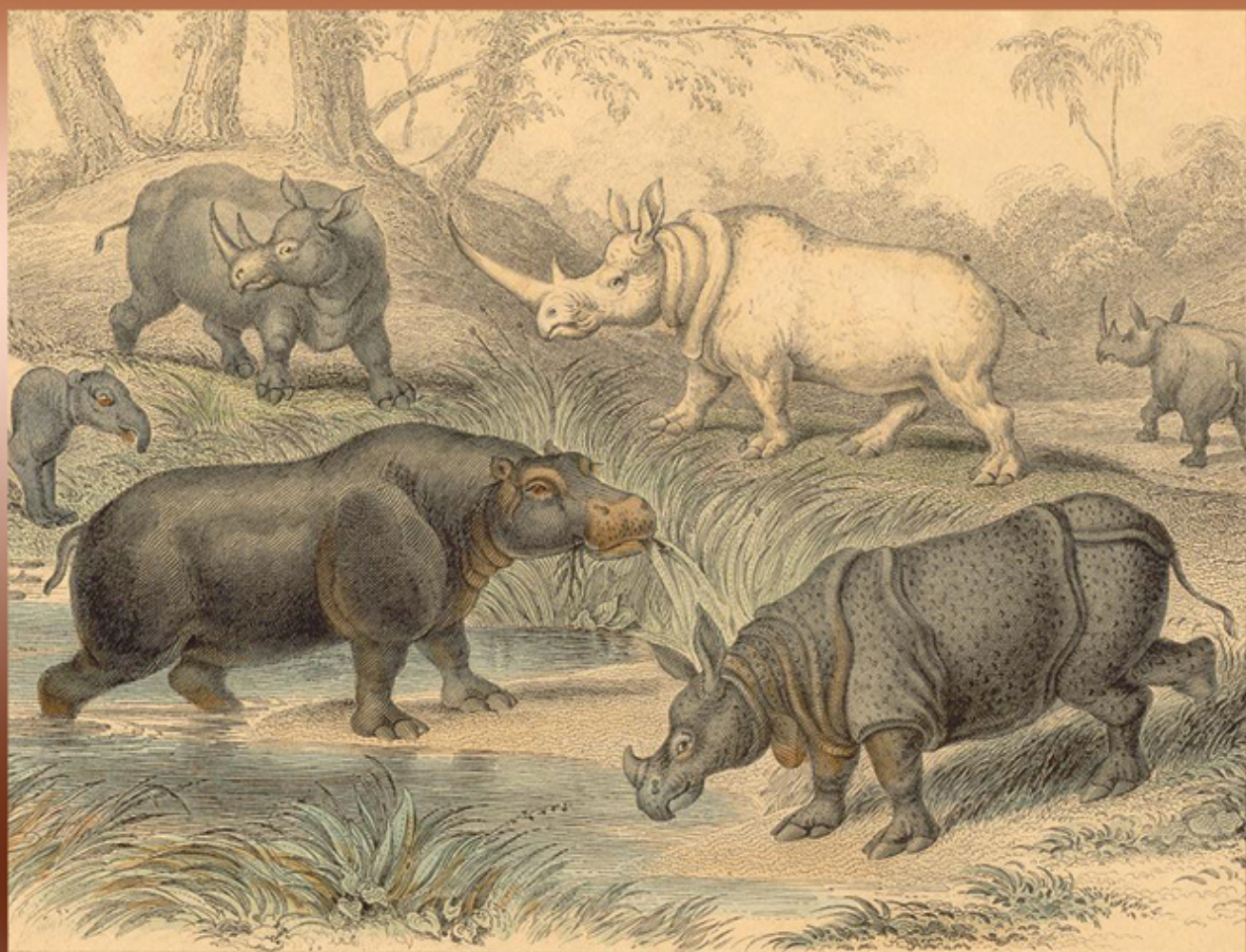


Pachyderm

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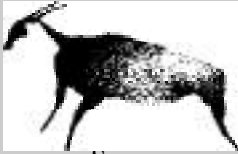


1. HIPPOPOTAMUS. 2. INDIAN RHINOCEROS. 3. MUCHOCO WHITE RHINOCEROS.

4. 5. TWO HORNED AFRICAN RHINOCEROS. 6. MALAY TAPIR.

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and Asian Rhino Specialist Groups

January–June 2003

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Cover: 'Pachyderms', a steelplate engraving by James Hope Stewart (1789–1856), probably first published in the 1868 edition of Oliver Goldsmith's *A History of the Earth and Animated Nature* (London: Blackie), though regularly found as a loose print. Here Stewart combined the hippopotamus, Malay tapir and Indian rhinoceros with the two-horned African rhinoceros (top left) and the 'Muchoco white rhinoceros' (top middle). This is the only known example where the white rhinoceros is actually coloured as its name suggests.

(Private collection of Kees Rookmaaker)

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CHAIR REPORTS

RAPPORTS DES PRESIDENTS

African Elephant Specialist Group report

Rapport du Groupe des Spécialistes des Eléphants d'Afrique

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The last issue of *Pachyderm* went to press just as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was beginning its deliberations at the 12th meeting of the Conference of the Parties (COP) in Santiago, Chile. At the time we were preparing for contributions and interventions that would possibly have been required. As always, a CITES year is a busy year.

In addition to work related to the CITES conference the AfESG staff and its task forces and working groups were kept busy throughout this period by various technical duties including drafting the 2002 *African elephant status report* and the guidelines for translocating and reintroducing African elephants.

The CITES 12th Conference of the Parties

With five southern African proposals on the table to allow trade in raw and worked ivory and other elephant products on the one hand and a proposal by Kenya and India recommending the uplisting of the elephant populations of Botswana, Namibia, South Africa and Zimbabwe from Appendix 2 to Appendix 1 on the other, it was not surprising that the African elephant once again dominated the agenda.

The main CITES conference was preceded by the fifth African Elephant Range States Dialogue meeting chaired by Denis Koulagna Koutou of Cameroon. The dialogue meeting culminated in an unprecedented consensus by all countries present except Kenya that

Le dernier numéro de *Pachyderm* partait sous presse juste au moment où la Convention sur le Commerce International des Espèces de Flore et de Faune menacées d'Extinction (CITES) commençait ses délibérations à la 12^{ème} réunion de la Conférence des Parties (COP) à Santiago, au Chili. A ce moment-là, nous étions occupés à préparer des contributions et des interventions qui pourraient être requises. Comme toujours, une année CITES est une année très occupée.

En plus du travail lié à la conférence de la CITES, le staff du GSEAf, ses équipes spéciales et ses groupes de travail ont été absorbés pendant toute cette période par diverses tâches techniques, y compris par la préparation du *Rapport 2002 sur le statut des éléphants africains* et par les directives concernant la translocation et la réintroduction d'éléphants africains.

La 12^{ème} Conférence des Parties à la CITES

Avec sur la table cinq propositions émanant d'Afrique australe destinées à faire autoriser le commerce d'ivoire brut et travaillé et d'autres produits tirés des éléphants d'une part, et une proposition du Kenya et de l'Inde recommandant le reclassement des populations d'éléphants du Botswana, de Namibie, d'Afrique du Sud et du Zimbabwe de l'Annexe 2 vers l'Annexe 1 d'autre part, il n'est pas étonnant que l'éléphant africain ait de nouveau dominé l'agenda.

La principale Conférence de la CITES a été précédée par la cinquième réunion du Dialogue des

the proponent countries should withdraw their proposals for sale in worked ivory. However, continued trade in trophies and, in some cases, new requests for hide processing as well as the trade in live elephants to conservation programmes were endorsed. The sale of 70 tonnes of legally sourced ivory stocks from Botswana, Namibia, South Africa and Zimbabwe and the establishment of an approval system for annual quotas that would function outside the COP process were also endorsed, including strict conditions to be in place and functioning before any ivory sales could take place. In addition, Kenya's amendments to Conference Resolution 10.10 (Rev.) were reworded and two draft decisions aimed at combating unregulated domestic trade markets around the world were prepared, endorsed by the meeting and circulated to the parties for debate.

The final outcome of the meeting was a compromise that reflected the controversial nature of the debate. Bowing to pressure from the United States on the issue of annual export quotas, Botswana, reluctantly followed by Namibia, South Africa, and Zimbabwe, agreed to amend their proposals by withdrawing the sections referring to annual quotas. With the exception of Zimbabwe's proposal, the other three amended proposals were then approved by the required two-thirds majority. Zambia's proposal to downlist their population from Appendix 1 to Appendix 2 was, however, defeated. A last-minute decision, tabled by Kenya in the final plenary session and adopted after several amendments, called on the Standing Committee to define further a number of the conditions attached to the approved ivory trade measures. In this decision, IUCN was requested to assist the MIKE Central Coordination Unit in defining the geographical scope and articulating what baseline information would be required under the conditions of the approved sale of stockpiles before the 49th meeting of the Standing Committee in April 2003. AfESG worked closely with the MIKE programme to help with this process.

African elephant reintroduction and translocation guidelines

The draft guidelines for 'best practice' in African elephant reintroduction and translocation have undergone three iterations and are now ready to be posted on the AfESG Web site <http://iucn/afesg.org> for wider public review. The Re-introduction Task

Etats de l'Aire de Répartition des Eléphants, présidée par Denis Koulagna Koutou, du Cameroun. La réunion du dialogue connut son point culminant dans un consensus sans précédent de tous les pays présents à l'exception du Kenya, demandant que tous les pays ci-dessus retirent leur proposition concernant la vente d'ivoire travaillé. Cependant, la poursuite du commerce de trophées et, dans certains cas, de nouvelles demandes pour le traitement des peaux ainsi que pour le commerce d'éléphants vivants dans le cadre de programmes de conservation ont été approuvées. La vente d'un stock de 70 tonnes d'ivoire de sources légales et connues au Botswana, en Namibie, en Afrique du Sud et au Zimbabwe et la création d'un système d'approbation de quotas annuels qui pourrait fonctionner en dehors du processus de la COP ont aussi été approuvées, à la condition stricte que ce système soit en place et d'application avant qu'aucune vente d'ivoire n'ait lieu. De plus, les amendements du Kenya à la Résolution 10.10 de la Conférence (Rev) ont été reformulés, et on a préparé deux projets de décisions, destinés à combattre les marchés intérieurs non réglementés dans le monde, qui ont été approuvés par la réunion et transmis aux Parties pour discussions.

Le résultat final de la réunion fut un compromis qui reflétait la nature controversée du débat. Fléchissant sous la pression des Etats-Unis au sujet des quotas d'exportation annuels, le Botswana, suivi de regret par la Namibie, l'Afrique du Sud et le Zimbabwe, ont accepté d'amender leurs propositions en retirant les sections concernant les quotas annuels. À l'exception de la proposition du Zimbabwe, les trois autres propositions amendées ont alors été approuvées à la majorité requise des deux-tiers. La proposition du Zimbabwe qui voulait faire passer sa population de l'Annexe 1 à l'Annexe 2 a été repoussée. Une décision de dernière minute, mise sur la table par le Kenya lors de la session plénière finale et adoptée après plusieurs amendements, faisait appel au Comité Permanent pour qu'il définisse plus précisément un certain nombre de conditions attachées aux mesures approuvées pour le commerce d'ivoire. Pour cette décision, on a demandé à l'UICN d'aider l'Unité Centrale de Coordination de MIKE à définir la portée géographique et à préciser quelles informations de base seraient requises par les conditions liées à la vente autorisée des stocks, avant la 49ème réunion du Comité Permanent en avril 2003. Le GSEAF a travaillé en collaboration étroite avec le programme MIKE pour l'aider dans ce domaine.

Force, set up jointly by AfESG and the IUCN/SSC Re-introduction Specialist Group, is scheduled to meet a second time to review the final draft, after which the guidelines will be widely distributed in electronic and hard-copy formats. The guidelines will be made available in English and in French.

African elephant status report

AfESG's Data Review Working Group met in Windhoek, Namibia, from 7 to 11 March 2003 to review the first draft of the 2002 *African elephant status report* (AESR). Based on feedback from working group members, the AESR was revised and a second draft was circulated in early April. It is expected that the report will be ready for printing and dissemination in July. For the first time ever the report will be printed in colour and will include a number of new features, including brief historical backgrounds on each elephant range state. The AESR will be made available in pdf format to the public through the AfESG Web site.

Human–Elephant Conflict Working Group

The main focus of the Human–Elephant Conflict Working Group has been on implementing the ongoing WWF-funded site-based mitigation project. The goal of this project is to build the capacity of wildlife managers and local communities in 10 different sites across Africa over the next three years to assess and mitigate human–elephant conflict (HEC) through supervised use and testing of AfESG technical products on HEC.

Project activities began in November 2002, when the AfESG project leader visited Tarangire in Tanzania to set up a comprehensive system for collecting human–elephant conflict data that will be essential for designing an effective mitigation strategy for this site. This was followed by a training workshop in Selous National Park organized by WWF's project site manager, with AfESG assistance. At this workshop 14 local students were trained in the use of AfESG's HEC data collection and analysis protocol using the training package specifically designed for this purpose. Nine of the 14 students were selected as official enumerators of elephant damage and they will be investigating HEC incidents and carrying out the bulk of data collection in the Selous site.

Directives pour la réintroduction et la translocation d'éléphants africains

Le projet de directives pour le « bon usage » de la réintroduction et la translocation d'éléphants africains a été retravaillé trois fois et est maintenant prêt à être posté sur le site web du GSEAF : <http://iucn/afesg.org> pour une plus vaste révision. L'équipe spéciale de la Réintroduction, formée conjointement par le GSEAF et par le Groupe de Spécialistes de la Réintroduction du SSC/UICN, prévoit de se réunir une seconde fois pour réviser le projet final, après quoi les directives seront largement diffusées sous forme électronique ou papier. Les directives seront disponibles en anglais et en français.

Rapport sur le statut de l'éléphant africain

Le Groupe de Travail du GSEAF chargé de la Révision des données s'est réuni à Windhoek, en Namibie, du 7 au 11 mars 2003 pour revoir le premier projet du Rapport 2002 sur le Statut de l'Eléphant Africain (AESR). Basé sur le feedback des membres du groupe de travail, le AESR a été revu et une seconde version a été mise en circulation début avril. On prévoit que le rapport sera prêt pour l'impression et la diffusion en juillet. Pour la première fois, il sera imprimé en couleurs et comprendra un certain nombre de nouveaux éléments, comme un bref historique sur chaque état de l'aire de répartition des éléphants. Le AESR sera disponible en format PDF sur le site du GSEAF.

Groupe de Travail sur les Conflits Hommes–Eléphants

Le principal objectif du Groupe de Travail sur les Conflits Hommes–Eléphants fut de mettre en place le projet de mitigation sur site financé par le WWF. Le but de ce projet est de construire la capacité de gestionnaires de la faune et de communautés locales à 10 endroits différents dans toute l'Afrique au cours des trois prochaines années afin d'évaluer les conflits hommes–éléphants (HEC) et d'intervenir si nécessaire en utilisant et en testant les produits techniques du GSEAF en matière de HEC.

Les activités du projet ont débuté en novembre 2002, lorsque le chef du projet du GSEAF a visité Tarangire, en Tanzanie, pour installer un système complet pour récolter, sur les conflits hommes–

A French-speaking expert, Frederic Marchand, has joined our project to carry out training activities in selected sites in central and West Africa. He will initially focus his attention on central Africa, where training of project executants and enumerators will be carried out in Waza National Park and Mt Nlonako in Cameroon and the Gamba complex in Gabon.

Central Africa programme office

All seven Central African elephant range states have now provided me with ministerial-level endorsement for AfESG to assist in facilitating and developing a Central African Elephant Conservation Strategy. To this end, AfESG is planning to convene a workshop to design a strategic framework for the strategy with input from the range state governments, NGOs and the private sector. To prepare for this Elie Hakizumwami, the AfESG programme officer for central Africa, has recently finished a series of fact-finding missions within central African range states. Over the coming months he will be compiling a substantive background document detailing the history of elephants in the subregion and identifying current threats and opportunities regarding their conservation and management. A proposal for funding the workshop has also been written and sent to interested donors for their consideration.

West Africa programme office

The logistical and technical preparations for the technical workshop to discuss the conservation and management of elephant corridors, which was initially scheduled to take place last December, are now nearly complete. At this workshop experts will try to identify the main conservation threats and opportunities facing six of the largest remaining cross-border elephant populations in West Africa and to make recommendations on appropriate conservation and management. The workshop will take place from 9 to 11 June in Ouagadougou, Burkina Faso, and will involve technical experts from West African elephant range state governments as well as local and international NGOs. The workshop is to be fully funded by Conservation International's Critical Ecosystem Partnership Fund.

After the workshop a meeting is planned to take place between AfESG, IUCN's regional office for West Africa, the Convention on Migratory Species of Wild Animals, and the Economic Community of

éléphants, les données qui seront essentielles pour préparer une stratégie de mitigation efficace pour ce site. Il y eut ensuite un atelier de formation au Parc National de Selous organisé par le manager local du projet WWF avec l'aide du GSEAf. Lors de cet atelier, 14 étudiants locaux ont été formés à l'usage en matière de récolte de données et au protocole d'analyse des données HEC du GSEAf, en utilisant le set de formation spécialement conçu à cet effet. Neuf des quatorze étudiants ont été choisis comme rapporteurs officiels des dommages dus aux éléphants ; ils vont enquêter sur les incidents HEC et mener à bien le plus gros de la récolte de données sur le site de Selous.

Un expert francophone, Frédéric Marchand, a rejoint notre projet pour réaliser des activités de formation dans des sites choisis en Afrique centrale et de l'Ouest. Il concentrera d'abord toute son attention sur l'Afrique centrale où une formation d'exécutants et de rapporteurs sera donnée au Parc National de Waza et au Mont Nlonako, au Cameroun et au complexe de Gamba, au Gabon.

Bureau du programme en Afrique centrale

Les sept Etats de l'aire de répartition d'Afrique centrale m'ont maintenant donné l'aval gouvernemental pour le GSEAf, afin d'aider à faciliter et à développer une Stratégie de Conservation de l'Éléphant pour l'Afrique centrale. Dans ce but, le GSEAf prévoit de réunir un atelier pour préparer un cadre stratégique pour cette stratégie, avec l'input des gouvernements de l'aire de répartition, des ONG et du secteur privé. Afin de s'y préparer, Elie Hakizumwami, le responsable du programme du GSEAf en Afrique centrale, a terminé récemment une série de missions d'observation dans les Etats de l'aire de répartition d'Afrique centrale. Dans les mois qui viennent, il va réaliser un document qui fera la compilation substantielle de l'historique détaillé des éléphants dans la sous-région et qui identifiera les menaces actuelles et les opportunités concernant leur conservation et leur gestion. On a aussi rédigé une proposition de financement de l'atelier qui a été soumise à l'attention des donateurs intéressés.

Bureau du programme en Afrique de l'Ouest

Les préparations logistiques et techniques de l'atelier technique qui doit discuter de la conservation et de la

West African States (ECOWAS) to discuss future collaboration on subregional efforts to conserve elephants in West Africa. AfESG is hopeful that these discussions will lead to the official adoption of the Strategy for the Conservation of West African Elephants by ECOWAS. This strategy, which was developed in 1999 with technical input from AfESG, has already been widely endorsed by the heads of wildlife departments in the West African range states. We believe that high-level recognition and political endorsement will add to the effectiveness of its implementation.

In the meantime national elephant conservation and management plans are in various stages of development in several countries in the subregion. The national elephant conservation strategy for Burkina Faso is now complete and awaiting ministerial approval while Togo's national strategy is undergoing final review. Although the funds to hold a national elephant strategy planning workshop in Côte d'Ivoire were approved by the United States Fish and Wildlife Service in August 2002, the continuing political instability in that country has thwarted all efforts to hold the workshop. It is hoped that the current easing of tensions in Côte d'Ivoire will allow this process to regain momentum in the near future. Meanwhile, Mali, Niger and Nigeria are fundraising for their strategic planning workshops and Guinea-Conakry recently took the first step towards formulating a national elephant conservation strategy by submitting a draft proposal to AfESG for review.

The AfESG small grants fund

In line with its goal to help build the capacity of African students, researchers and organizations, AfESG is continuing to look for small-scale applied research projects for funding from its small grants fund (SGF). The SGF has clear selection criteria and application guidelines, which can be found on the AfESG's Web site: <http://www.iucn.org/afesg>. AfESG is putting considerable effort into disseminating information about the grant programme and welcomes applications from suitable candidates. To date, 11 projects have been selected for funding. The most recent SGF projects include a study of the previously unsurveyed Itigi thickets in central Tanzania and a human–elephant conflict study in the Red Volta region of Ghana.

gestion des corridors pour éléphants et qui était initialement prévu pour décembre dernier sont pratiquement terminées. Au cours de cet atelier, des experts vont essayer d'identifier les principales menaces qui pèsent sur la conservation et les opportunités concernant six des plus grandes populations transfrontières restantes en Afrique de l'Ouest, et de faire des recommandations pour une conservation et une gestion appropriées. L'atelier aura lieu du 9 au 11 juin à Ouagadougou, au Burkina Faso, et il impliquera des experts techniques venus des gouvernements des Etats de l'aire de répartition des éléphants en Afrique de l'Ouest ainsi que des ONG locales et internationales. L'atelier devrait être entièrement financé par le Fonds de Partenariat pour les Ecosystèmes critiques de *Conservation International*.

Après l'atelier, est prévue une réunion entre le GSEAf, le bureau régional de l'UICN en Afrique de l'Ouest, la Convention des Espèces Sauvages Migratrices et la Communauté Economique des Etats d'Afrique de l'Ouest (ECOWAS) afin de discuter de la future collaboration dans les efforts sous-régionaux pour conserver les éléphants en Afrique de l'Ouest. Le GSEAf espère que ces discussions mèneront à l'adoption officielle de la Stratégie pour la Conservation des Eléphants d'Afrique de l'Ouest par l'ECOWAS. Cette stratégie, qui a été développée en 1999 avec l'input technique du GSEAf, a déjà été approuvée en grande partie par les chefs des départements de la faune sauvage des Etats de l'aire de répartition en Afrique de l'Ouest. Nous croyons que la reconnaissance et l'approbation politique de haut-niveau amélioreront l'efficacité de sa mise en route.

Pendant ce temps, les plans de conservation et de gestion des éléphants en sont à différents stades de développement dans plusieurs pays de la sous-région. La stratégie nationale de conservation de l'éléphant du Burkina Faso est maintenant complète et attend l'approbation ministérielle tandis que la stratégie nationale pour le Togo est soumise à une relecture finale. Bien que les fonds nécessaires à la tenue d'un atelier de planification d'une stratégie nationale pour l'éléphant en Côte d'Ivoire aient été approuvés par le *Fish and Wildlife Service* des Etats-Unis en août 2002, l'instabilité politique qui perdure dans ce pays a contrarié tous les efforts accomplis en vue de la tenue de cet atelier. On espère que l'allégement actuel

Sixth AfESG members' meeting

Technical and logistical preparations are already under way for the sixth AfESG members' meeting scheduled to take place in Namibia from 4 to 8 December. This meeting will be fully funded by the European Commission.

Fund-raising for the future

In recent years the AfESG has been a fortunate recipient of generous funding from the United States Fish and Wildlife Service, the European Commission, the UK Department for Environment, Food and Rural Affairs, the World Wide Fund for Nature, the International Elephant Foundation, the Chicago Zoological Society and others. However, in today's climate of increasingly scarce donor funds, continued support from our traditional donors, all of whom are faced with budgetary constraints, can by no means be taken for granted. With this firmly in mind I am hoping to organize a series of fund-raising talks on behalf of AfESG beginning with a three-day visit to the Netherlands in June 2003 followed by a three-week North American tour in November. I hope that for the sake of AfESG and our continuing efforts to help conserve Africa's remaining elephant populations the response from the donor community, including the public at large, will be positive and generous in its support.

des tensions en Côte d'Ivoire va permettre au processus de se remettre en route très bientôt. De leur côté, le Mali, le Niger et le Nigeria récoltent des fonds pour les ateliers de planification de leur stratégie, et la Guinée-Conakry a fait un premier pas vers la formulation d'une stratégie nationale de conservation des éléphants en soumettant un projet de proposition à l'attention du GSEAF.

Le fonds pour les petits subsides du GSEAF

Dans son objectif d'aider à construire une capacité parmi les étudiants, les chercheurs et les organisations africains, le GSEAF continue à rechercher de petits projets de recherche appliquée qu'il pourrait financer par l'intermédiaire de son fonds pour les petits subsides (SGF). Le SGF a des critères de sélection et des directives très clairs que l'on peut connaître en consultant le site Web du GSEAF : <http://www.iucn.org/afesg>. Le GSEAF fait des efforts considérables pour diffuser l'information au sujet du programme de subsides et accueille favorablement les demandes des candidats qui remplissent les conditions requises. A ce jour, 11 projets ont été sélectionnés. Les projets SGF les plus récents comprennent une étude des fourrés jusqu'ici non étudiés d'Itigi, au centre de la Tanzanie, et une étude des conflits hommes-éléphants dans la région du Nazinon (ancienne Volta Rouge), au Ghana.

La sixième réunion des membres du GSEAF

Les préparations logistiques et techniques de la sixième réunion des membres du GSEAF qui se tiendra en Namibie du 4 au 8 décembre sont déjà en route. Cette réunion sera complètement financée par la Commission Européenne.

Récolte de fonds pour l'avenir

Ces dernières années, le GSEAF a été l'heureux bénéficiaire des financements généreux du *Fish and Wildlife Service* des Etats-Unis, de la Commission Européenne, du Département de l'Environnement britannique, des *Food and Rural Affairs*, du Fonds Mondial pour la Nature, de l'*International Elephant Foundation*, de la Société Zoologique de Chicago, et

d'autres. Pourtant, dans le climat actuel de raréfaction des fonds des donateurs, le soutien continu de nos donateurs traditionnels, qui sont tous confrontés à des contraintes budgétaires, ne peut en aucune façon être considéré comme acquis. C'est en gardant ceci à l'esprit que j'espère pouvoir organiser une série de conférences-récoltes de fonds au nom du GSEAf, qui commencera par une visite de trois jours aux Pays-Bas en juin 2003, suivie par une tournée de trois semaines en Amérique du Nord en novembre. J'espère, pour la survie du GSEAf et pour la poursuite de nos efforts pour aider à conserver les dernières populations d'éléphants africains, que la réponse de la communauté des donateurs, et celle du publique dans son ensemble, sera positive et généreuse.

African Rhino Specialist Group report

Rapport du Groupe des Spécialistes des Rhinos d'Afrique

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In the last edition of *Pachyderm*, Campbell Scott outlined a proposed survey he and Dr Hubert Planton were organizing in Cameroon to confirm whether a nucleus for a viable population of western black rhino (*Diceros bicornis longipes*) still remains, and to dart and radio-collar any rhino seen. Due to lack of funding, it will unfortunately not be possible to undertake the survey this year as originally planned, but it is hoped sufficient funds will be raised to enable the survey to take place next year. Encouragingly, following a recent visit to Cameroon, Campbell reports that there have been unsubstantiated reports from local scouts of as many as 17 animals in eight different areas, some of which had previously not been surveyed. Campbell and Hubert together with the University of Cape Town plan to use DNA analysis of rhino dung to determine the number of different individuals surviving.

The encouraging trend of cross-boundary translocation and re-establishment of black and white rhinos continues with the first phase of the reintroduction of an initial founder group of five black rhinos into North Luangwa National Park, Zambia, scheduled for May 2003. The rhinos, being donated by South African National Parks, are being released into the electric-fenced sanctuary, which has been completed. The hope for the future is to augment the initial founders by introducing a further 15 animals to bring the founder number up to the recommended minimum of 20. Following the initial introduction of 5 and then 10 more white rhinos into the Mombo area of Moremi Game Reserve, Botswana (although one male was subsequently killed in a fight), the Department of Wildlife and National Parks report they expect a further 21 founders to be introduced in two operations in April and July. The animals are being provided as part of an exchange programme with South African National Parks. For further details of these important reintroduction projects see the short notes by George Kampamba and Mercy Masedi in this issue.

Dans le dernier numéro de *Pachyderm*, Campbell Scott donnait un premier aperçu d'une recherche qu'il se proposait d'organiser avec le Dr. Hubert Planton pour confirmer s'il restait encore au Cameroun un noyau suffisant pour une population viable de rhinos noirs de l'Ouest (*Diceros bicornis longipes*) et pour anesthésier et équiper de colliers-radio tous les rhinos aperçus. En raison du manque de fonds, il ne sera malheureusement pas possible d'entreprendre cette recherche cette année comme prévu, mais on espère que l'on trouvera assez de fonds pour permettre à cette étude de se réaliser l'année prochaine. Il est encourageant de savoir que, suite à une récente visite au Cameroun, Campbell signale qu'il a eu connaissance de rapports non confirmés provenant d'éclaireurs locaux, selon lesquels on aurait vu pas moins de 17 animaux à huit endroits différents, dont certains n'avaient pas été surveillés antérieurement. Campbell et Hubert, en association avec l'Université du Cap, prévoient de procéder à des analyses d'ADN sur les crottes de rhinos pour déterminer le nombre d'animaux survivants.

La tendance favorable des translocations et des réinstallations transfrontières de rhinos noirs et de rhinos blancs se poursuit, avec la première phase de la réintroduction d'un premier groupe fondateur de cinq rhinos noirs dans le Parc National de Luangwa Nord, en Zambie, qui est prévue pour mai 2003. Les rhinos, qui sont offerts par les Parcs Nationaux d'Afrique du Sud, doivent être relâchés dans le sanctuaire entouré de clôtures électriques, qui vient d'être terminé. On espère, à l'avenir, pouvoir ajouter à ce groupe fondateur 15 animaux supplémentaires pour qu'il atteigne le nombre minimum recommandé qui est de 20 individus. Suite à une première introduction de cinq, puis de dix autres rhinos blancs dans la zone Mombo de la Réserve de Faune de Moremi, au Botswana (bien qu'un mâle ait ensuite été tué dans un combat), le Département de la Faune et des Parcs Nationaux déclarait qu'il attendait la

The African Rhino Specialist Group (AfRSG), as a consortium partner, continues to give technical direction and input to the SADC Regional Programme for Rhino Conservation (SADC RPRC). Following the resumption of funding from the Italian government, this important programme is once again fully operational and is scheduled to continue until December 2004. Initiatives recently funded by the programme include holding the second SADC Rhino Recovery Group (RRG) meeting (Angola, Botswana, Malawi, Mozambique, Tanzania and Zambia), which was held in Maun, Botswana. Readers wanting more information about the RRG and its activities should read the short note in this issue by the RRG chair, Dr Roy Bhima.

The third SADC meeting of rhino range states was also held at the same venue. The programme continues to undertake field assessment visits. More recently a training needs assessment was done in Namibia. The carrying capacity of Swaziland's rhino areas was assessed and some management recommendations were given. Development of the WILDb rhino database continues; a beta version of the new RHINO 2.0 population estimation software is undergoing field testing and is scheduled for release in late June 2003. The first of a number of planned SADC-sponsored Scene of the Crime training courses (reported in *Pachyderm* 33) also took place in Namibia in May.

The next updated and revised version of AfRSG's successful modified Sandwith training course for field rangers on rhino monitoring is also currently being produced with joint funding from SADC and the US Fish and Wildlife Rhino and Tiger Conservation Fund (RTCF). This course will form the basis of the next SADC training of trainers course, which is likely to be held in Pilanesberg National Park, South Africa, in July this year. The Darwin Initiative in the UK has also recently announced it is going to fund a major project in Kenya over the next four years to build rhino-monitoring capacity and assist the Kenya Wildlife Service's Rhino Programme implement and institutionalize a system of annual reporting on the status of the black rhino. This project will also develop a carrying capacity model for black rhinos for Kenyan conditions to aid decision-making in biological management. The AfRSG's rhino monitoring training course will also form the basis of courses to train trainers in Kenya.

The next meeting of the SADC Rhino Management Group (RMG—Namibia, South Africa, Swaziland

réintroduction de 21 animaux reproducteurs supplémentaires, en deux opérations, en avril et en mai. Les animaux sont fournis dans le cadre d'un programme d'échange avec les Parcs Nationaux d'Afrique du Sud. Pour avoir plus de détails sur ces importants projets de réintroduction, veuillez consulter les courtes notes de George Kampamba et de Mercy Masedi, dans ce numéro.

Le Groupe de Spécialistes des Rhinos d'Afrique (GSRAf), en tant que partenaire du consortium, continue de donner des orientations et un input technique au Programme Régional pour la Conservation des Rhinos de la SADC (SADC RPRC). Suite à la reprise du financement du Gouvernement italien, cet programme important est de nouveau tout à fait opérationnel et il devrait se poursuivre jusqu'en décembre 2004. Les initiatives récemment financées par le programme comprennent l'organisation de la deuxième Réunion du SADC *Rhino Recovery Group* (RRG) (Angola, Botswana, Malawi, Mozambique, Tanzanie et Zambie) qui s'est tenue à Maun, au Botswana. Les lecteurs qui souhaitent plus d'informations sur le RRG et sur ses activités devraient lire la courte note écrite dans ce numéro par le président du RRG, le Dr. Roy Bhima.

La troisième réunion SADC des Etats de l'aire de répartition des rhinos s'est aussi déroulée à cette occasion. Le programme continue à faire des visites d'évaluation sur le terrain. Plus récemment, on a réalisé une évaluation des besoins de formation en Namibie, et on a évalué la capacité de charge des zones à rhinos du Swaziland et fait certaines recommandations en matière de gestion. La mise en route de la base de données sur les rhinos WILDb se poursuit ; une version bêta du nouveau software RHINO 2.0 pour l'estimation de la population est en train d'être testée sur le terrain ; on prévoit de la diffuser fin juin 2003. Le premier cours de formation « Lieu du crime » de toute une série prévue et sponsorisée par la SADC (voir *Pachyderm* 33) a aussi été donné en Namibie, en mai.

La prochaine version révisée et remise à jour du cours de formation Sandwith du GSRAf sur le contrôle continu des rhinos, destiné aux gardes de terrain, est en préparation, avec le financement conjoint de SADC et du *Rhino and Tiger Conservation Fund* (RTCF) du *Fish and Wildlife Service* américain. Ce cours constituera la base de la prochaine formation des formateurs de SADC qui se tiendra probablement au Parc National de Pilanesberg, en Afrique du Sud, au mois de juillet prochain. La *Darwin Initiative*, en Grande Bretagne, a aussi annoncé récemment qu'elle allait financer un

and Zimbabwe) is taking place in June 2003 and one of the main activities of this meeting will be to revise the South African National Black Rhino Plan. In the last edition of *Pachyderm* I reported on the promotion of the results and recommendations to emerge from the SADC RPRC-funded RMG Workshop on Biological Management of Black Rhinos. I am pleased to report that proceedings of this important workshop can now be downloaded from the SADC RPRC Web site: <http://www.rhino.sadc.org>.

AfRSG members have been and are involved in all the above initiatives.

Planning for the next AfRSG meeting (scheduled to be held in Tsavo in Kenya in May–June 2004) has commenced. So far half the required funding to hold the meeting has been secured from SADC RPRC, and we have approached another donor to try to secure the balance of funds required. A SADC Rhino Recovery Group meeting will be held at the same time to save costs.

Once again, AfRSG would like to thank WWF's Africa Rhino Programme and WWF-US and WWF-SA for their support, which continues to allow the AfRSG Secretariat to function.

projet important au Kenya au cours des quatre prochaines années, pour élaborer des capacités de contrôle continu des rhinos et aider le Programme Rhino du *Kenya Wildlife Service* à réaliser et à institutionnaliser un système de rapport annuel sur le statut du rhino noir. Ce projet va aussi développer un modèle de capacité de charge pour les rhinos noirs dans les conditions rencontrées au Kenya, pour aider à la prise de décisions dans leur gestion biologique. Le cours de formation au monitoring des rhinos du GSRAf constituera aussi la base des cours qui servent à former les formateurs au Kenya.

La prochaine réunion du Groupe de Gestion des Rhinos de SADC (*Rhino Management Group*—RMG: Namibie, Afrique du Sud, Swaziland et Zimbabwe) se tient en juin 2003, et une des principales activités de cette réunion sera de réviser le Plan National pour le Rhino Noir d'Afrique du Sud. Dans le dernier numéro de *Pachyderm*, je parlais de la promotion des résultats et des recommandations qui devaient sortir de l'Atelier RMG sur la Gestion Biologique des Rhinos Noirs, financé par SADC RPRC. Je suis heureux de pouvoir annoncer que les mesures prises lors de cet atelier important sont maintenant disponibles sur le site Web de SADC RPRC : <http://www.rhino.sadc.org>

Les membres du GSRAf ont été et sont encore impliqués dans toutes les initiatives citées ci-dessus.

La préparation de la prochaine réunion du GSRAf (prévue pour mai–juin 2004 à Tsavo, au Kenya) a commencé. Jusqu'à présent, on a pu assurer la moitié du financement nécessaire pour la tenue de cette réunion grâce au SADC RPRC, et nous avons contacté un autre donateur pour essayer de compléter la somme requise. Une réunion du *SADC Rhino Recovery Group* se déroulera aussi à ce moment-là, pour faire un peu d'économies.

Une fois de plus, le GSRAf aimerait remercier le Programme pour le Rhino d'Afrique du WWF, le WWF-US et le WWF-SA pour leur soutien, qui permet au Secrétariat du GSRAf de continuer à fonctionner.

Asian Rhino Specialist Group report

Rapport du Groupe des Spécialistes des Rhinos d'Asia

Mohd Khan bin Momin Khan, Chair/Président, with/avec Thomas J. Foose and Nico van Strien, Programme Officers/Responsables de Programme

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Vietnam

In April 2003, the conservation situation of the Vietnamese rhino (*Rhinoceros sondaicus annamiticus*) in Cat Tien National Park, Vietnam, was re-evaluated. The protection of the rhino area in the Cat Loc part of the park has greatly improved, indeed to such an extent that there is concern that the active patrolling of three protection units (RMPUs) in the small (~ 4000 ha) rhino area may be disturbing for the rhinos. Therefore, it was recommended that the anti-poaching patrols concentrate on the periphery of the rhino area, while inside the emphasis will be placed on biological monitoring.

The reclamation programme of some remote agricultural settlements inside the park has now been approved and will be implemented soon. This will reduce disturbance by villagers and will free lands for establishing feeding areas for the rhinos. The boundaries of the Cat Loc area will be realigned and there will be an attempt to establish a Strict Protection Zone around the rhino area, closed to everyone except park staff and permit holders. This will allow the rhinos to use a larger area, provide them access to more resources and reduce the stress of repeated disturbance.

The status of the population remains a matter of serious concern, as it is clear that the number of rhinos is very small, and for the last three years there have been no signs of reproduction. Therefore, further recommendations include intensification of the biological monitoring of the rhinos and formation of a special Rhino Monitoring Unit. This unit should operate full time in the rhino area and concentrate on collecting more and better data for monitoring. A particular objective will be to assess the reproductive potential of the Cat Loc population. Basically, if the Vietnamese rhino is to have any chance for survival, a birth needs to occur in the next 18 to 24 months.

Vietnam

En avril 2003, on a réévalué la situation de la conservation du rhinocéros vietnamien (*Rhinoceros sondaicus annamiticus*) dans le Parc National de Cat Tien, au Vietnam. La protection de la zone à rhino dans la partie Cat Loc du parc s'est fort améliorée, au point qu'on craint que le dynamisme des patrouilles effectuées par les trois unités de protection (RMPU) dans la petite (~ 4000 ha) zone des rhinos ne soit dérangeant pour ces derniers. C'est pourquoi on a recommandé que les patrouilles antibraconnage se concentrent sur la périphérie de la zone tandis qu'à l'intérieur, on ferait plus attention à la surveillance biologique continue.

Le programme de réclamation de certaines installations agricoles très isolées à l'intérieur du parc a maintenant été approuvé et il sera bientôt appliqué. Ceci va réduire les perturbations occasionnées par les villageois et va libérer des espaces où on pourra établir des aires de nourrissage pour les rhinos. Les limites de Cat Loc seront redéfinies et on va tenter d'établir une Zone de Protection Stricte autour de la zone des rhinos, interdite à tous sauf au personnel du parc et aux détenteurs d'un permis spécial. Ceci permettra aux rhinos d'utiliser une plus grande surface, leur donnera l'accès à de plus nombreuses ressources et réduira le stress causé par de trop nombreuses perturbations.

Le statut de la population reste très préoccupant, parce qu'il est clair que le nombre de rhinos est très réduit et que, au cours des trois dernières années, il n'y a eu aucun signe de reproduction. C'est pourquoi, les nouvelles recommandations incluent l'intensification de la surveillance biologique continue des rhinos et la formation d'une équipe spécialisée en la matière. Cette équipe devrait travailler à temps plein dans la zone des rhinos et se concentrer sur la récolte de données plus nombreuses et meilleures. Un des

In late 2004, we will review again the results of the intensified monitoring, and we anticipate that by that time the rhino's reproductive potential can be ascertained.

AsRSG and AREAS

The most recent addition to AsRSG membership is Dr A. Christy Williams, coordinator for the WWF-International Asian Rhino and Elephant Action Strategy (AREAS). AsRSG and AREAS have been collaborating on a number of projects and Christy's official membership should facilitate increased cooperation.

Nepal

AsRSG members have reported greatly increased poaching in Nepal due to the disruptions that the political insurgency in progress there for the last two years has caused. Poachers removed at least 37 rhinos in 2002, the largest number since the crisis in the 1950s and 1960s, when the population declined from 800 in 1950 to a low of 100 in 1966. Indeed, the current loss of 37 in one year is greater than the total number of 35 lost to poachers from 1973 to 1991. A large part of the problem has been redeployment of army units away from rhino areas. The army has been prominent in protecting the rhinos since the 1960s. Only 10 of a previous 34 army guard posts remain. Conservation officials in the Department of National Parks and Wildlife Management are moving to remedy the situation and hopefully it will soon be stabilized. In the meantime, more rhinos have been translocated from Chitwan to Bardia National Park.

objectifs particuliers serait d'évaluer le potentiel reproducteur de la population de Cat Loc. Il est évident que si le rhino vietnamien doit avoir une chance de survie, il faut qu'il y ait une naissance dans les 18 à 24 mois qui viennent.

Fin 2004, nous réviserons les résultats du monitoring intensifié et nous pensons qu'à cette date, le potentiel reproducteur des rhinos aura été clarifié.

Le GSRAs et AREAS

Le dernier arrivé dans le GSRAs est le Dr. A. Christy Williams, coordinateur pour la Stratégie d'Action pour le Rhino et l'Eléphant Asiatiques (*Asian Rhino and Elephant Action Strategy*—AREAS) du WWF International. Le GSRAs et AREAS collaborent dans un certain nombre de projets, et l'adhésion officielle de Christy devrait faciliter une meilleure collaboration.

Népal

Les membres du GSRAs ont rapporté un braconnage en forte augmentation au Népal en raison des perturbations qu'a causées le soulèvement politique qui progresse depuis deux ans. Les braconniers ont prélevé au moins 37 rhinos en 2002, le chiffre le plus élevé depuis la crise des années 50 et 60, lorsque la population s'était effondrée de 800 en 1950 à 100 en 1966. En effet, une perte de 37 animaux en une seule année est plus grave que le total de 35 rhinos braconnés de 1973 à 1991. Une grande partie du problème est due au redéploiement des unités de l'armée loin de la zone des rhinos. L'armée a été prééminente dans la protection des rhinos depuis les années 1960. Il ne reste que 10 des 35 anciens postes de gardes armés. Les officiels chargés de la conservation au Département de la Gestion des Parcs Nationaux et de la Faune sont occupés à tenter de remédier à cette situation et on espère qu'elle sera bientôt stabilisée. Entre temps, on a déplacé d'autres rhinos de Chitwan au Parc National de Bardia.

RESEARCH

The elephants (*Loxodonta africana*) of Gash-Barka, Eritrea: Part 1. Historical perspective and related findings

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Abstract

Historically, elephants inhabited the north, east, west and south-west of what is now Eritrea, a new nation in the Horn of Africa. Today, they are confined only to portions of Zoba Gash-Barka in the south-west. Historical observations are based on material from the National Museum of Eritrea, the Qohaito archaeological site, and documented observations that date to the third century BC when elephants were reported in parts of the Land of Punt, including portions of today's Eritrea. From the 16th through the late 19th century various authors reported on the presence of elephants in areas where there are none today, as well as in the Gash-Barka region. Throughout the 20th century reports were only from areas within Gash-Barka, and usually the elephants were in small numbers, except for one report of 100 to 200. The reasons for the shrinking elephant habitat in Eritrea vary from human settlements to lack of water resources. Observations of elephants during the 21st century have been helped by regular United Nations flights between Ethiopia and Eritrea. We also conducted ground surveys, which proved useful as it is difficult to observe elephants from the air in the dense riverine forest, composed mostly of doum palms. Two recent ground surveys (December 2001 and January–February 2003) provided valuable information on a relatively large elephant population in Eritrea. All 83 elephants, young and adult, observed in various locations within the watersheds of the Gash and Setit Rivers appeared in good physical condition. These data are welcome news of a large relict population of elephants in Eritrea, unheard of since 1955.

Additional key words: archaeological evidence, historical distribution

Résumé

Historiquement, les éléphants habitaient le nord, l'est, l'ouest et le sud-ouest de ce qui est maintenant l'Erythrée, un nouveau pays de la Corne de l'Afrique. Aujourd'hui, ils sont confinés dans des parties de Zoba Gash-Barka, dans le sud-ouest. Les observations historiques se basent sur du matériel trouvé au National Museum d'Erythrée, sur le site archéologique de Qohaito, et sur des documents qui remontent au troisième siècle AC et qui rapportent la présence d'éléphants dans certaines parties du Pont, dont certaines portions de l'Erythrée actuelle. Du 16ème à la fin du 19ème siècle, divers auteurs ont rapporté la présence d'éléphants dans des régions où il n'y en a plus aucun maintenant, ainsi que dans la région de Gash-Barka. Tous les rapports parus au 20ème siècle ne mentionnent que la région du Gash-Barka, et d'habitude les éléphants sont en petit nombre, à l'exception d'un rapport qui parle de 100 à 200 individus. Les raisons de la diminution de l'habitat des

éléphants en Erythré vont des installations humaines au manque d'eau. Les observations des éléphants qui ont eu lieu au 21^{ème} siècle ont été facilitées par les vols réguliers des Nations unies entre l'Éthiopie et l'Erythré. Nous avons aussi réalisé des études au sol, qui se sont avérées très utiles étant donné qu'il est très difficile d'observer des éléphants d'en haut dans la dense forêt riveraine, composée en majorité de palmiers doum. Deux études au sol récentes (décembre 2001 et janvier–février 2003) ont fourni des informations intéressantes sur une population d'éléphants relativement importante en Erythré. Les 83 éléphants, jeunes et adultes, observés à divers endroits entre les bassins versants du Gash et du Setit, semblent en bonne condition physique. Ces données sont autant de bonnes nouvelles d'une grande population d'éléphants en Erythré, dont on n'avait plus entendu parler depuis 1955.

Introduction

This paper is part one of our findings on elephants in Eritrea. The second will cover present numbers and distribution, ecology and behaviour, and fauna and flora in the biodiverse ecosystem of Zoba Gash-Barka. Gash-Barka is one of the six administrative 'zobas' (zones), in Eritrea. The others are Anseba, Debub, Debubawi Keih-Bahri, Maekel and Semenawi Keih-Bahri, each with its own geography, climate, vegetation, wildlife, ethnic composition, languages and trade.

Historical records of elephants were documented in all zobas except Debubawi Keih-Bahri at the south-east of the country, bordering the Red Sea on the east, Ethiopia on the west, and Djibouti on the south. Zoba Debubawi Keih-Bahri was not always a desert as it is today and has been in the recent past. Palaeontological findings dating from the Pleistocene include *Elephas recki*, an elephant that was also found in other countries in the Horn of Africa and in eastern Africa (Abbate et al. 1998; Coppens et al. 1978). To understand better some of the possible factors for the shrinking range of living elephants in Eritrea, a brief description of the physical and climatic setting is in order.

Physical and climatic settings

Topographically, the highland of Eritrea is a part of the massif uplift that occurred in the Tertiary, although the rocks themselves are of Precambrian origin, at least 570 million years old. The mountains, with an average elevation of 2000–2500 m above sea level, continue southward into Ethiopia and Kenya. On either side of the mountains are lowlands; to the east is the escarpment overlooking the Red Sea, and to the west the topography slopes gradually into the Gash-Barka zone and stretches towards Sudan farther west and Ethiopia to the south. In essence these are

the three main geographic zones of Eritrea: the highland, the eastern lowland and the western lowland (Paice 1996; Tetley 1996). Further subdivisions into coastal lowland, eastern escarpment, central highland, western escarpment, and western lowland have been employed by Zinner et al. (2000). According to White (1983) the phytogeographic classification of Eritrea includes at least three regions: Somalia–Masai, Sudanian and Afromontane. The western lowland (including the Gash-Barka) is a part of the Sudanian phytogeographic region.

Moisture from the Atlantic Ocean is carried north-east across the Congo Basin. Upon rising at the Ethiopian Plateau, clouds release their water content, which constitutes the long summer rains from June to September. In the opposite direction, moisture from the north-east Asiatic landmass is carried south-west across the Red Sea and clouds drop their content once they clash with the mountains, around March to April, in the short winter rainy season. Yet another source of rain at other times of the year is from the Indian Ocean. Some parts of Eritrea, like Filfil and Mrara, in the 'green belt' on the eastern escarpment receive monthly precipitation year-round (close to 100 mm per month) and this rainforest is the only place in Eritrea with a spectacular habitat for birds and other wildlife.

Only a few countries in the world, such as Namibia, can claim to have desert or semi-desert elephants—Eritrea is one of them. Today the elephants, *Loxodonta africana*, in Gash-Barka are one of the northernmost populations in Africa, inhabiting areas north of 15° latitude (the elephants in Mali inhabit latitudes of 16.5° N; Barnes et al. 1999, p. 210). Although not all the elephant habitat in Eritrea is xeric (dry), vast portions are dry for most of the year. With the exception of one, all rivers in Eritrea are seasonal (wadis); they flow only during the rainy seasons. The exception is the Setit (Tekezze) River, which flows all year; this river marks the boundary

between Ethiopia and Eritrea in the south-west. When water is scarce, elephants dig water-holes in dry riverbeds. The riverine forest in the flood-plains of the Gash and Setit Rivers is composed, in part, of impressive doum palms that contribute a special atmosphere to this already captivating oasis-like habitat.

J. Shoshani



Figure 1. A decorated war shield said to be made from elephant skin, believed to be from areas of historical distribution.

Research objectives

We have been seeking an overview of historical distribution of elephants in Eritrea to better understand current distribution. We are also interested in finding out whether the current distribution occurred in past habitats.

Materials and methods

For the extirpated elephant population in Eritrea, we referred to the available literature and consulted historians. For the extant population, we used direct and indirect observations (spoor such as dung and footprints, chewed vegetation, scratching posts) and employed any help possible, which included local residents and United Nations personnel. In 1996, the senior author found one tusk near Hasta, Sahel (Zoba Semenawi Keih-Bahri), 200 km north of Haicota, far beyond the current elephant distribution in Eritrea. In addition, the National Museum of Eritrea (NME) in Asmara has on display leather shields, said to be made from the hide of elephants that roamed in regions where they are not found today. In its storage area is a third cervical vertebra of an elephant of unknown origin; it appears, however, to be an old bone. Our plans include carbon dating this tusk, a shield, and the vertebra with the hope that they will shed light on the timing of past distribution of elephants in this country. Genetic testing might help narrow the general sources (within or outside Eritrea) of these items. Archaeological remains such as petroglyphs of elephants near Qohaito on the highland of Eritrea,

outside current elephant distribution, provided additional material evidence.

Results

Examination of material at the National Museum of Eritrea and petroglyphs at Qohaito

Using a magnifying lens, we examined the shields displayed at NME (fig. 1). We could not be certain that they are genuine elephant leather, which has characteristic hexagonally shaped studs with hair protruding in between the hexagons in the pattern (Horstman 1966). In some places a possible similar pattern was detected. Identifying these studs could be difficult because the leather had been worked and stretched in the tanning process. Genetic testing might

give credence to their authenticity as elephant products. As museum records indicate that these shields may have originated from outside Gash-Barka, it is possible that they came from an area that historically had had an elephant population. Radiometric dating on a sample from these shields would be useful as further corroboration of their age.

In the gorge close to the archaeological ruins of Qohaito one can find petroglyphs of animals, including those of elephants, engraved in sandstone (fig. 2). Peter Schmidt (pers. comm. 2003) suggested that the Qohaito site, including the petroglyphs, may date to the pre-Axumite period, ca 200 BC. The prehistoric artists who engraved these elephant petroglyphs evidently used as their models the live elephants that roamed this part of the country, an area that is included in the historical distribution.

Literature review and historical background for elephants in Eritrea

3rd century BC—Indirect evidence for the earliest observations of elephants in the Horn of Africa comes from writing on a stela (dated to the mid-6th century

AD) at the ancient sea port of Adulis on the coast of the Eritrean Red Sea. We learn that ‘the Red Sea coast of modern Sudan and Eritrea’, generally identified with Punt, ‘was rich in wild elephants, enough so that these two kings [Ptolemy III, 246–221 BC, and his father, Ptolemy II] mounted campaigns to hunt them’. These elephants were of two types: ‘Troglydote and Ethiopic’; possibly the reference is to the African forest elephants, *Loxodonta cyclotis*, and the African savannah elephants, *L. africana* (Phillips 1997, p. 445–446). Gowers (1948) reported that throughout the reign of Ptolemy III, elephants were caught on the Eritrean plateau and in the lowland between the escarpment and the sea. Pankhurst (2002a,b) confirmed that the Ptolemeic dynasty (Ptolemy II–IV) hunted elephants along the southern Red Sea coast.

16th century—One of the earliest documented observations of elephants is that of Francisco Alvares (narrated 1520, published 1961, p. 513), a Portuguese Jesuit missionary. His notes pertain to various parts of Eritrea, including an area where elephants are not found today, in Debre Bizen and vicinity, some 25 km east of Asmara, towards the Red Sea coast.

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Figure 2. A petroglyph of an African elephant (dating to the pre-Axumite period, ca 200 BC) found near Qohaito archaeological site on the highlands of Eritrea, an area of historical elephant distribution.

18th–19th century (1722–1899)—In a map provided by Largen and Yalden (1987, p. 104), it is evident that elephants were present in north-east Eritrea (in 1987 Eritrea was a province of Ethiopia), including areas along the coast of the Red Sea from Adulis to Karora region close to the border with Sudan. Today this region, which covers two administrative zones (Zoba Semenawi Keih-Bahri and Zoba Anseba), is devoid of elephants.

19th century (1859–1889)—Yalden et al. (1986, p. 47–50) provided comprehensive detailed records of elephants in Ethiopia (in 1986 Eritrea was a province of Ethiopia). Records pertaining to Eritrea were in areas where elephants are not found today.

Early 20th century (1900–1939)—Same source and comments as for ‘18th–19th century (1722–1899)’ preceding, but fewer elephants observed in these administrative zones. Yalden et al. (1986, p. 49) noted that Frade (1936) reported on elephants ‘between Gash River and Setit River; Mt Aighet’.

Mid 20th century (1940–1986)—Same source and comments as in paragraph ‘18th–19th century (1722–1899)’ preceding, but this time elephants were recorded from Zoba Gash-Barka, south of Zoba Anseba. Largen and Yalden (1987, p. 104) stated that Leuenberger (1955) reported that herds of 100 to 200 elephants still roamed between the Setit and Gash Rivers. Additional records of elephants in Eritrea were reported by Yalden et al. (1986, p. 50).

Late 20th century (1993–1999)—Hagos (1993), Litoroh (1997, p. 16), and Barnes et al. (1999, p. 77) reported anywhere from two to eight elephants, some in Eritrea, others on the Ethiopian side of the border. Yacob (1998) reported on 20 to 50 elephants in Eritrea. Yalden et al. (1996) provided a revised checklist of mammals and notes on zoogeography and conservation in Ethiopia and Eritrea.

Turn of the 20th century (2000)—Marchant et al. (2000, p. 11) estimated the number of elephants in the Gash-Setit area, Eritrea, to be between 8 and 50. Hagos (2000) and Shoshani et al. (2000) provided the most recent data, including conflicts with farmers and ecological evaluation of the habitat in general.

21st century (2001–2003)—At least 28 elephants were observed on 25 December 2001 as reported in this paper. Various reports on elephants in Eritrea, some with photographs, with varying estimates were provided during 2002 (table 1). The minimum estimate of elephants in Eritrea in January–February 2003 was 83, with a guarded estimate of 100 elephants during the dry season.

The historical and current distribution map produced here (fig. 3) is based on the map provided by Largen and Yalden (1987, p. 104), and our observations on historical material noted above, as well as observations on living elephants during 2002 and 2003. In the second part of this paper we will provide details on the current distribution.

Habitat description of past distribution

Since past distribution included areas in the highlands, as well as the lowlands, a brief description of these habitats and comparison between lowlands and highlands will simplify discussion. The northern part of Eritrea and central plateau where elephants once roamed included both lowlands and highlands. Except for the central highland plateau, of all the regions where elephants roamed or are still roaming, the south-western part of the country (Zoba Gash-Barka) has the next highest average annual precipitation (up to 600 mm per year, during May and September). The central plateau receives 500 to 700 mm per year, in two rainy seasons. In the north-western region the temperatures are high and the precipitation is low, with average annual precipitation of up to 300 mm per year and typical xerophytic vegetation of open acacia woodland. The south-western portion of the western lowland (where elephants roam today) is described separately below. The north-eastern region and the Red Sea coastal region are rugged desert, with little (close to 100 mm per year) or no precipitation. Historical distribution of elephants included the portion of the coastal region as far south as the Buri Peninsula. In these coastal areas the habitat was dry during historical times, with average annual precipitation of 100 to 200 mm (Ministry of Education, State of Eritrea 1995). Fertile seasonal fluvial deposits from the highlands, however, provide substrate for greener vegetation in deltas or wadis than in the arid surroundings.

Acacia etbaica is the prevalent acacia species in the higher elevation (1400–2300 m), and *A. tortilis* is more adapted to lower elevations (0–1900 m) (Bein et al. 1996). In the highland afromontane, a dominant species in the past was the African pencil cedar (*Juniperus procera*); at higher elevations, *Juniperus* is associated with African wild olive (*Olea europaea africana*). Similarly, broadleaved trees such as *Combretum fragrans* are usually associated with relatively high precipitation such as found in the Gash River basin. Here one can find another broadleaved species, bitter frankincense (*Boswellia papyrifera*),

Table 1. Data on elephants observed in Eritrea since the 3rd century BC

Date	No.	Locality	Observed by	Comments
3rd century BC 246–221 BC	many	Land of Punt (part)	Ptolemy III Ptolemy II	elephants were hunted (Phillips 1997, p. 445–460)
16th century 1520	?	Debre Bizen and vicinity	Francisco Alvares	today no elephants are found in Debre Bizen between Asmara and the Red Sea
18th–19th century 1722–1899	?	north-east Eritrea	various authors	reported by Largen and Yalden (1987, p. 104). Today no elephants are found here
19th century 1859–1889	?	Eritrea, where there are no elephants today	various authors	reported by Yalden et al. (1986, p. 47–50)
20th century 1936	?	between Gash and Setit Rivers, and near Mt Aighir	Frade	reported by Yalden et al. (1986, p. 49)
1955	100–200	between Gash River and Setit River	Leuenberger	reported by Largen and Yalden (1987, p. 104). Other records on elephants for the period of 1940–1986 were given by Yalden et al. (1986, cf. p. 50)
Unpublished	2–8	Gash River	Hagos	some in Eritrea, others in Ethiopia
1997	2–8	Gash River	Litoroh	2 in Eritrea, 6 in Ethiopia
2000 December	4	near Bimbina	UN staff	2 large and 2 small
21st century 2001 April	1	on road between Antore and Um Hagar close to Ethiopia	UN staff	'very large' [p]
2001 May 18	3	near Solomon farm	Shoshani and UN staff	in doum palm forest [p]
2001 August	1	Om Hajer near Tekezze River	Yacob Yohannes and other MoA staff	calf about one year probably swept by Setit River [p]
2001 Sept 19	15	Tekezze River 20 km east of Om Hajer	UN staff	family of 10+ [p] and 5 bulls [p]
2001 Dec 25	28+	junction of Gash River and Bayaye wadi	Shoshani, Ghebrehiwet, students	adult, young and newly born [p]
2002 February	?	near Adi Omar	Ghebrejesus Ghebrelul	
2002 March	2	near Antore and Awagaro	Emun Kebrom	elephants were killed
2002 April 5	~ 30	near Awagaro	Mahmud M. Osman	filmed a herd of elephants [p]
2002 ~ Sept–Oct	~ 40	near Tekezze River	UN staff	aerial photographs [p]
2003 January 7	~ 40	Gash River, near Gogne	Tedros Kebede, Travel House Int'l	filmed elephants move towards Haicota
2003 Jan 10–11	?	near Antore and Awagaro	Kebrom and Shoshani	fresh elephant footprints
2003 Jan 26–Feb 11	83+	Gash-Barka	Elephant Team	live elephants, footprints and dung

Shoshani et al. (2000) provided data with photographs up to the year 1999; previous data are given in the text. [p] = photographic evidence, not included here; MoA = Ministry of Agriculture, Asmara, Eritrea

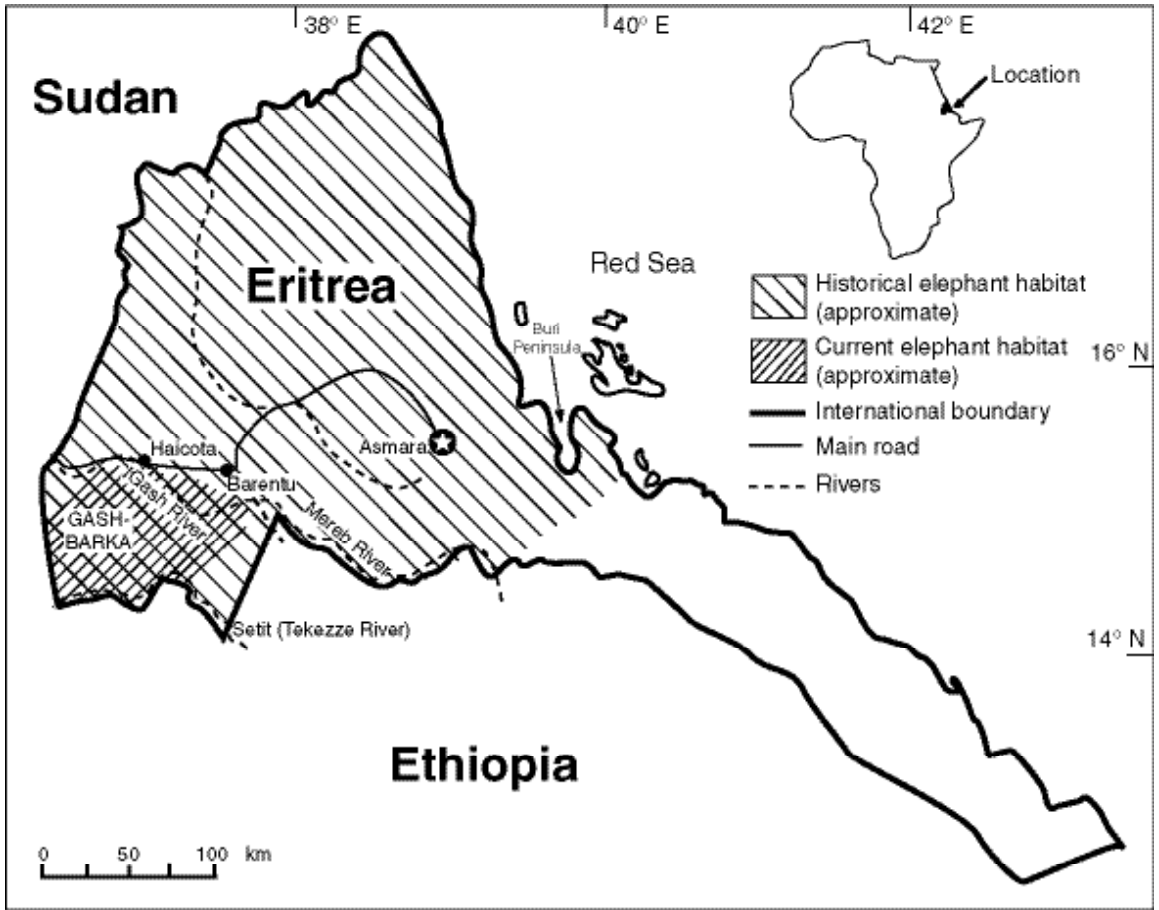


Figure 3. Map of Eritrea with historical and current distribution of elephants. It is possible that in historical times elephants roamed over all or most of what is now Eritrea; present evidence, however, is not conclusive.

which has been used for centuries as ceremonial incense. Overall, the northern highland and escarpment regions are more xeric than the south-western region. Major river basins include the seasonal Barka River in the north-west, the seasonal Anseba River in the central and north regions, the seasonal Felket River in the north-east, the seasonal Merab River in the south, and the permanent Setit (Tekezze) River in the south-west. River watersheds and divides are good habitat for many wildlife species, each region with its characteristic fauna and flora.

Habitat of current elephant distribution in south-western Eritrea

The south-western portion of the country incorporates Zoba Gash-Barka, where elephants have been observed at least since 1936 but possibly since the third century

BC (table 1). The riverine semi-desert habitat of this region is composed mostly of doum palm and ziziphus bush, acacia woodland and open grassland savannah. The terrain is mountainous to hilly, rising to between 500 and 1000 and punctuated with wadis. Average temperatures range from 25°C in January to 35°C in June. The rains fall from June to September, with average precipitation of 300 to 600 mm per year in the wetter parts. August has the highest rainfall. The elephants are located north and south of the Setit (Tekezze) River; they migrate between Eritrea and Ethiopia. Members of the Kunama and Nara tribes reside in Gash-Barka with their camels, goats and sheep.

Results from most recent ground surveys

Table 1 includes documentation of elephants from historical times to the present. We conducted our most

recent ground surveys in December 2001 and January–February 2003. In 2001 we observed at least 28 elephants and in 2003 the minimum number of elephants observed in various locations was 83, within the watersheds of the Gash and Setit Rivers. Herd composition included calves, juveniles and adults, and all appeared in good physical condition.

Discussion

Current taxonomic knowledge integrated with historical and ecological considerations

Historically, the elephants in Africa have been classified as one species with two subspecies: *Loxodonta a. africana*—the bush or savannah elephants of eastern, southern and central Africa—and *L. a. cyclotis*—the forest elephants of central Africa (Laursen and Bekoff 1978; Sikes 1971). Recently, however, Grubb et al. (2000) provided morphological evidence for elevating the two subspecies to species level. Roca et al. (2001), and Eggert et al. (2002) provided molecular evidence corroborating these morphological findings. Data from Eggert et al. (2002) provide additional genetic evidence that the populations of the forest and savannah elephants of West Africa may be interpreted to constitute a third species in Africa.

Even though the elephants in Eritrea often visit forested regions, they are classified as bush African elephants, *Loxodonta africana*. Some people believe that these elephants are supposed to be, or include, hybrids between the native African elephants and Asian elephants. This possibility is based on a historical 19th century event. In 1868 the British General Sir Robert Napier brought 44 elephants from India to fight the Ethiopian King Theodore of Magdala (Markham 1869, p. 140; Myatt 1970, p. 90). It is said that an unspecified number of these Asian elephants (*Elephas maximus*) were released or escaped from Napier's camp and mated with native African elephants. The elephants we saw in Gash-Barka were, as well as could be judged externally, typical African elephants (*L. africana*), not hybrids. Yet to be absolutely certain, genetic tests will be conducted to test this hypothesis. It should be noted that there is one known case of a hybrid produced in captivity between an African and an Asian elephant (Howard 1979); thus there is reason to believe that such a hybrid is possible.

Although there are no elephants today in the eastern portion of Eritrea, indirect evidence indicates that they may have roamed portions of the Land of Punt in the recent past. A clue that elephants may have inhabited regions close to the Red Sea in historical times comes from the name of a fishing village, Irafale (or Irafaile), not far from Adulis, an ancient port on the Red Sea, about 65 km south of Massawa. Villagers say the name means 'I see elephants' or 'I can see elephants' (from *ara*, 'I see' and *fil*, 'elephant') in the Semitic language Saho. It has also been reported that in an incident called 'the Battle of the Elephants', African elephants trained for war were shipped from Adulis, apparently to Yemen across the Red Sea (Hillman and Hillman 1998).

From the accounts related by Gowers (1948) we learn that what is now Eritrea played a fundamental role in the history of domesticating elephants.

The Ptolemies in the third century BC deliberately sought their own source of elephants, to counter the Seleucids, who got theirs from their Indian allies. Ptolemy II established a catching base at Ptolemais, on the Baraka (Barka) River. Although they caught elephants all along the coast as far as Cape Guardafui in what is now Somalia, the port of shipment back to Egypt was Adulis, near Massawa, which was founded in the reign of Ptolemy II.

Pankhurst (2002a) also corroborates that the Ptolemy rulers hunted elephants for military purposes along the southern Red Sea coast for about a century, that is, during the reigns of Ptolemy II (280–246 BC), Ptolemy III (245–221 BC) and Ptolemy IV (221–204 BC). This interest then shifted to hunting elephants to furnish the 'white gold' of the ivory trade. Pankhurst (2002b) elaborated on ancient hunting methods. He also reported that 'a large group of elephants, about five thousand in number' was seen at Aue, midway between Aksum and Adulis. This area today is partly in Ethiopia (Aksum) and partly in Eritrea (Adulis). Pankhurst (2002b) quotes Kosmas Indikopleustes, an Egyptian merchant-cum-monk who visited both Adulis and Aksum: 'The country abounds with them, and they have large tusks which are exported by sea from Ethiopia even into India and Persia and the Homerite country [south Arabia] and the Roman dominion.'

More concrete evidence for the presence of elephants in Eritrea in historical times comes from archaeological sites. Qohaito, an archaeological site on the highland of eastern Eritrea, is said to have been

an ivory trade post. As noted above, Qohaito site includes at least one petroglyph of an African elephant, which appears to have been engraved during the pre-Axumite period, ca 200 BC, close to the time when the Ptolemaic dynasty reigned in this part of Africa. In the Ham monastery, about 100 km south of Asmara, 60 mummies were found wrapped with what is believed to be elephant skins (Yosief Libsequal, pers. comm. 2002). The war shields housed in NME are possibly made from ancient elephant skins; some are said to be from animals originating in Eritrea, possibly from regions other than the western part of the country where elephants are found today. It appears that there is museum and archaeological evidence to substantiate the historical distribution of elephants in Eritrea. This evidence is augmented by documented observations of elephants and giraffes close to the Debre Bizen monastery some 25 km east of Asmara made by the 16th century Portuguese Jesuit missionary Francisco Alvares (narrated 1520, published 1961). Travellers and scientists reported on elephants in various parts of Eritrea, so that we can safely assume that they were found all over the country, particularly in the northern regions, until 500 years ago (fig. 3). Recently, remains of extinct proboscideans—elephantids and the forerunning gomphotheres, which were proboscideans that lived from the early Miocene to the early Holocene, about 24 million to 10,000 years ago, and that gave rise to stegodontids and elephantids, including the extinct mammoth—have been found in the plains near the Red Sea (Shoshani et al. 2001) and in the Danakil Depression (Abbate et al. 1998).

Tusk size

Most of the tusks measured and those observed on live elephants in Eritrea appeared to be small. From previous data on eight isolated tusks (based on tusks salvaged and examined post mortem) we measured an average of 107 cm in length and 9.8 kg in weight (Shoshani et al. 2000). Among the tusks measured was the one found in 1996 in Sahel, 200 km from current elephant distribution. Measurements of this tusk fell within the range of other tusks examined. With caution, it is possible to surmise that there was apparently little or no variation in tusk size in historical times. Baker (1871, p. 219) noted that most Abyssinian elephants have short but thick tusks. One possible explanation for the almost uniform tusk size

and weight in Eritrea is the homogeneous genetic make-up of the population. This hypothesis may be related to isolation and inbreeding. Genetic testing may help answer some of these intriguing questions.

Possible explanation for the shrinking elephant habitat

All water courses (rivers and wadis) in Eritrea are seasonal except for the permanent Setit (Tekezze) River within the jurisdiction of Gash-Barka, where elephants have been documented since early history. Elephants do not stay far away from water for long (see Sikes 1971); even the 'desert elephants' of Namibia seek water as often as possible and will travel long distances in search of water and food (Walker 1982; Olivier 1983). Water alone appears to be the single most important factor of elephant distribution; next is food.

In Eritrea, the groundwater level (aquifer) appears to be lower in the highlands, in Zoba Anseba and Zoba Semenawi Keih-Bahri (including historical elephant distribution) than in Zoba Gash-Barka. It is also possible that above-ground perennial springs in the area of historical elephant distribution dwindled or dried out in recent times (Semere Berhe, Department of Water Resources, Ministry of Land Water and Environment, pers. comm. 2003). It would thus have been more difficult for elephants during dry seasons to reach water as the water level was deeper in historical times than it is at present. To these factors we may add expansion of human population and deforestation. Thus it appears that in historical times the area outside the current distribution might not have been able to support a large elephant population, and gradually their permanent home range shifted towards the watersheds of the Setit and Gash Rivers.

Future investigations

One of our long-term plans is to continue our surveys of elephants and attempt to apply radio collars to be able to study their migratory routes. Concomitantly, we will continue ecological and behavioural studies and continue to collect data on the biodiversity of Zoba Gash-Barka. In an effort to convey a simple and powerful message on the value of elephants in their ecosystem, we plan to develop an educational programme in the three major languages spoken in Eritrea (Tigrigna, Arabic, English). Radiocarbon dating on a leather shield,

the tusk and the cervical vertebra at NME might help us better understand the historical distribution of elephants in Eritrea. Finding the possible sources of these items, within or outside Eritrea, may be difficult, but genetic testing should help narrow the guesses. Genetic tests will also be conducted to ascertain that the elephants of Eritrea are typical African elephants (*L. africana*), not hybrids between the Asian (*E. maximus*) and African elephants.

Concluding remarks

Only a fraction of what has been documented as elephant habitat in historical times is currently available for elephants now. Further shrinkage of elephant habitat may have an irreversible effect on their long-term viability. A possible explanation for the shrinking of their habitat may focus on the lack of water throughout the year. The vulnerability of the elephants in Eritrea, their role in the ecosystem, and their value as part of the international wildlife heritage cannot be overstressed. The highest number of elephants observed in Gash-Barka was in 1955, at an estimate of 100 to 200. In 2003 we estimate this number to be close to 100. Elephants inhabit areas where doum palms dominate. The elephants we observed in the Gash River were a healthy, fecund and viable population. The elephants of Gash-Barka area may be a classic example of isolation, a hypothesis to be tested.

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The status of the black rhinoceros (*Diceros bicornis*) on private land in South Africa in 2001

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Abstract

Considerably fewer black rhinos (*Diceros bicornis*) than white rhinos (*Ceratotherium simum simum*) are found on private land in South Africa. Primary reasons are that originally there were fewer black rhinos in the wild and that black rhinos have been available to private owners only since 1990. Further contributing factors include the high price of black rhinos and the stringent habitat and security requirements imposed by sellers, essentially state conservation agencies, who want to ensure that private owners establish minimum breeding populations. Consequently few private landowners had established black rhino populations on private land. But now a survey undertaken in 2001 has shown that 118 black rhinos are privately owned on 15 properties. This is an increase of 34% since 1999, 55% of which is accounted for by sales to the private sector from state-owned conservation agencies. *D.b. minor* make up 69% of the total; *D.b. michaeli* 19% and *D.b. bicornis* 11%. Natural growth within the population is 5.7% per annum. Almost two-thirds of the population are adult animals (63%) with females outnumbering males, while among subadults males slightly predominate. There is keen interest in some sections in sport hunting surplus bulls on private lands.

Résumé

On observe nettement moins de rhinos noirs (*Diceros bicornis*) que de rhinos blancs (*Ceratotherium simum simum*) dans les domaines privés d'Afrique du Sud. Les premières raisons en sont que dès le début, il y avait moins de rhinos noirs que de blancs dans la nature et que les propriétaires privés n'ont pu acquérir de rhinos noirs que depuis 1990. D'autres facteurs importants incluent le prix élevé des rhinos noirs et les conditions strictes en matière d'habitat et de sécurité qui sont imposées par les vendeurs, ceux-ci étant principalement des organes de conservation de l'Etat qui veulent s'assurer que les propriétaires privés constituent des populations reproductrices minimales. Par conséquent, peu de propriétaires ont installé des populations de rhinos noirs sur leurs terres. Mais une étude entreprise en 2001 a montré que 15 propriétés privées abritaient maintenant 118 rhinos noirs. Ceci représente une augmentation de 34 % depuis 1999, dont 55 % sont dus à des ventes des organismes de conservation d'Etat au secteur privé. *D.b. minor* représente 69 % du total ; *D.b. michaeli*, 19 % et *D.b. bicornis*, 11 %. La croissance naturelle de la population est de 5,7 % par an. Près des deux-tiers de la population sont des animaux adultes (63 %), et le nombre de femelles est plus élevé que celui des mâles, tandis que chez les sub-adultes, les mâles dépassent légèrement les femelles. Il y a un intérêt marqué dans certaines sections pour la chasse sportive, dans les terrains privés, des mâles qui sont en surnombre.

Introduction

A telephone survey to assess the status of black rhinoceros (*Diceros bicornis* Linnaeus, 1758) on private land in South Africa was undertaken during November 2001. It included all property other than

national parks, provincial, municipal and defence force reserves and the greater Kruger reserves. The survey was funded by WWF International's African Rhino Programme. Several surveys of this nature have been undertaken on the southern white rhino in recent years (such as Buijs 2000; Castley and Hall-Martin

this issue) but none on the black rhino. However, the Rhino Management Group (RMG), a multi-agency association including conservation agencies, rhino experts and private owners has figures on the distribution and status of black rhinos on private land (Knight 2000). It coordinates black rhino management issues in South Africa and some neighbouring countries including Namibia, and more recently Swaziland and Zimbabwe. The RMG is also responsible for updating and putting into effect the South African national conservation plan. The current survey data complement and update existing RMG information.

Three of the four recognized subspecies or ecotypes of black rhino (according to du Toit et al. 1987) are found on private property in South Africa. The South African national rhino conservation plan recommends that they not be allowed to interbreed. To prevent such interbreeding and to ensure maximum breeding of the individual subspecies, a premium is placed on proper monitoring of these populations. The most numerous black rhinos on private property belong to the south-central subspecies, *D.b. minor*. A population of the south-western subspecies (*D.b. bicornis*) that is regarded as indistinguishable from the locally extinct Cape black rhino (Hall-Martin 1985) has been reintroduced into South Africa from Namibia. A population of the eastern subspecies (*D.b. michaeli*) that was originally introduced to Addo Elephant National Park from Kenya in 1961 and 1962

J.G. Castley



Black rhino in boma at Addo Elephant National Park, ready for transport.

J.G. Castley



Diceros bicornis michaeli cow and calf.



Black rhinos in boma.

(Hall-Martin 1979) is also present. South African National Parks is moving the *D.b. michaeli* out to make way for the indigenous *D.b. bicornis* because Addo plans to increase its area to be able to support an independently viable black rhino population. The majority of the *D.b. michaeli* removed from Addo were translocated to a single private reserve selected as a suitable custodian of this population, while others have been translocated to reserves in Tanzania that are within the subspecies' historical distribution range.

This paper presents the findings of a recent survey of black rhinos on private land in South Africa, with the hope that it will lead to improved management. It updates population figures, demographics and trade aspects, and it provides supporting baseline data for future comparative surveys with RMG information.

Objectives

The survey was carried out to determine the numbers of black rhinos on individual private properties, the

structure of each population, the pattern and numbers of animals traded or moved between properties, the success rate of such translocations, an overview of population performance, and an estimate of rhino horn stock under private ownership. Secondary objectives were to understand the factors influencing the market in black rhinos, the owners' reasons for keeping them, and their attitude towards the possibility of legalizing rhino hunting and trading in rhino horn.

Methods

The starting point was to contact the 11 properties listed by Knight (2000) as having black rhinos and the 4 others that subsequently acquired them. Pertinent questions in a structured questionnaire were asked of either the landowner or manager or sometimes a third party (such as wildlife dealer or conservation official) for relevant information pertaining to the specific property (property registers, permit applications, sales records, and so on). Other information was obtained

through personal contacts. Records of sales of black rhinos to private landowners by Ezemvelo KwaZulu-Natal (EzKZN) Wildlife and South African National Parks (SANParks) were also consulted.

Results

Information quality

Only one of the owners of black rhinos was reluctant to be interviewed, but the status of this particular population was satisfactorily derived from other sources. The remaining owners cooperated fully in disclosing their dealings and the status of their populations. Two private animal dealers who had traded in black rhinos also gave full information on their transactions. All populations known to the various provincial conservation authorities were accounted for and we believe that the number of black rhinos on private land is accurately reflected in this paper. The nature of the questions asked and the data collected in the present survey are neither as intensive nor as detailed as the

information that RMG collected. The confidential RMG summary reports distributed to participating parties are, however, not made available to the general public.

The properties

All 11 properties that Knight (2000) listed still had black rhinos. An additional 4 properties acquired animals after the 1999 survey. Two of the properties kept a single black rhino each under confined zoo conditions. On the remaining 13, the rhinos were free ranging, and 11 had sufficient numbers to be classified as breeding populations (table 1). The total area of the private properties on which black rhinos are found is 245,000 ha. The average size of the properties is 16,333 ha which is considerably larger than the 6314 ha mean size of properties supporting white rhinos (Castley and Hall-Martin this issue). Seven properties are between 10,000 and 50,000 ha, three are less than 5000 ha, two are between 5000 and 10,000 ha and only one property is larger than 50,000 ha. Thirteen of the 15 properties have both black and white rhinos.

Table 1. Black rhino population on 15 private properties in South Africa

Property	Ecotype	Total 1999	Total 2001	Purchases	Births	Deaths	Sales	Moved	Adult male	SA male	Adult female	SA female	Un-sexed calves
A	<i>minor</i>	19	18	–	1	–	–	2	9	–	8	–	1
B	hybrid	0	1	1	0	0	0	0	0	0	0	0	0
C	<i>minor</i>	7	7	0	1	1	0	0	2	1	3	1	0
D	<i>minor</i>	5	5	0	1	1	0	0	1	1	2	0	1
E	<i>minor</i>	6	8	0	4	2	0	0	3	1	2	1	1
F	<i>minor</i>	12	11	0	2	0	3	0	2	3	5	1	0
G	<i>minor</i>	10	14	5	3	4	0	0	2	1	6	4	1
H	<i>michaeli</i>	10	22	10	5	1	0	2	6	7	4	3	2
I	<i>minor</i>	0	6	6	0	0	0	0	2	0	4	0	0
J	<i>bicornis</i>	12	13	0	3	0	0	2	1	2	5	3	2
K	<i>minor</i>	0	5	6	1	2	0	0	2	0	1	2	0
L	<i>minor</i>	0	2	2	0	0	0	0	0	1	0	1	0
M	<i>minor</i>	4	4	0	1	0	1	0	1	1	1	0	1
N	<i>michaeli</i>	2	1	0	0	1	0	0	0	0	1	0	0
O	<i>minor</i>	1	1	0	0	0	0	1	1	0	0	0	0
Total	<i>minor</i>	64	81	19	14	10	4	3	25	9	32	10	5
Total	<i>bicornis</i>	12	13	0	3	0	0	2	1	2	5	3	2
Total	<i>michaeli</i>	12	23	10	5	2	0	2	6	7	5	3	2

Tinted rows are populations classified as non-breeding.

Rhino numbers and population trends

In November 2001 there were 118 black rhinos on the 15 properties, representing an increase of 30 animals since 1999: 81 *D.b. minor* subspecies, 23 *D.b. michaeli*, 13 *D.b. bicornis* and 1 thought to be a hybrid of *D.b. minor* and *D.b. michaeli*. Natural growth within the population is 5.7% per annum. Almost two-thirds of the population are adult animals (63%) with females outnumbering males, while among subadults males slightly predominate.

The increase between 1999 and 2001 was due to the birth of 22 calves, plus purchase by the private sector of 17 animals from EzKZN Wildlife and 10 animals from SANParks. The overall increase of 49 animals to the private sector was reduced by 12 deaths, 4 animals transferred to SANParks control, 2 animals sold to Mkomazi Game Reserve in Tanzania, and 1 animal sold to the Free State Provincial Nature Conservation Authority (table 1). At this time only one population is large enough (22 animals) to rank as *Important* according to the criteria of Emslie and Brooks (1999).

The rhino populations on six of the properties (A,E,F,H,J, M), of all three subspecies, are increasing in terms of biological performance, having increased from 63 in 1999 to 76 in 2001, representing an annual increase of 9.9%. However, if the natural increase in the entire breeding population is calculated, excluding properties I and K, as these rhino were bought during the survey period (table 1), the increase is 6.9% a year. The increase observed in four of the populations can be attributed to purchases during the survey period. Three populations were static and two were decreasing. Three of the properties had only one black rhino each.

Age and sex structure

Within the entire population, the sex of all the black rhinos except for nine calves is known. The ratio of adult male to adult female is 1.00 : 1.27. The sex ratio of animals sold from EzKZN Wildlife populations is weighted in favour of females, while the animals sold from Addo were more males than females. This has resulted in a sex ratio among the subadults (all animals younger than 7 years) of 1.13 : 1.00. The age structure of the population is primarily determined by the structure of groups sold at auction by EzKZN Wildlife where the ratio of adults to subadults is 1.74 : 1.00. In the overall population of breeding age, there are more

females than males, which should boost the rate of natural increase. By comparison the Addo Elephant/Mountain Zebra National Park metapopulation of *D.b. bicornis* rhino has an adult sex ratio of 1.00:1.80 in favour of females but in the subadult population males outnumber females 1.33 : 1.00. The ratio of adults to subadults is 1.00 : 1.50, indicating an increasing population.

Rhino mortality

Deaths recorded were 12, from seven properties. Three of these deaths occurred on one property, all within three months of translocation where a resident bull killed a subadult male and two adult females. Two deaths were probably due to translocation stress—a cow calved within 12 months of translocation and was then attacked by a bull that had been moved with her, resulting in her death and that of her young calf. Lightning struck and killed one subadult male, and a calf was killed by an adult bull. One adult male was killed in a fight with another bull on a relatively small property of 4000 ha. One adult bull died of old age. An adult female died and her female calf, which then tried to stay in the company of a white rhino, was killed by another white rhino. No black rhinos were poached on private property during the reporting period.

Trade in black rhinos

Black rhinos were sold largely by state conservation agencies directly to owners or through auctions. EzKZN Wildlife sold 17 animals, all *D.b. minor*, and SANParks sold 10, all *D.b. michaeli*. When the price paid is considered in South African rand (ZAR) there appeared to be an increase, but this increase is not as great when calculated in US dollars (USD) (table 2). Higher prices were paid for adult females, particularly if pregnant, while subadults and bulls generally fetched lower prices. SANParks sold rhinos to a single selected property as previously agreed with the Department of Environmental Affairs and Tourism, while those repatriated to Mkomazi in Tanzania came from SANParks as well as from this selected property. Given that this property may not sell to any other third party within South Africa, prices were negotiated and set as those at which black rhinos were recently traded between international zoos: USD 45,000 for females and USD 5000 for males.

Table 2. Trade statistics on black rhinos sold within the private sector with average price comparisons at the time of each sale

Seller	Year	Type of sale	Numbers		Price per rhino	
			Males	Females	ZAR	USD
EzKZN Wildlife	2000	auction	2	4	375,000	54,230
EzKZN Wildlife	2001	auction	2	4	550,000	68,247
EzKZN Wildlife	2001	direct	2	4	undisclosed	
EzKZN Wildlife	2001	direct	1	0	150,000	21,692
SANParks	2000	direct	8	2	108,537	13,000
Private	2001	dealer	1	1	175,000	21,054

ZAR – South African rand; USD – US dollar; EzKZN – Ezemvelo KwaZulu-Natal; SANParks – South African National Parks; tinted cells are subadult sales

Rhino horn stocks

At least 37 black rhino horns are in private ownership. No data were obtained on the weights of these horns as many owners did not differentiate between black and white rhino horn. The rhino horn stocks on private land have been summarized by Castley and Hall-Martin (this issue). These figures include a number of black rhino horns, most of which have been registered with the provincial conservation authorities.

Discussion

Availability of black rhinos to the private sector

The number of black rhinos available from EzKZN Wildlife has varied from year to year. The usual number offered on auction is five or six animals per year since the first animals were auctioned in 1990. Initially prices were high when compared with white rhino prices; consequently demand and then prices declined. In 1998 when several black rhinos offered in the auction were not sold, a later negotiated transaction resulted in 28 black rhinos being sold to a private landowner in Zimbabwe. Many landowners questioned in the recent white rhino survey (Castley and Hall-Martin this issue) indicated that they would be interested in acquiring black rhinos if prices were lower and revenue could be generated by trophy hunting of surplus males.

The sale of the *D.b. michaeli* animals from SANParks' Addo population has been completed, although not all the animals have yet been delivered.

SANParks has no plans to sell any of its *D.b. minor* animals from Kruger, which has adequate habitat available. Although its population is large, it is still far below its estimated ecological carrying capacity of 3000 animals (Brooks and Adcock 1997). The population will therefore be allowed to grow for some time before any sales are considered.

It has been suggested that the populations of black rhinos in the EzKZN Wildlife reserves that are showing low birth rates at present could be stimulated if population density was lowered (Knight 2000). One way of doing this would be to transfer more animals to Kruger, where adequate habitat is available. Another way would be for EzKZN Wildlife to sell more black rhinos to the private sector. Such a course of action should, however, be critically assessed against the overall breeding record of black rhinos on private land since 1990. At least 99 black rhinos have been sold to private properties from EzKZN Wildlife, SANParks and Namibia since 1990. Yet the total number now stands at only 118, indicating that on the whole the birth rate has been low or that mortality has been unnaturally high. This trend is not true in all properties, as some are doing well, but it does highlight the complexities of managing black rhinos that have been clearly outlined by Emslie (2001) but that are not widely appreciated by all private wildlife owners and managers.

Costs of establishing viable populations

The costs involved in establishing viable populations of black rhinos are significantly higher than for white rhinos, prices being strongly influenced by the age and sex of the animals needed. Also, properties are

supposed to meet certain area requirements to support a minimum ecological carrying capacity of rhinos in line with recommendations in the national conservation plan, although these recommendations are not always adhered to. Direct field-to-field translocation of black rhinos, such as is often done with white rhinos, is not advised. Holding pens for black rhinos need to be much more substantial than those required for white rhinos and consequently are far more expensive. Intensive monitoring is often required when animals are introduced. The need for tight security and the level of staff training needed to deal with potential incidents add to the costs. Wise handling of many of these issues rely on the management ability of the owner or manager, suitability of the property, and adequate funds.

Hunting and land use

As the black rhino is currently listed in Appendix 1 of CITES, trade is restricted because of the threatened status of the species. Permits for black rhino hunting fall within the South African provincial conservation ordinances, and any quotas, if set, would need to comply with international trade restrictions in terms of movement of trophies as well as with CITES regulations. Five properties are prepared to allow hunting of surplus males if this becomes legalized, while seven properties, used for tourism or recreation, do not consider hunting compatible with their objectives. The other three properties are used purely for recreation, education and conservation. The economic potential of black rhinos has not been as great a reason for acquiring them as it is for white rhinos (Castley and Hall-Martin this issue). Owners of black rhinos appeared to have greater appreciation than did white rhino owners of the part they can play in conserving a rare and endangered species.

Whether the black rhino population of South Africa should be downlisted from Appendix 1 of CITES, to stimulate trade and sustainable use of the species is an ongoing debate. Public interest in whether hunting black rhinos should be allowed is likely to be keen. The opinions gathered in the present survey tilt towards the view that legalizing the hunting of surplus male black rhinos, one of the management options listed by Brooks (2000), will stimulate a desire to provide more privately owned habitat for the species. It would probably also drive up prices, as hunting white rhinos was shown to have done some two decades ago (Buijs 2000).

Landowners, however, are prepared to make large investments if there is a reasonable prospect of long-term profit. The current shortage of black rhinos in the market will likely stimulate demand for the few animals available each year.

Security

No black rhino has ever been poached on private land in South Africa whereas at least 20–30 white rhinos have been poached on private property over the past decade. This may be because the properties where black rhinos are found are relatively larger, better funded, better managed and have better security than properties keeping white rhinos, but it may also be a function of black rhino social structure and general behaviour. Or it may simply be that there are significantly more white rhinos than black rhinos on private land.

Metapopulation management

To avert potential deleterious genetic consequences of interbreeding in small populations of black rhinos a national metapopulation strategy has been worked out (Brooks and Adcock 1997) and adopted by various conservation agencies (such as SANParks 2002). The issue of adopting such a policy for the small populations of black rhinos on private land was also raised. Some owners thought that it might be possible to exchange bulls with the larger populations in state facilities or to hire the services of bulls as is done in horse racing and other livestock industries. It is clearly desirable to increase population sizes on private properties, if capture and translocation mortality can be avoided (see Adcock 1995). As the risk associated with introducing new bulls to existing groups of black rhinos is considerable (Emslie 2001), introducing adult females may be more advisable.

Greater collaboration among private sector owners to maximize population viability where possible makes conservation sense, but not necessarily business sense. Nevertheless, there is little value in having single animals or populations with only two or three animals. As the national plan advocates that potential black rhino properties have an ecological carrying capacity of at least 20 animals, efforts should be made to encourage owners to stock larger numbers.

Habitat and management requirements

When the specialized habitat requirements of black rhinos and effective population size are considered

together, it becomes evident that breeding rates are markedly different in different regions of the country. Evidence is already available that black rhinos in the low-nutrient, mainly broadleaved savannah regions on both private and state land are not thriving as well as those living in higher nutrient areas. A model for predicting carrying capacity for black rhinos in different environments has been developed (Adcock 2001). This model should be of great value in guiding private landowners in purchasing and managing black rhinos and should be used, together with property size, when assessing the suitability of a property for raising black rhinos.

A recent publication produced by the RMG gives prospective owners of black rhinos a comprehensive guide to keeping the species successfully on private land (Emslie 2001). Whether the state conservation agencies have the legal power, or the ecological knowledge, to discourage or prohibit introducing black rhinos to an unsuitable habitat is, however, debatable.

Conclusion

Black rhinos of three of the four recognized subspecies are now established on private property in South Africa. The single largest population, however, is only 22 animals and the average size of the groups is less than 10. The record of success on individual properties has been varied. Despite the good performance of some of these populations, it appears to be necessary for landowners to re-examine the recommendations made in national plans to ensure that conservation objectives for the species are met while still providing the private owner with an opportunity to make a profit. The data from this survey will contribute to the existing databases of RMG and the African Rhino Specialist Group (AfRSG) to help evaluate black rhino performance on private land. Such an evaluation should be done before any decision is taken by the state authorities to sell more black rhinos to the private sector.

More landowners would like to have black rhinos on their properties, but the numbers that can be provided are limited. Managing black rhinos is clearly more demanding of expertise than is managing white rhinos. For this reason the RMG's efforts to provide better guidelines (Emslie 2001) is to be welcomed as is their commitment to producing status reports for the species.

Black rhinos have been acquired by properties that do not meet minimum criteria for number of animals and quality of habitat, resulting in unnecessary deaths. Indications are that translocating a pregnant female tends to cause miscarriage or the loss of a calf born prematurely and therefore selling these females is counterproductive for black rhino conservation.

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The status of the southern white rhinoceros (*Ceratotherium simum simum*) on private land in South Africa in 2001

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Abstract

A telephone survey to determine the status of the southern white rhino on private property in South Africa was carried out during October and November 2001. White rhino numbers on private land increased from a minimum estimate of 1922 in 1999 to 2534 at the time of the survey. The rhinos occurred on 242 properties, 88 of which were new to our records; together the properties covered a minimum of 14,593 km². The total number of rhinos on new properties was 486 or 19% of the total. Increases in white rhino populations on private property through reproduction at a rate of 21% over the 28-month survey period (or 9% per annum) were higher than those purchased from state wildlife management agencies (14% over the survey period, or 6% per annum), although the latter remain a significant source of animals. The trade in live animals continued to grow, both from the state to the private sector and within the private sector, and average prices were still increasing. Data appeared to support the hypothesis that having only a single bull did not limit the breeding potential in the wild. The stock of reported rhino horns in private ownership has steadily grown although the figures were lower than expected.

Résumé

En octobre et novembre 2001, on a réalisé une recherche par téléphone pour déterminer le statut du rhino blanc du Sud dans des propriétés privées en Afrique du Sud. Le nombre de rhinos blancs dans les propriétés privées a augmenté d'une estimation de 1922 individus minimum en 1999 à 2534 au moment de l'enquête. Il y a des rhinos dans 242 propriétés dont 88 sont nouvelles dans les rapports. Ensemble, elles couvrent un minimum de 14.593 km². Le nombre total de rhinos sur les nouvelles propriétés était de 486, c'est-à-dire 19 % du total. La croissance des populations de rhinos blancs dans les propriétés privées due à une reproduction dont le taux est de 21 % sur les 28 mois de l'étude (ou 9 % par an), était plus élevée que celle due à l'achat d'animaux dans les organes de gestion de la faune de l'Etat (14 % pendant la période en question, soit 6 % par an), mais ces derniers restent une source significative d'animaux. Le commerce d'animaux vivants continue à croître, de l'Etat vers le secteur privé et au sein du secteur privé, et les prix moyens sont encore en augmentation. Les données semblaient soutenir l'hypothèse selon laquelle le fait de n'avoir un seul mâle ne limite pas le potentiel reproducteur dans la nature. Le stock de corne de rhinos que l'on a relevé comme appartenant à des particuliers a augmenté régulièrement quoique les chiffres soient moins élevés qu'on ne s'y attendait.

Introduction

A telephone survey to assess the status of the southern white rhinoceros (*Ceratotherium simum simum* Burchell, 1817) on private land in South Africa was undertaken for WWF International's African Rhino

Programme (WWF-ARP) during October and November 2001. This is the latest in a series of similar surveys undertaken between 1987 and July 1999 (Buijs 1988; Emslie 1994; Buijs and Papenfus 1996; Buijs 1998, 2000). It forms part of an ongoing focus towards rhino conservation in southern Africa and

highlights recent trends within the South African population on private lands.

These surveys have tracked the rapidly increasing numbers of white rhinos on private land in South Africa from about 60 to 100 on properties in KwaZulu-Natal in 1984 to 1922 in 1999 (Buijs 2000). The first survey of this nature was completed by Buijs (1988), who recorded 931 individuals on 103 properties in 1987 and noted that between the period of 1984 and 1987 large numbers of white rhinos had been moved to private land (Buijs 2000). The recovery of the southern white rhino population within southern Africa can be seen as one of Africa's greatest conservation success stories (Emslie and Brooks 1999), and the ongoing monitoring of this population is critical to the development of pragmatic conservation strategies for the future.

The need for undertaking such surveys and long-term monitoring activities has been outlined previously by Emslie and Brooks (1999) as they are essential for sound management and rhino conservation. Survey information can be effectively integrated into national management plans and inform biological management. The benefits to the private sector from such monitoring should not be underestimated as the trends these surveys indicate should ultimately lead to improved rhino management on private lands. Continued monitoring of these populations should lead to improved understanding of white rhino performance in these areas.

Objectives

Survey objectives were to determine the number of white rhinos on various private properties, which excluded all municipal nature reserves and defence force reserves but included rhinos in zoos; to determine the structure of each population, the pattern and number of animals traded or moved between properties, and if the translocations succeeded; to assess population performance; and to estimate the amount of rhino horn stock under private ownership. Secondary objectives were to obtain an understanding of the factors influencing the market in white rhinos, what motivated owners to keep white rhinos, and owner attitude to the possibility of trading in rhino horn.

Methods

Either the landowner or the manager on the various properties identified were asked pertinent questions

in a structured questionnaire format. In all cases accurate data or an authoritative opinion was sought from owners or managers, and sometimes from third parties (for example, wildlife dealers and conservation officials) with relevant knowledge (property registers, permit applications, sale records, and similar data) pertaining to the specific property. The database of 183 properties that had been produced in the 1999 survey was used as a starting point for the survey. Nine properties were deleted from the 2001 database as they had no record of rhinos since 1996, were duplicated elsewhere in the database or had been amalgamated with other properties listed. New properties were identified during the course of the survey with the aid of private landowners and conservation authorities. Focus included a review of not only the rhino population but also the properties on which these animals were kept.

Included were auctions in the private sector as well as those of South African National Parks (SANParks) and Ezemvelo KwaZulu-Natal (EzKZN) Wildlife. SANParks, the North West Parks and Tourism Board and Mpumalanga Parks Board also sold white rhinos on tender and these records were examined as well. Many details of transactions and translocations were derived from the records of game-capture operators and wildlife dealers in the private sector. These latter sources had not been used in the previous Buijs survey (2000).

Data were incorporated in a database that helped set population performance parameters and status indicators.

Results

Information quality

Information on rhino populations is regarded as sensitive, even confidential, by many landowners. Although the nature of this survey (by telephone or fax) may have made owners wary of responding to questions, previous face-to-face interviews in surveys also met with resistance. There is, however, a general desire on the part of the surveyors to retain the confidentiality of this type of data, and the increased response may be indicative of the confidence landowners have placed in researchers to ensure that this remains the case. Potential reasons for not providing information could include the high value of the transactions, tax implications, and security

concerns about rhinos and rhino horn stocks. Although the majority of owners provided precise information on rhino numbers based on detailed records, several property owners gave only vague information, and five refused to give any information at all. The estimate of the number of white rhinos on private land in South Africa in this survey is therefore to be regarded as an absolute minimum.

The properties

Of the 22 properties that no longer had rhinos in 1999, 20 were excluded from the analysis after contact with 6 revealed that their status had remained unchanged. Two had reintroduced rhinos and were included. Targeted for the telephone survey were 258 properties comprising those previously identified and new ones; 224 provided information, 8 were contacted but their information is still outstanding, and 23 that are known to have rhinos could not be contacted. The remaining 3 are the greater Kruger National Park (KNP) reserves (Sabie Sand, Klaserie and Timbavati/Umbabat) on the western border of Kruger National Park, whose information was provided by the Agricultural Research Council game ranch monitoring project (M. Peel pers. comm. 2001) (fig. 1). The figures for the greater Kruger reserves are derived from aerial surveys that may inherently have an undercounting bias and should therefore be seen as minimum figures. The inability to contact the 23 properties was because information in the 1999 database had changed or was

originally incorrect. Extensive efforts to trace these properties or their managers (through provincial agencies, telephone company enquiries and the Internet) proved unsuccessful. Several additional properties reported to have rhinos were also identified after the survey was completed but they could not be contacted. Estimates of their rhino numbers, however, were available either from the 1999 survey (as a minimum number) or in some cases from third parties.

Out of the 161 properties that had rhinos during the 1999 survey, 151 still had rhinos. Rhinos from the remaining 10 properties had either been transferred to other properties belonging to the same owners or sold. Of the 151 populations still extant, 68 (45%) have increased, 34 (23%) have decreased and 49 (32%) show no change, although some of these figures may represent an unwillingness to divulge information.

The present survey identified 88 properties holding white rhinos that were not listed in the 1999 database. Of these, 70 were contacted, and 18 could not be contacted. White rhinos from two properties were incorporated into other areas while a further four properties are currently managed as two single entities but are listed in the database as separate properties. Of the 88 new properties in the database, 19 (22%) had rhinos at the time of the 1999 survey, and these clearly had been overlooked in the previous survey.

Rhino numbers

In South Africa in 2001, 1969 white rhinos in private ownership were accounted for on surveyed properties (excluding the greater Kruger reserves) that provided information. A further 280 rhinos were listed from 31 properties in the 1999 and 2001 databases where information was still outstanding or where these properties could not be contacted. In these cases the 1999 figure or estimates provided by third parties were used to give a minimum total of 2249 animals in November 2001. There has, therefore, been an increase of at least 593 animals or 36% in the rhino population on private properties (excluding the greater Kruger reserves) between August 1999 and November 2001. The number of white rhinos sold to the private sector during this period was 238 : 117 from Kruger National Park, 102 from EzKZN Wildlife and 19 from other provincial reserves. These account for an increase of 40% in private holdings. Three animals were imported: two from private property in Namibia, and one from a private reserve in Swaziland, account-

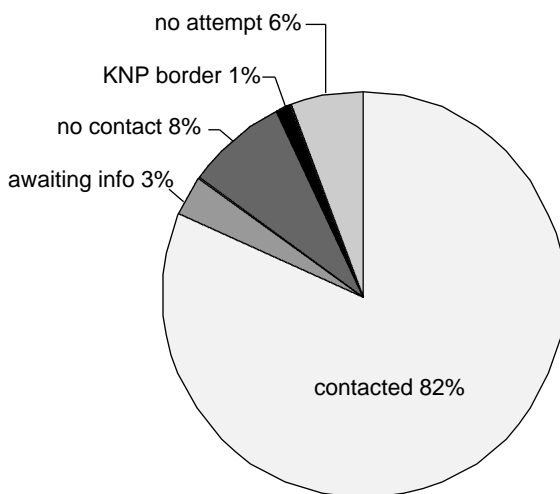


Figure 1. Representation of private properties on the 2001 white rhino survey database.

ing for 0.5%. The remaining increase is made up of recruitment (58%, $n = 346$ rhinos) to both old and new populations, and new populations added to the database (58%, $n = 342$ rhinos). It quickly becomes apparent that the expected increase (926 rhinos) is higher than the observed increase (593). However, after factoring in the mortality within the total population of 183 rhinos (from hunting and natural causes) as well as the 132 rhinos bought by new properties from existing private owners (that is, not an increase in real terms), there is an excess of only 21 rhinos. This could suggest a survey bias in that not all the properties that received rhinos from private transactions have been identified, but it may also indicate that the information supplied by the owners in such surveys is not always accurate. The observed discrepancy in the figures is, however, only a relatively small proportion of the total estimate (0.9%).

A further 285 white rhinos were recorded from the greater Kruger reserves (M. Peel, pers. comm. 2001) during standard aerial survey monitoring. This estimate indicates an increase of 19 animals or 7.1% over the 266 recorded in 1999 by Buijs (2000), or an annual increase of 3.55% (fig. 2). Although there is no physical boundary between KNP and these adjacent areas, the rhinos are owned by the neighbouring private landowners under the current management agreement with SANParks. In the terms

of this agreement any rhinos that cross over onto these properties become the property of the private landowners while those that return to KNP become the property of SANParks once more.

Overall there has been a 32% increase in the white rhino population, from 1922 in 1999 to the present 2534 on all categories of private land (including Sabie Sand, Timbavati/Umbabat and Klaserie). This estimate includes the rhino figures from yet uncontacted properties. There is no compelling reason not to include them, as minimum estimates of these populations were obtained from either 1999 totals or third parties. However this increase does not consider the 19 properties that were overlooked in the previous survey. These properties held an estimated 151 white rhinos in 1999 and if this figure is included in the previous total the real increase would only be 22%.

Although there are white rhinos in all nine provinces in South Africa more than 55% are to be found in Limpopo Province, which together with Mpumalanga and KwaZulu Natal account for over 80% of all white rhinos in private ownership (table 1).

Classified according to the African Rhino Specialist Group criteria, a number of the populations under private ownership are either *Key* or *Important* populations (Emslie and Brooks 1999). Only one reserve is classified as *Key 1*, in which the underlying trend in the population (that is, after accounting for removals) was increasing or stable and exceeded 100

animals, while four were recognized as *Key 2* populations. However, one of these areas is also within the greater Kruger so strictly only three isolated *Key 2* populations are in private reserves.

An additional 22 properties were categorized as *Important*. But this figure is lower than the 27 listed by Emslie (2002). The current survey recognized one additional *Key 2* property and eight *Important* properties since 1999 (Emslie and Brooks 1999). Of the African Rhino Specialist Group rated populations in South Africa, 14 are rated as *Key* and 44 as *Important* (Emslie 2002). Private populations therefore account for 29% and 50% respectively of these rated populations.

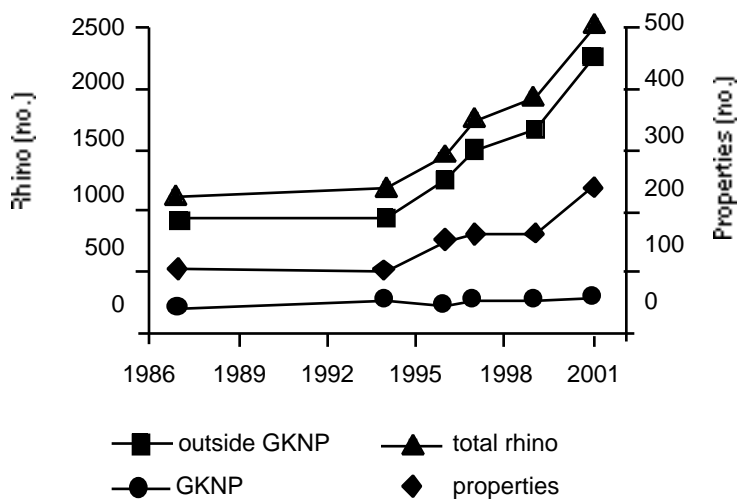


Figure 2. Trends in the total number of white rhinos under private ownership (total excluding greater Kruger area—GKNP) in South Africa as well as the number of properties where these rhinos are held.

Table 1. White rhino numbers in each of the nine South African provinces

Province	Rhino numbers	Percentage of total	Mean density \pm SE
Limpopo Province	1326	54.77	0.247 \pm 0.025
Mpumalanga	371	15.32	0.500 \pm 0.114
KwaZulu-Natal	250	10.33	0.401 \pm 0.081
North West Province	133	5.49	0.391 \pm 0.088
Gauteng	100	4.13	0.441 \pm 0.097
Northern Cape	95	3.92	0.121 \pm 0.034
Eastern Cape	74	3.06	0.199 \pm 0.082
Free State	68	2.81	0.370 \pm 0.114
Western Cape	4	0.17	0.183 \pm 0.103

Age and sex structure

Demographic information that was of value (that is, sex and age structures were known) and could be used in analysing the sex and age structure of the white rhino population in general was obtained from 211 properties that supported 65% of the population. This was similar to the 68% of the population assessed in the previous survey (Buijs 2000). Animals at least seven years old and mature were taken as adults; younger animals and calves were considered as subadult, in the same way as was done in the previous surveys. A more detailed classification would have been of little value as most owners regard any animal that still associates with its mother as a calf. The ratio of adult males to adult females is 1 : 1.78, while that of subadult males to subadult females is 1 : 1.01. The ratio of subadults to adults is 1 : 2.10. In addition to these figures, unsexed calves made up 14.5% of the total population from these 211 properties, and the sex of 37 adult rhinos was not determined.

Recruitment and mortality

At least 346 white rhino calves were born between August 1999 and November 2001, of which 96 were male (28%), 84 female (24%) and 166 were unsexed at the time of the survey (48%). Recruitment to existing populations through purchases (from state and private sector) accounted for 367 rhinos. Of these 152 were males (41%), and 208 females (57%), 1 was unsexed, and information was not provided for 6 animals.

Reductions in existing populations occurred through the sale of 226 rhinos, although these were not lost to the greater population. These were 86 males (38%), 90 females (40%), 4 unsexed calves (2%), and 46 for which information was not provided. Hunting accounted for the death of 57 animals (55 males and 2 females). Many of the bulls purchased were hunted within a year of arriving on the property of the purchaser.

Natural mortality and post-translocation deaths accounted for 126 rhinos (50 males, 60 females, 13 unsexed calves, information not provided for 3). A number of factors were listed as the cause of mortality in the rhino populations on private land but the cause for a large proportion was unknown. Known causes ranged from conflict with other animals (rhinos, elephants) to capture-related mortalities and to a number of natural and accidental causes (old age, lightning strikes, drowning) as indicated in table 2. Among the calves and subadults, conflict with resident bulls and other adult rhinos was a dominant contributing factor to mortality while within the adult population illness and poaching were also major contributors. The 10 poaching incidents reported by four properties were marginally lower than the 12 reported for the 1999 survey. The maximum number of poaching incidents from a single property was 7 animals.

Table 2. Causes of mortality within the white rhino population on private land in South Africa, excluding the 57 that were hunted commercially

Cause of death	Percentage	Adults	Calves	Total
Conflict rhinos	22.2	12	16	28
Natural	9.5	6	6	12
Illness or injury	8.7	10	1	11
Poaching	7.9	10	0	10
Capture	7.1	6	3	9
Conflict–elephant	5.6	6	1	7
Lightning or drowning	5.6	4	3	7
Unknown	33.3	33	9	42

Conflict relates to conflict with both rhinos and elephants and includes orphaning of calves that died subsequently; natural causes include old age, complications during birth, starvation; capture-related deaths are either direct or indirect, such as from post-release stress.

Property size and population size

Size information was provided for 245 of the 275 properties identified. The mean was 6314 ha with a range from 200 ha to 92,000 ha. The minimum total area of private land on which white rhinos occur in South Africa is 1,459,329 ha.

An analysis of populations in relation to property size revealed that rhino populations fared better in the larger properties. The mean area of properties from which rhinos were removed during the past two years was smaller ($n = 10$, ha = 2895 ± 585 SE) than areas where populations were decreasing ($n = 34$, ha = 5213 ± 989 SE), while properties where rhino numbers were increasing had the highest mean area ($n = 68$, ha = 8530 ± 1593 SE) (fig. 3).

Most properties (68%) had fewer than 5000 ha and only 12% were over 10,000 ha. Most properties (70%) supported rhino populations of 10 or fewer animals with only 13% having populations of more than 20 animals (fig. 4). White rhino density on private land ranged from 0.009 to 2 rhino km⁻², with a mean of 0.30 ± 0.02 km⁻².

Rhinos born into each population (recruitment) expressed as percentages appeared to peak in intermediate-sized populations whereas detected mortality was higher in smaller populations (fig. 5). These figures were adjusted for size of the total rhino population in each of the size categories as the total numbers born into each population may be a function of the total numbers within each size category. The ratio of birth to known death was lowest in the smallest size category (1.09 : 1) and was highest in the 21–50 size category (5.36 : 1).

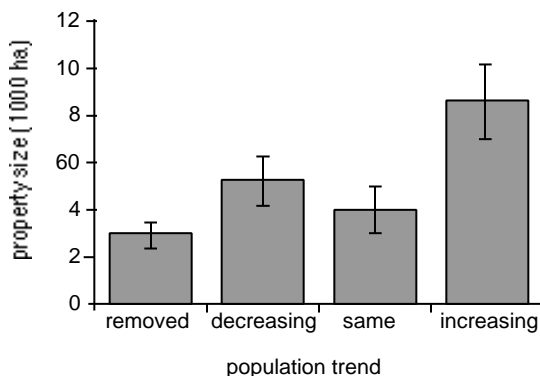


Figure 3. The trend in white rhino populations on private land in South Africa as a function of property size.

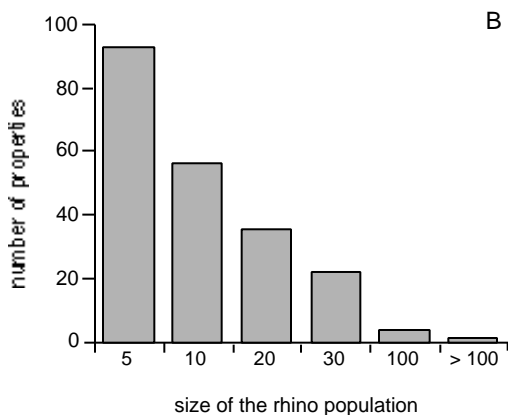
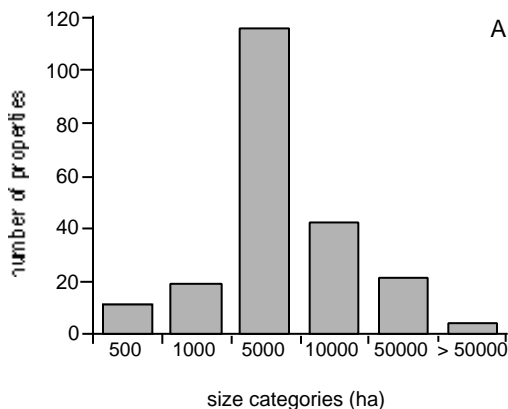


Figure 4. Relationship between property size and number of properties (A), and size of rhino populations and number of properties (B).

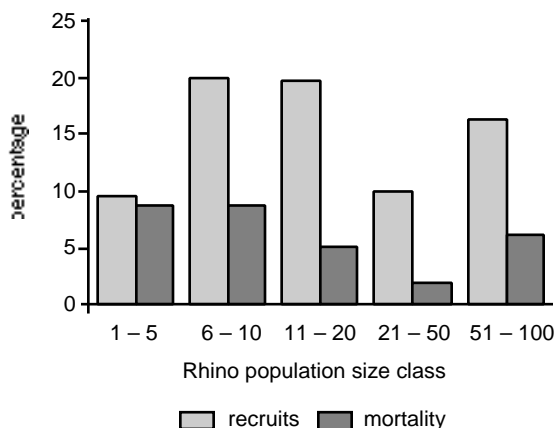


Figure 5. Rhino recruitment and mortality in relation to population size categories on private land in South Africa.

Land use

Most of the landowners or managers interviewed were asked what were their primary objectives in managing their properties. Only 11.6% of the respondents cited what could be termed ethical or aesthetic reasons (conservation, education, recreation) for keeping the rhinos. The overwhelming majority of properties are managed as commercial operations, to which rhinos contribute the most. Almost all of these properties were in the past used for cattle production. Some form of ecotourism is now the leading form of land use,

and trophy hunting is also a primary objective. This does not necessarily mean, however, that rhino hunting takes place on the properties as some only allow hunting of other animals. Another large component is made up of properties that focus on breeding and ranching, and they derive their benefits from the sale of live animals (table 3).

Trade in live rhinos

A summary of prices is provided in table 4 for rhinos traded in the private sector between late 1999 and

Table 3. Management objectives of private properties where rhinos are held in South Africa. The number of properties reflects the total number that offers some form of a specific activity. Subcategories indicated in *italics* are those not repeated within the primary management category

Management objective, primary	Properties		Management objective, subcategory	Properties No.
	No.	%		
Ecotourism	83	37.2	<i>Pure ecotourism</i>	33
			Ecotourism, hunting	29
			Ecotourism, breeding	8
			Ecotourism, conservation	4
			<i>Ecotourism sustainable use</i>	3
			Ecotourism, breeding and hunting	6
Hunting	66	29.6	Exclusively hunting	18
			Ecotourism, hunting	29
			Ecotourism, breeding and hunting	6
			Breeding, hunting	11
			<i>Photographic safari, hunting</i>	2
Breeding	48	21.5	<i>Pure breeding, ranching</i>	19
			Breeding, hunting	11
			Ecotourism, breeding and hunting	6
			Ecotourism, breeding	8
			<i>Breeding, live sales</i>	2
Conservation	9	4.0	<i>Pure conservation</i>	5
			Ecotourism, conservation	4
Recreation, education	10	4.5	<i>Recreation</i>	6
			Education	4
Private, shareblock	7	3.1	<i>Private, shareblock</i>	7

Table 4. Prices fetched for white rhinos on the South African market during 2000/2001 based on prices received from private landowners (in South African rand)

Rhino purchase category	1999	2000	2001
Adult male	139,167	159,990	156,000
Adult female	143,333	179,706	185,833
Subadult (male or female)	126,000	124,600	118,733
Adult female with calf or pregnant	none recorded	373,333	319,273
Average price (for all animals)	138,353	164,447	171,014

USD 1 = (South African rand) ZAR 6.12 in 1999; 6.95 in 2000; 8.63 in 2001. Exchange rates are an annual average of monthly averages.

November 2001. These data are derived from the figures provided by property owners and as far as possible have been verified with records from EzKZN Wildlife and SANParks. Over the survey period conservation agencies supplied 238 rhinos into the market and private owners supplied 226. However, private owners reported buying only 173 rhinos from state conservation agencies such as SANParks and EzKZN Wildlife and a further 194 on the private market. These figures represent only 73% and 86% of the respective sales. At least 63 rhinos (14%) were purchased by expatriates owning property in South Africa. Analysis of the records from conservation agencies has revealed that a number of private landowners who purchased rhinos had not yet been contacted at the time this study was completed, introducing a degree of error into the population estimate. Recently another 16 animals have been identified from the SANParks auction and tender records for 2000 and 2001 that were not included in the survey figures.

The price of white rhinos in the private market for the past two years was calculated from figures provided by rhino owners. The prices fetched varied considerably depending on the animals offered. Single young animals tended to fetch lower prices on auctions than did adult cows with calves or that were certified pregnant. Similar variations in prices according to sex and age could be seen from 1999 through to 2001 where young animals and subadults fetched the lowest prices; next were adult bulls and then adult cows. Adult cows that had a calf at foot or were pregnant (or both) consistently fetched the highest prices. These were on average about twice that received for adult bulls. The average white rhino price (for all sex and age classes combined) was ZAR 138,353 for the last two months of 1999, ZAR 164,447 for 2000 and ZAR 171,014 for 2001 (until November).¹ Prices have increased steadily since the 1999 survey when Buijs (2000) reported that the average price paid for a white rhino was ZAR 127,130. The average price of ZAR 200,238 that Emslie (2000a) reported in 2000 refers only to the average for selected animals sold at the Hluhluwe auction and not to the overall market price. The most recent records for a few late-season sales indicate that

prices and demand may have fallen, but this will be verified with subsequent surveys.

Rhino horn stock

Although 92 owners reported they did have rhino horn stock on their property (three times as many as in the previous survey—Buijs 2000), little additional information was provided in terms of the number of pieces or their size and weight. Another 85 owners said they had no rhino horn stock. It is also possible that there are private landowners in South Africa who possess rhino horn but who are not rhino owners (such as trophy horns), and this horn stock would not have been accounted for in the current survey. Most of the horns that owners held came from animals that had died. Some came from animals whose horns had been docked to prevent injury to other rhinos or from animals that had lost their horns while being transported. Only 30% of the horns were registered with the respective nature conservation authorities of each province although some owners were still waiting for officials to register horn stock. Some 64% of owners with horn stock did not provide information on registration or did not know if the horns were registered. In many cases horns had been micro-chipped.

Interest in trading in these horns was keen, with 79% of owners with stock willing to sell should a legal market be opened. The perception is that the revenue generated from a well-controlled trade in rhino horn could contribute significantly to rhino conservation and management on private land in South Africa. Despite this overwhelming interest a number of owners (18%) felt there should be no trade in rhino horn as this could fuel poaching. This contrasts with the findings of Buijs (2000) in the previous survey where *all* respondents supported a legal trade in rhino horn.

Half the owners felt that a privately run organization should handle rhino horn sales, and only 9% felt that a state-run organization (nature conservation or otherwise) should operate the process. A further 9% felt that a combination of both private and public sectors should control such an initiative. These feelings originated from lack of confidence in the current

¹ Exchange rates against the US dollar (USD): 1999 average for Nov/Dec, USD 1 = ZAR 6.15; 2000 average for year, USD 1 = ZAR 6.95; 2001 average for year USD 1 = ZAR 8.63.

provincial conservation agencies as well as the need to have representation of the private owners in any body that would affect private concerns. The remaining 32% of owners did not have any strong feelings about who should be in charge of running such trade initiatives.

The total number of horns reported was 291. Only 13 owners reported rhino horn weights; 118 horns reported weighed an approximate total of 277 kg. A further 5 owners indicated that they had only small fragments of horn. Using the average weight per horn of 1.74 kg, as calculated from the known horn stock, the weight for the remaining 173 horns can be derived, which totals 301 kg. A total of 578 kg is therefore estimated from private land in South Africa. This figure is, however, significantly lower than the confidential figure TRAFFIC reported for private rhino horn stocks, suggesting that 1) private owners are not willing to divulge such information, 2) the estimate may be an underestimate by using lower average horn weights (EzKZN Wildlife average horn weight is 2.2 kg), 3) provincial authorities may have a more complete record of such stocks in South Africa and 4) a number of properties may have been overlooked in the survey. The current study did not assess the horn stock from provincial authority records as a means of verifying information received from properties during the survey. Gathering of these data may be improved in future surveys.

African Rhino Owners' Association

Of the 106 (63%) owners who knew of the African Rhino Owners' Association (AROA), 53 claimed to still be members, 9 were uncertain of their membership, and 44 said they were not members. As there were only 45 AROA members in 1999, it seems that some owners may have been confusing AROA with other associations. While most owners knew of AROA the general feeling received was that AROA was generally inactive so that retaining membership in it was no longer of value. Many of the owners had let their membership lapse, while others said that the membership fees were too expensive to warrant joining the association. The fact that AROA has been rather dormant in recent years contributed to owners' lack of faith in the association, and many owners had opted to join local rare game or conservancy groups instead. The isolated and fragmented nature of the private white rhino owners in South Africa may require greater coordination than can be achieved through local conservation groups, and it

may be worthwhile to consider restructuring AROA to be more mindful of the needs of private rhino owners.

Discussion

Rhino populations

The results show an increase in the number of private properties in South Africa holding white rhinos. At least 69 properties (88 new properties were added to the rhino database during 2001; however, 19 of these already had rhinos in 1999) had acquired white rhinos in the 25 months between September 1999 and November 2001. This indicates a minimum rate of expansion of about 35 properties per annum. This far exceeds the rate (about 5 per annum) at which owners are disposing of their rhinos.

The increasing numbers of white rhinos on private property continues the trend seen since 1987 of a consistent rate of increase in excess of natural births alone (Buijs 2000). A major source of rhino increase on private land has been purchase from the state authorities. The early concerns expressed over acquiring and managing white rhinos on private land (Buijs and Anderson 1989; Anderson 1993) appear to a substantial degree to have been overcome. While there may still be management problems, it is clear that since rhinos can be purchased only at market-determined prices, and not at state-subsidized prices as in the past, private owners have shown greater responsibility in managing them.

The white rhino population on private property increased through reproduction at a rate of 21% over the 28-month survey period (9% per annum). This indicates that the rate at which rhinos are increasing in private populations through breeding is more important as a source of increase than purchases from the state wildlife management agencies (14% over the survey period, or 6% per annum).

The increase in the rhino population in the greater Kruger reserves (Sabie Sand, Klaserie and Timbavati/Umbabat) adjoining KNP at 3.5% per annum is lower than might be expected. The birth rate in Umfolozi Game Reserve is about 9.6% per annum (Owen-Smith 1988), and in KNP it is 9% per annum (Viljoen 1993). The increase in the greater Kruger reserve populations between 1995 and 1997 was 22.77% (see Buijs 2000), indicating a rate of about 11.3% per annum. Since 1997 the rate has been consistently about 3.5–3.6% per annum. The habitat of the private reserves is very similar to that of KNP and similar rates of recruitment

would be expected, as shown in 1995–1997. The western boundary of these reserves is fenced, while the eastern boundary is open to the park. This raises the possibility that if the recruitment is actually as good as expected, white rhinos could be moving from private reserves into KNP. The Sabie Sand Reserve in particular may be at its carrying capacity. Anderson (1993) records 176 white rhinos in the reserve in 1990. The current estimate is 184, at a time when no animals have been sold or hunted for some years. The lower population estimate may also be that these populations were undercounted during routine aerial monitoring.

The latest estimate (2001) of the total number of southern white rhinos in South Africa is 10,988 (International Rhino Foundation 2001) from a global population of 11,670. This figure is lower than the estimate derived from the 1999 figure of 9754 rhinos, which could have potentially increased at a rate of 8.8% per annum, calculated from the estimates given by Emslie (2000b) for the period 1993–1999, which would have resulted in a total of 11,546 rhinos. The actual growth is closer to 6%, which still represents a good growth within the population. The total number of southern white rhinos on all categories of land managed by the private sector in South Africa at present (2534 animals) therefore represents 23% of the national population but possibly more importantly 22% of the global population.

Age and sex structure

The ratio of adult male to adult female white rhinos in a large natural population in Umfolozi in 1969 was 1 : 1.24 (Owen-Smith 1988). The divergence from this standard in the current ratio (1 : 1.78) as reported clearly has two main causes: fewer males than females were sold at auction (1 : 1.39) and trophy hunting removed mostly males (1 : 0.036). The sex and age figures from the present survey are similar to those reported previously by Buijs (2000), although the ratio of adults to subadults is lower, suggesting that the population has become younger since 1999, which is indicative of an increasing population.

Number of males and reproductive success

The findings of Lindemann (1982) that breeding success in captive groups of white rhinos with only one male was significantly lower than in groups with two or more males has been widely commented upon.

Anderson (1993) found evidence from the records of white rhinos on private land in South Africa up to 1990 that supported these findings but Buijs (2000) cast doubt on these assertions. Of the properties in the present survey, 99 had only a single adult bull, and 76 had two or more bulls. On the 99 properties with only one adult bull 100 calves were born in contrast to the 176 born on the 76 properties where two or more adult bulls were present. This may, however, have been a consequence of the number of females in each population. There were 143 adult cows on properties with only one bull, indicating that 70% of the cows calved, whereas there were 272 cows on properties with more than one bull, which gives a 66% calving rate. It appears, therefore, that the effect of having more than a single adult bull in the population is slight. Other factors that may complicate these indications, however, need to be assessed, such as the length of the acclimatization period after translocation or the function of population size.

Mortality

Buijs (2000) reported 20 rhino deaths caused by fighting or by a calf getting in the way of a bull trying to mate with the calf's mother. The current survey accounted for 35 rhino deaths in conflict encounters—28 caused by rhinos and 7 by bull elephants (table 2). The elephants had been translocated to private land as youngsters, and the killing of the rhinos appeared to be in incidents similar to those reported by Slotow and van Dyk (2001).

Trade

The three largest state agencies selling rhinos to the private sector (SANParks, EzKZN Wildlife and North West Parks) see these sales as an important source of income. All income from the sale of rhinos in SANParks is deposited in a park development fund that is used exclusively to acquire land for new national parks or to consolidate existing ones. The other two agencies use the funds for their operating budgets. All three agencies are likely to continue selling white rhinos even if prices decline significantly as they would still be high-value animals, making important budget contributions. Private sellers may be more put off by lower prices, and indeed at a private auction in September 2001 four white rhinos were withdrawn when the reserve prices were not met.

The economic value of white rhinos largely determines the attitude of private owners towards them. The commercial approach to wildlife management on private land (Anderson 1993) is still the driving force behind the white rhino market. This is clear from the fact that the majority of the private owners in the current survey were using their land for ecotourism or hunting, and few kept rhinos solely for conservation or aesthetic purposes. Although ecotourism and conservation are not necessarily mutually exclusive, financial benefits rather than conservation principles appeared to drive white rhino management. The cost of importing rhinos from other countries indicates that sale prices are probably lower in them than in South Africa.

Awareness in the private sector of the need for effective monitoring and control to regulate the trade in rhino horn appears to be limited, although many owners may not have provided information in this regard. It was also unclear what proportion of the owners knew what restrictions were currently imposed by CITES and how these restrictions would be addressed. Should the trade in rhino horn be permitted in the future there would be a clear need for effective monitoring, registration and control to regulate the trade. Private owners were hesitant to allow such an operation to be coordinated entirely by state institutions because they lacked confidence in their capability. The information that these state organizations currently hold, however, would be invaluable in implementing any trade in rhino horn efficiently. Consequently, effort between the private sector and conservation agencies should be coordinated.

Hunting

We are not convinced that this survey has produced an accurate estimate of the number of rhinos hunted in South Africa, and some of the discrepancies in the figures reported above may be that hunted animals are not being reported. Buijs (2000) was of the opinion that the hunting industry had stabilized and was unlikely to grow as sale prices increased. Buijs reported that 47 rhinos were hunted over two hunting seasons (1998 and 1999). This figure included a minimum of 31 rhinos reported as hunted, plus 16 sold by KZN Wildlife for hunting purposes. Whether the latter 16 animals were all shot during the survey period was not recorded. It is also possible that more animals could have been hunted after July 1999, when Buijs ended his survey. The present survey could

account for 57 rhinos, also over two hunting seasons, indicating a probable increase in hunting activity contrary to Buijs's opinion. Trophy prices are quoted in US dollars and were in the range of about USD 25,000 to 35,000 per animal. As the rand has lost 30% of its value against the dollar since January 2001, and 21% between 11 September and 7 December of that year, this will push up the value of trophy animals in rand terms. It could well be, therefore, that more rhinos will be offered for hunting by landowners in 2002.

At least four properties allowed green hunting (where rhinos are darted, often to perform other procedures, but not killed) of rhinos for an average price of ZAR 40,000 per 'hunt', while a further two were interested in initiating green hunts. The consequences of green hunts that concentrate on single animals that are repeatedly darted are as yet undetermined and may be detrimental to these animals.

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Les éléphants du Parc National des Virunga au travers la guerre en République Démocratique du Congo

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Résumé

Les guerres à répétition, la relégation de la conservation aux secteurs non prioritaires de l'Etat, l'absence des moyens opérationnels des services de conservation et l'ignorance des statuts actuels des éléphants dans la plupart des biotopes sont des risques de disparition de ces pachydermes au Parc National des Virunga. Des grands massacres des éléphants ont eu lieu entre 1964 et 1968, 1974 et 1984 et entre 1998 et actuellement. La première et la dernière période sont caractérisées par les guerres et période d'insécurité, la deuxième par une forte demande et une flambée de prix de l'ivoire dans les marchés internationaux.

Les parcs transfrontaliers ont joué un rôle important dans la sauvegarde des populations des éléphants. La partie centrale du parc qui comptait 3000 éléphants en 1960 en dispose autour de 400 actuellement. Les éléphants sont concentrées près du Queen Elisabeth National Park (Ouganda) et dans le massif du Mikeno, partie contigue au Parc National des Volcans (Rwanda) et au Mgahinga Gorilla National Park (Ouganda).

Summary

Incessant wars, relegation of conservation to a non-priority sector by the government, lack of operational means in conservation agencies and ignorance of the status of elephants by the local population are the risks of extinction facing elephants in Virunga National Park. Large numbers of elephants were killed between 1964 and 1968, 1974 and 1984, then from 1996 to date. The first and last periods are characterized by wars and insecurity, the second by a high demand for ivory resulting from high prices fetched on the international market.

Neighbouring parks have played an important role in safeguarding the elephant population. There were 3000 elephants in the central part of Virunga National Park in 1960, but now only around 400 exist. Elephants are concentrated around Queen Elizabeth National Park and in the Virunga volcanoes near Mgahinga Gorilla National Park (Uganda), and in the Parc National des Volcans (Rwanda).

Introduction

La guerre en République Démocratique du Congo (RDC) affecte toutes les composantes de la vie des communautés humaines. Ces dernières recourent aux ressources naturelles qu'elles récoltent souvent sans contraintes dans les aires protégées (AP) ou en dehors de celles-ci. Les groupes armés en conflits se ravitaillent et commercialisent les produits des ressources naturelles qu'ils obtiennent grâce à leurs armes. Les agents chargés d'assurer la conservation et protection des AP sont souvent démunis des moyens opérationnels et souvent sans support (salaires, avantages sociaux...) et se donnent peu à la protection ou

deviennent soit braconniers soit leurs complices. La biodiversité est ainsi détruite, les étendues des AP diminuent, les espèces animales et végétales sont fragilisées et une tendance vers la disparition s'observe sur des espèces rares, menacées et déjà fragilisées.

La présence de l'ivoire et surtout leur abondance dans les agglomérations autour des AP à l'Est de la RDC sont souvent des indicateurs d'un abattage sévère des éléphants dans ces AP ou dans les forêts adjacentes.

La guerre en RDC est un facteur qui menace la survie des grands mammifères, plus spécialement les

pachydermes (éléphants, hippopotames), les buffles, les antilopes de savane et les gorilles de montagnes et de plaine de l'Est. La présence du marché de l'ivoire étant un facteur déterminant pour la survie des éléphants.

Les éléphants à travers la guerre au Parc National des Virunga

Le Parc National des Virunga (PNVi) couvrent une superficie de 790.000 hectares. Il comprend plusieurs milieux naturels : forêts primaires sempervirentes, plaines alluviales, savanes herbeuses et boisées, forêts de montagne et des nuages, forêts sclérophylles sur substrat rocheux volcaniques, plaine de lave...

Evolution et tendances des éléphants au PNVi : cas du PNVi-centre

Le PNVi a su protéger plusieurs espèces animales rares et menacées à travers les différentes guerres dont les plus importantes se situent dans les années 1960 (rébellion Muleliste) et de 1996 jusqu'en ces jours. Les différents recensements et recherches y effectués (voir note en bas du tableau 1) permettent de comprendre l'évolution des espèces clés et indicatrices, les facteurs qui menacent la survie des animaux et la dégradation des milieux naturels. Ci-dessous le tableau 1 indiquant l'évolution des éléphants depuis le début des guerres en RDC.

L'année 1959 marque l'apogée pour les éléphants au PNVi. A partir de 1960, début des troubles pour l'indépendance, les populations d'éléphants ont commencé à diminuer en nombre. Le braconnage qui

Tableau 1. Evolution des éléphants au PNVi

	Total PNVi	PNVi-C
1959	8.000	3.293
1960	—	3.000
1971	—	674
1973	—	780
1980	—	621
1983	—	631
1989	830	500
1994	—	500
1998	706	486
2001	~ 650	400

Les données de ce tableau ont été obtenus à partir des recensements généraux des plusieurs chercheurs, des nos observations ponctuelles, des notes des guides touristiques et des estimations de l'ICCN.

a sévi avec recrudescence en cette période est évidemment responsable de la chute des effectifs. Entre 1964 et 1968, le temps des troubles armés dus à la guerre (rébellion), des grands massacres ont été perpétrés sur les éléphants « en 1968, on voyait alors partout des cranes et des squelettes d'éléphants abattus par des rebelles, habitants locaux, parfois par des militaires et souvent par des étrangers », a écrit Jacques Verschuren en 1993, qui peut être entrevoyait des massacres des éléphants au regard des tensions dans les Pays des Grands Lacs.

Une légère stabilisation des effectifs s'observe à partir de 1969, juste après la guerre et une légère augmentation entre 1969 et 1974, année où d'autres massacres commencèrent pour se terminer vers les années 1984. Le comptage du Dr Mertens en 1983 donne le chiffre de 631 éléphants contre 621 en 1982. A partir de ce moment, des grandes mesures de protection, bien que coûteuses, furent envisagées et ne seront mises en place qu'en 1986, mais cela n'a pas empêché la chute continue des effectifs.

En 1988, on estimait à près de 500 éléphants au PNVi-Centre. La chute des éléphants en cette période peut s'expliquer aisément par la flambée du prix de l'ivoire sur le marché mondial dans les années 1975 à 1989 (Richard Barnes comm. pers.). Entre 1988 et 1995, la sécurité du Parc fut totale. La protection des éléphants connut son succès par la mise sur pied du troupe choc anti-braconnage d'éléphants (équipes des gardes formés militairement et bien équipés pour s'occuper essentiellement de la lutte contre le braconnage d'éléphants) par Mankoto ma Mbaelele, ancien Président délégué général de l'Institut Congolais pour la Conservation de la Nature (ICCN). Le nombre d'éléphants augmenta apparemment, mais malheureusement, aucun comptage ne fut effectué pendant cette période et les archives des patrouilles ne renseignent pas suffisamment sur le nombre d'éléphants existants. Les notes des guides touristiques ont été détruites lors de la guerre de 1996 et plusieurs documents dispersés ou pillés pendant cette période.

Comme si cela ne suffisait guère, d'autres troubles apparurent à l'Est de la RDC en 1994 avec l'afflux massif des réfugiés rwandais. La sévérité de la crise poussa l'UNESCO à déclarer le PNVi comme étant un Site du Patrimoine Mondial en péril et ce, le 16 décembre 1994. En 1995, deux éléphants furent abattus par les réfugiés au secteur Mikeno. En 1996, une guerre dite de libération commença à l'Est du pays

Le poids moyen des pointes d'ivoire a diminué depuis le grand abattage de 1973 à 1984. Alors que la moyenne par pointe variait entre 30 et 40 kg dans les années 60, il est actuellement difficile de trouver sur le marché des pointes de 15 kg. La moyenne peut tourner entre 6 et 10 kg. Tout récemment, en avril 2002 les pointes ramassées au PNVi Centre par le conservateur Beghen Katumbano² pesait en moyenne 2,8 kg. Ceci montre que les braconniers recherchent surtout l'ivoire et que les gros porteurs ont presque disparus. Les gardes du PNVi mentionnent des nombreux jeunes dans les quelques hardes existantes.

Il est bien visible que le nombre d'éléphants continue à diminuer dans le PNVi dont les agents chargés de la conservation contrôlent environ la moitié de la surface totale. Cette diminution est certainement due à un braconnage qui est motivé par une quelconque demande en trophées.

En analysant le tableau 1, on constate aisément la descente des éléphants du PNVi vers les enfers. En effet, une stabilisation des effectifs s'observe de 1994 à 1998, avant le déclenchement de la seconde guerre et avant le pillage des stocks d'ivoire dans les dépôts/magasins des stations de l'ICCN, pillage qui aurait occasionné la naissance d'un marché pour l'ivoire. A partir de cette période, les éléphants ne cessent de diminuer en nombre.

Rôle des aires protégées transfrontalières

La partie centrale du parc qui est une savane qui a su garder le même nombre d'éléphants depuis 1989 et 1998. Il en est de même que la partie sud du parc dont les effectifs sont restés autour de 120 dans le secteur Mikeno et Nyamulagira depuis 1960 jusqu'à aujourd'hui. Il s'en déduit que la plupart du stock d'ivoire à Goma, viendraient des forêts de basse altitude (PNVi Nord et surtout en dehors du parc). Dans la Réserve de Tayna située à l'ouest du PNVi, les éléphants sont cloisonnés dans un site sur les sept sites connus (Kakule Wvirasihikya,³ comm. pers.). La situation dans ces forêts reste inquiétante car elle est inconnue. Le sort des éléphants de ces forêts serait le même comme au Parc National de Kahuzi-Biega où les éléphants ont diminué sensiblement dans la basse altitude et exterminés dans la haute (Hall et al. 1997). Il

est important et urgent que la situation des éléphants soit élucidée dans tous ces milieux. Des mesures de protection doivent être prises mais surtout des mesures d'accompagnements de la décision de bannir le commerce de l'ivoire doivent être mises en place.

La forte diminution des éléphants au PNVi a laissé plusieurs habitats sans éléphants actuellement, il s'agit de :

- Mont Tshiaberimu ; il y avait 10 éléphants qui fréquentaient le Mont Tshiaberimu en 1995. En mars 1997, il en restait seulement trois qui furent abattus et mangés par les habitants du village Kabeka non loin de Kyondo (Vital Katembo, comm. pers.).
- Les Monts Kasali, la forêt galerie au niveau de Bushendo au secteur Centre du PNVi : cette partie était réputée pour sa forte concentration d'éléphants dans les années 60 et 70 (Verschuren 1993 ; Rugira Sikubwabo,⁴ in verbis). Il n'en reste aucun actuellement (obs. pers.).
- La plaine du Parc au sud de la route Goma–Butembo entre l'entrée barrière Vitshumbi et Kanyabayonga et l'escarpement Kabasha. Cette partie était aussi fort fréquentée par les éléphants jusque dans les années 80. Une petite partie de cette zone était très peu fréquentée au début des années 1990. Il arrive des fois que les éléphants traversent cette route mais n'avancent guère à 2 km au sud.
- La côte ouest du lac Edouard depuis Muko jusqu'à Taliha n'est peut-être plus fréquentée par des éléphants. Nous avons des doutes de l'existence encore d'un troupeau de 30 éléphants qui fréquentait Kamandi, lequel troupeau était la cible des groupes armés basés dans cette partie et qui avaient abattu six éléphants en un seul jour en mai 1999.
- Les éléphants seraient aussi exterminés dans la forêt du cours moyen de la Semliki.

Il est facilement remarquable que les zones sans éléphants sont des zones internes du parc, zones qui ne touchent pas aux parcs des autres pays. Les plus grandes hardes d'éléphants s'observent entre le village de Nyakakoma, la station de Lulimbi et la vallée de la rivière Ishasha à la frontière avec le Queen Elizabeth National Park (QENP) en Ouganda. Un grand troupeau pouvant totaliser 200 éléphants fréquente cette partie et fait des séjours au QENP. Il

² Conservateur, adjoint du Chef du PNVi Centre

³ Conservateur du PNVi depuis 1985, actuellement coordonnateur de la Réserve de Tayna

⁴ Garde de l'ICCN, engagé en 1947, mis en pension en 1978 et ayant travaillé dans tous les secteurs du PNVi.

se scinde parfois en des petits troupeaux variant entre 50 et 120.

Dans la partie Sud du PNVi, la zone du Mikeno, transfrontalier entre le Mgahinga Gorilla National Park (Ouganda) et le Parc National des Volcans (Rwanda) est aussi fréquenté par près de 80 éléphants.

Les aires protégées du Rwanda et de l'Ouganda, transfrontalières au PNVi, jouent un rôle primordial dans le maintien des éléphants aussi au Parc National des Virunga et vis versa. Il en est de même pour les gorilles de montagne. Il est urgent pour qu'une gestion concertée de ces aires soit mise en place. La collaboration transfrontalière existe d'une façon non officielle pour la conservation et gestion des gorilles de montagne, le Projet Parcs pour la Paix est aussi opérationnel dans la région des Grands Lacs. Ces mécanismes doivent être bien renforcés et des fonds suffisants sont nécessaires pour ce renforcement au bénéfice du maintien de ces espèces rares et de leurs écosystèmes fragiles.

Facteurs qui menacent la survie des éléphants en temps de guerre

En temps de guerre, quatre grandes menaces pèsent sur les éléphants au PNVi :

- insuffisance de surveillance due à l'insécurité dans les postes des patrouilles, à la non assistance (absence des salaires et/ou retard dans l'octroi de la prime UNESCO existante) des agents chargés de la conservation.
- braconnage par la population locale, les armées en positionnement dans les AP.
- forte demande en viande, trophées suite au pillage et extermination du cheptel domestique dans les villages limitrophes du parc.
- la déprédation des cultures et autres dommages causés par les éléphants (4 éléphants abattus à Burungu et Mushari sous prétexte de la protection des cultures).

Ces facteurs peuvent jouer sur la densité des éléphants mais la survie de ces derniers semble liée surtout au marché de l'ivoire, facteur important qui joue même en temps de paix.

INSUFFISANCE DE SURVEILLANCE

Dans les années 1960, les gardes furent les cibles de plusieurs rebelles et le PNVi en perdit près d'une centaine (Mburanumwe Chiri, comm. pers.). Les gardes

passèrent plusieurs mois sans salaires et sans appuis. Démotivés, la conservation fut reléguée au second plan mais cela ne fut pas la cause principale des grandes mortalités des éléphants. Au regard des massacres commis sur les éléphants, il est clair que l'ivoire devrait avoir un marché alléchant. La diminution générale des éléphants en Afrique a commencé vers 1968 (dans les aires protégées de Tsavo, Kidepo, QENP) et s'est généralisée sur les autres aires protégées à partir des années 1975 jusque dans les années 1985 et au-delà (Douglas-Hamilton 1988).

Pour la période actuelle, les agents du PNVi ont été aussi la cible des hommes armés. L'ICCN déplore la mort de 152 gardes entre 1996 et aujourd'hui avec plus de 80 % liés à la guerre et ses stress (rapports ICCN de 1996 à 2001). En 1996, les gardes du PNVi ont été désarmés par les forces de l'Alliance des Forces démocratiques pour la Libération du Congo (AFDL). Depuis ce temps, ils n'ont jamais été réarmés et cette situation ne le permet pas de faire face aux braconniers armés. En juin 2001, les gardes venaient de totaliser 75 mois sans salaires et cette situation les décourageait de telle sorte qu'ils ne se donnaient pas beaucoup au travail. Une grande partie du temps de ces agents était passée pour la recherche des moyens de subsistance en dehors du Parc (Sikubwabo et Nzojibwami 2000). Malgré ce relâchement de la surveillance, les éléphants n'ont pas été fortement braconnés car l'ivoire n'avait pas un marché alléchant, même le prix actuel de l'ivoire n'est pas attrayant et beaucoup de braconniers préfèrent les autres gibiers aux éléphants. Les données sur le braconnage au bureau de l'ICCN à Goma, montrent que les animaux étaient braconnés pour la viande. Le cas de l'hippopotame est éloquent par sa baisse de plus de 10.000 en 1990 à moins de 1.000 actuellement. La stabilité des effectifs des éléphants entre 1994 et 1998 est due au manque de marché de l'ivoire, le ban lancé par l'UICN contre l'ivoire étant la cause primordiale de l'absence de ce marché.

Des efforts sont actuellement menés par l'UNESCO et l'UNF pour payer des primes aux gardes. Un espoir vient de voir le jour avec la mise en œuvre des fonds de l'UNF pour appuyer la conservation pendant 4 ans à partir du mois de juin 2001. Les autres partenaires pour la conservation en place au PNVi (Projet Parcs pour la Paix, le Programme International de conservation des Gorilles (IGCP), le Programme Environnemental autour des Virunga et le Dian Fossey Gorilla Fund-Europe) sont un soutien

qui a été presque le garant de la conservation jusqu'aujourd'hui.

BRACONNAGE PAR LA POPULATION LOCALE ET LES ARMEES AU FRONT OU EN POSITION

Le braconnage de la grande faune mammalienne est devenu monnaie courante au PNVi. Depuis le début des hostilités, les grands mammifères, spécialement les hippopotames, les buffles, les antilopes et le phacochères sont les cibles des braconniers. Les éléphants semblaient être épargnés. En juillet 1998, avec le chercheur Congolais Léonard Mubalama, nous avons effectué un inventaire des éléphants dans le secteur centre du PNVi et avons trouvé une situation apparemment stable dans les effectifs. En effet, 486 éléphants vivaient dans la plaine de la Rutshuru, Rwindi et Ishasha au moment des inventaires (Mubalama 2000), ce qui était proche des moyennes de plusieurs années (voir tableau 1).

Depuis ce temps l'éléphant est entré sur la liste des animaux braconnés. Ceci suppose l'existence d'un marché plus attrayant quelque part. Cette situation très préoccupante nous a poussé à mettre en place un système pouvant nous aider à comprendre le taux de braconnage à partir des patrouilles et des observations sur les véhicules traversant le PNVi. En effet, les éléphants qui apparemment ne faisaient pas partie des animaux braconnés sont recherchés et abattus pour la viande et les trophées sont vendus à l'étranger. Quarante éléphants ont été abattus au PNVi en 1999, 15 en 2000 et 10 en 2001 (Sikubwabo et Nzojibwami 2000). Cependant, l'appui du Programme MIKE devrait nous permettre de relever plus des données.

FORTE DEMANDE EN VIANDE, EN TROPHEE ET EN ESPECES VIVANTES

La présence de 750.000 réfugiés dans les alentours de Goma, a provoqué une destruction de plus de 450.000 vaches dans la zone de Masisi et un pillage systématique du bétail dans la zone de Rutshuru entre 1994 et 1997. En ce moment, la faune du Parc était surtout braconnée par des groupes armés en stationnement autour du Parc et par la population.

Après cette destruction du Cheptel, la demande en viande de la population a augmenté et cela a provoqué une ruée sur les animaux du parc dont les gardes n'avaient pas assez des moyens pour assurer la lutte anti-braconnage. Alors la viande de brousse se

retrouvait dans tous les marchés et le prix par animal ou quartier de viande était connu.

Plusieurs commandes des trophées et des animaux (soit vivants ou morts) ont aussi provoqué la mort de plusieurs animaux. Les commandes, dont certaines se retrouvaient sur Internet en 1998, concernaient surtout l'ivoire, les dents d'hippopotames, les reptiles, les oiseaux comme le perroquet gris, le bec à sabot, la grue couronnée, les coléoptères, les caméléons...

CONFLITS HOMME-ELEPHANT

Bien que le nombre d'éléphants soit réduit par rapport aux années antérieures, ces derniers causent des dégâts non moins négligeables dans les endroits qu'ils fréquentent. Il s'agit essentiellement des ravages des cultures par le broutage ou le piétinement et la destruction des huttes. Dans la zone de Mikeno, les éléphants et les gorilles sortent très fréquemment du Parc et parviennent à ravager des superficies considérables. Les renseignements recueillis à l'ICCN, au bureau de la FAO à Goma et à l'inspection de l'agriculture, informent que 15 hectares de pomme de terre des associations locales ont été détruits par les éléphants et les gorilles en 1999 seulement près du village Kabonero.

Huit milles épis de maïs ont été ravagés seulement au mois de juillet 2000 soit une valeur de près de US\$ 400 entre Jomba et Rugari. Une hutte a été détruite et 5 autres endommagées par des éléphants à la recherche de la cendre dans les maisons. Les animaux sortent du Parc sur des distances allant jusqu'à 1,5 km de la limite du parc pour les gorilles et les éléphants, 3 à 8 km pour les buffles.

La situation des éléphants dans le secteur Mikeno semble être difficile. Ces éléphants, estimés à près de 80 fréquentent la forêt de montagne transfrontalière entre l'Ouganda, le Rwanda et la RDC. En Ouganda, des murs de pierre ont été érigés le long du parc pour empêcher la sortie des animaux. Cela a été une réussite et a réduit les conflits entre l'éléphant et l'homme. Actuellement, le IGCP en collaboration avec le Programme Alimentaire Mondial soutient les travaux de construction d'un mur en pierre dans ce secteur.

Un pédoncule (corridor) de forêt qui permettait le passage des éléphants du secteur Mikeno au secteur Nyamulagira surtout pendant la saison de pluie a été endommagée par l'élagage de 100 m des arbres de chaque côté de la route sous prétexte de la sécurité et cela ne permet plus le passage des éléphants. Les

ravages sur les cultures se sont augmentés à cause probablement de cette situation, accentuant le conflit homme-éléphant.

L'autre milieu connaissant les ravages des éléphants est Mushari (dans le secteur Nyamulagira). A Burungu, le bureau du groupement rapporte l'abattage de quatre éléphants par les militaires, sous prétexte de protection des cultures, à la lisière de la forêt du parc entre Burungu et Mushari au mois de mars de 2001. Les militaires auteurs de ces actes ont récupéré les pointes d'ivoire après avoir vendu la viande à la population.

Une solution devra être trouvée pour pallier, atténuer ou mettre fin à ces conflits car, si l'abattage illégal des éléphants doit être couvert par le motif de ravage des cultures et que certaines personnes doivent gagner de l'argent, le danger, l'extinction de ces petites populations n'est pas loin d'être évident. Il en est de même de la déforestation du couloir de passage des éléphants qui accentue les problèmes de ravages des cultures.

Conclusion

La chute du nombre d'éléphants est bien visible dans le PNVi alors que cette PA est la mieux protégée à l'Est de la RDC. Ce phénomène est lié à la fois à la guerre, au manque des moyens pour assurer la surveillance dans tous les coins du Parc et surtout à l'existence des marchés pirates pour l'ivoire. Le nombre exact d'éléphants n'est pas tout à fait connu car le dernier comptage s'est effectué avant les récents massacres et s'est effectué au secteur centre.

Un autre facteur qui menace la survie des éléphants au PNVi est leur sortie de la forêt et le ravage des cultures de la population. La population recherche les hommes armés pour s'en débarrasser. Quatre éléphants ont été tués de cette façon. Cette situation ne pourrait jamais se passer de cette façon en temps de paix, l'ICCN et le service de l'environnement devraient trouver des méthodes appropriées pour le refoulement.

La persistance de la guerre, l'absence des moyens opérationnels des services de conservation et l'ignorance des statuts actuels des éléphants dans la plupart des biotopes sont des risques de disparition de ces pachydermes à l'insu des hommes.

Il est urgent qu'un update de la situation des éléphants soit fait sans tarder et que des campagnes de sensibilisation sur la situation et du statut de ces pachydermes soient lancées à tous les décideurs politiques.

Recommandations

De ce qui précéder, nous recommandons ardemment :

- Que des missions de reconnaissances soient programmées et envoyées dans toutes les forêts pour s'enquérir des situations générales des éléphants.
- Que les comptages soient effectués dans les endroits où la sécurité le permet.
- Que des mesures de protection des cultures soit mises en place surtout aux lisières de la forêt, là où les éléphants sortent pour ravager les cultures.
- L'interdiction formelle d'achat de l'ivoire en provenance de la RDC.
- La fourniture des moyens opérationnels pour les agents chargés de la conservation dans les PA et leur motivation pendant les périodes des troubles.
- Que les aires protégées spécialement, le PNVi, ayant statut de Sites du Patrimoine Mondial soient soustrait à des opérations de combat.
- Que le programme MIKE soit inclus au PNVi et que certains agents de terrain puissent être désignés, formés pour suivre le programme jour après jour.
- Que le programme MIKE travaille en étroite collaboration avec le GSEAF et qu'il leur fournisse des moyens pour suivre les dégâts sur les éléphants.

Remerciements

Nous adressons nos remerciements sincères aux autorités de l'ICCN au Nord-Kivu, plus particulièrement à Monsieur Bakinahe Nt. Stanislas, Kajuga Binyeri, Beghen Katumbano, Déo Mbula qui ont mis à notre disposition, avec enthousiasme les archives de l'ICCN et qui nous ont donné des informations nécessaires pour cet article. Notre gratitude s'adresse également au Dr Bihini Won wa Musiti, Elie Hakizumwami, Helen van Houten, Dali Mwangore, Kasereka Bishikwabo, Sikubwabo Rugira et à Mme Chantal Shalukoma pour les informations additives et commentaires.

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Preliminary results on movements of a radio-collared elephant in Lobeke National Park, south-east Cameroon

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Abstract

To better understand the movement and distribution patterns of forest elephants in the south-east Cameroon forest region, the WWF Jengi project in the area launched an elephant telemetry programme. Preliminary results from a radio-collared elephant have indicated that elephants spent more time in the surrounding forest areas of the national park that constituted logging concessions and professional hunting zones than in the forest itself. Initial results confirm the need to step up protection efforts in the form of anti-poaching patrols that will fight against poaching and the ivory trade that are common within logging concessionaires. Future work on monitoring radio-collared elephants will also help determine important animal corridors and migratory routes, especially within a trans-boundary conservation programme involving contiguous protected areas in Cameroon, Congo-Brazzaville and Central African Republic.

Résumé

Afin de mieux comprendre les déplacements et le schéma de distribution des éléphants de forêt dans la région sud-est du Cameroun, le projet Jengi du WWF dans la région a lancé un programme de télémétrie pour les éléphants. Les résultats préliminaires provenant d'un seul éléphant équipé indiquent que les éléphants passent plus de temps dans les zones forestières qui entourent le parc national et qui constituaient des concessions d'exploitation forestière et des zones de chasse professionnelle, que dans le parc lui-même. Les premiers résultats confirment la nécessité d'intensifier les efforts de protection sous forme de patrouilles anti-braconnage qui devraient lutter contre le braconnage et le trafic d'ivoire qui sont fréquents au sein des concessions. Le futur travail avec des éléphants équipés de colliers-radio va aussi aider à déterminer les corridors et les voies de migration importants pour les éléphants, spécialement dans le cadre d'un programme de conservation transfrontière qui implique des aires protégées contigües au Cameroun, au Congo-Brazzaville et en République Centrafricaine.

Introduction

Conserving and managing the African elephant is a complex undertaking, requiring skills and strategies that deal with populations in both protected and unprotected areas throughout their range. Dublin et al. (1997) indicated that the increase in proximity of human populations and subsequent expansion of their activities into elephant ranges is increasingly calling wildlife authorities to consider not only the welfare of the species and its habitat but also the problems that arise between elephants and their human neighbours competing for limited resources.

The multitude of problems confronting this mega species has led international conservation organi-

zations and leading specialists to focus on defining various conservation strategies such as establishing more protected areas to fight against diminishing species populations. Measures taken also include increased use of methods such as radio collaring elephants to monitor movement and distribution. While successful conservation and management of elephant populations in the wild strongly relies on sound scientific, ecologically based information, the long-term survival of the species throughout its range in tropical Africa can be secured only by combining solutions that reconcile ecological, economic and cultural values. There is no doubt of the role elephants play as pace setters within their ecological range,



A forest elephant (*Loxodonta africana cyclotis*) in Lobeke National Park, Cameroon.

changing the physiognomy of forest structures. They also help propagate certain tree species by passing seeds through their digestive system where enzymatic reactions help stimulate germination of the ingested seeds.

Local economic and cultural values

Elephants play an important role in the life of forest people inhabiting tropical forests. Elephants are hunted for meat but more importantly for their ivory, which brings many households a high income. Elephant tusks not only have economic value because they are used to manufacture various ivory products such as jewellery and carvings, they also are symbols of power, especially within the elitist class in Cameroonian society. Baka forest pygmies also have a strong sociocultural affiliation with elephants; these animals occupy a special place in pygmy life. An elephant is killed during Jengi, a widely celebrated pygmy festival that symbolizes the people's attachment to the forest.

Species population status

The south-east forest region harbours a significant population of elephants although no data exist for the entire region. Over the past 10 years, much research

has been carried out that focuses on the status and distribution of elephant populations in protected areas of Boumba Bek, Nki and Lobeke National Parks. Population densities in Lobeke range from 2.5 elephants km⁻² as reported by WCS (1996) to 4.6 elephants km⁻² reported by Stromayer and Ekobo in 1991. But overall population density for elephants within protected areas could be estimated at 2.17 km⁻² (Ekobo 1995). Lobeke National Park and the surrounding forest area cover an area of more than 500,000 ha with the park itself being 220,000 ha.

Conservation threats

Poaching

The biggest threat to elephant populations in the entire south-east region is poaching, mainly carried out to furnish the ivory trade. There is a paucity of existing data on elephants killed in the region, although recent and ongoing monitoring studies in Lobeke National Park and surrounding forest areas show at least five elephants are killed every month in the region. Five major logging companies operate in the forest areas surrounding Lobeke. The effect on elephant populations is negative, as most of the poachers work for these companies and the logging trucks provide easy transport for both meat and ivory to distant towns and cities, notably Bertoua, Yaoundé and Douala. Existing laws are loosely and arbitrarily implemented, a situation that the government should address seriously, because elephant hunting in the area is increasing. The amount of arms is also proliferating, made easy by the porous borders with neighbouring Congo-Brazzaville and Central African Republic (CAR). The wide circulation of arms can also be attributed to political instability in neighbouring states. For example, a modern AK47 rifle can be bought for less than CFA 150,000 (USD 200) in the black markets of south-east Cameroon.

Elephant hunting and trade in ivory is a delicate and undercover business in the region as some influential members of the society actively encourage the trade. Muslim traders (who own most of the stores

in the area) are widely known to be major intermediaries and buyers of ivory from the region. They also sponsor small hunting groups who are paid monthly according to the amount of ivory they poach and bring in.

Logging

As mentioned above, logging companies provide ready transport to market for the ivory trade and also harbour most of the elephant poachers, who work for them. The poachers know the forest areas where the elephants are concentrated, finding them especially when carrying out forest inventory reconnaissance and prospecting missions before logging begins in an area. Logging destroys forest cover and habitats, although forest elephants may favour disturbed or secondary forest (Ekobo 1995).

Human encroachment

Although human encroachment does not pose a serious problem at the moment, increased opening of forestland through logging activities attracts a significant population of mostly non-indigents who settle in logged areas to hunt and embark on agriculture. The human population density in the area is low, less than 1 person km⁻², which favours conservation of natural resources. However, the nomadic lifestyle of the Baka pygmies and the lifestyle of non-indigents, which includes establishing temporary settlements and subsistence farming, sometimes deep inside the forest, has at times led these groups to intrude into elephant ranges. This has been confirmed over the past two years with serious elephant-human conflicts that have led to loss of both human and elephant life (pers. obs.). Present Cameroonian laws do not prohibit citizens from settling in certain areas.

Transborder conservation issues

Lobeke National Park is contiguous with forest areas and protected areas of Congo-Brazzaville and with Nouabale National Park in the Republic of Congo-Brazzaville and Dzanga-Sangha Dense Forest Reserve in CAR. These three protected areas constitute the Sangha Tri-national Park, which covers more than 7750 km² of core protected area and proposed multiple-use zones of about 21,000 km². The

entire region is widely known for its rich biodiversity in both wildlife and timber species that has attracted many logging companies, hunters and poachers.

One of the unique biological features of the area is the significant population of forest elephants of great ecological importance. Elephant research has been conducted over the past decade in nearby CAR, notably research on identifying and monitoring species populations. This study has led to conservation biologists working in Dzanga-Sangha being able to identify and recognize more than 1000 elephants (Turkalo and Fay 1995; Turkalo 1996). Elephants are also known to range seasonally within the three protected areas.

The present study of radio collaring and monitoring movements of forest elephants is part of a broader research programme that spans the three countries, executed site by project site, that will provide more insights on elephant movement and distribution. This study will help identify major migratory routes and important biological corridors for elephants across their range. Three elephants have been collared in neighbouring Nouabale Ndoki National Park. A number of elephants have been observed crossing the Sangha River. For example, in November 1998, I personally observed four elephants crossing the Sangha River into Lobeke from Nouabale Ndoki.

Satellite data of a collared forest elephant in Lobeke

In February 2001, Dr Mike Loomis of North Carolina Zoo, USA, working in collaboration with the WWF programme office successfully collared a five-year-old forest elephant, named Desiré, after the project chief elephant tracker and field assistant, Desiré Dontego. Desiré was collared in one of the major forest clearings, Ndagaye Bai, of Lobeke. Attached around the neck of the elephant was a high-powered VHF radio collar equipped with a UHF unit that transmits data on movements to orbiting satellites. The location data are sent from these satellites to a ground station in France, where they are in turn emailed to an Internet server in North Carolina. This server then transmits the data to North Carolina Zoo as well as to several locations back in Cameroon, notably the server of the WWF programme office. Field biologists then download the data from the server in Yaoundé for further analysis. Meanwhile, researchers in North Carolina Zoo review the data at least once daily. In the field, our chief tracker equipped

with a small VHF radio tracks the elephant within a maximum radius of 5 km. The elephant has been successfully tracked at least three times from the ground.

Recent results on elephant movements

The map (fig. 1) shows Desiré's movements during the eight months since he was tagged in March 2001. The satellite readings show that he has spent about 75% of his time in surrounding forest areas north of Lobeke National Park. Between February and April, a period that coincides with the dry season, Desiré spent at least 75% of his time inside the park, especially in the forest areas surrounding Ndangaye Bai, where he was tagged. Meanwhile during the months of May through August, Desiré was found mostly in surrounding forest areas outside the park, particularly in the professional hunting zone of Faro West. Desiré visited the park only once during the month of August as he moved further northwards to professional hunting zones beyond Nsok Safari, some 30 km from the park boundary. Each dot represents a position location of the elephant, and the satellites capture at least one position each day. Daily locations of the animal are determined by a Doppler shift that represents the mean of satellite data captured per location.

Protecting the Lobeke elephant population is critical, especially in surrounding forest areas managed by professional hunters. More data may confirm the strong hypothesis of a greater concentration of elephants in areas north of the park where two major logging companies are operating. Elephants have been widely reported to prefer logged or disturbed forest characterized by an abundance of secondary growth, which provides suitable foliage for feeding (Ekobo 1995). The need is urgent for the project management to consolidate existing collaboration between these companies and sport hunting outfits, especially with regard to poaching. Long-term survival of wildlife populations, especially elephants, will depend on collaboration and support from these stakeholders in the fight against poaching. Coincidentally most poaching in Lobeke is within these particular forest areas, although sport-hunting outfits are actively carrying out anti-poaching missions in their hunting zones. Unfortunately anti-poaching activities are not sustained throughout the year, notably in the sport-hunting concessions as

sport-hunting companies in the region operate seasonally between December and July, the official sport-hunting season.

It is also too early to predict seasonal animal movements, but initial results portray elephant preference for the park during the wet season, particularly the marshes and swamps of the surrounding forest areas of Ndangaye Bai. During the wet season, Desiré spends more time in the park, presumably feeding on the many trees that fruit abundantly at that time. During the dry season from June through August, when fewer forest tree species are in fruit, Desiré covers a wider range, more than 30 km beyond the park, in search of food. More research and data are, however, required to verify this observation.

Future action

Future action should concentrate on tracking elephant groups to gather more baseline data related to group size, feeding habits and so on. The project should continue the ongoing mission to sensitize stakeholders in the region—the logging companies, sport-hunting outfits and surrounding local community—on the importance of this study and to seek their active collaboration in gathering information. Desiré was spotted on several occasions by the Faro West hunting concession while hunting with clients during the last sport-hunting season. At least two more elephants should be tagged to provide a better understanding on group size and ranging patterns. Desiré is part of a family group of four elephants that will continue to be monitored, and more elephant tagging is planned in the region to reinforce the ongoing monitoring programme.

Acknowledgements

The SE Jengi project would like to thank the North Carolina Zoo and Dr Mike Loomis in particular for his technical contributions (data and map development) and material assistance in these ongoing studies. Dr Martin Tchamba, WWF director of conservation, has been instrumental in setting up this project, which is part of the WWF northern savannah project. Former Jengi project leader Henk Hoefsloot has been supportive of this study. Many thanks go to project chief tracker and field assistant Desiré Dontego, without whom no elephants would have been collared in Lobeke. Initiation of this project was under the

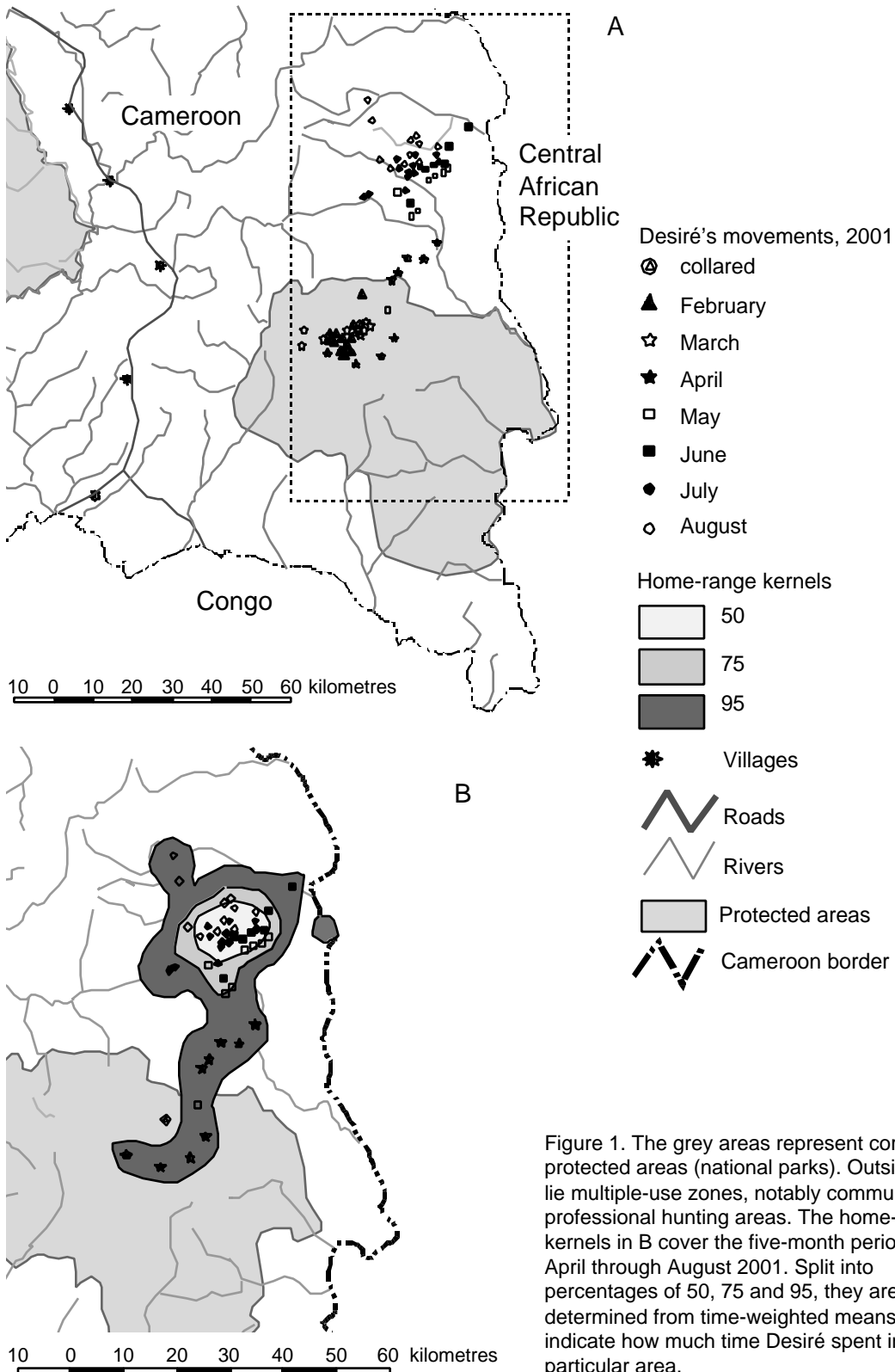


Figure 1. The grey areas represent core protected areas (national parks). Outside them lie multiple-use zones, notably community and professional hunting areas. The home-range kernels in B cover the five-month period from April through August 2001. Split into percentages of 50, 75 and 95, they are determined from time-weighted means and indicate how much time Desiré spent in a particular area.

technical coordination of our late colleague Dr Robinson Ngnegueu, who unfortunately never had the chance to appreciate results from this pioneering effort of elephant conservation in Lobeke. The entire staff of the Ministry of Forests and Environment in Yokadouma have been very supportive, realizing how much this study will help in future design and implementation of management strategies for elephants in Lobeke.

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Importance of anti-poaching measures towards successful conservation and protection of rhinos and elephants, north-eastern India

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Abstract

A well-planned and implemented anti-poaching strategy is essential for conserving species endangered by illegal international trade. Illegal trade in wildlife, especially in rhino, elephant, tiger and bear, is flourishing and severely threatening the remaining populations. Monitoring the trend of poaching and international trade is important for assessing the threats and preparing an effective counter-poaching strategy. This paper is based on the research and monitoring of endangered mammals, especially rhino, elephant and tiger, in Assam and other north-eastern states of India. It analyses major anti-poaching aspects and presents a strategy that other conservation managers can use to check poaching and illegal trade.

Additional key words: Assam, endangered species, law, trade

Résumé

Une stratégie bien conçue et bien appliquée est essentielle pour conserver les espèces menacées par un commerce international illégal. Le commerce illégal de la faune, et spécialement des rhinos, des éléphants, des tigres et des ours, est florissant et menace gravement les populations restantes. Il est important de surveiller de façon continue les tendances en matière de braconnage et de commerce international, pour évaluer les menaces et préparer une stratégie de contre-braconnage efficace. Cet article se base sur la recherche et la surveillance continue de mammifères en danger et spécialement des rhinos, des éléphants et des tigres, en Assam et dans d'autres états du nord-est de l'Inde. Il analyse les principaux aspects de la lutte antibraconnage et présente une stratégie que d'autres gestionnaires de la conservation peuvent utiliser pour contrôler le braconnage et le commerce illégal.

Introduction

Economists have estimated global trade in wildlife at more than USD 25 billion annually (Menon and Kumar 1998), over 40% of it illegal. The increase in this trade has been of serious concern (Martin 1990, 1999; Wenjun et al. 1996; EIA 2000; Stiles and Martin 2001). In India, the illegal trade in items such as ivory, tiger skins and bones, skins of other cats like leopard and the clouded leopard, rhino horns, musk of the musk deer and the gall bladders of bears has already caused concern among many conservationists, including those in the government. In response to this threat, the government of India has promulgated many policies and enacted many laws to protect wildlife

and halt wildlife crime. Most of the wildlife in India is protected under the Wildlife Protection Act, 1972, which is the single most significant statute on wildlife conservation in India (Upadhyay and Kothari 2001). Under it, over 80 national parks and more than 450 sanctuaries are legally protected. Several non-governmental organizations (NGOs) have also started investigating the illegal trafficking of the wildlife materials.

A number of anti-poaching efforts have been made in India, especially in Assam, and in other north-eastern states and in Bhutan, Myanmar and Nepal, with the aim of minimizing trade in wildlife trophies.

Wildlife officers working in sanctuaries and national parks are more vulnerable and subject to assault with

Nilam Bora



Recovering arms and ammunition is one step in working to reduce poaching.

lethal weapons than are their counterparts who work in urban areas. In a protected area where the number of endangered species is large and the threat of poaching is high, the main goal of wildlife officials and those working in other law-enforcing agencies is to reduce poaching without losing any member of the anti-poaching unit to illness or outright attack. One species particularly threatened by poaching is the rhino. Conserving rhinos in Assam, India, is a relentless fight with poachers and smugglers (Vigne and Martin 1998; Talukdar 2000).

Methods

Through extensive field visits from 1998 onwards I made a study on the trade in wildlife items—in Assam and other north-eastern states of India and in Bhutan, Myanmar and Nepal. I visited Myanmar in February 2000, going to the areas of Mandalay and Yangon and to Mount Popa National Park. I made field visits to Nepal, specifically to Biratnagar, Dholabari, Kakarbhita, Kathmandu, Pokhra and Sauraha in December 1999, March 2001 and June–November 2002. During 1999 to 2002, I made 10 trips to Nepal, and in 2002, 2 trips to Bhutan

WCMIP/Aaranyak



It is important to assess in advance what arms the poachers have.

visiting Phuntshiling and Thimphu. Acting at times as a buyer and at others as a seller, I visited people suspected of engaging in the wildlife trade, working in each country through a tourist guide and a network of intelligence units.

A drive against the wildlife trade was launched among enforcing agencies including forest departments, police, army and customs. I represented Aaranyak, a centre for biodiversity conservation in north-eastern India that has acted as a connecting link among these enforcing agencies for better coordination and execution of the plan prepared for each operation. Aaranyak employed agents to collect vital information, which was verified and then passed by personal oral message to the concerned enforcing agency

carrying out a particular operation in a key site. No other communication system was used.

Anti-wildlife trade strategy

Both an anti-poaching strategy and an anti-wildlife trade strategy are essential to stop poaching and trade in

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Poaching rhinos for their horn is the key threat to the rhino population in Assam.

endangered species. Poachers and their links to wildlife traders within the country and abroad all need to be identified. Wildlife trade is not confined to its country of origin; it cuts across the globe to wherever an illegal market still operates. This field study has amply indicated that poaching endangered species depends on the signal poachers receive from traders in the international market. It is the traders who indirectly determine the rate of poaching. Poachers on the ground will do little if traders do not buy the wildlife materials from them immediately, as storing such items invites risk of arrest and subsequent court trial with fines or imprisonment.

The general attitude of poachers as studied during these past six years of investigation is that they want to sell their product as soon as possible. They work in groups and the group members need their share. If they are able to sell their wildlife materials quickly, it helps them to stay

united and keep their mutual faith intact; if they are not able to sell quickly, cracks begin to open within the group and members lose faith in each other. This is where the first pressure might be put. When these cracks in a poacher group develop, it is easier to get accurate information from one dissatisfied member and thus be able to track down and recover the wildlife products. Tracking down products as they shift from one trader to the other also often provides vital clues. By the time the wildlife products reach the international market they may have been sold up to eight times since they were poached.

The tendency among enforcing agencies is to celebrate whenever poachers are arrested. Such celebration is not warranted, however, because arrest alone does

not stop poaching as long as the market encourages killing animals for their trophies or their organs. To really stop the trade, more emphasis needs to be given

WCMP/Aaranyak



This anti-poaching squad operation was successful, recovering arms, ammunition and a rhino horn.



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Ivory seized near Shillong in 1999.

to nabbing the traders, as only one or two traders can handle the wildlife products that a hundred poachers bring in—and wipe out an endangered species from a site. Arresting traders creates more of a vacuum in the trade circle than does arresting poachers, as it hampers the swift transit of goods from one trader to another before they reach their ultimate destination in the international market.

Further steps need to be taken to ensure that those arrested are rapidly convicted, and for that legal assistance is of the utmost necessity. It is essential to have good lawyers to fight against wildlife traders.

Uncovering and checking new information on the movement of poachers and smugglers should be the highest priority of the anti-poaching intelligence unit. Receiving advance information on poacher and smuggler activities is extremely important for apprehending criminals engaging in such nefarious activities. Occasionally such information is received from common people in India and

major routes: 1) through Naga-land to Myanmar and 2) through West Bengal to Nepal or Bhutan. They are transported with various other goods, legal and illegal, including drugs. Rhino horn is generally taken out of Kaziranga National Park in Assam in two major routes (figs. 1 and 2) to ultimate known collection points for illegal Asian wildlife markets.



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Ivory products for sale in Mandalay.

other South Asian countries. But most underworld activities are carried out in remote areas and even if someone has information they withhold it from law-enforcing agencies for fear of serious underworld reprisal. It is therefore imperative that clandestine channels of information collection be protected to assist the anti-poaching staff.

The field investigation carried out in illegal wildlife markets in Myanmar showed that products such as tiger bone, ivory, rhino horn and bear bile are imported into Myanmar through the porous western borders of Arunachal Pradesh, Manipur, Mizoram and Nagaland in north-east India. Wildlife products from Assam move out of the state through two

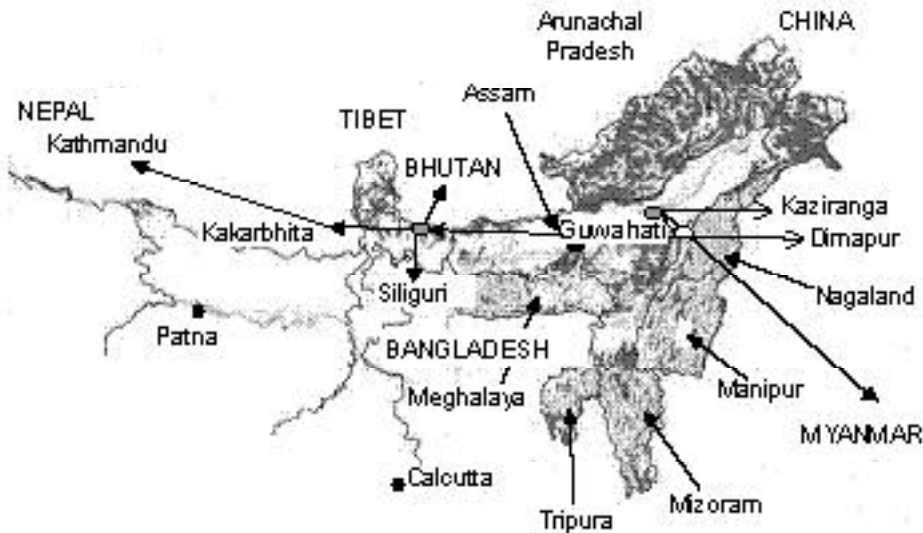


Figure 1. Rhino horn trade routes from Assam to Bhutan, Myanmar and Nepal.

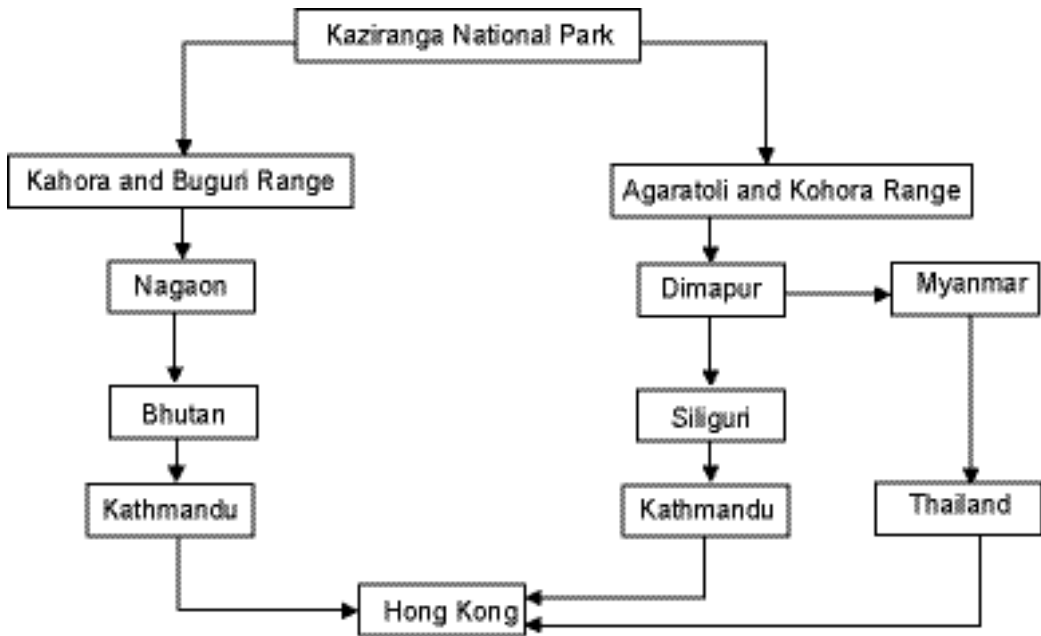


Figure 2. Routes for smuggling rhino horn from Assam to Hong Kong.

The current investigation showed that these two routes are the major routes for smuggling rhino horn from Assam to the international market. The buyer groups that operate from Dimapur in Nagaland have agents in various districts of Assam, mainly in Golaghat, Kamrup, Karbi-Anglong, Nagaon and Tezpur (fig. 3). When poachers in the eastern part of Kaziranga National

Park kill a rhino, it is most probable that the horn will be transported to Dimapur. Hekte Sema and Chettan Subba in Dimapur are the big buyers. The horns are then sent to Kathmandu through Siliguri with some portion sent to Myanmar through the Nagaland–Manipur border with Myanmar. Not as much rhino horn is transported from Assam to Myanmar as to Nepal.



Figure 3. Assam state showing districts.

This study found that poaching elephants for their ivory has increased in the forest, especially outside the protected area network. From 1998 until 2002, more than 17 elephants were poached in various parts of Assam exclusively for their ivory, including one big elephant at Laokhowa Wildlife Sanctuary. In parts of Meghalaya in north-eastern India, elephants are also killed for their meat, which is dried and stored. The agents involved in the project have determined that some 14 elephants were killed for meat along the Assam–Meghalaya border, especially in Kamrup and Goalpara Districts. According to available records, 18 elephants were killed in Assam in 1997, 20 in 1998, 12 in 1999, 20 in 2000, increasing to a loss of 61 in 2001 and 39 in 2002, making a total of 170 killed over the six-year period. Maintenance of records on elephant poaching is poor, however, especially in the forest areas outside the protected area network. Poor record-keeping occurs throughout India. It is possible that poachers have killed many more elephants in the reserved forest areas of Assam without the forest staff having noticed.

In Manas National Park, which is also a World Heritage Site, records show that from 1990 to 2002, poachers taking advantage of ethnic unrest in the area killed 38 elephants. Such ivory is taken to Siliguri and sold in Kathmandu. On two occasions, the ivory was sent to Myanmar through Assam and Nagaland. In 1999 about 30 tusks were seized near Shillong in Meghalaya on their way to Myanmar through Meghalaya and Mizoram. Much more ivory than rhino horn is transported to Myanmar from north-eastern India, because Myanmar towns such as Mandalay still have big ivory-carving industries.

Conclusion

With this kind of well-organized chain of connection among poachers and smugglers involved in wildlife trafficking kept in mind, it is essential to prepare an action plan to break the chain poachers and smugglers follow. Hence it is imperative that a state like Assam in India, which has many endangered species, adopts both an anti-poaching strategy and an anti-wildlife trade

strategy. The rationale for an anti-poaching strategy is to minimize the killing of endangered wildlife and for an anti-wildlife trade strategy it is to pinpoint those involved in illegal wildlife trade. In a situation where little funding is available, the limited resources should be used to search for traders rather than poachers. Poaching will be cut back if the market with traders is not there. More vigorous investigation and more severe penalties will aid anti-poaching and law-enforcing agencies in halting wildlife crime and keeping endangered species alive for future generations.

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Elephant poaching and ivory trafficking in African tropical forests with special reference to the Republic of Congo

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Abstract

In and around Odzala National Park, Republic of Congo, elephant poaching is chronic and ivory is traded continuously. In 1999, larger-sized ivory pieces than in previous years and more high-calibre weapons were seized when the southern African nations legally exported ivory in a one-off sale to Japan. In other areas in northern Congo, elephant poaching and ivory trafficking continue on a daily basis. Most disastrous was the Mouadjé slaughter in which more than 300 elephants were killed for their ivory, not long before a CITES resolution in 1997 permitted the sale. In Congo elephants are protected completely and the laws on elephant poaching, ivory trade and illegal arms possession are clearly defined with harsh penalties. But the laws are not well enforced and in some cases, the Congolese authorities themselves are involved in the crimes. Various local factors encourage elephant poaching: widespread availability of military weapons effective in poaching elephants; local people's urge to profit from ivory; conflict between local people and the authorities over conservation policies; and logging activities, which have made poaching and trafficking much easier. The MIKE programme currently does not seem to function well in central Africa because of difficult logistics in the tropical forest and the lack of experienced personnel. The driving force behind elephant poaching is the international demand for ivory, in particular the strong demand in Japan for the hard ivory that comes from forest elephants, used for name seals and parts of musical instruments. Allowing ivory trade, as adopted in the CITES Conference of the Parties, will encourage illegal traffic in hard ivory and stimulate more poaching of forest elephants.

Résumé

Au Congo, dans le Parc National d'Odzala et dans le voisinage, le braconnage de l'éléphant est chronique et le commerce de l'ivoire est continu. En 1999, on a saisi de l'ivoire de plus grande taille que les années précédentes et plus d'armes de gros calibre au moment où les pays d'Afrique australe ont exporté légalement en une seule fois de l'ivoire destiné au Japon. Dans d'autres parties du nord du Congo, le braconnage des éléphants et le trafic d'ivoire sont des événements quotidiens. Le massacre de Mouadjé, au cours duquel plus de 300 éléphants ont été abattus pour leur ivoire, a été catastrophique ; c'était peu de temps avant qu'une résolution de la CITES n'autorise cette vente, en 1997. Au Congo, les éléphants sont intégralement protégés, et les lois portant sur le braconnage des éléphants, le commerce de l'ivoire et la possession illégale d'armes à feu sont clairement définies, avec des peines très sévères. Mais les lois ne sont pas correctement appliquées et dans certains cas, ce sont les autorités congolaises elles-mêmes qui sont impliquées dans ces délits. Divers facteurs locaux encouragent le braconnage des éléphants : la disponibilité excessive d'armes de guerre, redoutables contre les éléphants ; le besoin pressant des locaux de tirer profit de l'ivoire ; les conflits entre les locaux et les autorités au sujet de la politique de conservation ; et les coupes de bois, qui ont rendu le braconnage et le trafic beaucoup plus faciles. Le programme MIKE ne semble pas bien fonctionner pour le moment en Afrique centrale en raison des difficultés logistiques rencontrées dans la forêt tropicale et du manque de personnel expérimenté. L'incitant qui pousse au braconnage des éléphants est la demande internationale pour l'ivoire, et particulièrement la forte demande du Japon pour l'ivoire plus dur qui provient des éléphants de forêt, utilisé pour les sceaux personnels et pour certaines parties d'instruments de musique. Le fait de permettre le commerce de l'ivoire, comme l'a accepté la Conférence des Parties à la CITES, va encourager le trafic d'ivoire dur et stimuler d'avantage encore le braconnage des éléphants de forêt.

Introduction

Trade history in forest elephant ivory

Between 1979 and 1989, African elephant populations decreased by 50% because of poaching to supply international demand for ivory (Milliken 1989). Based on the CITES quota system the Republic of Congo was the largest African exporter of ivory between 1986 and 1989. During that period Japan imported ivory from the Republic of Congo, the Central African Republic (CAR), the Democratic Republic of Congo (DRC), and Sudan, in order of volume. Ivory from these four countries amounted to 70% of the total ivory imported into Japan (Milliken 1989). The forest elephant *Loxodonta africana africana* dwells in the first three. The Republic of Congo was the most important source for Japanese ivory dealers.

Demand for forest elephant ivory in Japan

Japan has a 1000-year history with ivory. In the 1920s, the demand for hard ivory exceeded the supply available from the Asian elephant (*Elephas maximus*), which had supplied ivory constantly, and Japan started to import large quantities of hard ivory from Africa (Martin 1985). During the 1970s Japan became the largest ivory importer in the world and two-thirds of its imports consisted of hard ivory, which in Africa comes from forest elephants. More than half the imported ivory (55%) was used for *hanko* or name seals (fig. 1). Hard ivory seals, comprising about 65% of the seals, were preferable: they are heavier and less likely to be damaged, the seal is less likely to stain the fingers with ink, and they are regarded as finer (Martin 1985).

Hard ivory is preferred for parts for two Japanese traditional musical instruments, the *shamisen* and the *koto*. These parts are usually made to order and they demand great precision in carving, since each one is designed to suit the individual player's requirements. Hard ivory is particularly preferred for the *shamisen* picks, called *bachis* (Martin 1985) as it is more durable. The *shamisen* is an important and popular musical instrument in Japanese traditional culture, and

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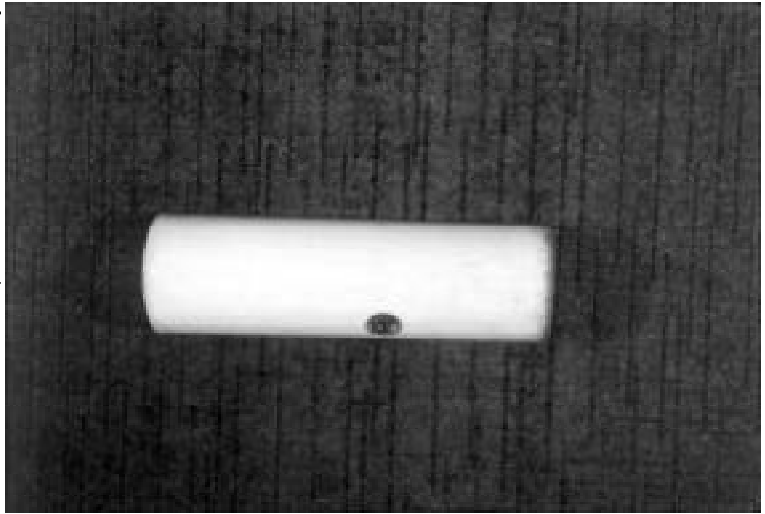


Figure 1. Ivory name seal.

present-day professional *shamisen* players, numbering approximately 1000, all require picks made from hard ivory. The pick is normally about 20 cm long, 10 cm wide and weighs 100–200 g (fig. 2). It is disposable, replaced each year. At present, one large pick costs about 1 million yen (c. USD 8000). The Japanese association for traditional musical instruments has lobbied CITES to be permitted to import hard ivory.

Elephant poaching and ivory trafficking in the northern Republic of Congo

Odzala National Park and Mbomo village

Odzala National Park, located in the north-western part of the Republic of Congo and covering 13,600 km², is the country's largest park (fig. 3). Since 1992, an EU conservation programme, Ecosystèmes Forestières d'Afrique Centrale (ECOFAC), has supported management and scientific research in and around the park. Mbomo is a village located at the south-western edge of the park where ECOFAC headquarters is situated. Following are results on poaching and ivory trade of the forest elephant, based on data collected by ECOFAC since 1996.

Among arms seized in 1999, the highest percentage was military weapons (26.7%); also high was the proportion of hunting rifles (16.7%), used for hunting medium-to-large animals (table 1). Both types of

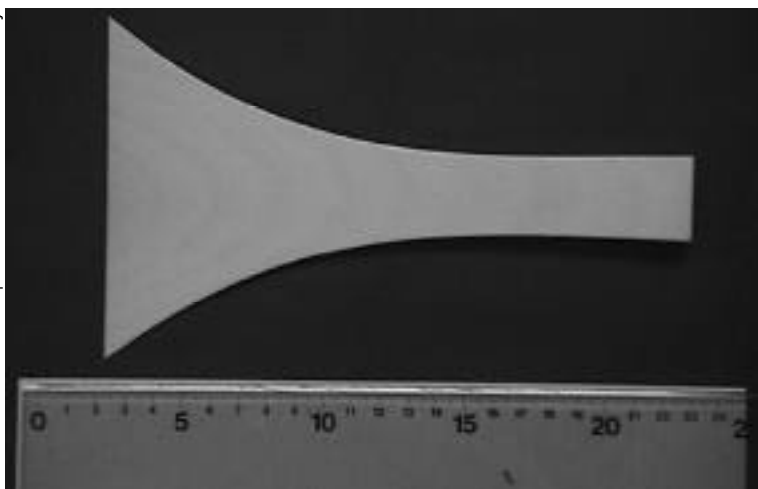


Figure 2. A pick for the shamisen, a Japanese traditional musical instrument.

weapon are mainly used to hunt elephants, suggesting that much elephant poaching occurred in 1999.

Between December 1997 and May 2002, the volume of seized ivory was 174 tusks or pieces of

tusk including 26 tusks weighing more than 10 kg each, with an average length of 72.9 cm and average weight of 3.8 kg. Seized tusks were longest and heaviest in 1999 (fig. 4). This suggests that in 1999 poachers targeted larger tusks, and there may be a connection with increased seizures of more powerful weapons in 1999.

Nouabalé-Ndoki

Large-scale human settlement has never developed in this area (fig. 3). Nevertheless, elephant poaching was carried out by local people before the area was established as

protected. The poaching focus was the marsh clearings that the elephants frequented.

In 1993, the Congolese government with the support of a US-based international conservation

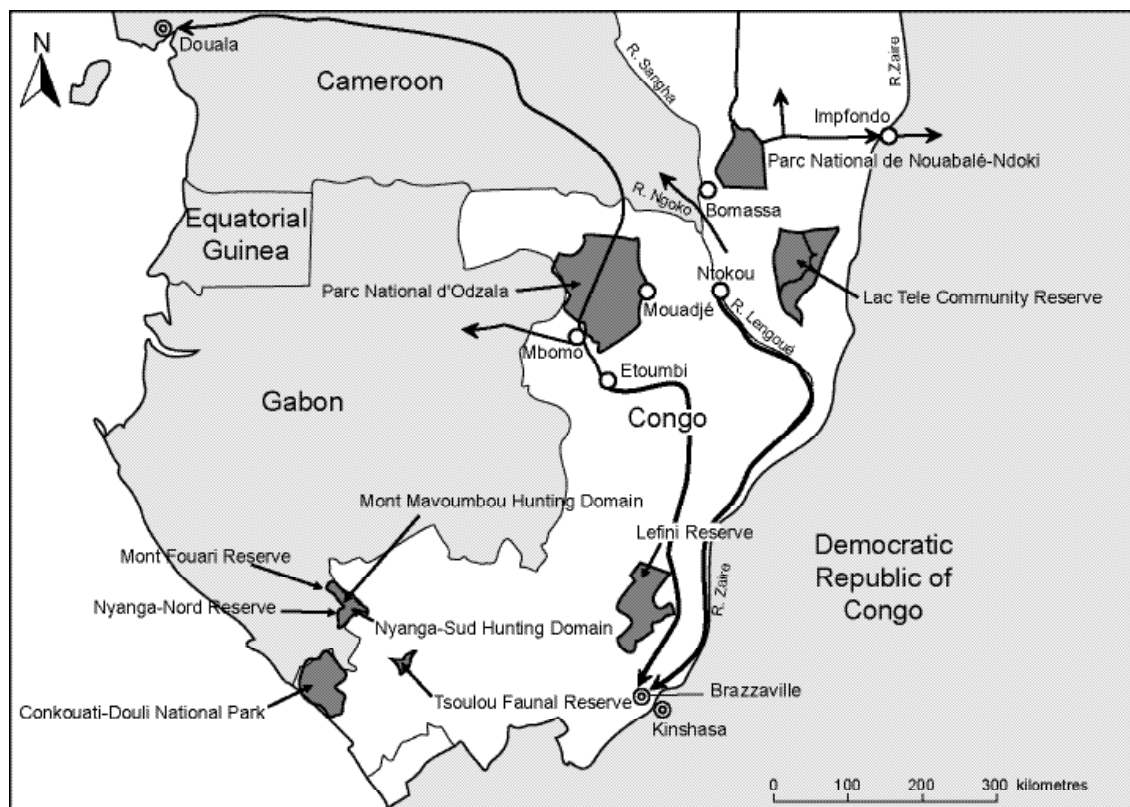


Figure 3. National parks and reserves in the Republic of Congo and outgoing routes of Congolese ivory traffic.

Table 1. Arms seized in and around Odzala National Park, 1996–2002

Type of arms	Total		Before 1998	1999	After 2000	2001	Unknown
	(no.)	(%)	(%)	(%)	(%)	(%)	(no.)
Military arms	26	20.3	22.6	26.7	21.7	14.6	
Arms for hunting medium to large mammals	12	9.4	6.4	16.7	8.7	7.2	
Arms for hunting small to medium mammals	87	68.0	71.0	53.3	69.6	78.0	
Others	3	2.3	0.0	3.3	0.0	0.0	
Total (no.)	128		31	30	23	41	3

Original data from ECOFAC. Military arms are dominated by automatic arms such as the Kalashnikov. Arms for hunting medium to large mammals are used for hunting forest buffaloes and the other medium-to-large mammals but generally are used for elephant hunting. Data for 1996 and 1997 are combined with those for 1998 as ‘before 1998’ because the data quantity was slight. Data for 2002 were combined with data for 2001 as ‘after 2001’ because the 2002 data were complete only until May. The percentage was calculated as the proportion of each type of arms among the total number of seized arms.

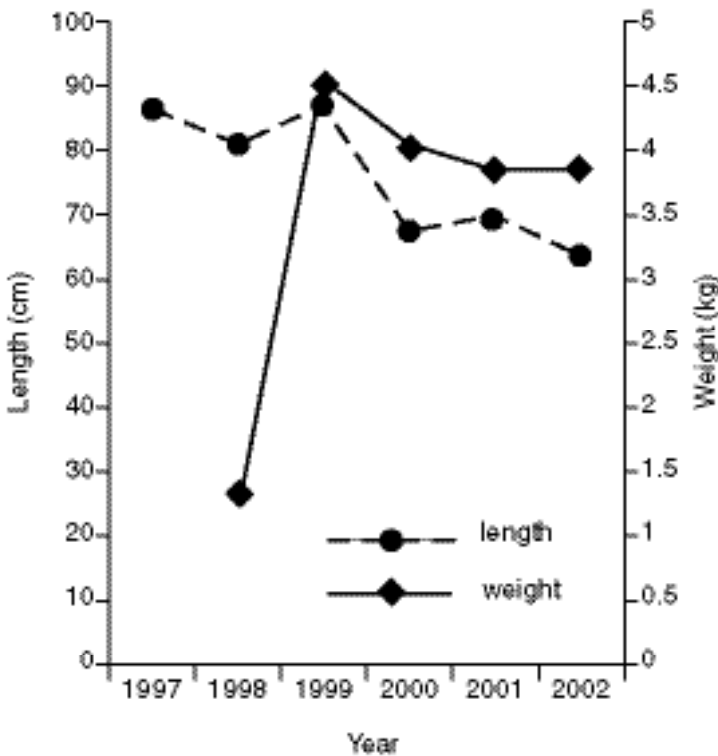


Figure 4. Yearly change of length and weight of seized ivory in and around Odzala National Park, Republic of Congo (original data from ECOFAC).

organization, the Wildlife Conservation Society (WCS), established this area as the Nouabalé-Ndoki National Park (about 4000 km²). Through anti-

poaching measures with the assent and collaboration of local people, hunters were removed, particularly from several marsh clearings where poaching was heavy, and then platforms were erected in several clearings to facilitate the study of larger mammals.

In addition WCS, under the Congolese Ministry of Forest Economy (MEF: Ministère d’Economie Forestière), has begun a collaborative project with a logging company that has concessions in the south and east of the park. For two years poaching and illegal trade of wildlife have been strictly controlled within the logging concessions.

A short survey on elephant poaching and ivory trade was conducted at 13 sites (villages and towns) in north-eastern Congo in September and October 1999 (Nishihara 2000a). Currently elephant poaching is uncommon, as is the trade in ivory and elephant meat. First, these villages are situated a 30-km walk away from elephant populations. Second, WCS has set up anti-poaching patrols and made the communities aware of

conservation. A low frequency of poaching, however, continues. In one village elephant meat is eaten twice a month. Although merchants stock only a small

quantity of ammunition, retired military men in some villages have a huge stock of ammunition and military arms, which could make elephant poaching easy.

Mouadjé

In 1995 and 1996, more than 300 elephant carcasses, both fresh and old, were confirmed from the air and from the ground in Mouadjé, a large marsh clearing in north-western Congo. Interestingly, carcasses were not only of males, usually with larger tusks, but also of females and juveniles. Tusks were removed from all individuals, but the meat was not taken. Poaching occurred continuously in the clearing for almost a year. Local hunters said that it was permissible to take the tusks because the ivory trade would reopen soon, presumably referring to the CITES resolution in 1997.

With great efforts against poaching taken by MEF, ECOFAC and WCS, poaching has dropped to zero at present, and elephants could be seen in the clearing during the daytime.

Lengoué River

An area along the Lengoué River remains in the central northern part of the Congo where no scientific research and no conservation activities have ever been done. Several clearings exist in that area, and elephant poaching in them has occurred constantly for many years. Frequency has increased since 1997, especially recently. In the first half of February 2000, 26 elephants were killed and all tusks removed. At least three poaching incidents were confirmed between December 2000 and January 2001 (Nishihara 2000b; 2000c; 2001).

Ivory smuggling routes

See the map showing ivory trading routes, figure 3.

From the Odzala area

Usually, the ivory from Odzala is taken by merchants and then sent to Brazzaville by road or river. On rare occasions, ivory is carried west by road, crossing the border into Gabon. Larger tusks weighing more than 5 kg are mixed with small pieces (20–30 cm) to make carrying easier.

In the last seven years the number of West African merchants in Mbomo has increased from 2 in 1995 to 15 in 2002. This suggests that ivory trafficking is increasing in volume.

Most of the ivory from the Mouadjé massacre was taken to Cameroon across the Ngoko River. In Cameroon the road networks are well developed and ivory is easily conveyed by road to Douala, the largest port in Cameroon (Programme ECOFAC and Projet WWF Minkébé 2001).

From the Nouabalé-Ndoki area

Ivory from the southern area of Nouabalé-Ndoki is usually taken to south-eastern Cameroon across the Sangha River and traded with Cameroonian merchants. Then it goes to Douala.

Most of the ivory from the north-eastern area of Nouabalé-Ndoki is conveyed to Impfondo, Likouala Province, by river and then to the DRC across the Zaire River. Nowadays, in the northern areas of Nouabalé-Ndoki logging roads have been established, possibly making it even easier to convey ivory to CAR (Nishihara 2000a).

From the Lengoué River area

Ivory is collected at Ntokou, a major village in that area, and most of it is conveyed to Brazzaville by river (Nishihara 2000b; 2000c; 2001).

Price trends of ivory and poaching weapons

The price of ivory in Mbomo has been increasing in recent years (Programme ECOFAC and Projet WWF Minkébé 2001). Prices vary according to weight. The average price in Mbomo in 1997 was CFA 2000–4000 (USD 3–6) per kg. In 2002 it rose to CFA 8000–10,000 (USD 12–15) per kg. If it is taken to Brazzaville, the price increases by a further 2 to 3 times.

The price of military weapons dramatically decreased after the civil war in 1997. In 2000, one weapon cost around CFA 30,000–50,000 (USD 45–75) in Ntokou, south Lengoué, and CFA 50,000 (about USD 75) in Mbomo in 2002. This shows that a military weapon can be bought for the price of a 5-kg tusk. Ammunition is also quite cheap (CFA 150–250 or about USD 0.23–0.38 per round).

Trade in ivory products in Brazzaville

Brazzaville is the capital of the Republic of Congo. A survey was conducted in 1994 and 1995 in the markets

in Brazzaville, where ivory products are sold (Madzou and Moukassa 1996). The merchants were foreigners from Chad, Guinea, Senegal and even countries further beyond. Each merchant obtained a maximum of 50 kg of ivory per month. Most of it came from northern Congo and the forests along the Zaire River. The main clients are Congolese, French, Senegalese, Chinese and Italian. Approximately 20 to 30% of these clients are diplomats. In 13 months, about 800 kg of ivory was sold in total, representing ivory from about 80 elephants.

Another survey was conducted at the ivory market in Brazzaville in 1999 (Madzou 1999b). Compared with the previous survey, the number of merchants and ivory products had decreased, but they still have stock and there is still illegal trade in ivory. For instance, both merchants and artisans said that ivory had been smuggled from the Congo to Botswana, Namibia and Zimbabwe after the 1997 CITES decision to extend the ban. Also according to the merchant who has dealt in the largest quantity of ivory products for more than 15 years, 'Since the one-off trade of ivory in 1999 from three southern African nations, the status of ivory trading has become stable. One Japanese man living in Kinshasa phones periodically to confirm the amount of ivory in stock and asks us to bring ivory to a fixed place across the Zaire River. He buys more than 10 kg of ivory every time.'

National laws on elephants and ivory in the Republic of Congo

Elephant hunting

Legal protection of elephants in the Republic of Congo did not exist until 1983. This led to an enormous decrease in elephant populations owing to heavy hunting pressure. In 1983 wildlife conservation measures and related laws were established. At a national conference in 1991, it was agreed that elephant hunting be prohibited nationally and that elephants be entirely protected in the whole country by MEF through the law.

The Congolese law states that hunting entirely protected species like elephants is a crime. The penalty for offences is a fine ranging from CFA 10,000 to 5 million (USD 15 to 7500) and imprisonment for 2 months to 5 years, or both; there is also a penalty for accomplices. However, incidents of poaching are rarely handled well in court.

Elephant poaching is controlled by MEF. When necessary the ministry can request reinforcement from public safety authorities (the military, police and gendarmerie). In general, seized ivory is kept in the national safe and belongs to the government.

Ivory trade

Most African countries have stopped legally trading ivory since the international ivory trade was banned by CITES in 1989. In the Republic of Congo, which is a party to CITES, ivory trade into or out of the country is prohibited. Domestic ivory trade is also prohibited. It is treated as a crime and dealers are punished.

Possession of arms

Under Congolese law, a civilian cannot legally possess military weapons and the possession of other types of arms is strictly controlled. MEF has a role in controlling and seizing arms in illegal hunting. Hunting (with legal arms) is permitted only during the hunting period from 1 May to 31 October in non-protected areas and only for unprotected species.

Discussion

Poaching and illegal trade

Both elephant poaching and illegal ivory trade still occur on a daily basis in northern Congo. In and around Odzala National Park, 12 poached elephant carcasses were found between January and March 2002. In 2001, 64 tusks or pieces of tusk were seized through patrols and traffic controls. A poacher who had killed an elephant was arrested in the park during the survey in August 2002. A few days later, an informant in Mbomo village said that three elephants had been killed.

In the central northern part of Congo, 26 elephants were killed for their ivory during the first half of February 2000 alone. Three elephant-poaching incidents were confirmed between December 2000 and January 2001.

Ivory trade is conducted at a local level. Ivory and its products are sold in markets where many foreigners come to buy. Ivory is conveyed by various routes into the neighbouring countries of Cameroon, CAR, DRC and Gabon.

Trend corresponding to the CITES decisions

The rampant elephant slaughter in Mouadjé happened just before 1997 when the Parties to CITES decided

that three southern African nations could carry out a one-off trade of ivory to Japan. When this one-off sale took place in 1999, the length and weight of the seized ivory increased, as did the number of seized weapons in and around Odzala National Park. Elephant poaching has increased since 1997 in the central northern part of Congo, partly because military weapons and ammunition have been easier to obtain since the civil war in 1997. The local price of ivory has also increased since 1997.

Major factors for poaching and traffic

The wide distribution of military arms, mainly from civil wars, has stimulated elephant poaching. The public security authorities supposedly controlling these arms and ammunition appear to be involved sometimes in distributing them.

The income from ivory is so highly valued that elephant poaching for ivory is still attractive to local people. A pair of tusks can fetch almost twice the average monthly income of an agriculturalist-hunter (Programme ECOFAC and Projet WWF Minkébé 2001).

Because only some people in Mbomo can obtain employment at ECOFAC, which supports the conservation programme for Odzala National Park, others are killing elephants as a way of demonstrating their dissatisfaction. This tendency may be related to the desire of the younger generation to display their social status in the village (Programme ECOFAC and Projet WWF Minkébé 2001). In addition, difficulties arise over the issue of subsistence hunting areas between the villagers on one hand and MEF and ECOFAC on the other. This also seems to generate hostility against ECOFAC's activities.

It has been argued that crop raiding by elephants would encourage local people to kill elephants. However, in northern Congo at least, there does not seem to be a causal relationship between crop raiding and elephant killing. In Bomassa village at the edge of the Nouabalé-Ndoki area, elephants have been raiding crops for several years. But negotiations between MEF, WCS and the villagers appear to have resulted in a greater understanding of the need to conserve elephants (Madzou 1999a). In Mbomo village adjacent to Odzala National Park, elephants started crop raiding only recently. Fortunately, field owners have had an understanding with ECOFAC and crop raiding has not resulted in elephant killing.

Recently logging activities in the central African forest area have increased dramatically. Loggers not only cut down trees but they also bring large numbers of labourers into the forest, and the logging roads and trucks provide easy access for hunters and poachers, merchants and dealers. If hunting activity is not controlled by the logging concessions, excessive commercial hunting, including elephant poaching for ivory, is made easy.

Anti-poaching efforts

While legislation in the country is strong, its implementation is hampered by lack of finance, personnel and equipment. Anti-poaching patrols and traffic controls in Nouabalé-Ndoki and in Odzala would not function without support from WCS and ECOFAC.

The entire central northern part of the Congo is outside the protected areas, and elephant poaching and ivory trade are still uncontrolled. In and around Odzala National Park, great efforts have been made in anti-poaching and traffic controls in the past several years. The reality, however, is that elephant poaching and illegal ivory trade cannot be stopped because of complex factors, such as widespread prevalence of military weapons, expected large income from ivory, and local dissatisfaction with ECOFAC.

Controlling illegal trade in arms and their possession is the role of the Ministry of Interior and public security authorities. But the ivory trafficking in Mbomo suggests that arms and ammunition used to poach elephant are coming from the very authorities meant to protect them. Conversations with local people in Ntokou village revealed that there was conflict between the local political staff and the police staff over the possession of weapons that could be used for elephant poaching (Nishihara 2001).

International demand for ivory

All the factors described above relate to local conditions. However, the key factor is that demand for ivory exists. If there were no demand and no ivory trade, elephant poaching would rarely happen except for meat.

Historically, for the Japanese hard ivory from forest elephants has been the preferred material for hankos and bachis (Martin 1985; TRAFFIC International 1997). Japanese dealers continue to lobby for reopening of trade in hard ivory, and even during the CITES Conference

of the Parties 12 (COP) some clearly told us that they needed hard instead of the soft ivory of the savannah elephants. Also the control system of ivory trade in Japan still has loopholes that make it possible for a mixture of illegal ivory to come onto the market (Sakamoto 2002). For instance, the official control of business in ivory is weak and the system regulating whole tusks is not strict. In an implicating case in 2000 a board member of the Tokyo Ivory Arts and Crafts Association participated in an attempt to smuggle hard ivory into Japan. If the COPs continue to adopt legal ivory trade, even in soft ivory, the ivory market price will go down, encouraging the flow of hard ivory, which is preferable even if more expensive. This appears to be one of the reasons why during CITES the Japanese government strongly advocated on behalf of the southern African nations that want to export soft ivory.

All these factors would likely increase the illegal ivory traffic to Japan—particularly forest elephant ivory—resulting in more poaching of forest elephants. We would be able to expect that the trend corresponding to the CITES resolutions (see ‘Trend corresponding to the CITES decisions’ above) may not be accidental.

Effective ways to conserve the forest elephant—MIKE programme

The Monitoring of Illegal Killing of Elephants (MIKE) programme in the central African tropical forest area started in 1999. It helped develop and establish methods of estimating elephant populations as these were largely unknown.

The first phase of MIKE as a pilot project finished in 2000 and a report was presented (Thomas et al. 2001). However, this project was only a preliminary survey and did not extend to an assessment of the impact of ivory trade on elephant populations. Its various limitations are listed here, including a lack of historical data on population trends and distribution.

- It is almost impossible to count elephants directly in the dense tropical forest where visibility is poor. Dung counts using line transects can be used to obtain population estimates, but it is not easy to cover a huge area of tropical forest using this method. Combined methods using line transects and reces were tried but their effectiveness has not been established.
- Density estimates from only one particular period are not helpful in estimating overall density in a given area because forest elephants move long

distances each season. It is impossible to estimate elephant density without a long-term survey by seasons serving as a base.

- To carry out a continuous wide-ranging and long-term survey would require experienced personnel. Most of the local staff in the central African forest area do not yet have the skills needed for the task. It is not easy, therefore, to obtain reliable data even when there is plenty of staff.
- A weakness in the dung-counting method is that the mean decay rate of dung needs to be included in the formula. To estimate elephant density the decay rate in each area of the range being studied has to be established, since it differs depending on vegetation and other environmental factors. It then becomes possible to show the density in each area. But at the moment, the decay rates for different types of vegetation are not known.

From our knowledge of conditions in the forest, these four problems seem daunting if inevitable. MIKE is still not able to carry out the original objectives of CITES. Solving these problems would take a huge amount of money and time. The priority is that we need to find a way to stop ongoing poaching and illegal trade. The recce method is more effective, since it covers the widest range with minimum workforce to produce data on population trends. Also, concentrated patrols around marsh clearings should be a priority because historically, heavy poaching is known to happen there.

International tasks for forest elephant conservation

The first requirement is to conserve the tropical forest habitat. Protected areas should be continuously patrolled to prevent elephant poaching and ivory trafficking. It is essential that international support be maintained. Furthermore, new protected areas should be established, as far as possible in collaboration with local people. More collaboration with logging companies around the protected areas should be initiated.

In reality, as is the case in Odzala National Park, poaching and smuggling continue despite significant anti-poaching and law enforcement efforts. The fundamental reason for this is the continuing demand from ivory-consuming countries. Without stopping the demand, particularly from Japan, what can be achieved locally is limited.

Also the ivory-trade control system in Japan should be implemented more strongly because it does not function effectively in preventing illegal trade (Sakamoto 2002).

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Trade in rhino horn from eastern Africa to Yemen

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Abstract

Almost all rhino horn that entered Yemen from 1998 to 2002 originated from rhinos killed in the Democratic Republic of Congo, Kenya and Tanzania. In the late 1990s little poaching was recorded in eastern Africa, but in 2002 Kenya experienced the worst poaching in more than 12 years. The number of rhinos killed from 1998 to 2002 in the three countries was an estimated minimum of 46. From this figure we ascertain the potential weight of rhino horn that may have reached Yemen to be an average of 29 kg a year. Poaching is mainly by snaring or shooting with rifles. Most horns are smuggled to Djibouti and then by dhow to the Yemen coast among consignments of alcohol, which are illicitly moved to Sanaa. The price of horn increased from USD 519–650/kg when exported from Kenya to USD 750/kg from Djibouti and USD 1200/kg in Sanaa in 2002.

The price for horn in Sanaa has remained the same in US dollars since around 1985. In 2002 we counted 70 workshops with 102 craftsmen making traditional *jambiyas* (daggers); the most prestigious are made with rhino horn handles. The number of craftsmen has increased since 1985 as the human population has grown. Nearly all handles, however, are made from the horn of water buffalo. The number of rhino horn handles being made has fallen significantly, mainly because of the shortage of rhino horn on the market. In 2002 the Yemen government brought in proper legislation to implement CITES and has expanded its staff involved in wildlife conservation at the upgraded Environment Protection Authority. To help reduce demand for rhino horn, we produced a poster in Arabic against the buying of *jambiyas* with new rhino horn handles and distributed it widely.

Résumé

Presque toutes les cornes de rhinos qui sont entrées au Yémen entre 1998 et 2002 provenaient de rhinos tués en République Démocratique du Congo, au Kenya et en Tanzanie. A la fin des années 1990, on relevait peu de braconnage en Afrique Orientale, mais en 2002, le Kenya a connu le pire braconnage depuis plus de 12 ans. Le nombre de rhinos tués entre 1998 et 2002 dans ces trois pays est estimé à un minimum de 46 animaux. D'après ce chiffre, on évalue le poids de corne de rhino qui pourrait avoir atteint le Yémen à une moyenne de 29 kilos par an. Le braconnage se pratique principalement au piège, ou à l'arme à feu. La plupart des cornes sont passées en fraude jusqu'à Djibouti et de là, en boutre, vers la côte yéménite au milieu de cargaisons d'alcool qui sont acheminées en fraude jusqu'à Sanaa. Le prix de la corne augmente de US\$ 519–650/kg lorsqu'elle quitte le Kenya à US\$ 750 en passant à Djibouti, puis à US\$ 1200 à Sanaa, en 2002.

Le prix de la corne à Sanaa est resté le même en dollars depuis 1985 environ. En 2002, nous avons dénombré 70 ateliers et 102 artisans fabriquaient les traditionnels *jambiyas* (poignards) ; les plus prestigieux sont faits avec un manche en corne de rhino. Le nombre d'artisans a augmenté depuis 1985 parce que la population entière a augmenté. Presque tous les manches sont cependant faits en corne de buffle d'eau. Le nombre de manches en corne de rhino a chuté significativement, principalement par manque de corne de rhino sur le marché. En 2002, le gouvernement yéménite a rédigé une législation adéquate pour mettre en œuvre la CITES et a augmenté son personnel impliqué dans la conservation de la vie sauvage dans l'Autorité de la Protection de l'Environnement qui a été revalorisée. Pour aider à réduire la demande de corne de rhino, nous avons édité un poster en arabe, contre l'achat de *jambiyas* avec un nouveau manche en corne de rhino, et nous l'avons largement diffusé.

Introduction

For over 20 years most horn from illegally killed rhinos in Africa has been sent to Yemen to be made into handles for traditional daggers, called *jambiyas* (Martin et al. 1997). Although quantities of horn have declined significantly from the early 1980s, when about 1250 kg per year were imported into Yemen, since the late 1990s around 30 kg annually were coming into the country (table 1). This paper examines Yemen's rhino horn trade from 1998 to 2002, looking first at poaching and trade to Yemen under 1) rhino poaching, 2) information on the poachers, 3) trade routes through the Democratic Republic of Congo (DRC), Kenya and Tanzania, 4) export prices for rhino horn out of eastern Africa, and 5) trade routes from Africa to Sanaa in Yemen.

Data are presented on findings in Yemen's capital, Sanaa, that include 1) numbers of workshops and

craftsmen, 2) the making of jambiya handles, and 3) prices for jambiyas. The final section of the paper discusses the conservation strategies that have been introduced into Yemen to reduce demand for new rhino horn from Africa. With the backing of several international conservation organizations, we have been working on these strategies since the 1980s and have made some progress in law enforcement and CITES, and in discouraging the use of new rhino horn.

Trade in rhino horn from Africa to Yemen from 1998 to 2002

Rhino poaching

Three countries left with rhinos are supplying Yemen with horns: DRC, Kenya and Tanzania. Kenya has by far the largest remaining number: about 430 black and 170 white, next is Tanzania with about 49 black, and then DRC with about 30 white rhinos (Anon. 2002). In 2001 and 2002 more rhinos were poached in Kenya than in Tanzania and DRC combined (tables 2 and 3).

Kenya official statistics from 1998 to 2002, which of course are minimum figures, show that most of the 26 poached rhinos had their horns taken (table 2). In 1998, poachers shot dead one black rhino in Ol Pejeta Game Reserve, one in Tsavo West National Park and four white rhinos in Solio Game Reserve. No poached rhinos were recorded in 1999.

Information is known in detail for the later poaching incidents. In 2000, two black rhinos were poached. The first, a female, was speared and died near the Masai Mara Game Reserve in the Lelata Naikara area. Extraordinarily, the horns were not removed although the hind legs, sexual organs, tail and teats had been cut out with a panga and taken (Kenya Wildlife Service, pers. comm. 15 June 2000). None of these body parts would have been exported to Yemen. They were probably for use in East Africa as traditional medicines. The authors know of no other incident like this in eastern Africa where the horns were purposely left but other parts taken instead. The

Table 1. Minimum weight (kg) of rhino horn bought by the main jambiya-making family from 1980 to 2002

Year	Amount (kg)	Country of origin of horn
1980	1050	Kenya, Ethiopia, Somalia, Tanzania
1981	1320	Ethiopia, Sudan, Tanzania
1982	1585	Ethiopia, Sudan, Tanzania
1983	1120	Kenya, Sudan
1984	1058	Somalia, Tanzania
1985	475	Ethiopia, Sudan
1986	100	Sudan
1987	ca 250	Kenya, Sudan, Tanzania
1988	ca 250	Kenya, Sudan, Tanzania
1989	ca 250	Kenya, Sudan, Tanzania
1990	ca 333	Kenya, Sudan, Tanzania
1991	ca 450	Kenya, Sudan, Tanzania
1992	150	East Africa—imported from Oman
1993	80	Unknown—imported from Dubai
1995	30	Unknown
1996	15	Eastern Africa
1998	< 30	DRC and Kenya—imported from Djibouti
2000	< 20	Kenya—imported from Djibouti
2002	ca 30	Eastern Africa—imported from Djibouti

Source: Data from rhino horn traders in Sanaa collected by Esmond Martin and Lucy Vigne
Between 1980 and 1993 the figures represent about 80% of the total imports of rhino horn into Yemen.
DRC – Democratic Republic of Congo

Table 2. Number of known rhino poaching incidents in Kenya from 1998 to 2002

Location	Approximate date poached	Horns present or absent	How killed	Age at death (years)
BLACK RHINOS				
OI Pejeta Game Reserve	29.01.98	absent	shot by rifle	12
Tsavo West National Park	1.06.98	present	shot by rifle	21
Lelata Naikara area	15.06.00	present	speared	20
Kitich, Mathews Range	8.10.00	present	shot by rifle	21
Tsavo East National Park	8.11.01	absent	shot by rifle	17
Tsavo East National Park	24.11.01	absent	shot by rifle	0.4
Tsavo East National Park	24.11.01	absent	shot by rifle	16
Tsavo East National Park	25.11.01	absent	shot by rifle	14
Tsavo East National Park	8.01.02	absent	shot by rifle	16
Tsavo East National Park	31.01.02	absent	shot by rifle	12
Lake Nakuru National Park	15.05.02	absent	snared	14
Lake Nakuru National Park	15.05.02	absent	snared	adult
Solio Game Reserve	31.10.02	absent	snared	adult
Solio Game Reserve	1.11.02	absent	snared	adult
Solio Game Reserve	1.11.02	absent	snared	adult
Solio Game Reserve	13.11.02	absent	snared	adult
Total number poached 16				
WHITE RHINOS				
Solio Game Reserve	7.02.98	present	shot by rifle	adult
Solio Game Reserve	7.02.98	?	shot by rifle	adult
Solio Game Reserve	7.02.98	?	shot by rifle	adult
Solio Game Reserve	7.02.98	?	shot by rifle	adult
Solio Game Reserve	2.08.02	present	snared	adult
Solio Game Reserve	5.08.02	present	snared	adult
Solio Game Reserve	3.10.02	present	snared	adult
Solio Game Reserve	31.10.02	absent	snared	adult
Solio Game Reserve	31.10.02	absent	snared	adult
Solio Game Reserve	1.11.02	absent	snared	adult
Total number poached 10				

Source: Kenya Wildlife Service, Rhino Programme, pers. comm. February 2003

Table 3. Number of known poaching incidents of white rhinos for Garamba National Park, Democratic Republic of Congo from 1998 to 2002

Approximate date poached	Horns present or absent	How killed	Age at death	Sex
January 1999	anterior absent*	shot by rifle	young adult	female
January 1999	?	?	juvenile	male?
April 2001	absent	shot by rifle	?	?

Source: Kes Hillman Smith, pers. comm. 18 February 2003

*Posterior recovered

second rhino was shot in the Kitich region of the Mathews Range.

In November 2001 at least four rhinos were killed in Tsavo East National Park (Tsavo's rhinos are all black). Kenya Wildlife Service (KWS) intelligence revealed the poachers were Somalis using mostly AK-47 guns. They removed all the horns. On 6 December, the KWS intelligence team arrested a Somali at the Nyali Beach Hotel in Mombasa with three fresh horns that may have been from these rhinos (KWS 2001; Opala 2001). In 2000 there was an acute shortage of rhino horn in Yemen. There was also a severe shortage of foreign exchange in Somalia with the closure of the al Barakaat banking facility in September 2001, resulting in the devaluation of the Somali shilling from 13,000 to 23,000 to one US dollar from September to November in Mogadishu (Wayne Long, head of UN security in Somalia, pers. comm. 3 February 2002). These two factors explain the added incentive for the Somalis to kill rhinos (Martin 2002).

A minimum of 14 rhinos were killed in 2002, the largest number in a single year since the 1980s. In January 2002 two were shot in Tsavo East, probably by Somalis. In May poachers snared two more black rhinos in Nakuru National Park using electric cables covered with dung, which were probably set specifically for rhinos (Anne Kahihia, senior warden, Lake Nakuru National Park, pers. comm. 9 February 2003). The rest were snared from August to November in Solio Game Reserve: four blacks and six whites. Two horns from a black rhino that died of disease in 2002 in Aberdare National Park were stolen.

From 1998 to 2002 Tanzania officially lost no rhinos to poachers (Mathew Maige, Tanzania Wildlife Division, pers. comm. May 2002). Rhinos, however, may have been poached in the Selous Game Reserve, one of the largest in Africa and where more rhinos remain than anywhere else in Tanzania. In this region, rhino carcasses decompose quite quickly with the high humidity and rainfall (Vigne and Martin 1997/8). Max Morgan-Davies recently surveyed the Selous extensively and recorded poaching camps specifically along the Ruaha River inside the reserve (Morgan-Davies, pers. comm. 12 April 2003). He concluded, 'Although no rhino carcasses have apparently been found in recent years [inside the Selous] . . . the large areas of dense evergreen thicket and riparian forests and inadequate ranger force . . . [make] the detection of carcasses on foot or from the air very difficult—particularly in the wet season. This could give the

Solio Ranch Ltd



Poachers use heavy wire cables to snare rhinos on Solio Game Reserve in Kenya, but not all those snared die, because sometimes Kenya Wildlife Service personnel find them in time to remove the wire cables.

false impression that there is no poaching' (Morgan-Davies 2001). On two occasions in the late 1990s in Dar es Salaam Morgan-Davies was offered a rhino horn for sale. He saw the horns, which were fresh, and according to the sellers, both were from Tanzania.

Another rhino population in the south-east of Tanzania was only recently rediscovered by a western scientist. In January 2001 he found a rhino skull with cut marks from a panga plus three elephant skulls and steel wire that had been used as a snare. Local people informed him that they could catch more rhinos if he wished (Conservation International via Tom Butynski, pers. comm. February 2003).

In the Democratic Republic of Congo it is known that three rhinos were poached between 1998 and 2002 (table 3). It is the only known population of northern white rhinos left in Africa. Since 1983 Kes Hillman Smith has been surveying DRC rhinos, which

are located in Garamba National Park. She believes that not all the poached carcasses have been found. The Garamba population has been stable for some time at around 30. There have been 10 births from 1998 to 2002 with no rhinos recorded dead from poaching. Therefore, perhaps an additional one or two rhinos have been poached annually in this five-year period with the horns usually stolen (Hillman Smith, pers. comm. 18 February 2003).

Information on the poachers

In Kenya there are two very different groups of rhino poachers: Somalis, who kill the animals using modern rifles, and Kenyans, who usually use wire snares. The two regions preferred by poachers have been Tsavo East National Park, nearly always Somalis, and Solio Game Reserve, mostly Kenyans from the area.

An average Somali gang infiltrating Tsavo consists of five or six men, one of whom may live locally and who knows the terrain of the park. The gang usually carries one or more guns, especially AK47s, an axe to remove the horns, various knives, water containers and food (maize meal, tea leaves and sugar). A businessman or the gang leader will give Kenya shillings (KES) 15,000–20,000 (USD 195–260) for

food and a porter, and to hire guns and ammunition. The gang may stay in the park for a couple of months searching for rhinos. Unlike ivory, which they often bury in the ground to conceal before taking out of the park, the poachers carry the horns directly out on foot. According to one confidential source who has worked in Tsavo East, one gang member, a porter, was arrested in the park in 2002 and admitted that he was promised KES 12,000–13,000 (USD 156–169) for two weeks' work inside the park and a week's travel time to and from his home. For comparison, the lowest monthly wage in Kenya is around USD 26 a month. This is the only recent payment that we know of for a poaching gang member in the three countries still trading rhino horn to Yemen.

Solio Game Reserve, a privately owned area of 7082 hectares near Mount Kenya, holds the largest population of rhinos in eastern Africa: 135, both black and white species. On its northern border is the road from Rumuruti to Naro Moru with small agricultural settlements on the other side of the road. This is the most vulnerable part of the reserve. In 2002, 10 rhinos were poached using snares, and it is thought that the same gang was involved in each incident, coming in from the north. The gang members climbed over or through the reserve's electric fence without cutting

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A few of the wire snares on Solio Game Reserve were attached to logs.



Some of the rhino horns that were sent to Yemen may have been stolen from government stores in eastern Africa.

the wires. They brought heavy wire cables that they attached to trees or logs to snare the rhinos. Four rhinos were snared in August, but only two, according to KWS, died from their wounds. In October the gang returned and set up a camp, which was found after the gang had fled in November. The camp was situated near a derelict road as the poachers realized that no vehicle would come that way. The road has since been reopened. At the camp were clothes, tobacco, Coca Cola, sugar and maize meal, as well as more wire snares and probably firearms, which they never used, no doubt fearing the noise would attract attention. The poachers had placed all their snares in the northern part of the reserve. Black rhinos tended to get caught in the wire loop around their hindquarters while the larger white rhinos got caught around their necks. When the gang members found the snared rhinos, they removed only the horns and either buried the carcasses or hid them under bushes. In October and November nine rhinos were snared and only one survived. The poachers vanished suddenly. Later in November, 8 to 10 men of the KWS Special Operations Unit from Isiolo went to the reserve and found six wire snares

that had been set up. No more rhinos had been poached up to March 2003 as the unit stayed on inside the reserve (Edward Parfet, general manager, Solio Ranch Ltd., pers. comm. 14–16 March 2003).

The main problem has been that Solio had no anti-poaching team for years, only a group of five to six men who checked the 62-km electric fence around the reserve each day. Solio's general manager now plans to create an anti-poaching unit once more for greater protection. None of the poachers has yet been captured so Solio's general manager and KWS are not certain of their identity. Informants have suggested that Somalis have been behind the poaching gangs. Two Somalis who were dismissed from Solio's employment in 1998/9 may have found a market for Solio's horns through Somalis living in Isiolo. There is no doubt that Somali middlemen for the horns operate in and around Isiolo. The Somali connection with Solio is not new. In 1998 Somali poachers shot dead at least two white rhinos (Parfet, pers. comm. 14–16 March 2003).

In Tanzania, little information on rhino poachers is available. The Selous poachers are mostly from the surrounding areas. Few would be looking specifically for

rhinos, but if they found one, they would kill it (Benson Kibonde, chief warden of Selous in the late 1990s, pers. comm. 15 July 1997). In the dry season, poachers concentrate their efforts around waterholes, where they wait for rhinos and elephants to come to drink. Poachers are more efficient during the wet season when wildlife division patrols are less frequent in the Selous.

Results of law enforcement monitoring since 1992 show that 70 to 90% of the poachers in Garamba are Sudanese and often members of the Sudanese People's Liberation Army (SPLA). SPLA camps are located just to the north of Garamba across the border in Sudan, and SPLA personnel currently reside in the *domaine de chasse* (hunting reserve) to the east of Garamba as well. They have modern rifles and kill many mammal species in Garamba, primarily for meat, but elephants are killed also for their tusks (Martin and Hillman Smith 1999; Hillman Smith, pers. comm. 18 February 2003).

Trade routes through the Democratic Republic of Congo, Kenya and Tanzania

Several trade routes run from Tsavo East, mostly for rhino horns carried by Somali poachers or middlemen.

One is northwards to the Kenya–Somali coastal border town of Ras Kiamboni. The town is noted for smugglers, mostly Somalis and Arabs living in Somalia, and they handle many commodities (Wayne Long, pers. comm. 16 December 2002). The road north from here to southern Somalia's main town, Kismayu, which is on the coast, is in poor condition so some rhino horn is carried there by dhow. Rhino horn from Tsavo East is also known to be carried on foot to villages along the Somali border where it is sold for Somali shillings or US dollars. It is taken on foot north to the Ethiopian border as well. Some has been transported to the Kenyan towns and cities of Garissa, Mombasa and Nairobi, mostly by vehicle. The Solio rhino horn is also probably taken by vehicle to Nairobi.

In Tanzania, there are two main trade routes for rhino horn leaving the Selous. From the western and northern sides, the horns go to Morogoro and then by bus to Dar es Salaam where they are loaded aboard ship and transported to Zanzibar. From eastern and southern Selous, the horns go to the ports of Lindi or Kilwa Kivinje where traders put them into containers for palm oil for shipping to Zanzibar (Morgan-Davies, pers. comm. 12 April 2003). From southern Tanzania's newly

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The Mocha area along the Red Sea coast of Yemen is the main point of entry for rhino horn for the market in Sanaa.

discovered rhino population, poachers say that they sometimes sell horn to Arabs who come to Iringa (Conservation International via Tom Butynski, pers. comm. February 2003). From there the horn probably goes to Dar es Salaam or Zanzibar.

In DRC, traders smuggle the horn from Garamba to Uganda or Sudan. There are two examples of this: A rhino horn was on sale in Maridi in southern Sudan in May 2001 and a trader offered a horn to a transporter in Kampala in central Uganda in June 2001. There have also been reports of rhino horn smuggled across the border into Uganda at Ariewara (Hillman-Smith, pers. comm. 18 February 2003).

There has been no official confiscation of rhino horn in DRC or in Tanzania recently, but there have been some confiscated in Kenya. From 1998 to 2002 there were 11 seizures of 32 rhino horns and pieces weighing 49.6 kg (KWS, pers. comm. 1 April 2003). Most of these (23 weighing 35.7 kg) were seized at exit points along the Kenya coast, especially Mombasa (17 weighing 26.2 kg) (KWS, pers. comm. 1 April 2003). Neither KWS nor the Kenya police, however, know the origin of most of them. Some horns may have originated outside the country, others could have been stolen from old government stockpiles, and a few may have been old horns only recently put on the market by private traders. So-called rhino horns that were well-made fakes may also have been included. Consequently, as we do not know the country of origin for these horns nor their ages, we are not including these data in our calculation on the maximum amount of new rhino horn that could have gone from Kenya to Yemen from 1998 to 2002.

Export prices for rhino horn out of eastern Africa

Prices for rhino horn are much higher than for ivory. Tusks from Kenya's elephants sold for an average of KES 1250 (USD 16) a kilogram in late 2001 on the Kenya–Tanzania border near Amboseli (Cynthia Moss, pers. comm. 8 February 2002). Traders on the Kenya–Ethiopia border received KES 2400 (USD 31) a kilogram in late 2002 and early 2003 (KWS, pers. comm. 25 February 2003). This means that tusks

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Wastage in making rhino horn handles for jambiyas runs to over 60%. Large quantities of rhino horn chips and powder since the 1970s have been sent from Yemen to Chinese pharmaceutical factories.

weighing say 10 kg each from a poached elephant in 2002/3 would earn these traders USD 620. In 2002 rhino horns sold for around KES 40,000–50,000 or USD 519–650/kg for export from Nairobi or Mombasa. A black rhino carries about 3 kg of horn while a white rhino's horns together weigh around 5.5 kg so the export price in 2002 was about USD 1950 and USD 3575 for an average adult pair of horns from each species of rhino.

We have no recent prices for rhino horn exported from Tanzania or DRC.

Trade routes from Africa to Sanaa in Yemen

From Kenya rhino horns that are taken across the Kenya–Ethiopia border are moved by modern transport to Addis Ababa and then via Djibouti to Yemen. The horns that are smuggled out of Mombasa go by dhow or small cargo ship into Somalia to join other smuggled horn there or through Djibouti to Yemen or directly to the Yemeni coast. Although in the 1970s and 1980s rhino horns reached Yemen from

East Africa by air, today this is rare due to tightened security at the airport in Sanaa.

From the Tanzanian coast and from Zanzibar the horns are also transported by dhow or modern ship via Djibouti or directly to Yemen. There is no hard evidence on how DRC rhino horn is taken to Yemen, but it may go from southern Sudan to Khartoum and is possibly flown to Yemen, as it used to be, or it may be taken to Port Sudan and then moved by boat to Yemen. The DRC horn found in Kampala was probably intended to go through Kenya to Yemen.

When the horn arrives in Djibouti, its value rises to about USD 750 a kilogram. In early 2003, a Yemeni

trader offered up to USD 1000/kg for excellent rhino horn in Djibouti. Traders offering these prices are in Sanaa, but they have business connections in Djibouti. The port of Djibouti supplies many goods to Yemen, including other illegal ones, especially alcohol. As it is essentially not allowed in Yemen, there is a big illicit trade in beer, gin, vodka and whisky. Most of it is transported in dhows called *zarooks*, which can land elusively on beaches or in very shallow waters, unlike modern ships that require ports for docking and unloading cargo, and where Customs officers and other officials are located. Traders smuggle rhino horns in these dhows among the boxes of alcohol. They usually

land in the quiet waters around Mocha opposite Djibouti. Truck drivers take the cargo by road via Taiz to Sanaa. There are roadblocks along this route, and payments are required to clear them. Transport charges are thus greatly inflated, reflected in the higher price of alcohol in Sanaa. In January 2003 a can of beer cost retail USD 0.60 in Mocha, USD 1 in Taiz and USD 3.85 in Sanaa. A bottle of whisky cost retail USD 4.95 in Mocha, USD 6.59 in Taiz and USD 13.74 in the capital. The price increase for rhino horn sold in Sanaa is not so great, being a tiny addition to the main illicit cargo. In late 2002 the main jambiya trading family in Sanaa, who probably handles over three-quarters of the new rhino horn, offered about USD 1200/kg depending on quality and size, for horn brought to Sanaa.

The jambiya business in Sanaa

Number of workshops and craftsmen

In a survey in January 2003 we counted 70 active workshops with 102 craftsmen working on jambiyas. The numbers were almost the same as for our

Lucy Vigne



Jambiyas with rhino horn handles, both old and new, can be found openly on sale in Sanaa.



Compared with the 1970s and early 1980s few jambiyas with rhino horn handles are being made; instead, several hundred thousand are manufactured with water buffalo horn handles and offered for retail sale for an average price of only USD 15.

previous survey two years earlier (Vigne and Martin 2001). Overall, the number of workshops and craftsmen has increased since the early 1980s, primarily because of the big annual increase (about 3.8%) in the population (Vigne and Martin 2001). We did find that although some of the basement workshops had closed down and are now used as storerooms, four new workshops with seven craftsmen had recently opened in the retail jambiya sheath and belt section of the souk.

The making of jambiya handles

Craftsmen use new rhino horn for handles in Sanaa only, but new handles are being made of other materials and repairs are being carried out elsewhere in Yemen, especially in Dhamar, Sadah and Taiz (Vigne and Martin 2001). In early 2001, for the first time since 1978, we saw no new rhino horn handles being made in the main market in Sanaa, and in January 2003 we did not see any either. We believe, because the government has taken a stricter position

on this illegal activity by occasionally inspecting the souk, the craftsmen are probably filing the new rhino horn handles at home and bringing in the semi-finished or completed handles to the souk.

The number of handles being made out of new rhino horn is small because so little new horn is available. From 1998 to 2002 we estimated the annual minimum number of adult rhinos that had had their horns stolen was 3.5 (2.6 black and 0.9 white) in Kenya, 2 black in Tanzania and 2 white in DRC. The total for this period was 23 black and 14–15 white. (This excludes one black rhino calf with very small horns taken in Kenya.) If these figures are multiplied by 3 and 5.5 kg respectively for the weight of the average adult black and white rhino horns, it gives the maximum potential amount of new horn that could have reached Yemen: 30 kg on average per year from 1998 to 2002.

A kilogram of raw rhino horn makes about three handles at present. The average size of a new rhino horn handle is smaller than in the past when horn was more abundant and when the Yemen economy was much stronger. Therefore, from 1998 to 2002 a

maximum of 90 jambiyas with new rhino horn handles could have been made per year in Yemen. This is a tiny amount compared with the peak period of 1969 to 1977 when 8750 rhino horn handles on average were produced each year (Martin et al. 1997). The main material used is water buffalo horn imported from India. In the late 1990s craftsmen in Sanaa made about 300,000 jambiyas per year with water buffalo horn handles (Vigne and Martin 2001).

Prices of jambiyas

The retail prices quoted below were collected in January 2003. They are for the jambiya alone, not including the sheath and belt, which are bought separately.

Retail prices for new rhino horn jambiyas are quite low taking into consideration the cost of the rhino horn. On average, small ones sold for USD 255, medium-size ones for USD 446 and large ones for USD 824 (table 4). These prices in US dollars are about the same as in our surveys of 2001 and 1999. How can traders make a reasonable profit by selling them at such low prices? There are two main ways. The family in Sanaa that buys nearly all the raw rhino horn makes most of the handles and also sells them retail, thus avoiding a middleman. Secondly, the family sells the horn chips and powder that are left over from the handle-making process. Eastern Asians buy these shavings when visiting Sanaa for about USD 500 a kilogram to smuggle out of Yemen and into eastern Asian countries for medicinal use. The family sometimes buys the left-over horn shavings for USD 400 from other craftsmen and sells them to their eastern Asian contacts; thus they can make USD 100 a kilogram on such a transaction. In summary, those making and trading jambiyas with new rhino horn handles only break even nowadays on their retail sales (excluding their small overheads) and thus make most of their profit from selling the left-over horn chips and powder later.

Water buffalo horn handles make up almost 90% of all the materials used. Well-made handles look quite similar to those of rhino horn and this is a reason they are so popular. The other reason is that they are very cheap. New ones range from USD 2.75 to USD 66 with an average of USD 15.03. These prices have remained roughly the same since 1986 (Vigne and Martin 2001). In Yemeni rials, however, there has been a large price increase because of a major currency devaluation from 9.7 in 1986 to 182 in early 2003 for one US dollar.

The other main materials used to make handles are wood, which ranges in price from USD 2.20 to USD 10.90 with an average of USD 5.26 per handle, and amber, which ranges from USD 20 to USD 30 averaging USD 24.37 per handle. In earlier surveys we saw jambiyas with handles from camel nail and plastic for sale; we did not see them on this survey.

Conservation strategies to reduce demand for new rhino horn

Law enforcement and CITES

In 1982 Yemen banned the import of new rhino horn. In 1987 the government banned the re-export of rhino horn (in the form of left-over chips and shavings). In 1992 the sale of rhino horn in its raw form within Yemen was made illegal and all rhino horn in Yemen had to be declared to the Ministry of Supply and Trade. Any material not reported was to be confiscated with legal action taken, but there were no penalties mentioned, inspections in the souk were infrequent and ineffective, and confiscations in Yemen were very rare. The efforts to stop imports and exports of rhino horn were also inadequate.

After much deliberation Yemen finally joined CITES in 1997. The government did not implement the convention requirements properly, and it failed to answer correspondence from CITES in 2000 and 2001

Table 4. Retail prices for newly made jambiyas with rhino horn handles in Sanaa in January 2003

Size	Range in rials	Range in US dollars	Average in rials	Average in US dollars
Small	25–85,000	137–467	46,333	255
Medium	50–120,000	274–659	81,111	446
Large	90–250,000	495–1374	150,000	824

Source: Survey carried out by Esmond Martin and Lucy Vigne in Sanaa
USD 1 = 182 Yemeni rials

to rectify these problems. On 14 January 2002 the CITES Secretariat, consequently, informed 'the Parties that, pursuant to decision 11.16, the Conference of the Parties recommends that, from the date of this Notification, all Parties should refuse any import from and export or re-export to Yemen of specimens of CITES' listed species until further notice' (CITES 2002a). Thus, Yemen enacted the Prime Minister's Resolution No. (104) on 16 April 2002 regarding the protection and regulation of trade in endangered species, including penalties (Yemen 2002a). In 2002 the government also designated a scientific committee consisting of members of the University of Sanaa and established a provision for the confiscation of specimens that are illegally traded or possessed. As a result, on 4 October 2002 the CITES Secretariat informed the Parties that the recommendation to suspend trade was withdrawn with immediate effect (CITES 2002b).

Since 2001 Yemen has placed high priority on environmental issues in general. In June 2001 the government's former Environment Protection Council was upgraded to become the Environment Protection Authority (EPA). It is placed under the Ministry of Tourism and Environment with the minister representing the EPA in the cabinet. The EPA has more and better-qualified personnel than formerly and has been given more responsibility.

Although the EPA has now organized its enforcement methods to stop the rhino horn trade, in 2002 it had only occasionally and superficially inspected the souk and found no new rhino horn pieces. To make these inspections more thorough, officials, especially the Customs officers and the police, need training to identify products from endangered species. The CITES Management Unit within the EPA has requested training also on the administrative work that CITES requires. Either TRAFFIC or the CITES Secretariat should treat organizing such training as a priority. When we met with the British ambassador, she said that she would try to support a training course for CITES and Customs officers. We discussed these points in detail with the EPA chair. We also discussed the need to check the officially registered stockpiles of rhino horn.

Further efforts to control rhino horn trade are still needed. Since the main entry point for rhino horn is around Mocha, the EPA should consider setting up an informant system in this area. There should also be official cooperation with the Djibouti authorities.

Discouraging the use of new rhino horn

An important strategy used to conserve the rhino populations of eastern Africa has been to encourage consumers in Yemen to buy new jambiyas that are not made from rhino horn. Compared with the early 1980s the supply of rhino horn coming into the country from 1993 to 2002 has decreased by almost 95%, but the price in US dollars has stayed the same. Considering inflation, the price of rhino horn has fallen significantly in US dollars in Yemen over this period. Demand has fallen sharply because far fewer customers nowadays are buying jambiyas with new rhino horn handles, preferring alternative cheaper ones on the market such as jambiyas with handles made from water buffalo horn. This decline in demand also is directly related to the poor state of Yemen's economy. From 1990 to 1998, according to official government statistics, the per capita annual income fell from USD 701 to USD 359 (Yemen 2000b). If, however, the economy of Yemen were to expand considerably once more, due probably to increased remittances and more oil discoveries in Yemen, then many more Yemenis would choose to buy jambiyas with new rhino horn handles. This would push up prices, putting more pressure on the rhinos.

In January 2003 we continued our ongoing public awareness efforts to stop people from buying new rhino horn jambiyas. We produced a coloured poster with a large picture of a jambiya with a rhino horn handle and pictures of a dead and a live rhino urging in the Arabic language that rhinos not be killed for the sake of a jambiya and that they should be allowed to live. These were distributed to schools, the Sanaa Zoo, along main roads, in the souks of Aden, Manaka and Sanaa's old town where some of the jambiya craftsmen complained that the poster would damage their livelihood. We also distributed wildlife posters and rhino postcards. We gave a copy of the WWF rhino film in Arabic (which we had made several years earlier) for reshewing, this time on a large cinema screen in towns around Yemen. We had discussions with various senior officials in the government and in the ruling political party (the General People's Congress). These included the minister of Tourism and Environment, the secretary general of the ruling party and the mayor of Sanaa, to give a higher priority to helping conserve rhinos by encouraging Yemenis not to buy jambiyas with new rhino horn handles.

One important requirement that still remains is to find an acceptable substitute for new rhino horn handles

that is of similar price and prestige. We have encouraged in the past the use of locally mined semi-precious stones such as agate and jasper. Although they have been used in Yemeni jewellery for hundreds of years, they have not become popular for handles. Customers find them too heavy, and they break if dropped on a stone floor. They are also over four times more expensive than the average new rhino horn jambiya. Consumer research is required to see if customers will buy expensive handles made out of gold and silver, which formerly were popular, or to try to introduce new materials such as agarwood (*Aquilaria* spp.), which is popular as an incense in the Arab world.

The lack of funding has been the main problem in moving forward on investigating and promoting substitutes for rhino horn. We, and unfortunately no one else, visit Yemen to work on these issues for only a couple of weeks about every two years because funds for more regular visits are lacking—a highly unsatisfactory situation. Furthermore, there are no NGOs in Yemen to support the government on the rhino horn issue. Funding for a Yemeni person is desperately needed for the follow-up work required, such as communicating with the EPA, other agencies and individuals.

Conclusion

To conserve the rhinos in eastern Africa better, it is important to improve the implementation of two main strategies: anti-poaching and trade reduction. Firstly, greater emphasis needs to be put on protecting the rhinos in the national parks and reserves and on private land. This means more money for employing capable and motivated guards to patrol these areas, and more resources for intelligence-gathering networks to arrest poachers and middlemen. The second strategy, which is at least as important, is to encourage Yemenis further to buy jambiyas with handles that are not made of new rhino horn. Yemenis much prefer, if they have the money, the more prestigious and more attractive antique jambiyas with rhino horn handles. If adequate resources are allocated to these two strategies, then the future for rhinos in eastern Africa is favourable.

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OPINION

Why the name of the white rhinoceros is not appropriate

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Abstract

John Barrow referred to a white rhinoceros in South Africa in 1801, followed by Petrus Borchers in 1802 and Andrew Bain in 1826. The term came into general use after the publication of books by J.E. Alexander and W. Cornwallis Harris in 1838. Ten different theories are listed to explain the name 'white rhinoceros' for an animal that is grey, not white. The popular explanation that 'white' is derived from the Afrikaans word 'wyd' is examined and found to be unsubstantiated and historically incorrect.

Résumé

John Barrow fait référence à un rhinocéros blanc en Afrique du Sud en 1801, suivi par Petrus Borchers en 1802 et par Andrew Bain en 1826. L'appellation est devenue usuelle après la publication des livres de J.E. Alexander et W. Cornwallis en 1833. On connaît dix théories différentes pour expliquer le nom de « rhinocéros blanc » pour un animal qui est gris et pas blanc. On a examiné l'explication populaire qui veut que le « white » (blanc en anglais) dérive du mot afrikaans « wyd » (large en afrikaans) et on a trouvé qu'elle était sans fondement et, historiquement, incorrecte.

Introduction

Some call it square-lipped or square-mouthed rhinoceros when they want to be anatomically correct, others call it grass rhinoceros in reference to its ecological niche (Kingdon 1997) or Burchell's rhinoceros after the first describer. Taxonomists call it *Ceratotherium simum* (Burchell, 1817), but in daily life we all use the name white rhinoceros. At the same time, everybody knows that the colour of this animal is a shade of grey, largely similar in colour to the skin of the black rhinoceros, *Diceros bicornis* (Linnaeus, 1758). It needs to be explained why an animal that isn't white in any sense of the word is called 'white', or conversely, why its relative is called 'black'. It is often taken for granted that the 'white' in white

rhinoceros is a corruption of the word 'wyd' ('wide') used by the Boers in 19th-century South Africa, for instance in the popular and authoritative works by Penny (1987:36), Cumming et al. (1990:3), Booth (1992:34), Fouraker and Wagener (1996:4) and Toon and Toon (2002:9). A similarly significant corpus of authors, however, dismiss this derivation from Afrikaans in favour of other explanations; these authors include Guggisberg (1966:87), Player (1972:30), Owen-Smith (1973:14–15), Balfour and Balfour (1991:38), Pitman (1991:38) and Zecchini (1998:25). In this paper, I review the earliest references to a 'white' rhinoceros in southern Africa to establish when the name came into general use, then I survey the various theories of the origin of the name and discuss the linguistic argument.



The 'flat-nosed rhinoceros' as portrayed in a 19th century engraving (private collection of Lucy Vigne).

Early references to a white rhinoceros

William John Burchell (1781–1863) first came across a new kind of rhinoceros on 16 October 1812 near Chué Spring (26°18' S 23°10' E), north of Kuruman in South Africa. He shot two and made a number of sketches on the spot (Cave 1947). After his return to England, Burchell named the animal *Rhinoceros simus* in a letter published in a French journal in 1817, but only alluded to its existence in the account of his travels, because his narrative abruptly stops with events of 3 August 1812 (Burchell 1817, 1824:75). Although he never used an English name for this animal, it became known as Burchell's rhinoceros (Lesson 1827) or as the flat-nosed rhinoceros (Jardine 1836). Clearly, the colloquial name 'white rhinoceros' was introduced elsewhere.

The identity of the animals in two earlier instances involving a 'white rhinoceros', in quotation marks, needs further discussion. The first example is found

in the account of travels by John Barrow (1764–1848), who stayed at the Cape of Good Hope from 1797 to 1803 as private secretary to the governor. In 1798, Barrow met a local chief at Kamiesberg in the Northern Cape Province who used to hunt beyond the Hantam Mountains and boasted to have killed in one excursion seven giraffes and three rhinoceroses, said to be large in size and endowed with a thin skin. The chief called them 'white', and this is confirmed on the map in Barrow's book, where he stated for the country of the Bosjesman (east of Kamiesberg) that 'the white rhinoceros [is] plentiful in this part of the country, also springboks, hartebeest, and eland' (Barrow 1801:395 and map). Because the thinness of the skin is insufficient for proper identification, we may never know what exactly was hunted by the chief of Kamiesberg.

A few years later, in 1801, the government sent an expedition to the Briquas at Latakoo (near Kuruman), commanded by P.J. Truter and W. Somerville and accompanied by Samuel Daniell and Petrus

Borcherds. Members of the party shot a male rhinoceros on 27 December 1801 at Koussie Fountain (27°54' S 23°14' E) and a female on 30 December 1801 at Yzerberg Fountain (28°07' S 23°01' E). When the hunters returned to camp with news about slaying the second specimen, they claimed that it was different from the first animal as it was a 'white' rhinoceros. Borcherds was among those who rode out to inspect the new trophy, but as he admitted in a letter written in 1802 to his father Meent Borcherds in Stellenbosch, he was surprised: 'I expected this animal to be entirely white according to its name, but I found that she was paler ash-grey than the black, and will appear lighter at a distance, and put the derivation of its name down to that' (Borcherds 1802:219). The incident was mentioned in the official report of the journey by Truter and Somerville (1802:393), stating that this animal, compared with the first, had a flatter upper lip, horns much finer and bent more hindwards, and a body generally smaller. Unfortunately, the description does not allow conclusive specific identification, because it combines the flat upper lip of the white rhinoceros with the smaller size of the black rhinoceros. Samuel Daniell made 11 sketches of the rhinoceroses in the field and, although his notes of sizes are not completely consistent, he apparently depicted both specimens. There is no doubt that all his sketches show animals with a prehensile upper lip and with the other characteristics of the black rhinoceros, not the white species (Rookmaaker 1998).

It is very difficult to pinpoint exactly when the name white rhinoceros came into general use for *Ceratotherium simum*. At the start of the 19th century, only *Diceros bicornis* was known, generally denoted simply as the African rhinoceros. The two species were consistently referred to as black and white, comparable to modern usage, in the accounts of travels and hunting by Alexander (1838) for Namibia and by Harris (1838:376, 1839:371) for the Magaliesberg region. Neither author saw a need to clarify this choice of names, which suggests that they had heard them in Cape Town or that they were commonly used by their companions or by the local inhabitants. These people would have spoken Dutch, Afrikaans or one of the indigenous Bantu or Khoekhoe languages. When Andrew Bain on 5 August 1826 went to examine a rhinoceros shot between Honing Vlei and Konkay (ca. 26°13' S 23°22' E), he stated that the local Griquas called it 'white rhinoceros' and that it had a broad and flat nose (Bain 1949:29).

The theories

There have been at least 10 theories, previously reviewed by Renshaw (1904:131–134), why a rhinoceros with a greyish skin should be called white. I will list them here briefly only, initially without discussion or elaboration and with just a few references to their proposers or adherents.

1. *Colour*. It is possible that the white rhinoceros is in fact lighter than the black species, described respectively as 'pale broccoli-brown' and 'pale yellowish brown' by Andrew Smith (1838, pl. 2; 1839, pl. 19). As suggested by Shortridge (1934, vol. 1:435), the animal would have been called *white* in contradistinction to the darker-coloured *black* rhinoceros.
2. *Albinism*. Nicholson (1894) advanced that white originated 'from the comparative frequency of albinos among them'. A truly albino rhinoceros would be a real find but has never been seen as far as I am aware. Apparently, Nicholson meant animals that were lighter than usual, because he continues to say that he shot three specimens 'of a light yellow or cream colour', unfortunately without stating where he shot them or what happened to the trophies. He was correct, however, to state that cream-coloured rhinoceroses had been reported previously. Alexander (1838, vol. 2:150) saw one of this description on 23 May 1837 near the Chama or Soft River in central Namibia (23°18' S 16°24' E). According to Harris (1841:96), who had seen white rhinos in their hundreds near the Limpopo River, the animal 'often approaches to cream colour'. This may be interpreted to mean that some white rhinos are much lighter than others of the same species or than the black rhinoceros.
3. *Wallowing*. When a rhinoceros leaves a wallow or pool, the mud clings to its body and dries, which gives the animal the same colour as the soil on which it lives. As this is often lighter than the colour of the skin, the early settlers in South Africa referred to it as white rhinoceros. Owen-Smith (1973:15) suggested that this was the colour of the calcareous soil of its habitat.
4. *Sunlight*. When a rhinoceros is seen under certain light conditions in the African bush, it may appear much lighter from a distance than its skin actually is on close inspection (Roosevelt and Heller 1915:663). Kirby (1920:229) ensured that on the

open grass plains ‘standing on a ridge exposed to the slanting rays of the morning sun they look absolutely white’.

5. *Geographic variation.* Beddard (1902:257) had heard that, in years past, the white rhinos living in the south-west of the Cape Colony were much paler and whiter than those in the north-east. As white rhinos never existed in the south-western part of South Africa, this might refer to the rumours about the animal in the book by John Barrow (1801).
6. *Egret droppings.* Lavauden (1934:426) assumed that settlers in South Africa saw rhinos covered with droppings of the cattle egrets, *Bubulcus ibis* (Linnaeus, 1758), which are often perched on their backs. The droppings being white in colour, the rhinoceros would look white when seen from a distance.
7. *Disposition.* According to Player (1972:30), the old Boer hunters likened the white rhinoceros to the white man said to be of timid disposition compared with the wild and fierce nature of the black rhinoceros, like the tribes of the interior.
8. *Age and sex.* Drummond (1875, 1876) suggested, without further clarification, that the difference in colour between individuals or species may be attributed to age or sex.
9. *Colour of horn.* MacGillewill (1894) stated that the horns of the white rhinoceros are white, while those of the black rhinoceros are black: ‘The above is the explanation I got from a veteran hunter, old Hartley, in Mashonaland in 1867. The late Mr Thomas Bain was of the opinion that this explanation is correct. The old Boer hunters Viljoin and Swartz could give no other reason for the name ‘witte rhinoster’.’ He continued that knobkerries were generally light in colour and were of such length that they could only have been made from a white rhino’s horn. He also made pipes out of rhino horn, choosing those of the black rhinoceros, because dark-coloured pipes were in fashion. It is strange, however, that in the hunting literature of the 19th century, the colour of the horns is never a point of discussion.
10. *Corruption of an Afrikaans word.* Pitman (1931a) apparently was the first to suggest that ‘white’ is a corruption of a Dutch word expressing ‘bright’ or ‘shining’ in the vernacular, referring to the smoother hide. By the time he published his book about his activities as game warden in Uganda, it had been pointed out to him that there was no

such word in Dutch resembling ‘white’, hence it was ‘more likely to be a corruption of the Dutch word *widg* meaning *great*’ (Pitman 1931b:1, my italics). When Shortridge (1934, vol. 1:435) sought to clarify the etymology of the term, it was, of course, very quickly discovered that *widg* does not exist in Dutch. Pitman’s theory was soon buried—in fact I have been unable to find a reference to it in publications on the rhinoceros for almost 20 years; Roberts (1951), for instance, offered no explanation at all. It was tentatively revived by Bergh (1952:11), when Antwerp Zoo received their first examples of the northern white rhino. However, he transformed the words as somebody with knowledge of Dutch would do, suggesting that *white* derived from a confusion with the Dutch *wijde*, meaning *wide*. This theory was repeated by Owen (1956) and Astley Maberly (1963) and became the most common explanation from the 1960s onwards.

Discussion

The argument that *white* in *white rhinoceros* is a corruption of a Dutch or Afrikaans word needs careful analysis before it can be dismissed or accepted. Afrikaans, I am told, evolved into a language distinct from Dutch during the second half of the 18th century but would still have had many similarities in the first half of the next century. In current Dutch, there is a word *wijd*, which through the ages and dialects could possibly have been spelled *weit*, *weid*, *wyd*, *wyt*, without change of pronunciation or meaning. It can be translated into English as *wide*, *spacious*, *large*, or *broad*. Where English has the words *wide* and *broad* with partly overlapping meanings, so the Dutch has *wijd* and *breed*. A Dutch person today would use the word *breed* to denote the width of a small object or anatomical part, hence *square-lipped rhinoceros* becomes *breedlipneushoorn* in Dutch (Bruggen 1965) or *breëliprenoster* in Afrikaans (Bigalke 1963).

It is my contention that in order to corrupt the Dutch *wijd* into *wide* or *white*, there must have been such a word used in relation to the rhinoceros. Therefore, we would need to find a usage such as *wijd* or *wijdlip* or *wijdmond* or *wijdbek* together with *neushoorn/rhinoceros/renoster*. As etymology is slippery ground for a zoologist, I asked teachers of Afrikaans and old Dutch questions about this issue during a symposium held in 2002 at the University of Stellenbosch. In

short, the outcome was that there is no evidence of a combination of *wyd* and *rhinoceros* in written Dutch or Afrikaans. Hans den Besten (University of Amsterdam) checked all the relevant material, including Scholtz (1974) and Silva (1996) and found that *wydrenster*, *wydbek renoster* or similar combinations have never been recorded. It is, therefore, impossible that *white* in *white rhinoceros* is a corruption of *wijd* or any other Dutch or Afrikaans word of the early 19th century.

Among the 10 theories listed above about how the white rhinoceros got its name, none stands out as obviously correct, but few can be completely ruled out. The possibilities based on external characteristics fail to explain why they would apply to the white rhinoceros and not to the black, whose skin is similar in colour. The currently most widely accepted explanation that white is a corruption of a word used by the Boers of South Africa in times when the rhinoceros was still plentiful, discussed in the previous paragraph, proves to be ill founded. Unfortunately, a good alternative remains elusive. The earliest references to a white rhinoceros in the South African interior, by Barrow in 1801 and Borchers in 1802, may well hold the key to the truth, even if at the moment evidence is insufficient to know exactly in which direction to search. Alternatively, *white* could have emerged as an opposite to *black* rhinoceros, but I have not been able to find historical evidence to justify this possibility. Another option could be that the epithet *white* is a translation or derivation from one of the original languages spoken in the African interior. The chief interviewed by Barrow, the hunters reporting to Truter and Somerville, and the Griquas accompanying Bain probably used the word *white* for the rhinoceros in accordance with the usage in their own vernacular speech. Preliminary investigations, however, have not yielded any clues that would strengthen this argument. Nevertheless, I hope to have established that 'white' in 'white rhinoceros' cannot have evolved from a Dutch or Afrikaans word. This derivation should no longer be used in popular texts to explain the name of the rhinoceros called 'white'.

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NOTES FROM THE AFRICAN RHINO SPECIALIST GROUP

Workshop proceedings on biological management of the black rhino now available online

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In *Pachyderm* 31, I reported on the results and recommendations from the SADC Rhino Management Group Workshop on the biological management of black rhino to meet continental and national black rhino conservation goals. Since the workshop was held, the proceedings have been widely circulated and the main findings and recommendations presented to staff of Ezemvelo-KZN-Wildlife, South African National Parks, the Kenya Wildlife Service and the Namibian Ministry of Environment and Tourism as well as to the African

Rhino Specialist Group meeting in 2002. Ezemvelo-KZN-Wildlife has since developed a strategy for biological management of their black rhinos, which includes set percentage harvesting as recommended by the workshop. Proceedings of this important workshop can now be downloaded from the SADC Regional Programme for Rhino Conservation (SADC RPRC) Web site at <http://www.rhino.sadc.org>. Select *Resources* and then *Documents*. After registering, you will be able to download a copy of the strategy in pdf format. It is 1.44 Mb.

Black rhinos reintroduced to North Luangwa National Park, Zambia

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Luangwa Valley was once a stronghold of one of the biggest populations of black rhino (*Diceros bicornis minor*) in the region; but sadly it was poached to extinction in the 1970s because of its horn. However, decades later the Zambian government has rediscovered its place in rhino conservation and has expressed a strong desire to re-establish the species. A principal objective is the desire and recognition of the need to develop Zambia as a country in which a

well-protected and viable black rhino population will contribute to and enhance the establishment of a viable metapopulation in the subregion.

The SADC Regional Programme for Rhino Conservation (SADC RPRC) supported a scientific study for putative rhino range suitability to determine the basis for reintroducing black rhinos to North Luangwa National Park. A team of experts from the IUCN SSC African Rhino Specialist Group (AfRSG)

and SADC RPRC also visited the area in June 2002.

Zambia has received tremendous support for the project from the SADC region. The Frankfurt Zoological Society has a long-standing working relationship with the Zambia Wildlife Authority and is currently working under a 10-year agreement with the Zambian government to manage wildlife resources in North Luangwa National Park, including reintroducing black rhinos.

Zambia will receive an initial founder group from South Africa National Parks (SANParks) of five black rhinos: two males and three females. This follows endorsement of the North Luangwa rhino reintroduction project by both the SADC Rhino Conservation Programme and AfRSG, as well as favourable approval by SANParks scientific, veterinary and security staff to further the

conservation of black rhinos in the subregion. The plan is for the introduction exercise to take place mid-2003. The rhinos are to be released into an electric-fenced sanctuary that has already been completed.

The rhino conservation project in North Luangwa National Park is attracting a lot of attention from the government and the public. Zambia plans to re-establish a viable rhino population, and in the longer term return numbers to original levels. This is the initial step in that direction and is based on the principle of phased introduction to ensure animal safety and adaptation. The intent is to establish a viable founder population in the park in the next three years by seeking to introduce another 15 founders to bring the total founder number up to the recommended 20 animals.

Update on the status of Botswana's rhino populations

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Botswana's rhino population is doing well and has continued to increase from both natural growth and the reintroduction of additional southern white rhinos. Despite losing a male in a territorial fight, Botswana's rhino population has now increased to 52.

The reintroduction of southern white rhinos to the Mombo area of Moremi has continued. Following the translocation of the first five rhinos from within Botswana (with three being bought by Wilderness Safaris from Mokolodi), a further 10 were introduced from South Africa almost a year later (November 2002) as part of an exchange programme with South African National Parks. One of the introduced males was subsequently killed in a fight giving a current population of 14. In the coming months, Botswana expects to receive an additional 21 founder animals from South Africa. These are being delivered in two batches, in April and July, and preparations are being made for their arrival.

All rhino stakeholders in Botswana have adopted the rhino management strategy, which will be published soon. Two committees have been formed. The first one is the Botswana Rhino Management Committee, chaired by a representative of the private

sector and with senior representation and a secretariat from the Department of Wildlife and National Parks (DWNP). The DWNP and the private sector are in partnership and together have played an important role in re-establishing Botswana's rhinos. This committee acts as an advisory body to the director of Wildlife and National Parks. It will be responsible for planning, coordinating and implementing Botswana's rhino conservation programme, including approving areas where rhinos can be conserved, and dealing with associated management and periodic action plans. The committee will also be responsible for planning all introductions in unfenced areas.

A second committee, established in Maun, comprises the Botswana police service, the Botswana defence force and the DWNP. Its focus is mainly on the security of the rhinos at Mombo in the Moremi Game Reserve.

Good news has just been received from Khama Rhino Sanctuary, which has reported the birth of a white rhino calf. Its sex has not yet been confirmed.

The anti-poaching unit is doing a good job. We have not lost any rhinos to poaching since 1993, and we hope this situation will continue.

The SADC Rhino Recovery Group is established

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Establishment

The SADC Rhino Recovery Group (RRG) was established in May 2002. It comprises six member states: Angola, Botswana, Malawi, Mozambique, Tanzania and Zambia. These countries have very small rhino populations or none at all, and the RRG was formed to help them re-establish or build their populations into viable ones.

Inaugural meeting

The RRG inaugural meeting was held in Mangochi, Malawi, in May 2002. At this meeting, terms of reference of the group were drawn up and activities for each member state for the coming year according to its needs were determined as follows:

1. Facilitate and assist with the development of national policies, strategies and plans.
 - Zambia is to develop a national rhino plan with funds from the US Fish and Wildlife Service.
 - Malawi needs a rhino plan and should link with South Africa to be considered in its strategy.
 - Mozambique does not need an immediate plan but should implement the approved SADC Regional Programme for Rhino Conservation (RPRC) for Limpopo National Park when funds become available.
 - Angola needs a team of experts to visit either Iona or Kissana National Park to discuss management issues.
2. Identify key issues and priority needs including sourcing of rhinos for regional metapopulation management.
 - The RRG Chair is to facilitate a review and prioritize common needs in each RRG country using a matrix table.
3. Facilitate capacity building in RRG management agencies, including targeted training and staff development and development of appropriate tools and techniques.
 - The RRG Chair is to follow up with RRG countries to determine training needs, levels and numbers of personnel to be trained.
4. Assist RRG countries to assess potential areas for reintroduction and to prioritize these areas.
 - This is particularly important for Angola and Mozambique considering point 1 preceding.
5. Disseminate information among RRG members on best practices through workshops, publications, exchanges and study visits, and staff assignments.
 - The RRG Chair is to document available documents produced under the SADC Rhino Programme, the Rhino Management Group and AfRSG.
6. Confirm the presence of remnant rhinos and promote surveys of remnant populations.
 - Tanzania is to report on the status of the rhino surveys to determine if there were any constraints or requirements for assistance.
7. Circulate guidelines on the reintroduction of rhinos and consolidation of remnant populations.
 - Raoul du Toit of the SADC RPRC is to submit a report, 'Guidelines on the reintroduction of rhinos'.
8. Network and share expertise with regional and continental rhino conservation bodies such as SADC Rhino Management Group (RMG), AfRSG, SADC Rhino Programme, and donor communities including creating links with RESG on security needs. The Chair is to initiate contacts.
9. Monitor and evaluate progress towards achieving national rhino conservation goals and the effectiveness of rhino recovery projects implemented in RRG countries.
 - The RRG Chair is to develop a monitoring plan and a reporting schedule on progress of RRG states towards implementation of RRG projects.
10. Assist RRG countries in developing and funding proposals based on identifying common needs and facilitate the funding of common proposals.
 - The RRG Chair is to assist in developing and reviewing RRG projects for funding.

Second meeting

The second meeting of the RRG was held in March 2003 in Maun, Botswana. Member states presented reports on what they had done in the past year, as shown following. Progress on the above terms of reference and activities were reviewed and a plan of action for the coming year of 2003 was developed.

Country reports

ANGOLA

There is still no information on rhino numbers and no expertise on rhino management. The Institute of Forestry Development (IDF MINADER—the relevant Angolan authority) intends to approach Namibia and to conduct surveys in all historical areas of rhino distribution. The visit by rhino experts did not take place in 2002.

BOTSWANA

The country now has 51 white rhinos and 1 black rhino, and is expecting 21 more white rhinos from South Africa. A national rhino management strategy was adopted recently. With SADC Rhino Project funding, some staff were trained in rhino ID monitoring and experts assessed the suitability of both Mombo and Khama sanctuaries. The WILDb rhino database has also been obtained. More staff training and a new computer are needed.

MALAWI

The country has only seven black rhinos, located in Liwonde National Park. The park's management plan is being reviewed and upgraded with support from the Frankfurt Zoological Society. The rhino plan will be part of the upgrading process. A boundary fence is being constructed at Liwonde.

MOZAMBIQUE

The Limpopo National Park Project with South Africa needs to develop a rhino management programme. Mozambique has no expertise in rhino management and it needs guidelines to set up this programme.

TANZANIA

The status of rhinos in Selous Game Reserve is not known although monitoring in selected areas is under

way. The area of about 55,000 km² is vast and staff density low. No remnant *D.b. minor* is left in other areas in Tanzania. Staff training in rhino management is important.

ZAMBIA

There is a rhino reintroduction programme in Luangwa Valley and the initial founder group of five was being introduced in May 2003. A project to develop a national rhino plan was approved by the US Fish and Wildlife Service's Rhino and Tiger Conservation Fund (USFWS RTCF), and the Zambia Wildlife Authority (ZAWA) is awaiting the funds. Training staff in rhino monitoring has been identified as a key need.

RRG action plan for 2003

National policies, strategies and plans

ANGOLA

- Draw up a statement of intent and commitment on rhino conservation for the government as a basis for rhino strategy.
- Use the preliminary assessment mission by SADC RPRC to assist with developing a rhino management policy document.

MALAWI

- Proceed with developing a management plan for Liwonde National Park, with input from SADC RPRC. Integrate the Liwonde evaluation report into the plan. The Department of National Parks and Wildlife is to refine priorities for Liwonde National Park regarding rhinoceros and biodiversity conservation.
- Follow up with South Africa National Parks on their continued role in regional metapopulation management of rhinos between Malawi and South Africa.

MOZAMBIQUE

- Draw up a statement of intent and commitment on rhino conservation by the government as a basis for rhino strategy.
- Develop a rhino management policy document.

ZAMBIA

- Proceed with strategy development with funding from the US Fish and Wildlife Service's RTCF. SADC RPRC is to assist ZAWA expedite transfer of the agreed funds from USFWS RTCF. Additional technical input is available from SADC RPRC and IUCN SSC AfRSG, with facilitation of participation of focal points from other RRG countries.
- Submit updated proposal for evaluating other areas in Zambia for reintroduction of rhinos.

Priority needs for rhino reintroductions

Review and set priorities on common needs for each RRG country for reintroduction and management programmes.

Capacity building and training needs

Include the RRG working group in the next AfRSG meeting, including attendance of Angola and Mozambique (dependent on funding from SADC RPRC).

The Chair will follow up in RRG range states on training needs, confirm requests for training inputs available from SADC RPRC, and develop a training plan and schedule for RRG countries.

Assistance with assessment of areas for reintroduction

Assistance currently comes through SADC RPRC inputs (for example, policy development, assessment of realistic options, evaluation of specific areas). Angola and Mozambique need generic guidelines for drawing up a preliminary definition of intent (species, range areas, and so on).

MOZAMBIQUE

Carry out a feasibility study on the reintroduction of rhinos to Limpopo National Park.

Dissemination of information on rhino management

Establish the distribution pattern for SADC RPRC task reports. Make available task reports and other

relevant documents on regional projects on the SADC RPRC Web site.

Surveys on remnant rhino populations

MOZAMBIQUE AND ANGOLA

Follow up and confirm rhino presence in Niassa Game Reserve and Cuando Cubango Province using the checklist of information developed by SADC RPRC.

Guidelines for reintroductions

Specific RRG countries are to provide input from case studies on management and security guidelines that range states can use. Reintroduction guidelines are to be completed and circulated to RRG countries.

Networking with other rhino conservation bodies and sharing of expertise

- RRG is presenting the terms of reference to the SADC RMG in its June 2003 meeting.
- The RRG Chair is to be a member of AfRSG.
- The RRG Chair will use the Rhino Notes section of *Pachyderm* to circulate news from RRG countries on country reintroduction projects.

Monitoring action towards achieving national population goals of RRG countries

- Ensure minimum biannual coordination visits between the SADC RPRC coordinator and the RRG Chair.
- The RRG Chair is to submit biannual progress reports (end of June, end of December 2003) to SADC RPRC to incorporate issues of concern into its planning and reporting cycle.

Developing project proposals for funding by SADC RPRC

- The SADC RPRC coordinator and the RRG Chair are to coordinate in conceptualizing projects with good potential for funding by SADC RPRC, particularly where assistance is needed from the RRG Chair in developing new proposals from RRG countries.
- The RRG Vice-chair should be instrumental in proposal development.

New RHINO 2.0 population estimation software scheduled for release

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A beta version of the RHINO version 2.0 Bayesian Mark Recapture rhino population estimation package is currently undergoing testing. This new improved version of the software will replace the DOS-based versions of RHINO that have been in use since 1991. The project is on schedule, and it is hoped to release RHINO 2.0 by the end of June 2003. Thanks largely to funding from the SADC Regional Programme for Rhino Conservation, copies of RHINO 2.0 will be made available free of charge to all those who want to use the software to analyse their sighting–resighting rhino observation data to obtain population estimates with confidence levels. RHINO is designed to deal with populations where not all rhinos are individually identifiable (called ‘clean’ rhinos), and can deal with introductions, removals, deaths, calves becoming independent of their mothers and marking by ear-notching of clean animals to make them identifiable. The programme can also deal with ‘trap-happy’ rhinos and can be used in parks where users would be better off estimating the size of separate subpopulations within the whole park. RHINO is used to analyse ongoing sighting data rather than sighting data from multiple and intensive discrete surveys. Those interested in getting more information or in getting hold of the new software to estimate rhino numbers should contact Richard Emslie at remslie@kznwildlife.com or kerynric@absamail.co.za.

The following points summarize the changes and features of the new RHINO 2.0.

- A new feature of RHINO 2.0 is that the user can select to produce separate population estimates for sub-areas within a large park despite the cross-boundary movement of some animals between sub-areas. The new multi-area analysis with cross-boundary movement correction is probably the major enhancement to the software and replaces the area weighting analysis option in previous versions of RHINO. A spin-off is that users can print out a table showing the number of sightings of each animal by area.
- Data can be imported from Microsoft Access (database), Microsoft Excel (spreadsheet) and text files. In addition to importing Access data tables, users can also choose to import data from an Access query. Files can now be selected by browsing.
- RHINO 2.0 uses the familiar Windows format. It is also form based, grouping related topics together onto separate forms. As a result the software is easier to use than previous versions.
- Context-sensitive help is now available by clicking the help button on each of the forms.
- RHINO 2.0 now comes bundled with a manual on CD. However, to make it easier to learn and master the software, RHINO 2.0 will come bundled on CD with the Camtasia AVI player and a number of training AVI videos. By simply clicking on a menu option, users will be able to watch and listen to specific AVI training videos. This will make the software much easier to learn.
- Unlike previous versions of RHINO, users can now go backwards at any stage during an analysis if they would like to change any parameters they have selected. (Users of earlier versions had to quit and restart the analysis from scratch.)
- Users have the option of filtering data before analysing it to select specific subsets of data for analysis. A bigger range of data filters is offered in RHINO 2.0.
- RHINO 2.0 now automatically generates a summary table describing the sightings and special events in the dataset being analysed, broken down by population segment.
- The routines used in RHINO 2.0 are computationally much more efficient than in previous DOS-based versions of the software. RHINO 2.0 has also been completely rewritten. Its modular structure makes it easier to enhance and update than RHINO 1.21.
- An improved clean estimator is used. Maximum clean priors are no longer needed. However, users can supply a field ranger’s guesstimate of the

- maximum number of clean animals. On the clean posterior probability distribution, RHINO will then shade all probabilities above this level and quantify (based on the data) the likelihood (%) that the clean population is bigger than the supplied maximum guesstimate. RHINO 2.0 also more appropriately deals with records of ear notching than did previous versions.
- A consistent approach has been taken to dropping extreme values of N with a very small chance of occurrence, and probability distributions are now routinely normalized (so that probabilities sum to 1).
 - An improved routine has been implemented for estimating dependent numbers when there are special codes and trap-happy animals.
 - The best-fit mean sighting frequency is now estimated automatically using a root mean square (RMS) error minimization routine to find the truncated Poisson mean with the best fit to the observed frequency distribution of sightings of identifiable (ID) animals present for the whole analysis period. Users can graphically examine how RMS varies with mean sighting frequency. The best-fit value (or other user-supplied value) can be used to indicate the maximum number of sightings of a particular animal users should allow before treating the animal as trap happy (for a specified significance level).
 - If users select to drop trap-happy animals, the sighting frequency distribution graph is updated by marking dropped animals in a different colour and indicating on the form how many animals and the total number of sightings that will be dropped.
 - Users can enter either 'Uninformative priors', 'Informative priors' or 'Previously saved priors'. Users can save Uninformative or Informative priors. Thumbnail graphs of saved prior distributions are also available as part of the menu to select saved priors.
 - On all final posterior probability distribution graph forms, the axes of the initial graph are automatically scaled. However, users can interactively 1) rescale the graph by varying the minimum and maximum X -axis and maximum Y -axis values; 2) change to view partial ID independent distributions calculated after each fifth of the dataset (if minimum ID independent prior was set at 1); and/or 3) manipulate the credible posterior interval (CPI) value cell to see the effect this has on CPI values. (The CPI is the Bayesian equivalent of confidence levels.)
 - Confidence levels can now be shaded on the posterior probability graphs to aid understanding.
 - Separate dependent distributions are generated for calves of both Identifiable and Clean animals (if both categories exist), and the total dependent distribution is then automatically generated and displayed as the default dependent graph. All three dependent distributions are now included together on a single form, and different graphs and statistics can be selected using tabs.
 - The new RHINO 2.0 includes greatly improved reporting whereby colour graphs and results are automatically inserted into the final reports that are in the form of an MS Word document. If you interactively rescale a graph, this is the version that will be used in the report. *Currently, reporting requires the user to have Microsoft Word and Microsoft Excel installed.*
 - Greatly improved simulation options have been added to RHINO 2.0. These allow 1) simulation of a more complicated single-run dataset, which now can also include special codes, dependents, and trap-happy animals, 2) multiple simulation and automated summary analysis of large numbers of runs for a given set of parameters, which can be used to determine more objectively the costs and benefits of notching different numbers of animals (as opposed to collecting more data) as well as providing better guidelines on the minimum proportion of a population one should aim to have notched, and 3) simulation of a simple multi-area dataset.
 - RHINO 2.0 calculates additional variables (RMS estimated mean sighting number, and calculated measures of distribution skew and peak), which combined with the multiple-simulation option will provide developers with data that will be used to improve RHINO's in-built statistical expert system (which guides and sometimes warns users) in future versions.

NOTES

Rhino Resource Center

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When a large contingent of the world's rhino community met at the International Elephant and Rhino Research Symposium held in Vienna in June 2001, current issues were discussed in a workshop with the incomparable facilitation of Ulysses Seal, who recently passed away (Walker 2003). The perception was widespread that the communication between rhino researchers in different continents and countries needed to be improved to be able to use all funds effectively and efficiently (Delegates of the international rhino community 2002). We are all aware that there is a considerable store of knowledge about the five living species of rhinoceros in Africa and Asia, published in books and papers or stored away in reports and dissertations. While acknowledging the importance of the existing data as a foundation for further research and management issues, access to the literature is time-consuming and often impractical. With the initial support of the International Rhino Foundation and SOS Rhino, several steps were taken after the Vienna Symposium towards the establishment of a Rhino Resource Center (the RRC) dedicated to storing and disseminating everything pertaining to the rhinoceros.

Considerable progress has been made in the last two years. The Rhino Resource Center has been registered as a charity in The Netherlands and a board has been constituted with Dr Nico J. van Strien as chair, Prof. Dr Rob Visser as secretary-treasurer and Dr Esmond Martin as the first international member. The initiative has received the endorsement of the IUCN Species Survival Programme, as well as the African and Asian Rhino Specialist Groups. With Kees

Rookmaaker as the chief editor, assistance with elusive French sources is volunteered by Dr Henri Carpentier of Paris.

As a result of earlier projects and decades of interest in the rhinoceros, a substantial amount of literature on the five species of rhinoceros has already been assembled. At the moment (June 2003) the collection has close to 8700 references dating from Roman times up to the latest books and articles, available in original or photocopies. On average, 100 titles are added every month. Some are short paragraphs in longer papers, others are full-length studies. There is no limitation as to subject, as long as one of the five species of rhinoceros is mentioned in the text. The list of topics is surprisingly wide, ranging from the traditional biological disciplines of taxonomy, ecology, behaviour, nutrition and morphology, to husbandry, management and veterinary studies, to the importance of the animal in different cultures. In fact, the rhinoceros is found in so many studies in such a variety of interests that it is safe to say that anybody venturing outside their immediate speciality is likely to find some new and refreshing insights in the works of colleagues in other disciplines.

The RRC is set up to get the right information to the right people at the right time. It is an aid to researchers in the field, where access to publications is often greatly limited. There is need to distribute the available data in traditional ways of publishing, like books or CD-ROMs. We hope to edit much-needed books on each species of rhinoceros and to produce an atlas of the rhinoceros with historical and

current data on distribution, status, and trade for each range country. While the means to achieve these products are being explored, the RRC has opted to give access to all data through a Web site on the Internet, registered as www.rhinoresourcecenter.com

Currently the Web site contains a full bibliography of all titles in the collection, which can be searched by author, date or word in the title. There is also access to a database of 'notes' on the rhinoceros, which again can be searched by subject, species or geographic location. Whatever the interest of the user, the result is a list of relevant data, which not only gives the full title of the publication, but also the exact text pertaining to that particular topic. When the original author wrote in German, French or Dutch, the section on the rhinoceros is found in an English translation, often translated for the first time. At the moment, about 3000 references have been analysed according to subject matter, emphasizing the literature of the 20th century.

While this is only a beginning, there is ample scope for the RRC to be established as a centre for all infor-

mation on research, conservation and management of all five species of rhinoceros. There will be a database of all current workers on the rhinoceros in the field and in captivity. However, to achieve optimum benefit for the global rhino community, the work of the RRC needs to be expanded and upgraded. The work can be done only when there is long-term commitment of funding from organizations, zoological gardens or individuals, who can thus make an important contribution to rhinoceros research and conservation.

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Rhinos in Chitwan

Pralad Yonzo

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'The Curse of Success' is the title of an article by T.R. Adhikari that appears in *Habitat Himalaya*, vol. 9, no. 3, 2002. The author, who has been involved in anti-poaching since 1991, examines the classic success of Nepal's rhino conservation. Rhinos have dramatically turned around from the brink of extinction. Establishing the Royal Chitwan National Park brought this about. In it, rhinos increased from 147 animals in 1972 to 544 in 2000. The rapid recovery of the rhino population in the Chitwan Valley, however, has set off frenzied poaching that may knock off the rhino's growth rate. Although a network of anti-poaching units has been formed, poaching increased drastically in 1998 and peaked at an all-time high in 2002.

Rhino poachers have become much more organized. Some took advantage of the breakdown in law enforcement caused by Nepal's major political upheaval to engage in their activities. Anti-poaching units have been weakened as informants have been

completely removed since 2001. In addition, the Maoist uprising has affected the army, which has vacated 24 guard posts in the park and now maintains only 10. Moreover, the media has over-exposed anti-poaching activities. Now poachers move into villages to carry out their operations inside the park. Access to the park's rhinos is easy because the national highway runs around the park and all rhino habitats lie adjacent to settlements. Early detection of poacher movements must therefore be the key.

These factors suggest that the conservation effort needs restructuring, emphasizing knowledge over capital. In the long run, arresting or suppressing poaching is foremost—but it is not the end. Therefore, a road map for conserving the rhino, based on contemporary knowledge, is much needed.

Details of this publication are available by downloading a free electronic copy through www.resourcehimalaya.org. Or write to Resources Himalaya, GPO Box 2448, Kathmandu, Nepal.

North-west Namibian desert-dwelling elephant project

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PO Box 527, Outjo, Namibia

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The current project to identify and monitor elephants in the Kunene region of Namibia is an extension of the Ministry of Environment and Tourism (MET) policy related to the consumptive use of resources, ongoing Community-Based Natural Resource Management initiatives and more recently the Hoanib River Catchment Study. The study has been under way for the last two years. The project focuses on collecting and sharing elephant identification and monitoring data, with the aim of improving the understanding of elephants in the target area. This information will be incorporated into both long-term and local programmes for conservancy elephant management. Elephants are becoming increasingly important income generators for local conservancies and information is required to guide decision-making. This revenue has the potential to contribute to rural livelihoods as well as to ensure good monitoring practices over the long term.

The elephants involved in this study are resident most of the time outside protected areas and within communal areas. As populations of both humans and elephants are increasing, the chance of confrontation increases. As has been evident in many other areas of Africa (and indeed the world) the immediate losers will always be the animals and the habitat. However, the ultimate losers will be the communities living in these areas as they are faced with a disturbed and degraded ecosystem that is unable to support traditional livelihoods. Community-based initiatives for managing natural resources are an attempt by many southern African countries to conserve as much wildlife and as many habitats as possible. These initiatives seek to give communities livelihood options other than keeping domestic stock by providing income through consumptive and non-consumptive uses of wildlife.

While the desert elephants of the Kunene region have been photographed and discussed by many filmmakers and journalists, little actual scientific research has been carried out on these populations. Only two research teams have published data on them

(Viljoen 1987, 1989a,b; Viljoen and Bothma 1990; Lindeque and Lindeque 1991), and their modern ranges, group sizes and dynamics are unknown. This scarcity of information has practical implications. The increasing tourist appeal of these elephants may already be disturbing their behaviour and their ranges to an unknown extent. In September 2002, eight GPS collars were fitted on elephants in north-western Namibia. These collars coupled with a photographic identification and database storage system that is currently under development will provide detailed information on movement, range, social structure and behaviour of this elephant population.

The project has recently received MET permission to expand into other geographical areas, and if funding becomes available more elephants will be GPS collared and additional researchers hired. Part of this programme will also be to develop a collaborative research effort with conservancies to monitor elephants in their respective areas.

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Fonds pour des petites subventions du Groupe des Spécialistes des Eléphants d'Afrique

Financé par la Commission Européenne

But : Renforcer les capacités de gestion des éléphants dans les Etats de l'aire de répartition et promouvoir la mission et les objectifs de UICN/CSE/Groupe des Spécialistes des Eléphants d'Afrique (GSEAf)

Introduction

Le Fonds pour les petites subventions du GSEAf a été conçu pour aider à renforcer les capacités des étudiants africains, des ONGs et des chercheurs indépendants pour conserver et gérer l'éléphant d'Afrique (*Loxodonta africana*). Le but de ces subventions est d'appuyer la recherche d'informations utiles à la conservation tout en permettant aux bénéficiaires d'acquérir l'expérience dans la recherche appliquée et dans la collecte et l'analyse des données nécessaires pour soutenir la conservation et la gestion des espèces.

Critères

Les propositions soumises au Fonds pour des Petites Subventions du GSEAf doivent satisfaire aux conditions suivantes :

- La proposition du projet doit concerner un domaine de haute priorité en relation avec la conservation et à la gestion de l'éléphant d'Afrique. Les domaines prioritaires sont les suivantes :
 - Le renforcement des capacités pour l'application de la loi et la lutte contre le braconnage
 - Le commerce illicite des produits d'éléphant
 - L'impact de la perte d'habitat sur les éléphants
 - La surpopulation locale des éléphants
 - Les conflits hommes-éléphants
 - Les enquêtes sur les éléphants (les effectifs, la distribution et les mouvements)
- Les postulants doivent être des ressortissants des Etats de l'aire de répartition de l'éléphant d'Afrique.
- Le budget de chaque proposition doit être dans les limites de 2 000 à 10 000 EUROS.
- La durée du projet proposé doit être inférieure à

un an- la préférence serait accordée aux projets à court terme.

- La proposition doit être rédigée et soumise par le postulant. Des demandes écrites au nom d'une tierce personne ne sont pas acceptables.
- Afin d'obtenir un équilibre géographique le GSEAf essaie de financer des activités dans la plupart des Etats de l'aire de répartition de l'éléphant d'Afrique. Le GSEAf essaie aussi de garder un équilibre entre les différentes questions de prioritaires. Ces deux facteurs peuvent influencer les décisions finales de financement.
- Les fonds pour des petites subventions ne soutiennent pas :
 - Les déplacements pour des conférences
 - Les déplacements pour des réunions scientifiques
 - Les actions juridiques
 - La construction d'une infrastructure permanente
 - La scolarité
 - Les salaires*
 - Les frais généraux
 - Les analyses de laboratoire ayant pour objectif la recherche et le développement de techniques
 - L'achat de véhicules
 - L'achat de l'équipement lourd**

* Bien que les salaires ne soient pas prises en compte, les chercheurs sans d'autres sources de financement peuvent demander une bourse modeste à couvrir au sein de la subvention. La main d'oeuvre temporaire peut être engagée si nécessaire pour réaliser le projet, mais dans ce cas précis, une paie nominative dans les limites acceptables du pays concerné peut être demandée.

** Seulement un équipement ESSENTIEL qui est nécessaire pour conduire le projet sera financé. Les achats des ordinateurs et d'autres biens à long terme ne sont pas encouragés.

Comment présenter la demande

Instructions générales aux postulants

Les demandes reçues sont examinées sur base de leurs pertinences vis à vis de la recherche sur la conservation et la gestion de l'éléphant d'Afrique en tenant compte de la manière dont les méthodes proposées et l'analyse préconisée contribueront à atteindre les objectifs décrits. Les propositions doivent être réalistes et les postulants ne doivent pas sur-estimer les attentes du projet. **Mieux vaut proposer un projet modeste qui peut définitivement se compléter et servir de modèle pour le travail futur, au lieu de proposer un projet qui a peu de chance d'être finalisé à temps ou dans les limites du budget.** Au besoin, il est important que les postulants consultent étroitement un conseiller qui peut fournir des conseils sur les méthodologies de collecte de données et les techniques analytiques à utiliser.

Les propositions de projets doivent être structurées sous le format suivant :

RESUME

Il doit inclure une brève historique de la zone d'étude proposé, un résumé des objectifs principaux et une description de l'importance du projet proposé pour la conservation de l'éléphant d'Afrique. La description des sites d'études doit être limitée au minimum possible.

BUTS, OBJECTIFS ET RESULTATS ATTENDUS DU PROJET

Les buts, objectifs et résultats attendus doivent être clairement présentés et doivent être spécifiques, mesurables, réalistes et réalisables étant donné les capacités du personnel, le temps disponible et le niveau de financement du projet proposé. Si le projet proposé est une composante d'une étude beaucoup plus large, les objectifs, buts et activités de l'étude ainsi que le rôle de tous autres bailleurs de fonds doivent aussi être clairement décrites.

DESCRIPTION DES METHODES ET ACTIVITES PROPOSEES

- La méthodologie et le plan de travail doivent être bien développés, scientifiquement acceptable, et mener à des résultats pratiques et réalisables (produits, information ou services).
- Si la recherche doit s'effectuer dans une zone protégée alors une lettre d'autorisation des autorités

appropriées est nécessaire comme document de soutien.

- L'on doit obligatoirement inclure dans la proposition une carte du site d'études.
- La proposition doit examiner la potentialité de durabilité des activités du projet au-delà de la vie du projet, si cela est approprié.
- Là où la mise en oeuvre des activités du projet nécessite l'utilisation d'un véhicule, l'on doit fournir la preuve de disponibilité d'un véhicule.

DETAILS SUR LE PERSONNEL DU PROJET

La proposition doit inclure une description du personnel et de l'organisation qui entreprendra les activités du projet. La description du personnel doit inclure des détails sur l'expérience et l'expertise du personnel ainsi que leur capacité à mener à bien effectivement les activités du projet proposé.

DETAILS DU BUDGET ET DES NOTES DU BUDGET

La proposition doit inclure un tableau de budget avec une liste d'énumération des coûts en dollars U.S. Ce tableau doit obligatoirement comprendre une colonne pour les frais demandés au GSEAF et des colonnes des coûts à couvrir par des fonds supplémentaires ou du soutien en nature par le postulant ou par d'autres partenaires. Les lignes budgétaires doivent être clairement liées aux activités du plan de travail. Des propositions peuvent être présentées simultanément à d'autres organisations de financement mais le GSEAF doit être informé sur l'organisation, le montant demandé et le statut.

REFERENCES ET BIBLIOGRAPHIE

Les propositions envoyées doivent avoir une référence appropriée et contenir une brève liste de bibliographie ayant toutes les sources primaires de l'information utilisée pour préparer cette proposition.

Instructions spéciales pour les étudiants entreprenant le travail proposé faisant partie d'un programme de maîtrise

Les étudiants sont priés de prendre note de des points suivants :

- Une lettre de soutien d'un conseiller expérimenté dans le domaine de la recherche et qui est prêt à

guider ce projet, et à aider si nécessaire avec le planning, la collecte de données, l'analyse des données ainsi que l'interprétation des données est à joindre à la demande.

- Si le projet fait partie d'un programme de maîtrise ou d'une thèse de doctorat, l'on doit présenter une lettre d'acceptation du projet par l'institution académique concernée.

Les propositions doivent être présentées sous format électronique, en version anglaise ou française, et envoyés à l'adresse suivante :

Leo Niskanen
IUCN/SSC
African Elephant Specialist Group
PO Box 68200
00200 City Square
Nairobi, Kenya
Email: afesg@ssc.iucn.org

Dates limites et processus de sélection

Les décisions finales de financement sont normalement prises à la fin de chaque trimestre du calendrier (le 31 mars, le 30 juin, le 30 septembre et le 31 décembre). Comme le processus de révision dépend de la disponibilité des évaluateurs volontaires, cela peut prendre du temps et **il est demandé aux postulants d'envoyer leurs propositions aux dates limites de 15 février, 15 avril, 15 août et 15 novembre pour considération dans le trimestre suivant.** La sélection est très compétitive ; moins de 20 % des propositions reçues sont financées. Toutes les propositions sont évaluées par les experts techniques et les décisions finales sont prises par le Responsable du Programme en consultation avec le Président du GSEAf. Les demandeurs retenus seront informés sur les décisions de financement à la fin de chaque trimestre.

GUIDELINES TO CONTRIBUTORS

Aim and scope

Pachyderm publishes papers and notes concerning all aspects of the African elephant, the African rhino and the Asian rhino with a focus on the conservation and management of these species in the wild. At the same time, the journal is a platform for dissemination of information concerning the activities of the African Elephant, the African Rhino, and the Asian Rhino Specialist Groups of the IUCN Species Survival Commission (SSC).

Submission of manuscripts

Where possible, manuscripts should be submitted both in hard copy and on floppy disk. Alternatively, the text can be submitted by email. Whatever media are used, the hard copy of the script must be identical to floppy or email version.

Contributions should be sent to:

The Editor, *Pachyderm*

IUCN/SSC AfESG

PO Box 68200

Nairobi, Kenya

tel: +254 2 576461; fax: +254 2 570385

e-mail: afesg@ssc.iucn.org

Preparation of manuscripts

Manuscripts are accepted in both English and French languages. Where possible, the abstract should be provided in both languages.

Title and authors: The title should contain as many of the key words as possible but should not be more than 25 words long. Follow with the name(s) of the author(s) with full postal address(es). Indicate the corresponding author, to whom proofs and editorial comments will be sent; give post, fax and email addresses for the corresponding author.

Research papers: Should be not more than 5000 words and be structured as follows: 1) Title (as above), 2) Abstract of not more than 200 words (informative type, outlining information from the Introduction, Materials and methods, Results, Discussion, but not detailed results), 3) additional key words (if any), not appearing in the title. 4) Introduction, 5) Materials and methods, 6) Results, 7) Discussion, 8) Conclusions if appropriate, 9) Acknowledgements (optional, brief), 10) References, 11) Tables, 12) Figure and photo captions, 13) Figures and photos.

Papers may be reports of original biology research or they may focus more on the socio-economic aspects of conservation, including market surveys.

Preferably provide figures and maps in their original form, for example, Excel files, maps as eps or tif files (17 x 15 cm, 600 dpi), when submitting in electronic form. Indicate clearly the author or source of figures, maps and photographs.

Notes from the field: The journal welcomes notes from the field. They may contain figures and tables but should be brief.

Book reviews: *Pachyderm* invites reviews of newly published books, which should be no more than 1500 words long.

Letters to the editor: Letters are welcome that comment on articles published in *Pachyderm* or on any other issue relating to elephant and rhino conservation in the wild.

Journal conventions

Nomenclature

Use common names of animals and plants, giving scientific names in italics on first mention; include the authority.

Use an 's' for the plural form for animals: rhinos, elephants.

Spelling

Use British spelling, following the latest (10th) edition of the *Concise Oxford Dictionary*, using 'z' instead of 's' in words like 'recognize', 'organization', 'immobilized'; but 'analyse', 'paralyse'.

Numbers

Use SI units for measurement (m, km, g, ha, h) with a space between the numeral and the unit of measurement. Give measurements in figures, for example 12 mm, 1 km, 3 ha, except at the beginning of a sentence.

Spell out numbers under 10 if not a unit of measurement unless the number is part of a series containing numbers 10 or over, for example: 14 adult males, 23 adult females and 3 juveniles.

In the text, write four-digit numbers without a comma; use a comma as the separator for figures five digits or more: 1750, 11,750. The separator will be a full stop in French papers.

References

Use the author-year method of citing and listing references.

In the text, cite two authors: '(X and Y 1999)' or 'X and Y (1999)'; cite more than two authors '(X et al. 1996)' or 'X et al. (1996)'. Note that there is no comma between the author(s) and the year.

In the reference list, cite publications as follows. List in alphabetical order. Write out journal titles in full.

- Adams, J.X. 1995b. Seizures and prosecutions. *TRAFFIC Bulletin* 15(3):118.
- Dobson, A.P., and May, R.M. 1986. Disease and conservation. In: M.E. Soulé, ed., *Conservation biology: The science of scarcity and diversity*. Sinauer Associates, Sunderland, MA. p. 123–142.
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- Sukumar, R. 1989. *The Asian elephant: ecology and management*. Cambridge Studies in Applied Ecology and Resource Management. Cambridge University Press, Cambridge.

Cite unpublished reports as follows:

- Tchamba, M.N. 1996. Elephants and their interactions with people and vegetation in the Waza-Logone region, Cameroon. PhD thesis, University of Utrecht, The Netherlands. 142 p. Unpublished.
- Woodford, M.H. 2001. [Title]. [*Journal* or publisher]. Forthcoming. [if publication date is known]
- Woodford, M.H. [Title]. [*Journal* or publisher]. Forthcoming. [if publication date is not known]

Government reports, reports to wildlife departments, MSc theses, PhD theses, etc. are to be noted as unpublished. Not accepted as references are papers in preparation or submitted but not yet accepted. 'Pers. comm.' accompanied by the date and name of the person are cited in the text but not given in the reference list.