On the clover trail

The plight of the world's rhinos

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Dedicated to three men who shaped my life

Willem Stapelberg Joubert, my late father
Who taught me an awareness of and love for nature

Fritz Eloff, my Professor
Who, through his teaching, gave substance to this love

Bernabé de la Bat, my mentor and colleague
Who made use of this love for conservation

TABLE OF CONTENTS

Foreword by Professor F C Eloff		vi
Introduction		viii
CHAPTER		**PAGE**
1	Catching a rhino ...	1
2	Prehistory and taxonomy	11
3	Translocations and reintroductions in Namibia	28
4	On the trail of Asian rhinos	42
5	The clover trail of African rhinos	55
6	Politics, conservation and rhinos	68
7	The black rhino study	81
8	Courtship by black rhinos	95
9	The menu: specials of the day ...	105
10	Black rhino society	117
11	Activity cycles of black rhinos	129
12	The white rhino story	142
13	The onslaught against rhinos in southern Africa	152
14	Strategies and crisis management	162
15	Rhino quo vadis ... ?	172
	Bibliography	178

FOREWORD

Based on his research work on the ecology of the black rhinoceros in Namibia, Eugène Joubert received a master's degree in wildlife management from the University of Pretoria in 1969.

A quarter of a century later he has now placed on public record his lifelong commitment to rhinos. With this book he describes his personal research, encounters and experiences in southern Africa while on the trail of rhinos. The tone of his narration varies from being light and humorous to being scientific. It is an extremely readable book. It gives the reader an overview of the paleontology, taxonomy and biology of the Asian and African rhinoceroses. The book concludes with a commentary on the present situation regarding the survival of the rhinoceros family.

The observations on the two rhino species in southern Africa are based on the personal experiences of someone who has lived close to nature; someone in whose life every living organism - from plants to the remarkable desert-dwelling elephants - forms an integral part of his personal ecosystem, and directly or indirectly influences his life.

The author states in his introduction that the book is not supposed to be a serious scientific work. However, despite this, it contains a wealth of biological information on the black rhinoceros and its environment. Information about the behaviour, social structure, movements, reproduction, parental care, communication, feeding habits, activity cycles and interactions with other animals is conveyed in an entertaining way against the backdrop of the milieu in which these animals live; an arid region that they share with elephant, predators and game such as oryx, springbok, kudu and many other herbivores. It is an area where all must face similar challenges concerning food, water, thermoregulation and, not the least, ravages from humans for their existence.

The book also contains interesting observations on birds that entertained the writer all day long with their melodious repertoires: white-browed sparrow weavers, buffalo weavers, sand grouse, social weavers, guinea fowl and many others that form a part of the surroundings of rhinos.

Namibia forms an adventurous playing field for an ecologist. To determine the movements and drinking habits of rhinos, day and night surveillance had to be conducted at waterholes. Circumstances under which not only the presence of rhinos made life precarious, but where lion, elephant and even wasps contributed to the hazards which, at times, were life-threatening. The author manages to relay these experiences, where the ability to scale a tree may have meant the difference between life and death, in an entertaining and humorous way.

Apart from the information on the natural history of rhinoceroses, the reader is informed of the perilous situation regarding their survival in Asia and Africa. The message portrayed is clear: for rhinoceroses to survive this onslaught against their very existence, drastic management measures must be carried out and protection enforced. If this is not done the trail left by the tracks of this unique animal, which appeared on earth 60 million years ago, will disappear forever.

F C ELOFF
Pretoria, April 1995

INTRODUCTION

When I wrote this book I had in mind readers who would have included my late father and, I hope, all our children. My study of black rhinos, as well as my wildlife experiences in Namibia, is the vehicle I use to convey the rhino story. The book is not a treatise on rhinoceroses. Instead it is written for those people with a more general interest in rhinos and rhino-related issues. Despite the book not being a scientific work, I have tried to ensure that the biological information is accurate. I must admit that as I worked on the manuscript it developed a will and life of its own. Constantly I had to guard against it becoming too conceited, and I hope I have succeeded in preventing it from possibly being perceived as something it is not intended to be.

As the name suggests, this book deals mainly with rhinos, but not only with rhinos. Professor Fritz Eloff used to tell us, his students, that nature consisted of more than just the animal species we may be studying at the time. I have therefore liberally included observations on some other characters that share the environment with rhinos. These are animals that formed an intimate part of my life during the five years I lived at Otjovasandu. While I was writing about the plight of the black rhinos, I realised that one could not look at one rhino species in isolation. From here it was a short step to include all five species. Similarly, I also explain some basic biological concepts and conservation principles in the text. These are connected with popular buzzwords and jargon, such as ecological carrying capacity, territory, habitat, and the like, which the public are presumed to understand when conservation matters are discussed. All these are also, directly or indirectly, applicable to the conservation of rhinos.

It was always one of my father's wishes that I would write a book on my experiences with black rhinos during the years that I lived and worked at Etosha Game Reserve and in Kaokoland and Damaraland. Thus the idea of the book has been floating around in my subconscious for many years. Frequently I formulated sections of the book in my mind. A few times I started writing it but would invariably get involved in something else. However, the fact that this book is written at all has to be attributed to my wife Martie. She has been schooled by life, and she quickly brought me back to earth. Stop dreaming about the book you want to write; sit down and do something about it. This was her counsel.

During one's life various events and people play a part in shaping one's destiny. Some of these influences are subtle and one may only appreciate their effect many years later. The three men who had a major influence in my life each had a strong personality and a basic, no-nonsense approach to life. All three revealed in different ways an amazing sensitivity to and awareness of nature. These are the men to whom I dedicate this book.

The first is my father, who conveyed to his three sons his love for nature and all things wild and beautiful. He had a vision of his sons working as game rangers in South

Africa's national parks. After I had finished high school he immediately took me to the Pretoria offices of the South African National Parks Board. We never progressed beyond the first office. A man at reception told us that they received so many applications that they only considered candidates with university degrees. That settled that. No question; I had to attend university.

The second major influence in my life was Professor Fritz Eloff, head of the Zoology Department at the University of Pretoria. His love for wildlife formed a golden thread through all his lectures. I remember how enthralled I would be if he digressed from his lecture to tell us about his experience while doing research in the Kalahari.

I graduated with majors in zoology and entomology. Another journey to the offices of the Parks Board followed. We were haughtily informed, in the same office by the same person, that they now only considered candidates with a PhD. Undeterred, my father said, 'Well then, you have to obtain a PhD'.

I started work with the Department of Agricultural Technical Services and enrolled for a M.Sc. degree. However, shortly afterwards the University of Pretoria announced that they were starting an honours course in wildlife management. Despite threats of never again being employed by the civil service, I resigned. I was the first student to enrol for the new course. Halfway through the academic year I wrote to all the southern African conservation organisations, exploring possibilities for work. The reaction that I received left no doubt in my mind of my low employment value. So when Professor Eloff offered me a chance to conduct a research project on black rhinos in Namibia, I jumped at the opportunity. The research project was to be sponsored by the French petroleum company, Total.

The process had been initiated by a request from Bernabè de la Bat, Director of the Division of Nature Conservation, for a biologist to conduct a research project on black rhinos in the then South West Africa. Bernabè, however, had to face typical bureaucratic red tape that surfaced in Windhoek. This mainly concerned the apparent difficulty involved in granting permission for me, someone who was not a government official, to be housed in a game reserve, and on top of this, allowing me to drive on roads other than designated tourist routes. The precedent that this would set apparently caused shivers of anxiety in the offices of the government administrators. The most serious objection they had, however, was the question of liability should I be killed by a 'wild beast' while working in the game reserve.

I happened to be in Professor Fritz's office when Bernabè phoned. One way to avoid the objections would be to temporarily employ me. The only position he could offer was that of an assistant game ranger. I immediately accepted and arrived in Namibia towards the end of 1965. This temporary appointment became a full-time position and lasted 27 years. During the larger part of this time Bernabè was a major influence in my life. In some ways his sway succeeded that of my parents during my childhood. He very much became a father figure to me.

During the years I spent in Namibia I built up a good reference library on conservation in general, and rhinos in particular. I kept copies of official reports and documents relating to these issues. A suggestion by Professor Fritz, which I followed for many years, was to keep a journal of interesting things I encountered and did. All this was done with the day in mind when I would sit and write my book on rhinos. The irony is that this book was written in Riyadh, Saudi Arabia, without me having had access to my reference library, which was in storage in South Africa.

Thus, while writing this book I had to rely largely on memory. This may have been a blessing in disguise, for if I had had access to my references and copious notes I may have become bogged down with too much detail. Under those conditions the manuscript might easily have won the tussle, and we would have ended up with a more serious work. The book is not a chronological or precise description of the time I spent at Otjovasandu. However, all the events that I describe really did happen, although the capture described in the first chapter is a generalised picture of a rhino capture operation.

Over the years many people, directly or indirectly, contributed to or participated in the events described in this book. To all of them I owe a word of gratitude. There are the men to whom I dedicate this book. I will not succumb to the temptation to say more about them. However, I need to thank Professor Fritz for kindly agreeing to write the foreword. My faithful companion during those years was Abraham Taurob. He was very proud to be called a 'two blood': his father was a Damara and his mother a Himba. Once, Bernabè asked me why I did not appoint as my assistant someone who was literate. My reply was, 'Sir, I need someone who will not leave me in the lurch when we suddenly find ourselves in a difficult situation'. Abraham and I learnt to respect and trust each other, and together we survived many close shaves.

The people stationed at Etosha Game Reserve during this time will always have a special place in my memory. Men like Stoffel Rocher, who managed to shoot his own horse while chasing poachers on horseback; Peter Stark, who could rob a beehive unperturbed while the bees launched an all out attack on him; Piet (Halali) van der Westhuizen, who proposed a motion of no confidence in the authorities at our first-ever staff meeting at Etosha because they would not grade fire breaks; the famous artist Zakkie Eloff, who used his sojourn at Etosha to charge his creative batteries; big Giel Visser, who could and would finish a leg of lamb in one meal; Jaap Meyer, with whom I was stationed at Otjovasandu and who drank the strongest coffee I have ever tasted; Johan Brisley, Chris Alberts, Koos Theron, Walter Piepmeyer, Pottie Potgieter, Andrè Duvenhagè, and later Danie Grobler were the other game rangers. Ken Tinley, with his contagious enthusiasm, and Hymie Ebedes, always interested in my project, were constant sources of inspiration. In Windhoek, the man in the background who was known as 'Mr Conservation', *Oom* Sixie Holtzhausen, needs to be mentioned. He was Bernabè de la Bat's right-hand man. Polla Swart joined the division a short time later, and over the years we shared many experiences; a friend ever-ready to help.

There is another group of people I need to thank. These are my colleagues from many other conservation organisations, national and international, with whom I had the pleasure of rubbing shoulders over the years. Many of them are also members of the various rhino specialist groups on which I had the honour and pleasure to serve. These people all contributed to enrich my life: Martin Brooks, chairman of the [1]IUCN Rhino Specialist Group; Esmond Bradley Martin, Anthony Hall-Martin and the other members of this group; members of the southern African Rhino Management Group, especially Ted and Liz Reilley and Clive Walker; and all my colleagues from the [2]SARCCUS and [3]SADC countries, who over the years became friends with whom one could walk the second mile. I need to mention Peter Hitchins, who became enthralled by black rhinos in Natal while I was falling under their spell in Namibia. Peter and I, through our mutual interest in rhino, developed a special bond over the years.

The saying goes that behind every successful man there is a woman. At the risk of sounding arrogant I wish to say that I was fortunate enough to have five women who played an important part in my life, and continue to do so. They are my mother Sally Botha, Marie, Tertia, Anne-Marie and of course Martie. Lastly, I want to thank Wimpie, Louw, and Nicky, whose loyalty was there for the taking at the times when I needed it most. To all these people I owe a lot, and I now take the opportunity to convey my heartfelt appreciation to them.

Finally, there are those who helped behind the scenes to turn my efforts into something worth reading. I have to thank Martie first. She had to wade through several early drafts, but remained positive and offered sound advice. Polla Swart checked several chapters dealing with Namibia. Esmond Martin, Peter Hitchins and Clive Walker unstintingly made information available to me, and I thank them. The late Gerrie de Graaff gave me the benefit of his considerable experience as editor by reading the Afrikaans version of the manuscript. Both his and Piet van der Westhuizen's contributions are gratefully acknowledged. A special word of thanks is due to Col. Andrè Dreyer and Lt. Col. Pieter Lategan for briefing me on the latest activities of the South African Police Service's special unit, the Endangered Species Protection Unit, ESPU. I am also indebted to Bernie Sangil, who prepared the maps and diagrams, and Pushkin E H, for the drawings used in the book.

The decision by the publisher that the book should be published first in English had me in despair. However, Kevin Dunham, with extraordinary patience and a great aptitude for editorial work, laboured as hard as I did to turn my version of English into something resembling the Queen's language. Apart from helping in cleaning up the English, his

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[1]IUCN, The world Conservation Union
[2]SARCCUS, Southern African Regional Commission for the Conservation and Utilisation of Soil
[3]SADC, Southern African Development Community

frequent enquiries and the resulting debates did much to improve the book. I will always be greatly indebted to him.

Despite the participation of all those mentioned, the manuscript still required the attention of a professional. Avrille du Plessis, senior editor with Gamsberg Macmillan, brought a much needed editorial consistency to the manuscript. More importantly, with artistic flair she added several touches to the layout that improved the final product. However, I accept all responsibility for any remaining errors and ambiguities.

Finally, there remains my publisher to thank, Herman van Wyk. If it were not for his enthusiasm, support and constant enquiries into the progress of the manuscript, the project could very well have floundered along the way.

EUGÈNE JOUBERT
Riyadh, July 1995

CHAPTER 1

Catching a rhino ...

A big black rhinoceros bull was lying under a thorn bush. He had his left foreleg folded with his chin resting on it. His right foreleg was pushed out in front of him. Mopane flies were buzzing around his nostrils and closed eyes, trying to find moisture. The rhino was in a deep slumber, totally unaware of the flies or of the flycatcher shrike hopping around in the branches above him. The bird cocked an inquisitive eye at a delicate spider's web, but did not notice the spider sheltering under a small piece of bark. A little further up the slope of the hill a family of mountain zebra *Equus zebra hartmannae* was grazing quietly. They were uneasy, aware that people were in the area.

Cicadas were pumping away in shrill abandon. In a strange way the resulting symphony, and the white shimmering haze dancing above the calcrete rubble, seemed to merge. Together they had an almost hypnotic effect on me. I was sitting a few hundred metres away, trying to shelter from the sun in the shade of a stunted mopane tree. Unlike the rhino I was acutely aware of the tiny mopane flies trying to crawl into my nostrils, eyes and ears. The mopane fly is actually not a fly at all but one of the smallest honey bees in the world. Yet somehow this fact gave me no comfort. I could not help but envy my Himba assistant, Abraham Taurob, sitting next to me, apparently unaware of the flies and showing no signs of annoyance. Even the heat did not seem to bother him.

Our day had started six hours earlier when we had left the capture team's base camp. On the eastern horizon the stars were paling. The rest of the camp's inhabitants slowly became active as we left in the Landrover. According to our schedule we had to visit several waterholes that morning. In silence we drove to the first hole. This morning we were lucky. In the poor light of early dawn we came across fresh rhino tracks.

In a narrow gorge transverse barriers of rock dam the subterranean water in the sand-filled river-bed. Over hundreds of years, pathways have been worn into the rock face by the hooves of animals that have come down to the water. The animals dig for water in the sand, creating *gorras* into which the water seeps. The rhino covered almost 15 kilometres during the night to reach these water seeps. He crossed the last fifty metres or so at a trot and with a snort he cleared the other game from the waterhole. He spent almost an hour quenching his thirst, repeatedly taking a few sips and then waiting for the hole to refill. It was as though the sand was reluctant to relinquish the life-giving moisture. Having taken his fill the rhino moved slowly around the hole. He stopped at a communal rhino midden and sniffed at a scrawny, urine-coated shrub next to it. He turned around and urinated backwards, between his hind legs, onto the shrub. He scraped the midden with his hind feet. Having deposited two balls of dung he moved slowly forward, scattering the dung with his hind feet. With his horn he worried the shrub and then disappeared silently into the night.

We prepared ourselves with a quiet efficiency because we had been through this ritual many times. I took my binoculars and shouldered the rifle. Abraham carried the radio and a plastic container filled with water and covered with hessian to keep it cool. At first we had trouble following the tracks in the poor light, but as visibility improved, tracking became easier. We lost the spoor several times on the hard, rocky ground but with an almost uncanny ability Abraham always managed to find it again. As the sun followed its path, climbing higher in the sky, the cool air of the early morning was replaced by the heat of the day. Almost four hours after we had set out we saw the rhino. We followed him as he moved slowly forward, browsing on acacia bushes. Success tasted sweet in my mouth. On the previous few days we had returned to base without locating a rhino.

We had already contacted the base camp by radio, giving our approximate position. The rhino had laid down a short while before. I tied my handkerchief around my face, covering my nose, trying to rid myself of the mopane flies. Suddenly we heard the noise of the approaching helicopter. The familiar whop-whop of the blades sounded like music to our ears. The zebra family moved away. As always the female with the youngest foal was the first to move off. The stallion, proudly trotting with his head held high, tried to position himself between the disturbance and his mares. He had a problem pinpointing the source of the sound. Frustrated, he turned around and followed his females over the crest of the hill.

Under the shrub where he was resting, the rhino pricked up his ears at the sound of the approaching helicopter. When the chopper circled above him he jumped up, snorted and wheeled around. He became utterly confused by the clattering noise overhead. In frustration he took a swipe at a thorn bush with his horn, but it was not the enemy. He could not detect any foreign odour, nor with his poor eyesight could he see anything. He wheeled around again, surprisingly agile for such a big animal. With his short tail curled he charged away.

Suddenly he felt a burning sensation on his lower rump where a dart had struck him. He swerved several times but could not get rid of the burning, nor of the terrifying sound. The rhino was not aware of it but the chopper pilot was steering him towards flatter ground at the base of the hill. The rhino followed a watercourse down the slope and charged onto the flat ground of the omaramba (omarambas are ill-defined drainage lines that are almost level). After ten minutes the rhino started staggering, the sun reflecting off the dart that had contained the immobilising drug. Finally he keeled over and lay still. In the chopper the pilot and veterinarian smiled and gave each other a thumbs-up sign.

The rhino was blissfully ignorant of the rest of the activity that took place around him. To ensure that he was safely immobilised the pilot circled the chopper for another minute before landing. The vet alighted and approached the rhino carefully; one could not be too cautious with such a large animal. He placed a black cloth over the rhino's head, covering his eyes. Meanwhile Abraham and I, having followed the chase on foot, now approached the rhino. We found it difficult to hide our excitement. When the vet noticed the water container he asked Abraham to wet the rhino. He was concerned about the body heat that

the rhino may have built up during his charge down the hill. We emptied the remainder of the water from the plastic container over the rhino.

After satisfying himself that his services were no longer needed the pilot took off in a cloud of dust. The chopper winged away in the direction of base camp, on its way to find the rest of the game-capture team and lead them to the rhino. They had occupied the early morning with general maintenance and other duties but had kept their ears tuned to the radio, awaiting word from the two teams on the reconnaissance surveys. The second team, consisting of Dick Fryer and Piet Halali, had just returned to camp without locating a rhino. When they received my message it was as though an electric current suddenly ran through the camp. Everyone dropped everything they were doing. All the equipment and vehicles were ready. Shortly after the chopper had departed with the vet the vehicles had followed. The team had a fairly good idea of the general location of the immobilised rhino and they slowly made their way in that direction.

The convoy consisted of two pick-up vehicles and a five-tonne truck, which was carrying the heavy rhino crate. All three were four-wheel drive vehicles. They followed a road for some distance and then stopped on a rise. The senior game ranger, who was in charge of the capture team, radioed their position to the chopper pilot. As a reference point he used a flat-topped inselberg, a typical feature of this part of Namibia. The pilot told him that the rhino was down and that the chopper was coming to lead them in.

The senior ranger got out of the vehicle and impatiently peered into the sky. In reply to this gesture the rangers sitting on the rhino crate said that they could neither hear nor see the chopper. Some time later they suddenly picked up its sound. The chopper swooped low over the vehicles and hovered above them. The pilot wore a wide smile and gave them a thumbs-up sign. They followed the helicopter down the road a short way and then left the road and continued along a very poor track. After some distance they left the track and drove across country, with the chopper showing them the best route. Progress was agonizingly slow and one ranger complained that he would probably return home with his kidneys hanging in blood. Eventually they reached the omaramba. From there the going was relatively easy and shortly afterwards they reached the immobilised rhino.

Meanwhile, back at the rhino, the vet removed the dart from the animal's rump. He had to do this carefully because of the barb on the needle. He then administered doses of antibiotic and anthrax serum into a thick vein on the back of the rhino's ear. He attached a coloured tag to the ear in order to enable future identification of the animal. In the meantime I collected some ticks from under the rhino's tail. As always I was surprised to see how few external parasites were to be found on game in the drier parts of Africa. Animals living in the moister, eastern parts of the subcontinent carry heavy loads of external parasites.

With the assistance of the vet and Abraham I then recorded some information in my notebook. This included several body measurements, the sex of the animal and its condition, the

colour of the ear tag, which ear it was on and its position on the ear, as well as some general information about the vegetation and weather. With these chores completed we retired to the shade of a nearby tree.

The vet had brought his medicine bag over to the shade. At my request he removed an aluminium dart and showed it to me. The dart was remarkably light in weight. It had to be handled carefully because earlier it had been filled with immobilising drug. The vet explained that the dart consisted of a hollow tube and was available in a variety of lengths, depending on the quantity of drug one needed to use. A needle was attached to the one end of the tube and at the other end were plumes to improve the aerodynamics of the dart. The tube that formed the body was divided into two sections by a plunger. In the section behind the plunger was an asymmetrical counter-balance that separated two chemicals, concentrated acetic acid and saturated bicarbonate. On impact with the rhino this counter-balance toppled forward, allowing the chemicals to mix. The carbon dioxide gas resulting from the chemical reaction pushed the plunger forward. This movement in turn forced the drug, which was in the front part of the tube, into the animal.

I was curious about this equipment. Although I had been present at many rhino captures I had never had the opportunity of leisurely examining the veterinary equipment used in these operations. The needle was approximately six centimetres long and quite thick, in order to withstand the stress of impact. On the needle there was a strong barb, which gave it the appearance of a fish hook. The barb prevented the dart from becoming dislodged after it had hit the animal. Owing to the relatively large diameter of the needle the skin of the darted animal frequently formed a plug in the end of the needle, especially if the animal was thick-skinned like a rhino. There was a small hole in the side of the needle, the same diameter as the bore of the needle. With the needle opening plugged, the drug was injected through this hole on the side. The rifle used to launch the dart worked on the same principle as an airgun. It had an effective range of approximately 30 metres. This meant that when a helicopter was used in the capture of animals, success hinged mainly on the flying abilities and skill of the pilot.

The topic of conversation widened and we discussed the development of game-capture techniques in Africa. We talked about how the type of darts used during capture had been continuously improved by technicians from the National Parks Board in South Africa. The vet related the game-capture methods used previously. In the 1950s animals were captured by chasing them with a vehicle and then lassoing them. Frequently the noose of the rope would be positioned on the end of a pole to help place it around the animal's neck. As with most capture techniques, this was easier said than done. When game were caught this way, apart from vehicles taking a battering, there was an unacceptably high mortality rate.

Today most game is captured using a method pioneered by Jan Oelofse while he was in charge of the game-capture unit in Natal, whereby animals are caught in nets or bomas constructed of plastic sheeting or hessian. Frequently they are not touched by humans at all. Drugs are mainly used on rare species that have to be caught individually. At first,

several drugs were used with limited success. A veterinarian in Kenya named Anthony Harthoorn was the first to start mixing various drugs, immobilising agents and tranquillisers into a cocktail. He achieved remarkable success with these experiments.

Despite this breakthrough certain problems remained when it came to immobilising animals safely. The main one was accurately estimating the mass of the animal to be caught, as the correct dose of drug to be used for that individual animal was based on this crucial estimate. The dosages were always given as certain units per kilogram of body mass of the animal. In the field, one had to quickly estimate the mass of the animal and multiply this by the recommended dosage. Understandably this proved to be extremely difficult and incorrect doses were frequently administered. If the animal's mass was underestimated the dose would be insufficient to immobilise it. This would often lead to the animal injuring itself while staggering around, or it would disappear into thick bush where it was often taken by predators. Alternatively if the mass was overestimated the animal would receive an overdose, which could, and frequently did, kill it. No antidote existed for most of the drugs and they would have to be broken down by the animal's natural physiological processes. This normally took hours and the mortality rate was unacceptably high.

The coming of new and very potent morphine derivatives revolutionised animal immobilisations. A drug called M-99 proved especially useful. This drug, with the chemical name of etorophine hydrochloride, has a potency 10 000 times that of morphine. It allows very small amounts to immobilise even large animals: three milligrams is sufficient to knock down an adult rhino! In addition it has the advantage of having a wide safety margin. It thus becomes less necessary to estimate the body mass of the animal accurately and allows one to use the average body mass of the species as a guide when deciding the dose. Several darts can be prepared in advance, some with lesser doses for young or small individuals and some with higher doses for larger animals, or to obtain a quicker knockdown time. Secondly, and perhaps more importantly, an antidote is available. This means that once the animal is down it can quickly be dealt with and then given the antidote to reverse the effects of the M-99, which will have the animal back on its feet in seconds. M-99 is often mixed with a tranquilliser to make the anaesthesia smoother and lower the animal's stress at being handled by people.

My conversation with the vet was interrupted by Abraham informing us that the chopper was returning. It was several seconds later before either of us could pick up its sound. It landed in the same spot as before and shortly afterwards the three vehicles also arrived. Although they had handled rhinos many times before, the men found it difficult to suppress their excitement. The senior ranger and the driver of the truck studied the terrain. They then reversed the truck and parked it in front of the rhino. The rear of the truck was towards the animal. A hydraulic system was used to lower the flat bed of the truck to the ground, with the rhino crate on it.

Watching the ease with which this was done I could not help reflecting on the trouble the capture team had experienced in the past. They used to take the huge crate off the back of

the truck by hand, letting it slide down on a ramp on rollers. Getting the crate back onto the truck with the rhino inside took an even greater effort and was nerve-wracking. Modern technology had made the physical aspects of game capture much easier.

Meanwhile the sturdy door of the crate had been removed. A thick rope was tied around the neck of the rhino, while the other end was slipped through a hole in the far wall of the crate. Several large rocks and a shrub were cleared from between the rhino and the door of the crate. The senior ranger divided his men into two groups. One group took up the slack of the rope on the far side of the crate while the other positioned itself behind the rhino. After satisfying himself that everybody was ready and knew what was expected of him, the vet administered the antidote. He did this intravenously into a thick vein on the back of the rhino's ear.

Within moments the rhino showed signs of recovery. Some men giggled nervously as the animal strained to raise himself up. While he was guided into the crate by the rope around his neck, the rest of the men pushed from behind. Before the rhino had fully recovered, the senior ranger had the rope removed from the animal's neck and the door was closed. A snort, followed by the sounds of the rhino banging on the inside of the crate, indicated that the animal had been put inside just in time. With the aid of the hydraulic system the flat back was raised onto the chassis of the truck and the crate was then secured with chains. With the vet sitting on the crate to keep a close watch on the rhino, the truck and one vehicle that accompanied it started on the journey back to Etosha National Park.

I rode back to camp in the helicopter. As there was only room for one passenger, Abraham joined the rest of the men on the other vehicle. From the helicopter, in the fading light of the late afternoon, I had a bird's eye view of the vehicles departing in different directions. Over the edge of the escarpment huge cumulus clouds were building castles in the sky. The setting sun was tinting their bulwarks in soft shades of pink. As the helicopter raced to reach camp before last light I suddenly remembered that we had left my vehicle close to the waterhole. The pilot altered course. As there was no safe landing spot close to the waterhole I had to walk the last three kilometres to the vehicle. While driving back to camp I reflected on the factors leading to the need to translocate the black rhinoceroses of Namibia, and on my own involvement with the programme.

In order to appreciate the history and development of Namibia, one has to understand the environmental conditions of the region. These played, and are still playing, a role in shaping the country. The early history of game populations in Namibia was tied to the arid climate of the region. Most arid regions of the world are dominated by a continental climatological phenomenon known as the Hadley cell. The climate of Namibia, Botswana, and to a lesser degree their neighbours to the east, is similarly influenced by the Hadley cell. The cell is characterised by hot, moist air rising over the tropics in what meteorologists call the equatorial tropical convergence zone. As it rises, the air cools and the moisture condenses, falling as rain in tropical thunderstorms. The drier air continues to rise until it reaches a height of approximately 1 400 metres. At this height, owing to the rotation of the earth,

some air moves to the northern hemisphere and some to the southern hemisphere. In the subtropics the air sinks back to earth. As the air falls its temperature increases and the drying process continues. This cyclical movement of air is called the Hadley cell, and it causes the extensive subtropical high-pressure ridge that encircles the globe north and south of the equator.

The influences of the convergence zone, together with the presence of the cold Benguella current in the Atlantic Ocean off the west coast, caused the Namib Desert, from which the country takes its name. Except for the four rivers forming the northern border of the country, and the one in the south, there are no perennial rivers in Namibia. The Namib Desert runs the length of the country and is 100 to 150 kilometres wide. To the west of the desert is a mountainous zone, which also runs the length of the country. In some areas the mountains form a true escarpment; in other places there is just a broken transition from the coastal desert plains to the plateau of the interior. This region also forms a watershed between seasonal rivers running west to the Atlantic Ocean and those which drain, mostly endoreicly, into the interior of the subcontinent.

Moist air reaching Namibia from the northeast during late summer is the cause of Namibia's rainy season. The rains occur as scattered, convectional thunderstorms, normally during the late afternoon. The isohyets run almost parallel to the coastline. Mean annual rainfall increases towards the northeast of the country. The yearly rainfall pattern is one of irregular showers, and because the rains are unevenly distributed, some localities experience long droughts. The few showers that fall before late January are usually insufficient to fill the pans on the plateau. The main rainy season is from late January through to March. During these months enough rain may fall to fill these pans. The larger ones could contain water well into winter.

The only places in Namibia where perennial waterholes are found are in the beds of rivers in the broken escarpment zone. These stream beds are sand-filled and contain subterranean water because of their impervious rock walls. In localities where the sub-surface channel is narrowed by the rock wall, or where natural transverse barriers form a dam, the water appears on the surface. In many places the water lies just below the surface of the sand and animals dig holes or *gorras* to drink the seepage.

This arid climate therefore produces mostly desert or semi-desert types of soil and corresponding vegetation. Generally speaking the vegetation over most of the country can be divided into two main types. In the northeast is a dry savanna of grass and slender trees. However, the larger part of the country is a thorny savanna, with short grass, thorny trees and succulent bushes. Therefore the biological carrying capacity is low. From a European farmer's point of view, most of the country is suitable only for livestock farming. However, both the animals and plants that occur naturally in Namibia have developed interesting adaptations over thousands of years. Oryx *Oryx gazella* and springbok *Antidorcas marsupialis*, which adapted to survive with little or no water, used to graze the plains in large herds. These are the animals that the landowners should have farmed.

The lack of surface water did much to stem the southward movement of people. Only nomadic pastoralists ventured further south than the rivers on the northern boundaries of the country. Dependent on the environment for their survival, these peoples lived in complete harmony with the ecosystem. Water is the vehicle that drives the system. The temporal unpredictability of rain, as well as the scattered nature of the showers, ensured that a system of rotational grazing was practised by game and people alike. During the summer, when the depressions in the omarambas were filled with rainwater, the sandveld areas of the plateau in the centre and east of the country were used. As these depressions dried out, the game and domestic livestock moved west into the broken terrain of the mountains, along the escarpment. The vegetation in this region was more hardy and the water sources more permanent.

In the south the arid Bushmanland and Namaqualand of the northern Cape stemmed the flow of European settlers. For many years the Kalahari Desert in the east and the inhospitable Namib Desert coast in the west had the same effect. It was only during the early part of the 20th century that the flow of European settlers increased, changing the demographical composition and ecological landscape of the country forever. Large tracts of land were divided into farms and fenced. These were further partitioned into camps in order to improve animal husbandry. Surface water was supplied to each camp. Bad management and overgrazing changed the vegetation from open savanna into dense thickets of thorn shrub. Pastoral scientists from the Department of Agriculture later admitted that the carrying capacity of all the rangelands was badly overestimated. Throughout the commercial farming area predators and other wildlife considered to be incompatible with livestock were exterminated.

Ironically, the changes that took place benefited some game species. Bush encroachment, the increased availability of surface water, and the absence of predators turned large areas into ideal habitat for kudu *Tragelaphus strepsiceros*. Oryx also benefited to some extent. In contrast to kudu, which are browsers, oryx are primarily grazers. Thus although they gained from the reduction in predator numbers, the grazers, domestic livestock included, lost habitat. In the centre of Namibia, where according to early records large herds of springbok once roamed across open plains, bush encroachment effectively excluded springbok. In the south, however, the numbers of springbok have increased during the last three decades. One reason for this is that jackal-proof fences were erected over most of the springbok's former range. This was done with the aid of government subsidies and encouraged landowners to take up the farming of karakul, its pelt being an important export commodity at the time. The fencing made it possible to eradicate the main predators of small livestock, particularly jackal *Canis mesomelas* and lynx *Felis caracal*. But not all the predators suffered. One timid species, the cheetah *Acinonyx jubatus*, prospered in the centre and north of Namibia. With the removal of competition from larger predators, and with the increase in the number of kudu calves on which they preyed, cheetahs thrived.

Neither the white nor the black rhinoceros was ever common in Namibia. Black rhinos, however, were probably much more numerous than white rhinos. This is not surprising when one considers the habitat requirements of the white rhino. With low rainfall over

most of the country, Namibia is, at best, marginal habitat for the white rhino. If they ever did occur it would probably have been in an area to the north and east of Windhoek. As in the rest of Africa, black rhinos were more widespread in Namibia than white rhinos. Black rhinos formerly occurred along the entire length of the western mountainous area. Their distribution is discussed in greater detail in Chapter 5.

Rhinoceroses in Namibia do not carry any disease that can be transmitted to cattle. Nevertheless their presence, together with that of elephant, was considered incompatible with farming. The people who tended herds refused to take the livestock out to graze if they knew rhinos were present on the land. One of the first things European farmers did to 'tame' their land was to hunt rhinos. Large areas of Namibia were made available to these farmers during the 1950s. Many of those qualifying to buy land at low prices were South African ex-soldiers returning from the Second World War. The number of black rhinos dwindled. By the late 1960s there were probably fewer than 100 animals left in the country. After the deproclamation of a large part of Etosha Game Reserve in 1967 most of these animals occurred on private land.

The conservation authority knew that action was needed to safeguard the surviving rhinos. They realised that a management plan would have to be formulated. Such a document, however, would require information that was unfortunately lacking. Even basic information on their exact distribution, numbers, and habitat requirements was not available. It was decided in 1965 that a biologist should be appointed to conduct research on the black rhinos of Namibia. The brief included a survey of the past and present distribution of black rhinos, as well as their ecology and behaviour. This information would assist in the selection of game reserves with suitable habitat for reintroductions. It was hoped that this would also allow determination of the carrying capacity of any particular protected area for black rhinos. I was fortunate enough to be appointed to conduct this research. At the time there was only one position of biologist on the staff compliment and it was already filled by Ken Tinley. I was therefore appointed as an assistant game ranger.

A population of black rhinos was known to live in the western part of the Etosha National Park, near Otjovasandu. It was decided that I would be stationed at the Otjovasandu ranger's camp. Although I had no experience, being fresh out of university, I brimmed with enthusiasm and planned the project with dedication.

The first thing I did was conduct an intensive literature study in order to find out how much was known about rhinos and their requirements. This I did in the library of the Transvaal Museum in Pretoria before I even left for Namibia. It took me almost a month of intensive research to collect and photostat everything written on any rhino, Asian and African, from the records in the library. Although a large volume of literature of a general nature existed I found that no definitive study had been conducted. This was at a time when rhinos did not have the same high profile as they enjoy today. By coincidence two projects on black rhino were initiated elsewhere in Africa at approximately the same time. A biologist named John Goddard started work in Kenya and another project by Peter Hitchins began in Natal.

An interesting revelation to me was that the paleontological history of rhinoceroses and their relatives was quite well documented. I discovered that these animals had been around for a very long time. I found it well worth taking the time to look into the prehistoric ancestory of today's rhinos. With the rhino bull in the crate on his way to the Etosha National Park we have time to follow the rhino trail briefly through the paleontological history of earth.

CHAPTER 2

Prehistory and taxonomy

The history of life on earth is well preserved as fossils in the rock layers of the earth's surface. This is true for both plants and animals. Fossil-bearing rocks could be considered a library of information on life and its evolution over time. This branch of the biological sciences was opened in the late 19th century by people who, with painstaking patience and care, studied these fossils.

The best-known fossils are those from the dinosaurs. This name, a compilation of two Greek words meaning 'terrible lizard', was given to them by a geologist in 1841. He was the first person to study these fossils. Dinosaur fossils are found in rocks from the Mesozoic era, which lasted from 225 million years to approximately 65 million years ago. Over the past two decades dinosaurs have become a household topic, after being popularised by science fiction books and Hollywood productions. To place these early events on earth in perspective, and to follow the trail of rhinos, let's start our journey through history at the dawn of time.

The oldest rocks on earth were formed during the Pre-Cambrian. By dating these rocks geologists have found the earth to be approximately 4 000 million years old. We will skip the first 3 775 million years and look at the Mesozoic era. This era is divided into three main periods; the Triassic, Jurassic and Cretaceous. At this time the surface of the earth consisted of one huge land mass known as Pangaea, which was covered by extensive forests and deserts and stretched between the two poles. During the Triassic, Pangaea slowly divided into two continents, Laurasia and Gondwanaland. By 190 million years later, during Jurassic times, the two continents had drifted apart. During the Cretaceous, oceans started developing. By the Cenozoic era, 65 million years ago, the seven continents that we know today were in place.

It was during the Mesozoic that dinosaurs lived. They dominated life on earth for 160 million years. Compare this with the approximately two million years that people have been around! After dinosaurs reached their evolutionary peak during the Jurassic they declined and eventually became extinct towards the end of the Cretaceous. Scientists are still involved in a heated debate about why this happened.

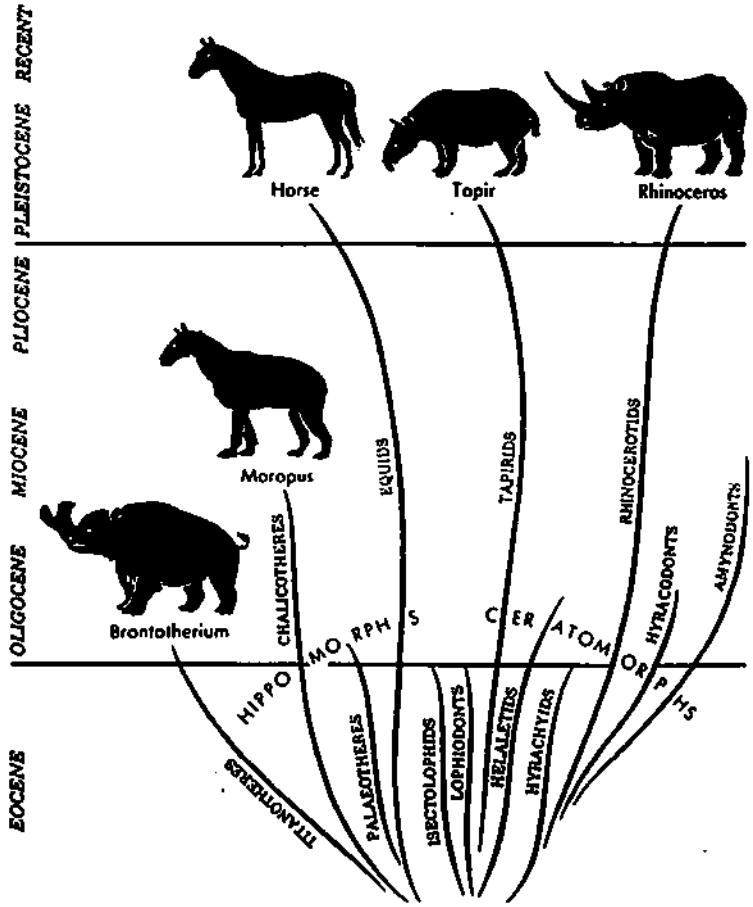
The Quaternary was characterised by extreme changes in the climate on earth. This period included the ice ages, which caused sea levels to vary. The lowering of the sea level was often sufficient to allow continents to be linked by land bridges. This made it possible for animals, including rhinos, to move between continents. It is at this point, at the onset of the Tertiary, that we find the first signs of rhino-like animals on earth.

ERA	PERIOD	EPOCH	MILLIONS OF YEARS BEFORE THE PRESENT
CENOZOIC	QUATERNARY	HOLOCENE	0.01
		PLEISTOCENE	2
	TERTIARY	PLIOCENE	12
		MIOCENE	25
		OLIGOCENE	37
		EOCENE	53
		PALEOCENE	65
MESOZOIC	CRETACEOUS		136
	JURASSIC		190
	TRIASSIC		225
PALEOZOIC	PERMIAN		280
	CARBONIFEROUS		345
	SILURIAN		430
	ORDOVICIAN		500
	CAMBRIAN		570
PRE-CAMBRIAN			OVER 570

A simplified geological time scale

The Tertiary lasted approximately 50 million years and rhino-like animals thrived during this period. They were present in a variety of forms and attained such high numbers that this time could be called 'the age of rhinos'.

The rhino trail is relatively easy to follow through the mists of early time. However, with several lines of rhinos and rhino-like animals evolving parallel to one another, the explanation of their evolution is complex. The available fossils, the clues that they represent, and their interpretation by paleontologists working in this field are fascinating. The evolution of rhinoceroses and rhinoceros-like animals during the Tertiary can be divided into two phases. During each phase they developed a central stock with several branches. Both phases were followed by the extinction of almost all the species.



Evolutionary radiation of modern day Perissodactyls (After Savage and Long)

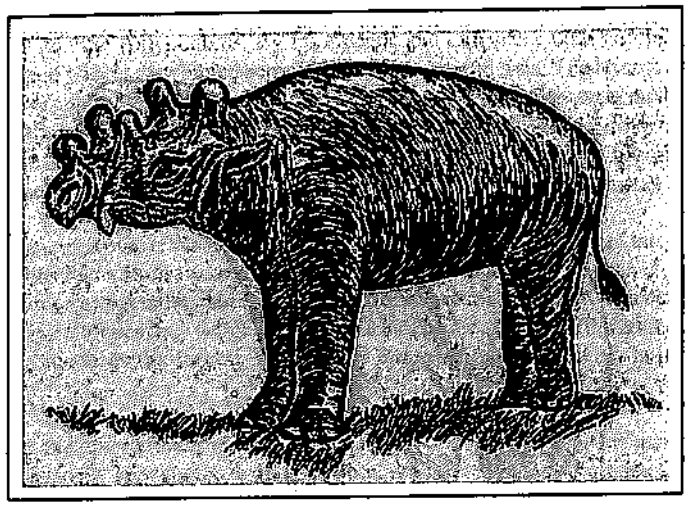
The development of the first central stock started during the Paleocene. Speaking in geological terms, rhinos developed into a diverse group in a relatively short time. Their fossil remains are abundant, and in geographical terms, widely distributed. These animals probably dominated the scene during the Paleocene and Eocene. The largest of all land mammals was a rhino that lived during this period. Rhinos retained their dominance until Oligocene times when various lines started dying out and their dominance waned. By the end of the Oligocene the central stock of the first phase had nearly died out. Scientists are still trying to find a feasible explanation for this near extinction. A few species, mainly in Asia, survived into the Miocene.

The second phase of radiation developed from this small remaining genes pool during the late Miocene. The dimensions reached by this second radiation overshadowed the first in every way. Although the dominance reached by rhinos and their rhino-like counterparts was spectacular it cannot be compared with the dominance of the dinosaurs during the Mesozoic, especially with regard to its duration. This domination by rhinos in terms of variety, numbers, and dispersion was true on all continents.

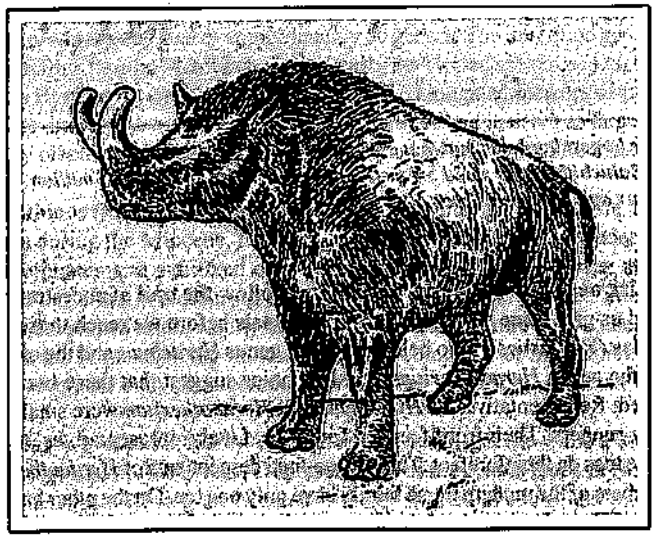
The second decline started in North America where many species were extinct by the end of the Pliocene. In Eurasia many species of rhino suffered the same fate. The remaining species managed to survive owing to their ability to adapt. By the Pleistocene they had become highly specialised. Ironically, it was this high degree of specialisation that later proved to be their downfall. The high level of presumed 'over' specialisation made it impossible for most species of rhino to adapt to the climate changes that occurred during the Pleistocene.

It is necessary to place the term 'climate change' in perspective. If, for example, the present climate of the earth was to change to the extent that the average temperature of the earth's atmosphere increased by two degrees centigrade, 70 percent of the grain-producing areas of the world would become unproductive. With two-thirds of the world's population (mainly the poorer part) dependent on rice as their staple food the impact on the human race would be catastrophic. Imagine the effect on the environment if whole continents, or even parts of them, were covered by ice caps! Therefore climate change meant that owing to changes in temperature and rainfall patterns the vegetation and thus the food of herbivores also changed. Of course some of the herbivorous species did manage to adapt to the forced dietary change and survived.

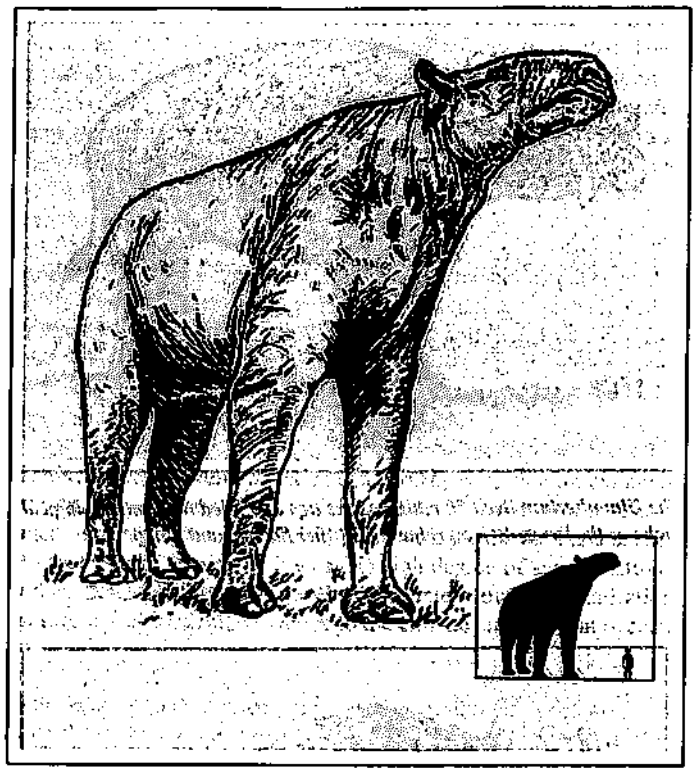
It was not only the rhinoceroses that suffered from this change in food during the Pleistocene. There were many other primeval herbivores that could not adapt to the changing conditions. Elephant-like animals, of which the best known are probably the mastodons and mammoths, faced the same dilemma. Less known is the diversity of horse-like and other ungulates that became extinct. With this dramatic reduction in their prey it is not surprising that predators like the sabre-toothed cats were also doomed. By the end of the Pleistocene nearly all the representatives of the various lines of rhinoceroses had died out. The surviving rhinoceros family contains only five species.



The Uintatherium lived 50 million years ago and filled the same ecological niche as the living African rhinoceros (After Savage and Long)



***Brontotherium**, a gigantic Oligocene browsing ungulate from North America (After Savage and Long)*



The largest land mammal that ever lived. The Indricotherium (=Baluchitherium) stood 5.4 metres at the shoulder and lived 35 million years ago in Central Asia (After Savage and Long)

After this quick overview let us now go back and follow the trail of ancestral rhinos. This trail will lead us past some strange, rhino-like animals before we reach those species still surviving today. The earliest rhino belonged to the genus *Hyrachyus* and the oldest ancestor of horses to the genus *Hyracotherium*. Fossil remains suggest that these two genera were closely related. Representatives of *Hyrachyus* and *Hyracotherium* were small and slender and were fast runners. Their front feet had four toes. Later, representatives of both genera had only three toes on their forefeet. These three-toed descendants of *Hyracotherium* became extinct. Members of the modern horse family have only one toe. On the other hand, surviving descendants of *Hyrachyus* retained three toes on their front feet. Despite this difference the horse family Equidae and the rhinoceros family Rhinocerotidae are placed in the same order, the Perissodactyls, on the basis of various anatomical similarities.

During the Paleocene two branches developed from the original *Hyrachyus* stock, the Hyracodonts and the Amynodonts. By the Eocene and Oligocene both groups were well represented and widely distributed across North America and Asia. The Hyracodonts were represented by approximately a dozen genera, most of whose members were medium-sized. During the Oligocene in Asia a series of huge rhinos developed from this group of medium-sized animals. Paleontologists group these hornless giants in a subfamily named Indicotherinae. They occurred from Caucasia, across central Asia and Baluchistan into China.

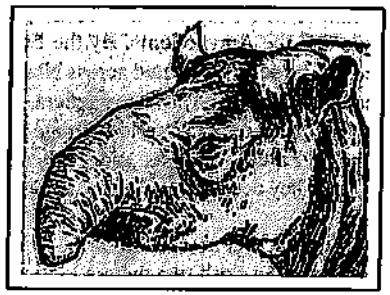
The largest mammal ever to walk on earth, *Baluchitherium*, was a member of this subfamily. *Baluchitherium* had a skull two metres long and a body length of more than eight metres. They could browse vegetation that was eight metres above the ground. With a body mass of approximately 30 tonnes they weighed four and a half times as much as the largest elephant and twice as much as the largest mammoths. *Baluchitherium* survived until the early Miocene.

Amynodonts, the other branch of the original stock, was represented by ten genera. These animals had a stocky appearance, with heavy bodies, short legs and shortened faces. They boasted elongated incisors. Their almost hippo-like appearance suggests that some representatives developed into semi-aquatic animals while others became fully aquatic. In this group Metamynodonts had a prehensile lip and Caduredons developed a short trunk.

The first phase in the development of the rhinos was all but over by the end of the Oligocene. The small group of surviving Hyracodonts formed the basis for the radiation of the second central stock of rhinos. The rhinos of this second phase are all grouped into the family Rhinocerotidae, which consisted of approximately 50 genera. The four rhino genera surviving today belong to this family. Members of this family developed specialised teeth. Although some, such as Hyrachyus, developed small horns, the elongated incisors of the lower jaw were their most important weapon. Some representatives had incisors as large as the tusks of present-day elephants, but all these became extinct during the middle Pliocene.

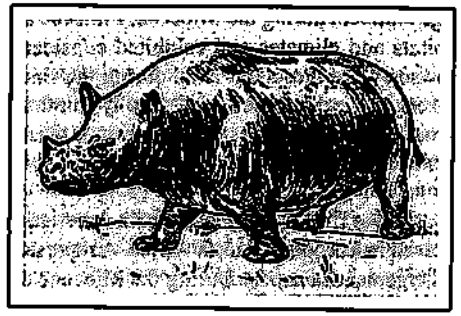
The different rhinos from this second phase lived in North America, Eurasia and Africa in large numbers during the Miocene, Pliocene and Pleistocene. They were adapted to many habitats and climates and exhibited considerable dietary diversity. Some of them were browsers, like those that lived during the first phase, but others evolved into specialised grazers. Some developed thick, woolly hair that covered their entire body; others developed horns. As with the horns of living rhinos these were composed of matted hair that did not fossilise. However, the bony protuberances on the skull suggest the presence of horns.

A variety of rhinos evolved in North America during the Oligocene while a different stock evolved in Europe and north Africa. A representative of the central stock in North America is the genus *Caenopus*. During the Miocene the key species in this genus was *Teleoceras fossiger*. These rhinos looked like hippos. They stood approximately one and a quarter metres tall, with a body circumference of three metres and a slightly longer body length. The amazing thing about *Teleoceras fossiger* is that with a body size similar to the rhino of



Cadurcodon, an amynodont rhinoceros with elongated proboscis from the Oligocene of Mongolia (After Savage and Long)

Arsinoitherium lived in Egypt during Oligocene times (After Savage and Long)



Teleoceras was a hippopotamus-like rhinoceros from the Miocene of North America (After Savage and Long)

today, its brain was twice as large. *Aceratheriums,* the other stock in Europe and north Africa, were of medium size. They were most numerous during the Miocene. They were hornless, with specialised teeth indicating that they ate both grass and leaves.

The second radiation dispersed rhinos to all corners of the earth and they developed into many different types. This process reached its peak during the Pleistocene. The main development was the increase in body size. To be able to support their heavier bodies they also developed large, wide feet. Their premolars became enamelled and molar-like and the familiar rhino horn developed. A well-known rhino from this period was *Coelodonta,* the woolly rhino that occurred from Britain to eastern Siberia. Apparently it never crossed Beringia into North America. Beringia is the name of the narrow strip of land that connected Asia and America when the level of the oceans dropped during the ice ages.

Woolly rhinos attained fame by being the subject of Palaeolithic artists. These ice age artists, who also shared their environment with mammoths and sable-toothed cats, depicted woolly rhinos on the walls of caves. An artist at Font-de-Gaum in France, by the flickering light of a smoky torch, painted a *Coelodonta,* clearly showing the shaggy coat and two large horns. Like the hairy mammoth, this rhino had adapted to eat the vegetation of the temperate and tundra regions.

The final rhino from the Pleistocene to be discussed is *Elasmotherium.* These rhinos, from the steppes of southern Russia, were very large. They had a skull that was 75 centimetres long and instead of a nasal horn they had an enormous, two-metre long horn on their forehead. This horn gave rise to the animal's alternative name, the giant unicorn. With complex enamel patterns on its molars it was the most specialised grazer to have evolved among the rhinoceroses.

Most of the fossil remains found in rocks dating from the Pleistocene come from animals that have living relatives. The two rhinos living in Africa today have a common ancestor. Fossils from the transitional period, between the Pliocene and the Pleistocene, suggest that at that time both black and white rhinos were distributed across Africa. At Langebaan, near Cape Town, fossils of rhinos that lived seven million years ago have been found. A type of white rhino *Ceratotherium praecox* was the most common rhino at that time. Apart from the extinct black rhino species being larger, no other anatomical differences exist between these rhinos and their living relatives. This fact is accepted as an indication of the evolutionary stability of the genus.

Except for a few localities along the Orange River, Namibia is not renowned for fossils. However, the complete skeleton of a fossilised rhino was discovered near Grunenthal. The carbon-14 dating process revealed these remains to be 10 000 years old. A set of well-preserved rhino footprints occur in a calcrete pavement in the Namib Desert, south of Lüderitz. Rhino skulls and scattered pieces of skeleton have been found along the drainage lines of the Fish, Kuiseb and Swakop Rivers. Old rhino bones have also been found at other localities in Namibia, notably Omaruru, Windhoek and Gobabis.

Coelodonta antiquitatis, the furry Ice Age woolly rhinoceros, which roamed Europe during the late Pleistocene (After Savage and Long)

Elasmotherium was a very large rhinoceros that lived in Siberia during the mid Pleistocene. The single horn on the forehead could reach two metres in length (After Savage and Long)

Over the millennia rhinos left a wide trail of footprints. This trail has been reduced and today only faint traces of footprints remain in Africa and Asia. From an evolutionary point of view it could be argued that rhinos were one of Mother Nature's more successful experiments: the first rhino-like animals left their footprints on earth 60 million years ago, and for 50 million years rhinos were one of the dominant animals. But eventually this dominance waned and most of the representatives became extinct during the Pleistocene. This trend is also true for several other large mammals.

Only five species of rhino survive today, grouped into one family. These living monuments of a forgotten era live in Asia, which has three species, and Africa, with two species. But the extinction that they avoided over millennia is now happening as a result of the activities of people. Rhinos have been placed on a collision course with extinction and are racing towards this destination at an ever-increasing speed.

Let us follow the clover trail of the African rhinos. Paleontological evidence suggests that those forms of rhino that selected open grasslands as their habitats evolved faster than their counterparts that remained in the forests. During the transition from the Miocene to the Pliocene two groups of rhinos stepped out onto the African savanna. Both groups boasted two horns. The importance of these protuberances as defence mechanisms continued and the nasal bone became stronger in order to support them. As they evolved, the African rhinos lost their incisors, their lower jaw became shorter, and the bone structure of their upper jaw adapted to the lower jaw. One group developed into browsers with a specialised, prehensile upper lip. The second group became grazers and developed wide lips and long, crowned molars.

Taxonomically, African rhinos are divided into two genera. The one genus *Ceratotherium* is of the white rhino lineage and the other *Diceros* is of the black rhino lineage. Each genus has one species, with several subspecies recognised by taxonomists.

The white rhino *Ceratotherium simum* has two subspecies. One subspecies *Ceratotherium simum cottoni* occurs in central and east Africa and is known as the northern white rhino. The other *Ceratotherium simum simum* lives in southern Africa and is known as the southern white rhino. The physical differences between the two subspecies appear to be small, with the most noticeable difference confined to the head. Jacques Flamand, who worked closely with southern white rhino during his years with the Natal Parks Board, had an opportunity to visit Garamba National Park in Zaire, where he saw a couple of the rhinos and could examine some skulls. He told me that while the body size and shape did not appear to differ markedly, the most striking difference was in the shape of the head. The northern white rhinos had a more 'boxy' look to their head, brought about by the almost flat nasal bones of the face, which in southern white rhinos are distinctly concave, giving the latter a dish-faced appearance in profile.

The taxonomy of the black rhinoceros is actually very interesting. With the black rhino *Diceros bicornis* seven subspecies are recognised. They are *Diceros bicornis longipes* from

west Africa; *Diceros bicornis brucii* from Ethiopia and eastern Sudan; *Diceros bicornis ladoensis* from Uganda and southern Sudan; *Diceros bicornis micheali* from east Africa; *Diceros bicornis chobensis* from Zambia and Botswana; *Diceros bicornis minor* from the wetter, eastern side of southern Africa; and *Diceros bicornis bicornis* from the south and drier, western side of the subcontinent. The physical differences between the subspecies also appear to be small. The black rhinos on the eastern side of the continent, from east Africa to Natal in South Africa, suffer from the presence of a parasite causing skin lesions behind their shoulders. The parasite is a microfilarial nematode and is thought to be transmitted by a fly. Black rhinos in Namibia and Zimbabwe, the drier regions of the subcontinent, do not show these lesions.

The existence of subspecies has become increasingly important in nature conservation. This is especially true when we look at rhino conservation strategies. However, before we address this issue it may be prudent to explain some basic rules involved when animals and plants are classified and receive their scientific names.

A Swedish biologist, Karl Linnaeus, is recognised as the father of taxonomy. He introduced the binomial system of naming specimens in the 18th century. According to this system every biological specimen receives a name, which consists of two words or parts: a first or species name and a surname or genus name. The name of the genus is always given first. Related species are grouped into a genus and groups of genera form a family. Families are placed in an order and orders combine into cohorts, and so on.

Biological forms that are described as a species are necessarily unique forms in that individuals of that species cannot mate with individuals of other species. If mating can take place the resulting progeny are infertile. Horses and donkeys are two separate species but belong to the same genus, *Equus*. Their scientific names are as follows: horses are *Equus* (surname or genus) *caballus* (first name or species) and donkeys are *Equus assinus*. These two species provide one example of the few instances where two species can mate successfully. However, their progeny (mules) are sterile.

Latin is the language used for scientific names, and foreign words are always printed in italics. These words are underlined in handwritten documents as a means of communicating with the typesetter to put them into italics. After a genus name is used once in a publication it is shortened to its first letter when used again.

In the past, scientists frequently named biological specimens without knowing that they had already been named by scientists elsewhere, resulting in a species acquiring two names. This happened often in botany because plants are usually widely distributed. Good examples in Africa are grasses that were described in southern Africa, only for it to be discovered later that the same grasses had already been described in east Africa.

With modern communications and easier, speedier access to study material this duplication does not happen so frequently today. When it is discovered that a biological form has two

scientific names, the name that was first published is accepted as the correct one. This is the reason why the name of the person who described the species, and the year when this occurred, are also given. Let us use the black rhino as an example. In scientific publications the black rhino would be referred to as *Diceros bicornis* Linnaeus, 1758. This means that Linnaeus published a scientific description and named the black rhinoceros back in 1758.

The concept of subspecies also needs to be clarified. Often a species with a wide geographical distribution will develop different genetic characteristics between the extremes of its range. At first these differences will frequently be morphological, for instance a minor variation will occur in colour or size. Sometimes the differences will be behavioral. When the two extremes of the distribution become genetically isolated, the differences may increase and reach a point where the individuals at either end of the distribution will be identified as separate subspecies.

In southern Africa, springbok are distributed over much of the southwest arid zone. Those springbok that live at the northwestern end of their distribution, in Angola and Namibia, are larger than those at the other end of their distribution in the Karoo of South Africa. Although taxonomists are not in agreement, three subspecies have been recognised: *Antidorcas marsupialis angolensis* from the north of their range, in southern Angola and northern Namibia; *A. m. hofmyeri* from the centre of their distribution, in southern Namibia and Botswana; and *A. m. marsupialis* from the southern parts of their range, in the Karoo.

Although subspecies may differ in appearance they will still be able to mate if brought together. If the spatial separation between two subspecies continues long enough, theoretically they could develop into two separate species. This is one reason why biologists and conservationists are intent on protecting the genetic variability and integrity of subspecies by keeping them separate. This ensures that biodiversity is maintained.

The southern African mountain zebra *Equus zebra* provides one example. The Namibian mountain zebra *Equus zebra hartmannae* is larger than *E. z. zebra* from the southern Cape. Likewise there are differences between the Cape bontebok *Damaliscus dorcas phillipsi* and the blesbok *D. d. dorcas* of the highveld regions of southern Africa. Conservation authorities in southern Africa are trying to prevent hybridisation between these subspecies by rigid controls on their translocation.

The first rhinoceros that was scientifically described was the black rhinoceros. Karl Linnaeus obtained the material from a museum but he wrongly assumed that the rhino was from India. Based on his detailed description scientists could later prove that the animal actually originated from southern Africa.

During the 19th and early 20th centuries taxonomy was the hottest biological field of the time and biologists vied to describe specimens new to science. Many strange and 'rare' animals were brought back from all corners of the earth by scientists and amateurs alike. In this competitive milieu animals from various geographical regions in southern Africa were

CLASS	**MAMMALIA (Mammals)**
SUBCLASS	**THERIA (Placental mammals)**
COHORT	**EPITHERIA**
ORDER	**PERISSODACTYLA (Odd-toed ungulates - horses, zebra and rhinos)**
FAMILY	**RHINOCEROTIDAE (Rhinoceroses)**
GENUS	**CERATOTHERIUM (White rhinoceros)**
SPECIES	*Ceratotherium simum*
Subspecies	*Ceratotherium simum simum* (Southern white rhinoceros)
	Ceratotherium simum cottoni (Northern white rhinoceros)
GENUS	**DICEROS (Black rhinoceros)**
SPECIES	*Diceros bicornis*
Subspecies	*Diceros bicornis bicornis* (Drier parts of southern Africa)
	Diceros bicornis minor (Wetter, eastern part of southern Africa)
	Diceros bicornis chobiensis (Botswana; Caprivi; western Zambia; eastern Angola)
	Diceros bicornis michaeli (Kenya; southern Somalia)
	Diceros bicornis ladoensis (Uganda; southern Sudan)
	Diceros bicornis brucii (Ethiopia; eastern Sudan)
	Diceros bicornis longipes (Western Sudan; Chad; Central African Republic; eastern Nigeria)
GENUS	**RHINOCEROS (One-horned rhinoceros)**
SPECIES	*Rhinoceros unicornis* (Indian rhinoceros)
SPECIES	*Rhinoceros sondaicus* (Javan rhinoceros)
GENUS	**DICERORHINUS (Two-horned rhinoceros)**
SPECIES	*Dicerorhinus sumatrensis* (Sumatran rhinoceros)
Subspecies	*Dicerorhinus sumatrensis lasiotus* (Burma)
	Dicerorhinus sumatrensis sumatrensis (Thailand; Malaysia; Sumatra)
	Dicerorhinus sumatrensis harrissoni (Brunei)

A simplified taxonomy of rhinoceroses

deemed to differ enough to be described as new species. In this way 'new' black rhino species were described from the Marico district of western Transvaal, from Zululand, and from South West Africa (as it was then called). Most of these taxonomic problems have subsequently been resolved.

Early travellers, taxonomists, and natural historians frequently fell victim to their own rich imaginations. A good example of this was recorded from Namibia. This also serves as an illustration of the scramble by taxonomists to immortalise their names in science. A taxonomist named Schinz published a taxonomic monograph *Synsopsis Mammalium* in 1845. He not only described a rhinoceros in this monograph but also gave it a scientific name. The existence of this rhino *Rhinoceros niger* was not based on any physical evidence or material but purely on a description by a certain Captain Alexander. It seems almost unbelievable that several other taxonomists would later quote this description without question.

Let us look at the circumstances leading to the 'birth' of *Rhinoceros niger*. During 1836 and 1837 Captain Alexander travelled through the northwestern Cape Province and southern Namibia. He described his experiences in a volume called *Travels in the interior of South Africa*, which includes a map showing the route of his journey. Captain Alexander gave a detailed account of his confrontation with a rhino that he observed at Chuntop, near Mount Mitchell. According to the map Mount Mitchell is located in the Naukluft Mountains south of Windhoek. He observed that these rhinos were giants, standing six feet tall. This is considerably larger than black rhinos really are. Furthermore, he claimed that the horns of these rhinos were loosely mounted on their foreheads. While they were browsing, these horns would supposedly clap together and make a clicking sound, which indicated that the animals were content. When the rhinos were alarmed the horns would stiffen on their mound and the animals would be ready to defend themselves!

There is a really simple explanation for the clicking that Captain Alexander heard. Black rhinos are browsers. They bite twigs up to one centimetre in diameter. When a rhino bites through a twig, this action makes a clear, clicking sound. As black rhinos browse, their heads are frequently obscured by the bush on which they are feeding. It is therefore quite possible that Captain Alexander approached the rhino close enough to hear the clicking sound but could not see exactly what was happening.

Probably because the description by Schinz was not based on any scientific source it was ignored by most taxonomists. The first noteworthy scientific work was the 1876 publication *On some Cranial and Dental Characteristic of the Existing Species of Rhinoceros* by Dr Flower, which does not mention *Rhinoceros niger*. Though *Rhinoceros niger* was to a large extent a figment of Schinz's imagination it was the first published name for a rhinoceros from Namibia.

The second rhino species from Namibia was described by a taxonomist named Zukowski. He travelled through Namibia during 1922 and came across rhinos in the south of Damaraland in isolated localities along the Ugab River, and further to the north in Kaokoland. Based on

his observations Zukowski published a description of a 'new' black rhino species from Namibia in 1924. He called this rhino *Opsiceros occidentalis*.

A South African taxonomist Captain Shortridge, at the time the director of the Kaffrarian Museum in King William's Town, travelled extensively in Namibia from 1930 to 1932. The objective of his travels was to collect as many animals and as much study material as possible for the museum. It was a successful collecting trip and he published a comprehensive work in two volumes on the taxonomy of the mammals of Namibia. In this work he tried to correct the taxonomic confusion, describing several new species in the process.

Captain Shortridge did not accept the existence of *Rhinoceros niger*. He believed that *Opsiceros occidentalis* was not distinctly different from *Diceros bicornis*, as described by Linnaeus back in 1758. Thus according to Shortridge, the black rhinos from Namibia were the same species as the rhinos from the Cape that had been described by Linnaeus. Two other well-known taxonomists, Allen and Austen Roberts, the latter the mammalogist from the Transvaal Museum in Pretoria, supported this view. These gentlemen published scientific papers in 1939 and 1951 respectively. Both declared that *Rhinoceros niger* and *Opsiceros occidentalis* did not exist as separate species and were synonymous with *Diceros bicornis bicornis*.

Despite the rejection of his species by taxonomists Zukowski continued undaunted. In 1965 he published his revision of the taxonomy of the black rhinoceros genus, *Diceros*. By this time it had been accepted that all the distinct black rhinos were different subspecies belonging to one genus, *Diceros*. Most taxonomists also agreed that *Rhinoceros niger* did not exist. Zukowski faced the following dilemma. The rule in taxonomy is that the first published name of a species is the name that science accepts. Although the description of *Rhinoceros niger* was not based on scientific fact, the name had been published in 1845. It therefore had to be used should a rhino species be described from that same region. To retain the name *Opsiceros occidentalis*, which was that given to the rhino he had described, Zukowski had to accept the existence of *Diceros bicornis niger* Schinz as a distinct subspecies. Zukowski gave in to the temptation to have his own name (subspecies) immortalised in the annals of science, and did just that.

Another baffling thing that Zukowski did was the following. In 1836 a certain Smith published a description of a black rhino species from the northwestern Cape. Smith based his new species on the fact that the anterior and posterior horns of the animal were the same size. This characteristic is subjective because animals with similar-sized horns are not uncommon in most black rhino populations. According to Smith his species of black rhino occurred north of Kuruman in the upper reaches of the Limpopo River. The validity of this animal as a separate species was already questioned in 1881 by a well-known hunter named Selous, who argued that the animal described by Smith was indeed synonymous with *Diceros bicornis* and therefore did not exist as a distinct species. This point of view was accepted by most taxonomists until Zukowski came along. In his revision of the genus Zukowski accepted the existence of this animal and included it as a subspecies *Diceros bicornis*

keitloa. Understandably Zukowski's revision of the genus is not accepted as a standard work of reference by taxonomists.

From a conservation point of view it is important to know whether a species consists of two subspecies or not. If the populations of rhinos in South Africa and Namibia proved to be separate subspecies, it would place a greater responsibility for conservation on both countries because they would need to protect their individual subspecies. This is an argument which could be, and in fact is, used by conservationists to strengthen their case in the constant battle for legal and financial support. Due to this situation the taxonomic status of the Namibian rhinos was studied in 1968. As part of this study I compared 18 black rhino skulls from Namibia with 20 black rhino skulls from Natal. Based on 16 different measurements taken from each skull it was found that the skulls from Namibia were, on average, six centimetres longer than the skulls from Natal. At the time I did not believe that the difference was sufficient to warrant placing the Namibian and Natal rhinos in different subspecies.

Using modern technology to study genetic material it was later found that the two populations could justifiably be considered as two distinct subspecies. The rhino described by Linnaeus is considered the nominal form or the original species. These animals, originating from the Cape, which is part of the southwest arid zone, are considered to be the same as the rhinos from Namibia. Black rhinos from Namibia are therefore regarded as part of the nominal form and thus retain the original name of *Diceros bicornis bicornis*. The rhino subspecies from other parts of the continent, such as Natal, receive other subspecific names. However, we have been immersed long enough in the taxonomy of rhinos. Let us return to that black rhino on his way to Etosha National Park.

CHAPTER 3

Translocations and reintroductions in Namibia

The chopper, with myself on board, made a sweeping turn over the truck with its valuable cargo. It hovered a moment, then tilting forward it headed away towards the setting sun and base. The crate was secured to the truck by chains, with the vet perched on top to keep an eye on the rhino. The long-acting tranquilliser he had given the bull appeared to be working. The truck followed the smaller vehicle, which was negotiating a course around bushes, termite mounds and aardvark holes. The senior game ranger, who was driving the pick-up, did not follow the same route along which they had arrived earlier that afternoon. It was important to reach the main road along the smoothest path, and they had decided that the best way out would be to follow the omuramba, which crossed the road some distance further along. In the gathering darkness both drivers and passengers kept a sharp eye out for holes and logs. When the drivers had to turn on the headlights the going was even slower. It was almost midnight when they reached the road.

They stopped to stretch their legs. The senior ranger had a thermos flask of coffee and they stood around sipping the scalding, sweet, black liquid. Before setting off, the vet again climbed onto the crate. He let the beam of a flashlight play over the rhino, who appeared calm. Satisfied, he descended and joined the others in the already over-full cabin. The road was in a poor state of repair, with numerous loose stones and criss-crossed with gullies washed by the rains. The smaller vehicle was still going on ahead to warn the driver of the truck should they encounter a particularly bad stretch of road. The going slowed again when they started up the escarpment. On top of the plateau the road improved slightly and they could travel a little faster. They stopped every half an hour so that the vet could check on the rhino.

At mid-morning they arrived at Ombika, an entrance gate to Etosha National Park. Vehicles filled with tourists formed a queue waiting to enter the park. When the small convoy stopped to wait for a side gate to be opened the tourists gathered around the truck and its load. Earlier, the capture team had proudly attached a sign to the truck showing the nature of their mission. But now they were tired as they fielded questions from the tourists. Halali, their destination, was still more than two hours' drive away. When the gate was opened they drove off, leaving the official at the entrance to answer the questions.

When they arrived they found me waiting at the holding pens, most of which already contained rhinos. I got there early that morning, travelling from base camp by a shorter route. I joined the vet and we watched the offloading. It was done efficiently, a sign of the experience of the capture team. The process was the reverse of the loading. The truck was

parked with its back towards the holding pen. With the aid of the hydraulic system the platform containing the crate was lowered to the ground from the chassis of the truck. The only difficult part was turning the crate around and moving it closer to the gate. When the crate was in position the gate was slid aside and the door of the crate was lifted. Everyone waited.

After a short while the rhino slowly moved from the crate into the pen. His first action was to walk around the inside of the pen, sniffing at everything. Although the pen had been carefully cleaned the bull could still detect traces of the previous occupant. In one corner of the pen was a pile of freshly cut branches. After a while the rhino returned to the water trough and began drinking. We both heaved a sigh of relief. The bull had accepted his temporary accommodation.

As I stood there watching the rhino munching branches I thought about the first rhino ever caught by the Division of Nature Conservation in Namibia. It was in the winter of 1967. The political turbulence that had caused the urgent start of the translocation of black rhinos in Namibia was still clearly imprinted in my mind. During 1965, in a dramatic verdict, the World Court in The Hague had confirmed the legality of South Africa's guardianship over the former German territory of South West Africa. It quickly became clear though that the international community was not going to accept this verdict. As soon as the judges serving on the bench were purged, an appeal was filed against the verdict. However, the positive verdict and the time bought by it encouraged South Africa to increase its efforts to convince the world about its good intentions towards Namibia and its peoples.

It was several years previously that the world was first alerted to the question of whether the guardianship of South Africa over Namibia was legal. During the time leading up to the court case the South African government appointed a commission of enquiry to study the situation in Namibia. The brief of the commission was to formulate a plan that would ensure sustainable economic growth in the country. This growth had to be similar to the policy of separate development, which was the basis of apartheid as practised by the South African government of the time. Consequently a commission under the chairmanship of Mr Fox Odendaal, then Administrator of the Transvaal, spent most of its time dividing the territory into smaller 'countries'. This would allow the government the opportunity of making provision for the separate development of the different ethnic groups. This meant that large sections of land had to be reallocated to form countries for each ethnic group. In each of these 'homelands' an infrastructure capable of supporting economic growth had to be put in place. It was a grandiose scheme and cost the South African taxpayer millions of rands. The proposal, which was eventually tabled in parliament and approved, became known as the Odendaal Plan. Implementation of this plan received the highest priority from the South African government.

Large areas of state land were earmarked for homelands. The land of more than 400 European farmers was expropriated for the same reason. The impact of the Odendaal Plan on nature conservation in Namibia was what concerned conservationists most. One of the plan's

recommendations was that a gravel road, passable in all weathers, was to be built to connect Kamanjab and the hydroelectric scheme at the Ruacana Waterfall on the Kunene River. A high-tension power line into the interior of the country, which had been constructed earlier, crossed through Etosha Game Reserve. For security reasons the proposed road had to follow the power line. Furthermore, it was recommended that the area of the game reserve to the west of this new road should become part of Damaraland and Kaokoland. A large section on the northern side of the game reserve was also excised to become part of Ovamboland. According to the plan all this land was to become cattle farms.

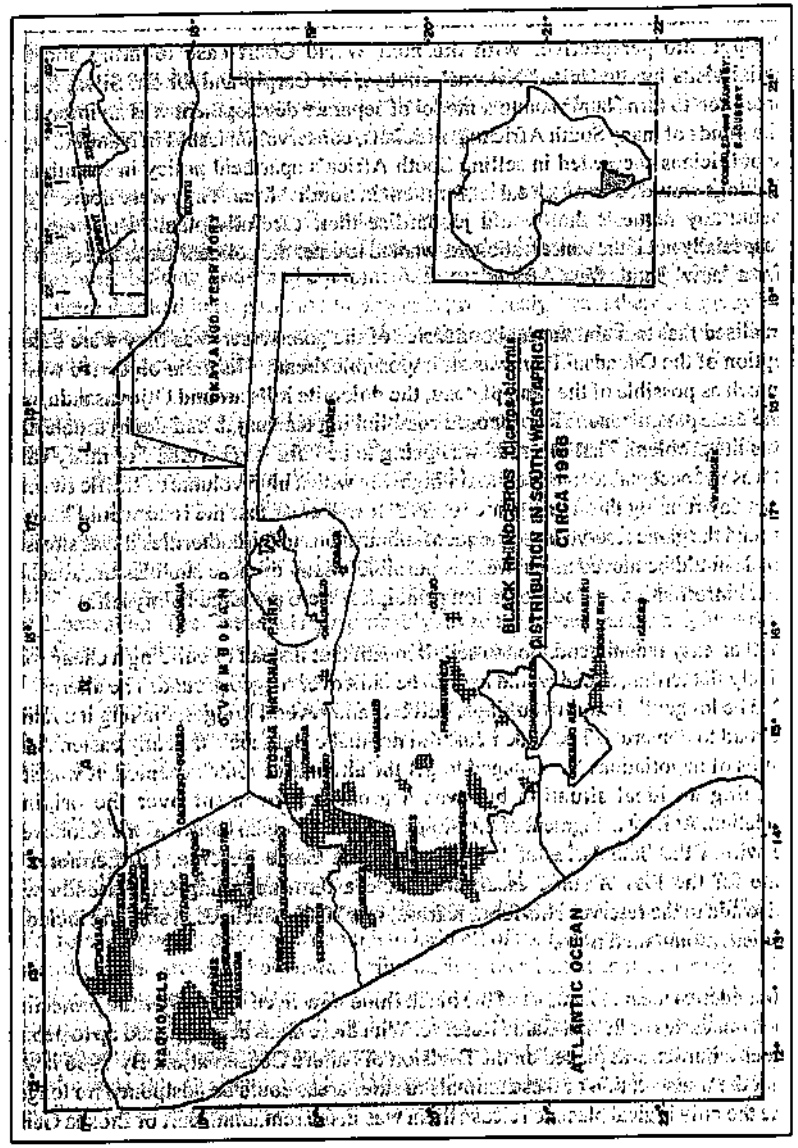
This recommendation had extensive implications for the biodiversity of Etosha Game Reserve. It meant that the larger part of the sand plateau between Okaukuejo and Otjovasandu would be lost, as well as the range of dolomite hills around Otjovasandu. Everything that lay 400 kilometres west of Otjovasandu towards the Atlantic shore would no longer be part of the game reserve. This included the broken escarpment region, the pro-Namib plains, and also extensive areas of desert. If carried out, the plan would not only have an adverse effect on the conservation status of black rhinos but would also seriously compromise the ecological viability of the game reserve.

The Odendaal Plan affected the black rhino in Namibia in two ways. The preferred habitat of the black rhino in Namibia is the broken escarpment zone. The application of the plan meant that most of the rhino, which up to that time had been protected in the game reserve, would now live on private farmland. Furthermore, these rhino would have to compete with domestic livestock for water. Other wildlife species living in this area would also be affected. These included the full spectrum of predators, other game such as mountain zebra, black-faced impala *Aepyceros melampus petersi*, dik dik *Madoqua kirkii*, and many birds. Similarly a variety of endemic species of plants and unique vegetation zones would be outside the protection offered by a game reserve.

The late Bernabè de la Bat, then Director of the Division of Nature Conservation, immediately did battle. The recommendations of the Odendaal Commission had already been tabled in the South African parliament and were approved. Their implementation received the highest priority from the government of South Africa. Bernabè's objective was to gain some concessions on those sections that had negative implications for conservation.

Some background information on Bernabè will be in place here. He was appointed to Etosha Game Reserve in 1953 as the first biologist at the park. In 1955 he became both warden and biologist. With the establishment of an official conservation agency in 1963 he was appointed as its first director, a position he held until 1981. He was responsible for developing a conservation organisation in Namibia that became a model for the developing world.

Bernabè de la Bat had to face formidable political opposition. What he managed to achieve is remarkable and should not be forgotten in the annals of conservation in Namibia. There were of course factors that helped him. For instance the indignation and support of national and international conservation communities, which were publicised worldwide by the media.



Black rhinoceros Diceros bicornis distribution in South West Africa, circa 1966. This map appeared in the original report on black rhino

This, however, does not compromise or diminish Bernabè's contribution. The issues at stake, both for South Africa on the one hand and conservation in Namibia on the other, need to be put into perspective. With the next World Court case looming and the consequential visits by the United Nations' envoys, Mr Carpio and Dr Da Silva, South Africa's intention to turn Namibia into a model of separate development was an important issue. In the minds of many South African politicians, conservation issues in Namibia were not. If the politicians succeeded in selling South Africa's apartheid policy in Namibia to the world, things would be so much easier for them in South Africa. They were not ready to accommodate any requests that would jeopardise their carefully-planned strategy for Namibia, especially not if the conservationists wanted to enter the political arena and question the plan for a 'new' South West Africa.

Bernabè realised that to maintain the boundaries of the game reserve as they were before the conception of the Odendaal Plan was an impossible dream. His main objective was to retain as much as possible of the sand plateau, the dolomite hills around Otjovasandu, and some of the escarpment zone. The proposed road linking Kamanjab and the hydroelectric scheme was the problem. That this road was going to be built was certain. For many valid reasons it was not acceptable to have a main highway with a high volume of traffic twenty-four hours a day running through a game reserve. It was clear that the road would have to be built around the game reserve. In subsequent submissions to the authorities it was stressed that the road should be moved as far west as possible. Many of these submissions, backed by biological information and conservation principles, were prepared by myself.

This was not an easy recommendation to sell. It meant that instead of building a cheap road over relatively flat terrain, a road would have to be built over rugged ground. The alternative route would be longer and require cuttings, culverts and several bridges, making it a rather expensive road to construct. The added cost did not make Bernabè's task any easier. After many months of negotiations he managed to get the alternative route accepted. It was still far from being an ideal situation but was a great improvement over the original recommendation. At least a fragment of the bio-geographical region known as the Kaokoveld would be within the boundaries of the 'new' Etosha Game Reserve. Furthermore, to compensate for the loss of some escarpment land a farm adjoining Otjovasandu was purchased to add to the reserve. This farm, Kaross, was 20 000 hectares in size and included some excellent mountain terrain.

The new boundaries meant that most of the black rhino now lived with very little protection outside the boundaries of Etosha Game Reserve. With these areas being opened up to people and livestock a burden was placed on the Division of Nature Conservation. By 1966 it was evident that the translocation of these animals to safer areas could be postponed no longer. At the time the only logical place to release them was in the remaining part of Etosha Game Reserve. At that time the game capture team had limited experience and insufficient equipment. Also, they had no experience in the capture of rhinos. Because it would be the first rhino translocation in Namibia, Bernabè was anxious for it to be a success. I was requested to recommend a locality that would present few obstacles.

The normal procedure for game capture at that time was to either approach an animal on foot or to chase it with a vehicle and deliver the dart with a special gas shotgun. The pro-Namib presented several advantages. Firstly, it would be relatively easy to find a rhino. Secondly, it was hoped that the open terrain would permit a vehicle to chase the animal. This first rhino capture, however, was filled with drama and ended in disaster. Fortunately we were not aware of this at the start of the capture..

The men were very enthusiastic. The logistic support was planned in great detail. A holding pen for the rhino was built at Ombika, close to Okaukuejo, the main camp in the game reserve. Hymie Ebedes was the veterinarian based at Etosha and he was made responsible for the immobilising drugs and equipment. Bernabè flew to Okaukuejo in the small Super Cub plane that had been purchased two years previously. From there a convoy of vehicles left via Kamanjab, following the road down the escarpment at Grootberg, to Wêreldsend. The road was very bad; barely passable in places.

Wêreldsend, meaning 'the end of the world', was the last farm on the pro-Namib before the desert proper began. It was chosen as the capture site because of its strategic location next to the road, due to the availability of water, and because it was known to have a population of rhinos. It was one of the farms expropriated by the Odendaal Plan and added to Damaraland. The previous owner had left the farm several months before and the signs of hardship and poverty still shrouded the hovel that had served as house and farmyard. The rubbish lying around bore silent witness to the owner's never-ending battle against drought and depravation. The Odendaal Plan probably saved the owner and the neighbouring farmers from financial disaster. Most of the farms that the government had now made available to black farmers had already proved to be economically unviable during the previous two decades. This 'minor' detail did not bother those in the air-conditioned comfort of the Houses of Parliament in Cape Town, who had decided with an almost total lack of compassion on the future of their fellow humans.

A couple of hundred metres from the homestead a stand of false ebony trees *Pseudebenus persica* grew in a small depression. An old, dilapidated windmill was still spilling water into a small, round, metal reservoir. The convoy decided to camp close to the water. After the long, dusty ride we were soon splashing around naked in the reservoir. The rusty and leaky reservoir was hardly large enough to hold all of us. Later that evening, sitting around a campfire with several whole mutton ribs sizzling on a bed of coals, we reviewed our plan of action for the following day. It was actually a very simple plan. We had to locate a rhino as early as possible, immobilise it, and translocate it to the boma at Ombika. Several men who took part in that first rhino capture have since passed away. The dynamic and charismatic Bernabè de la Bat; the big, jovial Giel Visser; Rodney Baxter, the English gentleman from Cape Town; and the popinjay, Viljoen, have all moved on.

The next morning, in the chill of a desert winter, it was difficult for us to rise from our sleeping bags. We drank coffee and stood around waiting for the sun to come up. We were not aware of it at the time but we had a long day ahead of us. As the sun rose over the crags

of the mountains forming the escarpment there we drove out of camp. Springbokwasser, a seep in the bed of the Springbok River, was about 40 kilometres down the road. I was aware of several rhinos using the brackish water at this fountain. The biggest black rhino midden I ever saw in Namibia was also located here. Probably the dryness of the climate helped to prevent the dung from decomposing.

The gods were smiling down on us that morning. We found fresh rhino tracks around the fountain. From here the tracks followed the river-bed. This was not surprising because the vegetation in this part of the country grew mostly in the river-beds and in the shallow washes that criss-cross the pro-Namib and Namib plains. It was therefore relatively easy to follow the rhino tracks. After carefully following them for about six or seven kilometres we saw the rhino browsing. Barely able to contain his anxiety Hymie prepared the drug and capture rifle. This was not only the first rhino to be immobilised in Namibia but would also be his personal first.

Over the next few hours we tried unsuccessfully to hit the rhino with a dart. First we tried to get close enough by approaching it cautiously with one vehicle. Several attempts failed. Then we used two Landrovers in wild chases across the wide, dry river-bed, which was filled with round boulders, gravel embankments covered in stumpy hard shrubs, and low outcrops of rock. Desperately we tried to herd the rhino into a position where Hymie could fire the dart at him. The few times he fired from the bumping vehicle he failed to hit the rhino. Then we ran out of darts and had to send a party back to camp to give Hymie an opportunity to prepare fresh darts. Our nerves were frayed and our tempers short.

We eventually managed to hit the animal with a dart and then with a second one because the first did not seem to affect him. The rhino left the wash and started to cross a gravel plain. One vehicle headed him off. Finally the animal stopped in the scree on the slope of a small hill and turned to face the vehicle that had followed him. A wind blowing from the southwest had come up in the middle of the afternoon. It became stronger, blowing clouds of dust over the rhino and his pursuers. In the afternoon sun it created a surrealistic impression. Apparently the dose was insufficient to put him down. After waiting more than an hour it was decided to shoot him again with yet another dart. In the subsequent chase the animal headed back into the river. He eventually collapsed in the river-bed against a low bank covered in salsola bushes.

The truck with the crate approached. As it was not a four-wheel drive vehicle it had some problems driving in the sandy river-bed. Low embankments and boulders frustrated the driver, who was trying to drive as close as possible to the rhino. Eventually it was parked in a satisfactory position. The heavy crate was manoeuvred down rollers placed against the back of the truck. An antidote was administered to the rhino and with a rope tied around his neck he was led and pushed into the crate. It took much physical effort to get the crate back onto the truck once the rhino was inside. It was already late afternoon when the truck eventually reached the river bank after being steered through the thick sand. The men were exhausted but we immediately departed on the long haul back to Etosha Game Reserve.

The late Giel Visser built that first holding pen at Ombika. He built it to last and it was to become his pride and joy. It took him almost a month of continuous work with a compressor to drill holes in the hard calcrete. The holes were approximately two metres apart. In them, four-metre long pieces of heavy gauge rail were imbedded in concrete. Upright creosoted poles were fitted close together between the rails, supported by three pairs of elevator cable at different heights, which were welded to the rails. A platform was built three metres above the ground at the one end of the pen. From here one could look into the boma. At the time, Ian Player and Nick Steele from the Natal Parks Board were on a private visit to Etosha Game Reserve. They could not believe their eyes when they saw Giel's construction. Later when I saw the rather flimsy, although effective, pole and wire bomas used so efficiently for white rhinos in Natal I could understand their astonishment.

The truck with the rhino on board arrived at Ombika during the early hours of the morning. Wisely it was decided to wait until daybreak before unloading the animal. Again it took many men to carefully lower the crate down the rollers onto the ground. The crate then had to be turned around so that the rhino would be facing into the boma when the door was opened. With all this going on the rhino became very agitated and began banging away inside the crate. When the crate was eventually in place the door was opened. I was standing on the platform with Bernabè de la Bat as the rhino entered the boma, puffing like a train.

The rhino was clearly very unsettled and showed no signs of calming down. He charged at the wall of the boma, striking it with his horn. Then he inadvertently hooked his horn under the lower cable. His neck expanded as he strained at the cable. Something had to give. One spot weld, where the cable was fixed to a rail, finally broke loose. We all stood watching with utter amazement as the rhino worked the heavy poles apart with his horn and broke out.

Outside, people panicked and scattered. The rhino ignored everything and charged straight through the game-proof fence. He stumbled over the second fence that marked the border of the farm adjoining the game reserve and disappeared into the dense bush. It had taken the rhino less than five minutes to break out of a boma that everybody thought was too strong! The rhino left a number of dismayed people on the hill above Ombika.

Bernabè regrouped the men quickly. Horses were brought in from Okaukuejo. The riders, wearing crash helmets, looked strange as they followed the rhino onto the farmland. The hard, rocky ground made it virtually impossible to find any signs of the rhino. Meanwhile Bernabè, with Rodney Baxter as passenger, tried locating the animal from the air with the Super Cub. When they found the rhino they guided two men on the ground towards him with the aid of walkie-talkies. They succeeded in hitting the rhino with a dart. The team in the aircraft kept him under surveillance, and when he stopped, the message was conveyed to the men on the ground. When the rhino did not lie down after half an hour, a second dart was administered and everybody waited.

Hymie joined me and we moved closer with some other staff members. We joined Bek Viljoen and a game ranger under a small mopane tree, from where they stood looking at the

rhino. We could barely see the animal in the dense shrub about 30 metres ahead of us. The men stood debating in whispers the next step to take. There were two schools of thought. One group favoured giving the rhino another dose of the drug. As he had already received two shots Hymie was hesitant to give him a further one. It was not clear how much of the drug had been administered into his body by these darts as one had fallen out shortly after impact. The second school believed that the rhino was immobilised but had not received quite enough of the drug to lie down. They favoured the idea of charging the rhino, wrestling him to the ground, and tying him up.

While the debate continued I decided to approach the rhino to try and photograph him from the side. More than two hours had lapsed since the last dart had struck. Carefully I approached the animal and came quite close. I focused and clicked the shutter of the camera. Immediately I could see by the way the rhino was moving his ears that he was far from being drugged. He was training his ears towards the debate, which had meanwhile increased in volume. Each group was intent on trying to convince the other side as to the best plan of action.

I tried to warn them but I found my mouth quite dry and I stood as if petrified. The next moment the rhino charged at the men, who looked as though they had floated involuntarily into a tree. Throughout the excitement I continued taking photographs. Someone later joked that the men had occupied the tree so quickly that it had never had the opportunity to break a branch. In any case, the relatively small tree presented a strange sight with its overload of green uniforms!

The rhino was pursued again, and this time Hymie increased the dose substantially. After receiving the shot the rhino lay down quickly. A road had to be cleared through the thick shrub to get the truck close enough. Meanwhile the boma had been repaired and the rhino was released into it a second time. It was, however, as if the rhino had lost his will to live. The stress of two days of harassment, the cumulative effect of the drugs (especially the last shot, which probably contained an overdose) proved to be too much for him. The animal lay down and died shortly afterwards. The barbecue organised for that evening to celebrate the successful translocation of the first rhino turned into a postmortem of the failed operation.

The following year two rhinos were caught and translocated. History was made during one of these operations when a rhino was darted from a helicopter. The chopper was made available to the conservation authority courtesy of the South African Police. This capture proved that it was practical to use helicopters to immobilise rhinos. At first, though, the cost of leasing choppers for game-capture operations was thought to be too high. In 1969 the division's game-capture team translocated another two rhinos. However, three of the five rhinos caught in 1968 and 1969 died during the operation or soon after their release. The track record of the division regarding the capture and translocation of rhinos was not impressive.

The year 1970 proved to be a watershed. It was the beginning of the golden era for conservation in Namibia. The efforts of Bernabé de la Bat eventually paid off and he was to

witness his dream come true. As a result of his tireless campaigning the Division of Nature Conservation was upgraded to a full directorate. The Directorate of Nature Conservation and Tourism became effective from January of that year. The number of staff members was more than doubled. The growth in staff, facilities, and budget was sustained over the next decade. The directorate consisted of four divisions: conservation and maintenance; research and information; tourism; and administration and finance. Several new game reserves were established and large rest camps with modern facilities were built for tourists. The legal status of Etosha Game Reserve was changed, as was its name, which became Etosha National Park.

Let us take a look at the research division. Before 1970 the research staff consisted of two people, a biologist and a veterinarian, both based at Etosha Game Reserve. With the new staff complement, apart from the assistant director in overall charge, ten biologists with technicians and lab assistants were added. These included zoologists, botanists, pasture scientists, ornithologists and a freshwater fish biologist. The importance of game capture in wildlife management was realised and several new positions were added to the game-capture unit, which was now led by a veterinarian. In addition, game capture became a function of the research division. The game-capture team was provided with new equipment and a few years later with their own helicopter. The wonder drug M-99 became more readily available. The successes that were achieved by the game-capture team during this period, with the translocation of large numbers of game, is also a story that needs to be told. Under the guidance of Polla Swart, then assistant director for research, Ian Hofmyer, the game-capture vet, and Roelf du Bruine, the senior nature conservator in charge of the capture team, the directorate had a winning team. We are concerned here, however, with the translocation of rhinos.

Following demands from farmers in the Outjo and Welwitschia (present Khorixas) districts the Executive Committee of South West Africa decided in September 1969 that the capture and translocation of at least 40 rhinos from private land must receive priority attention from the directorate. With this programme in mind holding pens were built at several sites at Etosha National Park. These sites included Kaross, close to Otjovasandu, Ombika outside Okaukuejo, Halali, and Namutoni on the eastern side of the park. The purpose of these pens was to allow the animals to become familiar with their new surroundings before their release.

With the success of the helicopter in the rhino capture operations in 1968 in mind, and with the directive from the Executive Committee in hand, the directorate requested a helicopter to use in the rhino capture operation. This request was granted for the 1970 capture season. Given the broken terrain of the Ugab River valley and the naturally low density of rhinos the use of a chopper became essential. However, to reduce the flying time of the chopper and thus save on the costs, the procedure was to first locate a rhino with a ground search, or at least confirm its whereabouts, before using the chopper. During May 1970 the game-capture team successfully emptied the Ugab valley with the capture of 21 rhinos, which were translocated to Halali and Ombika.

Although the 1970 capture was generally successful the team did experience some problems. One of these was the unacceptably high number of needles that broke on impact with the rhino. It is easy to understand the frustration when, after a skilful chopper flight and a good shot, the needle broke on impact! Other darts dropped out of the skin shortly after the rhino was shot without delivering the full dose of drug. This made it difficult to know how much of the drug was administered to the animal. No detailed prescription existed on the dosage to be used for rhino and this had to be learnt by trial and error. Fortunately this was not too great a problem with M-99. A few rhinos were lost in accidents after they were immobilised: a cow fell over rocks and broke her leg; another fell on its face onto a rock and broke its jaw. Both animals had to be put down.

Lessons were learnt from these experiences. Before the 1971 capture season, improved darts were obtained from the technical section of the South African National Parks Board at Kruger National Park. A combination of M-99 and a neuroleptic agent (Azaperone) was used to drug rhinos. This cocktail improved the efficiency of the tranquillisation process. Rhinos went down within eight minutes on average, even as soon as four minutes in a few instances. During the 1971 season the capture team concentrated on the rhinos that lived south of the Ugab River. Rhinos were caught in the Otjihorongo Reservation and near Kubutsivu. Several were immobilised in the Kamanjab district on the farms Ongivati (west of Kamanjab) and Westend. The 20 rhinos caught in these areas were translocated to Kaross in the western part of Etosha National Park. The directive from the Executive Committee that at least 40 rhinos had to be translocated from private land was met within two years.

The successful translocation of these rhinos was not the end of the story. When the farm Kaross was bought and added to Etosha Game Reserve the game-proof fence was never completed. Money was made available in 1970 for the completion of this fence but the broken terrain made it difficult to build the fence to the required standards. When the rhinos arrived at the bomas at Kaross in 1971 the contractor was still building the fence. Some of the rhinos were therefore kept in the holding pens for up to two months before they were released. Creosote poles had been used to build these bomas and tar had leached out of the poles into the drinking troughs of the animals. Three animals died while they were still in the bomas. Postmortem examinations showed that the animals had died of creosote poisoning.

This was not the end of the problems. After the rhinos were released from the holding pens some of them fought with one another. Two of these animals had been kept in adjoining enclosures and had frequently threatened each other through the partition separating them. After their release they engaged in a fight that resulted in the death of one of them. Three other rhinos died because of fights, one of them being a pregnant cow. A fourth died without the cause of death ever being established. These incidents stressed the importance of understanding the social behaviour and needs of animals when contemplating reintroduction programmes.

With the successful relocation of rhinos during the two preceding years the game-capture team concentrated on the capture and translocation of other species during 1972. They moved only two rhinos in that year. These were rhinos which lived on private land that was partially in the Erongo Mountains. The landowner had requested that the rhinos be removed. This exercise again illustrated the benefits of using a helicopter, without which these animals would never have been captured. One rhino was located high up in the mountains. It took the chopper more than an hour to carefully herd it down to the lower slopes before it could be immobilised. Both rhinos were released at Ombika. Ten rhinos were removed from the area to the west of Otjovasandu during 1973. This area used to be part of Etosha Game Reserve. Two of these animals died during the capture operation in freak accidents.

A strange decision was taken in 1973, which was to release three black rhinos in the Namib Desert Park, at the Kuiseb River. Some younger, more cynical members of the directorate's staff believed that the black rhinos were released into the area in an effort to persuade Topnaar Hottentots to leave the game reserve. The Topnaars had lived along the Kuiseb River since before the establishment of the game reserve in 1907. They claimed to have received permission from Queen Victoria to live next to the river in the Walvis Bay enclave. The fact that they were now living in Namibia outside the territory of the enclave did not seem to matter to them. Efforts to persuade them to leave the game reserve were intensified during the sixties. Many attempts to move these people to another area with better grazing had failed. It was argued that the new area would allow them a better standard of living and the possibility of keeping greater numbers of livestock. These attempts never considered the cultural needs of the Topnaars.

Allow me to digress here to explain the importance of the Kuiseb River to the desert ecosystem and the management of game in the Namib Desert Park. In Namibia the river courses that run through the desert are dry. Most of the time, however, water flowing under the sand nourishes lush vegetation growing on the banks and in the river-beds. Consequently rivers such as the Kuiseb River form a linear oasis leading into the desert. The vegetation constitutes an important food resource for desert ungulates, especially during the drier months of the year. The large numbers of livestock owned by the Topnaar Hottentots were overbrowsing and overgrazing this resource. The livestock also caused considerable soil erosion. Topnaars poached wild animals and also systematically eradicated predators. In the light of this the directorate's wish that the Topnaars leave the park is understandable.

The three rhinos that were translocated to the Namib Desert Park were released in the dry river-bed east of Gobabeb, near a place known as Homob. The directorate argued that historically rhinos did occur in the upper reaches of the Kuiseb River. The door of the mission station at Rooibank, some distance down the river, was made of a dried rhino skin. This rhino was reputedly killed by the missionaries in the Kuiseb River. Two of the three rhinos released were males, one young and the other older, and the third was a mature cow. The two bulls did not last long. One fell down a cliff and the other died of possible heat exhaustion. Ironically, the cow was saved from certain death by the Topnaars. For several

months they supplied her with water. She was then removed by the capture team. This failed experiment by the directorate was the cause of considerable embarrassment.

No rhinos were captured in Namibia during the five years following 1973, but an increase in rhino numbers in the west of Etosha National Park was thought to constitute a management problem. In 1977 rangers reported an increase in fighting between rhinos. The density of rhinos was probably too high for the area and it was thought that some of them would have to be removed. However, veterinary regulations caused a problem as animals could not be freely translocated from Etosha.

To protect the beef export industry of Namibia the whole northern part of the country is divided by a veterinary line. The line has become known as the Red Line. It runs along the southern border of Etosha National Park, across the breadth of the country, from the Atlantic coast to the Botswanan border. The domestic livestock in the northern area, which is an enzootic anthrax and foot and mouth area, are given regular veterinary inspections but no treatment. The local tribespeople are suspicious of vets and will not allow their animals to have any treatment or vaccinations. Because of this the European Community insists that it will only allow beef from Namibia to enter the European markets if the integrity of this line is maintained. Therefore the veterinary authorities were very strict in enforcing these regulations. All of the park lies to the north of the line. The strict veterinary policy made no exception for rare and endangered species, nor for odd-toed ungulates like zebras or rhinos.

In the end the solution was simple, and another of Bernabé's ideas. The farm Kaross, mentioned earlier, had been offered to the government at a very reasonable price on condition that it would become part of Etosha Game Reserve. It was bought in 1965 and added to the game reserve. Originally the farm lay to the south of the Red Line. After negotiations with the veterinary authorities it was agreed to use the 20 000 hectares of Kaross as a quarantine facility. Although Kaross forms an integral part of the park it is separated from the rest of the park by two game-proof fences three metres apart. These prevent contact between game in the Kaross section and that in the rest of the park. This complies with the international veterinary quarantine regulations. Now odd-toed ungulates could be brought into Kaross, kept in quarantine for the required period, and then moved south of the line. This privilege was eventually extended by the Veterinary Department, under certain conditions, to even-toed rare species such as roan antelope *Hippotragus equinus*.

From 1978 to 1982 the directorate relocated 28 rhinos from Kaross and Otjovasandu to other areas within the park. This was a short-term solution because the number of rhinos within the park would eventually reach saturation level. A national strategy was required to determine a long-term policy for conserving the black rhinos of Namibia. Outside the park rhino numbers in Kaokoland and Damaraland also increased after the directorate started maintaining a high profile presence in these regions. This issue is addressed in greater detail in Chapter 13.

The first white rhinoceroses were brought into Namibia by a private individual in 1970. The directorate first acquired white rhinos in 1975 when they released six in the Waterberg Plateau Park. These rhinos were obtained from the Natal Parks Board. Four of them died due to freak accidents shortly after their release. A further eight white rhinos from Natal were released during 1978. In 1985 the South African National Parks Board approached the Namibian conservation authority with a request for black rhinos for the South African parks. After negotiations an exchange of black rhinos for white rhinos was agreed upon. These white rhinos were used to increase the white rhino population in Waterberg Plateau Park.

Namibia fulfilled its obligation the same year and delivered six black rhinos to South Africa. The white rhinos to replace them only arrived in Namibia during 1992 and 1993. The reason for the delay was the prolonged drought experienced in the Kruger National Park. It was decided to wait until after the drought, when the physiological condition of the animals had improved, before trying to transport them the long distance to Namibia.

Meanwhile it became known that most of the white rhinos in Kruger National Park were infected with Tuberculosis. Namibia was adamant that the rhinos delivered to them had to be free of TB. With this first consignment in 1992, four of six animals died shortly after reaching the Waterberg Plateau Park. These deaths were ascribed to exposure and exhaustion after the long journey. The animals were replaced by the National Parks Board in 1993.

I will deal with the translocations and reintroductions of black and white rhinos elsewhere in southern Africa in later chapters. Lest we forget the Asian rhinos let us have a look at them and their environs. We will pick up their clover trail in the next chapter.

CHAPTER 4

On the trail of Asian rhinos

The three rhino species found in Asia are truly remarkable animals and are of great cultural importance. They are among the rarest animals on earth. The distribution of these animals, which formerly included most of south and southeast Asia, is now restricted to a few localities. The trail of the Asian rhinos is therefore considerably less distinct than that of their African relatives.

The Asian rhinos share their range with a high density of people. They therefore suffered the human onslaught sooner. The development of agriculture, which has occurred in order to feed the ever-growing human population, has resulted in a diminishing area of habitat for the rhinos. The loss of habitat has probably had a greater impact on the status of the rhinos than the uncontrolled use of the animals themselves.

Let us follow the trail of the Asian rhinos. The rhino family is represented in Asia by only three species, representing two genera. One genus *Rhinoceros* has two closely related species, the big Indian rhino *Rhinoceros unicornis* and the small Javan rhino *Rhinoceros sondaicus*. Both species have only one horn. The second genus and its species *Dicerorhinus sumatrensis* is also a small rhino but boasts two horns.

During early Pleistocene times dense forest covered most of Europe and Asia, including India. Fossil evidence shows that the rhino species which opted for the shelter offered by forests remained small. Both the rhinos from Java and Sumatra are inhabitants of the rain forests. The smallest and most timid of the Asian rhinos is the Sumatran species, which is also the only living rhino that has a coat of hair.

As already mentioned, the earliest known contact between people and rhinos was recorded by European cave artists during the last ice age. It is almost 15 000 years later before we again find references to rhinos, this time in Greek mythology. It appears that the Greeks had a problem distinguishing between their mythological unicorns and rhinoceroses. This is not so strange if one remembers that the rhinos they were most likely to have encountered were the single-horned Asian rhinos. The confusion was strengthened by Marco Polo. During his travels he came across a rhino on the island of Sumatra in 1298 and immediately proclaimed this animal as the missing unicorn. The rhino he saw could not have been a Sumatran rhino because this species has two horns and therefore must have been a Javan rhino.

The ancient Greeks claimed that rhinos possessed exceptional powers. They said that when rhinos came to water to drink and found the water dirty they would lower their horns into the water and immediately it would be purified. Possibly based on this myth the personal

physician of King Artaxerxus I of Persia referred to another supposed property of rhinos. In a document dating from 5 BC the physician Ctesias declared a defence against the popular murder weapon of the time, namely poison. If wine or any other liquid was poured into a vessel carved from rhino horn, the horn would immediately show if the wine was poisoned.

Asian rhinos are hunted mainly for their horns, although almost all parts of their bodies are claimed to have medicinal properties. A major misconception in the western world is the notion that Asian people use rhino horn as an aphrodisiac. This juicy story is perpetuated by the western media. Rhino horn, like all rhino products, plays an important role in traditional oriental medicine. These products remain in great demand. The horn is ground and the powder is used to combat fevers, rheumatism, gout, blood ailments and even piles. Rhino urine is considered a remedy for skin disorders.

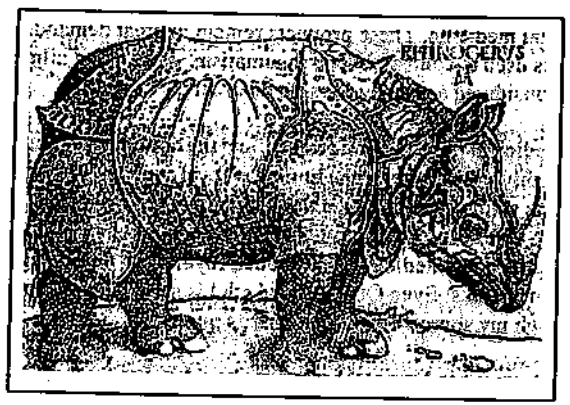
The supposed medicinal powers of rhino horn, and the notion that it could detect a poisoned liquid, made it highly sought-after in the European royal courts of the 18th and 19th centuries. With Arab traders acting as middlemen, large quantities of rhino horn were shipped to the European market. The horns were frequently sold as unicorn horns. In 1741 rhino horn was registered in England as a medicine. The French royal court was using it in 1789 to detect poison in food and drinks. Even Queen Elizabeth I is said to have kept a rhino horn in her bedroom, although my source does not reveal its purpose.

In Arabia, rhino horn is used in another way. Yemeni boys are circumcised when they reach the age of 12 years. They are then considered old enough to be married. As a sign of their manhood and dedication to the Muslim religion they are normally presented with a jambia by their father. A jambia is a curved dagger used for various practical purposes, as well as for personal defence. It is also used in ceremonial rites and traditional dancing. When a dispute between two Yemeni men needs to be settled by a higher authority the jambias again come into play. Both parties will hand their jambia to the sheik. This is a sign that they are putting their life in his hands, that they believe in his objectivity and will abide by his decision. To this day some Yemeni men would rather die than be seen in public without their jambia. Because of the value attached to a jambia it is decorated very beautifully. Great value is placed on the handles carved from rhino horn, which are studded with jewels.

Of the five rhino species in the world today the Indian rhinoceros is the largest. The habitat of the Indian rhino is the swamps and riverine forests of the Terai and Brahmaputra River basins on the Indian subcontinent. Old records show that once the Indian rhinos were abundant on the flood plains of the Indus, Ganges and the Brahmaputra Rivers. Many Indian rhinos were kept in captivity and trained. When Tamerlane and his Mongolian hordes invaded India in 1398, King Muhammad Nasir ed Din used 12 of these tame rhinos in the front line when Delhi was threatened; unsuccessfully though, as Delhi fell during this onslaught.

One of the most famous illustrations of a rhino is a woodcut by the German artist Albrecht Durer. He made the woodcut in 1515 and for two hundred years these prints were generally

accepted as the standard illustration of a rhino. The chain of events that led to the carving of this woodcut makes for interesting reading. King Muzaffat of west India decided in 1515 to present a rhino to King Manuèl of Portugal. Probably to win papal favour, King Manuèl in turn sent the Indian rhino to Rome as a gift for Pope Leo X. While the animal was in Portugal an artist made several sketches of it and sent them with a description to Durer. Meanwhile the ship with the rhino on board floundered off the coast of Genoa. The carcass of the rhino washed ashore, was skinned, and then continued on its way to the Vatican as a stuffed animal.



A print from a wood carving by Albrecht Durer dating from 1515. For almost two centuries this print was considered the standard rendering of a rhinoceros

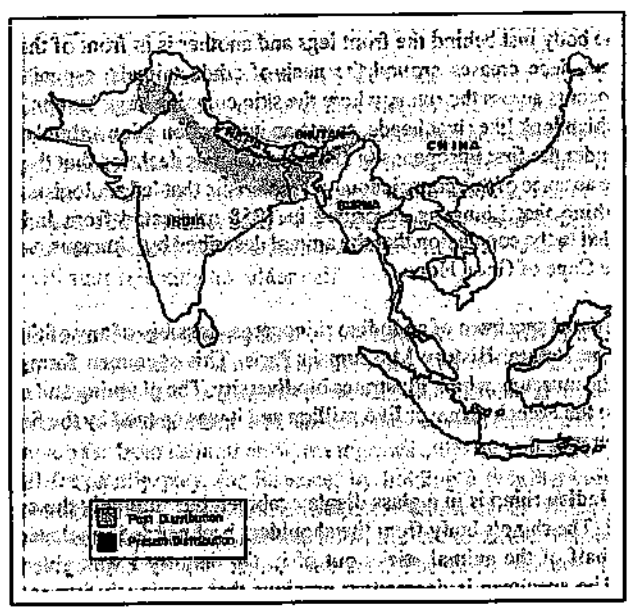
During the 18th century a Dutch gentleman named Douvemont van der Meer imported a live Indian rhino. He travelled through Europe and exhibited the animal in the major cities. According to accounts the rhino consumed large quantities of hay. Bystanders also offered it wine and beer, which it drank. The rhino was a source of excitement in the European courts. Poems were written about it and Casanova even referred to it in his autobiography. King Louis XV considered buying the animal but was not prepared to pay the exorbitant sum that Van der Meer was asking.

At the turn of the century Indian rhinos were still hunted for recreation. The Maharajah of Cooch Bihar reputedly killed more than 200 of them during his annual hunting expeditions between 1871 and 1907. By 1910 the British Colonial Government had outlawed the hunting of rhinos. Sanctuaries were established exclusively for the animals. In 1950 there were about 400 Indian rhinos left in the wild. Thanks to successful conservation measures their numbers increased and today there are approximately 1 700 on the Indian subcontinent. Another 75 animals are in various zoos around the world.

Indian rhinos formerly occurred from Pakistan in the west, across the northern part of the subcontinent to Bangladesh in the east. Their range included parts of Nepal and Bhutan.

Quite possibly, their former distribution may also have included Burma and the southern parts of China and Indonesia. The uncertainty over their former distribution is the result of confusion in the literature over the identities of Indian and Javan rhinos. There were reports of Indian rhinos in northern Burma as late as the 1970s but it is generally accepted that this rhino never occurred further east of Bangladesh.

At the beginning of the 20th century the distribution of Indian rhinos was restricted to a few localities in the north of the subcontinent. They were found in eight small game reserves in Assam, west Bengal and Nepal. The best known of these are the Kaziranga National Park in Assam and the Royal Chitawan National Park in Nepal. In both parks the rangers patrol on elephants. This mode of transport has two distinct advantages. Firstly, in grass growing up to three metres high the back of an elephant provides a good vantage point. Secondly, in an area where Bengal tigers still abound, a ride on an elephant's back is definitely safer than a patrol on foot. Both parks also cater for tourists, offering rides on elephants.



Distribution of the Indian rhinoceros

An Indian rhino bull can reach a mass of up to 2 070 kilograms. The shoulder height would be approximately 186 centimetres and the body length more than three metres (330 centimetres). This makes the Indian rhino slightly larger than the white rhino, the biggest of the African rhinos. The cows are smaller, with a mass of 1 600 kilograms and a shoulder height of approximately 160 centimetres. Both sexes have only one, well-developed

horn on the nose. The horns are usually 15 to 45 centimetres long, although horns of up to 60 centimetres have been recorded.

As with the other two Asian species the incisors of the lower jaw are elongated. In bulls these teeth may be up to 20 centimetres long. Instead of depending on their horns for defence they rely on their formidable incisors. There are frequent fights between the males where the teeth are brought into play. The females use their teeth when defending their calves from predators. The molar teeth have an intricate pattern on the grinding surface and are coated with enamel. This is indicative of a diet that consists mostly of grass. This morphological conclusion is supported by field studies, which show that between 70 and 90 percent of their diet is grass. The diet of the Indian rhino is variable and they are adapted to eating whichever species of grasses are available, depending on the season. Apart from grass they also nibble on young twigs, aquatic plants and fruit. Biologists have found that these rhinos eat 183 different plants from 57 families.

The most conspicuous characteristic of the Indian rhino is the deep folds in its skin. One fold circles the body just behind the front legs and another is in front of the hind legs. The skin also shows deep creases around the neck of adult animals, especially older bulls. Another fold occurs across the rump, where the skin contains large bumps. The heavy skin and bumps, which look like rivet heads, create an impression of an animal carrying armour plates. No wonder the first Europeans to see these animals declared that they were armour-plated! It is the absence of this conspicuous characteristic that led zoologists to first question whether the rhino that Linnaeus described in 1758 originated from India. Subsequent investigation led to the conclusion that the animal described by Linnaeus was really a black rhino from the Cape of Good Hope.

The oldest mounted specimen of an Indian rhinoceros, possibly of any of the rhino species, is housed in the Natural History Museum in Paris. This specimen forms part of a new exhibition at the museum, which illustrates biodiversity. The planning and execution of the exhibition cost the French taxpayer FF5 million and it was opened by the former president, François Mitterand.

The mounted Indian rhino is in a glass display cabinet, but strangely the case is too small for the animal. The rhino's body from the shoulders backwards is enclosed in the cabinet but the front half of the animal sticks out of it. On enquiry I was given the following explanation. The specimen is deemed so precious that previously it was kept in a store room where the climatic conditions were regulated. The condition for allowing it to be used in the public display was that it would be placed in a sealed, glass cabinet. However, the wrong measurements were supplied to the contractor who built the case. I am not quite sure why the case is used because it obviously does not fulfil a conservation function. Actually, according to my source, the display is an embarrassment to the museum personnel. The exhibition was the brainchild of one of President Mitterand's architect friends, who also won the contract to plan and build the new display.

The rivers flowing across the Indian subcontinent drain the Himalayas. On their way to the sea they meander over wide flood plains with tall grass and riparian forests. During many thousands of years the big rivers on these vast plains have often changed their course. The old river-beds and the lakes in them are frequented by the rhinos for mud baths and basking. These flood plains are inundated annually during the monsoon rains. The only safe areas are those above the flood level. At the onset of the monsoon the rhinos move to these areas. However, it is in these areas where the local people have built their homes and established small gardens and fields in which to grow annual crops.

With the growth of the human population the demand for land is increasing and the people have crept closer to the boundaries of the parks. With the utilisation of these areas by humans the rhinos are restricted more and more to the small parks. The rhinos leave the sanctuary of the parks at night to visit the neighbouring gardens and fields. Here they cause considerable damage, which obviously upsets the local people. As is the case elsewhere in the world it is wildlife (in this instance, the rhinos) that suffers most as a result of the confrontation with people.

Let us have a look at the social behaviour of Indian rhinos. Given the close relationship between the different rhino species it is not surprising to find that they share a number of behavioral traits. All five rhino species are partial to taking mud baths and will spend hours lying in the mud. Indian rhinos mostly live alone or in small groups. They frequently graze together and may even share the same muddy pool while bathing. The most lasting social bond is that between a cow and her calf, which may continue for as long as five years. The cow and calf maintain their close relationship until the next calf is due to be born. At this point the cow will start rejecting her older calf.

A cow has a single calf every three years, on average. As with most mammals, physical contact between the cow and her new calf is important. The calf will continually rub itself against the cow. When the cow is lying down the calf will clamber all over her, nibble her ears, or lick her face. This dependence on the cow may be a mechanism to prevent the calf from wandering too far from its mother. When it grows older the calf starts playing around the cow. It will frequently play, for instance, by holding a twig between its teeth and gambolling around the cow, who seldom participates in these antics. When the activities of the calf irritate the cow she will stand up and allow the calf to suckle. This is done from the side or from behind, between the legs of the cow. The calf continues suckling until it reaches approximately two years of age, from which time it becomes more independent.

An Indian rhino cow will not allow a strange rhino to approach her or her calf. If the stranger ventures too close she will chase it away. Calves are inquisitive by nature and will attempt to sniff a strange rhino. Cows with a young calf may attack and even kill people. This is most likely to happen when the rhinos are taken by surprise. As with the black rhino the cow will hide her young calf when she starts feeding. She may wander as far as one kilometre from the calf and it is on these occasions that rhino calves are taken by tigers. It has been estimated that up to six calves are taken annually by tigers in the Kaziranga

National Park. The figure is quite a bit lower in the Royal Chitawan Park, where only one or two are taken each year.

Two years after the birth of her previous calf the cow will come into oestrous again. If she mates with a bull and conceives she will start a gestation period of 16 months, after which time the calf is born. It is at this stage that the previous calf is driven away by the cow. The older calves always seem very nervous and alert. They react to every disturbance and will immediately flee if they become aware of the presence of any other animal. Young bulls are especially vulnerable to attack by older, mature bulls. Sub-adult rhinos will frequently gather in groups of up to eight animals. They will also take care to remain near a cow and her calf. Young mountain zebra stallions exhibit the same behaviour, forming small bands but staying close to a family group.

Social interactions between Indian rhinos are quite common. These interactions are normally aggressive when they occur between bulls, and fights normally take place in order to determine hierarchical position. The dominant bull in an area is the epitome of arrogance. He will only endure the presence of subordinate males as long as they are not perceived to threaten his position and do not try to mate with a cow in oestrous. In this way the behaviour of a dominant Indian rhino bull is remarkably similar to that of a dominant white rhino bull. In confrontations between Indian rhino bulls one of the combatants will sometimes perish. These interactions are always noisy affairs with a lot of posturing and boasting about the size of their tusks.

A dominant bull patrols his territory regularly and visits the communal middens. He marks his territory with his strong-smelling urine and urinates backwards between his hind legs like the other rhino species, walking slowly forward as he does so. He scrapes the ground with the toes of his hind feet and the urine gathers in little pools. No one has been able to find an acceptable reason for him doing this. The dominant bull shows no fear of anyone or anything, including people. If he comes across the track of someone who has crossed his territory he will follow the trail much like a dog.

When a cow in the territory comes into oestrous the dominant bull will quickly become aware of the fact by smelling the place where she has urinated. He will then find her and stay very close to her. The cow will scream and try to avoid him. This results in noisy chases through the territory for several kilometres. Biologists give the following explanation for this behaviour. In the tall, thick grass a submissive bull could very easily mate with a cow. With these chases through the territory the cow is trying, unknowingly of course, to ensure that the bull that is trying to mate with her is the dominant one. If the bull chasing her is not the dominant one the commotion will quickly attract the attention of the dominant bull. Through this process Mother Nature ensures that only the best genetic material is passed on to progeny.

There are several compelling issues that threaten the survival of the Indian rhino. Mention has already been made of the negative impact of the expansion of subsistence farming, now

encroaching on the already small national parks. Another problem posed by the presence of the smallholders is their livestock, which graze unlawfully in the parks and compete with rhinos for food. The increase in grazing pressure leads to overgrazing and the subsequent problem of large-scale soil erosion during the monsoon. Invading exotic plants are threatening the natural plants. With so many people living close to the parks the authorities have to maintain a never-ending vigil against poachers.

The main source of concern to the conservation authorities is as follows. Almost 90 per cent of the Indian rhinos remaining in the wild live in the Chitawan and Kaziranga Parks. The available rhino habitat in these two parks covers approximately 500 square kilometres. If any catastrophe or natural disaster were to befall either of these parks, such as a contagious disease, a serious flood, or a drought, it could conceivably eradicate many of the Indian rhinos remaining in the wild. With this possibility in mind the conservation authority recently started translocating rhinos from the densely populated Kaziranga National Park to some other more isolated parks in western Bengal and Assam. This move has a further advantage in that the genes pools of the rhino populations in these other parks are being enlarged.

Let us turn our attention to the other species in the genus *Rhinoceros*, which is the Javan rhinoceros *Rhinoceros sondaicus*. The Javan rhino has a body mass of between 800 and 1 000 kilograms, with a body length of approximately 130 centimetres and a shoulder height of 140 centimetres. Similarities exist between the Javan and Indian rhinos, one of these being the remarkable folds in the skin. The Javan rhino also has a skin fold that runs longitudinally along the back of the animal. Its single horn is small, seldom longer than ten centimetres, and often just a small nodular protuberance.

Formerly the Javan rhino lived throughout the Orient. Approximately 150 years ago they existed as three distinct populations. The first one occurred in the west, from Bengal and Assam eastwards into Burma. This population was represented by the subspecies *Rhinoceros sondaicus inermis*, which is now extinct. The second subspecies *Rhinoceros sondaicus annamiticus* occurred in Vietnam, Laos, Cambodia and eastern Thailand. The third subspecies is *Rhinoceros sondaicus sondaicus*, distributed from Tenasserim through the Kra isthmus and onto the peninsula, as well as on the islands of Sumatra and Java. The Javan rhino has disappeared over most of its range except on Ujung Kulon peninsula, formed by the western part of the island of Java, and in isolated pockets in Vietnam.

The Javan rhino is a very timid animal that hides in the dense understory of the rain forests of the region. This behaviour is a definite survival advantage to the animal because hunters find it extremely difficult to locate them. Unfortunately the same holds true for biologists who are keen to study them. Most of the current biological information on their distribution, numbers, and living requirements is pieced together from little bits of information gathered incidentally. The same is true of the Sumatran rhino. Information has been gathered by following their tracks and studying their wallows and dung. Behavioral information is much more difficult to gather. What little is known is based on reports by tribespeople who share the forests with the rhinos.

Distribution of the Javan rhinoceros

The questionable honour of being the rarest mammal on earth belongs to the Javan rhino. No zoo anywhere in the world houses a Javan rhino. The most reliable sources put their number in the wild as, at most, 50 individuals. Most of these animals are in the Ujong Kulon National Park in Indonesia. In this small national park, comprising only 761 square kilometres, live approximately 40 Javan rhinos. Biologists studying these animals believe that the rhino population in the park has reached the carrying capacity. This is cause for concern; as with the Indian rhino the entire population could be wiped out by disease. The reality of this threat was clearly illustrated during 1981 and 1982 when at least five animals died. Many more may have died without their carcasses ever being found. The reason for these sudden fatalities could not be established.

Until 1969 it was generally accepted that the Javan rhino had been eradicated from most of its range and lived only on the island of Java. Doubt was even expressed about whether any animals were left on this island. In scientific publications no reference was ever made to their former distribution in Malaysia and Vietnam, especially not after the Vietnam War when large areas of rain forest were exposed to systematic, heavy bombing. Also, the extensive use by the USA of Agent Orange to defoliate the forests could not have enhanced their chance of survival. It was unthinkable that any relatively large mammal species endemic to these forests would have survived the destruction of their habitat.

However, since 1969 reports have filtered out claiming that signs of these animals have been found in south Vietnam. In 1988 a hunter of the Stieng tribe killed an animal that was later identified as a Javan rhino! The stir that this news caused in the international conservation community is understandable. The skeletal remains of this rhino are kept in the offices of the Ministry of Forestry in Hanoi. Intensive surveys were immediately launched in the area and by 1991 it was established that 12 of these rhinos had survived the ravages of the war. The area in which they live is a low-lying, dense forest only 350 square kilometres in extent, which lies 150 kilometres east of the city of Ho Chi Minh (formerly Saigon).

The most serious threat to these survivors is the same as that which threatens rhinos everywhere, namely poaching. The unfortunate heritage of the Vietnam War, as with most wars, is the abundance and ready availability of firearms. These guns were left in the hands of soldiers who are now unemployed civilians and they are used for illegal hunting. A rhino carcass delivered to a Chinese middleman in Ho Chi Minh is worth more to a local poor man than a live rhino in the forest.

Studies show that the forestry practices of the Vietnamese Department of Forestry do not present a risk to the surviving rhinos. The forest in which these animals live harbours good stands of timber that could be commercially harvested. The management policy followed is that only trees with a circumference of more than 80 centimetres at chest height are taken, with a harvesting cycle of 35 to 40 years. It was found that, contrary to general belief, the controlled harvesting was actually beneficial to the rhinos' habitat. The real threat posed by the commercial harvesting of this virgin forest is that access roads have to be built in order to retrieve the timber. These roads, which create access into previously inaccessible areas, also benefit poachers. Another major threat to the surviving rhinos is the system of slash and burn agriculture that is practised by peasants. Fires started by these farmers pose a real threat to the core areas of Javan rhino habitat.

To cope with these threats the authorities in Hanoi are trying to have these forests declared as game reserves. The idea is to add the 350 square kilometres to the existing 450 square kilometres of the Nam Bai Tien National Park. The proposal includes a buffer zone around the park, which would increase the area to 1 000 square kilometres. Attention is also being given to public awareness campaigns among the local communities. All these efforts are doomed to failure, however, if the cooperation of the local population is not gained. It is very difficult to convince a man living in poverty, unable to provide for the basic needs of his starving family, to protect for posterity something that in the short term could mean wealth and an end to his family's suffering.

In contrast to the Sumatran rhino, for which the international conservation community has shown great concern and commitment, nothing much has happened regarding the Javan rhino. Plans are on the table to initiate a captive breeding programme but they have not been implemented. Approval and cooperation from the authorities are needed before anything can happen. The long war and consequent political instability do not favour the establishment of a captive breeding programme, which would need financial backing from foreign donors.

The Sumatran rhino has three recognised subspecies: *Dicerorhinus sumatrensis lasiotus, D. s. sumatrensis* and *D. s. harrissonii.* Although the tracks of this species have faded in the tropical rain forests of southeast Asia they remain clearer than those of the Javan rhino. The reason they apparently withstood the onslaught of people better than the Javan rhino probably lies in their different habitat requirements. Javan rhinos frequent forests on the coastal plains or flood plains. Sumatran rhinos, by contrast, prefer high mountain forests and forests in broken terrain. These areas are not as susceptible to logging and agriculture as are forests on the flat plains.

Early this century Sumatran rhinos still lived in the foothills of the Himalayas, in Bhutan and in northeastern India. They were distributed over Burma, Thailand, the Malaysian peninsula and on the islands of Sumatra and Java. Unconfirmed reports claim that they also occurred in Cambodia, Laos and Vietnam. Today their distribution is limited to small numbers in Burma, Thailand, the Malaysian peninsula and the islands of Sumatra and Borneo.

Little is known of the present status of the subspecies *D. s. lasiotus*, which lives in Borneo. The subspecies *D. s. sumatrensis* is represented by animals in Thailand, the Malaysian peninsula and Sumatra. Recently biologists have been unable to obtain any information on the status of the Sumatran rhino in Thailand. The consensus is that they are extinct in that part of their range. There may be approximately 100 of these animals surviving over the rest of the Malaysian peninsula in small, isolated pockets. Only two of these pockets fall within protected areas.

The largest population of this subspecies is on the island of Sumatra. Conservation sources estimate that several hundred of these animals may still survive in the forests there. The major concern though is the policy of the Indonesian government to repopulate the island. Together with this policy is a programme of intensified exploitation of the island's natural resources. Extraction of timber from the rain forests is now a priority. The result is that areas with suitable habitat for the Sumatran rhino are disappearing at an alarming rate.

Sumatra is a relatively large island and the rhinos are distributed in isolated localities over the whole area. This relatively wide distribution complicates the efforts of the conservation authority, which has limited resources in terms of people. Rangers are thin on the ground and the rhinos are exposed to high poaching pressure. Poachers use snares and firearms to trap and kill their quarry. Poaching is even a problem in those parts of the island where there have been regular patrols by game rangers. Recently the intensity of the problem was brought forcefully to the attention of the authorities. The conservation authorities initiated a translocation operation for rhinos, and despite numerous patrols by game rangers in the area, most of the rhinos caught had scars or wounds on their legs, which had been caused by poachers' snares.

The third subspecies *D. s. harrissonii* lives on the island of Borneo. It is generally accepted that this subspecies is the rarest of the three. The highest concentration of these animals occurs in the northeastern corner of Borneo, in Sabah. The population of an estimated 30

rhinos is also exposed to intensive poaching and their numbers are declining rapidly. The government of Sabah recently started a programme to catch these animals and translocate them to a captive breeding centre. Apart from this population two other small populations of Sumatran rhinos have been reported from Sarawat and Kalimantan.

Distribution of the Sumatran rhinoceros

Biologists have never been able to conduct proper surveys, owing to the type of terrain frequented by the Sumatran rhinos. The figure for the total population therefore remains, at best, an estimate. Over the past few years conservationists have accepted figures varying between 500 and 900 rhinos. In 1994 a concerted effort was launched by the Asian Rhino Specialist Group to obtain accurate figures for this species. Their results showed that the true figure was definitely lower than 500 individuals. More alarming was the information that, due to poaching, the population was declining at a rate of more than 10 percent annually. Evidence was obtained which showed that this subspecies was reproducing in the wild but the rate could not be ascertained.

According to general rules of animal population dynamics the subspecies should be able to increase at a rate of ten percent per annum. With the low density of the population, however, it is possible that females may not be served every time they have an oestrous. If the figure of a ten percent decline due to poaching is correct, these figures could indicate a negative growth curve. The future that faces the Sumatran rhinos is therefore a terrible combination of both low and declining numbers. Thus even though the population crash of the black rhino over the past decades may have been more spectacular, and although there are fewer Javan rhinos left today, the Sumatran rhinos are probably the most threatened of all rhino species.

Apart from the captive breeding programme initiated by the government of Sabah, similar programmes are underway in Indonesia and Malaysia. In an effort to ensure the survival of the Sumatran rhino the international conservation community is involved in cooperative programmes with the range countries of these animals. The most important component of these programmes is the effort being made to breed the rhinos in captivity. The programme in Malaysia is using a system of large paddocks where the animals are in almost natural surroundings. Concerned, private conservation organisations in the USA and the UK are preparing to start similar captive breeding programmes with stock originating from Indonesia. Apart from these programmes, 16 Sumatran rhinos are in zoos around the world.

It is obvious that the Asian rhino has a bleak future. Apart from the direct impact on their populations by poachers their habitat is also threatened. The governments of their range countries are under considerable pressure from ruthless international companies to open their rain forests for the exploitation of their natural resources. On top of this the countries of southeast Asia have the highest human population densities in the world. To ensure the survival of these magnificent remnants of a bygone age is going to demand full commitment from the governments and peoples of the range states, as well as support from the world at large. Only time will tell whether these efforts are going to succeed.

The African rhino is in a better situation, but only slightly so. In medical terms one could refer to the African rhino as a patient in intensive care, critical but stable. Let us now return to Africa and see where the clover trail of these interesting inhabitants of the African continent leads us.

CHAPTER 5

The clover trail of African rhinos

Africa is covered with the tracks of rhinos. The only parts where rhinos did not occur were the Sahara desert and the tropical rain forests of west Africa. The earliest reference to an African rhino is one that was in captivity in Alexandria during 2 BC. Apparently this was a white rhino caught as a calf in Sudan and taken north to Egypt. During Roman times an expedition up the Nile River reported rhinos from Sudan.

Africa south of the Sahara was visited by many European explorers during the 18th and 19th centuries. Most of these travellers published details of their exploits in richly illustrated works. These books, travel journals, official reports and other archival material contain valuable information. They can be used to determine the historical distribution of animals that have given way before modern development. These sources do have certain inherent restrictions, however. The main one, from a biological point of view, is that the authors were sometimes carried away in their descriptions of what they saw. Despite this problem these sources still serve as valuable reference material.

From these old records one gets a remarkably complete picture of the past distribution of rhinos, especially in southern Africa. Although few early travellers made any distinction between white and black rhinos, casual observations sometimes provide valuable clues about the species seen. References to special features, for instance 'a trunk-like lip', or the fact that the rhino seemed to prefer eating grass to leaves, frequently allows one to identify the particular species. Two examples illustrate this point. In 1787 a certain Mentzel described a rhino he observed:

> *... the upper lip can be stretched half a foot and ends in a pointed fleshy protuberance, which it uses as a kind of hand and imperfect trunk for taking up its food and putting it into its mouth.*

Another early traveller named Kolben had the following to say in 1731 about a rhino he came across in the Cape:

> *His mouth is like that of a hog, but somewhat more pointed. He is not fond of grass, choosing rather shrubs, brooms and thistles. But the delight of his tooth is a shrub, ... the Rhinoceros bush.*

With our knowledge today of the habitat requirements, food preferences, and behaviour of the two species of African rhino it is frequently possible to identify the species described. White rhinos are grazers, preferring level plains with short, sweet grass to eat, plenty of trees to provide shade, and permanent water sources. Water is needed not only for drinking

but also for wallowing. This landscape and vegetation type is characteristic of the southern African bushveld savanna. These habitat requirements immediately rule out large areas of southern Africa as part of the past distribution of white rhinos. Thus one may deduce that white rhinos probably never lived far south of the Orange River. Similarly one can presume that white rhinos probably did occur from Zululand westwards, through the Transvaal lowveld, western Transvaal and the northwestern Cape. Furthermore, their previous distribution included such areas as northern Botswana, possibly northeastern Namibia, and the lowveld areas of Zimbabwe and Mozambique.

The diet of black rhinos differs from that of white rhinos in that the former eat woody plants. Therefore black rhino habitat must supply sufficient food in the form of young trees and shrubs. Black rhinos are dependent on water and they normally drink daily during the dry summer months before the rains. Despite this, black rhinos will frequently wander

Distribution of the white rhinoceros

greater distances from water and their range includes the drier areas of southern Africa. This phenomenon can probably be explained by their dietary preference and social behaviour.

In the semi-arid and arid regions of the subcontinent most grasses are ephemeral, being annuals with a short lifespan. After rain showers they germinate quickly, grow, produce seeds, and have disappeared before the end of the dry season. In these areas, therefore, there would not be enough fodder for bulk grazers such as white rhino. Furthermore, in contrast to white rhino who live in family groups, black rhino are solitary, and a lower density of food would meet their requirements. In general, woody plants are more resistant to drought than grass. In the arid areas the woody vegetation is restricted to washes. These dry washes frequently provide enough food to sustain a single rhino. Black rhinos also show an affinity for broken, mountainous terrain. Bearing all this in mind it is not strange to find that black rhinos have a wider geographical distribution than white rhinos, not only in southern Africa but also over the rest of the continent.

One would therefore deduce that all the early references to rhinos in the Cape would have been to black rhinos. When the Dutch East India Company occupied the Cape in 1652 black rhinos appeared to have been quite abundant. Jan van Riebeeck, who commanded the first settlement of Europeans at the Cape, mentioned rhinos in his daily journal. They were found on the slopes of Table Mountain and around the fort, which was built to shelter the first settlers. As they started exploring the interior these settlers frequently came across rhinos. One of the best known incidents was when a rhino charged the stage coach of Governor Simon van der Stel on a journey into the interior.

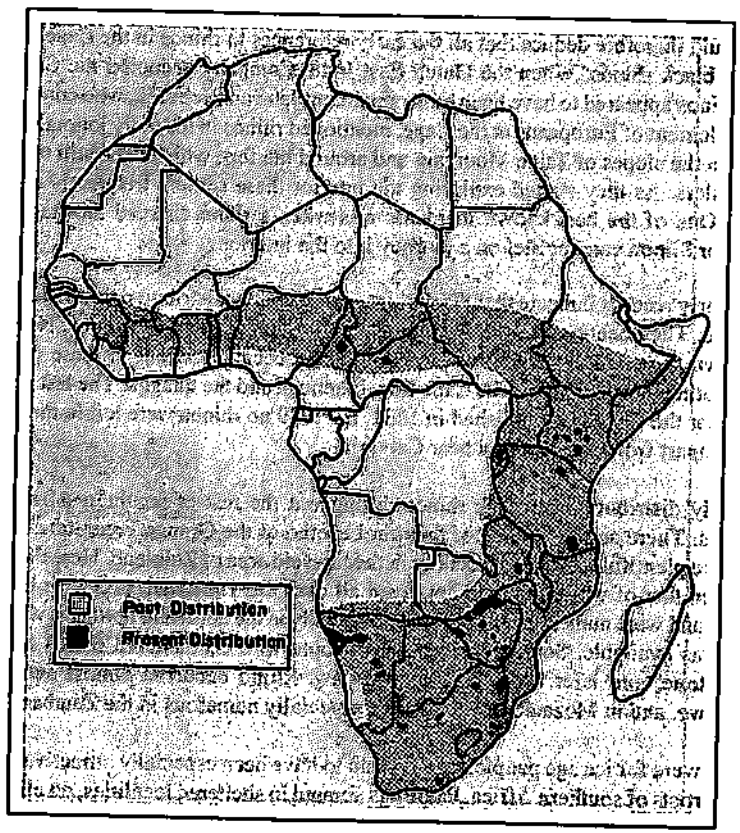
These early records indicate that black rhinos were widely distributed throughout the Cape Province. They occurred in the Eastern Cape, through the Karoo regions, Namaqualand and down the Orange River. However, they soon became extinct in these regions, like several other species such as the Cape lion, bluebuck and the quagga. The last reference to rhino near the Cape was published in 1731. By 1789 no rhinos were left in the Bokkeveld regions apart from one reported near Calvinia.

The early distribution of black rhinos throughout the rest of southern Africa holds no surprises. There are no records of them in Lesotho or the Orange Free State. In contrast, they were plentiful in Natal, especially in the lowveld area of Zululand. Here their numbers surpassed that of white rhinos. They lived all over the Transvaal, except in the highveld regions, and were numerous in Botswana, especially in the north and northeast where surface water was available. Some of the famous people who encountered rhinos here include Livingstone, and later Moffat, his son-in-law. Rhino occurred almost everywhere in Zimbabwe, and in Mozambique they were especially numerous in the Zambezi valley.

As they were for ice age people, rhinos seem to have been especially attractive to the early hunter artists of southern Africa. Paintings abound in sheltered localities, on cliff faces and in caves. The distribution of rock art across southern Africa could provide an indication of the early distribution of rhinos. However, it can also be argued that these localities are

rather a reflection of the distribution of the artists, or of rock faces on which it was suitable for them to paint. These are of course valid arguments. Yet the distribution of art, skeletal remains and the records of rhinos encountered by early travellers show a remarkable correlation. Together they provide a compelling and convincing record of the early distribution of rhinos.

Let us concentrate on the distribution of black rhinos in Namibia. Dr Scherz dedicated most of his adult life to recording rock art in Namibia. He came across many localities where rhinos were depicted either in paintings or petroglyphs. These works of art occur along the escarpment zone, from the Orange River in the south all the way north into the Kaokoveld, near the Kunene River. In the Lüderitz district, on the farm Aar (farm number 16) three black rhinos are depicted, and on the nearby farm Geelperdhoek (farm number 76) there is a petroglyph of a rhino that is taller than one metre. The petroglyphs at the Spitzkoppe



Distribution of the black rhinoceros

have been known since the 19th century. The most eastern petroglyph of a rhino occurs on the farm Ivanhoe (farm number 92) south of Gobabis. The best-known location for petroglyphs in Namibia is at Twyfelfontein, where over five thousand occur in a relatively small area. A petroglyph of a rhino from this area was portrayed on a Namibian stamp during the 1980s.

In 1938 a German missionary named Dr Vedder published a book that is a veritable gold-mine of information about the early history of Namibia. Details on several early expeditions into Namibia are given. The first was a 'scientific' expedition in 1761 organised by Ryk Tulbagh, who was governor of the Cape at the time. The expedition went north of the Orange River and explored as far as Leeurivier (Lion River). The official report contains some interesting information on the wildlife of the area and is the earliest literary reference to rhinos in Namibia. Their travel journal refers to giraffe *Giraffa camelopardalis*, buffalo *Syncerus caffer*, zebra, kudu, eland *Taurotragus oryx*, hartebeest *Alcelaphus buselaphus*, blue wildebeest *Connochaetes taurinus* and rhino. It also confirms the presence of the now extinct quagga in southern Namibia. Thirty years later in 1791 Willem van Reenen reached present-day Keetmanshoop. The main purpose of his nine-month expedition was to hunt, and during this period he and his companions shot and killed 65 rhinos, as well as many other game.

The 19th century was a period of colonisation of Africa by European powers. To prevent the British from colonising Namibia the Dutch government dispatched the ship *Meermin* to reconnoitre the Namibian coastline for possible harbour localities. She dropped anchor off present-day Swakopmund and on 23 January 1793 landed a party on shore. This party travelled some distance up the Swakop River and recorded abundant wildlife. They came across elephant *Loxodonta africana*, oryx, springbok and also rhino.

A traveller who published a detailed account of his journey through Namibia was a Captain Alexander, who left Cape Town with his party on 8 September 1836. After crossing the Orange River they followed the Fish River, travelling north across a large plain. When they reached the Naukluft Mountains at 'Bulls Mouth Pass' (present-day Bullspoort) they came across their first rhino. It is Alexander's description of this rhino that was referred to in Chapter 2. Alexander mentions that the Bushmen whom they encountered in the area considered rhino meat a delicacy. He and his party reached Walvis Bay by following the Kuiseb River down to the coast. Their return journey took them past fountains at present-day Windhoek, across the Eros Mountains and down the Fish River.

Two other travellers from the second half of the 19th century need to be mentioned. Charles Anderson and Francis Galton undertook an extensive journey through northern Namibia. This was at a time when more and more Europeans, especially missionaries, were coming to Namibia. At this time the established route from the coast to the interior was along the Swakop River. Travellers frequently reported encountering rhinos in the mountainous transition from the desert plains of the Namib to the plateau of the interior. Shortly before Galton joined him Anderson shot a rhino in this area.

The two men set off on their travels in 1850. This journey, which was to last two years, is well documented. Both gentlemen published accounts of their experiences. A map of their route shows that after leaving the coast they travelled north, past the Omatakos, the Waterberg Mountains and the Etosha Pan, to Ovamboland. From here their journey took them southeast to Elephant's Fountain (present-day Gobabis), which they reached in August 1851. Galton records that they did not see one rhino during the year that it took them to reach this point. As Anderson had shot a rhino earlier along the Swakop River, Galton was anxious to bag one as well.

The Hottentots at Elephant's Fountain assured them that there were plenty of rhinos in the vicinity. They travelled another two days eastward and arrived at a water-rich ravine. Here they found more than 20 rhino skulls lying around the waterhole. Their guide told them that Hendrik Witbooi, the leader of a band of Hottentots, had visited the area the previous month. Apparently he and his party had shot and killed 40 rhinos in the vicinity.

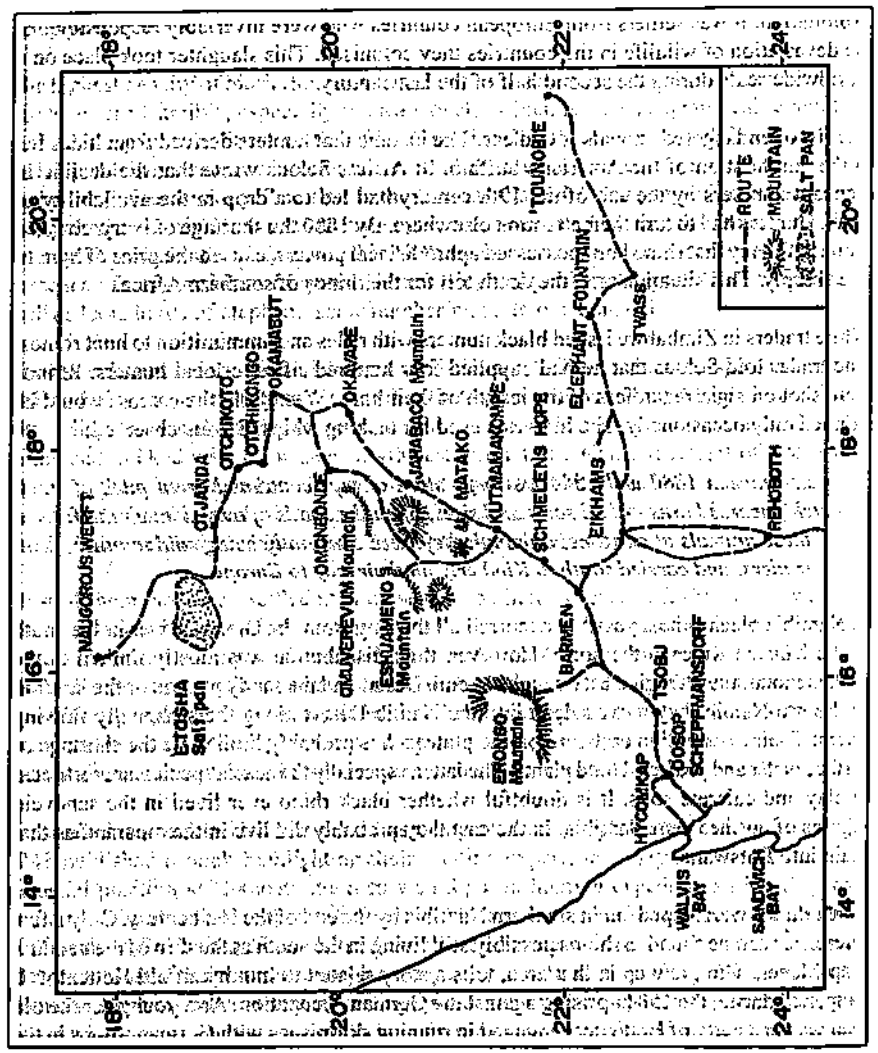
Anderson and Galton spent several days at the waterhole but only saw a jackal come to drink. They speculated that the game was driven away by the previous hunting party. They then moved further east to a waterhole called 'Tounabis, which according to their map could quite possibly have been in Botswana. Here Galton eventually had the opportunity to shoot a rhino. Several rhinos were shot over the next couple of days but unfortunately Galton mentions no figures. It is best to quote him:

> *The Hottentots shot away a great many bullets at rhinoceros and did, I daresay, a great deal of mischief. They bagged but a very few, compared to the number they fired at; the others most likely lingered on for a few days, and then lay down and died elsewhere.*

Let us return to the southern African scene. Despite the large numbers of rhinos of both species that had occurred in southern Africa their numbers declined to such an extent that Selous, a well-known big game hunter, wrote in 1908:

> *In southern Africa the black as well as the white rhinoceros has been almost absolutely exterminated during the last sixty years. During that period, thousands upon thousands of these animals had been killed ...*

This statement was confirmed by several other authors of the time. The trail of the white rhino was the first to fade. The reasons why this species was more vulnerable are clear; their preference for a habitat type that is readily accessible, as well as their habit of living in groups, makes them easy to find. Also, white rhinos have a moderate disposition and are therefore easier to approach. The combination of these factors meant that hunters could easily eradicate a whole group of white rhinos. Black rhinos, apart from having an infamous temper, frequent a habitat which is not as accessible as that of white rhinos. They are generally solitary animals and thus hunters would have to search for each individual they shot.



The travels of F Galton and C Anderson in Namibia (1850-1851)

It is clearly human greed that has led to the extinction of many species during the past two centuries. Alarmingly the rate of extinction shows no sign of decreasing; in fact, it is more likely to be increasing. Without exception developed countries are the root cause of this exploitation. It was settlers from European countries who were invariably responsible for the devastation of wildlife in the countries they colonised. This slaughter took place on a worldwide scale during the second half of the last century.

The list of endangered animals is endless. The income that hunters derived from hides led to the annihilation of the American buffalo. In Africa, Selous wrote that the decline in elephant numbers by the end of the 19th century had led to a drop in the availability of ivory. Hunters had to turn their attention elsewhere. By 1880 the shortage of ivory, coupled with the fallacy that rhino horn possessed aphrodisiacal powers, caused the price of horn to rise sharply. This situation rang the death toll for the rhinos of southern Africa.

White traders in Zimbabwe issued black hunters with rifles and ammunition to hunt rhinos. One trader told Selous that he had supplied four hundred rifles to local hunters. Rhinos were shot on sight regardless of the length of their horn. Wastefully the carcass would be skinned only occasionally. The hide was used for making whips. Selous observed:

> *... between 1880 and 1884 his large store always contained great piles of rhinoceros horns - of all sorts and sizes, often the spoils of over a hundred of these animals at one time, although they were constantly being sold to other traders, and carried south to Kimberly on their way to Europe.*

In Namibia black rhinos possibly occurred all the way from the Orange River in the south to the Kunene River in the north. However, their distribution was mostly limited to the broken mountainous region between the Namib Desert and the sandy plateau of the interior. In the pro-Namib they moved deep into the Namib Desert along the seasonally flowing rivers. Their distribution eastward on the plateau was probably limited by the shortage of surface water and preferred food plants. The latter, especially the acacia species, are restricted to clay and calcrete soils. It is doubtful whether black rhino ever lived in the sandveld regions of northeastern Namibia. In the east they probably did live in the omarambas that drain into Botswana.

Black rhinos were wiped out in southern Namibia by the end of the last century. Only a few references can be found to rhinos possibly still living in the south at the turn of the century. Jaap Meyer, who grew up in that area, tells a story related to him by an old Hottentot. It happened during the 1904 uprising against the German occupation. As a youngster the old man was in a party of Hottentots engaged in running skirmishes with German troops in the Keetmanshoop district. After one such engagement they fled into the broken terrain of the Fish River Canyon. One night they were camping in a steep ravine when a rhino charged through their campfire. The old man said that during the panic that followed, his first thought was that they were being attacked by the German troops.

Piet van Blerk, who also grew up in the south, recounts that rhino horn, or pieces of it, were valued for the honing of knives. This was during the 1920s and 1930s when rhino horn was extremely difficult to come by. Those people who still owned some horn had obtained it many years previously.

The highest density of black rhinos in Namibia was in the mixed acacia vegetation zones of northwestern Namibia, especially the Kaokoveld, which is a zoogeographical region that includes the present political entities of Kaokoland and northern Damaraland. Two interesting and dependable sources of information exist about the occurrence of rhinos in this region at the turn of the century. The first is the German Colonial Company of Dresden, which dispatched a certain Hartmann to investigate northwestern Namibia. Hartmann travelled through Ovamboland and Kaokoland in 1900. In his report to his superiors he mentions the presence of large numbers of game. He saw hippo and rhino along the Kunene River, as well as large herds of elephant, some numbering up to one hundred.

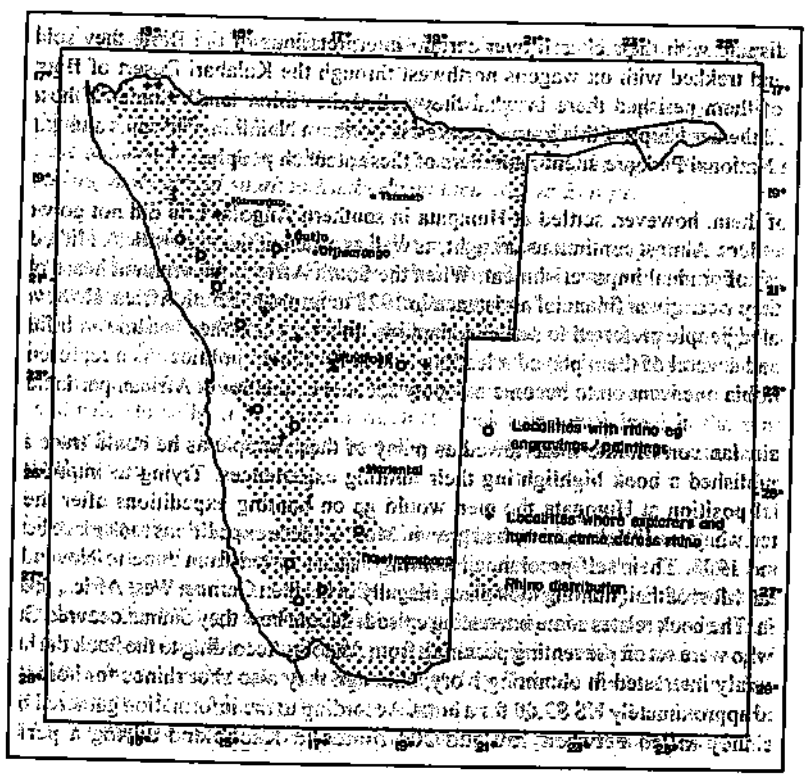
The second source is the so-called 'thirst land pioneers'. These Afrikaans-speaking people of Dutch descent originally farmed in the Rustenburg area of South Africa. Following a bitter dispute with their church over certain interpretations of the Bible they sold their farms and trekked with ox wagons northwest through the Kalahari Desert of Botswana. Many of them perished there in what they called the 'thirst land'. Some of those who survived the hardships of this journey settled in northern Namibia. Old ruins and graves at Etosha National Park are silent reminders of these staunch people.

Most of them, however, settled at Humpata in southern Angola. Life did not go well for these settlers. Almost continuous drought, as well as a lack of the necessities of life, caused a process of gradual impoverishment. When the South African government heard of their plight they were given financial assistance in 1928 to return to South Africa. However, the repatriated people preferred to settle in Namibia. In later years they became an influential group and several of them played a leading role in Namibian politics. As a representative for Namibia one went on to become a deputy speaker of the South African parliament.

A certain Jan von Molkte interviewed as many of these people as he could trace and in 1943 published a book highlighting their hunting experiences. Trying to improve their financial position at Humpata the men would go on hunting expeditions after they had harvested whatever little crop they had grown. Most of these expeditions took place between 1898 and 1908. Their self-proclaimed hunting season lasted from June to November of each year. Most of their hunting took place illegally in the then German West Africa, presently Namibia. The book relates some interesting episodes about how they outmanoeuvred German troops who were set on preventing poaching from Angola. According to the book the hunters were mainly interested in obtaining ivory, although they also shot rhinos for horns. They received approximately US $3.00 for a horn. According to the information gathered by Von Molkte they killed between 150 and 200 rhinos in Kaokoland during a period of approximately ten years.

Several travellers who visited Kaokoland later give numbers of rhinos that they came across. Steinhardt travelled through the Kaokoveld during 1915, and again in 1919, and reported only occasional rhinos in the lower Ugab River with some more along the Kunene River. Steinhardt believed that there was approximately one rhino for every kilometre of river front, which would reflect a relatively high number of rhinos. Manning estimated the Kaokoveld rhino population to be approximately 50 in 1923. Seven years later Shortridge thought that there were between 40 and 80 rhinos in the region between the Ugab and the Kunene Rivers. In contrast to Steinhardt's figure the rather subjective estimates of these two gentlemen were too low. Black rhinos are normally difficult to find and it is more than likely that the Kaokoveld numbers were higher.

Farmers who settled state land in the lower Ugab valley recall that black rhinos were relatively abundant at the time, causing problems for their herders. Many of these rhinos were shot in order to 'tame the land'. I found many skulls during a survey I did of these farms in 1966. On two farms only, Minorca (farm number 71) and Persianer (farm number 105), I found a total of 12 skulls.



Distribution of black rhinoceros in South West Africa, circa 1850

The situation facing the southern white rhino was once just as critical. By the end of the 19th century they had been virtually wiped out of their range in southern Africa. If they ever did occur in Namibia they certainly were not around early in the present century. None survived in Botswana or Zimbabwe. By 1929 the only surviving white rhinos were in a remnant population of approximately 100 animals. These lived in the small Natal parks of Hluhluwe and Umfulozi and in the corridor of land between these two game reserves. The conservation success story of the white rhinos is described in Chapter 11. Suffice to say the successful conservation of the southern white rhino was an achievement of which all South Africans can be justifiably proud.

Strict conservation measures, which included wildlife management practices, the provision of legislation, and most importantly the application of both, gave the southern white rhino a new lease on life. From this small group of approximately 100 animals, white rhino today number more than 6 000 worldwide. A breakdown of this number shows that more than 3 500 white rhinos occur in various protected areas throughout southern Africa. The largest single population is more than 2 000 in the Kruger National Park.

There are approximately 134 white rhinos in the game reserves of Zimbabwe, while Namibia has a population of more than 100 animals. There are approximately 1 500 in private game reserves in southern Africa. Several private landowners in Kenya imported southern white rhinos and today have approximately 80 animals between them. There are another 500 in zoos all over the world.

Although rhinos were already being exploited in certain areas at the beginning of this century there were other parts of the continent where they were still relatively abundant. In Africa as a whole, black rhinos were apparently always more numerous than white rhinos. In 1940 the British Colonial Government began an agricultural development scheme in the lowlands of Kenya. They appointed a big game hunter, J A Hunter, for the sole purpose of hunting rhinos that lived in the proposed agricultural area. Hunter killed 1 000 black rhinos in an area of approximately 250 square kilometres.

After the winds of change swept across Africa halfway through the 20th century the number of elephants and rhinos declined at an alarming rate. The figures from Kenya are a good reflection of what happened on most of the continent. According to their wildlife department there were still 20 000 black rhinos in Kenya in 1968. Between 6 000 and 8 000 of these animals lived in the Tsavo ecosystem. Ten years later in 1978 the same source estimated that 1 800 black rhinos were left in the whole of Kenya, and by 1987 this figure had dropped to 600, with only 160 in the Tsavo ecosystem!

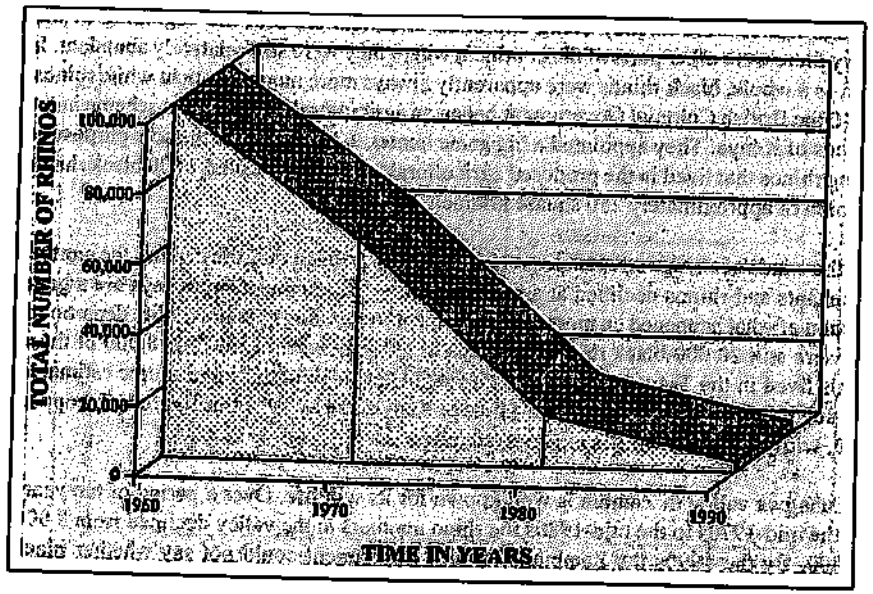
The Luangwa valley in Zambia is well known for its wildlife. Over a period of ten years from the mid-1970s to the mid-1980s the rhino numbers in the valley declined from 8 000 to 1 800. By the 1990s the Zambian Wildlife Department could not say whether black rhinos still occurred in the country! The big increase in the demand for rhino horn coincided with the rise in the oil price in the early 1970s. Yemenis working in the Gulf earned lots of

money and there was a surge in the demand for rhino dagger handles. An increase in the demand for ivory followed after many of the rhinos were shot.

This is the sad story across most of Africa. These animals, which previously had a wide distribution throughout the continent, today occur in only nine countries. The highest number of black rhinos at present are to be found to the south of the Zambezi River in Zimbabwe, South Africa and Namibia. Together these three southern African countries house more than 70 percent of Africa's remaining black rhinos.

Let us look at the populations north of the Zambezi River. In Tanzania there is a population of approximately 100 rhinos, with another 400 in Kenya. Four other countries maintain that they have populations of 50 or less. These countries are Angola (50), Cameroon (35), Mozambique (50), and Zambia (40). Three other countries claim to have relic populations. A figure of 15 rhinos in Rwanda is questionable. Botswana claims to have five in the northeast of the country but several surveys in the area could not confirm this. Swaziland had six black rhinos on a game ranch but three were recently taken by poachers.

To obtain a true picture of the rhino's plight one should look at the African continent as a whole. According to conservative estimates there were approximately 100 000 black rhinos in Africa in 1960. This figure had dropped to approximately 63 000 by 1970. By 1980 the figure generally quoted was 14 800, which by 1990 had dropped to 3 000. Since then the number has dropped even lower and was about 2 475 for 1994. Because of the low numbers,



Decline in black rhino numbers

wildlife departments are trying their best to obtain the most accurate figures possible. The above figure is probably very close to the real number remaining at present. The graph on the previous page places this shocking state of affairs in perspective.

The onslaught on the remaining rhino populations is accelerating. The intensity of the recent decimation of the rhino population in Zimbabwe is an example of this tendency. During 1994 the number of rhinos was reduced from 1 500 to the present 425, mainly by poachers from Zambia. Poaching in general is addressed at greater length in Chapter 13.

The decline in rhino numbers over the entire continent is the work of poachers. Some lessons can be learnt from Zimbabwe's problems. Firstly, it is difficult to protect wild animals against an organised onslaught of the kind of high-intensity poaching that the Zimbabwe rhino population experienced. Secondly, there can be no doubt that the remaining populations in southern Africa are going to be exposed to a similar threat very soon.

White rhinos faced the same fate. The northern white rhino occurred to the north of the Zambezi River. Their historic distribution covered most of west, central and east Africa, wherever there was suitable habitat. Today this animal is the rarest subspecies of the surviving rhinos. In 1984 their numbers had dropped to 15 free-ranging individuals.

Concerted conservation efforts have allowed this number to more than double during the past 20 years, bringing it to 36 rhinos in two countries. Of these, 31 live in the Garamba National Park in Zaire, where they are under constant threat from poachers across the border in Sudan. Sudan itself has only five white rhinos remaining. For several years there has been no confirmation that any white rhinos still live in the Central African Republic or in Uganda.

In the national and international arenas of politics and economics, environmental issues, including nature conservation, are always put on the back burner. The old adage that we did not inherit the earth from our parents but are borrowing it from our children still goes unheeded. Africa's greatest natural asset was the amazing diversity of its wildlife. The way in which the developed world squandered this asset will go down in history, along with slavery, as a terrible crime against the peoples of Africa. Allow me to share some thoughts with you on this subject because it has and still does affect rhinos.

CHAPTER 6

Politics, conservation and rhinos

Now that we have dealt with the historical aspects let us turn briefly to the role played by politics in conservation. The history and politics of Africa are intertwined with nature conservation, or to use the buzz phrase, environmental protection. Some background information is needed in order to understand the influence of politics on the environment and on rhinos in particular. Some environmental issues and conservation principles also need to be addressed. This will place the clover trail that we are following in the correct perspective.

Two phases can be identified in the European onslaught on African wildlife. The first was when Africa was being perceived by European courts as a rich bounty to be divided among them. They colonised their allocated parts of the continent and raped the natural resources in various ways. The second phase occurred mainly after the Second World War, when emerging African nations capitalised on the guilt of their prior occupiers, and with the funds made available inflicted further destruction on the environment in the name of development. Although Europeans were not necessarily as physically involved with the impact on the remaining African wildlife during the second phase, the damage caused by their financial resources was as devastating.

The first phase was manifested by European 'explorers' and settlers and had its greatest effect in the years prior to the First World War. These so-called explorers travelled through Africa and 'discovered' natural phenomena that were previously unknown to the west. Early settlers decimated wildlife populations, especially in southern Africa. This mindless slaughter was not acceptable to some people around the turn of the century. Fortunately some of these people were in positions of authority and had the conviction and moral fibre to act. Two people in southern Africa who come to mind are President Paul Kruger of the Republic of the Transvaal and Governor Francois von Lindequest of German West Africa.

The area that later become Kruger National Park was the last area in the Transvaal lowveld that still teemed with game. Animals survived here because the area was considered inhospitable to humans and unsuitable for agriculture, owing to the presence of malaria and various livestock diseases. However, it was the presence of game that made President Paul Kruger proclaim the Sabie Game Reserve in 1898 and the Singwetsi Game Reserve in 1903. In 1926 these game reserves were extended and joined to form the Kruger National Park. The game reserves in the Natal lowveld were created in areas where tsetse flies occurred. Tsetse flies are the natural vector for a particularly virulent blood parasite that causes nagana in cattle and sleeping sickness in people.

Etosha National Park and Namib Desert Park in Namibia were also originally established for a reason other than that of nature conservation. Three cattle-free zones, areas 1, 2 and 3, were proclaimed in 1900 in order to protect the domestic livestock of the German colonials. Although it is true that from the outset no hunting was allowed in these cattle-free areas, a look at a map will show that all three were strategically located between the central, mainly colonial cattle farming area, cattle-rich Ovamboland in the north, and the Okavango in the northeast. German colonials imported cattle from Europe. Unfortunately these imported breeds had little or no resistance to the local diseases. The objective of the cattle-free zones was to enable the authorities to control cattle movement and prevent contact between the endemic livestock and the imported cattle. The cattle-free zone behind Swakopmund and Walvis Bay was created to prevent the uncontrolled selling of beef to ships, apparently to prevent the spread of disease.

It is not well known that during the German occupation of Namibia there were veterinary research facilities at Gammams just outside Windhoek, which were more advanced than those at Onderstepoort in South Africa. These facilities stopped functioning after the First World War when South African troops occupied the country. Governor von Lindequest proclaimed the three cattle-free areas as game reserves in 1907. Apart from their status quo being maintained nothing happened to these areas for the 40 years following the First World War. Then in the early 1950s one of these areas became Etosha Game Reserve and another became Namib Desert Game Reserve. The third area, located astride the Omaramba Omatako and which also formed the route to the Okavango, was deproclaimed, and in exchange additional land was added to Etosha Game Reserve.

The point is that most of the oldest game reserves in southern Africa were not established on the basis of pure conservation considerations. They came into being because at the time the land was considered unfit for human habitation and agricultural development. This said, it does not negate the actions of those who proclaimed them as protected areas, nor does it diminish the justifiable pride (one could almost call it a possessiveness) that southern Africans feel towards these game reserves. The high standards of wildlife management practised in these reserves is not equalled anywhere else on the continent.

Let us return to our main theme and see what this meant to the conservation of rhinos in southern Africa. The survival of both rhino species in South Africa was mainly due to the existence of two small game reserves in Natal. Both were established without the presence of rhinos being a prime consideration. Elsewhere in South Africa neither of the two rhino species survived. White rhinos were exterminated in the Transvaal lowveld two years before the proclamation of the Sabie Game Reserve. The last black rhino in the Kruger National Park was a cow that died in 1936, apparently of old age. Despite the promulgation of hunting regulations in Namibia in 1897 it was too late to ensure the survival of the white rhino, that is assuming they ever occurred there. The Namibian black rhino, however, fared better.

Development aid to the newly-emerging states after the Second World War heralded in the second phase in the onslaught against Africa's wildlife. The slumbering political giant of Africa started to awaken and demanded the right of self-determination. A wave of black nationalism washed across the continent and frequently led to bloody civil wars. Strife and unrest had a negative impact not only on the human population but also on the environment.

During this period, developed countries vied with each other to bring financial aid and technological assistance to the developing countries. Their stated objectives were to ensure economic growth and political stability in these countries. Unfortunately this much-publicised assistance was mostly a thinly-veiled attempt to put in place a process of westernisation. Developed countries laboured under the illusion, alas many still do, that development meant westernisation. This is one reason why financial aid to Africa frequently does not achieve its objectives. In retrospect the blame for the inability of Africa to react 'positively' to aid is usually placed on the client, without the realisation that Africa exists in another dimension.

During the early years that followed the *Uhuru* wave which washed over Africa the hidden environmental costs of 'development' were never considered or addressed. The short-term economic and political advantages were always allowed to outweigh the long-term environmental disadvantages. The environment was therefore irreversibly damaged in the name of 'progress'. The areas where the kaleidoscopic diversity of African wildlife could exist without interference by people quickly became fewer and smaller. The pressures from development increased exponentially.

International aid organisations believed that agricultural development based on western concepts was the way to ensure the economic growth and sustainability of developing countries. Livestock and agricultural practices from temperate Europe were introduced at an accelerated rate. These were ill-suited to the African landscape and the introductions took place at a terrible cost to the indigenous species. In an attempt to eradicate diseases such as nagana and malignant catarrh, game were eliminated over large areas in some southern African countries as a matter of official policy. These diseases are endemic to the continent. Game, and to some extent the indigenous livestock, had developed immunity to them. However, in the minds of Europeans the indigenous livestock were of an inferior quality and had to be replaced. Thus the land was 'tamed'.

Game were exterminated as competitors to livestock for grazing. Predators and scavengers were ruthlessly persecuted, hunted and poisoned. Birds of prey, which gracefully adorned the azure African sky, disappeared. Nobody ever considered using the bountiful natural resources of Africa on a sustainable basis. If the millions in financial aid that were pumped into the bottomless pit of 'development' had been used instead to enhance the available natural resources, the African village may have looked quite different today. As it was, Africa's potentially biggest natural asset was annihilated.

In the southern African countries thousands of kilometres of fences were built. In those countries where development came early, such as in South Africa and to some extent Zimbabwe, one could argue that these fences were erected in ignorance. It is difficult, however, to understand or justify the wanton waste that took place during the second half of this century in countries like Namibia and Botswana. Many thousands of kilometres of fences were erected as veterinary measures to 'protect' cattle of European origin. These fences cut across age-old migration routes and thousands of game died of thirst and hunger against them.

High concrete walls were constructed in pristine rocky ravines for hydroelectric and irrigation schemes. Thousands of head of game perished in the lakes that formed behind these dams. The seasonal floods of these rivers do not take place any more. Many species, such as the tiger fish, require this flood to stimulate hormone release and reproduction. Flood plains and swamps, once teeming with wildlife, were destroyed. Deforestation took place. Green hills and their slopes were turned into monocultures of sugar cane, exotic timber, or some other agricultural crop. Mine shafts and dumps, high industrial smoke stacks and extensive urban spread developed almost overnight on the African savanna. The beat of game hooves, once the pulse of the continent, faded, and with it also the clover trails of the African rhino.

Another point of dismay in the development and application of modern technology in Africa is the insensitivity shown to environmental issues by policy deciders and decision-makers. This is true locally and nationally. In particular, the negative impact on the environment of agriculture and veterinary practices cannot be ignored. In desperate attempts to achieve a balance between a growing human population and its increased socio-economic demands, consideration for the wise use of natural resources was frequently ignored.

Under this type of pressure the integrity of many wildlife departments all over Africa crumbled. Game reserves established during colonial times were hardest hit. With unrealistically small budgets and low salaries for officials and rangers alike, corruption took its toll. In many countries, especially in east Africa, poaching for ivory and rhino horn in game reserves was blatantly allowed for a share of the profits. In one well-recorded case an East African president's daughter was involved in this illegal trade.

Understandably, under such conditions anti-poaching activities were mere window-dressing. The ban placed on the trade by the international conservation community, first on rhino horn in 1977 and then on ivory in 1989, was a result of this poor show in east Africa. Kenya's request for the ivory ban should be seen as an effort to recover some credibility. The practical implication of this ban is that those countries in southern Africa where conservation was rigidly practised were penalised. They lost a valuable resource for generating revenue. Now, six years after the ivory ban was instigated, the financial support that donors from developed, pro-ban countries promised in order to offset the loss in revenue has still to appear.

Until now in this chapter we have been involved in the role that politics has played in shaping conservation in Africa. I would now like to discuss some 'conservation politics', as well as a few basic conservation principles. Although this may not immediately seem applicable to the conservation of rhinos, I believe that an understanding of ecological principles will help clarify some issues that will be addressed in later chapters.

Let us go back in time to the Second World War. The small areas of virgin territory remaining after the war were exposed to development. Conservationists realised that the writing was on the wall for Africa's wildlife. Those countries that did not immediately face the post-war independence issue concentrated their efforts on ensuring that conservation was placed on a sound footing. As a first step most of these countries initiated ecological inventories in order to ensure that representative samples of all ecosystems were adequately protected. Efforts to establish new protected areas were intensified, despite resistance from politicians and to a lesser degree from landowners. Another measure implemented was to translocate rare and endangered species to protected areas where they did not already occur.

Especially in some older game reserves an anomaly developed. Because of natural population increases under protection, some species became very abundant and were perceived to be causing management problems. This was in many ways a novel experience for managers. Those responsible for running wildlife departments were often from the old school. Their attitude was that the balance of nature was something best left to nature. They did not realise that the basis of this premise might have been removed the moment the wildlife areas were protected or enclosed, despite these areas often being relatively large.

The classic African example is the experience of Tsavo National Park in Kenya. Policy-makers did not heed the warnings of biologists. Game numbers, especially those of elephant, increased to a point where they were thought to exceed the carrying capacity of the game reserve. The vegetation, especially the trees, was being extensively damaged by elephants. This coincided with a severe drought in the early 1960s. Many thousands of game died in this catastrophe. Although Tsavo National Park is now in the process of recovering, the structure and species composition is different to what it was before this disaster. Similarly the park has not been able to retain anything close to the number of rhinos that it previously housed.

It is sound policy in wildlife management to ensure that the numbers of game do not exceed the ecological carrying capacity of the protected area. This occasionally implies active intervention: manipulating the numbers by removing surplus game. Unfortunately the public at large sometimes does not have compassion for the dilemma in which wildlife managers frequently find themselves. The controversy that occurred in South Africa when the Kruger National Park started culling its elephant population in the 1970s, and the frequent recurrence of this issue in the local press, is witness to this problem.

When protected areas were first being established nobody was really aware of carrying capacity and its importance. It was always assumed that the protected areas were large

enough to satisfy the needs of the game that they harboured. The 'needs' of game were equated with sufficient grazing and enough drinking water and no effort was made to quantify either 'sufficient' or 'enough'. As most of those early protected areas were relatively large tracts of land it did not really matter. Over the years, however, there has been a growing realisation that an understanding of an animal's social behaviour is as important as food and water. Two questions that could quite rightly be asked at this point are: how does one determine carrying capacity? And, what has an animal's social behaviour to do with its conservation needs? Let us answer these questions by first having a look at the example of domestic livestock.

If a farmer would like to know how many and what type of livestock to farm in a particular region, he or she would decide in the following way. Apart from the economic aspects, which would obviously be important, the farmer would determine, using well-established pasture management techniques, the fodder production potential of the piece of land. Knowing this and the type of fodder to be grown, the farmer could decide whether the land was most suitable for cattle, sheep, or both. It could be established with some certainty how many animals the land could sustain. The chosen livestock would be herded into paddocks and rotated on a predetermined schedule in order to use the available fodder optimally. With livestock therefore it is the quantity of food available that is the regulating factor when calculating carrying capacity.

Determining carrying capacity for game is unfortunately not so simple. One frequently hears the statement that a given piece of land, say a paddock with a mixed plant community, could probably support a larger number of wildlife than livestock. The argument is that while livestock only eat certain parts of some plants, a variety of game species in the same paddock would be more efficient users of the available vegetative material. This is because the various species feed on different parts of the same plants, as well as on different plant species. Thus because of ecological niche specialisation they do not compete for food. Although this argument holds true hypothetically it does not always work this way in practice. Differences in social behaviour and the need for living space (*Lebensraum*) result in one having fewer game animals in the paddock than the food on offer could support. With game, the social needs of the various species are as, if not more, important than the availability of food.

Let us consider the problems that face a biologist trying to determine the carrying capacity of a certain piece of land for game. With livestock one is looking at the production potential of a relatively homogeneous group of plants, mostly grasses. Even then, livestock do not feed on all the grass species available. With game one would have to determine the production potential of all the plants, be they grasses, herbs, shrubs or trees. In addition one would have to consider unquantifiable factors like social behaviour and *Lebensraum*. With species that normally live in herds, such as springbok, impala *Aepyceros melampus*, blue wildebeest *Connochaetus taurinus*, and eland *Taurotragus oryx*, there would not be too much of a problem. Although one could not ignore social behaviour, the issue of food availability would carry more weight. One could therefore probably stock these species according to food availability.

Many other species, however, that live in pairs or small family groups, or exhibit territorial behaviour, would need larger areas. With these species their social behaviour dictates that the availability of food play a less important role. For instance, studies have shown that the social behaviour of ungulates is not correlated with the availability of their food. Therefore when a wildlife biologist sets out to determine the carrying capacity of a certain area, all these factors have to be taken into consideration and each species considered individually. The biologist is thus determining what is, in wildlife biological terms, the eological carrying capacity of an area.

There are several examples that illustrate the importance of social behaviour. One of them is an interesting case history from Kruger National Park. When regular aerial surveys were initiated in this park during the 1960s it was noticed that tsessebe *Damaliscus lunatus* numbers were low. Their numbers were carefully monitored but the population showed no signs of increasing. This became a tantalising problem. The generally accepted explanation was that it was probably due to some mineral deficiency in their diet. I remember during a lecture on nutrition how the professor referred to the inability of the Kruger Park tsessebe population to increase its numbers as an example of the importance of trace elements in the food of wildlife. A biologist named Salmon Joubert, who later became the warden of the park, was assigned to conduct a study on the tsessebe. His findings showed that the limiting factor was not food but social interaction!

Another example was an incident reported in 1994 from Pilanesberg National Park just north of Johannesburg. During the 1970s, 80 elephant orphans that were a legacy from the culling operation in Kruger National Park were released in the Pilanesberg National Park. These elephant calves grew up without the presence of adult elephants and therefore without the exposure to the social code that regulates elephant behaviour. When the reproductive organs of male elephants become active the elephants normally become irritable and aggressive. This period is called *musth*. When, at the age of 15 years, the Pilanesberg orphans experienced their first season of *musth*, it occurred without the presence or domination of mature bulls. As a result three young bulls went on a rampage and killed 17 adult white rhinos.

Here is a fascinating example from a study conducted on rats in which the influence of population density on social code was studied. Rats form monogamous pairs and both parents take care of the young. In a natural situation the social code of the rats controls the population density, with young animals moving away. In this particular experiment a cage was divided into three sections. Ample supplies of food and water were provided in all the sections. Rats were released into sections A and B, while none were released into section C. In section A the population was controlled to ensure that their numbers did not exceed the density level found in nature. In section B, the centre part of the cage, the rats were allowed to multiply without restriction. When their numbers increased to beyond natural density their social code broke down. Monogamy disappeared. Mothers became cannibalistic, eating their own young. Young rats formed bands that attacked other rats.

A segment in the dividing panel between sections B and C was removed. By moving into the empty space provided by section C, the rats would have been able to restore their natural population density. However, none of the rats chose to move into section C. Then part of the dividing panel between sections A and B was removed. All the rats from section A, which had been living according to their social code, moved into section B and joined the melee. This result makes one ponder the consequences of the conditions under which much of the world's urban population live.

Let us return to the topic of acquiring protected areas. It is now seldom possible to obtain areas solely for nature conservation simply by applying a special conservation status to them. The ever-increasing need for land demands that the public be convinced that this form of land use is indeed to the benefit of the country and its people. Conservationists have to do this not only to obtain new areas but commonly also to retain areas already established as game reserves. This public attitude is politically inspired and driven by socio-economic realities. Furthermore, over the years the whole idea of conservation has changed, becoming more focused and specialised. Now, emphasis is being placed on the protection of those species classified internationally as endangered or threatened.

The result of this approach is of course that conservationists are now forced to do proper homework. Submissions requesting land for conservation purposes have to be based on sound scientific data including, among other things, ecological and socio-economic surveys. To compile a conservation strategy for any animal species it is important to know and understand the specific requirements of the animal in question. This information is imperative in order to ensure that when an area is designated for the protection of the species it will fulfil all the animal's needs. In southern Africa several game reserves have been established for the protection of a specific species. They include Namib Naukluft National Park in Namibia, which was created for the protection of Hartmann's subspecies of mountain zebra. Mountain Zebra National Park in South Africa was created for the protection of the other subspecies of mountain zebra, while Bontebok National Park was created to protect bontebok *Damaliscus dorcas dorcas*.

We have dealt with ecological carrying capacity and established the importance of social behaviour. However, there are a few other important terms that are used when dealing with wildlife. The first is home range. An animal's home range is the area covered by the animal while meeting all its life requirements such as feeding, resting and breeding. The home range is not protected against other individuals of the same species. A territory, on the other hand, is protected against some other individuals of the same species. The size of territories varies depending on the species, but generally 'territory' means that the breeding area is defended. With many birds that nest in colonies the only area defended is that which the bird can reach with its beak, immediately surrounding the nest. With certain species, especially primates, the entire home range is defended. Some small game species, such as dik-dik *Madoqua kirkii* and steenbok *Raphicerus campestris*, whose social structure is based on a pair bond, defend their whole home range. This is also true for many predators. Thus these species also defend their food source.

For those animals that defend a territory, maintaining a presence is imperative. Among territorial birds the male (and sometimes both partners) sits in a conspicuous place and sings, thus proclaiming his presence in the territory. The beautiful, sweet, rolling melody of male masked weavers is distinctive in urban southern Africa. The males, which frequently build their nests in gardens, will sit in the same tree, joyfully informing other masked weavers of their presence. Game species with territories engage in an olfactory advertising campaign to signal their occupation of a territory. Urine, middens and glandular secretions are used to mark the territories in strategic places. Those game species that defend territories only during their breeding season also use physical presence, with broadside displays of their bodies.

One word that is most often incorrectly used, sometimes even by biologists, is the term habitat. Let us look at this term as it relates to animals. The space that a particular species needs in order to fulfil its life requirements (food, water and shelter) is called its habitat. One could equate habitat with the address of a particular species. Some animals have very simple habitat requirements while those of other species are quite extensive. An animal's home range or territory lies within its habitat.

Allow me to illustrate this. Imagine we are looking at a landscape that consists of a mountain range and an extensive grass plain with scattered trees. A river drains the mountains and flows across the plain. Along the banks of the river is a dense forest. The mistake people usually make is to refer to the various vegetation zones or landscapes as habitats without referring to a definite species. They would look at the above scene and talk about the river, the riverine forest, the grass plain and the mountain range as separate habitats. It is true that any one of these zones could form the habitat of a certain species. It is more likely, however, that a species will need more than one of these zones to fulfil its living requirements.

The habitat of an otter *Aonyx capensis* living in our landscape would be the river and the river banks. The otter would only be using part of the available otter habitat. The rest would be used by other otters. Bushbuck *Tragelaphus scriptus* are timid animals and mainly browsers. They are also dependent on water. The habitat requirements of a bushbuck are thick bush and water. The home range of a bushbuck would therefore be in the habitat presented by the riverine bush and the river. Impalas are mixed feeders; they both graze and browse. The transition zone between the riparian forest and the grass plain, as well as the river for water, fulfils an impala's habitat requirements. A herd of impala would therefore have a home range that included all three zones. Again the rest of the available habitat would be shared by other herds of impala. Wildebeest are grazers and prefer open grass plains, but they are also dependent on water. Their habitat would therefore be the grass plain and the river. They would have to move through the riparian forest to get to the river but the forest would not be part of their habitat. Elephant would use the river, the riparian forest and the grass plain, as well as the vegetation growing on the slopes of the mountains. All these vegetation zones would be part of the elephants' habitat.

In the literature one finds a confusing variety of habitat types described for black rhinos. This confusion is apparent only if one is not aware of the indiscriminate way in which the

term 'habitat' is used. The first description of the habitat requirements of black rhino was published as early as 1900. Subsequently many big game hunters and natural historians have published descriptions of 'typical' black rhino habitat. It was only in the early 1960s that biologists started studying the habitat requirements of black rhinos.

The early descriptions of the habitat requirements were not necessarily wrong. What the authors described were the home ranges of different black rhinos within the habitat range of the species. These habitat descriptions for black rhinos varied from sea level to 4 000 metres above sea level; from desert areas, through the savannas and the plains, on to the mist-enshrouded moorlands of the great mountain ranges in central Africa. A great variety of landscapes and vegetation zones fall within black rhino habitat.

Another important aspect in nature is reproduction. The driving force in evolution is the inherent pressure to ensure the continuation of the species. Part of this scheme is not only to make sure that reproduction takes place but also to ensure that the most suitable genetic source is used. One finds in nature that the key to achieving this is contained in the social behaviour of the species. The fact that a female is on heat is not enough to guarantee mating. Males of a specific species must have access to the female on heat in order to mate and reproduce. The social codes of species have evolved to ensure that the most successful males reproduce. Animals usually go through an elaborate courtship behaviour, which culminates in mating. The mating flights of birds of prey or the dances by the various crane species are examples of this type of behaviour. It is impossible for these animals to mate without going through these courtship motions.

In nature males compete to establish dominance, and through attainment of the dominant position gain access to the females. Through a dominant position the male acquires control over a territory, a harem, or a family group. The right to mate with oestrous females flows from this dominant position; it is the physical act of attaining this position that allows them to mate. Males that cannot achieve this position are often psychologically castrated. Sigmund Freud and other psychologists were therefore not correct in assuming that sex alone was the driving force in the social behaviour of nature.

Various social codes can be identified in nature. The social code that seems at a glance to be the simplest is where animals appear to be solitary. However, it frequently turns out that what appears to the casual observer as a solitary animal is really an individual from a pair that is temporarily alone. One finds this type of social code mostly within the smaller game species, such as steenbok and duikers *Sylvicapra grimmia*. With these animals the home range also forms the territory. The territories are marked and protected against other members of the same species. These species defend their territories throughout the year and not only during the mating season.

The pair bond within these species lasts for life. Nevertheless they frequently move around within the territory on their own. When the female comes into heat the male will join her. He will also be present when the young are pushed out of the territory. This normally

happens when the lamb is approximately one year old, and shortly before the birth of the next lamb. The two adults also combine forces to repel intruders from the territory.

The size of the territory depends on the quality of the habitat. There is often a negative relationship between carrying capacity and the size of the territory. The territory will normally be large enough to ensure sufficient food for the pair throughout the year. If the vegetative cover is poor, as it is in more arid areas, the territory will be larger than in areas with lush vegetation. The territories are marked with middens, normally on the borders. Pairs from adjoining territories may use the same midden on a communal border. Dik-dik and duikers have glands in the front corner of their eyes. These pre-orbital glands secrete large amounts of matter, which is deposited on twigs or grass stems by the little buck.

With other species, where the males hold territories during the mating season, it may appear to the casual observer that these males are individuals that have been pushed out of the herd. This behaviour was described for the first time by a biologist who was undertaking research on wildebeest in east Africa. The study, conducted in the early 1960s, was the first to discover the biological importance of solitary males. Before this study the general view was that these animals were outcasts and that only those males which were still in the herd mated. These 'outcasts' were frequently shot by rangers for rations, which resulted in the removal of the prime genetic material.

Apart from wildebeest other species evincing this behaviour are springbok, lechwe, blesbok and bontebok. With these species, mating occurs within a fixed and relatively short period. Births are synchronised to take place within a very short time. The males compete for a territory within the home range. The size of the territory depends on the species involved and the quality of the habitat. It could vary from the size of a tennis court to the size of two football fields. The occupation of the breeding territories takes place annually, just before the onset of the rut. The male 'owner' marks the territory by depositing dung on communal middens that mark territorial boundaries. The presence of fresh dung signals that a territory is occupied.

In Etosha National Park springbok males already occupy their territories during June and July. These solitary males are quite conspicuous on the plains, chewing the cud while mixed herds of springbok may be grazing a hundred metres away. To the uninformed observer it appears as though these solitary males have been ostracised from the herd, especially as other males would be observed with the herd. Often two territorial males would be relatively close together but completely ignoring each other. The advantage of this is protection; two pairs of eyes are better than one for spotting the golden shadows of predators moving across the plains.

Biologists have theorised that game live in herds because this behaviour has certain advantages. The most obvious advantage of course is that it is a defence mechanism. The chances of an animal spotting a predator are much greater when the animal is in a large herd than when it is in a small herd. The second advantage is that in a large herd more time

becomes available for grazing without compromising safety because animals share the watch. When a springbok herd is smaller than 20 animals, individuals spend more time watching their surroundings than they do grazing. A third advantage of herd formation is that a herd moving forward abreast has less chance of coming across a spot that has already been grazed by the same species than small herds moving around at random.

The determination of dominance usually starts at an early age. Young animals often engage in mock combat with peers. By the time they reach maturity, dominance has largely been established. This does not mean that intense fights do not occur. However, such fights seldom end in the death of a combatant. In the social behaviour of most species an escape mechanism or safety valve is built in. When dogs get involved in a fight, the vanquished will depart with its tail between its legs, or turn its exposed belly to the stronger animal. Inbreeding among domestic dogs has caused this type of behaviour to be weaker than that of their wild counterparts. With some animals, pigeons for example, this escape mechanism does not exist. Therefore one frequently finds that when two domestic pigeons get involved in a fight it will continue until one is dead.

Males from adjoining territories will frequently get involved in shadow skirmishes with their neighbour. This is part of their advertising campaign but sometimes becomes quite intense. Lechwe *Kobus leche* males patrol a communal boundary, moving abreast, proud and with èlan, phallus exposed. The most dominant males have their territory located closest to the females, often in localities with the best food or on the route to water. When a female comes into oestrous the male whose territory she is in at the time will mate with her. Mating is normally preceded by ritualised behaviour, which ensures that the female is physiologically responsive. When a dominant male is removed from his territory, by a predator for example, the vacuum created is immediately filled by one of his peers. Less dominant males, usually younger males lacking the experience of their older counterparts, will have territories further from the focal point of female activity. As they grow in stature and experience males graduate to the better territories.

An alternative social structure found among game is where the dominant males try to gather exclusive groups of females, or harems. This behaviour is evinced by impala in southern Africa. With elephants and kudu a dominant cow or matriarch with her female offspring normally forms a family group. They move around without a male being present at all. When a female becomes sexually receptive a male will join the group for a time and mate with her.

The social structure of zebra differs. It consists of small, stable family groups and bachelor groups. In family groups there is always a stallion in the company of females. The male is replaced by another stallion quite regularly. The permanent groupings are formed by females and consist of a dominant female with up to four or five other females in a strict social hierarchy based on age. The bond between the females is lifelong and is not broken, even if a stallion should try to split the group. Sometimes, however, before this bond is established,

young females are successfully abducted by other males. The dominant or oldest female is never challenged by the younger females and is only replaced when she dies.

Young males leave the family group and join bachelor groups. These are not stable and will constantly change. The dominant stallion in a family group wards off other males and mates with receptive females. With a young female coming into oestrous for the first time, two things may happen. If the number of breeding females in the family group is less than four or five the male will try to prevent the young female from being abducted by other stallions. If the number of breeding females is more than five the dominant male will not try so hard to prevent this from happening.

Strategies that have developed to improve the chances of survival of young are interesting. Two main patterns are distinguishable. The first strategy is found among animals that live in large herds. Among species such as springbok, wildebeest, impala and blesbok the births in the herd are synchronised and all the young are dropped within a few weeks. The young animals develop quickly; it only takes a few hours before they are moving about freely and within a day they can keep up with the herd if need be.

These young are only exposed to the ravages of predators for a short time. The territorial behaviour of predators ensures that there is only a limited number of them present in the breeding area of the ungulates. Obviously these predators can only eat so much. If there is a large number of young ungulates present at a given time the survival rate is therefore better than if they were available over an extended period. The strategy in economic terms is one where the supply greatly exceeds the demand. Many young animals may be taken but many more will survive.

The second strategy is where the births are not synchronised and individuals are born throughout the year. This strategy is normally found among those species where the social code is structured towards small family groups. Within these species a single young is born at a time and the vigilance of the whole unit is employed to ensure its survival. Species that use this strategy include mountain zebra. Characteristically the female with the youngest foal will be the first to move away at any sign of danger. The rest of the family group will then place themselves between her and the source of danger.

In the following chapters we will get to the really interesting aspects of the lives of African rhinos. We will explore their ecology and behaviour and look at how these shape their lives. Although most of the information refers to my study on black rhinos, I have tried not to ignore the white rhinos, as well as those denizens that share the rhino's environment. The results of my study created a window through which the private life of rhinos can be viewed. Let us follow this clover trail.

CHAPTER 7

The black rhino study

Reference was made in an earlier chapter to the social behaviour of animals and its importance in wildlife management. It is not only the physiological needs (food, water and shelter) of game that must be considered in the management of protected areas; attention also has to be given to the psychological needs of animals. To be sure that these needs are met it is necessary to understand the social structure and behaviour of the game.

It was intended that the results of my study be used to evaluate the suitability of other protected areas for rhinos. Suitability in this instance refers to the habitat requirements of black rhinos, such as the availability of food, water and shelter. However, it was also important to know what social effect a translocation programme would have on the individuals suddenly dumped together in a new and strange area. Equally important, we needed to know what impact the removal of individuals from a stable population would have on those animals left behind.

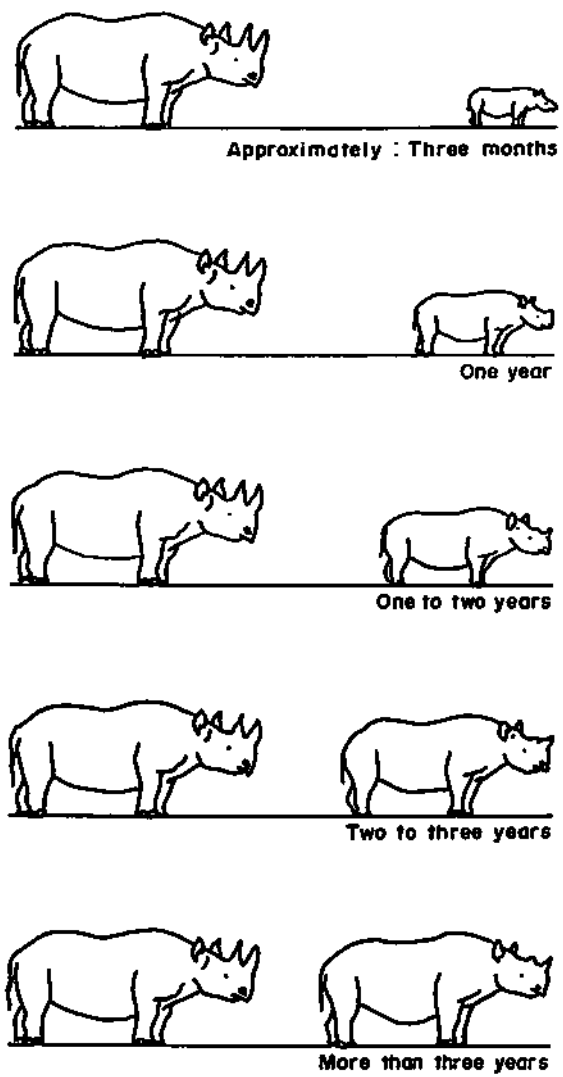
As much as possible had to be learned about the social structure and behaviour of black rhinos in order to be able to address these issues. To enable me to do this there were several things I had to know. For instance, I needed to be able to identify and determine the age and gender of the various individuals within the study area. It was important to identify the individuals so that I would know which individual was doing what to whom. In retrospect I found the behavioral aspects of my study the most interesting, even though they were the most difficult to undertake.

Identifying the various individuals turned out to be the least of my problems. I found the ears and horns of the animals useful in this regard. While browsing on thorn bushes rhinos sometimes rip their ears. The size of each tear, its position on the ear, and whether the rip appeared on the left or right ear was useful information in the identification of individuals. Also, the relative size and shape of an individual's horns helped me to identify it.

I recorded this information on data sheets on which provision was made for the usual information of date, time, climate and location. Each sheet also featured the silhouette of a rhino head in a frontal aspect and in profile. On finding a rhino I would check the ears for tell-tale rips and mark the presence or absence of these on the form. I would then draw the relative shape and size of the horns on the profile silhouette. Over time I managed to build up a complete record of all the individuals in my study area.

Determining the age of the animals was more difficult. From a scientific point of view I knew that the parameters used should not be subjective; they would need to be repeatable. To use only the body size of individuals to determine age, for example, would be subjective,

AGE CLASSES OF BLACK RHINO CALVES



The ageing of an immature black rhinoceros using ratio of body size between the calf and cow (After Peter Hitchins)

especially if there was no adult individual close enough for comparison. Body size changes as animals grow and social groupings could also change with time.

In practice, however, I quickly discovered that those parameters I knew to be subjective were the ones I found most helpful. This was especially true early in the study. After an individual reached adult size it became extremely difficult to determine its age with any accuracy. After careful consideration I decided it would be sufficient to group the rhinos into three age classes: calves, sub-adults and adults. Animals up to two years of age, which were still dependent on their mothers, were classified as calves. These were animals whose shoulder was lower than the base of the female's tail. Sub-adults were animals taller than the base of the tail of an adult but without the body mass of an adult. This group ranged in age between two and seven years. Whether such an individual was single or accompanied by a female did not affect the classification.

Initially I found it most taxing to detect the gender of the animals. In this regard Abraham was no help. The external reproductive organs of the two sexes are not explicitly differentiated. Furthermore, the vegetation in the study area - dense scrub and knee-high grass - made it nearly impossible to get a clear view of the sex organs. The fact that both sexes urinate backwards did not help either. Their behaviour during defecation is similar although I later learned that slight differences do exist. Males tend to scrape, defecate, and then scrape, while females frequently do not scrape before they defecate.

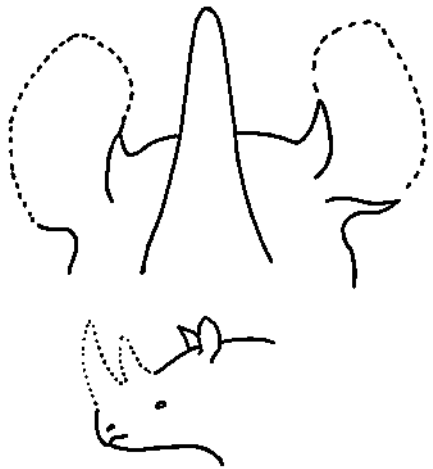
However, by the time these behaviour patterns had come into play I had invariably managed to determine the gender some other way. It was relatively easy to assume that adult animals accompanied by calves were females. I had a problem, however, trying to determine if a cow was pregnant. It therefore came as no surprise when one large individual in my study area, which I had considered a male, was suddenly accompanied by a small calf and was obviously female. In time I became more adept at discovering the gender of the animal we were observing. Nevertheless I was never very comfortable doing this.

When determining the social code by which animals live it is important to have as much information as possible before reaching conclusions. Hasty interpretation of scanty information frequently leads to incorrect assumptions. The social structure of the black rhino is a case in point. The original belief that black rhinos had a territorial social system arose from observations of them being mainly solitary. The manner in which they marked their territories while defecating or urinating was regarded as further proof of this assumption, as was the aggression recorded between individuals.

When biologists started studying black rhinos in greater detail in the early 1960s it soon became apparent that they were not really territorial animals. It took a while longer to determine their true social code. Apparently the aggressive behaviour evinced between individuals is not related to territorial behaviour. Rhinos sharing a home range are normally not aggressive towards one another. Aggression is observed mainly between bulls when a female is in heat. Behavioral interactions between males and females are also observed

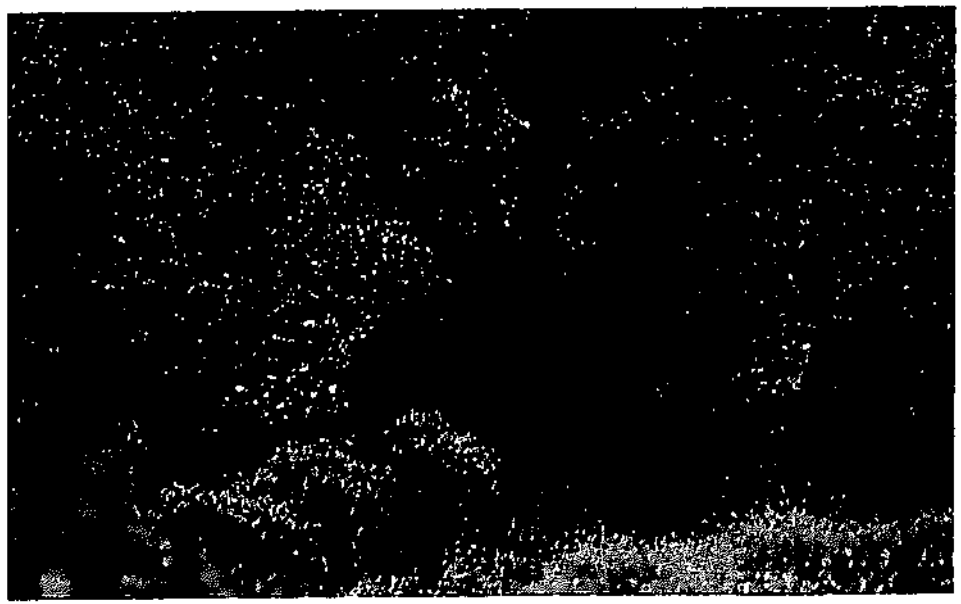
OTJOVASANDU RHINO IDENTIKIT

Date..... Time..... Weather.....
Home range (Area).....
Individual (ID No)..... Sex.....
Age class..... Activity.....
Info on other rhino/s (if present).....
.....
Other remarks.....
.....
.....
ID Notes
Left ear:.....
Right ear:.....
Front horn:.....
Rear horn:.....
Tail:.....
Other:.....



An example of the form that I completed every time I came across a rhino in the study area. I also attached a photograph of the individual on the master Identikit form

A female black rhino in the study area at Otjovasandu

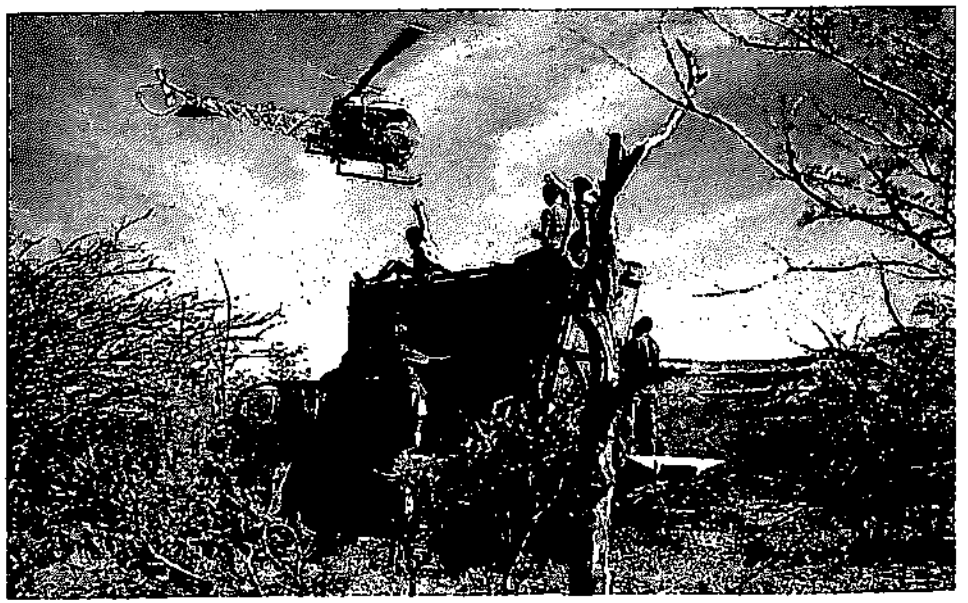


Catching a rhino
The hunt is on and the quarry is still unaware

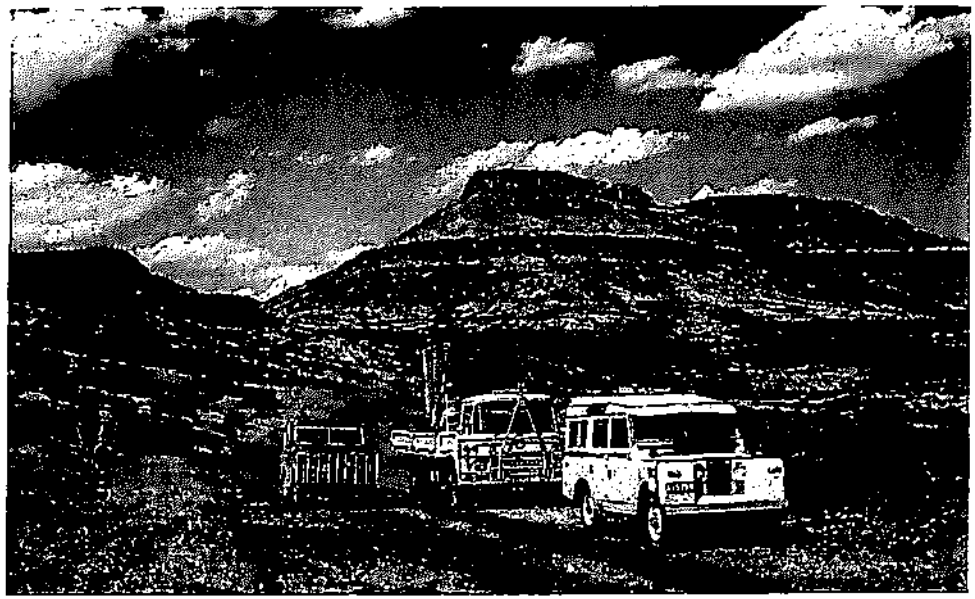
The rhino is down and the crate is in place. Notice the guide rope around the rhino's neck leading through a hole in the front of the crate

While some pull the rope others push from behind, anxious to have the rhino in the crate before it has fully recovered

The antidote is being administered



Another rhino on its way to Etosha National Park, while the chopper heads off to base camp



Translocations and reintroductions in Namibia
Part of the convoy on its way during the first rhino capture in Namibia in 1966

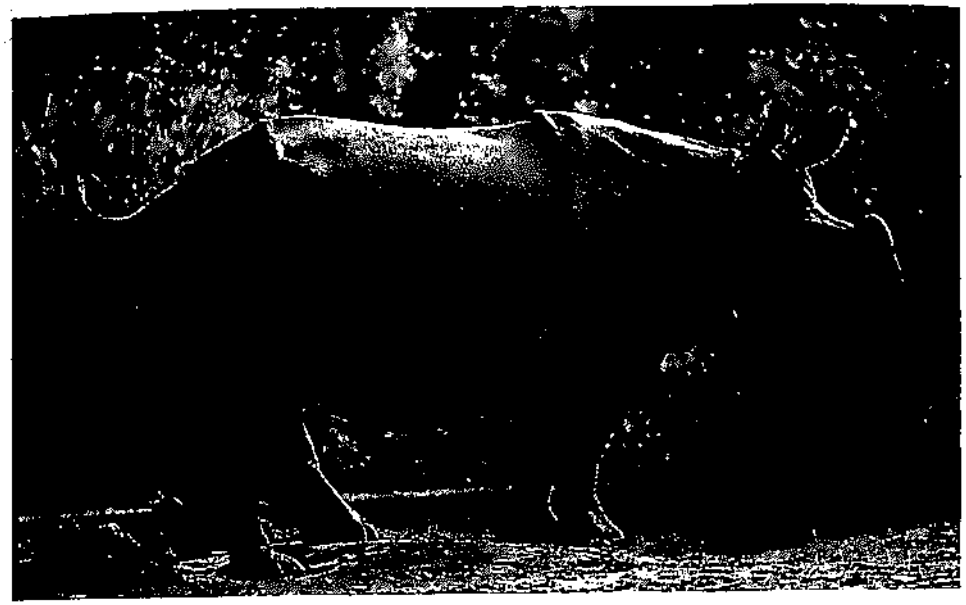
The black rhino midden at Springbokwater in 1966

Giel Visser building the first boma at Ombika

A rhino inside the exercise pen

Fanie le Roux, Hymie Ebedes and Polla Swart on a subsequent capture operation. The photo illustrates how easily rhino can be hurt during capture operations - one rhino broke a jaw

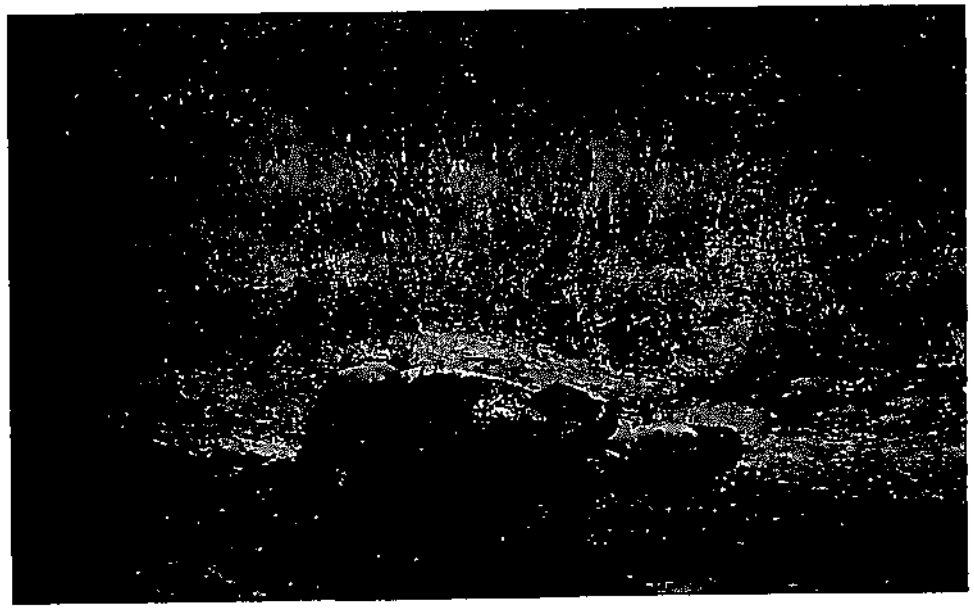
On the trail of the Asian rhino
The Sumatran rhino



The Indian rhino

The Javan rhino

The black rhino study
The calf is already in the wallow when the cow comes over and lowers her rump into the mud. Calves are much more attentive than adults - the calf has heard the sound of the camera shutter



The cow rolling onto her side. Rhinos cannot roll over onto their backs

The calf again hears the sound of the shutter

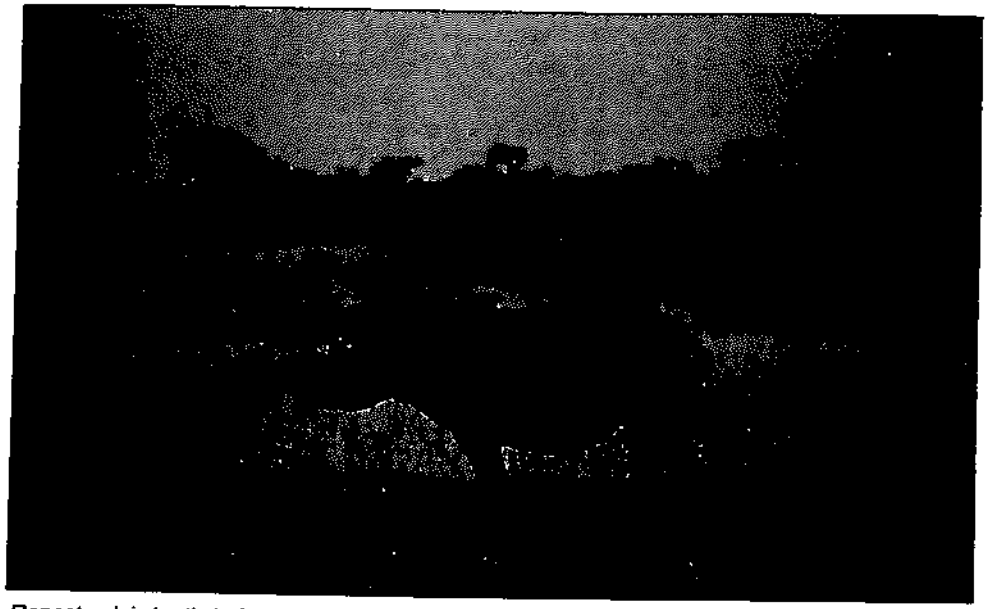
The cow rubbing her face against the trunk of a tree

A questioning look by a black rhino

***Catophractes alexandri** is a favourite food of black rhino*

A black rhino cow urinating backwards. Her small calf is approximately six to eight weeks old

A black rhino in the process of lying down to dust wallow



Renostervlei shortly before sunset with a black rhino coming to drink

The black rhino and her calf 'charging' my vehicle to determine the source of the disturbance

One of the first black rhinos in the boma feeding on twigs

A close-up of a rhino in the study area

A black rhino checking his surroundings for possible intruders

A black rhino browsing. Mud from wallowing shortly before is still wet on its face

The white rhino story
A white rhino pair grazing on short grass

A small white rhino calf investigating the surroundings while its mother is grazing

The onslaught against rhinos in Southern Africa
Louis Geldenhys of the Ministry of Environment and Tourism in Namibia using a chain saw to dehorn a rhino during a dehorning project which took place in conjunction with the Save the Rhino Trust in northwestern Namibia in 1991

After dehorning, the stump is filed down to enable better regrowth

more frequently when females are in heat. To an uninformed observer these latter interactions could appear to be aggressive.

The tendency of black rhinos to be rather sedentary has long been known and most biologists refer to this behaviour. Home ranges of individuals overlap and the size of their home ranges varies. Several factors influence the size of home ranges. The most important is the composition and density of the vegetation. This is a measure of the availability of food and determines the numbers of black rhinos that can live in a given area. The type of landscape also has an influence.

In Natal and East Africa, where there is relatively high rainfall and lush vegetation, home ranges may be as small as two square kilometres. Home ranges in the open savanna of the Ngorongoro Crater are approximately ten square kilometres. In the more arid Rift Valley they could be as large as 20 square kilometres. Home ranges in Namibia vary between 100 square kilometres in Etosha National Park to more than 500 square kilometres in the arid pro-Namib regions.

Home ranges are irregularly shaped and frequently not close to water. Under these conditions the home range would include a long, narrow strip that would allow the individual access to water. The number of rhinos in an area also influences the size of the individual's home range. The higher the density of rhinos, the smaller the home ranges. This phenomenon has been studied in detail in Natal and east Africa. It would seem that in areas with sufficient food, rhino numbers would be the factor determining home range size, while in areas with a low carrying capacity, availability of food would be the determining factor. Although this is also true for Namibia the low number of rhinos makes this effect much more subtle.

Initially my most frustrating experience was the difficulty of locating rhinos. I only became aware of this problem after I started my field work. I invested quite some time preparing for the research project. After completing the literature study I selected the methods that I would use. I obtained all my equipment, which included a third order weather station and plant presses for botanical specimens, and prepared the observation record sheets.

On a bright and sunny morning soon after my arrival in the study area I prepared for my first day in the field. My knapsack was packed with my camera, binoculars, a field guide for bird identification and the other paraphernalia I considered necessary. Full of enthusiasm, the Himba (as I sometimes fondly referred to Abraham) and I set out, but when we returned to camp that evening we had failed to see a rhino. This pattern was repeated over the next three weeks. We frequently came across rhino tracks at the waterholes but, as Abraham said, we never saw a body.

We criss-crossed the study area by vehicle and covered some areas on foot. Many mornings at the crack of dawn we would position ourselves on a dolomite hill. From here we would scan the surrounding area in the hope of seeing a rhino feeding or returning from water. We

tried following the tracks that we found at waterholes but invariably lost them on the hard ground. Frequently we would find fresh dung.

Yet the instinctive feeling and the knowledge as to where a rhino track would lead only developed later in the study. At the start I was unaware of the low number of rhinos in my study area. It was only later that I discovered there were only 23 rhinos, of which 17 used waterholes within the defined area of 270 square kilometres. Neither was I aware that rhinos could travel as far as 15 kilometres from a waterhole before they started browsing.

Early in the fourth week, after spending another morning without finding any rhinos, we stopped to have lunch in the shade of a tree. It was unbearably hot and the mopane flies were especially annoying. Our initial enthusiasm had ebbed during the preceding weeks and the Himba, who had grown fond of me, was aware of my depression. We did not talk and Abraham moved off, sat down, and lit his smelly pipe. I sat with my back against the tree, my head hanging on my chest. Impulsively I closed my eyes and prayed. If God had intended me to conduct this research project He should let me see a rhino that afternoon.

After Abraham had finished smoking he returned. The few items we had unloaded for lunch were replaced in the vehicle. Slowly we drove along the faint tracks that our vehicle had made on the previous occasions when we had travelled this route. We scanned the bush on both sides without any luck. As the afternoon wore on we turned the vehicle around and headed back towards our camp at Otjovasandu. Our route took us through a small valley between two low dolomite hills. An outcrop of rock on one of the hills offered a good view over the surrounding area. At Abraham's suggestion I parked the vehicle and we headed for the rocks. We had done this often and without success during the previous weeks and I became listless. Without paying much attention to the surroundings, I followed Abraham up the slope. Suddenly he stopped and I bumped into him. He touched my arm and pointed. About 200 metres away, among the scrub on the slope of the opposite hill, was the dark shape of a browsing rhino.

Adrenalin pumped suddenly through my veins. I checked my knapsack to make sure I had everything I needed. We studied the terrain and then consulted on the best way to approach the rhino. A slight breeze had started blowing from the west. This, and the presence of a family of mountain zebra grazing on the same slope as the rhino, had to be considered. If the zebras became alarmed they might alert the rhino. We decided to follow a circuitous route that would allow us to approach the rhino upwind and at the same time keep out of sight of the zebras. Abraham took the lead with myself hard on his heels. When we moved along the slope where the rhino was browsing we lost sight of it. We were not unduly concerned, however, because we knew where the animal was. We continued carefully and I lost track of time.

The zebras became active and playful, still unaware of our presence. I was listening to the bustle of the zebras when I bumped into Abraham, who had stopped. Ahead of him, about 30 metres away, I could see the rhino. I will never forget the intimidating effect this rhino

had on me. I felt sure that it had to be the largest black rhino on earth. It seemed as though the animal was waiting for us. We immediately crouched down. I knew from literature that the rhino probably could not see us at that distance. Nevertheless I still felt extremely exposed and vulnerable. I realised that although the rhino was facing us it was listening to the noise kicked up by the zebras behind us. This thought, however, did not comfort me. After what seemed like an eternity the rhino appeared to relax and commenced browsing.

Meanwhile I had sat down. I became aware that my feet were trembling uncontrollably. My boots were loosening pebbles that rolled clattering down the hill. I picked up my feet to reduce the noise. When I opened my mouth to whisper to Abraham I found that I could not utter a sound. My mouth was too dry. Looking at Abraham I realised that he had got as big a scare as I did. I touched him on the shoulder and motioned with my head. Still crouching, we cautiously moved away.

We were already back at the vehicle when I realised that I had not completed one of the schedules that I had prepared so carefully. Even though I tried my best I could not recall any detail of the rhino we had seen, apart from an overwhelming impression that the animal was enormous. During the next four years I often came close to rhinos but I never again experienced the intensity of that first encounter.

When I chose the boundaries of my study area I did so arbitrarily, considering only the accessibility of the terrain, known waterholes, and roads. I had no idea of the number of rhinos in the area, nor of their home ranges. I was to discover that there were several rhinos in my study area that were using a waterhole unknown to me outside the area. These rhinos initially confused the issue when I tried to establish the social structure. In time the information we gathered painted a picture of the daily activities and habits of the rhinos in the area.

There were three waterholes in my study area that could be considered permanent. Each of these was used by up to eight rhinos of both genders, and of course their calves. Rhinos making use of a specific waterhole formed a definite group. I considered such a group as a 'loose' family group. A more satisfactory description would have been to consider the group as a clan composed of several smaller family groupings. The smaller groups consisted of a single, dominant male, and the association between a female and her calves. When the calves reached the latter stages of sub-adulthood they did not necessarily accompany the female. The home ranges occupied by the three clans did not significantly overlap. There seemed to be a grey area on the boundaries that was used by individuals from both adjoining home ranges. The boundaries of the home ranges were not as clearly marked as are the boundaries of true territories. The home ranges used by the male and female animals largely overlapped. Despite this the males and females were seldom together. A male and female were seen together in only 27 percent of all the observations. In most of these instances the female was approaching or was in oestrous. Often, though, a male and female would browse a few hundred metres apart, seemingly oblivious of one another's presence.

A biologist working in Kenya claimed that black rhinos were both polyandrous and polygamous. Polygamy is when animals of both sexes mate with more than one individual of the opposite sex and polyandry is when a female animal mates with several males. Although single adult males and females shared home ranges in Namibia I did not consider that as sufficient evidence that the rhinos in the study area were monogamous. I believe that, especially owing to the low density of black rhinos in Namibia, if a male comes across a female in heat, mating will take place. Subsequently this notion has been confirmed.

FAMILY GROUP		MALE	FEMALE*	TOTAL**
	Adult	4	3	7
Group I	Sub-adult	1	0	1
	Adult	1	2	3
Group II	Sub-adult	0	1	1
	Adult	3	2	5
Group III	Sub-adult	0	0	0
TOTAL**		9	8	17

* The females were normally accompanied by a calf, although calf numbers are not shown

** The table does not include animals living in the study area but using waterholes outside the area

Composition of black rhino groups in the study area (numbers in the table are numbers of rhinos)

Rhinos move through their home ranges without showing any sign of concern at the presence of other animals. It is only cows with small calves that are cautious, especially when they sense the presence of predators. Adult rhinos can face most natural predators except people. Hyenas and even lions have tried to take adult rhinos but usually without success. On the other hand, rhino calves and even sub-adults are susceptible to predators and do get taken occasionally. Earless and tailless rhinos have been reported from areas with a high predator density throughout much of Africa. This maiming is normally the result of unsuccessful predation attempts on young animals. The effect of dehorning rhinos in an attempt to deter poachers and the subsequent ability of the rhino to protect their young will be discussed later.

The mortality rate of newborn rhino calves can be as high as 16 percent. This is typical of what one might expect for a large mammal with a long gestation period. Unfavourable climatic conditions and diseases contribute to this mortality rate. I noticed that a rhino cow became irritable with her existing calf and would attempt to chase it away as her pregnancy approached full term. The calf would linger nearby, especially if it was female. After the birth of the new calf the female would remain intolerant of the older calf. However, as the new calf grew the female seemed to have more patience and the previous calf would be allowed to join her and her young calf.

When analysing my information I found that on 74 percent of the occasions when I observed an adult female she was accompanied by a young calf. When she was accompanied by a sub-adult the accompanying animal was female on 67 percent of occasions and male on 33 percent. This illustrates that the bond between a female rhino and her female offspring lasts longer than that between a cow and her sons. Calves remained with their mothers for periods varying from thirty months to five years.

The sub-adults gradually became more independent and would roam further and further from their mothers. The areas covered by these young animals were considerably larger than the home ranges of the adults. In one year a young male used an area that covered the home ranges of three different adult groups. This specific animal then rejoined his mother and her younger calf in a loose association. Some of these young animals developed a *wanderlust*, especially during the rainy season, and covered enormous distances. Frequently they disappeared from the study area.

One day I had to go to Okaukuejo, the main administrative camp of the game reserve. Quite by chance I decided to take the southern route, which followed the boundary of the reserve, instead of the usual route. After a while I noticed the tracks of a young rhino on the dirt road. This particular animal had started wandering eastward and had kept quite close to the fenced southern boundary of the Etosha Park. In the process it traversed a distance of 120 kilometres in which no rhinos occurred. The tracks of this animal would sometimes leave the road but after ten kilometres or more they would reappear. I followed the tracks for 150 kilometres before they disappeared. Because I knew which animal was missing from the study area I was able to identify which one had gone on this excursion. About seven months later I saw this sub-adult in the study area again but then it disappeared once more. I never saw this individual again.

A female black rhino normally has her first oestrous cycle when she is six to seven years of age. Males start forming sperm when they reach the age of about eight years. The oestrous cycle of the female lasts about 30 days and she is receptive for two to three days. After a gestation period of 15 months the calf is born. There is no consensus in the literature on the exact length of the gestation period of black rhino. Biologists have published records that vary from 330 days to as much as 540 days. The most dependable sources are the records of zoos, where conditions are controlled. However, even here one finds that the period given for gestation varies from 438 to 476 days, with an average of 454 days. This gives a range of ten percent, which is what one might expect, bearing in mind natural variation.

The physiological condition of females has an influence on their reproductive cycles. It seems that those females living in zoos, where they are well cared for, have more regular oestrous cycles and sometimes shorter gestation periods than with free-living individuals. The obvious reason is that the captive animals are in better physiological condition than wild individuals that have to face droughts and other adverse conditions. The metabolic price paid by a lactating female is high: milk production requires a lot of energy.

The topography and black rhino home ranges during the study at Otjovasandu

In Natal it was found that black rhino females normally have a period of 30 to 44 months between calves. In Namibia, with its arid climate, regular droughts reduce the food supply. This factor probably causes females here to take longer to become physiologically ready for the next pregnancy. A female could well skip an oestrous cycle if a drought caused physiological stress. With the low density of black rhinos in certain parts of Namibia it is possible that the oestrous cycle of a female could pass without her meeting a male. My notes showed that at the time of the study the black rhino females in Namibia produced a calf every three to four years.

Reproduction is probably the most important event in the life cycle of any organism. The drive to ensure that genes are carried into the next generation is overpowering. We have already discussed the mechanisms in place in nature which ensure that only the best males are involved in the reproductive process. There are two trigger mechanisms or keys involved in the reproductive life of the male. The first is locked in the psychological process of being able to maintain a dominant position, either through the defence of a territory, of a single female, or of a group of females. This trigger mechanism is normally activated after a physiological process has been initiated by some environmental influence. This will be elaborated on shortly. The second trigger, which can normally only kick in if the first is in place, is when the male becomes aware of a female in oestrous. In many species a non-dominant adult male is physiologically castrated and cannot mate with a female, even if she is in heat. Within this oversimplified scheme one finds a large variation between different species.

However, nature is not only concerned with breeding success but also with the successful rearing of the young. Stories abound about parents, especially mothers, defending their young to the death. It is important that the young are born when conditions are optimal for their survival. This way the chances of the genes being transferred to the next generation are improved. The entire reproductive cycle is geared towards achieving this objective. In this regard physiological work has revealed interesting results. Most of the work has been done on birds but the basic principles remain the same for mammals.

Humans are the only species where the sexual act can take place throughout the year. A biological explanation for this phenomenon is the following. The human baby is helpless and dependent on its mother for a long period. It is therefore quite a drain on the mother to raise the baby and take care of her own needs. Because the sexual act can take place throughout the year the female has a mechanism for attracting and keeping the male interested in her. The male can also help the female to raise the infant in various ways. Cynical biologists have explained the behaviour of older men seeking out younger females, and likewise of younger females seeking out older men, by citing this inherent biological survival drive. They argue that a younger female will improve the chances for an older male's genes to be carried forward to the next generation. Likewise an older male who is more settled will be a more reliable caretaker of a female's offspring.

In most animals the reproductive organs are dormant outside the breeding season. This has some important physiological advantages, the most significant being that it saves energy. The reproductive organs are stimulated into activity through an intricate process involving certain interactions between the environment and the reproductive physiology of the animal. The physiological processes of animals usually have to be triggered by stimuli from the environment. With some animals, such as predators, food may be a secondary trigger. Their prey (or even the reproductive hormones of their prey), after having reacted themselves to environmental stimuli, provide the stimulus to the predator simply by being available and abundant. The basic criteria for a stimulus is that it should predict the optimal breeding season and precede it. Annual changes in the duration of day (light) and night (dark) are more constant and trustworthy than climatic conditions, for instance. The day length increases after the long nights of winter and when it reaches a certain duration a trigger mechanism is activated.

The influence of daylight length or photoperiodism in plants and animals has long been studied. It remains a subject of keen interest to scientists and amateurs alike. In layperson's terms this phenomenon is frequently called a 'biological clock' or biological alarm. The biological clock is in the central nervous system. Laboratory experiments have shown that some species are so sensitive that they can detect a change in day length of as little as one minute. In animals the light reacts on the retina of the eye and an impulse is transmitted to the hypothalamus of the brain through the optic nerve. The change in the length of the day activates the hypothalamus to secrete a hormone called gonadotropin. This hormone in turn activates the reproductive organs of the body. To a greater or lesser extent, sex steroids play a role in the reproductive process of most animals. Little physiological work has been conducted on black rhinos. However, it has been shown on a close relative of the rhino, namely the horse, that photoperiodism does have an influence on the reproductive cycle. Horses have a gestation period of 12 months, so it is easy to detect this influence. With the longer gestation period of rhinos the influence of photoperiodism is more difficult to detect.

The stimulation of the endocrine glands is the first trigger or key in the reproductive process. This trigger then starts some secondary sexual mechanisms such as particular behaviour patterns. The best known are courtship rituals, such as mating dances, or the aggressive defence of a territory or of a group of females. The second key in the reproductive process is partly the secondary behaviour rituals mentioned above, but also environmental factors such as rainfall, temperature and hormone levels in newly-growing plants. These mechanisms have developed to ensure that the species gets the most out of the available food. The increased consumption of food counters the physiological drain placed on the female during the reproductive cycle. The quality and quantity of food must be sufficient, not only for the females but also for their young. This is the reason why most herbivores reproduce during the rainy season.

The influence of the nutritional quality of plants on the physiology of animals has already been mentioned. It has been found that the sperm quality of males degenerates after they have been on a low-quality diet for a couple of months. The density and vitality of sperm

	PROTEIN-nx6.25			ASH %			CRUDE FIBRE %		
Species	March	July	Sept	March	July	Sept	March	July	Sept
Acacia reficiens	8.20	6.50	10.70	3.99	2.13	3.90	44.40	45.80	39.00
A. mellifera var detinens	7.90	9.60	9.20	3.45	2.86	1.81	44.20	42.60	48.30
Terminalia prunioides	5.70	4.70	4.60	3.45	6.60	2.44	41.60	43.60	57.60
Grewia species	4.60	4.60	3.80	4.90	2.70	1.95	42.70	47.60	49.50
Catophractes alexandri	5.30	4.20	5.30	2.70	1.55	1.31	43.90	42.60	44.00
Combretum apiculatum	7.50	4.80	4.10	5.50	3.10	2.04	33.70	41.40	49.20
Blepharis obmitratra	6.90	5.80	5.70	6.80	5.35	4.60	38.70	35.20	37.30
	FAT %			CA %			P %		
Species	March	July	Sept	March	July	Sept	March	July	Sept
Acacia reficiens	1.60	1.20	1.50	1.20	1.70	1.30	0.08	0.04	0.17
A. mellifera var detinens	1.80	1.90	1.40	1.40	1.40	1.40	0.18	0.07	0.05
Terminalia prunioides	0.70	0.70	0.70	1.60	3.20	1.60	0.09	0.04	0.07
Grewia species	1.10	1.00	1.00	1.60	1.90	1.90	0.14	0.06	0.07
Catophractes alexandri	1.40	0.90	1.00	0.70	0.70	1.00	0.09	0.05	0.08
Combretum apiculatum	1.30	2.50	1.00	2.50	1.80	1.50	0.07	0.07	0.06
Blepharis obmitratra	0.80	0.80	0.90	2.10	1.60	1.10	0.07	0.06	0.08

Nutritious value of some preferred food plants of black rhinos collected at Otjovasandu

are directly correlated with the quantity of protein in the diet. It has been shown that males are more susceptible to a shortage of vitamin A than females. Males experiencing a vitamin A deficiency display a drop in sperm quality, independent of the animal's condition.

Over most of southern Africa there is a clear differentiation between a dry winter and a rainy summer season. It has also been found that there is a clear correlation between the breeding cycles of most game species and the rainy season. The main source of protein and vitamin A is green vegetation. The new growth of plants is a rich source of protein and vitamins. Certain hormones present in this new growth also show a correlation with some reproductive hormones in animals. The increase in hormone levels in their food may be a factor stimulating breeding. Therefore the rainy season, through its effect on the vegetation, plays an indirect but important role in determining the time of calving and the successful rearing of the young. Game species showing the most obvious synchronisation with rainfall are those whose young are dropped in a relatively short period, such as springbok, impala, wildebeest and Burchell's zebra.

Most of the work conducted in east Africa suggests that black rhinos can have their calves at any time of the year. Other biologists claim that most calves are born during the rainy season. My information from Namibia also seems to suggest that most calves are born during the wet season. This would tie in with the phenology shown by plants in Namibia. Here the vegetation has two flushes of new growth each year. The first normally influences the grazers and is related to the rainy season from February to April each year. The second flush seems to influence the browsers. It is independent of rainfall and takes place during August and September when some of the woody species start budding. The bushes are mostly acacias, which are also the preferred food plants of black rhinos. These plants bud because of the increase in day length and the rise in air temperature. The sap of the plants starts to rise, increasing the amount of protein in the plants, which in turn could play a role in the reproductive cycle of black rhino. Unfortunately though there are few observations. Furthermore, if rhino calves are born throughout the year it is to be expected that some would be born during the rainy season.

In the next chapter we will look at the courtship of rhinos and the physiological process that regulates this behaviour to ensure successful mating.

CHAPTER 8

Courtship by black rhinos

I focused my binoculars on a rhino bull browsing on an acacia bush. That morning Abraham and I had followed the bull when it left the waterhole where it had quenched its thirst. At first the bull did not linger along the path it was following. Although the vegetation was relatively dense after the recent good rains we had no problem following the animal. Seven kilometres from the waterhole the path crossed a low ridge between two rocky outcrops. Here there was a rhino midden. The dung was not in a heap but scattered in the manner of black rhino dung. Scrapes made by their feet could be seen in the hard soil. Black rhino middens are frequently next to a shrub or small tree. This plant gets worried by the rhinos with their horns and is subsequently the worse for wear. If a midden is used often, only the trunk of the tree or woody stems of the bush remain, covered with a white deposit left after the urine has evaporated.

On reaching the midden the rhino stopped and sniffed the dung. He then moved forward and scraped a few times with his hind feet. While he kept his front feet still he slowly shuffled his hind feet forward until he stood poised like a ballerina. His buttocks stuck out and his short tail curled over his rump. He remained in this position for a few moments, which appeared to me to be rather uncomfortable, then dropped three large dung balls. These he scattered with his hind feet. He urinated against the tree trunk, backwards between his hind legs, and then moved off.

Many stories and explanations have tried to resolve why black rhinos scatter their dung. The Africans have developed an especially remarkable folklore about this. The Kikuyu of Kenya entertain with the following traditional story. The dung balls of elephants and rhinos are remarkably similar. According to the Kikuyu, people found it difficult to distinguish between the dung of elephants and that of rhinos. In the past this caused a bitter strife between elephants and rhinos. Unfortunately the story does not explain why it was so important to these animals that their dung be distinguishable to humans. Anyway, according to the legend the elephant emerged victorious. A condition imposed on the rhino by the elephant was that the rhino and his descendants would always scatter their dung to prevent any further confusion.

An alternative explanation offered by the Zulu of Natal is that when animals were created the rhino was the last species to be made. After he had been stitched together the needle was given to him for safekeeping. The rhino did not know where to keep the needle so that it would be safe. In desperation he eventually placed it in his mouth. Unfortunately he later swallowed the needle accidentally. Since then the rhino has been hunting for that needle by kicking apart his dung. A third, less imaginative explanation was offered by the early natural historians who visited Africa. According to them rhinos suffer from constipation because of their diet. In their frustration they scatter their dung after successfully defecating.

I stopped at the midden. Although the dung balls of rhinos and elephants are remarkably similar in shape and size there is a marked contrast in the texture of their dung. The source of this dissimilarity is their diet and in the way in which they treat their food. Black rhinos are browsers, eating mainly small twigs. Therefore rhino dung consists of short bits of twigs and is relatively crumbly. Elephant eat mainly grass and strips of bark. They do not cut the plant material into smaller pieces with their teeth but rather masticate it into pulp. Therefore the residue in their dung is fibrous and compressed and the balls do not break apart easily.

Middens represent interesting micro-ecosystems, with a variety of flies, blowflies, dung beetles, larvae and termites using the dung at one time or another. This rich source of food attracts guinea fowl and francolins. In the northeast of Namibia a dwarf mouse hollows out elephant dung and uses it as a nest. I collected some fresh dung, which I would later plant in containers of clean soil. I hoped that if the rhino had eaten the seeds of herbs or shrubs they would germinate and grow. In this way I would be able to identify small, less obvious herbs and sedges eaten by rhinos during the rainy season. I then studied what remained of the dung. It was sometimes possible to recognise part of a leaf or a seed. It was the rainy season and the dung contained a high proportion of leaves. The remainder of the dung consisted mainly of woody twigs. That morning I was unsuccessful and could not recognise the remains of a single plant in the dung.

Middens play an important part in the social behaviour and communication of rhino. Middens are distributed throughout the home range. If a midden is located where the home ranges of two individuals overlap, they both use it. Middens at waterholes are used by all rhinos visiting the water. Black rhinos using a distant waterhole normally have a midden or two along their route. These middens are frequently at the place where their route crosses a ridge. However, this does not mean that a rhino will defecate only at a midden.

After crossing the ridge the rhino bull slowed down and started browsing. The path he had been following petered out on the hard ground. I knew that the rhino had reached the core area of its home range and I studied it through my binoculars. Rhinos live in a narrow world. Their entire social life is organised around their olfactory abilities. Through smell they become aware of the movement and presence of other rhinos in their range. It is through his nose that a bull recognises a female in oestrous. It is their noses that warn them of potentially dangerous animals that share the bush, animals such as lions, hyenas and elephants. With their noses they select food plants. Importantly, their noses are also their main navigational aid. When a black rhino scatters its dung with its feet a residue of dung remains stuck to its soles. This leaves an olfactory trail wherever the animal goes. It is not known how long this trail remains detectable by rhinos.

John Goddard, a biologist who studied rhinos in the Ngorongoro Crater in Tanzania, conducted an experiment whereby he took a string bag and filled it with fresh rhino dung. He tied the bag to the back of his Landrover so that it would drag on the ground. He then drove through the home ranges of several rhinos, dragging the bag of dung behind his

vehicle. The experiment was repeated using dung from several rhinos. He made the following observations. When rhinos came across the artificial trail they would follow the new trail 70 percent of the time if the dung was their own. When the trail was made with dung from a different individual they usually ignored it. On only 17 percent of occasions was a bull interested enough to follow the trail. In all of these instances the dung used was from rhinos that did not share his home range. John thought that the interest shown in the unknown smell by the resident dominant male was prompted by his desire to identify the intruder.

The rhino that Abraham and I were following had now reached the plateau region of the study area. The plateau was used by rhinos mostly during the summer months. The vegetation of the plateau differed markedly from that of the broken hilly terrain of the escarpment zone, especially during the rainy season. When feeding on the plateau, rhinos tended to eat a greater variety of food plants. They seemed to concentrate on annual herbs and shrubs that did not grow in the rest of their home range.

The rhino followed an omaramba onto the plateau. These omarambas are part of an ill-defined drainage system that forms part of the internal drainage or endoreic system of the plateau of Etosha National Park, a system that gives rise to many of the salt pans, including Etosha Pan. Omarambas usually become waterlogged during the rainy season; woody seedlings drown and the vegetation cover is mostly grass. Because of this, omarambas look like golf course fairways winding through bush country.

It was now easier for us to follow the rhino. There were several rainwater pans in this omaramba; most had dried up but a few still contained water. The rhino approached one of these puddles. Next to it, several large trees were growing on an old termitarium, taking advantage of the height it offered to avoid flooding. There was a *Ziziphus mucronata* tree, known as a 'wait-a-minute' tree because of the delay it could cause any traveller unfortunate enough to become snared by its thorns. Several mopane trees also grew there. All the trees showed signs of browsing by passing elephants.

A warthog sow *Phacochoerus aethiopicus* and her litter, which had been wallowing in the mud, frantically gave way to the rhino. The rhino paid them scant attention, however. He walked into the water and then stood for a moment before lying down, bowing his hind legs first in order to do so. I was aware that it was an anthropomorphic thought but I imagined that I could see the pleasure that the rhino experienced as he turned on his side in the mud. The rhino wallowed several times with all four feet in the air. Black rhinos are not able to roll over on their backs. After a while the rhino stood and then lay down on his other side. Again he wallowed with abandon. Then he quietened down and, lying on his belly, dozed off.

About an hour later a warthog boar came trotting along the omaramba, tail upright. It was obvious that his destination was the rainwater pan. As he approached it his speed increased but he came to an abrupt halt when he noticed the rhino lying there. The boar seemed to hesitate a moment, then came to a decision and cautiously walked towards the puddle. He approached the side furthest from the rhino and then slipped into the muddy water. At first

he seemed careful as he wallowed in the mud but then he was overcome by the rapture of the moment. He rubbed his tummy energetically and rolled over on his back from side to side, completely indifferent to the rhino. The rhino picked up his head, watched the frolics of the warthog, and then lowered his head again. After a while the warthog had had enough and stopped his antics. I watched the rhino and warthog lying in the mud and wished we could approach and shelter in the shade of the trees growing next to the puddle. The acacia bushes where the Himba and I were sitting were too low to cast any shadow that could be used as shelter against the sun.

The discomfort that I experienced made me think of the importance of thermoregulation to animals. However, one cannot consider temperature in isolation. The water balance of the body is an inseparable part of the physiological process that regulates body temperature. It is important for animals that their body temperature does not reach too high a level. The brain is very sensitive and if its temperature exceeds 42 degrees centigrade the animal normally dies.

Many animals, including humans, use perspiration to lower their body temperature. One reason why people perspire first on the forehead is to lower the temperature of the brain. With the moisture on the forehead a convection cooling process takes place and cools the brain (the same process that occurs with a canvas water bag). Animals living in the arid savannas of Africa, with a shortage of surface water, cannot afford to lose water in this way. Therefore several other strategies for keeping cool have been developed by these animals.

Small animals like rodents and warthogs avoid the heat by sheltering underground. Larger animals such as most of the game species cannot use this strategy and have to rely on other mechanisms. They have developed some interesting adaptations. In southern Africa, oryx, springbok and steenbok are probably the ungulates best adapted to the arid environment. They can survive for long periods without drinking any water. Despite this they also succeed in handling extreme ambient temperatures.

Let us look at how they do this. At night many plants in the arid and semi-arid regions have a moisture content that exceeds the relative humidity of the air. Even when grass appears to be completely dry it will still have a higher moisture content at night than during the day. Studies on *Stipagrostis uniplumis*, also known as *Langbeen Boesman* grass, have shown that while its moisture content is only nine percent during the day it increases to 26 percent at night. Many animals take advantage of this and graze mostly at night. Oryx eat up to 70 percent of their food at night. Springbok and steenbok display the same feeding strategy.

Another behaviour pattern adopted to combat high temperatures is the manner in which some animals orientate their bodies in relation to the sun. They turn the long axes of their body towards the sun, thereby decreasing the surface area exposed to direct sunlight. Also, the light colour of the springbok has a high reflective value; they reflect almost two-thirds of the heat of the sun. Therefore the body absorbs relatively little heat from the environment.

Among the game species of the region, springbok and steenbok have the shortest hair on their hides. The only defence that these antelopes have against predators is to flee. They can run fast enough to escape most predators, with the exception of cheetah. The price of this evasive action, however, is that their body temperature rises quickly. The short hair on their body allows them to lose most of this heat through radiation. This heat loss takes place even during the chase and continues when they come to rest. There is a price tag to this strategy, however. They pay for this adaptation by not being able to retain body heat when they need it, such as on cold nights. This sensitivity to low temperatures influences their geographical distribution.

At the other extreme, oryx have an extremely dense coat of hair, although the hair over the lower abdomen is less dense. When ambient temperatures rise, oryx frequently lie down, sometimes directly in the sun. The thick coat of hair over most of their bodies forms an excellent insulation against the high temperatures. While the oryx is lying down, a flow of body heat occurs through the lower, less thickly-covered part of the body into the cooler soil beneath the animal. This lower area of the animal's body is known as a thermal window. Several other species show the same adaptive strategy.

Oryx have another very special adaptation. During hot days they allow their body temperature to rise to as high as 42 degrees centigrade. With this increase in temperature they start panting. The inside of their nasal cavities is rich in blood vessels. The panting allows air to flow quickly across the veins and thus cool the blood. This cooled blood is collected in larger veins and returns to the heart. These veins form a network around the two arteries supplying the brain with blood from the heart. An exchange of heat takes place and the blood in the arteries is cooled. This cooled blood serves to keep the brain cool despite the rise in body temperature.

Large animals, such as elephants and rhinos, have an advantage because of their body size. Their ratio of body surface area to body mass is less than it is for smaller animals. The advantage of the low ratio is that in hot climates the body is slow to heat up but the heat is also slow to escape from the body. In effect this means that large animals are less affected by high ambient temperatures than small animals. An additional advantage is that they can absorb and store more heat than small animals are able to do.

However, on hot days they need to get rid of this heat. Elephants do this in two ways. The first is through their extremely large ears. The ears of elephants are exceptionally rich in blood vessels. What they do is slowly flap their ears to cool the warm blood that flows through them. The cooled blood then returns to the rest of the body and reduces the body temperature, much like the water in the cooling system of a motor car that returns cooled to the engine block from the radiator. The second way in which elephants can reduce their body temperature is by bathing or taking mud baths. This explains the preference very large animals have for open water in which to bathe.

Black rhinos will seldom pass up an opportunity to take a mud bath. Whenever they come across open water they revel in it. What intrigued me was that they rarely seemed to drink this water. Even when the water in these rain-filled pans was clean and fresh, rhinos would prefer to travel some distance to drink at their regular drinking places. During the drier times of the year, rhinos take dust baths in dried mud wallows. Dust wallows used by zebras are favoured by rhinos. Rhinos also spend time rubbing their bodies against tree trunks, rocks and termite mounds. In the study area many of these objects had been worn smooth and one could see that they had been used as scratching posts for a long time.

While the rhino was lying in the mud wallow I scanned the view. I enjoyed the flow of activities taking place around me. To the trained eye there was much happening. Some distance from where we were seated the omaramba opened into a small plain on which several groups of both mountain and plain's zebra were grazing. A large herd of springbok with many lambs was a little way off to one side. I focused my binoculars on the springbok herd. Although I was too far away to hear them I knew the springbok were in constant vocal contact, using soft ruckle sounds made in their throats. Although not loud, these sounds do carry for some distance and also serve as an alarm system. Whenever an individual becomes alarmed or aware that something is amiss a subtle change in the sound alerts the whole herd.

Suddenly one lamb started stotting. This is a stiff-legged gait, with the animal appearing to bounce along off all four feet. The plume of long, white hair, normally obscured in a fold on the rump, stands upright. In an instant all the lambs were stotting. The quiet scene of a few moments earlier was replaced by one of alarm and concern and the entire herd moved away in a fluid movement. I scanned the area, looking for the cause of alarm. It did not take me long to find it. A cheetah sat on the edge of the omaramba, almost invisible, the mottled spots on its hide helping it to melt into the background. I was still studying her through my binoculars when a small face with a black tear-like streak below each eye appeared next to her and was joined a moment later by a second. The springbok herd had ended its move away from the predator and had started grazing. The cheetah lay down on her stomach, staring at the springbok. She obviously decided that they were too far away for a chase and turned on her side. The two cubs immediately interpreted this as an invitation to a meal and eagerly hunted for her teats.

By this time the herd was almost a kilometre away and grazing unconcerned. The pronking of the lambs had reminded me of another security measure available to springbok. The rump fold in the skin, in which the long hair is stored, also contains some glands. When springbok start stotting they arch their backs and the skin tightens, allowing the fold to open. The hair explodes upright in a mass of white. With the fold open, the glands inside the fold also open, sending sweet-smelling pheromones into the air. This odour stimulates other springboks to start stotting. A herd of springbok pronking is a sight that I will not easily forget.

When springbok stott they move forward in a jumping motion. The splashes of white colour against the normally tan background of the African veld accentuates the vertical movement.

At the same time they hide the horizontal movement. To a predator this must be a rather confusing sight, with all the white spots moving up and down. Before the unsuspecting predator realises what is happening the springbok are out of reach. I was reminded of something the Apostle Paul wrote in one of his letters to the congregations in Asia Minor. He wrote that to some people the smell of the Gospel is that of death and to others it is the smell of life. With springbok the pheromones were spreading the smell of life.

There was movement at the rainwater pan. The rhino had stood up and moved to a mopane tree. He started rubbing his head against the trunk, first one side and then the other. After a while he moved forward and started giving attention to the side of his neck, then to his shoulders and flanks. Meanwhile the sun had begun dropping towards the horizon. In the process it had been transformed by the haze in the air from a blazing white light into a red fireball. The Himba, who had been sitting patiently, nudged me. When I turned around he pointed to a female rhino approaching the wallow. Her calf followed a little way behind her. She headed towards the pan with a no-nonsense attitude about her. She was already in the wallow before the bull became aware of her. He uttered shrill squeaks and approached her with a strange, stiff-legged gait. When he attempted to sniff her she swiped her horn towards him. He immediately retreated. She then moved through the wallow and in turn approached him and sniffed him. The bull remained still and they stood a while with their heads almost touching. The female then turned around, entered the pan again, and started wallowing. The calf was already hard at play in the mud. The warthog had long since disappeared.

After lingering for a while the bull moved to the side of the omaramba and started browsing. The sun was sinking in the west and I felt weary. I tried not to think about the long hike back to the vehicle. The cow and calf did not spend as long in the wallow as the bull had, probably because it was not so hot any more. The cow also rubbed herself against the tree. After a while she and the calf entered the acacia shrubs growing on the slope of the valley close to where the bull was feeding. Even though I observed them for quite a while I saw no further interaction between the bull and cow. I wondered whether the female was approaching her oestrous cycle. If so it would explain her appearance in an area normally used only by the bull. I decided to spend more time in this area.

Later, while walking back to the vehicle, I contemplated my achievements during this project. I had invested much physical effort daily to find the rhinos. When I did find a rhino I had to endure heat, mopane flies and other discomforts. Furthermore, rhinos spent the greater part of the hot, daylight hours just lying in the shade of trees. Consequently I was collecting relatively little information, considering the many hours I had spent observing rhinos. The thought frustrated me but the idea of abandoning the project never crossed my mind. There were advantages that far outweighed the little personal discomforts. The fact that I was not cooped up in an office. The freedom of moving through nature and being exposed to the climatic extremes. Experiencing the pleasure of the first showers of the rainy season and watching the vegetation react to this life-giving moisture. The excitement of the rut and the first young being born. The exhilaration after close encounters with rhinos and the other

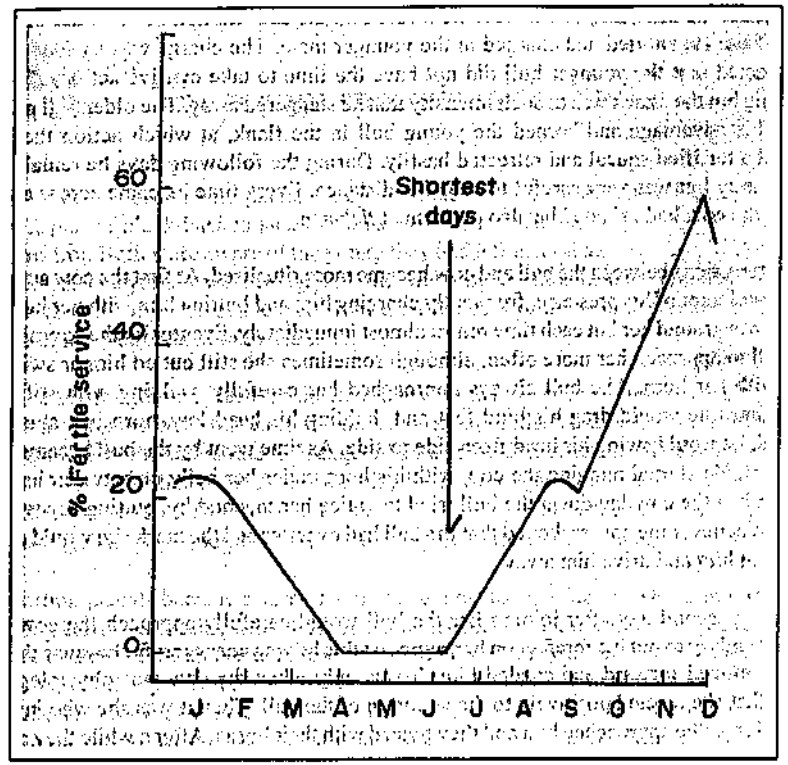
inhabitants of the bushveld. All these were experiences that no money could buy. I did not realise it at the time but I was also hooked on the stimulus of adrenalin pumping through my veins. Now, many years later, I am filled with nostalgia when I think back on those days.

Although the rhino female was not aware of it she was coming into oestrous. Unknown instinct forced her to frequent that part of the range usually occupied by the male. At the first meeting with the bull at the rainwater pan she manifest no exterior signs. In the following days the female started urinating more frequently. She also started walking with her short tail curled tightly across her rump. Small amounts of urine were sprayed between her hind legs onto shrubs or the ground.

To understand the mating behaviour of black rhinos it is necessary to have some knowledge of the physiological processes that precede conception. Apart from slight differences in the timing and duration of the various parts of the physiological cycle, the process is the same in most mammal species. An egg cell (ovum) starts to develop in an ovary of the female. When the cell is ready it moves down the fallopian tube into the uterus. In the uterus the egg cell is receptive to a male cell (sperm) for approximately one day. Conception takes place when a male cell enters the female cell. If conception does not take place the ovum is expelled by the body. The process is repeated approximately one month later. If conception does occur the ovum becomes imbedded in the uterus wall and the embryo starts developing. The period during the cycle when the ova are formed and develop to the point where they can be fertilised is known as oestrous. A receptive female is said to be in oestrous, or colloquially, on heat.

Conception can take place only if the male and female cells are in the uterus simultaneously. Therefore for conception to occur requires coordination and good timing. The male has to be present and ready when the ovum is available to be fertilised. If no males are available the opportunity is lost. However, nature places a high premium on ensuring that mating takes place successfully. It therefore has to ensure that both sexes are together at the right place and time.

To ensure successful conception nature has developed an intensive advertising campaign. This takes place in the few days prior to the ovum being receptive to the sperm. The main objective of the campaign is to inform males that the female is coming into oestrous, and thus to attract as many males as possible. The advertising campaign develops in the following way. As the ovum develops there is an increase in the concentration of sexual hormones in the blood of the female. Some of these hormones are excreted in the urine. The hormones exude molecules or pheromones with a strong odour. The presence of these pheromones in the urine of the female is detected by the male and is an irresistible attraction for him. As the ovum approaches the optimal time for fertilisation the concentration of hormones in the urine increases, as does their attractiveness to the male. When the ovum is ready there is normally one or more males ready to participate. The sexual process in animals is a biological process over which they have no control.



The influence of day length on the breeding season of mares at Onderstepoort, South Africa (After Nishikawa and Hafez)

During the next couple of days the bull remained in close proximity to the cow and her calf, following them on their daily excursions. He started paying more attention to the spots where the cow had urinated. When he smelt these places he would pull his top lip upward in what looked like a sneer. This behaviour is known as *flehmen* and is also found in zebra, horses and asses. What happens is this. There is an organ called Jacobson's organ at the bottom of the brain, from where it is connected to the roof of the palate by a small duct. When the rhino engages in *flehmen* the fold containing the opening of this duct is pulled open and molecules of pheromones from the female's urine flow to the Jacobson's organ. This enables the male to detect the concentration of hormones in the urine. As the concentration increases, the male's desire to copulate with the female escalates.

The bull became very irritable during this period and frequently tried to drive away the calf. At one point a young bull from the adjoining home range became aware of the cow's condition. He followed her tracks from the communal waterhole and approached her close

enough for the attending bull to become aware of him. The reaction of the older bull was immediate. He snorted and charged at the younger male. The charge was so sudden and unexpected that the younger bull did not have the time to take evasive action. He tried resisting but the attack was of such intensity that he staggered away. The older bull pressed home his advantage and horned the young bull in the flank, at which action the latter uttered a terrified squeal and retreated hastily. During the following days he remained in the vicinity but was very careful to keep his distance. Every time he came across a place where the cow had urinated he also performed *flehmen*.

The interactions between the bull and cow became more ritualised. At first the cow appeared to be intolerant of his presence, frequently charging him and butting him with her horn. He would trot around her but each time return almost immediately. Eventually the cow allowed the bull to approach her more often, although sometimes she still butted him or swiped at him with her horn. The bull always approached her carefully, walking with stiff legs. Sometimes he would drag his hind feet and, holding his head low, horn just above the ground, he would swing his head from side to side. As time went by the bull became more insistent. He started nudging the cow with his horn under her belly or between her hind legs. When the cow lay down the bull tried to entice her to stand by, butting her with his horn. Whenever the cow reckoned that the bull had overstepped the mark she would charge wildly at him and drive him away.

From the second day after joining her the bull would carefully approach the cow from behind and try to put his forefeet on her rump. At this he was unsuccessful because the cow simply moved forward and evaded him. It was only when the cow was physiologically ready that she reacted positively to the attention of the bull. Then it was she who initiated the activity. She approached him and they fenced with their horns. After a while they rubbed cheeks. She stood still and allowed the bull to place his feet on her rump. He then lowered the front of his body onto her and shuffled his hind feet closer. After he had successfully entered her vagina with his phallus they stood like that for 40 minutes. During this period the bull ejaculated several times. The cow and bull copulated frequently over the next day or two. It is possible that the high frequency of copulation, as well as the duration of time that rhinos remain coupled, have given rise to the lore that rhinos have a high sexual drive. This in turn led to a trade in rhino products as aphrodisiacs.

When the cow's oestrous period was over, she and the bull lost interest in one another and once again used their own separate parts of the home range. Although there were three rhino calves born in the study area during the duration of the study, I did not actually see any of them being born. I did, however, have the opportunity to witness the calves growing up. We will be having a closer look at this process in the following chapters.

CHAPTER 9

The menu: specials of the day ...

In the east the morning star paled. A zephyr stirred the air, which had cooled during the night. A pair of black-backed jackals *Canis mesomelas* were moving along the faint track at a slow trot. Both were aware of the young they had left in an abandoned aardvark hole on the plateau. The jackals were hungry. During the past few months they had usually found enough to eat. They had scavenged from the kills of a pride of lions *Panthera leo* that hunted in the area around the waterhole.

The intense drought that preceded the rains had caused most of the waterholes in the region to dry up. Animals were forced to run the gauntlet of predators in order to reach the only water available. Predators and scavengers had a field day. After the first rains ten days previously the lions had moved off, following the herds of game onto the plains. Since then the jackals had been forced to fend for themselves. The coat of the bitch was starting to look scruffy. The physiological stress of nursing her young was showing.

The trotting jackals became aware of a movement off to one side just ahead of them. The clattering calls of a black-bellied bustard suddenly broke the early morning silence. They stopped in their tracks and tested the air but could not identify the cause of the movement. The bitch carefully circled the darker shadow ahead of her and then picked up the unmistakable smell of a black rhino. In the improving light she could now discern the shape of the rhino cow, and a short while later the presence of the very young rhino calf. As with most newborn wild animals the calf was odourless. This is a defence mechanism against predators. The young calf was unsteady on its feet and tried to find the cow's udder. The mother guided the calf in the right direction with her head, moving slightly to make it easier for the calf to find a teat. The calf suckled for a few minutes and then lay down. The cow smelled the calf before proceeding to browse on the thorn shrub next to her.

A newborn rhino calf weighs between 35 and 45 kilograms. Within three hours of birth the young animal suckles for the first time. There is no sign of the front horn at birth and the rear horn is only a callous on the skin. During the first months of its life the calf grows at a rate of more than one kilogram per day. After about four to five months the rear horn is already five centimetres long. At this stage the front horn becomes noticeable. This horn then grows very fast and may reach a length of one centimetre within a month.

Up until the age of approximately five months the height of the calf is below the cow's belly. By the end of the first year the calf normally reaches a height of halfway between the cow's belly and the base of her tail. When the calf is two years of age it will reach the tail. By three years there is little difference in height between the calf and its mother.

The two jackals lay down and watched the cow and calf. They immediately noticed that the cow was very vigilant. The jackal bitch wisely decided that there was nothing to be gained from watching the cow and her calf and she continued along the path that they had been following, with the male following behind her. When she got closer to her den she also became very alert. The pair stopped frequently and checked the early morning air for signs of intruders. The bitch was aware of a honey badger *Mellivora capensis* family and a group of hyenas *Crocuta crocuta* that both lived in the area. Should they get the opportunity, these animals would not hesitate to kill and eat her pups.

When the jackals approached their hole the female called with a soft, guttural sound and heard an excited response. With a quick glance around her she entered the hole, to be met by a boisterous group of pups. They clamoured for her attention and climbed over her in their search for her teats. The male remained outside the den and lay down under a thick shrub. In the east the sun rose above the dolomite ridge and adorned the high cirrus clouds in a soft shade of pink. The light etched everything in stark lines. It was the beginning of a new day.

Driven by hunger the jackal pair had left their den late the previous afternoon. Their first call was at the waterhole. After quenching their thirst they lay down next to the dried carcass of an elephant. The animal had died from anthrax several months earlier. The soft parts of the carcass had long since decomposed. All that remained was the hard, dried shell of skin covered in white blotches, the dung of vultures and crows. The jackals gnawed on the hide for a while. Their preferred diet includes insects, rodents, and berries, but due to the recent drought these were in short supply. Unsatisfied, they left the elephant carcass and spent the rest of the night covering their home range in a futile search for food.

Black-backed jackals live according to an interesting social code. Five years earlier our jackal bitch was approximately one year of age. Her older brothers and sisters had been helping her parents to raise her and her siblings. In the spring her mother produced a new litter of pups. The oldest jackal pups, now almost two years of age, became sexually mature and started leaving the family circle. The bitch and her siblings took care of the new litter while the parents were away hunting. They played with the pups and looked after their hygiene by grooming them. They helped the mother when she twice changed den sites.

The food for the young pups was regurgitated by the adults when they returned from their forays. Our bitch and her siblings went on short hunting expeditions around the den, catching mainly insects, the occasional rodent, and once a careless hare. As the pups grew older they were fed more solid foods. When they were approximately three months of age they accompanied the rest of the family on nocturnal hunting expeditions. During the summer months they learned to eat fruits such as *Grewia* berries and wild melons or *tsammas*.

Late one afternoon the jackal family heard lions roaring in the distance. The adult pair immediately took off towards the sound, taking their family with them. They were close to the waterhole when they suddenly heard the sounds of snorting and animals charging away

in panic. This was followed almost immediately by the satisfied grunts of lions, and the jackal family knew that the lions had been successful in their hunt. As the jackals carefully approached the site of the kill they were joined by other pairs of jackals from adjoining territories. As usual the area immediately surrounding the kill became neutral ground. The jackals and a hyena that had joined them lay together watching the melee of lions around the kill.

A strange restlessness took possession of our young bitch and she lost interest in the lions feeding on the zebra carcass. Without her being aware of it she was experiencing her first oestrous cycle. She moved a short distance away and urinated. The jackal males became very attentive of her every move, the lion kill all but forgotten. They anxiously tried to smell the spot where she had urinated, straining to shoulder each other out of the way in order to try and urinate on the same spot. The males snapped nervously at one another and two became locked in a fight. The young bitch showed no interest in these frantic activities around her. She started moving away, her tail slightly raised and, at intervals, stopped to urinate a few drops.

The squabbling males followed her. Their numbers were quickly reduced as one male gained the upper hand. She allowed him to sniff at her but viciously snapped at him when he tried to smell under her tail. Perplexed, he evaded her. The bitch now started moving with more purpose but did not know herself where she was headed. At one point the male again had to scare away some persistent suitors. He proudly followed the bitch, his head held high and his tail fanned in the air. She allowed him to approach and smell her but added to his confusion by occasionally snapping at him. Suddenly she turned around and rubbed herself against him. He tried to mount her but she would not permit him to do so. These feigned attacks and the evasive action lasted well into the next day, when she finally allowed him to mate with her.

Their previous existence completely slipped from the mind of the young jackal pair. They mated frequently during the next few days. A bond was established between them and this monogamous relationship would last as long as both of them were alive. The next step in their new-found relationship was more difficult. They had to establish their own territory in an area that was already occupied by several other jackal pairs. In the early evenings they would listen to the calls of the other jackals and, by trail and error, find a place to get settled. When they encroached too blatantly on an existing territory the resident pair would leave them in no doubt as to their error. The resident bitch would tackle the young bitch while the males fought. In time the young pair gained confidence and eventually they felt comfortable enough to howl at night as well, in order to inform other jackals of their presence.

Let us rejoin the rhino cow with her newborn calf. While browsing, the rhino cow wandered further from her sleeping calf. The calf remained motionless against the shrub, deep in slumber. In this mixed bushveld the cow experienced no problem finding her preferred foods. Black rhinos browse twigs from an amazing variety of plants. Many of their preferred food plants are not available to other browsers. This is mainly owing to defence mechanisms

used by these plants. This mechanism can be chemical, such as when the plants contain poisonous or unpalatable substances, or it can be morphological, such as when the plants have thorns. Neither of these defences dissuade rhinos.

The various acacia species are high on the list of preferred food plants. Rhinos are also partial to various species of the Euphorbia family. The Euphorbia species, with their latex sap, are considered toxic and are not eaten by most other animals, not even elephants. In east Africa biologists have found that grass constitutes up to 30 percent of the diet of black rhinos. This is in contrast to southern Africa where grass forms an insignificant part of their diet. No satisfactory explanation is available for this difference in dietary preference. It has been shown that in the drier parts of the subcontinent rhinos show a marked preference for plants with a high moisture content. They never use plant material that is completely dry.

A rhino's sense of sight is poor. It depends to a large extent on its sense of smell and, to a lesser extent, on its hearing. Sounds that form part of the background symphony in the African bush do not bother them. Every so often the cow stopped browsing and listened. The continuous and monotonous calls of cuckoos on that particular morning did not affect the feeding cow. The rhino was unaware of a small group of kudu cows and calves that were browsing close to her. Kudus use their noses and ears continually to monitor what is going on around them. Their eyesight is adapted to their way of life. They can focus on twigs and leaves up to a few metres away but everything further than that is observed as movement rather than as objects.

It was the kudus that first became aware of Abraham and myself. We, however, were unaware of the rhino, her calf and the kudus. I was engaged in a botanical survey to try and find out the feeding preferences of black rhinos. I was also interested to see if I could find out what impact, if any, the browsing of rhinos had on the plants. To formulate a viable management plan for any species its dietary requirements must be known. Because of the threat from poachers in those areas where rhinos lived at the time of the study, it seemed that a logical precaution would be to transfer them to areas where their safety could be assured. With the knowledge I was gathering the conservation authorities hoped that we could assess the suitability of other game reserves for black rhinos. This would enable the department to decide which game reserves, and which areas within them, would be most suitable for black rhinos.

The method I used was to select areas in known black rhino home ranges. In each area I used a compass to choose a transect line. Then Abraham and I would move along this imaginary line. Every 50 metres I stopped and studied the plants closest to me in four quadrants, to the left and right of the line, in front and behind me. The name of the closest tree, shrub and herb in each quadrant was noted. Then I would try to decide if these particular plants had been eaten by rhino. Abraham and I had developed a working system. I would concentrate on the job at hand, in this case the botanical survey, completely oblivious to anything else that was happening around me, while Abraham would keep his eyes on our

Species	BROWSE INTENSITY CATEGORY (Numbers of plants)			Total number of plants used	% preference
	heavy	moderate	unused		
Acacia reficiens	48	39	13	87	36.6
A. mellifera var detinens	28	41	31	69	21.4
A. senegalensis	22	47	31	69	16.8
Terminalia prunioides	18	38	44	56	13.8
Grewia species	12	37	51	49	9.2
Catophractus alexandri	3	41	56	44	2.2
Combretum apiculatum	0	40	60	40	0.0
Colophospermum mopane	0	11	89	11	0.0

A list of the most important food plants and preferences of black rhinos at Otjovasandu

surroundings. This was necessary so that we should not be surprised by some bushveld occupant who might take umbrage at our presence.

Black rhinos have a very conspicuous manner of feeding. Twigs with a diameter of up to one centimetre are neatly bitten off. The cut looks as though it was made with pruning shears. Other browsers such as kudu and giraffe eat mostly leaves. They strip the leaves from the twigs with their lips and will sometimes nibble twigs as thick as a matchstick. The height at which rhinos browse is also a clue as to which animal has been eating a specific plant. Sometimes, however, rhinos will also strip leaves from twigs. I observed a rhino doing that once with a *Grewia* bush. If I could not decide without doubt that it was indeed a rhino that had eaten a specific plant, that plant was ignored in my calculations. Depending on the number of twigs eaten on a plant it was classified as heavily used, moderately used, or not used at all. Together with information on the abundance of different plants in the area, this information revealed the preferences of black rhinos for certain plants. I also noted the general condition of the twig used and also that of the plant.

The family of kudus became agitated. They were aware of our movement but could not smell us. The direction of the breeze was not in their favour. A female in the group snorted

to see if she could solicit some reaction from the intruders. In this she was successful. My attention was so focused on my task that the sudden sound made me jump. Abraham tried unsuccessfully to hide his smile and then scouted the area. Again the kudu snorted, then they broke cover in a wild dash. The females ran with their tails held high, sporting the white hair on the underside. The calves in the group kept contact with the fleeing females by following these white blotches. With all this disturbance the rhino cow also became alarmed. She jerked her tail in a tight curl over her back and spun around, testing the air. After a while, however, she relaxed and started browsing again.

Once my nerves had settled I continued making notes. Then Abraham saw the rhino cow. He touched my arm and pointed towards her. I immediately tried to identify the animal. I peered at her through my binoculars but she was partially hidden by the bush on which she was feeding. We carefully moved closer until we could see her head. The front horn, which she must have broken at some stage, was regrowing. It was still markedly shorter than the rear horn, a characteristic that I used to identify this female. We had not seen this rhino for almost a month. She was usually accompanied by a large female calf. Despite our careful survey of the area we were unsuccessful in locating the calf.

As I usually did in a situation like this, I stopped my feeding studies and turned my attention to the rhino. It would be quite easy to carry on with our plant survey the next day but finding a rhino would not be so easy. If one had the good fortune of stumbling across a rhino one should seize the opportunity of observing it. Fortunately the day was still relatively young and cool and the rhino would be active for another few hours before the midday heat drove her to seek shelter in the shade of a tree. I had immediately noticed that the cow was much more cautious than normal but I did not realise why.

I was observing the cow through my binoculars. As always I was amazed at the agility with which rhinos could use their upper lip. They can extend their lip into a proboscis and with the utmost skill and finesse select particular twigs to pull into their mouths. The cow was maneuvering a twig deeper into her mouth with her lips. She would bite the twig on the side closest to the centre of the bush. The remainder of the twig would be hanging from her mouth on the far side. A second and third twig would receive the same treatment. She would then pause and start chewing the twigs into small pieces, approximately one centimetre in length. With her specially adapted molars she would then grind the twigs to remove the bark. In contrast to ruminants that have four specialised stomachs for the digestion of their food, rhinos have a single stomach, the caecum, which is simply a big bag. The digestive system is a process of fermentation.

The biting and chewing were accompanied by clapping sounds, which no doubt were the sounds that Captain Alexander referred to in his description of a rhino feeding. He was wrong, however, to assume that the source of this sound was the horns being struck against one another. I had some sympathy for Captain Alexander's observation that the rhinos which he had observed were enormous. When I first started my study I had the feeling that

the rhinos I observed while on foot were larger than those I watched from the safety of my vehicle.

While I was watching the rhino peacefully browsing I contemplated the fact that frequently one does not appreciate that plants also face survival problems. Both the herbivores and the plants they eat have the same problem: how to avoid being eaten. A herbivore can evade predators by fleeing. Although plants cannot do this they employ a variety of mechanisms to dissuade herbivores. Generally one could say that the harsher and drier the environment, the more difficult plants find it to survive. Trees and tall shrubs growing under these conditions are not only placed under physiological stress, but they attract the attention of the large herbivores looking not only for food but also for shade and shelter. In these arid areas plant densities are low, which increases the grazing and browsing pressure on those plants that are available. This is especially true for the shrubs and trees.

The most common defence mechanism developed by plants in Africa is thorns. The drier the region, the higher the percentage of plants with thorns. In the savannas more than 30 percent of the plant species have thorns. An interesting phenomenon is that a whole group of thornless plant species has developed in association with the thorn-bearing species. Several thornless annuals and creepers grow within the branches of thorn bushes and benefit from the protection offered by the thorns of the host plant.

The presence of thorns does not offer total protection; at best it serves only as a deterrent. The thorns force a browser to nibble carefully instead of taking large mouthfuls of fodder. The browser cannot compensate by increasing its bite rate because of the time it takes to remove the leaves from between the thorns. The price for trying to increase the bite rate would be painful pricks by the thorns. Plants in desert areas generally have small leaves, which makes it even less effective in terms of time for herbivores to browse them. All these defence mechanisms have little if any effect on black rhinos and elephants. They browse these plants with abandon, showing no concern for the thorns.

Another defence mechanism developed by plants is chemical warfare. They have developed the ability to become unpalatable by producing tannin and other poisonous substances. However, investing in these secondary chemical compounds is costly for the plants. A lower growth rate and a reduction in the production of seeds are the most common consequences. The plants are required to perform a delicate physiological balancing act. If a plant has been heavily browsed there is a good chance it will not be able to produce seeds. While it is therefore advantageous for it to develop defence mechanisms, the hidden costs of storing toxins could be as high as the fact of it being heavily browsed. This is because of the nitrogen, phosphates and enzymes needed to produce the toxins, which are stored mainly in those parts of the plants most likely to be eaten, such as the leaves and tubers.

Some plants save on these costs by producing toxins only when they are needed, for example during those times of the year when the leaves are most likely to be eaten. Certain plants

have developed the ability to start producing tannins and toxins when they become aware that they are being eaten. Amazingly, the trees adjacent to the one being browsed also produce tannins in apparent anticipation of being browsed. Before a single leaf of these neighbour trees has been nibbled the tannin content of the leaves has increased by as much as 30 percent.

Many desert plants invest considerable energy and nutrients in the production of toxins or other defence mechanisms such as thorns. In this respect the various Euphorbia species are excellent examples. Most desert annuals such as herbs and grasses do not produce chemical defences. They compensate by growing quickly after the rains and by not having an extensive root system. They grow so quickly and in such abundance that they oversupply the demand. Before the herbivores have had an opportunity to make a significant impact on the plant population most of the plants have matured and produced seeds.

Meanwhile the cow had moved back to the thorn bush under which she had left her calf. The calf stood up and immediately started looking for her udder. It was only now that we noticed the calf. At last we understood the restlessness of the female during the morning. I also realised that this was the reason she had become so irritated by the presence of her previous calf on the last occasion I observed them together. She frequently butted that calf with her horn as she tried to persuade it to leave her. The female was pregnant and I had not even noticed it! Mortified, I tried to find a reason for this. With large animals such as rhinos and elephants it is frequently difficult to determine if a female is pregnant. The truth of the matter was that I was still unskilled. The calf finished suckling and both the female and her calf lay down under a bush.

I knew from experience that rhinos spent the greater part of the day lying in the shade. When we started our vegetation survey that morning we had planned to be back at the vehicle by lunch time. After a brief consultation we decided that Abraham would return to the vehicle to fetch our lunch pack and water. The Himba cautiously left in the direction of the vehicle. Although we knew there was only a slim chance that the female and calf would leave the area, I wanted to stay and observe them. This was my first opportunity to watch a newborn calf. I was anxious to see the interactions between the mother and her offspring and to watch the signs of maternal care. I mentally prepared myself for a long wait. The insistent lament of cuckoos continued to form part of the background symphony of the African veld, but I was hardly aware of it.

When Abraham left I had found myself a seat on the ground under an acacia tree. I now settled into a more comfortable position. As I was getting comfortable I saw a hairy caterpillar on my arm and flicked it off. Looking around I suddenly noticed that the tree under which I was sitting was covered with caterpillars. It always amazed me how quickly the eggs of butterflies laid during the previous year hatched after the first green growth appeared on the host trees. These hairy larvae form an important part of the diet of the cuckoos, whose plaintive calling still filled the air.

Looking through my binoculars I slowly searched either side of the resting rhinos. In a tree next to the rhinos a movement caught my attention. It was a crimson breasted shrike *Laniarius atrococcineus* and on a branch lower down I spotted another sitting on a nest. Crimson breasted shrikes are masters at imitating the calls of other birds. They frequently use this ability to trap their prey. Suddenly one shrike became agitated and hopped from branch to branch. Searching for the cause of its irritation I spotted a black cuckoo *Cuculus clamosus* in an adjoining tree. Black cuckoos are one of many cuckoo species that visit southern Africa on their annual migration. Clearly it was the presence of the black cuckoo that irked the crimson breasted shrikes. The cuckoo blatantly exposed itself to the shrikes. It then faked a move, as though it wanted to approach the tree in which the pair had their nest. This was as much as the shrikes could take. They rose to the bait and attacked the cuckoo. With evasive action the cuckoo avoided them and feinted another attempt to approach the tree. This increased the intensity of the shrikes' attack. They were no match for the agility of the cuckoo, however. Teasingly, staying just outside their reach, the cuckoo led them away from the nest. They followed in hot pursuit, intent on driving the intruder as far away as possible.

I knew what to expect and returned my attention to the now defenceless shrike nest. With team work black cuckoos have developed an infallible technique. The fleeing cuckoo, with the triumphant shrikes in hot pursuit, had hardly disappeared from view when the female cuckoo appeared. Without wasting time she removed one egg by rolling it over the side of the nest. She then sat, laid an egg, and disappeared as unobtrusively as she had arrived. The ability to lay eggs quickly is an important adaptation that improves the chances of success of this strategy. The shrikes returned shortly afterwards and without noticing anything amiss the female returned smugly to her nest.

By now the Himba had returned and we shared a tin of bully beef. Every so often the rhino calf would stand up and move about. Several times it suckled while the cow was still lying down. Analysis of black rhino milk has shown that it contains the same components as cow's milk. However, rhino milk contains only a trace of fat and less protein and calcium than cow's milk, but more lactose. During the period that the calf suckles, the lactose concentration increases from 4.4 percent to 6.9 percent, while the protein concentration declines from 6.4 percent to 1.7 percent. The total ascorbic acid, calcium pantothenate and vitamin B12 concentrations are similar to those in cow's milk. While the value for thiamine is higher, the values for nicotine acid, biotin, riboflavin and vitamin B6 are lower.

With the information on food preferences which I had gathered that morning still fresh in my mind I mentally started reviewing my data. As part of my feeding studies I quantified the damage caused to the plants by the feeding of rhinos. Although at times the damage could be considerable it never reached the same magnitude as that caused by feeding elephants. When black rhinos removed too many twigs from the same shrub one could detect that the shrub was under stress. This I observed in only a small number of instances. What causes more damage is that the rhinos frequently jerk their heads while biting off twigs. This causes the first branch lower down on the twig to tear, causing both the used

and unused twig to die back. Normally, however, the twigs pruned by the rhino will produce a dense new growth.

It is easy to differentiate between plants used by elephants and those eaten by rhinos; the latter normally have a neat, pruned appearance. If one was not paying attention one could easily miss the fact that the plant had been browsed at all. With elephants on the other hand the twigs and branches are torn from the tree or shrub with the animal's trunk. The branches never break off cleanly and hanging strips of bark give the tree an untidy appearance. Elephants sometimes remove enough strips of bark from trees for the tree to die. In Namibia I have frequently seen elephant completely destroy a stand of acacias. When elephant numbers exceed the ecological carrying capacity of an area, especially in the more arid parts of the continent, their feeding can and frequently does have an adverse effect on the food supply of rhino. The experience in Tsavo has been mentioned as a case in point.

Generally speaking however, in the evolutionary process, competition between species is avoided by natural selection and specialisation. Every living organism occupies a specific niche without competition from other organisms of other species. It is well known that in nature different species of herbivores which eat the same plant species as food plants use different parts of the same plant. In the arid and semi-arid regions the variety of woody plants is limited. I believed that in these areas some overlap in diet must occur among the browsers 'competing' for the same food resource as black rhinos. To prove my hypothesis I compared their patterns of resource use. This also allowed me to learn where black rhinos fitted into the broad spectrum of browsers.

The results did not surprise me. I found that, as I had been taught, there were distinct differences in food preferences. In those cases where there was an overlap in food plants the parts of the plants used differed from one animal species to another. Dik-dik, steenbok and duiker share largely the same type of food plants. The key phrase here is the same type, not the same species. Steenbok and duikers prefer the grass and herbs on the sandy plateau. Dik-dik keep to the areas with calcrete or hard stony surfaces, eating plants that grow in this more broken terrain.

Black-faced impala and eland use a variety of food plants and both species use grass and woody plants, but black-faced impala are more selective than eland. The latter, being taller animals, use plants at higher levels than those used by impala. Kudu and giraffe also use the parts of plants higher than rhinos can reach. Although browsing rhinos can reach a height of approximately 120 centimetres their preferred height is between 40 and 90 centimetres. They sometimes use their horns to break off branches in order to make their leaves accessible. They will frequently trample a thorn shrub to reach its higher branches. The long, subtle twigs of *Grewias* will be defoliated with their lips. None of the other browsing animals discussed above feed on branches as thick as those eaten by black rhinos.

By their feeding, black rhinos may improve the habitat of some of those animals mentioned. The new growth on the twigs browsed by rhinos provides more of the thin twigs normally

eaten by kudu, impala and giraffe. Rhinos open and improve dik-dik habitat by feeding on lower branches and by trampling. The results that I obtained confirmed work undertaken elsewhere in Africa. Even in areas with high densities of other game, black rhinos were still able to survive. Rhinos use coarse vegetation not eaten by other browsers. Some plants that they eat have high concentrations of tannins and other poisonous substances and these plants are often avoided by other browsers. Black rhinos could be considered a key species in plant management in Africa. In those areas where bush encroachment is a problem they could perform a useful function.

Species	Food plants with dead branches		Total food plants used		% F.P.U. with dead branches
	Browsing category				
	heavy	moderate	heavy	moderate	
Acacia reficiens	23	5	48	39	32.2
A. mellifera var detinens	9	4	28	41	18.8
Terminalia prunioides	4	1	18	38	8
Grewia species	0	0	12	37	0
Catophractes alexandri	0	0	3	41	0

Number of food plants that had branches die as a result of use by black rhino

The sun was sinking towards the western horizon. On the plateau the black-backed jackal bitch came out of the antbear hole and lay down. The pups followed her out and started to play boisterously around her. The male moved over from the bush and lay down a short distance from the bitch. The black rhino cow had followed the shade around the shrub where she had been resting. Every time she stood up she tested the air with her nose and listened keenly. She rose again and allowed the calf to suckle. Then she left the calf and, while browsing, started moving in the direction of the waterhole ten kilometres away. I knew that for the first several weeks she would leave the calf alone while covering this distance.

The Himba and I followed her carefully. The narrow escape we had a few months earlier with another cow and small calf was still fresh in our memory. It was dusk when I decided to call it a day and we started walking back to where we had parked the vehicle early that morning. The Himba walked with an uncanny sense of direction in the gathering twilight, almost straight to the vehicle. I was glad to have him with me.

Later that night I processed my notes. I had not completed the survey of rhino food plants scheduled for the day. However, the fact that we had stumbled across the rhino cow and her calf filled me with satisfaction. I had collected another small piece of information that I would use to complete the puzzle on the behaviour and social structure of black rhinos. On the plateau the jackal pair were greedily tearing at a carcass of a young springbok lamb that they had killed late that afternoon. After her initial dismay at losing her lamb the springbok ewe had again joined the herd. The rhino cow had rejoined her calf. The crimson breasted shrike was sitting on her nest.

Other actors were on the stage of the African night.

CHAPTER 10

Black rhino society

Against the slope of a small valley, in a thicket of acacia shrubs, a black rhino female and her calf were asleep. The chilled night air started moving down the drainage offered by the valley floor. A pre-dawn silence had settled on the valley. The pair of Scops owls *Otus senegalensis* that had been calling through most of the night were now quiet. The female rhino's ears suddenly twitched and after a while she opened her eyes. She stood and listened, moving her ears all the time. It was as though, after her sleep, she was trying to contact the world around her. She sniffed the calf and then gave it a few licks but it showed no signs of waking. Without moving from where she was standing the cow started nibbling at the thorn bush against which she had spent most of the night. In the east the morning star was fading and a red glow appeared on the horizon. She moved to the next shrub.

Unnoticed, the day was settling in around the rhinos. As usual the first sound to break the early morning silence was the restless chatter of whitebrowed sparrow weavers *Plocepasser mahali*. They had spent the night in nests woven untidily on the tips of branches on the western side of a tree. They were grouped together in a few nests during the cold night in order to benefit from each other's body heat. The nests in which they lay their eggs are normally sturdier than those in which they roost.

Then it was as though the noise kicked up by the sparrow weavers had woken all the other feathered inhabitants of the bushveld. All the various birds started singing. The sweet, rolling melody of wild canaries, the liquid-like, clear sounds of Kalahari shrub robins - all seemed to interlace - with contributions from warblers, thrushes, doves and others. The theme rose to a crescendo with the offering of red-billed francolins. In the silence that followed this ear-shattering cacophony one frequently heard the soft, almost desperately sad tune of mountain canaries. From under the trees a flock of guinea fowl added to the melee. They kicked up dust with the raking movement of their feet as they tried to find choice bits to eat. It was an early morning symphony to the creator in appreciation of a new day.

High above this boisterous sound a pair of bataleur eagles *Terathopius ecaudatus* circled in the azure sky. They had to work at it. It was not yet warm enough for rising air currents to help them. Later in the day they would benefit from these. Their height offered them a beautiful view over the expanse below. At Otjovasandu, outside my four-roomed, prefabricated house, blue smoke from an open fire lazily reached into the sky. Water in a petrol drum that had been cut in half was warming over the fire. A Damara woman was sorting the week's washing. The Himba watched her while they chattered.

I had been busy since early morning in a little zinc *rondavel*. Situated in the shade of a mopane tree the *rondavel* served as an office for both Jaap Meyer the game ranger, and myself. Two tables and a steel filing cabinet filled the tiny office, leaving us barely any space in which to move. Because of its proximity to the main dirt road to Ohopoho a layer of fine dust coated everything. Wasps had built mud nests against the walls and a gecko inhabited the space between two overlapping iron sheets that formed part of the roof. This gecko became rather tame but sadly fell prey to a boomslang *Dispholidus typus* towards the end of my study.

I concluded the unexpected telephone call from head office in Windhoek and left the office. I was asked to go to Halali, a rest camp in the eastern part of the game reserve. Two rhinos in the holding pens were about to be released. Since the start of the translocation and release programme of rhinos during the previous year, several had been freed. I found the request strange and could not understand why the director wanted me to attend this specific release. The director was not in his office and the clerk who called me had no further information.

In the same valley where the rhino and her calf had spent the night was a large termite mound. It had a hole at the base that had been dug by an aardvark *Orycteropus afer*. A keen observer would have noticed that the hole, previously vacant, was now inhabited again. The spiders' webs that had decorated the entrance to the hole were absent. In front of the opening were many tracks in the earth. The small, almost oval hoof marks told the observer that the new occupants were warthogs. The sun already shone into the hole when movement became noticeable. After a while one could discern the head of a warthog boar. Warthogs are high on the menu for most predators and therefore the boar was very anxious when leaving the safety of his hideout.

The boar lay with only his head protruding from the hole. His nostrils flared while he tested the early morning air. Satisfied that it was safe he left the hole and trotted away without lingering, his tail typically upright like an antenna. A short time later another movement turned out to be a warthog sow. She was as skittish as the male, but once she had satisfied herself that no surprises were waiting outside she also left the hole at a trot. Behind her, three piglets seemed to erupt into the morning sun. They had already suckled while inside the burrow and were anxious to get out. The sow uttered a soft call and the piglets followed her, all with their tails erect.

The protection offered to warthogs by the aardvark hole is as much against climatic conditions as against predators. With their hairless bodies warthogs are sensitive to temperature extremes. They seek shelter in the hole not only against low temperatures on winter nights; I have also occasionally seen them taking shelter in a hole during the heat of the day. Inside, this burrow had received some attention from the sow before her litter was born. She had excavated the back of the hole. She had loosened the earth with her feet and worked it out of the hole with her snout. In the process she formed a slight bench at the back, a little higher than the floor. This ensured that she and the litter remained dry should rainwater

wash down the entrance. Occasionally the boar spent the night with them in the hole but this association with them was rather loose. Her previous litter had moved into another hole several hundred metres away and on some evenings the boar joined them.

The road from Otjovasandu to Okaukuejo followed the valley a short distance then cut up the slope and wound its way across the plateau. A while later my vehicle appeared at the lower end of the valley. The Himba and I were on our way to Halali. By force of habit we kept an eye open for rhinos. Despite this we almost missed the cow and calf. I parked the vehicle next to a tree and hung my knapsack across my shoulder. We walked carefully to a position from where we could observe the rhinos. I knew in which rhino's home range I was and therefore knew which animals to expect. It did not take me long to confirm that it was the resident female and her calf. I almost did not have to use the binoculars. The rear horn of this rhino was slightly larger than the front horn. I was surprised to notice how large the rhino calf had grown.

Since we had first seen this cow and her then newborn calf several months earlier, we had made a special effort to find her as frequently as possible. This was easier said than done. Often we could not find her or the calf for weeks on end. I became unhappy about the instruction that ordered me to Halali. Fortunately I did not have to be there until the next morning. I decided to spend as much time as I could observing the cow and calf. It was interesting to see how the calf had started to develop its own character and individuality during the months since I first saw it. There were signs of a growing independence. This did not mean that the tie between the cow and her calf was weakening; far from it. The cow was as protective and cautious as ever. The cow continued browsing, unaware of us humans. The calf kept himself occupied, investigating the area around him. All the shrubs and other objects that attracted his attention were sniffed. Although he took time to nibble plants his growing awareness of his surroundings and his obvious interest in other animals, noises and plants were clearly noticeable. He suddenly charged off playfully but while trying to avoid a small shrub he lost his balance and fell into it. In an effort to regain his feet his legs milled in the air for a few moments.

I recalled the first few months of a rhino calf's life. Initially a calf always remained very close to its mother, frequently touching her. Whenever she lay down the calf would snuggle up and lie down against her. I observed that even as rhino calves grew older and showed more independence they still lay touching the cow. I had seen the same behaviour with Hartmann zebra foals and I think that it may have something to do with maintaining the cow-calf bond.

When this specific calf was born I had made an interesting observation. The road construction team were grading a new fire break. This well-graded fire break, with its wide, smooth surface, was located between the cow and her newborn calf, and the fountain at Otjovasandu where she normally drank water. The sounds of the bulldozer and grader were clearly audible while we were observing the cow and calf on that first day. The following morning we had found fresh tracks where she had crossed the fire break to go to the water and

return. She had to cross the fire break every night and the tracks of the newborn calf were conspicuously absent. My conclusion was that she left her calf hidden when she went to quench her thirst. This behaviour had not been observed before, nor was it reported in the literature, but subsequently Peter Hitchins and biologists elsewhere confirmed it.

Meanwhile the cow had disappeared behind a bush. The calf regained his feet and suddenly realised that the cow was not to be seen. He immediately called with a cat-like mew and the cow answered with a similar call, only much deeper. The cow appeared from behind the bush and the calf moved towards her making a plaintive sound. The calls between cow and calf are never loud and one has to be quite near to hear them. While the calf is young, both calf and cow frequently utter the mew sound and I concluded that it was a contact sound. As the calf becomes older this contact sound is used less frequently. This is similar to the behaviour of a hen, clucking to maintain contact with her small chicks. When one is close to a herd of springbok one can also hear contact noises in the form of grunts. Warthog sows also use sound to maintain contact with their offspring.

Communications between animals normally take place in three ways: smell, sight or sound. The sense used depends on the type of animal and the situation. With many game species communication takes place through ritualised behaviour and for this the use of sight is important. Ritualised behaviour is shown by rhinos but considering their poor sight it has limited application. Despite this remark, however, rhinos seem to put their ears to good use, as do their close relatives the Equines. The way they hold and move their ears seems to convey several messages. Similarly body posture and the way in which individuals approach one another, especially males approaching oestrous females, also contribute to their repertoire.

The senses that rhinos seem to depend on most are smell and sound. The disadvantage of smell is that it can be adversely influenced by the direction and strength of the wind. Although black rhinos do not seem to have the same vocal repertoire as white rhinos they do communicate quite extensively by sound. Their vocabulary is used mostly between a female and her calf. The sounds consist of the mews already mentioned. When the calf is hurt or endangered it utters a sound like the squeal of a pig. This sound normally elicits an immediate response, not only from the cow but also from any other adult rhino in the vicinity. The variety of noises uttered by an orphaned rhino that was raised by Ria Hofmeyr at Okaukuejo made me realise how little is known about this form of communication by rhinos. Vocal communication also takes place between a cow and a bull when the cow is in oestrous. The variety of sounds that the two animals utter consists of squeals, snorts and puffs. Unfortunately I was never presented with the opportunity to really investigate this form of communication.

When black rhino males that share a home range meet in the absence of a female the contact is normally brief. The older male approaches the younger (and therefore submissive) male with head held low and ears drawn back against the head. The younger male immediately moves away to avoid a confrontation. If a female is in the vicinity, and especially

if she is in oestrous, the older male will charge the younger animal with a squeal-like sound. Again the younger animal will try to avoid confrontation by immediately moving away. When strange rhinos meet, as often happens after reintroductions, confrontations are frequently fatal. Confrontations are not necessarily restricted only to males. If the density of rhinos in a specific area becomes too high, males will even attack females. They try to drive away strange rhinos and sometimes kill them. This was the case in the Kaross section of the Etosha National Park, where several rhinos were killed in confrontations. In one incident a male killed a female.

Let us return to the rhino being observed by the Himba and myself. The calf approached the cow and touched her. The cow reciprocated and touched the calf with her nose, then started browsing again after a few moments. The calf moved to the cow's side and started suckling. After a while she moved around the cow and suckled from the other teat. I have never seen a rhino calf butt the cow, as occurs with most ungulates. The feeding of the calf took approximately five minutes of intermittent suckling. The feeding times of calves vary depending on their age, the time of day and, I sometimes had the impression, on the mood of the cow. As the calf became older it was as though the cow would not always be so patient. After suckling, the calf lay down next to the cow, which was still browsing.

A cow remains standing while her calf suckles. I once watched a cow and calf while they were resting in the shade of a tree during the midday hours. After a while the calf stood up and started moving around restlessly. It then approached the cow and continued nudging her until she stood up and then the calf started suckling. As they grow older and taller the calves sometimes kneel while they suckle. It could be that they try to prevent their lengthening horn from irritating the cow. Black rhino calves suckle until they are well over two years old.

The Himba then spotted another rhino about 200 metres away, higher up on the same slope. I tried to identify this animal but it was obscured by foliage. Leaving Abraham with the cow and calf I carefully approached the third rhino. When at last I managed to identify it, it turned out to be the cow's previous calf. This calf was chased away shortly before the birth of the latest calf. The previous calf was a heifer and was usually found near her mother and the new calf. As the new calf grew the cow allowed the older calf to come closer. When the new calf was approximately six months of age the older calf was allowed to rejoin the cow and became part of the small family unit. While browsing they would sometimes drift up to a distance of 100 metres apart.

By this time I was already quite high up the slope of the hill forming that side of the valley. I decided to take up a position on a rocky outcrop on the crest, which would offer a view across the valley and of all three rhinos. After selecting a vantage point I signalled to Abraham to join me. Then I slowly scanned the landscape below with my binoculars. To my amazement I spotted a fourth rhino. Normally we had problems finding a single rhino and today we had the good fortune to see four. By now Abraham had joined me and we decided that this rhino must be the male that shared the home range with the cow. It was impossible to identify the animal at that distance. I left my knapsack with Abraham, stalked

the rhino, and confirmed its identity. Back on the rock outcrop I enjoyed the luxury of observing four rhinos from one vantage point. The four were spread over an area the size of a football field. Again I regretted that I had been asked to go to Halali.

This is a good time to discuss the composition of rhino groups in the study area. To do so we will have to leave these four rhinos for a while.

	Number of observations	Number of individuals	Individuals seen		
			alone	with another	
				male	female*
Adult male	46	8	73.6	0	26.4
Adult female	44	9	68.5*	26.4	5.1
Sub-adult male	25	1	66.6	0.0	33.4
Sub-adult female	23	2	32.7	3.7	63.6

* The females were accompanied by a calf

The composition of rhino groups in the study area

At the end of my study, as I analysed my data, I found that the assumption that black rhinos were solitary animals was really not true, especially for females. Females were alone in about two-thirds of the observations. However, this statement needs to be qualified. By alone I mean that the cow was not accompanied by a sub-adult or adult rhino; almost without exception the cows were accompanied by a calf. At times it was difficult to decide whether animals should be considered single. Two rhinos would be browsing 100 to 200 metres apart without showing that they were aware of one another's presence. I decided, rather arbitrarily, that if two adult or sub-adult rhinos were closer than 100 metres, browsing or resting, I would consider them together. This decision takes into account the low density of rhinos in the study area. When comparing these associations with observations on black rhinos elsewhere the low density of animals in the study area should be kept in mind.

When a cow was with other rhinos (her calf excluded), about half the time she was with a sub-adult female, probably her previous calf. A quarter of the time her companion was a sub-adult male, again probably the previous calf. This means that in most instances where adult cows were with other rhinos their companions were sub-adult and probably their own offspring. In only a quarter of the observations was the other rhino an adult male.

Black rhino cows were seen with other females on only five percent of occasions. Again a clarifying statement is necessary. At times I had a problem deciding whether the second individual in the group was the older calf of the cow or another young adult female. I only experienced this problem with animals I did not know, usually those from outside the study area. Young males spent almost two-thirds of their time alone while young females were alone only one-third of the time.

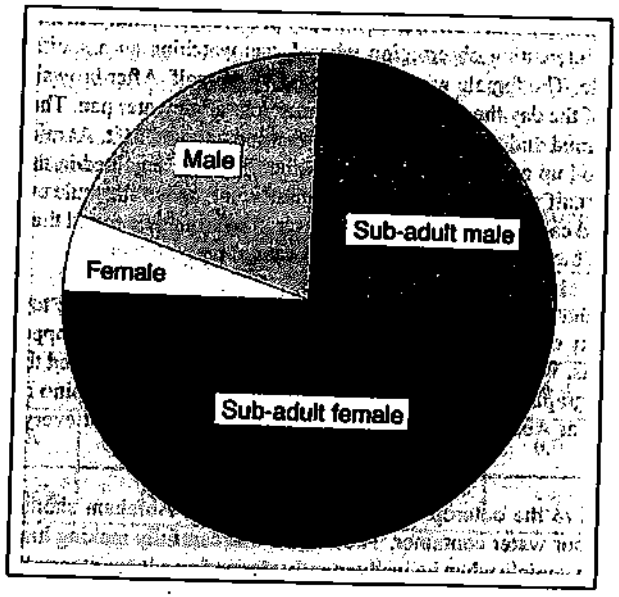
Observations confirmed that adult males were, by preference, solitary. In this regard I made one particularly interesting observation when I was watching an association between a male and a female. The female was accompanied by her calf. After browsing together for the greater part of the day the three rhinos came across a rainwater pan. They immediately wallowed in the mud and then spent most of the midday hours in it. At mid-afternoon the cow and calf stood up and started browsing while the male remained in the mud wallow. The cow and her calf moved off, browsing as they went. When the male eventually stood up, the female and calf were out of sight. After circling around he found their trail. Nose to the ground like a blood hound, he took off and caught up with them.

Meanwhile the four rhinos that we had been watching had moved closer together and also nearer to the rocky outcrop where we were sitting. I decided to use the opportunity to take some photographs. While Abraham remained seated on the rock I stalked the rhinos one at a time and photographed them. Frequently I would lose sight of the rhino I was stalking. I would then look at Abraham up on the rock to seek assurance that everything was still kosher.

When I returned to the outcrop a little later we decided Abraham should return to the vehicle to fetch our water container. The Himba was carefully making his way down the slope towards the vehicle when he inadvertently stepped on a loose stone. Although almost 70 metres away, the rhinos immediately reacted to the clattering sound. The cow turned towards the source of the noise and the calf stood next to her. The male charged past her and I thought for a moment that it was going to charge the Himba. About 20 metres beyond the cow the male stopped and snorted aggressively. Obviously they could not see Abraham, who stood quite still a short distance away. The male stood listening for almost ten minutes before he relaxed and started browsing again, giving the Himba the opportunity to slip away. The female was still restless almost half an hour later. This incident was the only time I ever saw a male behaving in a way that could be interpreted as defending a female and calf.

Abraham was already back on the rock when we became aware of movement below us. I carefully peeped over the edge of the ledge on which we were sitting. The run-off from rainwater supported a relatively dense growth of trees fringing the rocks. I saw a warthog sow and three piglets down on their knees, rooting in the carpet of leaves. The warthogs were so engrossed in feeding that they were completely unaware that they were being watched. After a while I managed to see that they were rooting for insect pupae. Warthogs are mainly herbivorous. They graze on short grass and dig for rhizomes, especially if the soil is moist. They also strip the seed heads from grasses with their lips. During the summer they scrounge fallen fruits under trees.

After a while the sow stopped her industrious search among the leaves and started rubbing herself against the trunk of a tree. I was amazed at the attention she gave to this activity. She rubbed every part of her body but it was her shoulders and head that received most of the attention. I knew it was anthropomorphic and subjective but I could not help thinking



Associations of a rhino female with other rhinos in the study area

that she looked ecstatic. One after the other the piglets abandoned their search and followed the example of the sow. It was a comical sight. Eventually the sow lay down and nibbled a piglet on the neck. The other two immediately came over and jealously vied for her attention, which she patiently divided among them. Meanwhile the group of rhinos had moved further away. When we got up to follow them the warthog sow suddenly became aware of our presence. With an alarm snort she burst away. The piglets followed her without being quite sure about the source of the panic.

During the morning we had to move constantly in order to keep up with the browsing rhinos. As morning wore on the male was the first to seek the shade of an acacia tree and lie down under it. He turned his body towards the wind to maximise the cooling effect of the slight breeze. In a large, nearby Camelthorn tree was a big social weavers' nest. Etosha National Park is the furthest north that these birds occur in southern Africa. Their distribution correlates with the drier parts of the subcontinent, such as the northwest Cape and Namibia. As with the other inhabitants of this desert area they are exposed to climatic extremes: warm, dry summers with high temperatures (over 40 degrees centigrade) during the day and winters when night temperatures drop below freezing.

Social weavers are relatively small birds with a small body mass. Thus they would have had to use much energy and water to regulate body temperature if they did so in the conventional way only. Instead they have developed another very efficient and innovative thermoregulatory system. The large communal nests with their insulated walls are the social

weavers' answer to extremes of weather. Within their range the ambient temperature varies by as much as 25 degrees centigrade. Researchers have found that the temperature inside the nests remains relatively constant despite the variation outside. The temperature inside the nests rarely changes by more then six degrees centigrade and remains between 23 and 29 degrees, come summer or winter. In the hot summer the social weavers avoid the midday heat by sheltering inside the nests. By doing this the birds reduce their energy requirements.

The nests are normally begun with a few twigs that serve as the foundation and are placed in the fork of a suitable tree. Building and maintenance continues throughout the life of the nest, which gradually grows bigger and bigger. A nest could eventually have a mass of up to 1 000 kilograms and a diameter of several metres. As the nesting material ages and weathers it absorbs moisture during rains. This additional mass frequently causes the supporting branches to break. When this happens the birds abandon the nest.

A communal nest could contain as many as 50 individual nests and house up to 300 weavers. The entrances to the nests are long passageways. When the nests are built, grass stems are placed so that their ends point towards the entrance. This hampers any intruder, who would meet these points head on. I know from experience that it is difficult to reach into a nest. Despite this precaution unwanted guests, especially cobras, still manage to enter the nests and eat the eggs and chicks. An interesting association is that which exists between these birds and pigmy falcons. The latter roost and breed in abandoned social weavers' nests within the communal nest. Their geographical distribution coincides with that of the social weavers.

Meanwhile the rhino cow and her young calf, with the older calf in tow, had moved along the slope of the valley, browsing as they went. They slowly made their way to the top of the ridge. Reaching it, they lay down in the shade of a bush. I knew that they would remain there for most of the remainder of the day. Reluctantly I returned to my vehicle to continue my journey to Halali.

We reached Okaukuejo, the main camp, at dusk. It is an hour's drive from Okaukuejo to Halali and I decided to spend the night at Okaukuejo. All the guest houses were occupied so we pitched camp under a tree in the paddock where the horses were kept. Later that evening I visited a colleague. It was then I learned that the Administrator for South West Africa and his entourage were visiting the park. He had the provincial administrator for the Cape Province with him as his guest. According to the official schedule they were going to visit Halali the following morning. During a small ceremony there they would release the two rhinos from the holding pens. Apparently the Administrator for South West Africa wanted to impress his colleague from South Africa. The director of the conservation department had arrived earlier in the day to be present at the ceremony. I realised now why my presence was considered necessary: I was to answer the VIP's questions about rhinos.

We left early the next morning in order to be at Halali before the VIP guests arrived. When we got there I drove straight to the holding pens, which were located a short distance from

the tourist camp. To my amazement I discovered that the pens were empty. On looking around I noticed that the remaining food branches in the pens were dry. It was obvious that the pens had been empty for quite some time. Back at the office I was told that the local game ranger had left suddenly the previous morning on an extended field patrol. This was after he had heard about the planned release! To reduce disturbance at the holding pens the other staff had not been allowed to visit the rhinos while they were in captivity. It was therefore no surprise to discover that none of the other staff were aware that the rhinos had already been released.

It is better to lower a curtain on the embarrassment felt later that morning and the terrible threats voiced by a humiliated director. It was park policy that the rhinos should be kept in the bomas for approximately one month before they were released in order to acclimatise them to their new surroundings. The task of feeding them fell on the local game ranger. Collecting sufficient branches from thorn bushes for food was a laborious and time-consuming task. Also, the staff had to move further and further afield in their search for suitable food. Therefore, while there were rhinos in the pens, the ranger and his staff were tied down for the greater part of every morning. All other responsibilities had to be neglected.

These particular rhinos had been in the pens for more than two months. The veterinarian in charge of the capture team had obtained permission to keep them in captivity for the longer period because he wanted to test certain drugs. In his application for extended captivity time he was vague about exactly what he intended to do and how long he expected the rhinos to be kept in the bomas. He also showed little understanding of the practical problems faced by the field staff. At the end of the second month he had still not started his experiments. By this time the local ranger, Piet Halali, had made several fruitless enquiries. When an appeal to head office provoked no reaction he decided to take matters in hand and release the animals without informing anyone. A few weeks later he received a message that the rhinos were to be released during the following week by the Administrator of South West Africa. Wisely, Piet decided to leave on an extended patrol. In one way his action did have a positive effect. A special team, equipped with a tractor and trailer, was designated to collect food for the captive rhinos. This freed the rangers from this rather tedious and time-consuming task.

Back at Otjovasandu the following week we kept a rhino female and her calf under observation. From the size of the calf I decided that she had to be more than two and a half years old. The calf was not suckling any more and was spending as much time browsing as was the female. They were feeding and moving in the same direction, sometimes as far as 50 metres apart. I was positioned on a rocky outcrop and could see both animals clearly. A family of mountain zebra was also grazing within view. The two groups of animals gradually moved closer to each other. At one stage both groups were in the same patch of slightly denser vegetation, which also obscured my view. Suddenly the zebras burst out, with a snorting rhino and calf hard on their heels. In retrospect I decided that the zebras must have come between the rhino and her calf. A rather funny interaction then followed: the zebras turned around and came trotting back towards the two rhinos. They were snorting and

shaking their heads, indignantly I thought. When they were close to the rhino she charged again but they evaded her easily. The cow started browsing almost immediately as though nothing had happened.

Contacts between black rhinos and other animals are interesting and mostly take place around waterholes. This is not surprising because in arid areas waterholes serve as focal points for the activities of most animals. The availability of water in the area and the volume of water available are important factors. If the water is spread over a distance, like a seep in a river-bed, rhinos do not seem to mind the presence of other animals. When the available water is concentrated in a small area, however, rhinos become agitated at the presence of other animals. Drinking rhinos will leave the water if elephants approach. Rhino cows with young calves seem to give way easier than do bulls. Rhinos do not waste time at a water-hole and leave as soon as they have finished drinking.

When elephants are already at the water when a rhino approaches the rhino will continue approaching until it notices them. Then it will stop and wait for the elephants to finish. Elephants drinking water are normally so full of frolics and occupy waterholes so completely that there is seldom space for other animals anyway. I once saw 25 elephants spend two hours at a water trough. The trough was relatively small and fed by a windmill. It took the elephants no time to empty it. They then stood patiently waiting for the creaking windmill to refill it. All this time a rhino was waiting a short distance away. I have frequently noticed that rhinos, having left the water when elephants have approached, silently reappear from the surrounding bush and finish their interrupted drink after the elephants have left.

Once Abraham and I were following a browsing rhino on foot. While we were busy doing this we noticed a group of six elephants passing a few hundred metres away. Evidently the rhino was oblivious of the elephants. About an hour later the rhino reached and crossed the trail left by the elephants. The rhino immediately snorted and whirled around, testing the air. He then urinated with a spray against a bush. This almost violent reaction by the rhino surprised me. When a short while later I had the opportunity to study the spot where this incident took place, I noticed fresh elephant dung. I think the strong smell of the fresh dung and not the tracks left by the elephant may have solicited the extreme reaction from the rhino.

Generally it appears that rhinos show more deference for elephants than the other way around. One has to bear in mind though that in most of these encounters a solitary rhino is outnumbered by a group of elephants. I have frequently wondered what would happen if a solitary rhino and a solitary elephant were to meet at a waterhole. Most other researchers refer to the antagonism that exists between rhinos and elephants. There are trustworthy reports of rhino killed by elephant, especially from east Africa. In Kruger National Park a white rhino bull was killed during a fight with an elephant bull. The 1994 carnage by three young elephant bulls in which 17 white rhinos were killed in Pilanesberg National Park has been mentioned.

Shortly after I arrived in Namibia I heard a rumour about a fight between a rhino and an elephant. Mr Besie Jooste, the Native Commissioner stationed at Ohopoho, the present Opuwa, confirmed the story. On one of his rounds through the Kaokoveld he came across the carcass of a recently-killed rhino at a waterhole called Otjitekwa, which at the time was on the boundary of Etosha National Park. Around the waterhole were signs that a fight must have taken place. From the size of the area where the fight occurred he concluded that it must have lasted quite some time. They camped a short distance from the waterhole. The next morning, by following circling vultures, they found the carcass of an elephant cow approximately five kilometres from the waterhole. Her wounds and the other marks on her body suggested that she must have been the other combatant.

A well-known association, which is frequently referred to in the literature, occurs between rhinos and oxpeckers. In the Afrikaans language oxpeckers are known by the colloquial name of rhino birds. According to hunting lore oxpeckers warn rhinos of approaching danger, especially from hunters. They do this in return for being allowed to eat the ticks on the rhino's body. Because of their thin covering of hair, rhinos normally do not carry heavy loads of ticks. Therefore oxpeckers concentrate not only on rhinos but also on other tick-carrying animals. Oxpeckers do not occur in Namibia except in the eastern Caprivi.

Drongos are another bird associated with game. In Etosha National Park they will perch on a branch and swoop down on any insects flushed by the grazing animals. Once I noticed a pair of drongos trying the same technique with a browsing rhino. After a short while though, the birds flew away. Apparently the rhino was moving forward too slowly to flush enough insects to make it worth their while waiting around him.

As my study progressed I found myself associating more easily with the rhinos. It gradually became easier to locate and identify rhinos. I also started moving through a greater area of Kaokoveld (Damaraland and Kaokoland) and through the known distribution range of black rhinos in Namibia. One reason was to conduct a census. The situation in Namibia was not favourable to black rhinos. It was not only the reduction in the area of Etosha Game Reserve that caused a problem, it was also the shape of the new boundary. In the process of the change, substantial areas of black rhino habitat were being lost, both within the game reserve and outside. In other areas black rhinos were placed in direct conflict with people and their livestock. During the early 1930s game rangers in Natal deliberately reported low numbers of white rhinos in order to highlight their precarious position. In presenting my findings I followed the example set by the early rangers in Natal and erred on the side of caution, preferring to underestimate rather than overestimate numbers.

CHAPTER 11

Activity cycles of black rhinos

Complex elements of nature constitute the climate of a given area. These elements are interrelated and their influences on biota are exerted in various ways. Although the influence of microclimate is infinitely more important to plants and smaller creatures, one cannot underestimate its importance as regards black rhino behaviour.

In preceding chapters, various ways in which plants and animals use the microclimate to reduce the severity of macroclimatic factors have been discussed. Unfortunately this somewhat complicated topic could not be conducted during the rhino project. I did not have access to the sophisticated instruments that would be necessary to take detailed microclimatic measurements. Even with these data it may have been difficult to pinpoint with any certainty the specific influence on rhino behaviour of any set of climatic conditions, given the many variables. Having said this, however, it was clear during my study that the climate did have an influence on the activities of rhinos. This influence manifested itself in two ways: physiologically and behaviorally. The two most important factors are temperature and rainfall.

One of the objectives of the study was to find out the daily and seasonal activity cycles of black rhinos during the year. This was easier said than done. It was easier during the daylight hours, provided I could find the rhinos. The real problem was to decide what they did after the sun had set. It was not only the physical difficulty of following rhinos in the dark, which would have to be done on foot. The real hindrance was all the other creatures with teeth; animals that would share the space with me. Consequently I used several strategies to collect this information. None of these were really satisfactory on their own. However, by combining the information from all of them a picture emerged as to how rhinos spend their nights.

One method was to try and follow rhinos on nights with a full moon, after they had come down to drink. This was unsatisfactory as it was difficult to see exactly what the rhinos were doing. One would have to assume that they were browsing when they were not moving. Only in one home range did the terrain allow this nocturnal study to be carried out in such a way that information could be collected. Another method attempted was to follow, during the day, the tracks of a rhino that had been to water to drink in the course of the previous night. Again the hard, rocky surface over most of the terrain rendered this method only partially successful. On top of these problems was the question of the individual variation displayed by the animals, which is usually the rule rather than the exception.

Despite these difficulties I eventually managed to formulate a broad framework of activities within which individual variations could be fitted. The black rhinos kept in the pre-release

enclosures presented me with an ideal opportunity to collect data under controlled conditions and then expand on them. When I later compared the two sets of information I was pleasantly surprised at the correlation between them. This showed that my field data, although skimpy, was usable.

The first rhino boma was built near Ombika. Adjoining the boma was an exercise enclosure about the size of a tennis court. The diameter of the boma was approximately 18 metres. The reason for building a round boma was to ensure that the rhino would not injure itself in a corner. The boma was sturdily built with wooden poles treated with creosote. The poles fitted closely together without gaps between them. As an extra precaution a layer of reeds was stacked against the poles. The fence of the exercise enclosure was built with steel cables tied between straining poles. Hessian on the fence prevented the rhino from being disturbed by the movement of people outside the enclosure. The strategy followed was to leave a newly-captured rhino in the boma until it had settled down. After a few days it would be allowed to use the exercise pen.

On the outside of the pens, in the corner where the boma and exercise enclosure met, I prepared a shelter for myself. A tarpaulin was fastened to the top of the boma poles and the straining poles of the exercise enclosure. From here it was stretched to a mopane tree, a metre and a half away. In the space below the tarpaulin was just enough room for a camp bed, a folding table and a chair. This simple shelter was sufficient to protect me from the elements.

The observations started only after the rhino had been in the boma and enclosure for 14 days and had had enough time to settle down. I spent ten days with the rhino, taking careful notes of its activities. My biological needs were taken care of while the animal was sleeping. Abraham kept the rhino under observation during the few short periods that I could not be there and informed me if it became active. This enabled me to obtain information on the rhino's activity over 24 hour periods.

Initially I believed that one could divide the activity cycle of black rhinos into two distinct periods. There would have been an active and an inactive period. The active period would start during the late afternoon and continue throughout the night until the next morning. The inactive period would start when they lay down to rest in the day and would continue until the rhino started browsing again in the late afternoon. When reconsidering this theory, however, I found it difficult to believe that rhinos could be active for such a long period. Considering that on average a rhino starts browsing around 5.00 p.m. in the afternoon and normally lies down at 10.00 a.m. the next morning, this meant that they would be active for up to 17 hours each day. I could not think of any physiological advantage such behaviour would have for the rhino.

Three of the home ranges in the study area contained waterholes. This meant that rhinos lost no feeding time on their way to or from water. The few occasions when I was successful in following the tracks from the waterhole to where the rhinos rested that morning gave me

a fairly good indication of how the animal had spent the night. Each time I found one or two places where the grass was trampled and dung had been deposited. It could be determined that the animal had spent a considerable amount of time at these places. There were signs from this point to where they were resting that indicated they had started browsing almost immediately after moving off. I was certain that these rhinos had broken the long hours of activity during the night to rest once or twice.

Observations on the rhino in the pen confirmed this hypothesis. The periods when they were inactive during the night in captivity totalled almost nine hours. The field notes showed an inactive period of six to seven hours when they were free-roaming. The difference could probably be accounted for by the journey to the waterhole and back. In captivity, where no time is spent travelling to and from water or wandering between shrubs while browsing, the animal was inactive for longer.

Clearly the rhinos had two active and two inactive periods per day. The active periods, with expected individual variations, lasted approximately five hours each. This means that out of every twenty-four hours rhinos were active for ten to eleven hours. On summer mornings they started browsing earlier than in the winter but stopped their activities earlier in the morning. Similarly, in summer they started browsing later in the afternoon. This meant that during summer they were active for longer periods at night than during the day. In winter the opposite was true. They would spend more daylight hours being active than they would night time hours. In winter they would browse longer during the morning and start earlier in the afternoon, showing that they were less active during cold winter nights.

The study also revealed that rhinos travel longer distances during the late afternoon and early evening hours than during early morning hours. Research on cattle has shown that they spend approximately six to seven hours grazing per day. Rhinos are therefore active longer than cattle per day. In contrast to rhinos, cattle do most of their grazing during daylight hours; 60 percent during the day against 40 percent at night. With rhino this ratio would be closer to 50:50, varying slightly with the season.

A study of the influence of climate on the behaviour of rhinos revealed some interesting patterns. Much of their daily routine is directed towards activities that help to regulate their body temperature. As stated earlier, one efficient way of reducing body temperature is by taking mud baths. The manner in which they use the topography within their home range is another subtle way of regulating body temperature. During the colder months of the year they would spend the night against the slopes of the valleys. The food available may have been an attraction but I believe their preference was also related to microclimates. At sunset there is a great volume of warm air present between the hills and the slopes of the valleys. The sinking cold air collects at night on the valley floors or on the plains of the plateau. The air mass against the slopes (in other words, against the sides of valleys or ridges) circulates when the temperature drops. This circulation mixes the cold air with the warmer air and keeps the slopes warmer than the valley floors.

Time interval	Total observation hours	Percentage of time standing	Percentage of time lying down	Percentage of time browsing	Percentage of time walking
0000-0100	17	41	43	14	2
0100-0200	16	17	83	0	0
0200-0300	17	27	56	14	3
0300-0400	14	25	75	0	0
0400-0500	14	3	90	2	5
0500-0600	18	23	38	32	7
0600-0700	18	25	12	50	13
0700-0800	24	7	7	50	36
0800-0900	32	5	0	54	41
0900-1000	36	15	27	31	27
1000-1100	38	14	39	18	29
1100-1200	38	32	50	7	11
1200-1300	35	20	44	16	20
1300-1400	36	19	46	19	16
1400-1500	34	33	46	8	13
1500-1600	31	38	38	10	14
1600-1700	35	20	32	24	24
1700-1800	29	26	0	48	26
1800-1900	23	23	8	46	23
1900-2000	20	20	10	50	20
2000-2100	18	12	59	22	7
2100-2200	19	22	64	9	5
2200-2300	25	20	34	33	13
2300-2400	15	20	80	0	0

Twenty-four hour activity cycle as shown by black rhino in Namibia

The protein content of most plants drops during winter. The exception is the acacia species, which retains its high protein values throughout the year. The same is true for the fat and ash content of acacias. The 'spring' flush, independent of rain and shown by these plants during August and September, may be the reason for these observations. In the drier parts of the subcontinent, paths used by rhinos meander past many Euphorbias, which they eat. Euphorbias have a low protein content (3 percent) and a high tannin content, but have the highest moisture and fat content of all the plants growing in the desert. By selecting from the plants available to them rhinos manage to maintain a high protein diet throughout the year.

While I was living under the tarpaulin next to the rhino pen I started analysing my field notes. The rather predictable activity pattern of the rhino allowed me plenty of time. The hill on which the boma was built had some large trees growing on it and the ludicrous antics of a flock of buffalo weavers *Bubalornis niger* in a nearby mopane tree provided me with much entertainment. I watched these birds as they set out to build a nest. Buffalo weavers go around in groups of approximately 30 birds. They use twigs, mostly thorn twigs, to built their communal nest. Part of the flock would keep themselves busy, hopping around the nest, chattering away. When a bird arrived at the nest, silence would descend over the group. All the birds would watch the new arrival with a twig in its beak while it decided where to insert it. The moment the weaver placed the twig an ear-piercing chatter would erupt. The twig would be pulled out repeatedly and placed somewhere else by any number of birds. It was as though a heated debate was being conducted on the best place in the nest structure for that particular twig. Normally no consensus would be reached. This would continue until the next bird landed on the half-completed nest with another twig and the process would be repeated. The twig that everyone was very concerned about the moment before was completely forgotten. Nests of buffalo weavers are untidy structures and, I thought, a good example of the claim that committees are not necessarily successful in creating aesthetical designs.

The drinking patterns of rhino are rather predictable. In the study area they normally went to drink between sunset and approximately 11.00 p.m. This preference for drinking at night is also shown by rhinos in the Northern Frontier province of Kenya. For many decades game in Namibia had to share the waterholes with humans and their animals. The activity of people and their livestock at the waterholes during the daytime forced rhinos and other game to visit the waterholes at night. This drinking pattern is still followed by rhinos in the game reserves to which they have been translocated.

Most other game, elephants included, will use waterholes during the day if there is no disturbance from domestic livestock or humans. Another reason for the nocturnal drinking habits of rhinos in the semi-arid region of Namibia is that these animals have large home ranges. Rhinos range as far as 30 kilometres or more from water. They travel during the late afternoon and early evening in order to avoid the heat. This invariably causes them to reach the waterhole after sunset. The time spent at the water by the various rhinos differs. On average rhinos spend about 30 to 40 minutes there and most of this time is spent actually

drinking water. Whether this is an indication that they drink large quantities of water, or whether they are just slow drinkers, I could not discover.

I found that rhinos were creatures of habit and showed a preference for certain waterholes within their home range. The following illustrates their attachment to a particular waterhole. A windmill was built at Renostervlei, which is located in the home range of those rhinos that use Otjovasandu as a water point. After its completion rhinos frequently passed within a few metres of the full water trough at Renostervlei but continued using the water at Otjovasandu. This meant that they had to travel an extra seven kilometres to get to water. It was several months later that they started using the water at Renostervlei.

Omboronbonga is a natural waterhole located in a narrow gorge with rocky sides. During the rainy season the water may flow over the surface of the river-bed for distances of up to one kilometre. Only one or two small pools remain during the dry season, when the water flows from the pool for a distance of only about twenty metres before disappearing beneath the sand. Even in the rainy season the rhinos would pass all the other stretches of open water along this river-bed and drink water only near the permanent pool.

One particular rhino that used this waterhole never drank at the pool. He would always excavate a *gorra* or hole next to the water flowing over the sand. Sometimes he would just reopen the hole that he had dug the previous time he was there. He would then stand around until the hole had filled with water and then noisily drink his fill. During the rainy season rhinos sometimes drank at certain of the rainwater pans. As these dried up, however, even if water was available at other rainwater pans, they would return to their preferred waterhole. In areas where they ranged over extensive areas, two or more permanent or semi-permanent waterholes might be located within a home range and the rhinos visited all these waterholes at some time or another.

The method I used to determine the frequency with which rhinos drank was simple. I would keep watch at waterholes which were frequented by animals that I knew I could identify at night. On full moon nights distinct characteristics such as the size and shape of the horns, or a cow with a small calf, made this possible. I would hide near a waterhole frequented by these individuals and record how often they came down to the water. I spent up to four nights at a waterhole before moving to another.

June to July 1966	October to November 1966
A total of twelve nights at three different waterholes	A total of seven nights at two different waterholes
Drank every other night	Drank nightly

Frequency with which black rhinos visited waterholes in the study area at Otjovasandu

Observations made during the cold months of June and July were repeated in the hot months of October and November. By December clouds would be building up and the odd thundershower would occur. I did not want to risk compromising my observations so I opted for recording at the end of October and the beginning of November. The results are shown in the table on the previous page, although variations may occur. Rhinos can probably go without water for longer periods, especially where they feed on succulents. The winter nights that I spent at waterholes passed without incident. My observations at the end of the dry season, however, were a different matter completely. In retrospect I realised that I should have expected this. During this very hot and dry period of the year animals concentrate their activity near waterholes.

One incident occurred at Omboronbonga. Here the sides of the gorge offered an ideal place from where the water could be watched. On one side of the gorge, in a narrow sloping gap between two boulders, Abraham and I tried to remove most of the stones from the ground. A small piece of canvas was stretched between the boulders and weighted down with stones on top of the boulders and on the ground at the back. The front of the opening was covered with shrubs. This shelter was very small inside with barely room for both of us. If one sat down on the ground one's head touched the canvas. During the day it was not so bad because one of us would be back at the vehicle preparing food or resting. The vehicle was parked more than a kilometre away. The night watches, when both of us crouched inside, were very uncomfortable. Owing to the cramped space I foolishly decided not to take my firearm with me and therefore we were unarmed.

The third night spent here in October was full of excitement. During the early part of the evening a pride of lions caught a kudu near the water on the river-bed below us. What unsettled me was that we became aware of the lions only when they brought down the kudu. The night turned into a long ordeal, listening to the pride of lion as they worked their way through the carcass. With the kill so close to the water no rhino or other game came down to drink that night. At daybreak there was no sign of the lions. If it had not been for part of the kudu skull and some bloody bones on which a jackal was chewing it would have been difficult to imagine the drama that had occurred there during the night.

In the bright daylight I found it difficult to imagine that I had been so scared during the night. I was sure though that the Himba had not been aware of my fright. After making quite sure that the lions were not still in the area we crawled out of our shelter. That was when we noticed the lion tracks close to the shelter and followed them around the boulder. Arrogantly the lion had defecated on the canvas where it was anchored to the ground by the stones. Only the thin canvas had been between us and the lion and we had not even been aware that a lion was there. So much for vigilance! It was then that we agreed that we had enough information from this waterhole. Although I had planned to spend another night there we returned to Otjovasandu instead.

We were due to move to Renostervlei the following morning. I had planned to spend four nights there as we had done in July. When I went to collect Abraham from his house I

quickly realised that he had no enthusiasm for spending any more nights at a waterhole. Although Abraham had a problem understanding the rationale behind my insistence for following rhinos through the study area, he could live with it. But he felt it was totally unnecessary to expose us to danger by willfully spending nights close to waterholes. I did not try to persuade him to accompany me. I would have to spend the next four nights at Renostervlei alone. The chance of having a close encounter on two out of three successive nights was slim, I thought.

We had prepared the hide at the windmill weeks before the June observations. We cut branches from acacia bushes and stacked them around the legs of the windmill. These were mainly to discourage predators. Inside the windmill legs we rigged hessian to prevent the game from seeing us. The game became accustomed to this hide and the June observations were very successful. When I arrived at the windmill in November I found that sun and wind had left the hessian in tatters. The thorns had lost none of their sharpness. I carefully crawled through the small opening left between the branches. Too late I saw the wasps' nest in the dry branches above the entrance. Suddenly it felt as though someone had tipped a pot of boiling water over my head and shoulders. I quickly scrambled back. For the first time in my life I was sorry I did not smoke. If I had smoked I would have had matches with me and would not have hesitated to set fire to the hide. Instead I used the long lever supplied with the car jack to destroy the nest. The wasps buzzed around angrily for another few minutes and then disappeared.

I carefully entered the hide again. It took me almost an hour to secure the pieces of flapping hessian with wire. After I had completed this chore I was screened from the sharp eyes of the game. The small Airmaster windmill did not have much space between its four legs. The rods and concrete head over the borehole occupied most of the available space. It was fortunate that I was alone. I had a hard time getting my folding chair inside and set up. Then I fetched the rest of my gear, namely my notebook, binoculars, torch, sandwiches, a thermos of coffee and a canvas bag of water. After our experiences at Omborongbonga I had also brought along a rifle.

The rifle was a Holland and Holland 300 Magnum. It was originally purchased by the well-known South African author, P J Schoeman. Professor Schoeman was an anthropologist by training but wrote books, with great compassion, for young people about wildlife and the ways in which people interact with it. Schoeman spent two years as warden of Etosha Game Reserve during 1954 and 1955. Gossip had it that this was the same rifle used to shoot a black rhino near Otjovasandu. The official reason given for this shooting was to confirm beyond all doubt that the rhinos occurring there were black and not white rhinos. This was a very weak excuse indeed as Schoeman grew up in Natal and knew his old 'African friends' very well. Apparently the real reason was to allow the South African prime minister of the day the opportunity to hunt a rhino! Despite this story I retain my respect for Schoeman, for it was under the spell of his books, which my father made me read, that I expanded my love for natural history and the veld.

After stacking all my gear inside the hide I moved my vehicle, parking it about a kilometre from the windmill and walking back to the hide. Before entering I checked the ground around the trough, which was about 30 metres from the windmill. The trough was originally built by a farmer who some years before had permission to graze his cattle within the boundaries of the game reserve. The trough was small and when it was full the surplus water flowed into a shallow depression. This allowed small animals to drink, such as birds that could not reach the water in the trough. Animals such as elephants, rhinos and warthogs usually turned this depression into a mud wallow. There were many tracks around the trough and wallow, including those of eland, kudu, warthog, Hartmann's zebra and Burchell's zebra. A short distance from the water I found some rhino tracks.

Elephants can wreak havoc with water installations. They have no problem pushing over windmills. If the water reservoir or trough at the windmill was empty they would tear the pipes leading to it out of the ground. Great care is therefore taken by conservation agencies to protect water installations in game reserves that are home to elephants. In Etosha Game Reserve a ditch approximately two metres wide and two metres deep was dug around each windmill. The pipes leading to the troughs were secured to prevent elephants getting a grip on them with their trunks. When the little windmill at Renostervlei was repaired a ditch was dug around it. The hard calcrete soil, however, thwarted the efforts of the local game ranger and his assistants. They decided to wait until a compressor became available. Consequently the shallow ditch, approximately a metre wide, was not really sufficient to protect the windmill. In the year since the completion of this windmill elephants had not been drinking there. Despite the name (*renoster* is the Afrikaans word for rhino) even rhinos only started using it several months after completion. Therefore I was not unduly concerned about elephants. What did worry me a little was the possibility of lions bothering me.

I made myself comfortable in the chair and started reading a paperback that I had brought along. Every few minutes I would check my surroundings. An hour after I settled in the hide animals slowly started approaching the water again. Some species viewed the windmill with suspicion but eventually thirst forced them down to the water. At sunset, flocks of sand grouse arrived. One could almost set a watch by the regularity with which these birds would come to drink. Watching them chattering away around the water filled me with wonder. One very easily forgets that birds experience the same difficulties as mammals with thermoregulation and maintaining a delicate water balance.

Like many other birds, sand grouse must drink to balance their body's water budget. Certain shore birds, among them coursers, which are related to sand grouse, possess special nasal glands. These glands enable the birds to excrete the salt that they have inadvertently swallowed with their food. During the evolutionary process sand grouse lost the use of these glands. They are therefore forced to drink fresh water, which they frequently fly considerable distances to find. Although this was not necessary in the Otjovansandu area I was aware that in the Namib region they covered up to 60 kilometres to reach fresh water.

Sand grouse chicks are precocious soon after birth. Despite being able to move around they are not yet able to fly. The male sand grouse carries water to its chicks in specially adapted breast feathers. These feathers are modified to allow them to hold more water than a bath sponge of similar size. In addition the contours of the male's body are such that the feathers lose relatively little water by evaporation during flight. When he arrives at the nest the chicks remove the water from the feathers with a preening action of their bills. An unanswered question is how sand grouse find their chicks on those featureless gravel plains, returning from a waterhole 60 kilometres away.

The sand grouse were still active around the water when the first rhino suddenly appeared in the clearing, close to the water. In the dusk it was possible to see its horns. This rhino must have lost its front horn at some stage. Although it had regrown almost to its original size this horn was almost the same length as the posterior horn, which enabled me to positively identify this bull. Like most game the rhino preferred to drink at the earthen dam. It spent about 30 minutes at the water's edge. An hour later the rising moon turned the scene around the water into a strange surrealistic stage. In the improved light I could see a rhino cow and calf approaching the water, although they were still some distance away.

I spent a long and uncomfortable night in the chair. Often I dozed fitfully. I missed the company of the Himba. The next morning after sunrise I walked around the waterhole. According to the tracks a third rhino and a pride of lions had come down to drink water during the night. Despite my vigilance I had been unaware of them approaching the water. I was quite satisfied, however, with the two adults and calf that I had identified. It made the discomfort of the night worthwhile. I knew from experience that the rhinos would not be back during the day so I returned to my house at Otjovasandu for breakfast and a rest. Shortly after midday I was back at Renostervlei again. The second night is the one I will never forget!

As on the previous evening the rhino bull with the familiar-shaped horn was the first to come down to the water. A short time later the cow and her calf pitched up. They were still at the water when a herd of elephants suddenly and noiselessly made their appearance from behind me. They were already past the windmill when I became aware of them. In contrast to the other game, elephants prefer to drink the clean water from the trough. Those that had quenched their thirst moved on to the earthen dam and started playing around in the water, quickly turning it into a muddy quagmire.

I sat frozen in my chair holding Piet Schoeman's infamous rifle across my lap. The dark bodies of the elephants formed clear silhouettes against the night sky, blocking out a large part of the starry expanse. After a while I became aware that it was a group of bulls. They seemed completely unperturbed by my presence between the legs of the windmill. After about an hour, which felt like an eternity to me, they departed as suddenly and silently as they had appeared.

I hardly had time to heave a sigh of relief, however, when the next herd of elephants arrived. This time it was a breeding herd with several calves. Apparently they had waited a short

distance from the water for the bachelor herd to finish. The latter herd had almost drained the trough and the cow herd stood waiting patiently for it to be refilled by the clattering windmill. A slight breeze kept the blades turning.

For the second time that night I remained motionless, hardly daring to breath. A young cow suddenly took an interest in the dark bulk between the legs of the windmill. She moved over and stood on the edge of the narrow ditch. Fortunately she and the rest of the herd were upwind of me. She stretched her trunk towards me but could not quite reach the metal stand of the windmill. Then she kicked some loose soil on the edge of the ditch with her front feet. The soil landed on top of me but I remained motionless. Obviously she was trying to get some reaction from me. I kept the rifle ready, determined to shoot at her should she try to step across the ditch. Luckily she lost interest after a while and moved away. In the early morning hours a third elephant herd arrived to drink. I took frequent sips of water from my water bag but my mouth remained dry with a slightly bitter taste in it.

I recounted my experiences of that night at Renostervlei to friends several times after that. They would laugh at me describing how desperately I needed to urinate but how I was too scared to move lest the elephants see or hear me, how I eventually slipped out of the chair and urinated, standing on my knees, staring upwards at the dark tower hulks. I found it impossible in the relaxed surroundings of a sitting-room or around a barbecue fire to relay to my audience the fear I had felt. I knew that the only elephants that my audience had seen were observed from the safety of a vehicle or from behind the wall at the waterhole at the Okaukuejo rest camp. I knew too, however, that when you are seated with an elephant only five metres away, you are aware of only two things: your own small, almost insignificant size and how enormous elephants are.

Despite all these adventures, the nights I spent at waterholes did provide useful information. Black rhinos drank every second night during the cooler months of the year. From October until the onset of the rainy season they drank almost every night.

The previous few chapters have been devoted to black rhinos. Let us now have a closer look at the other rhino genus in Africa, the white rhino. The saga of the efforts to conserve white rhinos, especially in southern Africa, is one well worth recounting.

CHAPTER 12

The white rhino story

Mention was made in Chapter 5 of the success achieved with the conservation of southern white rhinos. It may be a good idea to review the story of white rhinos in South Africa from the beginning.

White rhinos were nearly eradicated throughout their distributional range by the turn of the last century. In southern Africa a small number survived in two adjoining game reserves in the Natal lowveld. The number of white rhinos in this population was estimated to be approximately 100 animals, which were cared for with dedication by the staff of the Natal Parks Board. Under this almost personal care their numbers increased annually. In 1953 an aircraft was used to conduct a survey of these two game reserves. It was the first time that an aircraft had been used to count game in Natal, and probably southern Africa. This survey revealed that there were 437 white rhinos in the Hluhluwe and Umfulozi Game Reserves.

This was the good news. The bad news was that the white rhino population was reaching a level at which their numbers exceeded the carrying capacity of the two game reserves. Both reserves are relatively small, which meant that they could not sustain limitless numbers of large herbivores. Only 30 years after the shocking realisation of the plight of the white rhino, the Natal Parks Board was faced with another conservation management problem. The situation presented a dilemma. On a global scale the numbers of white rhinos were too low to consider the species safe from the threat of extinction. In their sanctuary in Natal, however, the number of white rhinos was too high.

In an attempt to relieve the situation the Natal Parks Board made white rhinos available to other conservation agencies in southern Africa free of charge. The recipient had to pay only the transport costs. By this process white rhino populations were established at Kruger National Park and in other game reserves in South Africa, Namibia, Botswana and Zimbabwe. The demand for white rhinos by official conservation agencies declined while their numbers in game reserves, especially those in Natal, continued to rise. Natal then started supplying white rhinos to meet the international demand created mainly by zoos.

An interesting situation now developed in the annals of conservation. The Natal Parks Board took a brave decision. The consequences of this decision had broad implications, not only for the conservation of white rhino but also for the development of conservation in general. In a revolutionary step the Natal Parks Board attached an economic value to an endangered species. White rhinos were sold to organisations and private individuals owning game ranches.

There were several advantages to this step. The publicity that accompanied this development gave the white rhinos a high public profile, turning them into a conversation symbol in most South African households. The Natal Parks Board acquired an additional source of revenue that helped to finance their conservation efforts. Furthermore, the private sector now entered the arena by conserving a rare and endangered species. In this respect South Africa was in the vanguard of the new conservation philosophy that was developing worldwide. Finally, due to this move, areas of southern Africa with suitable habitat for white rhino, yet previously not open to rhino conservation because they were private property, became available.

Given the opportunity white rhinos are prolific breeders. With the natural increase in numbers the populations on these private game reserves and ranches also reached saturation point after a while. There was an ever-increasing demand from the private sector to obtain permission to allow these surplus animals to be shot as hunting trophies. The argument put forward was that the founder animals originally received from the Natal Parks Board were growing old. They were reaching ages at which it was likely that they would soon die of old age. Also, these animals carried the best and potentially most valuable trophies. Instead of being allowed to succumb to natural causes they could be used to generate considerable sums of money if hunted as trophy animals. This argument, together with the fact that the rhinos had been legally purchased by their present owners, placed the conservation authorities under pressure.

The Natal Parks Board considered the facts. The number of southern white rhinos had increased from less than 100 in 1929 to more than 6 800 worldwide. In South Africa alone their numbers exceeded 6 300. Since the inception of the scheme the Natal Parks Board had supplied more than 3 500 white rhinos for reintroduction programmes. Most of these (2 200 to be precise) went to southern African destinations and 1 300 went to conservation organisations, private game ranches and zoos beyond South Africa's borders. All official game reserves in southern Africa and most private game reserves with suitable habitat now possessed a white rhino population. Many of these areas were facing a problem of overpopulation. A basic principle in conservation is the sustainable use of natural resources. One way of using a natural resource sustainably is by controlled hunting. There was no ethical reason in the field of conservation why trophy hunting of white rhinos on private land should not be allowed. Subject to certain conditions the ban on hunting white rhinos in South Africa was lifted after 86 years.

With white rhinos, free market enterprise came full circle. More and more landowners were willing to invest in white rhinos and the sale of them by the Natal Parks Board picked up again. The value of an adult white rhino, regardless of gender, was R50 000 (US $14 000) in 1994. Since the hunting ban was lifted more than 300 white rhinos have been shot in South Africa by trophy hunters. Hunters are prepared to pay as much as R130 000 (US $36 000) to obtain a good-sized white rhino trophy. Subsequently the taking of white rhino as trophies on private land has also been allowed by the conservation authorities in Namibia and Zimbabwe.

The reintroduction of white rhino to South Africa's oldest game reserve and first proclaimed national park, the Kruger National Park, is a success story worth recounting. The clover trails of rhino tracks disappeared in the Transvaal lowveld before the turn of the century. The first shipment of white rhinos from Natal to the 'Kruger' was awaited with excitement within the conservation community of South Africa. These animals arrived in the Kruger National Park in 1961, 65 years after the species was last found there. The main driving force was Tol Pienaar, the chief biologist in the park at the time. Apart from the rhinos the National Parks Board was involved with reintroduction schemes for several other species.

The white rhinos originated from the Umfolozi Game Reserve in Natal. They were released in a specially built enclosure near Pretoriuskop tourist camp in the south of the Kruger Park. During the following year, 1962, another two white rhinos were released into the enclosure. With the first rhinos the procedure for catching and translocating these animals was considered experimental. Once the techniques had been standardised the reintroduction of rhinos to the Kruger National Park went into top gear.

During the next ten years, from the autumn of 1963 until 1973, a lorry load of white rhinos was delivered to the park every 14 days. During this time 345 white rhinos were translocated. That only nine animals died during this entire exercise is a clear indication of the high standards maintained by the staff of both the Natal Parks Board and the Kruger National Park. The new arrivals adapted well and despite the several droughts that the Kruger National Park experienced the population continued to increase in numbers. Towards the end of 1994 the white rhino population was estimated to exceed 2 200.

The Natal Parks Board was careful not to make white rhinos available to countries that did not have a good conservation record. However, even in those countries where conservation was being practised judiciously the reintroduction of white rhinos was not always an unqualified success. As early as 1893 travellers reported that rhinos did not occur in Botswana any more. Their end, as was the case with white rhinos almost everywhere else in Africa, was due to hunting. When it was decided to reestablish the white rhino in Botswana 70 years after they had disappeared the southern African conservation community was again elated. Seventy-one white rhinos were translocated to the Chobe National Park and the Moremi Game Reserve in 1967 and 1981. All quarters considered this translocation to be successful. According to white rhino demography their numbers should have increased to over 220 by 1992. However, an aerial survey conducted in 1992 by Peter Hitchins and sponsored jointly by ERF and the Ministry of Environment and Tourism of Namibia found only 30 white rhinos. The main reason for this decline is poaching, although a certain amount of competition with elephants cannot be ruled out.

The main concern in the saga of white rhino conservation is of course the plight of the northern white rhinos. Only 37 of these animals occurred in the wild in 1994. A meeting of the IUCN Rhino Specialist Group was convened in 1994 at Geneva, where a special conservation management strategy was formulated for the northern white rhino. One recommendation was to start a captive breeding programme and build up white rhino numbers

to a level sufficient for reintroductions back into the wild. However, problems are being experienced with captive breeding. To enhance the programme, consideration is to be given to embryo transplants, as well as to the more conventional artificial insemination.

All this is easier said than done. The small number of northern whites even in zoos is a major predicament. According to official sources there are only eleven in zoos, including seven in the Dver Kralove Zoo in the Czech Republic. The same zoo also houses black and Indian rhinos. It was the first zoo to successfully breed a northern white rhino. In the London Zoological Gardens there was a single male that was sent to Dver Kralove several years ago. The San Diego Zoo has been successful in their breeding of Indian and southern white rhinos. They recently acquired more northern white rhinos and will embark on a breeding programme with the two pairs they have at present. All four of these northern whites were wild-born. The international conservation community hopes that they will be successful.

Let us return to the southern white rhino and the question of its former distribution in Namibia. Unfortunately this question cannot be answered satisfactorily. One reason is that early European travellers did not distinguish between black and white rhinos in their references to 'rhinos'. It can be stated with some certainty that white rhinos did not occur in Namibia at the turn of the century. Experience with animals reintroduced to various areas suggests that the southern white rhinos do not thrive in the drier parts of the subcontinent, for example in the drier areas of northern Transvaal.

The first white rhinos to step onto Namibian soil were taken there in the early 1970s by a private landowner who introduced them to his game ranch Otjiwa, just south of Otjiwarongo. During the next two decades several more game ranchers imported white rhinos. In general, supplementary fodder had to be supplied. Even then many of the animals did not survive the periodic droughts that affect Namibia, especially the region to the west of the main road between Windhoek and Otjiwarongo. This area normally receives less than 350 millimetres of rain per annum. The area of Namibia with probably the most suitable habitat for white rhino is Bushmanland, in the northeast of the country. White rhinos are also not partial to the sourveld regions of southern Africa, an observation that raises concerns about the long-term prospects of the white rhino population in the Waterberg Plateau Park.

The Waterberg is a sandstone mountain that juts out from the interior plateau of Namibia, east of Otjiwarongo. This flat-topped mountain is approximately 40 kilometres long. In its northeastern part the mountain is at the same level as the surrounding plateau of the subcontinent. It gets gradually higher as the plain of the plateau drops away to the southwest. In the southwest corner the mountain is approximately 300 metres high. The flat top of the mountain also forms a plateau.

In 1972 the plateau on top of the Waterberg Mountain was proclaimed a game reserve. Waterberg Plateau Park was the first game reserve in Namibia to receive white rhinos. The almost vertical cliffs on three sides of the plateau form a natural barrier. It was believed that these cliffs would be sufficient to restrict to the plateau most of the game introduced to

the park. On the northeastern side, where the plateau disappears into the plain, a game-proof fence was built.

The mountain massif creates a climatological phenomenon known as an orographic effect. This causes the plateau of the mountain to receive higher precipitation than the surrounding plain. The soils of the surrounding plain are mostly clay, while the plateau has a deep layer of sand. The combination of high rainfall and deep sand ensures that the plateau has a different plant community from the surrounding plain. Broad-leaved, deciduous woodland occurs on the plateau, the same as one finds further northeast in the Caprivi. The plant community on the plain is acacia thornveld, similar to the rest of the subcontinental plateau of central Namibia. The vegetation in the park makes it an ideal sanctuary for those game species normally found further east, such as roan antelope and tsessebe.

Waterberg Plateau Park was a logical destination when the conservation authority decided to reintroduce white rhinos to Namibia. Holding bomas and an exercise enclosure were built on the plateau. Great care was taken with the enclosure. Large shade trees and some sandstone formations, so characteristic of the plateau, were enclosed by heavy, rhino-proof fence. In one corner a sandstone slab was visible above the sand. The slab had a large natural hollow in it that was almost round, with a diameter of five metres and a maximum depth of 50 centimetres. The enterprising resident game ranger laid a water pipe to the hollow. During the site inspection by his supervisors his initiative was praised. Everyone was enthralled by this natural drinking trough and was happy with the fact that it fitted so well into the surroundings. Nobody could foresee the disaster that awaited the first shipment of rhinos ...

According to the procedure the rhinos were kept in their bomas for a time before they were allowed to use the exercise enclosure. Shortly thereafter a rhino cow was discovered lying dead in the water trough. An investigation showed that she had drowned in the shallow water. The edge of the natural trough had a lip that formed a ridge on the inside. The cow had gotten into the trough and had managed to get the tip of her horn caught under this overhang. With her mouth and nostrils under the surface of the water she drowned in water not much deeper than 30 centimetres. So much for the natural trough, which was immediately filled with sand and replaced with a metal one.

The misfortunes of these rhinos continued after they were released and allowed to roam the plateau. Three animals died in the following months. The sandstone outcrops on the plateau are columnar, with a maze of narrow passages between them. A rhino wandered into one of these passages. As it became narrower she managed to wedge herself between the columns and died of exposure before she could be rescued. Despite the fact that the cliffs were thought to be unscalable by the rhinos, one managed to find a way down. A gang of men maintaining a road below the Waterberg Mountain awoke one morning to find the large beast grazing in their camp. The terrified road workers refused to leave the shelter of their tents until the capture team arrived a few hours later. This male rhino was immobilised and taken back to the top of the plateau but promptly used the same route to escape again. The

bull was again immobilised and transported to the park but did not survive the second capture.

The cause of death of the third rhino was never discovered. She was a pregnant cow and it is possible that she never recovered from the exhaustion of the long overland journey from Natal. Subsequently the white rhino population on the plateau has been augmented by further consignments from Natal and the Kruger National Park and now numbers 38.

The behaviour and habitat requirements of white rhino have been studied in great detail by Dr Norman Owen-Smith in Natal and most of the following information is based on his findings. White rhino habitat is grassy plains with plenty of shade trees and sufficient water. White rhinos are actually quite dependent on water, both for drinking and for wallowing. In Natal it was found that they spent a great deal of time in wallows. During the heat of the day they lie up in thick shade. They also prefer flat areas, although they will cross hills if they have to.

As grazers they seem to prefer those grass species that grow in low-lying areas on alluvial soils or in the shade of trees. In Natal it was found that only four species of grass formed the bulk of their diet, comprising almost three-quarters of their daily intake. During the drier months of the year, red grass *Themeda triandra* was the most important species, but they also ate it during the rest of the year. The three other species eaten were buffalo grass *Panicum maximum*, small buffalo grass *Panicum coloratum*, and signal grass *Urochloa mosambicensis*. The latter two species formed about 42 percent of the grass growing in the preferred grazing areas of white rhino during the rainy season. Buffalo grass grows in the shade of trees, which is also where rhinos rest during the warmer part of the day. Apart from these species, white rhinos also eat approximately 30 other grass species. They completely ignore the sharp-smelling grasses such as the resinous turpentine grass *Cymbopogon plurinodes*.

While we are discussing the diet of white rhino there are a few other interesting points worth mentioning. Despite their huge size and the bulk of fodder consumed they are considered selective grazers that prefer short grass. While they are grazing they keep their heads very low, with their nostrils just above the surface of the grasses they are eating. Their wide lips are very pliant and sensitive, especially the upper lip. Because they do not have incisors they break the grass off with their lips using sharp little jerks of the head. They feed very methodically, standing in one place and moving their head from one side to the other while grazing. They then take a step forward and repeat the process. The width of their mouth is approximately 200 millimetres and they use all of it to crop the grass. They take approximately 70 to 80 bites a minute, chew for a few moments, then swallow the food. Like black rhinos, white rhinos are not ruminants and therefore do not chew the cud.

The behaviour of white rhinos differs from that of other rhino species, although the behaviour of the bulls is remarkably similar to that of Indian rhino bulls. White rhinos are territorial in behaviour but this statement requires some explanation. Let us start with the bulls. In a

given white rhino population one will find dominant and subordinate bulls. Each dominant bull has a territory that he defends against other bulls. In Natal these territories varied in size from less than one square kilometre to approximately three square kilometres. An interesting point is that all these territories had easily identifiable boundaries, such as a stream, a hill, or even a road.

In his territory the dominant bull usually has a few favoured shady spots. He will use one of these to lie up during the heat of the day. Bulls may sleep standing on their feet, although they may also lie down on their side or on their belly. The boundary of the territories consists of a no-man's-land, which varies in width from 50 to 100 metres. This no-man's-land is visited frequently by the bulls from both adjoining territories. They use the communal dung piles located in this area to advertise their presence. The bulls will urinate by spraying over the dung or over plants. However, when they are not in their territories, for instance when they are on their way to water, they urinate in a regular stream. Submissive males urinate only in a stream. Like black rhinos, white rhinos scatter their dung with their hind feet. Bulls defecate not only on the communal dung piles along the territorial boundaries but anywhere else in their territory.

Dominant bulls will enter an adjacent territory infrequently. If they do enter, and if they encounter the resident dominant bull, they will immediately take evasive action and try to avoid a confrontation. Usually they succeed and serious fights are rare. The bull whose territory has been violated will kick up much dust with short charges and try to drive away the intruder. Sometimes they will spar with their horns. Serious fights occur only if an oestrous cow is in the vicinity. During these fights the combatants may suffer injuries caused by the horns or by terrible buffeting on their shoulders.

Submissive bulls do not have territories. Their home range will frequently be the same as a dominant bull's territory. Many submissive bulls will spend most of their life within the boundary of a single territory, although they sometimes go on short excursions outside it. More than one submissive bull may share a dominant bull's territory. The dominant bull will tolerate their presence as long as they accept his dominance and acknowledge it with ritual submissive behaviour. This includes uttering shrill screams or snorting when a dominant bull challenges them. They will seldom engage in any form of tussle with a dominant bull. Dominant bulls are normally silent. When a submissive bull challenges a dominant one the resulting fight is sometimes fatal for one combatant. Usually it is the submissive bull who bites the dust. However, should the submissive male be the victor he takes over the territory. The vanquished bull will frequently be allowed to remain in the territory but only under the same conditions as the other submissive bulls.

Home ranges of white rhino cows are larger than those of the bulls. These ranges vary in size from 6 to 15 square kilometres, depending on the quality of the food source. The better the quality and greater the quantity, the smaller the home range, and vice versa. In exceptional cases the home range may be as large as 20 square kilometres. The home ranges of cows are not exclusive but overlap to a large extent with those of other females. The cows are

tolerant of one another, mostly ignoring each other. The home ranges of cows may cover the territories of several bulls, even as many as six or seven.

Let us now return to the social behaviour of white rhinos. You will now understand why I said we should first describe their social structure, otherwise the composition of white rhino groups will not make any sense. A group can consist of a cow with two of her calves. Another one or even two cows, each with her own calves, may be in the same area. The chances are good that the dominant bull will be in attendance, with several submissive bulls nearby. If one was not aware of the social structure of white rhinos, groupings such as this could be confusing. These groups may form temporary associations that are never permanent and only last for brief periods. These associations are dynamic: groups break up and reform with different individuals as the cows wander through the territories of dominant bulls and through the home ranges of other cows. Because of these associations white rhinos are frequently regarded as gregarious.

Like black rhinos, white rhinos rely heavily on their sense of smell for communication. They are aware of the movements of other rhinos by the scent that they detect at communal dung heaps or when they cross their tracks. Their eyesight is poor. At short distances they use ritual movements, some of which can be very subtle, to communicate with other rhinos. Examples of these movements are the way they move their ears or keep them against their head, the stiff-leg approach followed by a snort, short charges, the pressing of their horns against one another, and the intimidating stares they give one another. They are more vocal than black rhinos and use a variety of snorts and sounds to communicate.

Horn sparring is an intense ritual. It sometimes starts with horn prodding and develops into a sparring match. White rhinos may rub their flanks against one another in an effort to bond with a group. Calves and sub-adults will jerk their heads into the air at other young animals as an invitation to play. The calves are quite inquisitive and will approach other groups and sniff all the individuals. They will investigate everything that catches their attention, even road signs or a parked vehicle.

While walking, white rhinos hold their head low, barely off the ground. Their mouth sometimes marks the dirt. If disturbed they will run off with an elegant gait, head and tail held high. They can move at speeds of up to 30 kilometres an hour but can maintain a speed of 40 kilometres an hour for short distances only. They are creatures of habit and will regularly use the same route to and from water. White rhinos also have favourite places where they rest and graze. When it is cold, overcast or windy they will shelter in clumps of dense vegetation. Unlike dominant males the cows do not have favourite places where they shelter in these situations.

When a male white rhino reaches the age of 12 or 13 years he starts competing for a territory. It is also at this age that he becomes sexually active. Bulls can detect when a cow is approaching oestrous. Sometimes it will still be quite some time before mating takes place. However, the bull will stay close to her all this time and will actively try to prevent

her leaving his territory. He will chase her, screaming shrilly, and will even butt her with his horn should she insist on trying to leave. During this time the cow will resist attempts by the bull to come close to her. She will snort and even make short charges at him. The dominant bull is very active during this period, patrolling his territory and especially spending time keeping the submissive bulls at bay. These submissive bulls will keep their distance, especially from the cow, or else they will face the wrath of the dominant bull.

White rhino cows start breeding at the age of four years. Their oestrous cycle has been determined fairly accurately from the analysis of hormone levels in blood samples taken from a captive cow. The cycle lasts approximately 28 days. The calf is born after a gestation period of about 16 months. The cow leaves her group when she is ready to drop the calf and gives birth alone. The body mass of the calf is about 40 kilograms at birth. The pale white skin has a wrinkled appearance. The calf sheds its skin at one month of age and again at ten months.

During its first days the calf is unstable on its feet. It remains very close to the cow, lying down while she is grazing. When the cow moves about ten to fifteen metres away the calf will stand up and approach, lying down again when reaching her. The calf is weaned at one year but remains with the cow until it is two to three years old. If the cow should lose the newborn calf the bond between the cow and the previous calf is established again.

There is an interesting behavioral difference between the calves of white rhinos and those of black rhinos. When moving somewhere, but not while grazing or browsing, the white rhino calf will precede its mother. The mother will steer the calf with touches of her horn. With black rhinos, in contrast, the calf follows its mother. I believe that this difference is due to the habitat differences of the two species. With white rhinos living on short grass plains it is easy for the calf to walk ahead. This also has survival advantages for the calf. On the other hand, black rhino habitat is dense thorn bush, frequently with knee-high grass. In this environment it is much easier for the calf to follow its mother.

White rhinos completely ignore other animal species that share their home range, even those grazing in their vicinity. Calves are sometimes taken by predators and there is one record of lions attacking an adult white rhino. Shortly after white rhinos were reintroduced to Kruger National Park a big bull was so badly hurt in a fight with a pride of lions that he was put down. Another report from the Kruger Park tells of a fight between a white rhino bull and an elephant. This took place at a waterhole in the north of the park. The rhino lost the fight and was killed by the elephant.

Drongos *Dicrurus adsimilis* frequently keep the company of white rhinos, feeding on the insects flushed by them. Drongos show the same behaviour in Namibia with a variety of other game animals. Oxpeckers *Buphagus erythrorhynchus* eat the ticks on the hide of white rhinos, a service that these birds also extend to most other animals, even domestic ones. In days gone by hunters used to claim that, in exchange for the meal, oxpeckers would warn the rhinos of approaching danger. White rhinos spend a considerable time in

wallows, and even terrapins are known to remove ticks from these animals while they are lazing in the water.

Due to the dedication of a small number of people in Natal the clover trail of the white rhino is back over much of its previous range on the southern subcontinent. This is an exceptional achievement and one of which the international conservation community is well aware. Populations of the southern white rhino have been established even in Kenya and are doing well.

CHAPTER 13

The onslaught against rhinos in southern Africa

Let us now review the current status of rhinos in southern Africa. The collapse of the rhino populations elsewhere in Africa was discussed in Chapter 5. The clover trails of rhino footprints have also been fading in southern Africa over the last few decades. With growing concern conservation agencies in southern Africa observed the slaughter of rhinos in the rest of Africa. It was a foregone conclusion that, with the reduction in numbers elsewhere, the assault would shift to southern Africa.

Not that some rhinos in this southern stronghold had not already fallen prey to poachers. From time to time rhinos were taken by poachers in most of the national parks and game reserves. But what the countries further north had experienced was high intensity, well-organised poaching. When the crunch came to southern Africa it was not only the government conservation organisations that did battle but the private sector as well. By 1970 most of the rhinos in southern Africa were concentrated in protected areas. They had survived because of excellent conservation management, which included translocation and reintroduction programmes. But experience further north demonstrated that even in protected havens rhinos would not be safe.

In 1970 the Luangwa Valley in Zambia probably housed the largest population of black rhinos remaining in Africa. From being a wealthy and economically viable country at independence, Zambia had gradually become impoverished. The crash in the world price of copper (Zambia's principle export), corruption, unemployment and the resulting destitution, set the scene for rhino poaching. Zambia became the first country in southern Africa to be exposed to the onslaught. The Luangwa Valley population was intensively poached throughout the 1970s. In the process an illegal trade network was established with its headquarters in Lusaka. By the mid 1980s it was reported by biologists working in Zambia that the Luangwa Valley population had been exterminated. With a lucrative trade established, and having been unable to meet the demand from local sources, the poachers turned their attention southwards to Zimbabwe.

Predictably, the first population in Zimbabwe to suffer was the one closest to Zambia. Poachers crossed the Zambezi River and searched the Zimbabwean side of the Zambezi Valley. Serious poaching started in January 1985 and reached a peak in 1987. Management staff kept records of rhino carcasses found. These records show that more than 620 black rhinos were killed in the Zambezi Valley from 1984 to 1993. Zimbabwe's Department of National Parks and Wild Life Management had an excellent and active anti-poaching programme. With the escalation in the number of rhinos being poached they expanded their anti-poaching activities. Nevertheless they were powerless to contain the flood of

poachers from across the Zambezi River. In an attempt to contain the massacre, President Mugabe formally warned that poachers would be shot on sight. Although this policy was carried out with impunity it did not stem the killing of rhinos. The information is not freely available but some sources report that over a period of 15 years, between 60 and 80 poachers were shot and killed. Others put the figure as high as 170. During the same period four Zimbabweans were killed and several more wounded during skirmishes with poachers.

When the number of rhinos in the Zambezi Valley declined during the late 1980s the poachers turned their attention to richer pickings deeper into Zimbabwe. The logistics of these poaching excursions were amazing. After illegally crossing the international border the poachers had to walk at least 200 kilometres to reach the Hwange National Park and remain undetected. Despite the hardship, and the fact that some of them were killed in clashes with game rangers, they persisted. I paid a visit to Hwange during the 1992 dehorning operation and was told that all the poachers wore tattered rags and shoes. It is easy to imagine the poverty in their own country that drove them to undertake these desperate missions. However, the poachers were well armed with semi-automatic weapons, which showed that the middlemen were investing significantly in the poaching gangs.

Clearly, another strategy was needed to save the rhino. Following the example set by South Africa and Namibia, Zimbabwe convened a workshop in 1987 in order to assess available options and to develop a conservation strategy. Five objectives were identified:

* To conserve viable populations of black rhinos in the parks and wildlife estates. Eight separate areas were identified, which would be 'intensive protection zones', and each would harbour part of the remaining rhino population;
* To develop translocated breeding nuclei elsewhere in Zimbabwe and to maintain their genetic variability by translocating rhinos from vulnerable state lands to private conservancies in the country's interior;
* To develop one or more captive breeding centres, with intensive breeding of captive animals based on a population of 24 animals;
* To continue to support the international *ex-situ* captive breeding programme, thereby demonstrating formal support for the IUCN/SSC Captive Breeding Specialist Group;
* To secure a high commercial value for rhino through activities such as legal trade in rhino horn, stockpiles and farmed horn, sport hunting, and the sale of live animals.

Despite the plan's proposal that the short- and medium-term priorities be implemented immediately the plan became formal policy only when the department started implementing it in June 1992. However, financial restrictions prevented this ambitious strategy from becoming a reality.

Developments in Kenya showed that the private sector could successfully play a role in the efforts to conserve rhinos. Almost the only places where rhinos survived in Kenya were on private ranches. Based on this observation, and in anticipation of the formal adoption of the strategy outlined above, steps went ahead to translocate black rhinos from the Zambezi

Valley to areas further away from the international boundary. Aware of the plight of the black rhinos, owners of private game ranches agreed to cooperate and to hold these rhinos and care for them without insisting on ownership. The rhinos therefore remained the property of the state even though they were housed on private land.

One advantage of this move was that, in comparison with the game reserves, the ranches were relatively small. This allowed the rhinos to be kept under almost constant surveillance. Another advantage was that the 'new' distribution of rhinos would not be public knowledge, especially not to poachers from outside the boundaries of the country. Finally, the farms were in several locations and not as accessible to poachers. The disadvantage was that this strategy would not be a long-term solution as most of the individual ranches were too small to maintain viable rhino populations. Several rhinos were translocated to farmland under this policy. The problem that faced the authorities was that rhinos elsewhere in Zimbabwe were being poached faster than the translocations could be carried out.

Despite all the precautions taken by the Zimbabwean wildlife department the black rhino population was reduced from an estimated 2 000 to less than 380 in a few years. During the decade from 1982 to 1992 more than 1 000 rhinos were killed in Zimbabwe. In one year (1991) more than 200 rhinos were killed. The promising strategy to translocate rhinos to private land is now showing its vulnerability. In 1994 rhinos on these private ranches also fell prey to poachers. Two black rhinos were killed while still in their pre-release enclosure.

The white rhino population, which had been well on its way to a full recovery in Zimbabwe, was also targeted by poachers. Over the same period they killed 115 white rhinos in national parks and the population of white rhinos in Zimbabwe was reduced to 134. A disconcerting fact was that the 92 white rhinos, dehorned at great cost in the Hwange National Park, were among the victims. This experience in Zimbabwe places a question mark on the efficiency of dehorning as a method of trying to save rhinos from poachers.

Swaziland also became the target of organised poaching. Mostly owing to the efforts of Ted and Liz Reilly, white rhinos were established again in several of the country's game parks during the 1970s. Their numbers showed a remarkable increase and by 1988 the white rhino population in Swaziland numbered 96, with six black rhinos. In 1990, and again in 1992, poachers from Mozambique desecrated the sanctuaries in which these animals were kept. They managed to kill 53 white rhinos, which was 66 percent of the Swaziland population. During the same period two black rhinos were lost during a severe drought. The rhino population in Swaziland is probably the most vulnerable of all in southern Africa because of its proximity to Mozambique and because of Swaziland's population and political pressures. These animals remain under threat and their number is steadily declining. Today the white rhino population in Swaziland numbers 33.

The question of how these illegal rhino products and ivory were disposed of remained unanswered for quite some time. Then during the late 1970s and early 1980s several caches of illegal ivory and horn were uncovered by the South African Police, confirming earlier

theories and suspicions. Apparently, large quantities of illegal rhino and elephant products, originating from countries further north, found their way south across South Africa's borders. From here they were smuggled to the Far East, via Pretoria and Krugersdorp. The same route used to smuggle drugs into South Africa was used to smuggle rhino horns, ivory and young women out of the country.

South Africa was blamed by the international conservation community for being a conduit for the export of these products and was accused of not doing enough to prevent this. Indeed, it was not only animal products that were being smuggled; many endemic plant species, especially cycads, were also being threatened by illegal trade. The South African authorities decided to establish a special unit to combat this problem and in June 1989 the Endangered Species Protection Unit, ESPU, was formed. This unit has grown to comprise a staff of 32, with close ties to similar units in Interpol and other southern African police forces.

The achievements of ESPU have been remarkable. From January 1991 until June 1995 they have conducted 734 criminal investigations. They have managed to confiscate 403 rhino horns; 1 045 elephant tusks and 34 089 pieces of ivory cut into blocks and equivalent to another 3 410 tusks. The street value of these products is an estimated R30 million (approximately US $8.2 million). The efficiency of the unit may be ascribed largely to the dedication of its staff. However, it also has the use of very sophisticated equipment. Fixed-wing aircraft and helicopters that assist the task force are provided with the most advanced night vision and radar equipment. When information is provided by ground surveillance teams, people can be deployed by helicopters in a very short time to block escape routes. However, with budgetary constraints it is doubtful whether the ESPU will be able to retain this cutting edge in its war to save endangered species. In an attempt to overcome the budgetary cutbacks, the unit was granted permission to form a public trust, the Southern African Endangered Species Protection Unit Trust. This trust will enable concerned private individuals to participate in the crusade to save South Africa's heritage through donations to this campaign.

The expected full-scale onslaught against the South African rhino populations has not yet started. It could be that the early implementation of the conservation strategies has had a delaying effect or is successful in preventing full-scale poaching. Despite this the conservation authorities fully realise that the war against poachers is by no means over and security measures are constantly being improved. The first rhinos to become the victims of a well-organised poaching effort were white rhinos taken, ironically, in the Kruger National Park. Approximately 28 white rhinos were killed during 1991 and 1992 by a staff member of the park. The person was caught, brought to trial, and convicted. Five white rhinos have been poached on private property between 1994 and 1995. This number is small in comparison to what has happened further north. More rhinos could have been poached without the authorities being aware of the fact, but this is unlikely.

In Namibia, as was the case elsewhere, black rhinos were killed from time to time by poachers. During earlier times they were killed in retaliation for some perceived

'transgression' against the local people. In 1968 I visited a Damara village in the south of Kaokoland. A few days earlier an old woman in this little village had been in the way of a 'charging' black rhino. She sustained no injury but was highly indignant and called for vengeance. Several men from adjoining villages had assembled. They were all armed, a few with old .303 Lee Enfield rifles. The animosity towards rhinos was tangible, and in my journal that evening I remarked on the uncertain future faced by that particular rhino.

According to available information more than 100 rhinos were killed in Damaraland and Kaokoland over a period of 20 years before the mid-1980s. In subsequent investigations it was invariably found that Europeans were masterminding the poaching. European farmers, as well as the owner of a garage at Outjo, at different times hired Damaras and provided them with firearms and ammunition to hunt rhinos. The Damaras were paid between N$50 and N$200 (approximately US $13 to US $54) for a pair of horns. These horns then found their way to buyers in Windhoek, Okahandja and Swakopmund. The buyers were mostly businesspeople, although a senior public servant was also implicated. These products were on their way through South African outlets to the Far East.

The western side of Etosha National Park has always been a favourite target area for poachers because there has always been little human activity there. This section is not open to tourists. There are few roads and they are invariably in a poor state of repair. It was never visited by nature conservation staff with the same enthusiasm as other, more accessible parts of the park. Just outside the western boundary runs the main access road to Kaokoland and the western part of Ovambo. The area outside the park also has several natural waterholes and a high density of people. With the rhino and other game available just across the fence it is understandable why this area became a target for poachers.

This area was the scene of the first serious onslaught against black rhinos in Namibia. During 1984 poachers entered the park in broad daylight, shot and killed at least 15 rhinos, and removed their horns. At the time there were several vacancies on the staff roster for the park. Therefore the west of the park was neglected even more than usual. The poaching activity was reported to the police but no evidence could be found to allow identification of the culprits. After this unfortunate incident a concerted effort was made to increase staff activity in that area. During the next two years, 1985 and 1986, no rhinos were poached inside the park. In 1987 seven rhinos were poached in one day. The following year, 1988, was again quiet. During the same period, 1984 to 1988, only two rhinos were poached in Kaokoland. This, however, was the calm before the storm.

The black year was 1989. In Etosha National Park, 23 black rhinos were killed, and outside the park in Damaraland and Kaokoland another seven were shot. There was, however, a significant difference between the onslaught experienced in 1984 and that of 1989. Instead of Europeans acting as middlemen, the 1989 initiatives came from Ovambo and Herero businessmen based at Oshakati and Opuwa. They supplied the poachers with the necessary rifles, ammunition, transport and food. The poachers entered the park in small, mobile groups of three or four men and remained inside for several days at a time. The price they

received for a pair of horns had increased from N$500 to N$800 (approximately US $135 to US $216).

The redeeming fact is that most of these poachers were caught, brought to trial, and convicted. The seven rhinos killed in Damaraland and Kaokoland were not poached by the cartel that worked inside the park. A 25-year-old European farmer from the Rehoboth district south of Windhoek was arrested for these crimes. He personally shot and killed five of the rhinos and had the other two shot. On conviction he received a prison sentence of nine years, with the alternative of a fine of N$15 000 (approximately US $4 000) and five years of community service.

During the late 1970s and early 1980s only one nature conservator was stationed at Khorixas. His district included all of Damaraland and Kaokoland. This is an inhospitable, broken and mountainous area of approximately nine million hectares. It was at this time, after information was received about poaching which was taking place, that the private sector came to the rescue. The Namibia Wildlife Trust was formed, which appointed several game scouts to help the nature conservator patrol the area. The Endangered Wildlife Trust and the South African Nature Foundation, both non-government organisations from South Africa, also entered the scene. They contributed money for the appointment of additional field staff in Damaraland and Kaokoland. Meanwhile the Department of Nature Conservation increased its presence in the region.

Throughout those years several people worked hard to secure the wildlife in the area. The first name that comes to mind is that of Garth Owen-Smith. He worked mostly without any official backing or salary and under much personal hardship. With his obvious dedication and sincerity he convinced the Damaras to appoint their own game rangers and participate in a form of community development that also left room for wildlife. Blythe Loutit appeared on the scene somewhat later when her husband was transferred there as ranking nature conservation officer. Rudi Loutit's rather unorthodox ways of getting things done were initially restricted by red tape. But, true to his personality, he eventually found ways around the problems.

The situation improved considerably after independence. The man who probably did the most to enhance conservation in Kaokoland was Chris Eyre. He managed to win the trust of the headmen of the Himba tribe that live in the Kaokoland. Under his skilful guidance the headmen requested several times that the authorities should proclaim the western side of Kaokoland a game reserve. When the response was not quick enough in coming they sent a delegation to Windhoek to find out the reason for the delay.

It is unfortunate that officials employed by conservation agencies frequently do not get the credit due to them because they are simply 'doing their job'. Occasionally the people in the field have the pleasure of getting some credit for their work. This happens when they are exposed in the media when high profile and newsworthy conservation stories break. The people behind the scenes, mostly hidden in offices away from the limelight, seldom receive credit for their efforts. These are the individuals who have to fight for budget allocations

and equipment, who have to obtain permission from higher authorities for the hare-brained ideas of those in the field. These are also the people who frequently have to face the wrath of infuriated higher officials or politicians if things do not turn out as planned.

There are too many people to name them all but I would be amiss not to mention Polla Swart, the Director of the Department of Nature Conservation, who had the guts to approve the dehorning of black rhinos. This decision was taken in the face of opposition, not only from some of his own staff, but also from the purists in the international conservation community. Danie Grobler, Hentie Schrader, Leon van Rooyen, Roelf du Bruine, Piet van der Westhuizen, Dick Fryer and Allan Cilliers, each in their own way, left an indelible mark on conservation efforts relating to rhinos in Namibia.

In some ways the escalation of poaching in 1989 was a blessing in disguise. It provided the conservation department in Namibia with the necessary motivation to convince the government authorities that drastic measures had to be taken to prevent a repetition of the poaching. The strategy adopted had two components. The first was to physically try to prevent the poaching. The second was to establish an efficient network of informers. In order to implement the first part of the strategy a group of well-equipped people, especially selected and with specialised training, was needed. This meant the establishment of an effective anti-poaching squad, which in turn translated into a need for money.

The Rhino and Elephant Foundation (REF) from South Africa provided the initial financial support to turn the dream of an effective anti-poaching unit into a reality. From more than 120 candidates, 23 were selected. They started an intensive training programme and were in place by late 1989. The team is deployed for more than half the time outside the northwestern boundary of Etosha Park and has been extremely successful. With their tireless efforts and perseverance they have managed to earn the respect of all and have acquired the status of an elite corps. As an incentive they earn, in addition to their salaries, good bonuses on the completion of successful operations.

The second component of the strategy, the informer network, was set up with the cooperation and assistance of the Namibian Police. Owing to the connection between the illegal drug trade and the smuggling of rhino horn and ivory, the Namibian Police (and also the South African Police) have an interest in keeping tabs on the trade in rhino and elephant products. The Namibian Police Force has a special branch, established to investigate the illicit trade in diamonds and gold, and lately also drugs, rhino horn and elephant products. This branch relies heavily on its informer network and had the expertise and contacts needed to help the conservation department start their own network, although the two departments work closely together. The informer network has also proved to be extremely successful. In part this success can be attributed to the large rewards being paid for information. During 1990 and 1991 some N$500 000 (approximately US $135 135) was paid out annually by the Namibian Police for information. This is quite a bit more than any prospective poacher could possibly earn from the risky business of killing rhinos.

A further preventative measure taken was to increase the fines for transgressions of the laws governing illegal hunting and the trade in and possession of any rhino or elephant product. The new fines took effect in 1990. If convicted one could face a fine of N$200 000 (approximately US $54 050) and/or 20 years in prison. The increase in fines had an unexpected side effect. With the penalties being so high, poachers tried their best not to be arrested. In their desperate attempts to flee when confronted by conservation staff they suddenly resorted to shooting at the rangers. There was not much difference between the sentences for murder and poaching.

The success achieved by these measures in Namibia can be appraised against the following information. During 1982 to 1984 the department investigated 16 poaching cases and 35 people were arrested. These investigations dealt only with rhino poaching and the illegal possession of rhino horn or ivory. The garage owner referred to earlier was caught with 68 rhino horns. He used an ingenious way to transport them: he would open empty gas cylinders and pack the horns inside, using packaging material to secure them. Fortunately one cylinder was still open at the time that his premises were raided. Otherwise it is doubtful whether anyone would have discovered how these horns were being transported. Most of the horns were already enclosed in gas cylinders. Although he was found guilty he received a fine of only N$2 000 (approximately US $540)!

During 1988 there were 12 court cases involving 16 people facing charges of illegal hunting and/or the trade in elephant and rhino products. By 1989 the number of cases had increased to 34, and in 1990 to 47. The number of accused increased from 16 during 1988 to 33 in 1989 and 78 in 1990. This increase was partly due to investigations into earlier hunting incidents and to rhino horns that entered the country illegally from Angola. On two occasions confiscated horns were stolen from the official storage and these thefts also led to investigations. From 1990 the illegal hunting of rhinos virtually ceased: one white rhino was killed on a private ranch and another in Waterberg Plateau Park. In both instances the crime was committed by staff employed on the site and executed very amateurishly.

It is interesting to compare the situation and successes achieved in Namibia with the situation in Zimbabwe. The anti-poaching activities of Zimbabwe's Department of National Parks and Wild Life Management (DNPWLM) were frequently hailed as some of the strongest in Africa. During the seven years of what is now called the 'Rhino War' the DNPWLM maintained a systematic and deadly anti-poaching effort. The policy of shooting poachers on sight is used as an example of their commitment and conviction and implies total support from the government authorities. The fact that this policy did not prevent poachers from reducing the country's rhino population by an estimated 70 percent is accepted at face value as proof of the department's inability to prevent poaching. Thus, by implication, if Zimbabwe could not prevent annihilation, what chance do other conservation organisations have? This conclusion is grossly unfair, however, and to a large extent nullifies the sterling job done by the anti-poaching squads in Zimbabwe.

Why were these efforts in Zimbabwe not successful? There are several factors that contributed to the failure of the anti-poaching campaign. The most basic was the lack of an effective monitoring system, which resulted in an overestimation of the numbers of rhinos in the country during the late 1980s and early 1990s. This in turn lulled the authorities into a false sense of security. In retrospect it can be argued that the authorities in both the government and the DNPWLM failed to grasp the full impact of the country's poaching crisis until it was almost too late. Consequently the department, and especially the ranger force, was inadequately staffed and equipped to perform the task expected of it.

Substantive support was therefore sadly missing where it was most needed. It is good and well to tell your army to go out and fight a war, but to enable them to do so they need more than moral support. It is also true that, in terms of the department's budget, the recurrent expenditure for rhino protection was high, but only in local terms. Zimbabwe's government chronically underfunded the department. Thus although the anti-poaching component was generously funded in comparison with the rest of the department, the money was not enough.

The anti-poaching units were also understaffed for the size of the areas they had to patrol during their campaign. To emphasise the situation it may be mentioned that, based on research done in Zambia, Zimbabwe needed 2 500 people to adequately patrol the rhino habitat. During the crisis Zimbabwe's DNPWLM had only 800, and many of these were not in the field! To compound the situation the ranger staff were poorly paid and field allowances were low. To put this in perspective: a senior scout with 15 years of experience and at the top of his pay scale was paid less than a private who had just joined the Zimbabwean army. The field allowance was subsequently increased but the department was not given increased funds to pay the higher rate. The anti-poaching unit therefore frequently remained inactive when funds ran out.

In addition a chronic shortage of even the most basic equipment, such as vehicles and radios, and the absence of air support in the form of helicopters seriously hampered the effectiveness of the anti-poaching effort. Under these circumstances it was expected that the scouts should go out and apprehend armed poachers, knowing that every time they did so they were laying their life on the line. All these issues contributed to low morale within the ranks and were not conducive to efficiency. Thus the lack of practical support from the government led to low morale, which adversely affected the performance of the field personnel.

Until 1990 virtually all illegal hunting in Zimbabwe was carried out by poachers from across its borders. Since then, however, there has been a gradual shift. Zimbabweans have become significantly involved in both hunting and trafficking in horn. There is also a growing trend of involvement in this illegal activity by politicians, government employees, military personnel, as well as members of the Central Intelligence Organisation, which is directly connected to the president's office. To Zimbabwe's credit it must be reported that several of these people were apprehended and eventually convicted in magistrate's courts. However,

the number of convictions is low compared with the number of offences, especially when compared with the conviction rate in Namibia and South Africa.

It is true that Namibia has not yet been exposed to the same level of onslaught by efficient and experienced cross-border poachers as has Zimbabwe. In Namibia most of the poaching has been committed by locals. However, Namibia was fortunate in that the private sector immediately responded to the crisis. Several NGOs contributed financially to the conservation efforts. This was followed by a positive reaction from the central government. A well-equipped and highly trained anti-poaching unit was quickly placed in the field. Financial incentives kept the conservation staff motivated. Furthermore, the whole exercise had the support of the government's other law enforcement authorities.

Namibia achieved something that few of the other countries possessing rhinos could boast of, certainly not those countries to the north and in east and central Africa. In the decade from 1982 to 1992 about 70 rhinos were killed illegally in Namibia. Most of these deaths resulted in court cases and convictions. During this period Namibia managed to catch and convict not only the poachers but also the middlemen. In its efforts to conserve its rhino population Namibia has much to be proud of.

With civil wars raging until recently in Angola and Mozambique, the other two countries in the southern African region, reliable information from them is scant. Suffice to say that it is highly unlikely that the civil strife, which lasted more than a decade in both countries, would not have had a negative impact on the rhinos in these areas.

South Africa and Namibia harbour 40 percent of Africa's remaining black rhinos and over 90 percent of its white rhinos. It is interesting to step back in time and have a closer look at some of the steps that were taken by South Africa and Namibia to prepare themselves for the expected poaching onslaught. These steps included the dehorning of rhinos, an action that is tantamount to resorting to crisis management.

CHAPTER 14

Strategies and crisis management

With the rampage further north in the 1970s the conservation agencies in South Africa wisely decided to get their house in order. In 1983 a meeting was convened at the Pilanesberg Game Reserve, which was attended by representatives from all conservation agencies in South Africa and Namibia. The private sector also took part through an invitation that was sent to organisations with conservation concerns, such as the Wildlife Society of Southern Africa. Members of the South African Police were also present.

Over a period of three days, ways of securing rhino populations in the region were reviewed. Probably the most important achievement was the recognition that a uniform strategy was needed for the region. To withstand the threat to an important and precious resource, unity in effort, strategy and legislation would be needed. In South Africa this meant that the provincial conservation agencies and the National Parks Board would have to cooperate even closer than before.

This meeting gave birth to the idea of forming a rhino specialist group to advise and coordinate recommendations to the various conservation agencies. This specialist group, known as the Rhino Management Group (RMG), was formally recognised by the official conservation agencies. The RMG included representatives from those conservation agencies attending the meeting, and later by the South African Police and the Game Ranchers' Association. By formally recognising the RMG the official conservation organisations committed themselves to closer cooperation. The RMG meets annually. It does not have any executive powers and neither are its recommendations binding on any conservation agency. Its mandate allows its members to concentrate on the activities surrounding rhino conservation, coordinating research on rhinos in the region, and exchanging information. Under the guidance of the RMG all members compiled a national rhino conservation strategy.

In an early document in which the RMG reviewed the situation in southern Africa the following conclusions were reached:

* Based on the available habitat and its distribution the number of white rhinos in the region was fast approaching carrying capacity.
* Concern was expressed about the relatively low number of black rhinos in the region and about the fact that black rhinos were restricted to official conservation areas and game reserves.
* Based on the available habitat for black rhinos in official conservation areas it was estimated that South Africa had the potential to harbour 3 000 black rhinos in its game reserves.

Consequently the RMG recommended that, as with white rhinos, sub-populations of black rhinos should be established in all those game reserves that had suitable habitat. The advantages of this policy would be two-fold. Primarily it would create the opportunity for a population increase, but equally important from a security point of view it would improve the chances of survival of black rhinos. Until this recommendation was formulated in the mid-1980s most of the game reserves harbouring rhino populations were located on or close to international boundaries. The new areas identified as suitable to receive rhino were all deeper into the country and thus considered safer.

Another recommendation that had broad implications was one about the protection of the genetic integrity of the various black rhino subspecies in southern Africa. Simplified it meant that only black rhinos from Natal, *Diceros bicornis minor*, would be introduced to protected areas on the eastern side of the subcontinent. Black rhinos from Namibia, *Diceros bicornis bicornis*, would have to be the source with which to introduce black rhinos to the arid regions in the west and southwest of the subcontinent. The distribution of *Diceros bicornis chobiensis*, the black rhino from Zambia, should be restricted to Botswana, Zambia and southern Angola.

Both these recommendations were accepted and followed by the organisations concerned. Subsequently black rhino sub-populations have been established in most of the southern African conservation areas with suitable habitat. Now Botswana, Angola and Mozambique are the only countries in the region not to have an official conservation strategy for rhinos. Furthermore, very little is being done to protect their small relict rhino populations. This is despite several offers of assistance from both official and private sources in the region.

In the meantime the Rhino Management Group, under the able chairmanship of Dr Martin Brooks from the Natal Parks Board, took the initiative on various other important matters. It organised many workshops with invited speakers on issues pertinent to rhino conservation. One of the first workshops addressed the taxonomy of black rhinos on the subcontinent. Specialists presented papers on genetics and DNA. The recommendations about which subspecies of black rhino should be released where were based on the results of this workshop.

There was also a workshop on the practical aspects of rhino translocation and reintroduction. With the rapid development of new immobilising drugs and improvements in capture techniques the capture of a rhino at point A and its translocation to point B was not a problem any longer. A more serious problem turned out to be the question of how to keep them alive and rehabilitate them at point B. This was especially true in those instances where there was already a rhino population present at point B. It was found that after rhinos were released at their destination, fights would break out that frequently resulted in the death of one individual. Apart from the ethics involved the RMG believed that rhinos were too precious and translocations too expensive to allow this sort of thing to happen. Clearly the answer was locked up in the social behaviour and needs of rhinos. This realisation was further confirmation of the importance of studying the social behaviour of game.

Another frequently neglected matter to which the RMG gave attention was the need to involve those people who are responsible at the grass roots level for implementing conservation and management strategies. This need was addressed by specialised training on rhino conservation, especially for junior staff. It was realised that the training needed to focus on practical management issues. The curriculum included matters such as techniques with which to identify individual rhinos, the collection of basic behavioral and ecological information, and simple techniques to census rhinos. Under the guidance of the RMG members, countries improved and standardised their census techniques for rhinos. For the first time it was possible to have confidence in the national estimates of rhino numbers. The total number of rhinos in the South African region was not a thumbsuck any more but an estimate based on objective, repeatable survey techniques.

The RMG also capitalised on another advantage of regional cooperation by sharing experience and expertise. Late in 1988 it convened a Rhino Conservation workshop at the Kruger National Park. The aim of the workshop was to bring together game rangers experienced in anti-poaching and other practical aspects of management pertaining to black rhinos in particular. It was attended by 150 delegates, mostly game rangers and wardens from central, east and southern African countries. Again the private sector showed their commitment: this workshop was largely sponsored by donated funds. To a large extent the Rhino and Elephant Foundation coordinated the organisation of this workshop. The South African National Parks Board also assisted and published the proceedings of the workshop.

The RMG built a good relationship with the special unit, ESPU, established within the South African Police to investigate the illegal trade in ivory and rhino horn. In collaboration with the South African and the Namibian Police, junior staff of the various conservation agencies received further training, which focused on investigative procedures and the taking of statements in a manner that would meet the demands of a court of law. At the same time the conservation agencies reviewed their hunting legislation, some of which was more than 40 years old. In some legislation, fines were still given in pounds and were unrealistically low. For example, the fine for illegally hunting an elephant in the Transvaal was only 25 pounds! The conservation agencies succeeded in promulgating similar laws and fines for illegal hunting, or for being illegally in possession of any elephant and rhino product. The fines were also made much more realistic. Anyone found guilty of illegally hunting a rhino or elephant faced a fine of up to R200 000, or 20 years in jail, or both.

The Natal Parks Board was receiving an ever-increasing number of enquiries about the purchase of black rhinos from the owners of private game ranches. During a board meeting in 1988 an historic decision was taken to allow black rhinos to be sold at public auction. Two considerations apparently weighed heavily on the board members. The first was the unquestionable success, both from a conservation and a financial point of view, achieved when the board 'commercialised' the white rhino. The second consideration was that, with spiralling inflation and cutbacks in national budgets, the board was finding it difficult to meet its financial responsibilities for conservation. The board could put the funds that such

auctions would generate to good use for conservation in their parks. This would include strengthening the efforts to secure the rhino populations remaining in the reserves of Natal.

Although initially the RMG had reservations about the wisdom of this decision it was difficult to find arguments that could outweigh the advantages. The RMG had several concerns. The first was the continued protection of the genetic integrity of the various subspecies of black rhinos. With the white rhino this had not been a problem because only one subspecies occurred in southern Africa. The possibility of taxonomic problems occurring with black rhino was accentuated when in 1990 a South African game rancher obtained from a foreign zoo a black rhino subspecies alien to the region.

Under common law if an item is purchased legally it becomes the property of the new owner to dispose of as he or she sees fit. The RMG was concerned that the agreement under which a successful bidder would buy a black rhino would not prevent the buyer from selling it to a third party. Nor would it prevent the buyer from augmenting his or her black rhino population with animals of a different subspecies from other sources. The second concern of the RMG was the viability of the so-called 'breeding nuclei' with their small numbers of black rhinos. It was accepted that the rhinos on auction would fetch high prices. The question was whether a successful buyer would have sufficient capital to be able to purchase enough rhinos to form a viable breeding population. Finally, there was the question of whether the land of the successful bidder included habitat suitable for black rhinos.

The RMG's concerns were conveyed to the Natal Parks Board who decided that prospective buyers of black rhinos would be screened. The board asked the RMG to submit recommendations for the conditions that prospective bidders must meet. During 1988 the RMG held a week-long workshop at Lapalala Game Reserve in the northwestern Transvaal with Clive Walker as host. Again the RMG invited knowledgeable people from the private sector, including an attorney with experience in environmental matters (who was therefore sensitive to the cause) and the chairman of the Game Ranchers' Association in South Africa. The following recommendations were compiled during the workshop:

* The prospective buyer had to sign a legally binding agreement with the Natal Parks Board confirming his or her willingness to participate in and be subject to the black rhino conservation strategy as formulated by the board.
* The game ranch to where the black rhinos were going had to have suitable habitat for black rhinos and be a minimum of 3 200 hectares in size.
* The game ranch would have to be fenced with a rhino-proof fence, built according to prescribed specifications, and be managed according to accepted conservation principles.
* The game ranch could not have a public road running through it and could not be close to an international border.
* The black rhinos should not be auctioned in groups of less than five individuals.
* The board should retain the right to buy back the black rhinos should unforeseen problems arise and have the right to purchase their progeny should they so wish.

The Natal Parks Board accepted most of the recommendations of the RMG. Subsequently black rhinos were auctioned under similar conditions in Namibia. Prospective buyers of black rhinos had to register with the board when an auction was organised. The board then sent its staff members to evaluate the land according to the above parameters. The Natal Parks Board have held two auctions, one in 1990 and another in 1992, and have sold ten black rhinos to private landowners. At the first auction R500 000 was paid for each animal. Thus the auctions were very successful at generating funds for the board.

The National Parks Board of South Africa adopted the Black Rhinoceros Conservation Strategy formulated for the country. Not only did it adopt the strategy but it actively implemented it. All the national parks in the southwest of South Africa that contained suitable habitat for black rhinos were targeted to receive them. To comply with the requirements of the National Rhino Conservation Strategy it was decided that only black rhinos of the subspecies *Diceros bicornis bicornis* would be introduced to these parks. Since 1985 this policy has been implemented.

The first rhinos were reintroduced to the Augrabies Falls National Park where there are now seven animals. The next national park to receive rhinos was the Vaalbos National Park, which received eight rhinos in 1987. Their number has since increased to 14. The last black rhino in the Karoo region of South Africa was killed in 1778. They established a presence there again 215 years later when they were reintroduced in the Karoo National Park. The black rhinos introduced there were progeny of the rhinos released into Augrabies National Park and Vaalbos National Park.

There are two tales worth recounting in order to conclude the story of the return of black rhino to the southern African scene. During the mid-1960s the South African National Parks Board was involved in an active programme to reintroduce species to their various parks. It is a well-recorded fact that black rhinos previously occurred in the eastern Cape. It was only logical that the National Parks Board would consider reintroducing black rhinos to the Addo National Park. At the time, Kenya still had a large population of black rhinos and the Addo National Park was restocked with animals from there. The animals were shipped to Port Elizabeth and taken by truck to the park.

Three *D. b. minor* bulls from Natal were added to the population in order to enlarge the genes pool of the small Addo population. During the same operation all the black rhinos in the park were captured and given ear marks to aid future identification. When the recommendations of the Rhino Management Group were accepted, the three *D. b. minor* bulls were removed and their hybrid progeny given to the National Zoo in Pretoria. It is a very real possibility that sometime in future this *D. b. michaeli* population in Addo National Park will be returned to Kenya. When the protection of rhinos in Kenya is ensured it would serve to augment the black rhino numbers in that country.

The second deals with the travels of a black rhino cow that is now resident in Augrabies National Park. A single black rhino bull was in the collection of a zoo in Lisbon, Portugal.

During the 1980s this zoo formally requested the Namibian government to supply them with a cow to pair with their bull. This request was fulfilled by the Namibian authorities. It should be mentioned that this happened before the question regarding the various subspecies of black rhinos was settled. The bull in Lisbon Zoo originated from Kenya and therefore belonged to the subspecies *Diceros bicornis michaeli*. The Rhino Management Group was concerned about possible hybridisation between the two subspecies of black rhino. The solution was really very simple. It was also an indication of the commitment of the South African conservation authorities to the protection of the genetic integrity of black rhinos. The National Parks Board needed specimens of the subspecies *D. bicornis bicornis* for their reintroduction programme in the drier part of southern Africa. Furthermore, they had *D. b. michaeli* available in the Addo National Park, so they negotiated with the Lisbon Zoo to swop their new cow for a cow from Addo. The *D. b. bicornis* cow therefore returned to southern Africa after a sojourn in Europe.

Let us return to the clover trail of rhinos in Namibia. The nature conservation authorities in Namibia noted the dwindling number of black rhinos in the mid-1960s. With the information from my research project on black rhinos it was clear by the end of 1966 that the situation regarding black rhinos had reached a watershed. To a lesser degree it was a reflection of the scene throughout Africa. The concern was not only the low number of black rhinos but that most of them lived on private and communal land. Obviously something had to be done to improve their chances of survival. A major translocation programme was initiated, which reached its peak in the 1970s. Eighty percent of the black rhino population in Namibia was outside protected areas in 1966, but by the mid-1970s almost 70 percent were within protected areas.

The entire translocation programme by the Namibian conservation authority was a praiseworthy effort. In this regard the late Ian Hofmeyr should be mentioned. He was the vet in charge of the capture team and his personal dedication went a long way to ensuring the success of this venture. Before his death in 1984 he was probably the most experienced vet in southern Africa in the field of game capture in general, and in black rhino capture in particular. Subsequently Namibia developed a national conservation strategy for rhinos. The strategy was based on the format recommended by the Rhino Management Group. The recommendation that black rhinos be introduced to all the Namibian game reserves with suitable habitat was implemented once the strategy was approved. The first black rhinos were delivered to the Waterberg Plateau Park in 1985. This park received 14 black rhinos and in 1987 four black rhinos were introduced to the Hardap Game Reserve outside Mariental.

In line with the wider strategy for southern Africa, Namibia made black rhinos available to the South African National Parks Board. The black rhinos were exchanged for white rhinos. According to the agreement six black rhinos had to be delivered to South Africa during 1985. The six rhinos destined for the Augrabies National Park were already in the bomas at Otjovasandu by July. The evening before delivery was to take place a cold front swept over Namibia. By 10.00 p.m. the temperature was already down to minus ten degrees centigrade. By the next morning four of the animals had died of exposure, one a pregnant cow. It was

a great loss. However, with the large transport trucks waiting, the four rhinos were replaced that same morning with others from the immediate vicinity of the bomas.

In subsequent years rhinos were frequently translocated within Namibia for management purposes. The country held its first auction of black rhinos in 1993 and its second in 1994. The same basic conditions that applied for the Natal auctions were also applicable in Namibia. Unfortunately the auctions in Namibia did not raise the same prices as those achieved in Natal.

Namibia took the lead in another measure to discourage the poaching of rhinos. For many years a debate had waged on the possibility of removing horns from rhinos, both as a deterrent to poaching and on a sustainable basis for commercial purposes. In an editorial in the June/July 1979 issue of *Safari*, Henry Reuter wrote, rather satirically:

> *If we start this nonsense of removing the horns of rhinos to save their lives, why not extend the concept? We could, for example, detusk all the nation's elephants so as to make them less attractive to poachers. But we must not stop there, for poachers seek the hairs of the elephant's tail for the making of bracelets ... We must remove the elephants' ears, because they are coveted as basic material for the making of boots and shoes. And while we are at it, we should perhaps remove a leg or two, because who knows when there will be a ready market for elephant foot umbrella stands?*
>
> *But wait! Our vivisection campaign to save the wildlife is just beginning. All the horns must of course be removed from the antelopes. The lions, leopards and cheetah must be made to surrender their teeth and claws which are so much in demand by the modern jewellery trade, to say nothing of their skins ...*

It was a matter that had to be resolved, especially its efficiency as a measure against poaching, and what better way than in practice? In 1989 the conservation authorities in Namibia became the first to dehorn rhinos in an attempt to prevent them from being poached. This action immediately raised a hue and cry in the international conservation community but was nevertheless repeated in 1991.

Shortly after news of the dehorning of rhinos in Namibia appeared in the international press I received a letter from a man in Australia. He had patented a rhino horn fabricated from glass fibre. He offered to supply Namibia with these 'horns' at a very reasonable price in order to replace the horns we had removed. According to his letter this would not only reduce the trauma of the rhinos losing their horns but would also allow them to continue defending their young and themselves against predators! Without any knowledge of rhino behaviour he had placed his finger on crucial aspects of the side effects of dehorning.

The Namibian authorities claimed that this exercise was extremely successful and stated that no dehorned rhinos had been poached. They refrained from mentioning all the additional

measures taken simultaneously to prevent poaching. Furthermore, at the time this claim was made, no horned rhinos were poached either. The success of dehorning in Namibia has to be evaluated against this background. Recent experience shows that this method is not as foolproof as one is led to believe by its advocates.

Speaking personally, I believe that removing horns from rhinos because they are being threatened by poachers is like treating the symptom and not the disease. The dehorning of rhinos is a very expensive exercise. One has to use a helicopter, and apart from the ferrying costs, it takes quite some time to locate each rhino and immobilise it, especially in the broken terrain of northwestern Namibia. The logistic support, vehicles and people necessary to conduct such an exercise are additional costs. A conservative estimate based on the costs incurred during the first dehorning exercise in Namibia is a figure of N$90 000 (approximately US $24 320) per animal. Furthermore, every time a rhino is immobilised the animal is at risk, especially in rough terrain. After all this cost and effort the safety of the rhinos is still not guaranteed, as experience in Zimbabwe has now shown: all of the 92 white rhinos dehorned during 1992 were killed by poachers, as were an unknown number of dehorned black rhinos. One must also bear in mind that a dehorning exercise has to be repeated every two years as the horns regrow at a rate of approximately ten centimetres per year.

An argument used in defence of dehorning is that a poacher would not kill a rhino that has been dehorned. That dehorned rhinos were poached in Hwange National Park is ascribed to the dense vegetation, which made it difficult for the poachers to see that the rhinos were dehorned before they were killed. Therefore the deaths were 'accidental'. I have visited Hwange several times over the years, and although I have to agree that the vegetation is rather dense in places, I refuse to believe this explanation. Furthermore, one should remember that white rhinos prefer open vegetation. These factors make this explanation difficult to swallow.

Part of the argument in favour of dehorning is that poachers prefer larger horns because of the higher ratio of reward for effort exerted. In other words, if poachers have a choice between a rhino with small horns or no horns and a rhino with large horns, they will rather kill the animal with the large horns. Remember that killing a rhino, irrespective of horn size, increases the risk of being detected due to the noise of the shots fired. To test this argument an independent team of scientists conducted a small project. Joel Burger and Carol Cunningham tested the hypothesis by measuring all the confiscated rhino horns in custody. If the hypothesis was correct the confiscated horns should be relatively large. Secondly, the rhinos living in areas where they do not receive protection would have smaller horns than a population living in an area where they are protected. The assumption here is that all the animals with large horns would have been poached in an area without protection. Their study showed that this was not the case. They published their findings in *Nature*, a very reputable scientific journal.

Little is known of the biological and behavioral effects of dehorning. No one at this point can be sure what influence the removal of the horn will have on the social behaviour of rhinos; on dominance, reproduction and the defence of young against predators. The biological effects on dehorned rhinos are claimed to be minimal because dehorned cows have had calves, have successfully defended their young against predators, and interact normally with other rhinos. Yet the evidence in support of these observations is mostly anecdotal. For instance, if one takes the statement that dehorned cows have reproduced, one could say that all of these cows may have been pregnant when dehorned. There remains the question of whether dehorned cows have conceived or have lost their calves shortly after birth. Without substantive additional data it is premature to argue that dehorning has little or no biological impact.

Joel and Carol have studied this problem and although their results are based on a relatively small sample, some very disturbing side effects of dehorning are being brought to light. They compared three geographically distinct populations. The first was in Etosha National Park, where horned rhino live with the full spectrum of predators. The other two were dehorned populations in the pro-Namib. Only one of the latter populations was exposed to a large predator, namely spotted hyenas. Joel and Carol's results show that in areas where predators were absent (here information from Waterberg Plateau Park was included) none of the rhinos were missing ears or tails. In Etosha National Park and in the Namib Desert, where predators were present, approximately five percent of the population was maimed. In the area where hyenas were present alongside the dehorned rhinos, all the rhino calves died within one year of birth. Available data also show a striking difference in calf survival before and after dehorning at the same site. In the dehorned population without predators, calf survival was 100 percent. Further information indicates that, despite horn regrowth, dehorned cows are unable to protect their young calves adequately for at least three years after being dehorned.

As I have stated, Namibia should be lauded for being willing to conduct these trials. Regrettably, removing horns from rhinos does not seem to be the solution and this fact should be accepted. Unfortunately a Namibian biologist who at the time held a relatively junior position managed to convince the Namibian authorities that the *Nature* paper was an unwarranted slur on the government. Joel and Carol were refused permission to conclude their work on rhinos. At that point they had already invested three years and much money in their project, which had been approved for four years. In this incident Namibians are the losers because they lost access to high-quality scientific results collected at no cost to the taxpayers of the country. Conservation has to base its management policies on sound science and should be able to understand the relationship between research results and policy. Clearly, Namibia does not want to change its policy and that decision is respected. However, its action against the scientists mentioned was unnecessary.

There are two other matters that have to be considered in this debate. I have already referred to the expense involved when rhinos are dehorned. Most of the conservation agencies in countries hosting rhinos work on shoestring budgets. Therefore the costs of dehorning

rhinos have to be met elsewhere. The first concern is: how long will donors be willing to foot the bill for an exercise that does not even guarantee success? Basically, dehorning is pouring money down a bottomless pit. Secondly, one has to face the matter of whether the funds, ostensibly raised to protect rhinos, are being put to the best possible use from a cost benefit point of view.

The most expensive part of dehorning rhinos, as is the case with the translocation of rhinos, is to find and immobilise them. I believe that, considering the stress and other possible complications of immobilising rhinos, one has the moral obligation to load the immobilised rhino into a crate and translocate it to an area where it could be better protected against the onslaught of poachers. If the translocation of rhino even as a temporary measure is unacceptable or impractical for some reason, there is still another alternative. The funds could be used to enhance anti-poaching activities, increase staff, and buy more and better vehicles and equipment. Although this method was not very successful in Zimbabwe it has been proved to work in South Africa and Namibia.

What are the alternatives in the quest to save rhinoceroses? Let us review some of the options.

CHAPTER 15

Rhino quo vadis ... ?

Before trying to be clairvoyant and predict the future of the rhinos let us first look at the recent developments and achievements in the conservation of these animals. Throughout this book I have emphasised the negative or dark side of efforts to save rhinos. There is, however, also a bright side, albeit only a glimmer now. The fact is that we still have rhinos to be concerned about.

To my mind the most positive result of the crash in numbers of rhinos since the late 1960s has been the way in which the conservation agencies, especially in southern Africa, have rallied and joined forces to combat the problem. Hand in hand with this is the gratifying way in which the private sector in the various countries participated in conservation programmes and sometimes even replaced international donors.

The endeavours to protect rhinos from total annihilation had their origin both inside and outside countries hosting rhino. The conservation efforts from within countries entailed total protection, including increased anti-poaching activities, translocation to safer areas, stricter legislation and its enforcement, and as a last resort in southern Africa, dehorning. Under the scrutiny of international attention and with financial aid, which was mostly late in coming, countries in Asia and east and central Africa intensified their conservation efforts. All these attempts met with mixed success. Usually it was a case of too little being done too late. I would be amiss if I did not mention that corruption also played a major part in the declines. In some countries conservation staff appear to have been the people doing the poaching. This is true for both the Asian and African rhinos.

It is difficult to evaluate the success or failure of individual measures to protect populations of rhinos, as often several measures overlapped or were carried out together. Furthermore, these measures were not implemented everywhere with the same efficiency. Despite this it may be worthwhile to take stock. Let us start by looking at the most basic of conservation measures, total protection. Providing total protection to allow a species with low population numbers to recuperate is not a novel concept. That it can and will work has been amply shown by the recovery of white rhinos from the brink of extinction in South Africa during the early part of the 20th century. The crux here is the phrase 'total protection'. To achieve total protection one of the first steps normally taken by conservation authorities is to upgrade their anti-poaching activities.

However, total protection failed in many countries where it was attempted. The conservation community was staggered at the speed with which the rhino numbers dropped and by the persistence and intensity of the onslaught against rhinos. Alarmists lamented that conservation agencies lacked the ability to provide total protection. To confirm this notion,

Zimbabwe's experience, where poaching and anti-poaching forces were locked in a frontal assault, is often used as an example of a conservation agency's inability to cope against 'organised' poaching. However, I have shown in Chapter 13 how this perceived failure has to be evaluated in the light of the situation prevailing in Zimbabwe. The influence of these factors is not always appreciated. It is remarkable what the people of Zimbabwe's Department of National Parks and Wild Life Management achieved under difficult conditions.

Bearing these facts in mind, and recalling the success of anti-poaching operations over many decades, especially in Natal and more recently in Kenya and Namibia, I would hesitate to say that anti-poaching cannot thwart an all-out poaching onslaught. Where genuine anti-poaching efforts have failed it was because too few people patrolled too large an area. One should either increase the number of people or reduce the size of the area patrolled, in other words, one should concentrate one's efforts. Thus we have one positive conservation option.

A second achievement has been the refinement of rhino capture and translocations during the past two to three decades. This has offered conservation agencies the opportunity to translocate rhinos and introduce them to areas where they could be offered better or full protection. Where reintroductions have been tried they have generally been successful. Kenya pioneered this approach during the 1960s. By 1984 it had proved so successful that it became formal policy in Kenya, carrying the full support of the Kenya Wildlife Services. Today almost 80 percent of Kenya's black rhino population and all of its white rhinos are in intensively protected sanctuaries. Other more recent examples exist in Zimbabwe, South Africa and Namibia. Two matters are crucial during successful translocations: a good understanding of the social structure of black rhinos and the ability to maintain close vigilance over the new population. The success of the so-called 'sanctuary idea' provides another positive conservation option.

Let us look at another important achievement, which is the improved conservation legislation. Hand in hand with anti-poaching operations goes the need for an efficient legal system. During the 1960s and 1970s most countries in southern Africa had outdated wildlife laws. Subsequently many new laws were promulgated, with fines high enough to act as a deterrent. These are now in place in most of the countries in southern Africa that host rhinos. However, it is not enough to have legislation. People must be brought to trial and if they are found guilty the courts must be willing to impose severe penalties. Namibia went through a phase when apparently the judiciary thought that the prescribed penalties were too severe and thus transgressors were only lightly punished. This situation changed when an economic value was placed on rhinos, which 'increased' the size of the crime committed. The present system is working well and is another successful conservation measure. A very important aspect here is of course the highly effective special investigative units established in both the South African and Namibian police forces.

With these various options available it appears as though methods to protect rhinos do exist. However, one serious problem remains in the equation to find a solution to poaching. Finances to carry out these management options continue to be a stumbling block for most

wildlife departments worldwide. The lack of funds was a root cause of the failure of the Rhino War in Zimbabwe. Studies in Africa and experience in Asia, which mostly went unheeded, dictate that the breakdown in conservation efforts aimed at providing total protection is linked to the inability to adequately finance conservation programmes.

Traditionally, protected areas, and therefore the protection of rhinos, are financed by public funding through government spending. The limitations of such an approach are becoming increasingly evident. Conservation agencies find that this funding source cannot be relied upon. Conservation allotments from national budgets have to compete with the ever-increasing socio-economic needs of people. Furthermore, the political fortunes of the ruling political party can also influence conservation measures, depending on how the party wants to weather the political climate.

There are other sources of potential funds that need to be exploited, such as private sponsorship of rhinos, through trust funds if need be, and greater application of user-pays principles. Countries in southern Africa were in the process of investigating some of these possibilities when they were rather effectively ostracised by the international conservation community. I am referring specifically to the ban on the trade in rhino horn. However, the ban on the trade in ivory also had an indirect negative influence on the conservation of rhinos because it caused a reduction in the funds available for conservation measures in general. Let us look at the philosophy behind these actions by the international conservation community.

The ban on the trade in rhino products was born from the notion by developed countries that the demand will diminish if they can stop the supply. The ban blatantly ignored the needs and cultures of consumer countries. A change in the attitude of developed countries is needed. They must move away from the rather naive idea that rhinos are killed to provide orientals with their daily aphrodisiac, or to supply some rich Arabs with stylish handles for their daggers. The cultural desire for rhino products for both their reputed medicinal properties and their ornamental value in the East and Middle East are deeply imbedded in cultures older than most western societies. These needs and their local importance have been largely unappreciated by the west. Any future conservation and management policy for rhinos should take these needs into account and make provision to accommodate them.

A second notion, which went hand in hand with this, was that developed countries thought they could save rhinos by using their 'influence'. Certain conservation authorities and powerful NGOs in the developed world justified their actions by claiming that, by default, they had inherited the right to look after the welfare of rhinos. In the process they frequently ignored the wishes of the citizens of the countries involved. They tried to influence or manipulate conservation policies in developing countries in order to enforce their own perception of what conservation measures were needed. This was done through international legislation and treaties, a fine example being the banning of the trade in rhino horn.

Let us examine the ban on international trade in rhino horn. It was a decision taken by a concerned international conservation community through the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1977. At that time the decision could arguably have been justified. During the 18 years since the ban was put into effect we have witnessed rhino population figures around the world plummet by nearly 90 percent. There can be no doubt in anyone's mind that the effort to safeguard rhinos through the trade ban has been a disappointing and dismal failure. A total ban is clearly not the way to go. Consequently the countries from southern Africa submitted carefully prepared proposals to the 1992 meeting of the Conference of the Parties to CITES in Kyoto, Japan. These basically came down to a request to legalise trade and be allowed to sell rhino horn from government stockpiles and dehorned rhinos. South Africa argued:

> *It is well-established that legislation of trade results in improved intelligence as the legal entrepreneur informs on black market activities, and that a dependable supply of products depresses black market prices.*

Apart from the direct financial advantage there is also the other crucial matter, namely that with a commercial value placed on rhinos and their products, private landowners would be encouraged to invest in rhinoceros populations and to protect them as usable economic assets. This has been amply shown by the experience in South Africa where the sale of live white rhinos was allowed. The meeting at Kyoto preferred to ignore this fact.

Furthermore, there can be no doubt that the revenue that could have been generated if this proposal had been accepted would have helped to meet national expenditures on rhino protection. If the international conservation community had allowed Zimbabwe to sell its stockpile of rhino horn and ivory to generate funds, which it so desperately needed to fund the Rhino War, the outcome may have been different. Just think of what they could have achieved if there had been the necessary financial incentives for the staff, if sufficient new positions were created and filled, if the people in the field were properly equipped, and if these efforts had the same sort of air support that the dehorning programme had enjoyed. All this would have been possible if they had had the finances available. Or alternatively if the 'concerned' international community had put its money where its mouth was and given Zimbabwe the necessary financial assistance.

It was a self-imposed restriction of South Africa's submission that funds raised through the trade in rhino products would be used to augment wildlife budgets aimed at protecting rhino populations. Swayed by emotion and without a grasp of the reality of the costs of conservation efforts, nor of the financial predicament of conservation agencies, most of the members of CITES rejected the proposals. The proposals were not even given the courtesy of a debate. To add insult to injury no effort was made by CITES members to suggest what future actions by the southern African countries they deemed necessary in order for them to change their decision, nor from where the funds would come to enhance the rhino populations. It was as though the countries in southern Africa were being penalised for still possessing rhinos.

The ninth biennial meeting of CITES was held in November 1994 in Fort Lauderdale, USA. At this meeting two important decisions were taken, which could suggest that there may be a turn in the tide of public opinion. The Parties adopted a resolution that was initially formulated by the IUCN Species Survival Commission's Rhino Specialist Group. This resolution asks for an evaluation of the effectiveness of actions to reduce illegal trade in rhino products, the development of standardised indicators of success to measure any changes in illegal hunting, and finally, the widening of options available for rhino conservation. Another pleasant surprise was the approval of a proposal submitted by South Africa to transfer its population of white rhinos from Appendix I to Appendix II in order to allow trade in live animals and hunting trophies only. This decision will be reviewed at the tenth Meeting of Parties. Meanwhile South Africa has undertaken to monitor and amend the list of traders to whom export permits will be granted in order to ensure that exports go to 'appropriate and acceptable destinations'.

Experience in Africa and elsewhere has shown that consumptive use of wildlife is a valid option, not only economically but also for species conservation. If the international conservation community would accept this philosophy, which is both ecologically sound and economically viable, it would enhance the opportunities for raising funds for conservation and ultimately for rhino protection. Trophy hunting has been established as one of the most profitable ways of using wildlife. I have mentioned the prices obtained for white rhino trophies. However, the numbers of rhinos available for trophies are low, even for white rhino.

South Africa has come up with another innovative idea: a non-consumptive form of trophy hunting where the quarry (a rhino) is shot with a dart filled with an immobilising drug. The hunter pays up to R25 000 (US $7 000) for the privilege of darting the rhino and in this way helps to finance the translocation of the animal. There is an assortment of variations on this scheme. One is that the darted animal is dehorned, if a dehorning programme is under way. Another is that a tracking device is inserted in the horn as part of a research programme. The sale of live rhinos remains another option, although it is doubtful whether the high prices initially obtained for rhinos will be maintained. However, such sales remain a revenue-generating option.

Let us concentrate on the situation in southern Africa, although what is true for these rhinos is also applicable to rhino populations elsewhere. I do not think the solution to the problem is a magical formula or some new procedure. Rather, the solution is a simple one. It boils down to an innovative application of some or all of the methods already tried over the years. Together with this of course is the need for donor organisations to be less prescriptive about how funds should be applied, and the international conservation community to give the countries that still have rhino populations the right to manage and use this resource at their discretion.

It is time the international conservation community recognised the fact that the southern African countries house more than 90 percent of the white rhinos and almost 50 percent of

the black rhinos remaining in the world today. Surely this is proof of their commitment to the protection of these animals? Furthermore, basic courtesy dictates that the international conservation community should give southern Africa more credit for their commitment to the protection of rhino.

I am optimistic about the future of rhino, especially in Africa. I do not know enough about the situation in Asia to hazard a guess. However, those to whom the grass roots responsibility has been given to protect rhino are, in my experience, as tenacious as the animals they protect.

Some of the main organisations that accept funds for rhino conservation:

Namibia Nature Foundation
P O Box 245
Windhoek
Namibia
Tel: +264 61 248 345
Fax: +264 61 248 344

Save the Rhino Trust
P O Box 22691
Windhoek
Namibia
Tel & Fax: +264 61 232 154

Rhino and Elephant Foundation
P O Box 381
Bedfordview
2008
South Africa
Tel: +27 11 453 9829
Fax: +27 11 453 7649

WWF-International
Avenue du Mont-Blanc
1196 Gland
Switzerland
Tel: +41 22 364 9111
Fax: +41 22 364 4238

Save the Rhino International
105 Park Street
London
W1Y 3FB
Tel: +44 171 409 7982
Fax: +44 171 409 7981

Save Foundation of Australia (Inc)
229 Oxford Street
Leederville
Western Australia
6007
Tel: (09) 444 1545/444 6550
Fax: (09) 444 9270

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