



# Niassa Carnivore Project



## The beehive fence project: progress report

December 2012 to April 2014

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## **Executive Summary**

Human-elephant conflict destroys support for conservation in Niassa Reserve (16,000 ml<sup>2</sup>) and negatively affects people's life and livelihoods. At least 130 farms are affected by elephant crop raids; one person killed by elephant and one elephant shot as result each year. The people most affected are local subsistence farmers. As a result there is little political or community will to conserve elephants in the area and this makes it extremely difficult to reduce escalating elephant poaching for ivory. That is why reducing HEC is a priority.

The beehive fence choice was based on the encouraging results showed in Kenya by Dr Lucy King of Save the Elephants. This method has considerable application for Niassa Reserve because of the high levels of human-elephant conflict, high density of bees and a history of beekeeping and honey gathering in the area.

Four experimental beehive fences were constructed in Mbamba and two in Macalange villages. Six farms were protected in 1,122m of extension. Together there are 72 beehives and 69 dummy hives hanged and 24 beehives are currently occupied by bees. About 37 local people were involved in volunteer base to construct the fence, 29 were men and 6 were women.

The first beehive fence, located in Minache area, was made with direct assistance from Dr. Lucy King in 7th to 9th December 2012 to protect the Farmer Field School (FFS), a conservation agriculture initiative. The other five beehive fences protect the main elephant entrance points into the fields and are on the most affected farms. It was constructed by NCP jointly with the local beekeepers group.

There were 33 successful crop raids elephants in three control farms and eight successful elephant crop raiding in experimental farms, rom December 2012 to April 2014. All farms have similar main crops (maize and sorghum) but are not similar in size. Two problems encountered are breaking of baobab rope and imprecision in construction of top bars. Both will be resolved in future beehive fence construction.

About 7.5 liters of honey was harvested providing US\$150 of revenue from selling the elephant friendly honey, equivalent to the selling of 90 litres of honey harvested in the bush. The money was divided among the beekeeper group.

## **1. Introduction of the Project**

The Niassa Beehive Fence Project is being tested and implemented in Mbamba and Macalange villages inside Niassa National Reserve, northern Mozambique under the Niassa Carnivore Project (NCP). Since 2003 NCP has been working in Niassa National Reserve in close collaboration with management of Niassa Reserve, local communities and tourism operators to secure and conserve large carnivore and to promote coexistence between carnivores and people. This project is part of NCPs programs to provide conservation benefits to local communities and improve food security and local livelihoods and reduce human-wildlife conflict.

The project is managed by Mbumba Marufo (Community manager) of NCP. Through this Beehive fence Project it is expected that he will be able to pursue his Master degree in Environmental Science at North West University in South Africa. Mr Mbumba is already registered at the University and his proposal has been accepted.

### **1.1. Project aims and objectives**

The aim of the Niassa Beehive Fence Project is to pilot test and examine the potential use of the beehive fence in Niassa Reserve and where possible provide adjustments to meet local conditions. We hope to be able to bring to the Niassa Management team a long term and effective method of reducing elephant crop raiding that will be community based and sustainable with full community participation.

Goal: To test the potential for the elephant - beehive fence system to reduce crop raiding by elephants in community farmlands inside the Niassa National Reserve in Mozambique.

Objective 1: To evaluate whether the elephant beehive fence reduces the incidence of crop raiding elephants in Niassa Reserve.

Objective 2: To identify and test local adaptations that needs to be done to the beehive fence in order to ensure good performance and sustainability in the Niassa reality;

Objective 3: To evaluate the costs and potential benefits of the beehive fence to community participants in Niassa Reserve including honey production.

### 1.3. Project area

Niassa National Reserve (NNR) is situated in the north of Mozambique on the border with Tanzania. It is the largest and most important conservation area in Mozambique. It is 42,000 km<sup>2</sup> (16,000 ml<sup>2</sup>) in size, and has a relatively high concentration of wildlife. It has an elephant population of 12000 individuals and 35,000 people living within its border.

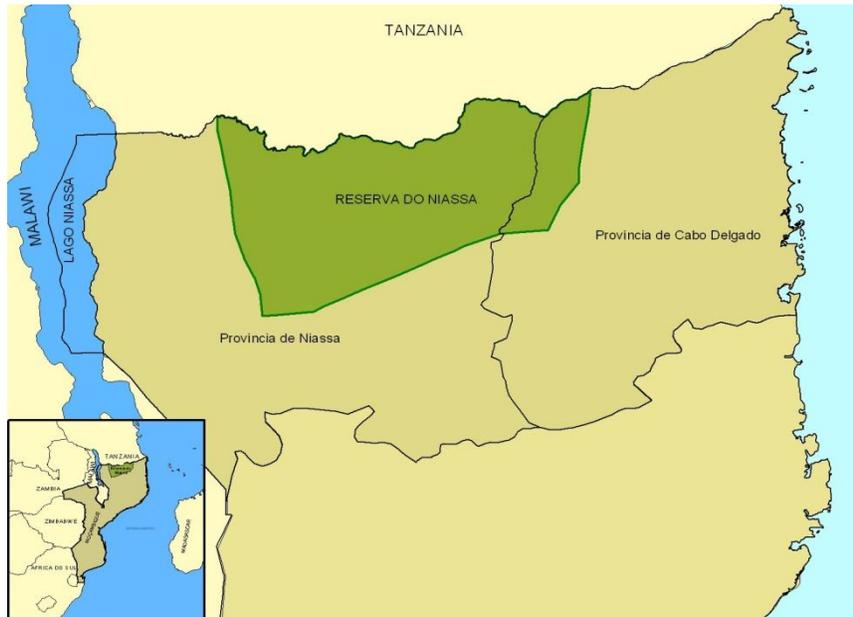


Fig. 1 Map of Niassa Reserve (Source: SGDRN-Niassa National Reserve Management Plan 2007-2008)

The main project area is Mbamba village that is located inside Niassa Reserve in the concession Block L5-South which is managed by the Niassa Carnivore project (NCP). There are an estimated 2000-4000 people living in this village. This is one of the highest-risk areas for elephant crop-raiding as it is situated close to the Lugenda River in a high density wildlife area.

In the past it had an electric fence installed to reduce human-elephant conflict but it failed because of the lack of maintenance, theft of the wire for bushmeat snares and lack of community ownership. There is a long term relationship and partnership between the concession operators of L5-South (who also run the Niassa Carnivore Project) and Mbamba village (10 years).

Macalange is situated outside of the concession Block L5-south, and shares boundary with Mbamba village. In the past used to have many elephants but it was hardly reduced due the heavy poaching. It is important to protect their machambas against elephant crop raiding in order to gain their support towards elephant conservation.

## 2. Activities done and results-December 2012 to April 2014

Six beehive fences were made in Mbamba village during the 2012/2013 and 2013/2014 crop seasons. Four fences are located in Mbamba village and another two fences are in Macalange village. Together these fences make 1,122m perimeter, have 72 beehives among which 24 are currently occupied by bees, and 69 dummies hives.



Fig. 2 Minache and Uacondoa beehive fences

### 2.1. The Minache's beehive fence

The Minache beehive fence, in Mbamba, was constructed with assistance from Lucy King, from Save the Elephant (STE), in 7<sup>th</sup> to 9<sup>th</sup> December 2012 to protect the experimental conservation agriculture plots (FFS).



Fig. 3 and 4\_Lucy king and farmer during the construction of Minache beehive fences

Minache beehive fence information:

- It fences the entire farm;
- 200m of perimeter;
- 12 beehives;
- 12 dummy hives;
- About 30 local people participated actively on volunteer base
  - Six were women and 24 were men.
- Until April 2014 seven beehives are occupied by bees (58% of occupancy);
- From December 2012 to April 2014, 10 abscondement cases were recorded;
- Seven beehives were reoccupied after abscondement.

## 2.2. The Uacondoa's beehive fence

The Uacondoa beehive fence protects the farmer most affected by elephant crop raiding in Uacondoa area. It was constructed between the 22<sup>nd</sup> to 23<sup>rd</sup> March 2013.

Uacondoa beehive fence information:

- It fences the three main elephant entrances,
- Has 240m of perimeter,
- 13 beehives
- 12 dummy hives
- On average eight local beekeepers participated actively on a volunteer base in each section including one woman and 10 men.
- Four beehives were occupied by bees (31% of occupancy) in the first two months;
- 14 abscondement cases were recorded.



Fig. 5. Uacondoa's beehive fence construction

### 2.3. The Namango's beehive fence

The Namango's beehive fence protects two of the most affected farmer by elephant crop raiding in the area. It was constructed on the 6th March 2014.

Namango beehive fence information:

- It fences the four main elephant entrances;
- Has 198m of perimeter;
- 11 beehives;
- 8 dummy hives;
- Twenty one local farmers and beekeepers participated actively on a volunteer base in the section including, among them seven were woman;
- No beehives are currently occupied by bees;
- Five absconded cases were recorded from March to April.



Fig. 6-7. Namena's beehive fences construction

### 2.4. The Micangaula's beehive fence

The Micangaula's beehive fence protects one of the most affected farmers by elephant crop raiding in the area. It was constructed on 30th January 2014.

Namena's beehive fence information:

- It fences the interface between bush and the farm;
- Has 200m of perimeter,
- 12 beehives and 11 dummy hives
- Twenty local farmers and beekeepers participated actively on a volunteer base in the section including, among them seven were woman;
- Three beehives are naturally occupied by bees (25% of occupancy) in the first four months;

- None absconded case was recorded.



Fig. 8- Namena's beehive fences construction

### 2.3. Macalange's beehive fence (Mr Victor Manuel)

The Victor Manuel's beehive fence protects the most affected farmer by elephant crop raiding in the area. It was constructed in 29th January 2014.

Beehive fence information:

- It fences the four main elephant entrances;
- Has 253m of perimeter;
- 12 beehives;
- 14 dummy hives;
- 12 one local farmers and beekeepers participated actively on a volunteer base;
- Eight beehives are currently occupied by bees (67% of occupancy);
- No abscondement case was recorded.



Fig. 9- Mr Victor's beehive fences construction

#### **2.4. The Macalange's beehive fence (Mr Mário Bernardo)**

This beehive fence protects one of the most affected farmers by elephant crop raiding in the area. It was constructed on 05 March 2014.

Beehive fence information:

- It fences the interface between bush and the farm;
- Has 2031m of perimeter,
- 12 beehives and 12 dummy hives
- 12 one local farmers and beekeepers participated actively on a volunteer base;
- Three beehives are naturally occupied by bees (33% of occupancy) in the first four months;
- Two abscondement cases were recorded from March to April.



Fig. 10- Mr Mario's beehive fences construction

#### **2.3. Effectiveness of the beehive fences**

- The data presented, in the table-1, were collected from December 2012 to May 2013 crop season and December 2013 to April 2014 crop season. There is still sorghum in the farms which will be collected at the end of May 2014;
- 10 successful crops raiding, elephant breaks in the beehive fences, were recorded in experimental farms, four during 2012/2013 season and six in the current season (some illustration in the annex). In two breaks the elephants did not eat crops;
- The majority of this crop raiding, in the experimental farms, were recorded when the bee's rate of occupancy were very low;

- In control farms 33 successful crop raidings were recorded, 11 during 2012/2013 crop season and 22 in the current season. All the cases resulted in crop loss.
- For some unknown reasons, the elephants stop to raid in the Namango area the same day that the beehive fence were constructed to protect two machambas.
- The Macalange entire village did not record any incident of crop raiding during the current season;
- In Mbamba village all farms have similar main crops, maize and sorghum but in Macalange village the farms have only maize.

Table-1. Successful crop raiding 2012/2013<sup>a</sup> and 2013/2014 crop seasons

<b>Beehive fences</b>	<b>Experimental farms</b>	<b>Control farms</b>
Minache's fence (Mbamba village) <sup>a</sup>	2	12
Uacondoa's fence (Mbamba village) <sup>a</sup>	6	17
Namena's fence (Mbamba village)	2	4
Namango's (Mbamba village)	0	0
Mr Victor's fence (Macalange village)	0	0
Mr. Mário's fence (Macalange village)	0	0
<b>Total</b>	<b>8</b>	<b>33</b>

### **3. Honey production and marketing:**

- 7.5L of honey were harvested and bottled in 2013.
- 200 container of 0.5L were bought to bottle the honey;
- The honey was sold at the price of US\$10 each bottle.
- The beekeeper group earned US\$150 revenue selling from 7.5L of elephant friendly honey equivalent to the revenue from selling 90L of honey they harvest in the bush;
- The money was shared among the beekeeper group members;
- The bottled honey was sold to different clients among them, tourists that visited Mariri camp, Luwire (block L7) and to Mariri headquarter. There are more potential clients available.
- Labels were developed in English and Portuguese to assist with the marketing of the honey in future.



Fig. 11-12 – Honey collected and bottled



Fig. 13- Honey label English and Portuguese versions

#### 4. Difficulties and lesson learned:

##### 4.1. Delay in *Uacondoa* beehive fence construction

- During the 2012/2013 crop season the failure of holding the meetings with the Mbamba village, was the main reason why the beehive was not constructed in December 2012 because people were busy planting in their fields after the first rain 11<sup>th</sup> December 2012;
- 2013/2014 crop season the lack of plywood of 9mm in the shops of the closest main cities (Lichinga and Pemba) was the main reason for the delay. As result of the lack of appropriate material and long waiting period we bought 6mm plywood;

- The 6mm plywood presents some challenges as the following pictures show:
  - There is difficulty to nail and joint well the plywood pieces.



Fig. 14 and 15- Nails problems with 6mm plywood

- With the humidity during the rain season the plywood expands. As the result the top bars don't fit in to the beehive. Some bees abscondment was caused due this problem once the top bars have fallen into the button of the beehives with bees inside;



Fig. 16 and 17- Expansion of 6mm plywood after 2 months

#### 4.2. Baobab rope versus tyre rope

Tyre rope and baobab rope were tested to hang the beehives as an alternative to the use of wire because of its use for snaring.

- The baobab rope is not appropriate to hang the beehives because it breaks down rapidly once it is easily degraded by exposition to rain and sun;
- Ideally tyre rope should be used to hang the beehives and link the beehives;
- People are stealing the tyre rope that links the beehives. About 65m were stolen in two beehive fences. No tyre rope that hung the beehives was cut. In the future we should promote individually owned beehive fence to encourage ownership and improve the control and management of the beehive fences and to expand the fence to

protect more machambas. To do so, first we have to be able to demonstrate convincingly that the beehive fence works. Then the individual farmer that wants beehive fence will make small contribution for costs for material and we will assist then to construct the beehive fence at subsidized costs.

- We have to continue to use tyre rope to hung the beehives and baobab rope to link the beehives;
- Tyre rope is more expensive than baobab rope and lasts longer.

#### 4.3. *Yellow Jackets attacks and ants*

- We had problems with yellow jacket but and we believe that some bees abscondements, at early stage of colonization, were related to this problem but it was not major problem after the bees have established themselves;
- Ants are also becoming the major problem currently. We believe that some bees abscondement in Macalange and Mbamba are also related with this problem.

#### 4.4. *Constraints with hive construction*

- The precision in the making of top bars are no longer an issue once the NCP has bought a saw machine after the broken of the one bought in during the Lucy's visit;
- The top bars produced in 2013 were not precise 33mm or 32mm width. As results we had poor production of honey;
- Currently the majority of top bars have 33mm width and we have replaced some of non-good top bars;



Fig. 18- Deficient top bars

#### *4.5. Motivation for volunteer work*

- In the 2013/2014 crop season there was more voluntary participation during the construction and maintenance of the beehive fences;
- In Mbamba village there are 24 member (6 are women) of beekeeper/FFS group. An average of 18 people have always participating during the sections;
- In Macalange the beekeeper group has 13 members that actively participating in the activities;
- We provide meals during the section to motivate them to participate and work hard;
- We also provide caps and t-shirts.

#### **5. Beehive fence acceptance**

- The owner of the experimental farm has made a positive, public speech about the beehive fence at a community meeting in Mbamba Village in May 2013, 180 people have attended. He also have made another positive appreciation of beehive fence in April 2014 once he had only farmer that experienced acceptable peace in the Uacondoa area;
- We were forced to change the beehive fence layout during the construction of two beehive fences, Namango and Micangaula in January and March 2014 because some community leaders demand to protect other/neighbour farms that were not in the plan;
- The challenge is that the beehive fence just protect, as test, four machambas in the middle of hundreds machambas that are suffering of elephant crop raiding. About 168 cases of elephant crop raiding were recorded in 2013/2014 crop season in entire Mbamba village. People are not patient and the expectation is very high. There are more people that want to have their machambas protected by beehive fence;
- Mbamba village had electric fence in the past then the beehive fence face challenge to perform at least at the same level as the electric fence and is demanded to cover about 10km of perimeter.
- Maybe both individual beehive fence and electric fence may coexist in the future. Maybe it can also allow the beekeeper group to develop a sustainable business through assistance in the construction of beehive fences;

#### **6. Next steps**

- From May to December 2014 we will focus on honey production and marketing;
- From September 2014 we will start the process to build four more beehive fences in Niassa Reserve;
- From December 2014 to May 2015 we will be monitoring the human and elephant conflict events;
- The beehive fence maintenance will be cared out during the entire year, 2014 and 2015.

## **7. Financial reports**

- The detailed financial report from 2013/2014 crop season is presented as an excel file that is attached with this report;
- The remain US\$2700 donated by Elephant Advocacy League (EAL) were all used for beehive construction cost;
- The funds donated by Taronga and Houston Zoo are still been used.

## **8. Acknowledgement**

We wish to thank Save the Elephants (STE) and Dr Lucy King for their tremendous contribution and support both technically and financially towards the implementation of this project.

We are also grateful to the Elephant Advocacy League, without whose initial donation this project would not have been at current stage.

We are also grateful to Taronga Conservation Society Australia (Taronga) through the Taronga Field Conservation Grants for the funds provided to this project in 2013/ 2014 that will help to expand the beehive fences to more machambas. We wish to send our gratitude to Houston Zoo for ongoing support of the project through payment of running costs.

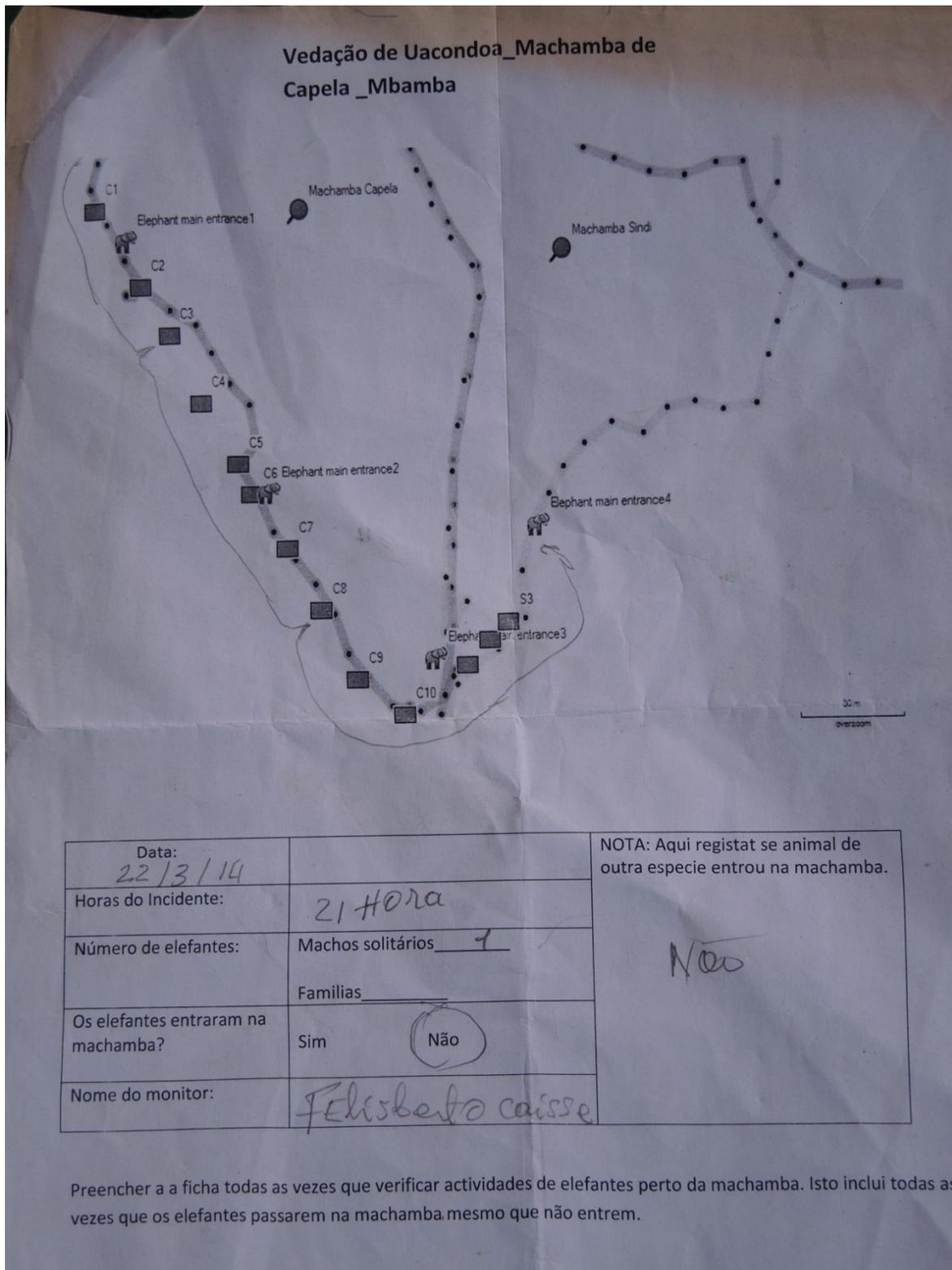
We also want to show our gratitude to the Mbamba community, specially the beekeepers and the conservation agriculture groups for their participation and volunteer work towards the construction and maintenance of the beehive fences.

We also wish to thank the Niassa Reserve Management (Ministry of Tourism of Mozambique and the Wildlife Conservation Society) for the support that has been given to this project.

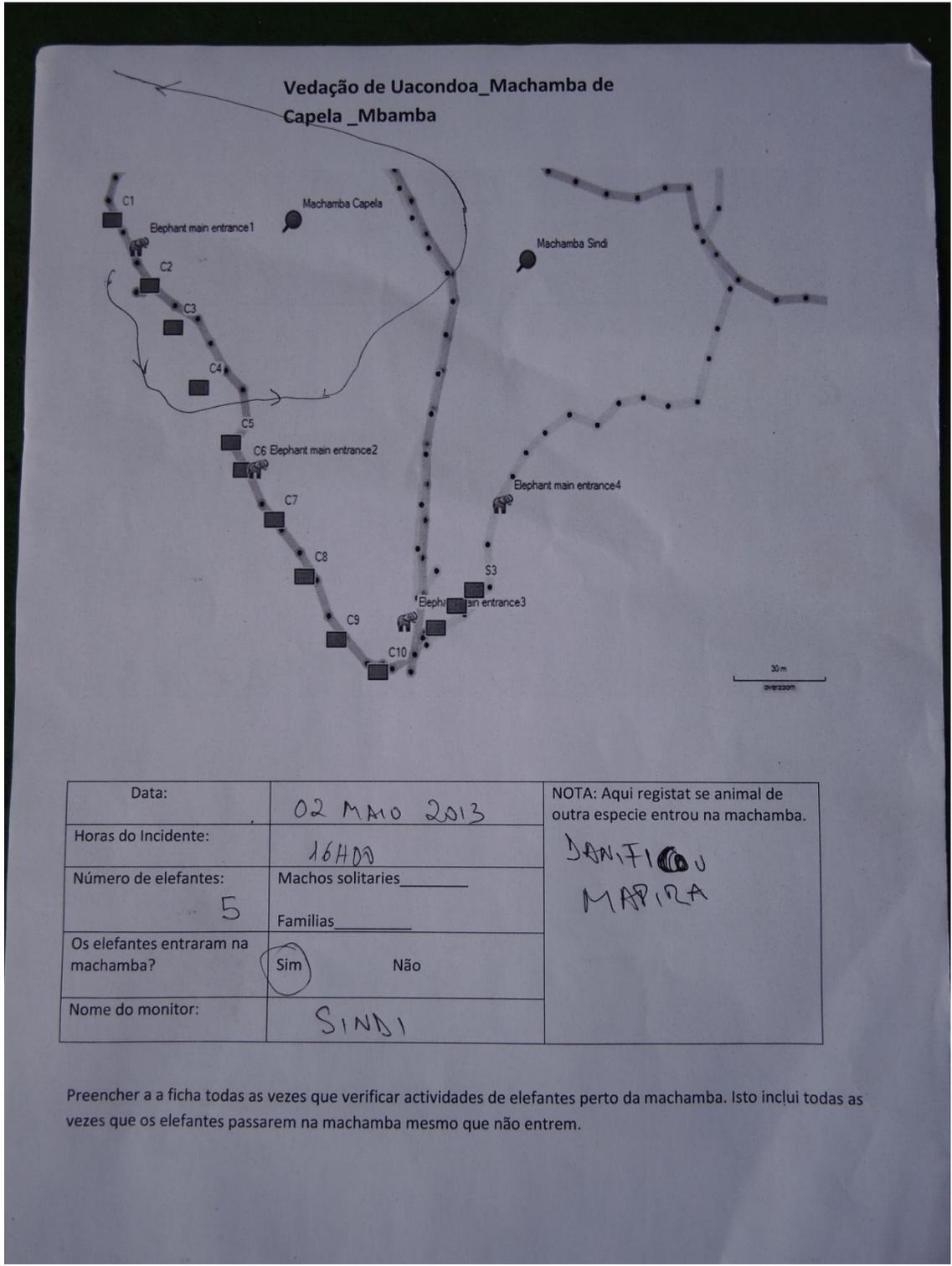
We want to thank WCN for having cross-partner internship program that sponsored the visit to our project by Lucy King from STE in December 2012.

We also want to thank Mr Hendri Coetzee for advice and ongoing support.

ANNEX-I



Datashets filled in during 2013/2014 crop season showing that elephant tried to break in the Uacondoa beehive fence but did not succeed



Datasheets filled in during 2012/2013 crop season showing that elephant did break in the Uacondoa beehive fence.