be lost. At the moment there is money only to pay the 379 staff salaries and a few other expenses, according to P. Lahan, Director of Manas. The Park needs a lot of extra funds. "Let the camps be burned down and money 'wasted', but it is more important to keep the area" pleads the Chief Conservator of Forests (Wildlife) Assam (pers. comm.).

As for the long-term benefit of the Park, the people nearby must receive assistance. Only then will they support the Park authorities as opposed to helping the poachers. Crop damage is a problem: in a recent study of certain fringe villages south of the Park, 97% of the villagers are affected by elephant damage, 57% by deer, 52% by wild boar, 10% by monkeys, but only 5% by rhinos because the rhinos live in the central core of the Park and thus rarely come out to graze (Dey & Bhattacharjee, 1993). If insurance cover against crop damage could be provided by the state government, this would greatly reduce the adverse attitude of the people (which often results in people killing animals). Many of the villagers are hostile to Manas due to their feelings of deprivation and neglect.

Solutions to these problems have been studied by WWF India (Dey & Bhattacharjee, 1993); the first recommendation of this report states that influential residents should encourage and educate the villagers on the importance of protecting Manas. In addition, the government needs to spend a lot of money in upgrading the amenities for these villagers who presently are 74% illiterate and very poor.

ORANG WILDLIFE SANCTUARY

Introduction

Orang was first secured as a Game Reserve in 1915 because of its growing number of rhinos and in 1985 became a Wildlife Sanctuary. It lies on the north bank of the Brahmaputra, west of Kaziranga, and covers only 75.6 km² (see map). The first detailed census in 1985 recorded 65 rhinos. By 1991, 97 individuals were counted (see Table 9).

Poaching and anti-poaching activities

According to the former Range Officer of Orang, B.N. Talukdar, from 1978 to 1992 93% of Orang's poached rhinos were killed inside rather than outside the Sanctuary. Hardly any rhinos wander outside, despite its small size, because there is no overgrazing in the Sanctuary. Rhinos are not poached by electrocution in Orang as there are no power lines. There are, however, incidents of pit poaching in the dry season. Pit trapping for rhinos began

Table 9: Number of rhinos in Orang Wildlife Sanctuary

Year	Number	Source
1966	12—25	Estimate by Spillet (1966)
1976	25—30	Estimate by A. Laurie (1978)
1985	65	Census
1991	97	Census
1992	100	Estimate by Assam Forest Dept.
1993	100	Estimate by Assam Forest Dept.

in late 1984, and in that year and 1985 12 rhinos were caught in this way (Martin et al., 1987). Three types of pits are dug: a 1.8 metre rectangular one into which the rhino falls and breaks its neck; a similar hole with an hour-glass-shaped cross-section in which the rhino is suspended above the base of the hole and may not be killed; and one with a v-shaped cross-section with pointed bamboo poles dug into the bottom which sink into the rhino's stomach. The poachers camp near the pits and check them every night and morning until a rhino is caught (Talukdar, pers. comm.). Most rhinos are killed by poachers using guns. The organizer usually provides a gang of four or five with firearms. In 1992 such a gang received from the organizer \$171 to \$514 per person for one horn.

From 1982 to 1985 poaching was serious in Orang, with 20 rhinos illegally killed. More staff and equipment, including a jeep, were consequently put into the Sanctuary, and the road system was improved. Thus, poaching declined. There are now 80 field staff in Orang with 37 guns (mainly .303 rifles), plus 35 casual labourers, 20 armed Home Guards and 14 domesticated elephants for patrol work and tourist rides. From 1988 to 1991, the Range Officer spent an average of \$340 a year on an intelligence network, but in 1992 it was stopped due to lack of funds; he believes that \$645 a year is now needed to be effective. Useful poaching deterrents in the meantime are the five wild rogue elephants in Orang. From 1987 to 1992, one of them killed 18 people (16 of them women), all outside the Sanctuary. As a result, Orang has very few human trespassers and thus cattle are not brought in to graze. Only four rhinos have been poached from 1990 to the end of 1993.

Development and maintenance of the Sanctuary

Orang's main problem is that it cannot be expanded in size. On the north and east sides of the Sanctuary

are Bengali villages, while on the south and west sides Orang is being eroded by the Brahmaputra and Dhansiri rivers, respectively. Due to the Forest Department's severe cut-back in funds in 1993, repair work since the last floods has been minimal, and much maintenance is needed.

PABITORA WILDLIFE SANCTUARY

Introduction

Pabitora is further downstream from Kaziranga and covers a mere 16 km² (see map). With a population of at least 56 rhinos (counted in April 1993), it probably has the highest concentration of wild rhinos anywhere in the world (see Table 10). Pabitora was made into a Reserve Forest in 1971, and cattle and fishermen were then allowed in. In 1985 it became a Wildlife Sanctuary because of the growing rhino population, and people and their animals were officially excluded.

The illegal killing of rhinos

The present Range Officer, B.N. Talukdar, estimates that at least 75% of the poached rhinos are killed when they wander outside the Sanctuary, which about a third of them do each night to look for food. This is the major problem; if rhinos could be kept inside the Sanctuary, poaching would decline. The main hunters are Nagas, Bodos and Bangladeshis resident in Assam who obtain their rifles from Nagaland and Bangladesh. Pit poaching does not occur in Pabitora as the grass is so overgrazed that the diggers and the mounds of earth would be easily spotted. Three power lines run directly through the Sanctuary. The first electrocutions occurred in 1989 (Vigne & Martin, 1991). There were no cases in 1993, however. The lines are patrolled at night, including those which are located outside the Sanctuary in the nearby villages.

Pabitora has 78 field staff with 14 .315 rifles and one 12-bore shot gun. Fifteen casual labourers help to patrol, along with four Home Guards. There are 25

Table 10: Number of rhinos in Pabitora Wildlife Sanctuary.

Year	Number	Comment
1987	54	Census
1993	56	Census: includes rhino habitat outside sanctuary

Source: Forest Department of Assam

anti-poaching camps, 14 of which are now outside the Sanctuary. There used to be an intelligence system, but this has been brought to an end by the severe lack of funds. It must be re-established as poaching increased in 1992 and 1993 with seven rhinos killed.

Maintenance and development of the Wildlife Sanctuary

Since our last visit to Pabitora in 1990, the habitat has deteriorated drastically; grass two metres high is now just stubble. The main reason is that the villagers illegally graze about 3,000 cattle within this small Sanctuary, and cattle grazing has been getting steadily more intense (Talukdar, pers. comm.). It is the main threat after poaching. The rhinos leave the Sanctuary because of disturbance and insufficient food.

Pabitora is surrounded by Bengali villages, and crop damage by rhinos mainly trampling the paddy is second in importance to the damage from wild boar. Crop damage here is probably the most serious in the state, yet there is no compensation. In addition, rhinos killed at least two people in 1987 and one in 1992. At least 15 to 20 rhinos go out each night in the dry season when crops are growing, and sometimes wander more than 30 km. The field staff can only help by driving the rhinos back into the Sanctuary with firecrackers and gunshots. Due to the present shortage of funds, the ordinary

Sanctuary maintenance was not carried out in late 1993 after the monsoon. For example, during our visit, the roads had not been cleared, making patrol work harder. Another difficulty is that people continually come illegally into Pabitora for thatch and fish. To worsen the problem, there is a lake leased to fishermen until the year 2000 in the southern part of the Sanctuary, which further encourages poaching. To save Pabitora, the trespassing and overgrazing must be stopped; this needs police assistance. Attempts have been made, resulting in mob attacks by the villagers. In August 1993 one policeman was beaten by the local people, and the Range Officer was forced to kill a farmer in self-defence (Talukdar, pers. comm.).

Even if all the cattle were removed so that the grass could re-grow, the Sanctuary would still be too small for the 56 rhinos. Extensions to the Sanctuary have been proposed, but with villages on all sides, competition for land is severe.

CONCLUSION

The greater one-horned rhino in Assam has increased steadily in numbers since the start of this century, and considerable credit must be given to the people of Assam. An increase in political instability recently, however, poses a growing threat to the survival of the rhinos. There has been a steady rise in poaching

Photo credit: Esmond Bradley Martin and Lucy Vigne



The first rhino to be electrocuted by poachers in Asia was in Pabitora Wildlife Sanctuary in September 1989.

over the last few years. Rhino horns from poached rhinos are sold to buy guns and more guns kill more rhinos.

Furthermore, there is now a severe financial problem. The Forest Department could be capable of making significant sums of money from tourism, if it raised its fees; presently, entry fees are only \$ 16 (5 rupees) and an elephant ride \$1.67. Yet there is little incentive for the Forest Department to make these increases, as all funds go to the state government. Furthermore, with Assam's instability, due to political agitations from ULFA and the Bodos, and the need for non-Indians to obtain restricted area permits to visit, foreign tourists are extremely few.

Yet at this precarious time, the Central Government of India has ended a Rhino Conservation Scheme (1986/7 to 1991/2) which provided a much needed sum of \$3,888,000 (67.5 million rupees) (Hazarika, pers. comm.). This scheme greatly helped rhino conservation and, since its termination, poaching has increased significantly. The year 1993 witnessed the worst poaching this century, except for 1983 when there was a breakdown in law and order in the State. The Assam Forest Department at the moment cannot support its own rhino protection measures, nor can it provide the small sums of money desperately needed for an intelligence network. The Department and the Government of India, for the first time ever, are seeking international assistance for the rapidly escalating poaching problem (Hazarika and S.C. Dey, Inspector General Wildlife, Ministry of Environment and Forests, Government of India, pers. comm.; and Bist et al., 1994). A secure flow of funds must be provided to maintain the parks and sanctuaries on a regular basis. The people of Assam certainly deserve assistance, and it will be an act of disastrous negligence, and a huge loss to the world, if their cries for help are not answered quickly.

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REFERENCES

- Bist, S.S., Singh, V P., Choudhury, S. Pal, Sanai, R.P., Prasad, R.S. (1994) Funding/Equipment required for the next five years for management of rhinos in India. *Zoos' Print*. IX, 3,4, March-April, 35.
- Deb Roy, S. (1991) Manas - A Monograph. *Tiger Paper*. January-March, 6-15.
- Deb Roy, S. (1993) Rhino Conservation Action Plan. Ministry of Environment and Forests. Government of India (unpublished).
- Dey, S.C. & Bhattacharjee, P.C. (1993) Ecodevelopment in the southern periphery of the Manas National Park. Technical Report, Project 4838. WWF India (unpublished).
- Forest Department of Assam (1993) Kaziranga National Park (A status report)(unpublished).
- Lahan, P. (1993) Present status and distribution of the Indian Rhinoceros (*Rhinoceros unicornis*) in the wild in Assam and its habitat. Assam Forest Department (unpublished).
- Laurie, W.A. (1978) The ecology and behaviour of the greater one-horned rhinoceros. A dissertation submitted to the University of Cambridge for the degree of Doctor of Philosophy (unpublished).
- Martin, E.B. (1983) *Rhino Exploitation*. WWF Hong Kong.
- Martin, E.B., Martin, C.B., and Vigne, L. (1987) Conservation Crisis - The Rhinoceros in India. *Oryx*. 21, 212-218.
- Sen, S.K. (1993) Status report on Kaziranga National Park. Assam Forest Department (unpublished).
- Spillett, J.J. (1966) A report on wildlife surveys in North India and Southern Nepal. *J. Bombay Nat. Hist. Soc.* 63, 492-628.
- Vigne, L. & Martin, E.B. (1991) Assam's rhinos face new poaching threats. *Oryx*. 25, 215-221.
- WWF India (1993) Project Kaziranga (unpublished).

BLACK RHINO ON PRIVATE LAND - THE EXPERIENCE OF LAPALALA WILDERNESS, SOUTH AFRICA

**The small black rhino population at Lapalala Wilderness
provides a case study for the effectiveness of private sanctuaries.**

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Between 1990 and 1992, ten black rhino (now four bulls and six cows) were re-established in the Lapalala Wilderness, a 244km² privately-owned property in the Waterberg Mountain range in the Western Transvaal, South Africa.

The reserve can be visualized as a large plateau, with a mean altitude of 11 00m, dissected by many drainage valleys. The main drainage rivers are the Lephelela (Sotho for “barrier”), and the Kgekong which flows during all but a few months of the year. The Lephelela river wanders for 55km through the reserve.

The vegetation of the reserve falls into two of the veld types described as mixed bushveld and sour bushveld. The reserve has an average rainfall of between 450 and 500mm per annum. Prior to the black rhino introduction, an area of approximately 1 0,000ha was designated as a breeding sanctuary for roan antelope and white rhino. The sanctuary is totally enclosed with an I 8-strand game-proof fence which is not electrified.

During 1990, the Natal Parks Board announced that five black rhino, two bulls and three cows, would be sold at their auction in June of that year, the first breeding herd of black rhino ever to go onto private land in South Africa. Eight reserves applied for classification and all eight were approved by the Natal Parks Board. In the case of Lapalala, the assessment was based on data collected over the previous nine years, which included a one-day evaluation by A. Marchant and P. Hitchins on behalf of the Natal Parks Board.

At the 1990 auction, Dale Parker, owner of Lapalala Wilderness, successfully bid in excess of R2,000,000 making him the first private individual to own black rhino. The animals were translocated to Lapalala holding pens, which had taken two months to construct, towards the end of August. They were kept there until after the summer rains, which did not fall before the end of

November that year. The re-establishment of black rhino at Lapalala Wilderness was due to a number of reasons. Firstly, the black rhino has been absent in the Waterberg mountains for at least 150 years. The original mission statement of Lapalala Wilderness, which was established in 1981, included the conservation of rare and endangered species. The author of the statement had been making approaches to the Natal Parks Board for seven years, asking that Lapalala be considered as a custodian of the black rhino. Up to that time it was not believed that rhino would be made available by auction or for sale to private landowners. In the case of the owner, it was the personal gratification of being involved in the conservation of a highly endangered species.

The release from the holding pens into the sanctuary was not entirely successful. One female died for reasons which have never been established. She was discovered when it was far too late to make any positive assessment of the cause of death. This was mainly due to inexperience on the part of the game scouts at the time and mistaken reports by one senior member of staff, who wrongly recorded seeing her up to a week before the body was found. In addition, the vegetation is extremely dense. The remaining four rhino settled in very well.

At the Natal Parks Board's auction, Dale Parker once again successfully bid R2.3 million to acquire a further five black rhino - three cows and two bulls. These five rhino were translocated to Lapalala within two weeks; this time there was no eight-week delay for boma construction and no difficulties were experienced in the release which took place over a period of one week, 15 days after arrival. Precautions were taken and the tips of the horns were cut. However, no serious confrontations took place initially, perhaps because the five new animals were about the same age as the resident rhino. Despite the fact that 1992 was the worst drought in more than a decade, all nine rhino coped well. The fears we had had concerning the first introduction seemed to have been unfounded.

POST RELEASE MANAGEMENT

Two questions remained unanswered, however. How would nine black rhino settle in the 10,000ha and secondly, what was the realistic carrying capacity for the area?

There are at present six game scouts who patrol the sanctuary daily in pairs, checking fencelines and water points, recording all sightings of general game and monitoring every individual rhino located. All information has to be corroborated by the second game scout and all sightings are recorded by Ms. Glynis Brown every morning and then transferred onto a computer. Monitoring is carried out seven days a week.

The diversity of plants in the Waterberg is considerable and since 1990, an ongoing programme has been in place to identify plants eaten by the rhino. A number of species that are well utilized are corkbush (*Mundulea sericea*), tamboti (*Spirostachys africana*), mountain karree (*Rhus leptodictya*), the spineless monkey orange (*Strychnos madagascariensis*) and the hornpod tree (*Diplorhynchus condylocarpon*).

HOME RANGES

The two bulls introduced in 1990 routinely overlap in their movements. However, the two most recently introduced bulls occupy separate zones with the larger bull mainly standing in the eastern area and the young bull in the western sector. The dominant bull of the 1990 introduction does not tolerate either of the two bulls introduced later. The females, with the exception of one that moves around very closely with the 1992 bull, have no difficulty in overlapping areas. While it is early to make firm predictions, there are indications that the sanctuary has reached its carrying capacity for mature bulls. In my opinion, it would be ill-advised to introduce any more bulls.

DISCUSSION

To address the question of food availability to support an excess of the present rhino population, we have

established a detailed plant collection to identify what the rhino are eating. Beyond the 10,000ha already set aside, there is a possibility of further enlargement of the sanctuary by 1,800ha at the end of 1994 and eventually an additional 4,000ha. The Iwaba Estate in Zimbabwe, which is approximately the same size as the current Lapalala rhino sanctuary, offers an interesting comparison. The first four mature bulls were introduced over a four-year period (1986-1989), and a total of 25 rhino were translocated to the estate. Every new bull introduced was killed by the resident four. Iwaba also experienced the loss of a number of introduced pregnant females. Nevertheless, 11 calves have been born since 1989 and the present population is 19. The Department of National Parks and Wildlife Management, Zimbabwe has since translocated four rhino out of the sanctuary.

RECOMMENDATIONS

In the case of Lapalala Wilderness, I believe that any potential problems which might have occurred were largely avoided by introducing rhino of roughly the same age group, and also by the size of the sanctuary - meaning little competition in terms of food and availability of good water. Even so, there are gaps in our understanding. A strong case exists for a much more thorough assessment of future private sanctuaries before any black rhino relocations take place. Furthermore, I believe that a far more detailed habitat assessment should take place. While it has been suggested that it might have been preferable to introduce all ten rhino together, our experience indicates that, providing the area is large enough and the bulls are of a comparable age, introductions at different periods should not be too problematic - as long as 50% of the estimated carrying capacity is not exceeded. Further considerations should include commitment on the part of the landowners, and, in terms of security, distance from large populations of humans and international borders.

ACKNOWLEDGEMENTS:

My thanks to Dr. Martin Brooks for commenting on the draft, Iwaba Estate for information and Sally Antrobus for comment.

POPULATION CHARACTERISTICS AND IMPACTS ON WOODY VEGETATION OF ELEPHANTS ON NAZINGA GAME RANCH, BURKINA FASO

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ABSTRACT

A total count of elephants of Nazinga Game Ranch identified 268 animals while a transect sample survey estimated 234 ± 379 animals. Because of the large confidence interval produced by a highly clumped distribution of elephants, a total count seems to be the most acceptable method of monitoring the population. The Nazinga elephant population is young with 79% under 15 years of age and a sex ratio that favours females 67% to 33%. Vegetation impact is characterized by broken branches and stems, mainly in the small diameter classes of trees and shrubs. Most often damaged species were *Vitellaria paradoxa*, *Acacia gourmaensis* and *A. dudgeonii*. Elephants on Nazinga are better protected than in national parks and more ingress from outside the ranch can be expected. Because of its age and sex structure, this population is expected to increase rapidly, which would lead to significant impacts on vegetation and depredations on surrounding villages. These changes will present challenges to the ranch management.

INTRODUCTION

Burkina Faso is a landlocked country in West Africa with an area of 274,000km² and a population of 8,000,000 (Direction de la Presse Presidentielle, 1988). The economy of the country is based on animal husbandry and agricultural crops (sorghum, millet, maize, groundnuts, cotton, sesame, rice and sugarcane). Tourism is relatively undeveloped and wildlife-associated visits have been primarily for big game hunting (*The Statesman's Year Book 1985-86*). Opportunities for developing wildlife-related tourism in Burkina Faso are linked to the country's elephant populations, prompting interest in better understanding these animals.

Estimates from the African Elephant and Rhino Specialist Group (1987) indicated that Burkina Faso contained

approximately 3,900 elephants, ranking it first among the 14 West African countries. Moreover, the northern part of the country contains a portion of the seasonal range for the Sahel elephant populations which migrate annually to Burkina Faso from Mali and Niger (*Nature et Faune*, 1989). Resident elephants are distributed in five game reserves and three national parks (Direction de la Protection, 1988). These national parks are Arly and the "W" in the southeastern part of the country, and Kabore Tambi National Park (KTNP) in the south-central region, approximately 25km north of Nazinga Game Ranch (Figure 1).

Because of the rapid increase in numbers of elephants on Nazinga Game Ranch, presumably through migration from KTNP, our study was initiated to investigate their impact on woody vegetation and surrounding village crops. Specific study objectives were to refine methods for estimating numbers of elephants on Nazinga, to characterize elephant population sex and age structure, to document impacts on woody vegetation on the ranch and to identify social impact on local communities surrounding the ranch. We have reported previously on social impact and attitudes of local villagers toward elephants (Damiba & Ables, 1992).

STUDY AREA

Nazinga Game Ranch is located in south-central Burkina Faso, 202km south of the capital city of Ouagadougou and half way between the cities of Po and Leo (Figure 1). The core area of the ranch (Figure 2) covers 806km² with a buffer zone on the south that increases the total area to 940km². Facilities include offices, lodgings for employees, accommodation for tourists (restaurant and bungalows), an abattoir, a research centre and a network of trails and primitive roads. The ranch was created in 1979 to protect wildlife species threatened by poaching and agricultural encroachment, to create jobs for local peoples and to provide a sustained yield of harvestable wild game. Since November 1989, the ranch has been

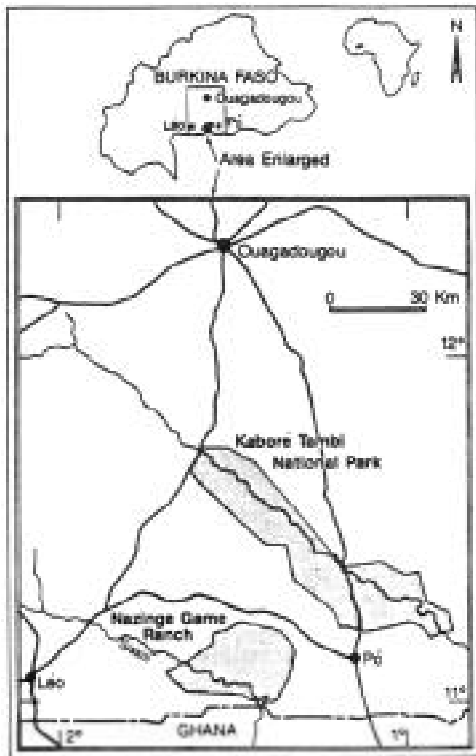


Figure 1. Location of the Nazinga Game Ranch in Burkina Faso (adapted from IUCN-SCD 1988).

self-sustaining, with income generated from cropping harvestable quotas of game species, safari hunting by expatriates and more recently, by an increase in tourists.

The ranch landscape consists of flat plains (76%), low plateaux and undulating terrain (13%), riverine and low lands (10%) and forests (1%) (Decker, 1988). The altitude is approximately 300m above sea level (Damez-Fontaine, 1987). Climate is of the sudanian type with six months of drought and six months of rains and an average annual precipitation of 1,000 to 1,100mm (IUCN-CDC, 1988). During the dry season a major wind, the Harmattan, blows from the northeast and brings dry continental air from the Sahara desert. The ranch is drained by the Sissili river and its two seasonal tributaries, the Dawavele and Nazinga rivers (Figure 2). At 11 locations on these rivers, small dams have been constructed to provide permanent water for wildlife during the dry season.

Decker (1988) characterized Nazinga vegetation as woody plains dominated by *Vitellaria paradoxa*, *Terminalia avicennioides* and *Combretum glutinosum* with islands of *Isoblerlinia doka* woodlands. Common lowland and riverine trees are *Daniellia oliverii*, *Anogeisus leiocarpus*, *Mytragina inermis*, *Cola lauriflora* and *Combretum nigricans*. Small forests

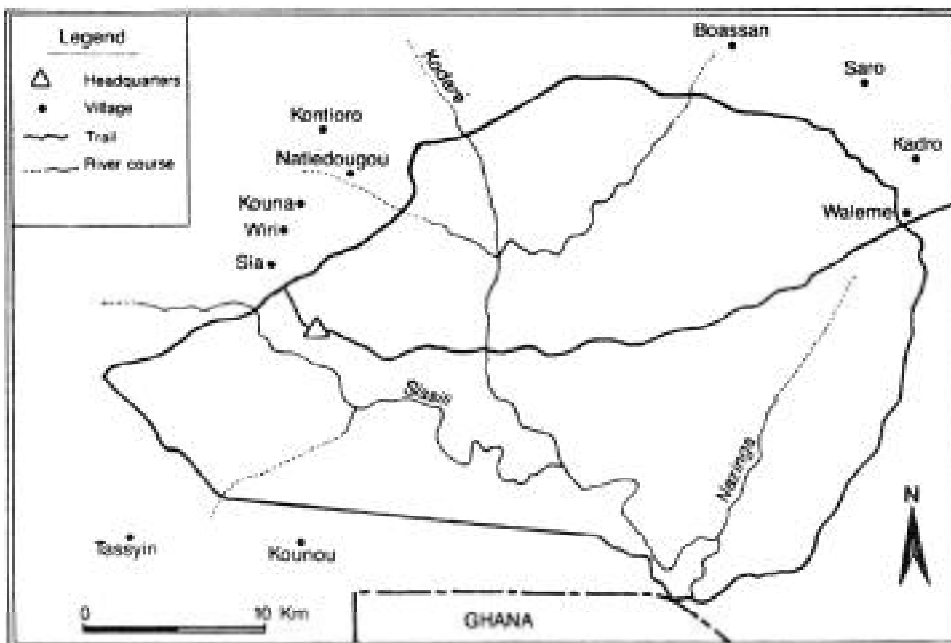


Figure 2. Outline map of Nazinga Game Ranch, Burkina Faso.

and gallery forests contain *Anogeisus leiocarpus*, *Khaya senegalensis*, *Diospyros mespiliformis* and *Piliostigma thonningii*. Major perennial grasses on the more open plains are *Hyparrhenia involucreta*, *Andropogon acinodis* and *Schizachirium sanguineum*; on the lowlands, grasses include *Andropogon gayanus*, *Vetiveria nigritana* and *Sporobolus pyramidalis*; and the gallery forests contain *Andropogon gayanus* and *Pennisetum subangustum*. Like elsewhere in West Africa, climate, fire and cultural practices have influenced the physiognomy, composition and distribution of the savanna vegetation (Cole, 1986). Fire is used as a major management tool in the various habitat types with a portion of the ranch being burned each year. In addition, accidental human-caused fires occur every three years on average.

Other common herbivores on Nazinga, in order of decreasing abundance, are as follows: warthog (*Phacochoerus aethiopicus*), roan antelope (*Hippotragus equinus*), oribi (*Ourebia ourebi*), Grimm's duiker (*Sylvicapra grimmia*), bushbuck (*Tragelaphus scriptus*), hartebeest (*Alcelaphus buselphus*), African buffalo (*Syncerus caffer*) and Defassa waterbuck (*Kobus defassa*). Less common species include western kob (*Kobus kob*), Hobor reedbuck (*Redunca redunca*) and red-flanked duiker (*Cephalotus rufilatus*). The ranch supports a large population of baboons (*Papio anubis*) while vervet monkeys (*Cercopithecus aethiops*) and patas monkeys (*Erythrocebus patas*) are common. Major game birds include helmeted Guinea fowl (*Meleagris numida*), double-spurred francolin (*Francolinus bicalcaratus*) and stone partridge (*Ptilipachus petrosus*).

METHODS

Population estimates

A line transect method which involved recording each animal observed and its perpendicular distance from the line of travel 'was used to survey the elephant population along with other wildlife species on the ranch. Our methods followed the one described by Burnham *et al.* (1980) and adapted for Nazinga by O'Donoghue (1984). Fifty-one permanently marked transect lines of varying length, evenly spaced 1.4km apart, were established to cover the entire ranch. Animal detection distances varied from 0 to 180m. Data recorded for elephants included group size, sex and age of all individuals, distance from the transect starting point, direction (magnetic azimuth) of animals

when first sighted, and distance from observer to the elephant group when first sighted. Perpendicular distances from the line of travel to elephant groups were calculated later. The magnetic azimuths were measured with compasses while the sighting distances were estimated visually. In order to minimize errors introduced by visual estimates, the team leader of each survey group was trained, and the importance of accurate estimates was explained, as recommended by Scott *et al.* (1981).

In the field, teams of three observers started walking transects at dawn. Direction of travel was by compass bearing and depended upon the prevailing wind. The team leader navigated and recorded data while the other two members of the team spotted animals. Population density was estimated from the computer programme, TRANSECT, (Burnham *et al.*, 1980) which uses the Fourier series or modified Haynes techniques. However, due to the relatively low number of elephant groups sighted during the survey, an optimum nonparametric method based on ordered distances (Patil, *et al.*, 1982) provided a more appropriate method for elephant estimates whereas for other wildlife species the Fourier series was satisfactory.

Cataloguing

Cataloguing is a technique used to recognize individuals in a population through careful identification of natural markings. We used this technique as a check on accuracy of sample surveys and to obtain exact sex and age ratios. This portion of the study lasted three months. Useful animal features included frontal line, height, shape and dimensions of tusks and tails, splits on ears, and any other features or markings which were distinctive.

Age determinations

Ages of live animals in the field were estimated by use of a pair of 7x50 binoculars with graduated optical scales. The shoulder height of the target animal (as observed through the binoculars) was recorded in graduated units. The distance to the target animal was measured with a tape measure and shoulder height calculated using standard trigonometric methods. Accuracy of the method was validated using measured heights on vegetation. Elephants were then grouped into five age classes according to equations developed by Laws (1975) and criteria specific to the Nazinga elephant population (Jachmann, 1986; Damez-Fontaine, 1987). Due to the tendency of elephants to

move out of visual range of the observers before all measurements could be made, a more rapid estimate of age classes was also used. Approximately 50% of animals were aged by measurement and 50% by estimation.

Woody vegetation survey

Forty circular plots with a 30m radius, were positioned approximately five km apart on the ranch. Within each plot the numbers of each species of shrub and tree were recorded. The plot was assigned to a major vegetative type and evaluated as recently burned or not. Damage by elephants was categorized as:

1. broken branches,
2. broken stems,
3. broken tops,
4. pushed over,
5. uprooted,
6. overbrowsed, or
7. debarked.

Only trees and shrubs damaged since the previous growing season were considered. Basal diameters taken 10cm above the ground were used to assign damage to size categories.

RESU LTS

Population estimates

Fifty-one transects 665.8km were walked.

Only four elephant groups totaling 85 elephants were sighted. The estimate was 234 ± 379 elephants. The cataloguing techniques resulted in an actual count of 268 individual animals. Five major elephant clans accounted for 198 animals. Within these clans were several small family units or sub-clans. The second social grouping was composed of eight distinct family units of 51 elephants which seldom associated with a larger clan. The third grouping was composed of groups of a few bulls each and accounted for 17 individuals. The remaining elephants were loners with very localized ranges, mainly in the south western part of the ranch.

Age structure of the population

The age structure displayed is based on 118 animals, or 44% of the population. The distribution of age classes in five-year increments (Figure 3) shows a very young population with 79% of the animals being less than 15 years of age. The female: male sex ratio was 2:1 (67% to 33%). There was no significant difference in the age distribution of male and female segments of the population.

Impacts on vegetation

The circular plots contained a total of 2,274 trees and shrubs of which 20% had some degree of damage by elephants. The most common kinds of damage were broken branches and broken stems (Figure 4). The least common form of damage was overbrowsing. The

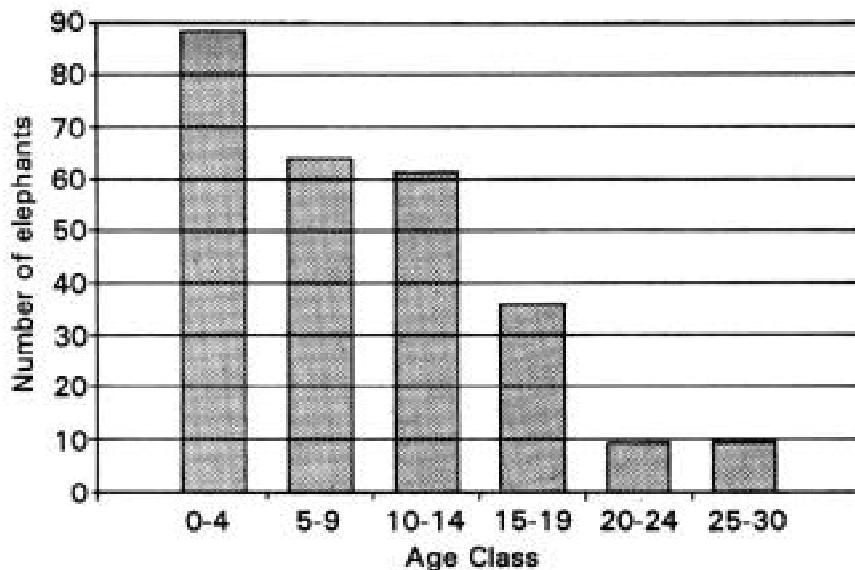


Figure 3. Age distribution of the elephant population on Nazinga Game Ranch.

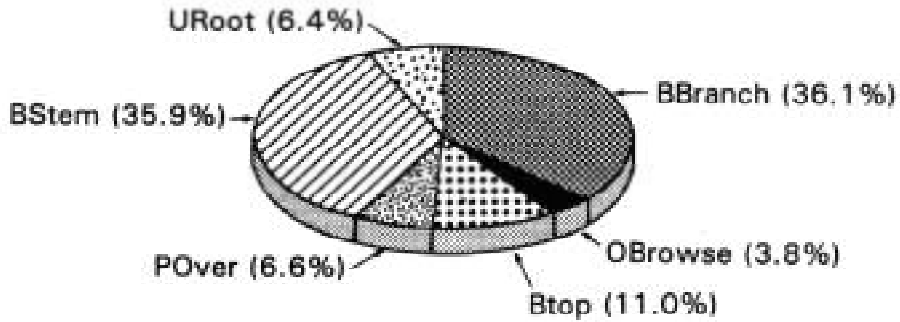


Figure 4. Frequencies on the different types of damage caused by elephants on vegetation on Nazinga Game Ranch. BBranch = broken branches, BStem = broken stems, Btop= broken tops, URoot = uprooted, POver = pushed over, OBrowse = overbrowsed.

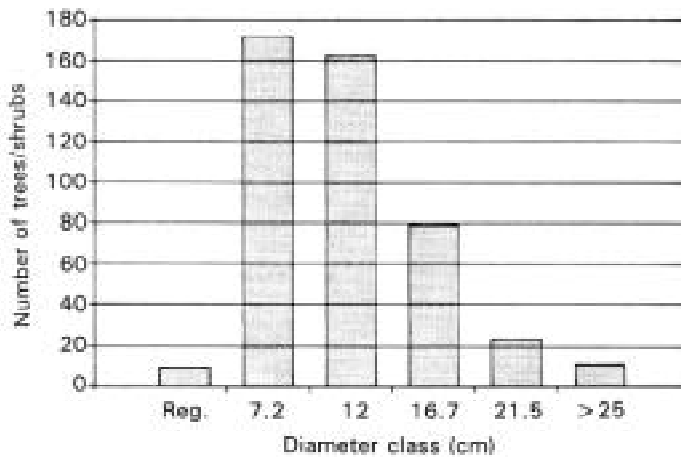


Figure 5. Elephant impact by tree/shrub diameter class on Nazinga Game Ranch. Reg = regeneration tree/shrub diameter class (3.2 - 4.8 cm).

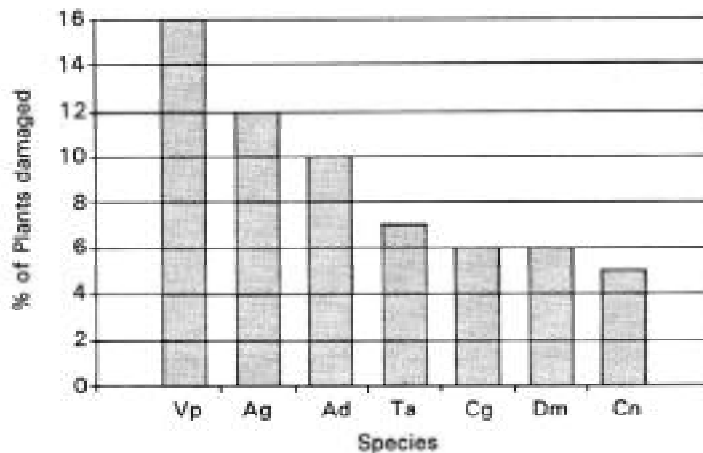


Figure 6. The 7 tree species most impacted by elephants on Nazinga Game Ranch. Vp = *Vitellaria paradoxa*, Ag = *Acacia gourmaensis*, Ad = *A. dudgeonii*, Ta = *Terminalia avicennioides*, Cg = *Combretum glutinosum*, Cn = *C. nigricans*, Dm = *Detarium microcarpum*.

level of impact was highest in diameter classes of 7.2cm (38% of damage) and 12cm (36% of damage) (Figure 5). **Seven tree species sustained two-thirds of the damage (Figure 6). Debarking was more selective and occurred most commonly on species of the genus *Lannea*. All species of this genus had some level of debarking.**

Elephant damage to woody plants on the ranch occurred in a non-random manner ($P < 0.001$), suggesting that damage is selective and highly localized. Of the 40 sample plots, 29 showed elephant damage while others were untouched. There was no significant difference between tree/shrub densities on damaged versus undamaged plots ($P > 0.025$), nor was there a correlation between numbers of damaged plants per plot and tree/shrub density on the plot ($r = 0.28$, $P > 0.025$). However, there was a correlation between numbers of woody stems damaged per plot and species richness of the plots ($r = 0.80$, $P < 0.001$). Plots recently burned which had more than 5% of stems damaged by elephants showed less woody plant regeneration than plots having only fire or only elephant damage, though the difference was not statistically significant.

DISCUSSION

Though the line transect method provided an estimate of the elephant population that was an acceptable approximation of actual numbers present, the large confidence intervals preclude its use as a reliable method on species with highly aggregated distributions. As in our study, prior estimates of the Nazinga elephant population based on the line transect (Jachmann, 1988) produced an acceptable estimate (306 ± 646) but one with large confidence intervals. An additional problem with the line transect method is its cost. Surveys were done on consecutive days using 10, three-person crews until the task was accomplished. Crew members had to be trained and paid both for training time and for survey time, making duplicate surveys prohibitively expensive. Road counts have been tried on Nazinga and provided an estimate of 293 ± 222 elephants (Jachmann, 1988). Without some kind of cataloguing scheme to supplement road surveys, this method is likely to produce double counts, the probability of which increases with survey duration. Aerial surveys of Nazinga have so far failed to provide reliable estimates. Estimates were either too large (610 animals, Jachmann, 1988) or confidence intervals were too broad (Hebier, pers. comm.). Scat counts were subject to serious errors (Eberhardt & Van Eten, 1956) and require extensive

sampling to be reliable (Neff, 1968). We believe that some sort of total count with provisions to prevent double counting is best for Nazinga even though such an approach will be time consuming. This method can be combined with sex and age estimation techniques to provide the most useful data.

Criteria used to classify the Nazinga elephants into age groups were based on data from East Africa. West African elephants may not follow the same growth patterns. There is a need for quantification of the relationship between shoulder height and age in West African elephants. Regardless of any errors in age groupings, the Nazinga elephant population is composed primarily of young animals and may, therefore, be expected to increase rapidly. This potential for increase will be enhanced due to the imbalanced sex ratio that favours females. This presumption is supported by comparing the population structure in previous years (DamezFountaine, 1987) with that in 1990. Age structures in 1987 and 1990 are significantly different ($P < 0.001$) with the major differences being in the higher proportions of animals in the younger age classes in 1990. These changes may be caused either by a high birth rate combined with high calf survival, or an increase in immigration of females with calves into Nazinga, or both these factors combined.

The age structure of Nazinga elephants is similar to those of most other elephant populations across Africa in recent years. Ottichilo (1986) found that most elephants in Tsavo National Park, Kenya, were under 15 years of age, while Poole and Thomsen (1989) pointed out that most African elephant populations were young with a sex ratio skewed toward females. Poaching has been a major factor in changing age structure and skewing sex ratios. We believe that the Nazinga elephant population has been shaped by the same factors. Furthermore, the Nazinga elephants have probably sought refuge on the ranch in recent years because of poaching and other forms of harassment within and in the vicinity of the KTNP to the north.

Even though it generally appears that there is not yet an "elephant problem" in terms of vegetation impact on Nazinga, extensive tree/shrub damage is evident in some areas. Some plots in the plain-shrub savannas of the central and western portions of the ranch had up to 88% of woody stems with some form of damage. Furthermore, since impacts are greater on certain diameter classes and there is preference for some species over others, the age structure and species composition

of the woody vegetation is being changed on parts of the ranch. The heaviest damage recorded was in plots containing almost pure stands of *Acacia dudgeonii* and *A. gourmaensis*. These plots contained very few stems in the lower diameter classes, suggesting that regeneration of these species was being impeded. Rood (1987) estimated that 8.3% of trees on the entire ranch was damaged by elephants. This would mean that damage has more than doubled in the six-year period since Rood's study. Fowler and Smith (1973) estimated the critical threshold for savanna elephants to be 0.5 animals/km², above which the habitat is likely to be altered. Jachmann (1988) suggested the same threshold density for Nazinga. The present elephant density on Nazinga is 0.3 animals/km² and is likely to increase in the near future. Extensive debarking, breaking off of fruit bearing branches, pushing over entire trees and altering age and species composition on woody vegetation will reduce the carrying capacity for elephants as well as having an influence on other wildlife species.

CONCLUSION

In conclusion, the Nazinga elephant population is young and has the potential for rapid increase, since it is more secure than populations in national parks. It is noteworthy that inhabitants of 11 villages adjacent to the ranch are for the most part tolerant of elephants, mainly because of other benefits derived from the ranch (Damiba & Ables, 1992). This tolerance will diminish if elephant incursions into fields and gardens increase much beyond the current level.

Tourism on the ranch has increased, and elephants are a major attraction. The tourism potential has hardly been tapped and offers a major opportunity for generating income, thus offering greater incentive to protect the elephant population. However, like most protected areas surrounded by human developments, wildlife creates conflict both within and outside its sanctuary. With elephants this problem is magnified by their capacity to alter their environment and to wreck havoc on crops and gardens.

Active management intervention is likely to become necessary for elephants on Nazinga. The hands-off policy practised in many parks and reserves around the world is often counter productive because most sanctuaries are just segments of ecosystems. Natural population regulation of wildlife species cannot function well in smaller areas where dispersal is limited, and

natural controls such as predators are absent. In the case of elephants on Nazinga, natural population controls are not likely to operate before the habitat has been drastically altered, incursions into surrounding farms have become intolerable and elephants have begun to die of starvation and disease. None of these options seems acceptable.

RECOMMENDATIONS

We recommend continual, yearly monitoring of the Nazinga elephant population to include estimates of population size, sex and age structure. Monitoring of the vegetation plots is essential to assess changes in impacts of elephants on woody vegetation. The role of fire combined with elephant impacts on woody vegetation and its regeneration should be studied more intensively, if the savanna vegetative complex is to be maintained. There is a need to document further the extent of elephant depredations on local village lands and possibly to offer assistance to villagers in terms of preventing damage and compensating damages incurred. Home range patterns and movements of ranch elephants are not well understood and need clarifying. Most importantly, the ranch management needs to be prepared for active interventions should the elephant population increase to the point where depredations on crops and serious changes in woody vegetation occur. Great care and sensitivity will be needed. "Elephants are not beetles" as Poole and Thomsen (1989) so eloquently stated and should not be controlled just to protect trees. Rather, the objective is to maintain a complex of species in balance with their environment and with each other on a long-term basis.

ACKNOWLEDGEMENTS

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REFERENCES

- African Elephant and Rhino Specialist Group (1987) Elephant population estimates, trends, ivory quotas and harvests. Report to the CITES Secretariat, Doc. 6.21. Annex 2. Typescript. 12pp.

- Burnham, K.P., Anderson, D.R. & Laake, J.L. (1980) Estimation of density from line transect sampling of biological populations. *Wildl. Monogr.* 72, 173pp.
- Cole, M. M. (1986) *The savannas: biogeography and geobotany*. Academic Press, London. pp. 254-264.
- Damez-Fontaine, I. (1987) Etude des parametres de la population d'éléphants à Nazinga. Ministère de l'Environnement et du Tourisme, Ougadougou, Burkina Faso. 34pp.
- Damiba, T.E. & Ables, E.D. (1992) Promising future for an elephant population - a case study in Burkina Faso, West Africa. *Oryx* 27, 97-103.
- Decker, C.J. (1988) Woody vegetation in the riverine and plains landscapes at the Nazinga game ranch, Burkina Faso. Nazinga Project, ADEFA, Ougadougou, Burkina Faso. 71pp.
- Direction de la Presse Présidentielle. (1988) Le Front Populaire AN I. Direction de la Presse Présidentielle du Burkina Faso, Ougadougou, Burkina Faso. 32pp.
- Direction de la Protection. (1988) Direction de la Protection/ Division Environment. Etat Recapitulatif des Park Nationaux, des Reserves de Faune et des Forêts Classees. Ministère de L'Environnement et du Tourisme. Ougadougou, Burkina Faso. Typescript 5pp.
- Eberhardt, L. & Van Etten, R.C. (1956) Evaluation of the pellet group count as a deer census method. *J. Wildl. Manage.* 43, 258-260.
- Fowler, C.W. & Smith, T. (1973) Characterizing stable populations, an application to the African elephant populations. *J. Wildl. Manage.* 37, 513-523.
- IUCN-CDC. (1988) Utilization rationnelle de la Faune et Rehabilitation d'un Milieu degrade en Afrique de l'Ouest. Etude d'évaluation du Ranch de Nazinga. Rapport de mission, Ougadougou, Burkina Faso. 48pp.
- Jachmann, H. (1986) Notes on the population dynamics of the Kasungu elephants. *Afr. J. Ecol.* 24, 215-226.
- Jachmann, H. (1988) Comparison of road and ground surveys of large mammals at the Nazinga game ranch. Nazinga Special Reports Series C. No. 33. Ministère de l'Environnement et du Tourisme, Ougadougou, Burkina Faso. 25pp.
- Laws, R.M., Parker, I.S.C. & Johnstone, R.C.B. (1975) *Elephants and their habitats*. Clarendon Press, Oxford, U. K. 355pp.
- Nature et Faune*. (1989) Situation et Avenir des populations d'éléphants dans les pays du Sahel Occidental et Central: I. La Mauritanie, Le Mali, Le Senegal. Revue Internationale pour la Conservation de la nature en Afrique. Bureau Regional de la FAQ pour l'Afrique, Accra, Ghana. pp. 1-4.
- Neff, D.J. (1968) The pellet group count technique for big game trend, census, and distribution: a review. *J. Wildl. Manage.* 32,597-614.
- O'Donoghue, M. (1984) Recensement à Pieds des grands Mamiferes au projet pilot pour l'utilisation de la faune à Nazinga. 1981-1984. Resume des resultats. Projet pilot pour l'utilisation de la faune à Nazinga, Rapport Special, Series C: No.5. 65pp.
- Ottichilo, W.K. (1986) Age structure of elephants in Tsavo National Park, Kenya. *Afr. J. Ecol.* 24,69-75.
- Patil, S.A., Kovner J.L. & Burnham, K.P. (1982) Optimum nonparametric estimation of population density based on ordered distances. *Biometrics* 38,243-248.
- Poole, J. & Thomsen, J.B. (1989) Elephants are not beetles: implications of the ivory trade for the survival of the African elephant. *Oryx* 23, 189-198.
- Rood, K. (1987) The impact of elephants on the vegetation of the Nazinga game ranch, Burkina Faso. Report of Nature Conservation Department, Agricultural University. Wageningen, The Netherlands. 45pp.
- Scott, J.M., Ramsey, F.L. & Kepler, C.B. (1981) Distance estimation as a variable in estimating bird numbers from vocalizations. *Studies in Avian Biology* 6, 334-340.
- The Statesman's Year Book 1985-86*. 122nd Edition. pp. 248-251.

CHEWING OF BARK BY ELEPHANTS: PASTIME OR MEDICINE?

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Photo credit: Joyce Poole



In a study of elephant impact on woody vegetation on the Nazinga Game Ranch, Burkina Faso, I noted that elephants frequently stripped and chewed bark but did not swallow it. Most of the instances of chewing bark involved trees of the genus *Lannea*. The chewed boluses, which are discarded near the trees from which the bark is obtained, are collected by local peoples and used to treat cases of accidental poisoning from food or beverages. In Burkina Faso the Mossi tribe also uses various parts of trees of this genus to treat severe stomach pains.

The local people believe that elephants occasionally consume poisonous plants or parts of plants then treat

themselves with compounds contained in the bark of some species of trees such as *Lannea*. I am aware of no previously documented case of elephants eating plants to treat themselves, but this behaviour has been observed in primates. In Tanzania, Nishida noted chimpanzees eating a particular plant (*Aspilia* sp.) for medicinal purposes (*Discover*, March 119:10). The same plant was used by local tribesmen also for medicinal purposes. For elephants, the hypothesis that they have learned to treat themselves might be pure speculation but it could also have a factual basis. In either case, further investigation seems warranted.

Editor's note:

Anyone care to take up this challenge?

THE EFFECTS OF BOMA DESIGN ON STRESS-RELATED BEHAVIOUR IN JUVENILE TRANSLOCATED AFRICAN ELEPHANTS

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ABSTRACT

Translocated juvenile elephants are generally kept in a boma so that they may adapt to the new environment and form bonds with group members before being released. Research on five different groups showed that high frequencies of aggressive behaviour can be expected, particularly in a confined space and with restricted food. Small pens with restricted view to the outside tend to induce nervousness. Nervousness decreases after the introduction of an adult female. Very young individuals may display aberrant behaviour. Older juveniles and adults seem to be most affected by confinement. It is suggested that food be dispersed so that weaker individuals have a better chance to feed. One or two open large paddocks with an electrified fence is recommended, instead of a closed wooden pen and paddock.

INTRODUCTION

Juvenile elephants originating from the Kruger National Park are usually kept in a boma for a certain period of time after translocation so that they may adjust to the new environment and form bonds with their new group members. The time the juveniles are kept in a boma depends on the availability of food outside, age and condition of the elephants, and also on management. Same sized juveniles are generally penned together and probably do not come from the same family unit. There is still much controversy as to how a boma at the new site should be constructed. The aim of this paper is to document various stress-related behaviours observed in translocated juvenile elephants and from these data make recommendations as to how bomas should be constructed in order to minimize stress in these elephants.

MATERIALS AND METHODS

There were two main study areas in the northern Transvaal, Spektakel Game Ranch which is 7,000ha, and the Venetia Limpopo Nature Reserve, an area of

20,000ha. Additional information was obtained at Madikwe Game Reserve comprising 60,000ha in Bophuthatswana, and by interviewing owners of translocated elephants.

Spektakel Game Ranch, N. Transvaal

Six juvenile elephants (three males, three females) aged approximately between two to four years were introduced into the boma in July 1991.

The boma consisted of a smaller pen and a larger paddock. The pen was 30m x 50m and had steel poles set about 30cm apart and horizontal cables. The feeding troughs were placed along one side about 3m apart. The elephants were fed and kept in here for five weeks. Then they were released into a 4.5ha paddock which had a large dam. The fence was made of welded mesh and had five horizontal strands of electric wires. Although the pen was always accessible to the elephants they only entered it for feeding and then left immediately. They spent six months in the boma and were observed from the beginning of September 1991 up to their release into the reserve in early January 1992.

Venetia Limpopo Nature Reserve, N. Transvaal

Four groups of juveniles were introduced into the boma during the same season as follows, but they were kept in different pens:

Group		Approx. age	Arrival
A:	0 males 4 females	6.0 - 7.0 yrs	21 5 1992
B:	3 males 5 females	3.5 - 4.5 yrs	28 5 1992
C:	5 males 0 females	2.5 - 3.5 yrs	26 6 1992
D:	5 males 0 females	1.8 - 2.5 yrs	28 6 1992

The boma was subdivided into four pens, each 25m x 25m. The feeding troughs were placed along one side about 3m apart. The fences between the four adjoining pens consisted of horizontal and vertical wooden poles

set 0.5m apart. A 1.5ha paddock joined onto two of the pens which each had a separate gate. There was a mud wallow available. The paddock fence was mesh and had three horizontal electric wires. The animals were kept in the boma until mid-August when they were released into the reserve (excluding group D). The groups A and B adjacent to the paddock were allowed into this on alternating days. The semi-tame 19-year-old female, Jane, originating from Zimbabwe, was introduced on 7 July 1992 and penned with group C for one week, then with groups C and B together until they were released. These four groups were observed throughout their boma stay.

Madikwe Game Reserve

Family units of 194 elephants of all ages were caught in Gonarezhou Game Reserve in Zimbabwe and translocated in groups of 5 to 15 to Madikwe Game Reserve in Bophuthatswana during August - October 1993.

Four days were spent at the boma with the last group of 23 elephants comprising three to four family units and four adult males. This group was kept in the boma two days longer than the others so that the observer could habituate them and identify individuals for subsequent research after the release. No sampling was done. A section with four strongly built pens was present. Each pen was 1 8m x 1 8m and each side had six vertical steel poles with wooden poles inbetween (about 1 5cm space between the poles), reinforced by two horizontal steel poles. The first groups of translocated elephants showed extreme aggression when confined in these pens. Subsequent elephant groups were therefore kept in the 3ha electrified paddock only, prior to being released into the reserve. The fence was 15cm x 10cm wire mesh, with steel poles set about 4.5m apart, reinforced with a horizontal steel pole. There were three electric strands.

METHODS

Observations were done on a daily basis. The elephants eventually became habituated to the observer walking and sitting around the fence of the boma.

At Spektakel all occurring interactions were recorded. At Venetia each group was observed separately. Due to the construction of the adjoining fences between the pens, the elephants could interact through these with the other groups. All occurring interactions within a given group and any interactions at the fence between the focal group and any other group were recorded.

The following elements were classed as a) aggressive behaviour: any form of obvious pushing, hitting with the trunk, kicking or chasing a partner; b) affiliated behaviour: touching or smelling any part of a partner's body with the trunk tip, leaning or rubbing against a partner (Garai, 1992); c) play behaviour: sparring bouts, playing in the water, climbing on a recumbent partner.

Group A at Venetia, a seemingly highly stressed group, gave me the opportunity to analyze and define arousal behaviour. The following elements were defined as arousal: ears up, head held high and tail held up horizontally; aggression; walking away from a stimulus; running; loud vocalizations; running into a "cluster formation"; temporal gland secretion. Arousal behaviour was recorded as I (occurred) or 0 (did not occur) in thirty second (30s) intervals. This is known as the one-zero method (Altmann, 1974).

Translocated Elephant Information Centre (TEIC)

The TEIC was established over a year ago. A three-page questionnaire was sent to 25 owners (or managers) of translocated elephants. Twenty of these owners were personally interviewed. The questions related to a) the boma: construction, hygiene, time kept in boma, contact with humans; b) behaviour of elephants: in the boma, diseases, behaviour after release, utilization of habitat; c) personal opinions: reasons for acquiring elephants, what would be done if there were too many elephants on the property? what would be done differently a second time?

RESULTS

Spektakel Game Ranch

Interactions

Once the elephants had habituated to the observer walking around outside the fence, they seemed at ease. Out of the combined total of 2,275 affiliated and aggressive behaviour elements, 56.1% were aggressive, except during feeding time when one of the females was bullied and prevented from feeding by the others. She had to be fed and guarded separately, mainly by the observer. This female was the recipient of most aggressive behaviour by all others at any time and was never aggressive herself. One of the males displayed most of the aggressive

behaviour. The three males, and particularly one of the females, had frequent sparring bouts with each other. The elephants also enjoyed playing in the water together. However the female that was bullied was frightened to enter the water with the others and often stood at the edge of the dam, or else she played on her own. Frequent play was seen when the elephants had a “sand bath”, then they would roll in the sand heap and climb on top of each other.

The six elephants were always in a group, seldom more than 10m apart. Only once when they panicked. after a truck drove past, a female split from the group and stayed alone for half an hour. She appeared to be looking for the others.

Venetia Limpopo Nature Reserve

Interactions

All four groups were more aggressive than affiliated within each group. Groups A and C which displayed much intragroup aggressive behaviour showed more affiliated behaviour to non-group members than to their own group members (Table 1). It is interesting that group B had much the same percentage of aggressive behaviour as the group at Spektakel, both being composed of a mixed sex ratio. There was hardly any aggression at the fences. Aggression could be seen at any time, but especially during feeding time, when weaker individuals could hardly get to the troughs. In

group D the youngest individual had to be fed separately and guarded during feeding time the first week until he learned to eat faster and fend for himself. In group B one female hardly ever got to the feeding trough for the pellets, but she was able to feed on the lucerne and branches which were dispersed.

Abnormal behaviour

Group D consisted of very young juveniles which would still have been suckling in a normal family unit. The youngest individual (probably less than 2 years), who received most aggression from others, repeatedly “suckled”, or “attempted to suckle”, at the ear pinna of another group member (36.1% of all his interactions with a partner were “suckling” and 44.3% attempted “suckling”). When prevented from suckling he emitted rumbles, growls and frustration screams with a frequency of one vocalization in every four minutes. This individual subsequently died after another translocation to Natal, three months after having arrived at Venetia. His “suckling partner” seemed to have learned this aberrant behaviour, which he in turn displayed at another locality after also being translocated again at the same time (Jim Stockley, pers.comm.).

Arousal behaviour

The oldest individuals, Group A, were extremely nervous throughout the boma stay, and one individual was particularly aggressive towards humans near the fence. There was also much aggression between

Table 1. Aggressive and affiliated behaviour for the four groups of elephants at the Venetia Limpopo Nature Reserve.

	Aggressive behaviour	Affiliated behaviour	Affiliated behaviour	
			intragroup	intergroup
Group A	80.3%	19.7%	38.7%	62.5%
Group B	56.6%	43.4%	78.2%	21.8%
Group C	90.9%	9.1%	33.3%	66.7%
Group D	60.7%	39.3%	75.9%	24.1%

Column 1: Groups A to D (see methods for group definitions);

Columns 2 and 3: aggressive and affiliated behaviour respectively in percent of combined aggressive and affiliated behaviour within a group;

Columns 4 and 5: affiliated behaviour within a given group (intra group) and between different groups at the fence (intergroup) in percent of total affiliated behaviour.

No play behaviour could be seen in groups A, C or D. Only in group B the three males and one of the females had occasional sparring bouts. They were never seen playing at the mudwallow.

Table 2. Frequency of interactions between partners per time for five different groups of elephants.

GROUP	No ELE	N	GR FR/hr	x/IND
Spektakel	3m, 3f	5696	53.2	8.9
venetia A	0m, 4f	711	12.5	3.1
Venetia B	3m, 5f	1633	35.2	4.4
Venetia C	5m, Of	68	6.2	1.2
Venetia D	5m, Of	798	29.6	5.9

No ELE = number of elephants; N = total interactions;
 GR FR/hr = group interacting frequency per hour;
 X/IND = average interacting frequency per individual per hour.

individuals, especially from one female which constantly pushed the others, but at the same time was always within touching distance of one of the others. Another female seemed particularly nervous, showing most signs of arousal among the four individuals. She secreted daily from the temporal gland, whereas the others only did so occasionally, when frightened by something. The frequency of temporal gland secretion appears to be individual (Garai, in prep.). All females calmed down after the release.

However, all groups showed nervousness or aggression towards alien stimuli (e.g. people, strange noises). There was overall a significant decrease (McNemar test one-sided, $p < 0.005$) in arousal behaviour after the arrival of the adult Jane (see Figure), even by those groups not in the same pen as Jane.

Frequency of interactions per time

The six elephants in the large boma at Spektakel showed most interacting frequency per time (Table 2). This group also showed much play behaviour and appeared at ease. At Venetia, groups A and C showed a very low interacting frequency and most interactions were aggressive (50.9% of total interactions for group A; 58.8% of total interactions for group C).

Madikwe Game Reserve, Bophuthatswana

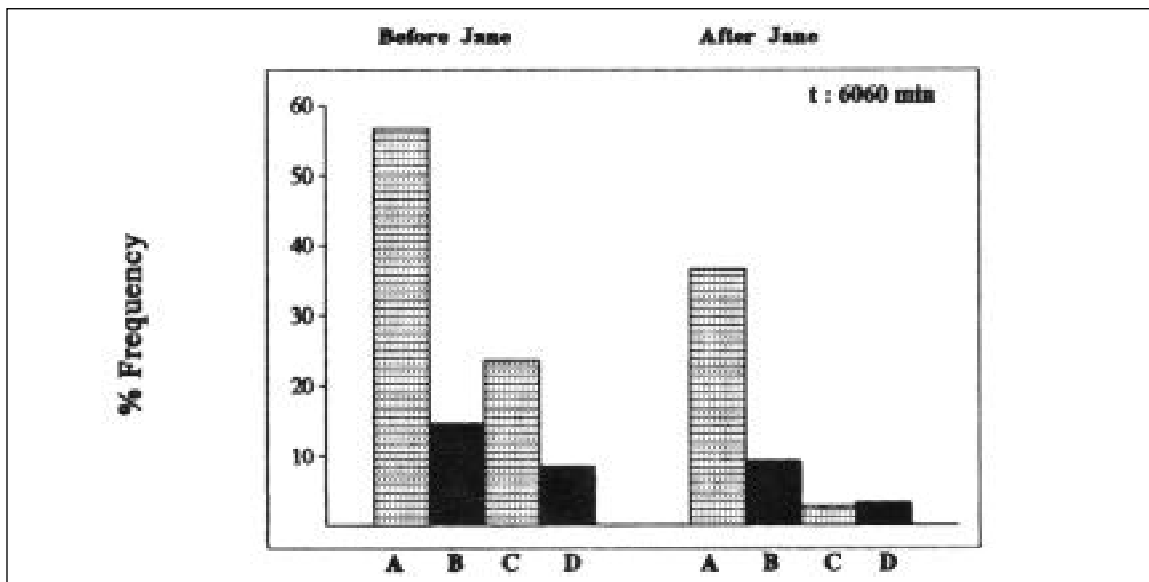
The first groups of family units translocated to Madikwe Game Reserve showed extreme aggression and nervousness when confined in the pen, and one

elephant broke out, demolishing the steel gate in the process. The subsequent groups were therefore kept only in the large electrified paddock and released into the reserve within two days after arrival. This procedure seemed less stressful to the animals. They were calmer and not aggressive in the paddock and respected the electric fence. Even during feeding time no aggression was seen during the four days spent at the boma. The family groups appeared to wait for their turn at the feed. These elephants probably knew each other from Gonarezhou.

Translocated Elephant Information Centre - TEIC

Aggressive behaviour in the boma was reported by nearly everyone interviewed (83.2%, $n=25$). In a number of cases the weakest and most bullied elephant had to be separated, especially during feeding time. It was unanimously stated that the elephants immediately learned to respect the electric fence, and that it was unnecessary, even dangerous, to electrify the pen.

Four ranches visited did not have a pen at all, but kept the elephants in a large electrified paddock only. The fence of this was much the same as the periphery fence of the reserve, only slightly reinforced with cable. At Mokolo River Nature Reserve there were two paddocks, a smaller one (0.5ha) with a fence consisting of horizontal steel cables and vertical wooden poles, and a larger paddock (2ha) with a game fence reinforced with steel cables. There were two electric wires. The small paddock had a rivulet flowing through it.



Percent of samples in which arousal behaviour occurred during preceding thirty second intervals in groups A to D at the Venetia Limpopo Nature Reserve before and after the introduction of the tame adult female Jane.

Once the juveniles had calmed down in the smaller paddock, they were given access to the larger paddock and they never went back into the smaller one, although the connecting gate was kept open. Keeping the juveniles in a paddock only was considered to have a positive effect on aggression and nervousness by all owners concerned. Everyone stated that the elephants were nervous of humans after the release and that they kept to the most secluded parts of the reserve. Only where the elephants had been habituated to one person and were constantly monitored after release were the people able to see their elephants regularly.

DISCUSSION

Aggressive behaviour was seen in all groups of juvenile elephants in a boma. There appear to be various causes for this. Aggression became most apparent during feeding time when certain individuals were pushed away from the feeding troughs. Restricted food seems to induce competition amongst individuals. It is interesting that there was so little intergroup aggression at the adjoining fences at Venetia, suggesting that the individuals realized that there was no food competition to fear from the other groups.

The fact that there was no aggression in the family units at Madikwe could either indicate that there is less aggression in a group when adults are present or else,

assuming these elephants from Gonarezhou knew each other, they had established a dominance hierarchy. In a normal family unit dominance rank appears to be based on age, but there also exists rank order between family units (Moss, 1988). In a new group each individual has to assess its position in relation to the others (Kummer, 1975), and a rank order will be established.

Research at the Kruger National Park has shown that newly captured juvenile elephants develop extreme signs of stress when confined within walls (Hall-Martin 1992). Therefore a closed pen should have much the same effect. Aggression could also be a reaction to nervousness, as appeared to be the case in the one female of group A at Venetia, who constantly pushed the others yet kept close to them. In addition, in a pen the natural flight distance to a person approaching cannot be maintained, a fact which will most likely enhance the feeling of being "closed in". Group A reacted strongly to humans around the boma, either with aggression or else "clustered" at the back of the pen. Given the opportunity, they would probably have chosen a greater flight distance.

Group A elephants were the oldest and the most nervous. They calmed down after they had been released. The youngest individuals, group D, were the least nervous. Very young animals may habituate faster to humans and a new situation. The significant

decrease in arousal behaviour after the introduction of the adult female shows that juveniles feel less nervous when an adult is present, even if she is not the mother and not in the same pen.

Display of play behaviour is probably an indication that animals feel at ease and therefore the elephants at Spektakel were the most relaxed of all groups. This could be due to the large paddock.

In cases where the elephants had a choice between a pen and a paddock (Spektakel) or between a small and a large paddock (Mokolo), they chose the larger of the two. Furthermore, in their questionnaire responses, the owners indicated that elephants confined to a paddock without a pen were less stressed.

CONCLUSIONS AND IMPLICATIONS TO MANAGEMENT

- Translocated juvenile elephants will tend to show aggression during the boma stay. This will be apparent especially where food is restricted, or placed too close together (i.e. within reaching distance of a neighbour). It is suggested that food be abundant and dispersed at several sites to allow weaker individuals access to it.
- Small or weak elephants will most likely be bullied. It is therefore not advisable to put different sizes of animals together, unless they are related.
- Introduction of an adult female to a group of juveniles has a positive effect.
- Certain, especially older, individuals seem to react badly to confinement and should not be kept in the boma long.
- Young elephants under two years of age should not be translocated without mothers.
- If one wishes to have a pen, it should be constructed in such a way that the animals can see through the fence. However, keeping the elephants only in a paddock appears adequate. This will probably be less stressful to them, cheaper to build and will still serve

the purpose of allowing the animals to adapt to the new environment and form bonds within the group.

- A large paddock with a normal electrified fence (reinforced with steel cable) is suggested. This will provide the elephants with security without feeling “confined” and allow them to become familiar with the electric fence. The size of the paddock will depend on the number of elephants, but an area of 3ha is considered to be an acceptable minimum. If the elephants are very young it is advisable to keep them in a small paddock until they calm down, then give them access to a larger paddock.

ACKNOWLEDGEMENTS

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REFERENCES

- Altmann, J., (1974) Observational study of behaviour: sampling methods. *Behaviour* 49, 227-267.
- Garai, M.E., (1992) Special relationships between female Asian elephants (*Elephas maximus*) in zoological gardens. *Ethology* 90, 187-205.
- Hall-Martin, A. J., (1992) Translocation and reestablishment of populations of juvenile African elephants. *Elephant and Ivory Information Service*. No 20; Special Issue 1-5. African Wildlife Foundation, Nairobi.
- Kummer, H., (1975) Rules of dyad and group formation among captive Gelada baboons (*Theropithecus gelada*). Symp. 5th Cong. Int. Primat. Soc. (1974), Nagoya. Japan Sci Press, Tokyo, 129-171.
- Moss, C.J., (1988) *Elephant Memories*. Elm Tree Books, London.

THE CHANGING FACE OF ELEPHANT MANAGEMENT IN THE UNITED STATES

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ABSTRACT

The Zoological Society of San Diego with its two facilities, the San Diego Zoo and the San Diego Wild Animal Park, manages one of the largest collections of elephants in the United States. During the last decade, several significant perceptual changes in the United States have converged with a growing awareness of threatened and declining wild elephant populations. These changes have been important contributing factors in causing zoological institutions in the United States to begin to scrutinize every aspect of their elephant management programmes. As a result, institutions are now examining their methods as well as their purposes for managing captive elephants.

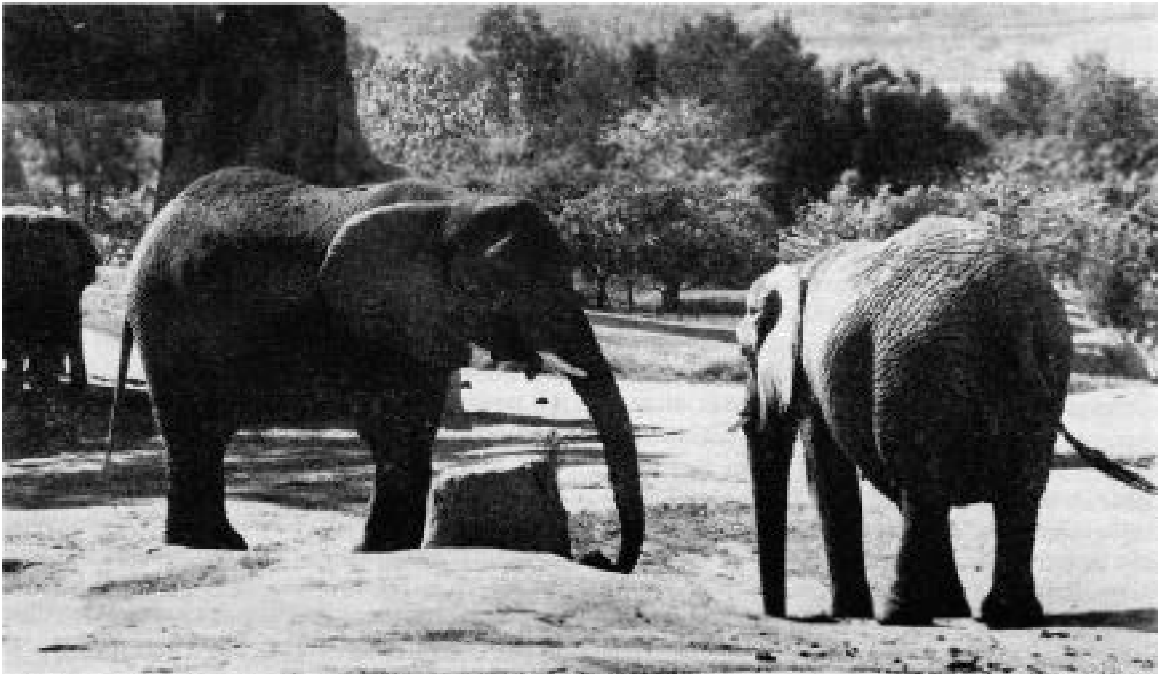
Experiments with alternatives to the traditional free contact management of elephants began at the San Diego Wild Animal Park in 1989. The experimental programme was driven by the need to gain safe access

to our bull elephants and our desire to determine if there was a safer method for managing the needs of captive elephants. In 1991, encouraged by the results of the pilot programme, we launched an expanded six-month test with a bull and cow of each species. In 1992, we undertook major facility modifications designed to support the management of our Asian elephant herd using a method that has now become popularly known as "protected contact". Today, a number of zoological institutions in the United States are either actively exploring a change in the way they manage elephants, or are in the process of substituting their traditional methods for managing elephants for protected contact management.

INTRODUCTION

There are 87 zoos in the United States with elephants. Of the institutions maintaining elephants, 78 participate in the American Zoological and Aquarium

Photo credit: Ron Garrison



African elephants on exhibit at the San Diego Wild Animal Park

Association's Species Survival Plan for the elephants. Currently, the American Zoological and Aquarium Association (AZA) [formerly AAZPA] members maintain a total of 25 male and 134 female Asian (*Elephas maxim us*) elephants and 19 male and 129 female African (*Loxodonta africana*) elephants at their institutions (Tuttle, pers. comm., 1994). Between its two San Diego facilities, the Zoological Society of San Diego maintains one of the largest groups of elephants in the United States, housing one male and seven female Asian elephants and one male and six female African elephants.

The Zoological Society of San Diego acknowledges its responsibility to help meet the wildlife conservation challenges of the future. Conservation, education and recreation form the core values of our institution's mission statement. The primary purpose for managing our elephants in San Diego is for their exhibition and reproduction.

Some of the factors which have stimulated a new approach to elephant management include:

Increasing risks

Because captive elephants are generally less mobile than wild ones, they require daily care if they are to remain healthy. Ensuring routine access to an elephant's feet for cleaning and regular maintenance is of utmost importance. Yet, because of their sheer size and power, elephants can be lethal (Benirschke & Roocroft, 1992). During the last several years, zoo directors and collection managers have become increasingly sensitive to an impending crisis in traditional captive elephant management. Elephants are responsible for injuring more zoo keepers in the United States than any other animal. Since 1976, 17 keepers in the United States have been killed by elephants (Lehnhardt, pers. comm., 1994). Eight of these fatalities have occurred in just the past five years. Statistics indicate that the risks associated with traditional management methods seem to be increasing. Each year, with shocking regularity, reports of keeper fatalities continue to occur. No statistics are available as to the number of near misses or elephant-inflicted injuries that have been suffered by keepers. The United States Bureau of Labor Statistics and the National Safety Council list elephant keeping, just beneath coal mining, as the most dangerous occupation in America. In the United States, elephant keepers are at greater risk of being killed on the job than either police officers or fire fighters (Lehnhardt, 1991).

Animal rights

In the United States, growing awareness of the dangers of an expanding human population coupled with the knowledge of the accelerating loss of habitat and decline of wild animal populations has helped fuel the social phenomenon known as the animal rights movement. Americans generally now have a greater awareness of the fragility of the earth's ecosystems. There is also a greater appreciation for the uniqueness of each of the species. As a positive result of these sensibilities, the care and treatment of all captive animals are coming under increased scrutiny at zoological institutions, from both internal sources as well as external ones.

The traditional method for managing the behaviour of a captive elephant occasionally requires the use of physical discipline. The same can be said of dog or horse training. However, in this new environment, using any physical discipline regardless of the justification to control the behaviour of an endangered animal seems incongruous. Without respect to the potential for the loss of a keeper's life due to an intractable elephant, the public's tolerance for the physical discipline of any animal is diminishing. Against this backdrop, zoo directors and curators have found themselves squarely in the centre of an increasingly uncomfortable dilemma. "How do we continue to meet the husbandry needs of the elephants in our collections in this environment?"

Advances in behavioural science

Concurrent with the pressures of several significant social changes has been a growing acceptance of a more positive method of training animals. Operant conditioning has proven to have application with a wide variety of both marine and terrestrial animals in the zoological environment (Priest, 1990; Mellen & Ellis-Joseph, in press). Needs not met, new technologies and economic necessity are the engines that drive nearly all revolutions in human thought. All three of these components have played a part in changing elephant management in North America.

Considering the risks to keeper staff, declining wild populations, and the enormous cost of maintaining elephants, institutions around the country are now asking, "Why are we managing elephants?" Captive elephant management has come to a critical juncture in the United States.

BACKGROUND

In 1989, an independent behavioural consultant approached the Zoological Society of San Diego with an idea to apply techniques to elephant training that since the 1960s had proven very successful with marine mammals (Pryor, 1991). The pilot project lasted 45 days and was undertaken with two animals, an African and an Asian bull elephant. Because of potential risk to keepers, these bulls had not been handled in the traditional free contact system for several years. At the end of the 45 day test period, both bulls had responded to their training well and the results were very promising (Desmond & Laule, 1991).

In January 1991, during the period between the pilot study and the next phase of our experiment, tragedy struck at the Wild Animal Park. One of our Asian elephant keepers operating in free contact was accidentally stepped on and killed by an Asian elephant cow. The death of Pam Orsi galvanized our resolve to continue our efforts to develop a safer method for managing elephants.

By April 1991, based on the success demonstrated in the pilot project, a second, more elaborate test was undertaken. The objective was to begin to refine the requirements for elephant training that exclusively used positive reinforcement. The second test involved four animals, both our bulls as well as one cow of each species. In this expanded programme, animals considered by the Wild Animal Park's elephant manager and supervisor to be "worst cases", owing either to their individual disposition or tendency toward aggression, were selected for protected contact training. At the end of a six-month trial period, managers were encouraged and began to make plans to develop a facility that would allow the application of these techniques to the management of a large group of elephants (Priest, 1992, A). Our entire staff of elephant keepers attended staff development classes in behaviour theory and operant conditioning (Stephens, 1992). Keepers were required to take and pass written examinations covering a variety of topics including elephant training under both methods, elephant ethology and husbandry.

During the spring and summer of 1992, the Zoological Society invested nearly US\$500,000 towards developing facilities that would support the protected contact management of the herd. With facility modifications and keeper training complete, in October 1992, we began to manage a large group of Asian

elephants exclusively by protected contact. In addition to all the behaviours required for their care, the elephants learned to hold their position while other elephants in the group were given the opportunity for training sessions. In April 1993, in our newly re-designed elephant show arena, we began offering the general public a demonstration, twice daily, of the new techniques for elephant training, care, and management. We have yet to cancel a demonstration because of a refusal by the elephants to participate. We are currently in the final stages of a year-long programme evaluation that will conclude in June 1994. The evaluation of the programme will cover a review of our consistent ability to gain access to the animals, their behaviour, health, and the keepers' ability to use their new skills in order to maintain the behaviours exclusively through protected contact.

METHODS AND RESULTS

In the traditional free contact method, the keeper enters both the animal's exhibit space and the social structure and moves freely among the elephants to accomplish his/her objectives. Through the delivery of positive (social, tactile, and food rewards) and sometimes negative reinforcement (through the bull hook or ankus), the keeper uses his/her skill to become accepted by the elephant as the dominant member of the elephant's social hierarchy. Free contact is relationship-dependent with each individual elephant.

At the Wild Animal Park in San Diego, the parameters for our own free contact training programme seemed nebulous or subjective; there seemed to be a general absence of accepted reference points from which to work. This is perhaps because much of the information about traditional elephant management has been handed down orally from one generation of keepers to the next. There is little scientific information regarding techniques in traditional elephant management available in the literature. The free contact method lacks a coherent system that can be accurately and objectively transferred from one keeper to the next in a reasonable amount of time.

The term "protected contact" was coined to describe an alternative system to traditional elephant management. It is a "hands-on" system designed to maintain physical contact with captive elephants while maximizing keeper safety, whereby keepers do not enter into the enclosure with the animal. Instead, they use food treats to form a co-operative relationship



Assistant behaviourist, Jennine Antrim, applies medication to Chico's eye. Chico is a bull African elephant. By training animals to accept voluntarily such husbandry procedures, the risks associated with veterinary intervention through chemical restraint can be avoided. As an added bonus, procedures like this are far less stressful to the animal.

with the elephant and work with the animal from a shielded position outside the enclosure. Because the keepers in protected contact remain outside the elephant's enclosure, no physical discipline is required to ensure the keeper's safety or maintain behavioural control. The premise is that keepers working from positions behind protective barriers can selectively reinforce, shape and maintain all the behaviours required for proper elephant husbandry.

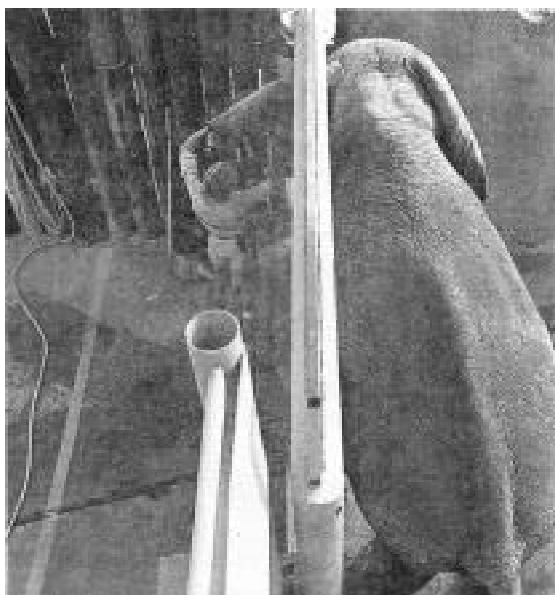
Unlike free contact where a keeper's life depends on the elephant's compliance, the elephant in protected contact is a voluntary participant. Keepers rely exclusively on the power of a timed or selective delivery of positive reinforcements to accomplish their objectives. The method completely changes the dominant/subordinate relationship between elephant and keeper, which is especially important with musth bulls.

The elements of protected contact management include a combination of the following: facility design, animal and keeper position relative to protective barriers, and operant conditioning techniques designed to encourage the animal to comply voluntarily with the keeper's objectives. In the protected contact system, behaviour modification is accomplished exclusively through the use of positive rewards including a wide variety of food

treats, tactile and social reinforcers. No physical discipline or food deprivation is ever used with our elephants. The elephants receive their normal diet of sudan or oat hay and alfalfa.

Reinforcement is delivered when the animal performs correctly in response to a specific signal. If the animal performs a behaviour incorrectly or in a manner below standards, it is simply given another opportunity to earn the reinforcement. The elephant's behaviour is modified exclusively through the skilled use of operant conditioning, which is a *systematic* conditioning process used to modify or shape an animal's behaviour towards a desired goal. In essence, operant conditioning is a universal language that an animal can understand and use to its benefit. The consistent and skillful use of this language provides information to the animal about its environment and how to go about gaining something it desires. These behaviour modification techniques fall under the well-established principles of behavioural theory (Holland & Skinner, 1961; Mazur, 1990).

Through conditioning, our elephants quickly learned to pair the sound of a dog whistle with the delivery of a food reward. The whistle in effect serves as an I.O.U. to the elephant. The whistle provides important information that helps the animal pair its actions with a positive consequence. It also bridges the gap in time



These two photographs show how Chico, a bull African elephant, is trained to stand parallel to the steel barrier and extend his ear through a specially designed port. This behaviour is completely voluntary on the elephant's part. Chico can choose to leave at any time. Chico will obediently hold position until the blood collection procedure is complete. Experience has shown that our ability to gain access to this animal is nearly 100%, dipping in reliability only slightly during his musth period.

between when the animal performs a behaviour and the delivery of a reward. Rewards can take a variety of forms as long as they are something that the animal desires. For training reinforcements, we use food treats consisting of monkey chow, cut carrots, apples, sweet potatoes, corn on the cob and seasonal fruits.

The technique used for moving elephants from one place to another was borrowed from marine mammal trainers. After whistle conditioning, the first behaviour the elephant is trained to perform in protected contact is to touch the bridge of the trunk to a foam target. Once the elephant has learned this behaviour, we use the targets to move elephants into a desired position and then from one place to another. The photographs illustrate a variety of the techniques being employed.

FUTURE PLANNING

With the expected completion of our first (of three) hydraulic elephant restraint chutes in June of 1994, San Diego's elephant management plan will employ a three-branched strategy to provide complete health care for our elephants. The three methods in order of priority are: (1) routine access through behaviour modification and protected contact; (2) occasional access by means of the restraint chute; and (3) in rare cases veterinary intervention through chemical restraint.

Similar to the process required to train an elephant for voluntary blood collection, every elephant exposed to the possible stresses that may come to be associated with confinement in a restraint chute will first be systematically desensitized to them. Stress reduction is an important part of good animal husbandry. Elephants will also be conditioned to perform all normal husbandry behaviour, (which are listed in the Appendix), within the confines of the restraint chute. In this way, the elephants will react positively to the restraint chute.

DISCUSSION

To a large degree, our training in protected contact has relied on conditioning already done in free contact. In San Diego, we have been fortunate to have many well trained and tractable cows with which to work. As we introduced protected contact to them, in many cases it was simply a matter of changing the context and orientation of the training tools we used in order for the animal to understand, generalize, and comply with our wishes. The cows did take a while to learn that the target and bull hook were used very differently. With the bull hook, the cows had been conditioned to move away from the stimulus, conversely, when the target was presented, the cows were required to approach and touch it in exchange for a reward. Naturally, the cows were wary at first,



Keeper Steve Cunningham uses a farrier's hook-knife and a wood rasp to trim the pads of an African bull elephant's feet. Using this method, the keeper is better shielded from physical injury, and the elephant is a voluntary participant, working in exchange for food treats consisting of apples, corn, carrots or yams.

but in every case, this shift was accomplished with a few hours of training, spaced over a three-week period (Priest, 1992,B).

Extensive free contact conditioning was not present in either of our bulls. Neither animal had been worked in free contact for several years, yet each has been able to learn and perform the same husbandry behaviours as the cows.

However, all captive elephants had been exposed to at least some degree of traditional training. Though it has yet to be demonstrated with a completely naive elephant (juvenile or wild-caught), I am convinced that behaviour modification relying exclusively on operant conditioning and positive reinforcement might take longer than was our experience but would prove to be just as successful.

Challenging the status quo or any traditionally accepted practice is seldom easy. Such has certainly been the case with elephant management (Desmond & Laule, 1993). Many professional elephant keepers' convictions are strongly held and are not easily changed. The development of protected contact has not been without opposition (Zoll, 1992). However, concern for keeper safety and the need to maintain healthy elephants now

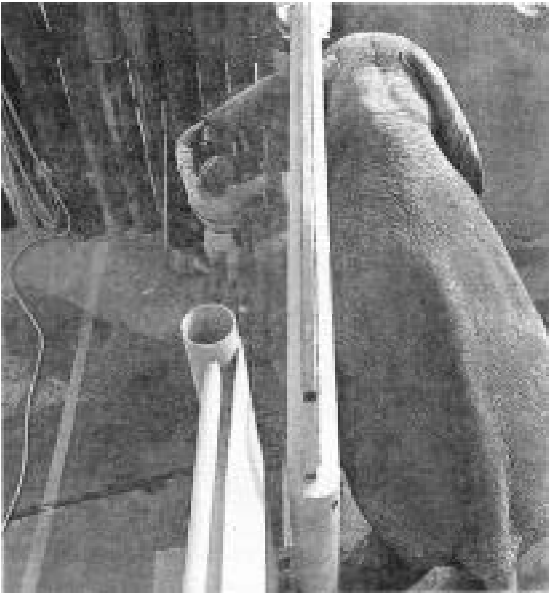
override opposition to change on a national scale. The AZA position statement reflects the trend in elephant management. "The Board of Directors of the American Zoological and Aquarium Association philosophically believes the future management of captive elephants should be based on methods associated with protected contact..." (Wylie, 1993).

In my judgement, only those institutions with the resources and commitment to pursue the following three criteria should consider elephants as an appropriate species for their collection. These criteria are:

1. to create the safest possible working environment for their keeper staff,
2. to maintain a programme that meets the husbandry requirements of the elephants and
3. to participate fully in the American Zoological and Aquarium Association's Species Survival Plan for captive elephants (Priest, 1994).

CONCLUSION

In conclusion, the following are some of the more important benefits that we have come to associate with protected contact elephant management:



In this photograph, Chico, a bull African elephant, is encouraged to touch his toot to a foam target. In this case, the keeper is gaining access to the animal's rear feet for examination and foot pad trims. The animal is trained to hold this position (up to 10 minutes) until given a separate command to step down. Preventing infections and treating foot problems is critically important in maintaining healthy captive elephants.

Safety

Through voluntary co-operation on the part of the elephant as well as trainer and animal position relative to protective barriers, protected contact can reduce the potential for animal-related keeper injuries.

Employee turnover

Protected contact can establish a safer training environment for new or inexperienced keepers, when operating under experienced supervision.

Consistent application of technique

The AZA Elephant Species Survival Plan Group states: "Most cases of elephants becoming unmanageable can be traced back to inconsistencies in handling." Operant conditioning establishes a clear formula and a common basis for consistency and uniformity within the elephant keeper staff. It establishes a common language, understood by both animal and keeper, and provides a medium of exchange or currency between the two. The system will, in short, allow a new keeper to become as reinforcing as a keeper with which the animals are familiar.

Animal rights

Operant conditioning is a method which is sensitive to animal rights and public relations. It projects a more consistently positive image to the public. The system provides elephants with positive rewards for voluntary co-operation. It eliminates the physical or psychological trauma incidental to the physical discipline necessary to establish and maintain the social dominance sometimes required to control the behaviour of elephants in free contact.

Without compromising elephant husbandry, protected contact is proving to be a logical, well-planned response to an ongoing animal management problem. The future of the use of traditional methods for training elephants in zoos may now be in doubt. However, for some time to come, there may continue to be a demand for skilled keepers capable of working in free contact, with elephants. Such specialists may become rare.

In San Diego, we are becoming more confident in our ability to manage the needs of our elephants safely. Now, our fondest dream is to, encourage our elephants to begin producing calves. As an institution, we recognize that the education of the public and contributions to captive reproduction are, by



Ranchipur, our bull Asian elephant, is given a reward by assistant behaviourist, Jennine Antrim, while a keeper inspects the animal's feet and nails.

themselves, an insufficient effort on behalf of elephant conservation. Besides these commitments, we also have a keen interest in exploring ways we can help to preserve large tracts of elephant habitat. Thus, we are working to provide a more secure future for elephants in our rapidly changing world.

Appendix:

Husbandry behaviours required for protected contact elephant management

1. Whistle conditioned
2. Target conditioned (animal's head)
3. Target conditioned (second target)
4. Left front foot up on command
5. Right front foot up on command
6. Left rear foot up on command
7. Right rear foot up on command
8. Left front foot trim (animal holds position for minimum of three minutes)
9. Right front foot trim (animal holds position for minimum of three minutes)
10. Left rear foot trim (animal holds position for minimum of three minutes)
11. Right rear foot trim (animal holds position for minimum of three minutes)
12. Lean-in right side on command
13. Lean-in left side on command
14. Trunk up on command
15. Trunk down on command
16. Retrieve object

17. Trunk up and mouth wide open for oral exam
18. Present right ear for inspection and/or blood collection
19. Present left ear for inspection and/or blood collection
20. Allow blood collection from either ear
21. Present for and allow anal palpation
22. Back-up on command
23. Steady (remain stationary) on command
24. Come towards the trainer on command
25. Enter and leave the introduction or restraint chute on command
26. Place feet in a tub of water (animal holds station for a minimum of three minutes)
27. Moving from position A to B through gates on command
28. Right eye examination on command
29. Left eye examination on command
30. Station for entire body scrubbing
31. Stationing while another animal moves through a gate on command
32. Allow vaginal manipulation

Mazur, J. (1990) *Learning and Behaviour*. 2nd Ed., Prentice-Hall, Englewood Cliffs, NJ.

Mellen, J. & Ellis-Joseph, S. (in press) *Learning and Training*. In: *Management of Wild Animals in Captivity*. Lumpkin, S. & Kleiman, D. Eds.) University of Chicago Press, Chicago.

Priest, G. (1990) The use of operant conditioning in training husbandry behaviours with captive exotic animals. American Association of Zoo Keepers, National Conference, New Orleans. Conference Proceedings. (AAZK) Topeka, KA. pp. 94-107

Priest, G. (1992, A) Caring for elephants and reducing the risks. *Zoonooz*. Vol. LXV 2, 12-15.

Priest, G. (1992, B) Elephant training: creating contrast between two training systems. American Association of Zoological Parks and Aquariums, Western Regional Conference, Tucson, AZ. Conference Proceedings. (AAZPA) Wheeling, W.V

Priest, G. (1994) Answers to questions about protected contact elephant management. *Animal Keeper's Forum*. 21(3). American Association of Zoo Keepers, (AAZK) Topeka, KA. pp 80-91.

Pryor, K. (1991) *Lads Before the Wind*. 2nd Edition. Sunshine Books. North Bend, WA.

Stephens, B. (1992) Keeper staff development programmes. American Association of Zoological Parks and Aquariums, Regional Conference Proceedings, Tucson, AZ. (AAZPA) Wheeling, W.V pp. 375.

Wylie, S. (1993) Communique. American Association of Zoological Parks and Aquariums. Oglebay Park, Wheeling, W.V. pp.11.

Zoll, D.A. 1992. What's wrong with protected contact? *Elephant Managers Association Newsletter*. III, 31-32.

REFERENCES

Benirschke, K. & Roocroft, A. (1992) Elephant inflicted injuries. Paper presentation, Symposium on Erkrankungen der Zoo-und Wildtiere., Spain.

Desmond, T. & Laule, G. (1991) Protected contact elephant training. American Association of Zoological Parks and Aquariums, National Conference, San Diego, CA. Conference Proceedings. (AAZPA) Wheeling, W.V pp. 606-613.

Desmond, T. & Laule, G. (1993) The politics of protected contact. American Association of Zoological Parks and Aquariums, National Conference, Omaha, NB. Conference Proceedings. (AAZPA) Wheeling, W.V pp. 12-18.

Holland, J. & Skinner, B.F. (1961) *The Analysis of Behaviour. A Programme for Self Instruction*. McGraw-Hill, New York.

Lehnhardt, J. (1991) Elephant handling - a problem of risk management. American Association of Zoological Parks and Aquariums, National Conference. San Diego, CA. Conference Proceedings. (AAZPA) Wheeling, W.V. pp. 569-575.

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