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# Boma Management, Construction and Techniques for a Founder Population of Black Rhinos (*Diceros bicornis minor*) as Applied in Lapalala Wilderness, South Africa

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## Introduction

The construction of six bomas to hold five black rhinoceros transferred from the capture pens in Umfolozi Game Reserve, Zululand, to Lapalala Wilderness, Waterberg Mountains, Transvaal, is described. Data are provided on site, location, equipment, construction techniques, feeding and release procedures. In addition, various problem areas are highlighted and emphasis is laid on the lack of available literature to assist the private landowner in the introduction of a species such as the black rhinoceros.

On 18 June 1990, a founder population of five black rhinoceros were auctioned by the Natal Parks Board. The two bulls and three cows were bought by Lapalala Wilderness for the sum of R2.2 million. This was the highest price per head ever paid for the species.

Lapalala Wilderness is one of eight private game reserves that applied to the Natal Parks Board for classification as suitable habitat for the introduction of black rhinoceros. Lapalala Wilderness is a 24,400 ha sanctuary with an area of approximately 10,000 ha selected as a black rhino sanctuary. The latter area is encircled by an 18 strand game-proof fence some 45 km long. The sanctuary has four permanent game scouts, i.e. one scout per 25 km<sup>2</sup>.

The topography consists of densely bushed slopes, hills, plateaus and valleys, with the Block-land River, which is a tributary of the Lephalala River, running from south to north. In addition to this permanent supply of water, there are two mountain streams, four boreholes that connect to five water troughs, and one dam capable of holding water throughout the year.

The entire area is surrounded by some 75,000 ha of wild country devoted entirely to conservation. For

obvious reasons, Lapalala Wilderness did not construct pens suitable for holding rhinos before the auction. The day after the sale, talks were held between Natal Parks Board officials and Mr Peter Hitchins, an advisor to Lapalala Wilderness on boma management and construction techniques. Natal Parks Board had anticipated the problem and were prepared to hold the five rhinoceros for six weeks in order to give Lapalala Wilderness time to complete construction.

It soon became apparent that there were wide and diverse opinions between one conservation agency and another, and between individual rhino specialists, on boma construction, feeding and release techniques for black rhino. The only literature available was a paper written by J P Raath and A J Hall-Martin (Koedoe, 32 (2) pp 69-76. Pretoria ISSN 0075 6458). One must bear in mind that this was the first disposal of black rhinoceros to the private sector, but certainly will not be the last in South Africa.

Numerous people, however, were consulted. They are acknowledged at the end of this paper and we are extremely grateful for their advice and assistance.

The first steps taken prior to the commencement of construction, were to consider the following:

- a) Suitability of the site for construction
- b) Availability of water
- c) Ease of access
- d) Availability of electric power
- e) Proximity to game-scouts' quarters and reserve management headquarters.
- f) Good terrain for release.

A rock-free plateau area on the eastern side of the reserve in relatively open country that has a gentle

west slope to the Blockland River was chosen for pens. As matters turned out, the rhino were successfully held in the bomas for some 18 weeks, which was not foreseen, but proved that the location was a good choice, apart from being too close (300m) to a provincial dirt road.

C B Ravenhill, Reserve Manager of Lapalala Wilderness, was appointed supervisor of construction and K Matshaba, a local builder, together with four of his staff, were engaged to carry out construction, assisted by various additional Lapalala Wilderness personnel. A total of 10 people were engaged in construction, which took four weeks to complete.

## Bomas

The holding pens, or bomas, at Lapalala Wilderness are constructed from chemically treated poles (tannerlith). They consist of six pens, each measuring 6 m by 7 m, back to back in two rows of three to form a rectangle 18 m by 14 m. An off-loading ramp is at the western end, extending 8 metres out and with two individual entrance gates. At the eastern end there is a pair of emergency exit gates. The south-western pen, the one nearest the off-loading ramp, has another exit gate. All gates are 1.5 m wide and their design is the same as that used at Umfolozi Game Reserve, consisting of upright double poles cemented into the ground, with loose poles across the opening. To facilitate movement of each rhino during daily cleaning and eventual release, there are interconnecting gates between each enclosure. Eleven gates in all were constructed.

All the main corner poles and main support poles of the gates are cemented into the ground up to a depth of 500 mm. In addition, two vertical poles are cemented into the ground every two metres. Horizontal cross poles are bolted top and bottom to the verticals; dropper poles are bolted to these in an upright position, with a gap of 15 cm between each dropper. All poles measure 150 mm in diameter except the four outer corner poles, which are 400 mm thick. The height of the boma sides measures 2 m. The spacing between each pole was not strictly adhered to and resulted in certain problems, which will be elaborated on later.

The following is a detailed list of all materials used in the construction and costs incurred:

## Poles for boma and off-ramp construction

	Size	Number of poles
Front end of off-loading ramp:	150mm x 2.5 m	22
Main dropper poles for bomas:	150 mm x 4.5 m	64
Main support poles:	150 mm x 2 m	280
Cross poles supporting droppers:	150mm x 2.5 m	142
Main corner poles:	150mm x 4 m	54
Gates: (11 in total)	200 mm x 2.5 m	4
	100mm x 2.5 m	150
<b>Total number of poles:</b>		<b>716</b>

## The following costs exclude the salaries of the permanent Lapalala staff:

	Rand
Builder's quote	2,500.00
Poles	11,852.15
Delivery charges	1,650.00
Bolts, nuts & washers	1,720.87
Rope/wire	467.62
Drill/bits	785.76
100 pockets of cement	1,186.50
Hosepipe	52.88
54 metres of shade cloth	1,050.00
580 metres of bolt rods 12 mm @ R 2.00 per metre	1,160.00
<b>Total cost for construction:</b>	<b>22,425.78</b>

## Water troughs

These measure 70 cm x 70 cm x 45 cm deep and were constructed below ground level. A concrete lip of 15 cm was added. The water troughs are located in each outer corner in the case of three of the corner bomas and in the case of the fourth boma, which was to be the release boma, the water trough is located in the centre on the west side between the entrance and exit gates. In the case of the two centre bomas, the water troughs are located in the centre of the outer wall. Water is laid on by means of hosepipes from two central points on either side of the off-ramp and the supply is obtained from a large reservoir 100 m away. A 50 mm (2 inch) pipe with release valve is built into the bottom of each trough, thus enabling a rapid release of water into a large drain located outside the boma.

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## Shade

This was achieved by attaching 80% shade cloth down the length of the centre of the entire boma extending four metres from the centre line into each of the six bomas. Additional strips measuring four metres wide were later added at right angles and attached to the outer walls. Shade cloth was found to be perfectly adequate, providing there is no intention of holding the rhino for longer than four to six weeks. However, it did not prove satisfactory in our case, due to the rhinos being confined for a lengthy period and, with the onset of increasingly high temperatures, might very well have led to the complications experienced with three of the rhinos, as will be described later.

## Feeding - daily cleaning

The four game scouts selected to patrol the rhino sanctuary were allocated the daily cleaning of the bomas and were assisted over weekends by general reserve staff, under the supervision of the Reserve Manager. Water troughs were drained every morning at 5.00 a.m. and cleaning commenced at 7.30 a.m. It took approximately two hours to complete all five pens; the sixth pen, which had been cleaned the previous day, was used for the first changeover. When a pen was clean, fresh lucerne and game cubes were added and the interconnecting gate poles pulled out. When they first arrived, it took some coaxing to persuade the rhinos to move, but later they waited impatiently and banged the poles in their desire to go through to reach the lucerne and cubes. The poles were rapidly replaced and secured and the process repeated until all five rhino pens had been cleaned.

During the cleaning every vestige of vegetation was removed as well as all traces of dung. The holes frequently dug by the rhinos were filled in and a regular supply of river sand added. Water was allowed to run into slight depressions to let the rhinos take mud baths, a ritual they all practised regularly. Care, however, is needed not to overdo this. As in fact did happen on occasion, resulting in the site being turned into a mud-house, with stagnant water and decaying faeces that in turn created a fly problem and unpleasant odours. Due to the relatively narrow confinement (6 m by 7 m), and the rhinos' habit of prancing and dashing about, wet and muddy conditions coupled with fairly deep holes could have resulted in injury. Nevertheless, I regard a mud-hole

as most important in boma management, for an animal would seek this out in the wild. As the months grew hotter, the rhinos became more desirous of the cool and soothing effects of the mud.

Care was taken to clear all the surrounding areas outside the boma and special attention was paid to the cleaning of water troughs. Dung that collected under the boma poles and in the bolted ends of poles from being shovelled over the walls was checked daily. A fly trap proved most useful in keeping flies under control.

## Feed

Four men attended to the day's food supply every morning and this took upwards of three hours depending on availability and distance traveled. August, the month the rhinos arrived, is not the best in terms of available browse and resulted in an increase in the amount of lucerne provided. Each rhino consumed one-and-a-half bales of lucerne a day and four kilograms of game cubes. Considerable effort went into browse collection; it was freshly cut twice a day. The afternoon browse collection was made by the crew who did the daily cleaning, allowing the morning browse crew to continue with general reserve work. The rhino were eventually in the pens for more than 18 weeks and had been held in Zululand for approximately 13 weeks. All five were fairly aggressive upon arrival, but settled down very quickly. No difficulties were experienced with feeding. Browse was mixed and varied and was increased in quantity as summer approached, with the lucerne being reduced to two bales per day between the five rhinos. The browse was thrown directly into the boma and whilst wire support lines had been erected, particularly for acacia, these were abandoned, for the animals readily took their feed from the ground. Constant lifting up of the browse by the rhinos took place as did the placing of browse on the horns and heads and scattering around the boma. Browse was frequently dumped in the water troughs. At no stage did any of the rhinos lose condition; they steadily gained weight during the day and night, with no noticeable difference in the volume that was consumed.

The afternoon feed usually took place after 4.00 p.m. and the morning feed commenced as soon as each rhino was moved from one pen to the next. Firstly

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they were fed on lucerne and cubes, and later browse when the vehicle carrying the latest collection arrived.

## Release

Release of the rhinos finally commenced on 3 December 1990, after 18 weeks in the bomas. After consulting a number of colleagues, I had decided to hold the rhino back, regardless of cost. The delay was necessitated by the poor veld conditions resulting from extremely late rains. By this time, the rhino had been almost totally weaned off any artificial food, such as lucerne and game cubes.

The release order was:

1. Bull
2. Cow
3. Cow
4. Bull
5. Cow

This was accomplished over a period of ten days, one rhino every 48 hours approximately. Two animals were released after dark and three at dawn. No plastic funnel was used, although recommended. This decision was taken in the light of the length of time the animals had spent in the bomas and the calming effect it had upon them. Release in the early evenings presented no problems, with only four people in attendance. The release animal was positioned in the boma next to the southwest release boma with the outer exit gate's poles having been removed earlier in the day. Feed had been reduced and no lucerne given at 4.00 pm. Whilst absolutely calm, the animal was given a small portion of lucerne, whilst the fourth person directed the extraction of the poles. A vehicle was parked some 50 m down the exit road and after the last pole was out, all four people quietly retreated and drove away. The animals came out undisturbed, after our departure. The dawn releases were the same, only this time all staff remained inside the off-ramp. Once the animals had finished eating the lucerne, they did not take long to realise the poles were out and came out very quickly. No problems were experienced.

One bull ran off twice and came back, before finally running off some 70 m, dropping to a trot and then walking away. In each case, the rhino fed on various types of vegetation and showed a high degree of curiosity. Only one rhino returned to the bomas and

that was No 2, a cow, seeking water. Unfortunately, in spite of Dr. Anthony Hall-Martin advising that both food and water should be available, this was overlooked and the rhino in her search for water damaged two of the outer drains. Dung had been collected prior to release and laid out leading to the river and also placed in numerous areas, as suggested by three specialists. No problems whatsoever were encountered after the final release and the two bulls are in fairly separate locations. Two of the cows have since been seen together and one cow is very settled in the presence of people in vehicles. The other four have reverted to type and are extremely shy.

## General

The original assessment of the 10,000 ha rhino sanctuary was not, in my opinion, sufficiently detailed to determine the outcome. I firmly believe that a more specialised study should be done in future on any private property that is to receive rhino. I am also concerned about the 'long-term' in relation to carrying capacity. I would question the timing of any introduction in the dry months, without a detailed feeding analysis coupled with a close examination of the habitat. The introduction of black rhino to a new area is not a task to be lightly undertaken.

Unlike Government Conservation Agencies who employ veterinarians and technicians, the private sector does not normally demand such expertise. For this exercise every precaution was taken and a full medical kit was on hand, together with immobilising equipment drugs and a dart gun. A list of veterinarians who had offered their assistance was drawn up, together with their telephone numbers, and a light aircraft was always available in the event of an emergency arising. For the releases, a helicopter was put on standby and a rhino crate was provided by the Natal Parks Board, who also very kindly agreed to come to our assistance if any of the rhino broke out after release. In addition, we had the benefit of our next door neighbour, Mr. Rodney Henwood, who was once Natal Parks Board Capture Officer and who was prepared to assist with any eventuality that might arise. Constant contact was maintained with various rhino specialists and veterinarians were called in twice for general checks.

A type of lesion developed on the backs of three of the rhinos and samples were obtained and sent to

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Onderstepoort. This condition has never previously been recorded in captive rhinos and the results of the analysis are still awaited. One month after the release of the most seriously affected animal, she was seen to be perfectly clear of all back lesions. This particular rhino arrived from Zululand with the most developed shoulder and chest lesions, which have since decreased.

## Problems encountered

### *Arrival*

As a result of not taking the precaution of spraying water on the floors of each boma, considerable dust occurred as the rhinos left the truck and moved down and through the pens at a fairly swift pace.

### *Gates*

It is strongly recommended that interconnecting gates should be constructed of steel and attached to sliding coasters. Whilst our staff became extremely adept at removing the poles, this obviously has certain drawbacks. Rhinos ran through the entrance before the last pole was completely removed and on more than one occasion slammed into the protruding end, which could have resulted in injury.

### *Water troughs*

The depth of 45 cm was too great and I would recommend no more than 24 cm, with a 10 cm lip. Problems were encountered with rhino attempting to stand in the water troughs and rocks had to be placed in them to reduce the effective depth. Definitely, the water trough should be constructed above ground level to avoid contamination with dung and soil.

### *Cleaning*

Particular attention must be paid to this aspect, as it was found on more than one occasion that shortcuts were being taken, and decaying dung left in the bomas was resulting in a fly problem. Careful checks need to be made where dung is thrown over the walls during the cleaning process; it must not be allowed to collect in the bolted ends of the poles. The utmost attention should be paid to this aspect on a daily basis, and extra checks should be devised to cover everyone concerned.

### *Browse*

It is essential to ensure that mixed browse is provided for each animal. On a number of occasions, it was found that one particular species of browse was being given, due to the ease of collecting from one tree rather than moving around over a wider area.

### *Dropper poles*

Most of the dropper poles were simply bolted to the two cross members and flush with the ground, whereas all the main support poles were cemented in. Possibly due to the long confinement, all five rhinos were in the habit of digging on a daily basis, resulting in large holes that were often directly under these poles. It might, therefore, be advisable to have longer droppers and bury them to a depth of 300 mm.

The spacing of 15 cm between droppers was not always maintained. Over-large gaps allowed rhinos to have greater contact with one another, which resulted on one occasion in one of the females losing the top half of her ear where the identification cut had been made. This was as a result of the rhino in the next pen exerting pressure on his horn, which was pressed down on the female rhino's ear.

Visitors to the rhino bomas were cautioned constantly not to get too close to the rhinos at these particular points, as the animals were very quick to respond by thrusting their horns through the openings and upwards. In addition to this, some openings let warthogs enter the pens, which they did on a daily basis, helping themselves to horse-cubes. The rhinos generally tolerated them with the exception of one warthog who was caught by a rhino and had his right tusk broken off as he endeavoured to exit from inside the pen.

A long and protracted dry season resulted in two white rhino bulls discovering the whereabouts of the black rhino enclosure. Their subsequent daily attendance in search of lucerne spilling out of the sides of the bomas presented problems with the outer drains, which had to be protected from the weight of these animals wandering around the bomas during both day and night. The continuing availability of food resulted in these two bulls becoming extremely tame and presented a potential hazard for the staff attending to the rhinos' daily needs.

Notwithstanding these minor problems, it must be understood that, whilst the staff had experience with white rhino, no-one had ever worked with black rhino before, and in the absence of any available literature, one relied upon contacts with people within the official conservation agencies for guidance. And without the support of all these people the eighteen-week-long introduction programme would not have achieved the successful outcome that it did.

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