



ANNUAL REPORT 2015

Niassa Carnivore Project



Promoting Coexistence between Carnivores and People

MISSION STATEMENT

PROMOTING COEXISTENCE BETWEEN CARNIVORES AND PEOPLE IN NIASSA NATIONAL RESERVE, MOZAMBIQUE

The Niassa Carnivore Project serves to secure and conserve lions and other large carnivores (leopard, spotted hyaena and African wild dog) in Niassa National Reserve, northern Mozambique by promoting coexistence between carnivores and people and directly mitigating threats. We acknowledge the costs to Niassa communities who live with carnivores while recognizing the potential of these carnivores to provide substantial ecological, cultural and economic benefits to Niassa Reserve and Mozambique.



In collaboration with Niassa Reserve Management Team



EXTENDED SUMMARY

Niassa National Reserve (NNR) is located in northern Mozambique on the border with Tanzania. It is both one of the largest protected areas (42 000 km²; 16000 mi²) and most undeveloped places in Africa. The protected area supports the largest concentrations of wildlife remaining in Mozambique including at least a third of the national lion population (1000-1200 individuals out of a National population estimated at 2700 lions) and more than 350 African wild dogs. Free-ranging African lions (*Panthera leo*) have declined over the last century to fewer than 24,000 today (Riggio *et al.*, 2012; Bauer *et al.*, 2015). While lions are still listed as vulnerable across their whole African range, in the majority of their range, particularly in Eastern Africa, they meet the criteria for Endangered (Bauer *et al.* 2015). The Niassa Reserve lion population is one of only 5-6 populations of 1000 lions or more left in Africa today and is of global and national conservation importance. However, this population is very vulnerable and facing increasing and new threats each year and recent data suggest it may be starting to decline in Niassa Reserve (see in this report) mirroring the decline of several other species, specifically elephants and increasing illegal activities.

Niassa Reserve is still one of only ten lion strongholds. These strongholds are identified as any area with at least 500 lions, within protected areas or designated hunting areas and with a stable or increasing population (Riggio *et al.*, 2012). Securing this population should be of local, national and international importance and will go a long way to securing Niassa Reserve itself as many of the threats facing lions and other carnivores are also the threats facing much of the wildlife in this area. Recent research has reaffirmed the important role that large carnivores play in ecosystems (Ripple *et al.*, 2014) and the cascading negative ecological effects when they are lost. The large carnivores really are indicators of ecosystem health.

The challenges are immense as Niassa Reserve also supports a growing population of more than 40,000 people resident in more than 42 villages inside the protected area. This is a lion population at significant risk and the long term prospects are uncertain given the growing number of people living inside the protected area and increasing numbers of people coming into Niassa Reserve attracted by illegal gold mining and logging. Recent signs that charcoal production is starting in Niassa Reserve are of grave concern as this could destroy the Miombo and mixed woodlands. Major current threats to the lion population in NNR are habitat transformation from a growing human population, bushmeat snaring where lions and leopards and their prey are caught in snares set to catch wild meat and the merging increasing in poisoning for bushmeat, skins, bones and other body parts. Bushmeat consumption is of increasing concern not only due to the conservation importance of all species but also because it will lead to an “empty savanna” and this will limit the potential for revenue to be generated through tourism for local communities. Loss of the large carnivores and particularly the lion population will be a blow to regional conservation efforts and will also have severe consequences for Niassa Reserve’s potential to develop tourism and generate revenues and employment for communities inside the protected area. This will be critical if wildlife is to be a valid form of land use in the area. Without revenue, employment and other benefits from conservation projects and tourism businesses there is also no incentive for communities to conserve wildlife rather than convert the bush to agricultural fields, or kill animals to protect livestock, for food or income. Other threats include retaliatory killing in response to attacks on livestock and potentially disease outbreaks (rabies and canine distemper) spread from domestic dogs.

The Niassa Carnivore Project (NCP) has been working in NNR since 2003 in close collaboration with the Mozambican Niassa Reserve management authority, Niassa communities and tourism operators. In 2006, based on Niassa Carnivore Project research, NNR and surrounding areas were identified as globally important areas for lion and African wild dog conservation. In 2009 and 2010, we contributed towards development of the Mozambican National Conservation Strategy and Action plan for the African lion and the National Conservation Strategy for the African Wild dog and Cheetah. These form the guiding documents for our work in Mozambique. In November 2015, we were invited to participate in the updating of the Mozambican Lion Action Plan at a workshop in Maputo. Mozambique is the first country to update their action plan and we applaud their commitment to lion conservation. We look forward to assisting with the implementation of this action plan.

The goal of our project is to secure and conserve the large carnivore populations (lion, leopard, spotted hyaena and African wild dog) in NNR in partnership with the NNR management team and promote coexistence between these large carnivores and the people who live inside the protected area. We do this through a holistic program of long term monitoring threats and population size, direct mitigation of threats to lions and other large carnivores, development of community programs that support sustainable, conservation friendly development and reducing causes of illegal use, and conservation education and outreach to share what we have learned.

For conservation actions to be sustainable, we believe they need to be culturally appropriate, locally derived and empowering for local communities. All our actions are accompanied by environmental education and community outreach. We base our conservation actions on targeted ecological and socio ecological research to provide baselines against which actions can be measured, to understand threats and then to find and test locally based solutions for each threat in turn before scaling up successful programs in partnership with the Reserve management authority. With this in mind we continue to strive to develop a strong collaborative partnership with the NNR management team to ensure that we complement their activities not repeat them and test models of community engagement that can be implemented on a larger scale. We are a Mozambican team and more than 75% of our team come from local villages within Niassa Reserve. Skills training is provided on the project recognising that employment provides one of the most significant incentives for conservation in the area but we recognise that developing a local conservation culture is essential for long term success. We are strongly committed to mentoring Mozambican conservationists and recognize that conservation is a process and not an end goal and we therefore have a long term view (more than 25 years).

Summary of key achievement and activities in 2015

Our annual reports form a critical part of our own assessment of our progress and provide a holistic overview for our team on what we have achieved and how the programs are progressing and are linked. This report is also one way we report back to the communities we work with, our team, Government officials, Reserve management team and others who support our work. The funding we receive deserves the utmost respect and attention to detail. Only once all the data are together can we assess how we need to move forward and where the gaps are. Many of our programs are experimental and the details are important if these programs are to be scaled up in Niassa or elsewhere. For these reasons our report is very detailed and long. We hope you will find the time to look through our detailed report and the progress we have made towards achieving our goals or just dip into the sections that interest you. A shorter summary of our key achievements and activities in 2015 is also presented.

Improving management of NCP and building capacity

In 2015, we opened the Mariri Environmental and Skills Training Centre and Mariri Investimentos / Niassa Carnivore Project Headquarters which we have been building for past three years as a skills training course using local labour and materials. It consists of two guest cottages, 5 student cottages, three offices and storeroom, fully functional workshop with carpentry area, refectory capable of feeding 50 people, library, ablution facilities, and kitchen. In addition we have an 800m airstrip that is in the process of being registered with an aircraft hangar and have a plane (Husky R1) operational in L5-South to assist with antipoaching, monitoring and logistics. We have completed 12 staff rooms with showers, 2 middle management cottages and 3 Manager Houses at the headquarters as well as three scout posts to accommodate 15 scouts.

Our permanent staff complement grew slightly in 2015 with two field based directors, four Managers (conservation, education, camp & logistics and community), 19 conservation/ tourism staff and 28 anti-poaching scouts with more than 80 seasonal staff all sourced locally who assisted with construction and conservation services (roads). All staff except the Directors and Founders, Colleen and Keith Begg are Mozambican with 96% of our staff from local communities. All our staff are being mentored into their posts and receive skills training on site. In 2015 our staff received in site training in financial management, mechanics and SMART. **We continue to improve our systems for financial, workshop and data management.**

Conservation Monitoring

Across Niassa Reserve the lion population seems to be stable at between 800-1000 lions but may be starting to decline with some areas of concern where no carnivores (lion, leopard, hyaena, wild dog) presence were observed during the call-up. No known lions have been snared in the intensive study area since 2012 indicating some success with our antipoaching and community programs. Two radiocollared lions died outside the area we manage – one was sport hunted, the second lioness died a natural death. The lion population is currently stable at 0.04 lions / km² with 6-7 lions prides living inside L5-South, comprised of 25-27 adults and 3 cubs under one year old. No known lions have been snared in L5-South since 2012. Between 2010 and 2012, only 22% of the known cubs born in the study area reached 1 year old due to sport hunting of pride males in neighbouring concessions and high levels of snaring within the concession of both males and females which resulted in high male turnover which in turn resulted in infanticide (cubs killed by incoming males). Between 2012 and 2015, the proportion of known lion cubs reaching one year old has risen to 71%.

Inside L5-South the concession we manage in partnership with the Mbamba Village community (580km²; Goal 2), impala, waterbuck continue to increase numbers on the floodplain with a slight decrease in kudu and warthog that might be a reflection of rainfall. Hippo numbers have steadily increased from 76 hippo in 2004 to 183 hippo in 2015.

We continue to manage and financially support the NNR community guardian program (MOMS) in partnership with the NNR reserve warden as we have done since 2006. Currently there are 24 wildlife guardians in villages across Niassa Reserve that collect information on special species seen in the village surrounds (dead or alive), fishing activities and human wildlife conflict events. These wildlife guardians provide a link between Reserve management and communities. They recorded 9891 sightings of special species in 2015 with buffalo, (55% of sightings), hippo (15%) and wild dog (10%) most commonly seen special species in village surrounds.

In 2015, the wildlife guardians regarded 208 dead special species and large carnivores represented 30% of the deaths recorded with 15 leopard, 12 lion, 18 hyaenas and 3 wild dogs killed in 24 villages in 2015 alone. In total in the past two years, 59 leopards, 21 lions, 35 hyaenas and 23 wild dogs have been killed. These mortalities would have to be extrapolated to represent 44 villages, and would need to include the number of animals killed as trophies by sport hunters (6 lions; 20 leopards), animals poisoned away from village surrounds and other mortalities to reach a reliable estimate of the number of large carnivores killed in Niassa Reserve. We continue to monitor African wild dog pack sizes across NNR through opportunistic sightings made by the community wildlife guardians. It is encouraging that wild dogs are still being seen across all 24 villages where we have wildlife guardians. The wild dogs are breeding in L5-South and in total 45 individuals from four packs have been visually identified from their coat patterns.

THREAT 1: REDUCE BUSHMEAT SNARING

Bushmeat snaring (the trapping of wild animals for meat) is the most significant threat to large carnivores in NNR at present. NCP aims to address snaring through a holistic approach of providing alternative income generating opportunities for hunters through skills training and employment of local people, providing an alternative protein source through small livestock breeding, increasing food security and developing effective anti-poaching that involves resident communities. We believe that similar amounts of funding should be spent on the “guns and boots” and community engagement approaches to conservation.

Providing alternative protein sources -Livestock Breeding Programs *(lead by A.Jorge, Conservation Manager)*

The livestock husbandry program aims to increase the quantity and diversity of meat protein available in the villages which we hope will increase food security, decrease reliance on bushmeat and provide an alternative income for local households. After two years this program is active in three villages in more than 85 households and primarily involves rabbits, ducks, and domesticated guineafowl. None of the people involved have other employment and 40% had no livestock before starting the program. It is a voluntary program similar to a micro credit scheme with peer groups who develop and maintain the rules and pay back loans. Each house is “seeded” with breeding stock of ducks and/or rabbits that have to be paid back once they breed to provide the starting stock for new households. This program was chosen as

the best community program by the local Mecula District Community Association in 2015. In 2015, people started earning their first significant income from the LBG. At least 12 households sold more than 50 animals to Mariri Environmental centre for food and to other villagers in 2015. Five households reported that they have started to eat the rabbits and ducks.

Improving Food Security through Conservation Agriculture *(lead by Mbumba Marufo, Community Manager)*

Improving food security is essential if conservation is to be successful in NNR. It is impossible to have a conversation about conservation when people are worrying about where their next meal is coming from. Increasing food security is a critical need that lessens the need for income from extractive use of wildlife resources (ivory, skins and bushmeat) and will decrease the rate of habitat transformation through slash and burn agriculture. The conservation agriculture program is a community based approach to increase productivity of Niassa fields in a sustainable way. It relies on the farmers to test, manage and maintain the conservation agriculture plots through a Farmer Field School (FFS) approach as developed by CARE International. The 2014/ 2015 wet season was the third year of the Mbamba FFS program. In 2015, 23 people (nine women and 14 men) in Mbamba were actively involved in the Farm Field School (FFS) activities. While members of FFS were meant to graduate this year, they refused to do so and wished to continue learning and experimenting. Three main experiments concerned with increasing water retention through mulching in the dry season, increasing soil fertility through intercropping with beans and using fallow land crops, and testing of potential cover crops to reduce nitrogen loss were conducted in the Farmer Field School in 2015. The yield in the FFS was very poor during the 2014/2015 season. This was probably due to intermittent rainfall and was not isolated within the Mbamba FFS. The FFS collected about 14kg of maize in total and 8kg of sorghum, compared with 50.3kg of maize harvested during 2013/2014 crop season.

Reducing human – elephant conflict: Elephant-Beehive Fences

Crop raids by elephants are a major challenge for many farmers during the wet season. This not only leads to severe food stress but reduces support for conservation. Elephants do not like bees and avoid beehives. Dr. Lucy King from Save the Elephants developed and tested the use of elephant-beehive fences in Kenya to reduce crop raiding by elephants. We are testing the potential use of this fence in NNR to reduce human-elephant conflict. The aims are to reduce elephant crop raids in Mbamba village (and if successful, Niassa Reserve) and reduce the loss of yield due to elephant crop raiding. The honey produced from these fences can also help community members improve their diet and earn revenue. The beehive fences now cover 4,112m perimeter and consist of 227 beehives and 223 dummy hives in two villages. There are 6 experimental fences supporting 72 beehives used to monitor the effectiveness of the fences, with 12 fences that are individually owned. The fences appear to reduce crop raids by 50-60%. In 2015 more than 20 local farmers asked for individual beehive fences. A typical fences has 24 hives and 24 dummy hives. We provide the first 12 hives for free and the remainder can be purchased at a subsidized costs of two bottles of honey (1 litre / hive). As result of the training received, 42 people in two villages are now able to build their own beehive fences and harvest the honey properly and four 4 local carpenters have been trained to make beehives. Honey is bottled and labelled under the Niassa Reserve elephant friendly honey label and all income goes back to the owner of the beehives. In 2015, the beekeeper group earned 10,800.00MT revenue selling 18 litres of elephant friendly honey equivalent to the revenue from selling 216 litres of honey they harvest traditionally in the bush with none of the other consequences of honey-gatherer – fire and cutting down of trees. We believe this program has significant potential to not only help people develop an alternative livelihood but also help farmers reduce elephant crop raids in their fields with a low cost, sustainable, individually owned elephant beehive fence. Major constraints at present are lack of maintenance of fences and theft of honey and burning of hives by other community members. In 2016 we will be hiring a beehive fence extension officer to help monitor maintenance and ensure regular harvesting of the honey to increase income generated.

Reducing snaring, mining and armed poaching through community supported antipoaching

Lead by Agostinho Jorge and Keith Begg

In 2015 we increased our antipoaching scouts from 20 to 28 with five patrol teams and 6 control post scouts. Our scout teams are well equipped and armed and we have received additional training in firearm safety, wildlife law, and SMART. We were able to purchase a boat for wet season patrolling. Our scouts conducted more than 100 foot patrols and apprehended more than 1000 illegal gold miners, 3 bushmeat poachers, recovered 6 tusks, 9 rounds of ammunition and removed 58 snares. Elephant poaching has decreased substantially since 2012 with on one elephant killed in 2015 compared to 13 in 2014, and 14 in 2013 despite the continued presence of large herds of elephants and presence of poachers in neighbouring concessions. No known lions were killed in snares. We are the only operational SMART site in Mozambique and all data is collected on digital devices that allow monitoring of effort and efficiency. However, illegal gold mining has increased exponentially. A questionnaire survey (n=165 miners) showed that while the majority of miners are Mozambican (70%) with only 30% Tanzanian, a low percentage of the Mozambicans come from local villages within the concession. This influx of people is destabilizing villages, and negatively affects our community programs. Prostitution, alcohol abuse and littering have increased exponentially and Traditional leaders have asked for assistance.

Bushmeat snaring remains a threat to wildlife in L5-South as it is across NNR. While snaring has reduced in Mbamba village it is still considerable particularly in the wet season before the harvests are ready. At least one leopard skin was traded from Mbamba village in 2015 compared to three in 2014. The number of individual animals harvested in Mbamba reduced from 99 animals in 2014 to 61 animals in 2015. The biomass harvested in the same period reduced from 15,704 Kg to 11,831 Kg. This suggests that not only has the number of animals harvested decreased but smaller animals are being targeted, perhaps due to effective antipoaching. Of the 7 men that we have caught bushmeat snaring in past two years, one has been given 16 months of jail time, 4 have been released and two are awaiting trial. Unless bushmeat snaring is treated as a serious offense, antipoaching efforts will not act as a serious deterrent. Our data from informers across suggest that at least 710 ungulates, one bird and 26 large carnivores (hyena, wild dog, lions and leopard) were traded from Mbamba, Macalange, Marrupa and Nkuti villages between January 2015 and December 2015. The total illegal bushmeat sold, 115,176 Kg, from the ungulates generated an estimated 7,495,802 MT (US\$ 187 395). This is a minimum estimate as it comes from very few informers from only two villages inside Niassa and two centres outside. This illustrates that bushmeat is major business in Niassa Reserve and should be taken seriously. Emerging threats of increasing concern are potential charcoal production, illegal logging and poisoning linked to the lion bone trade. Informer information suggests that poisoning is increasing dramatically.

THREAT 2: RETALIATORY KILLING IN RESPONSE TO ATTACKS BY CARNIVORES ON PEOPLE AND LIVESTOCK

Reducing attacks through living fences, safe shelters, safe behaviours and effective corrals

Human-carnivore conflict results in retaliatory killing of lions and leopards. Research in previous years has shown that lion and leopard attacks can be reduced through behavior changes, specifically sleeping inside a shelter during the wet season, never walking alone and improving goat corrals etc. We continue to include information on ways to reduce conflict in educational materials (comic book, storybook, poster, plays). We are trialling visual deterrent lights and reflective tape on goat corrals and small livestock corrals and an incentive based scheme to reward goat owners that improve their corrals.

Human carnivore conflict is relatively rare in NNR compared to other areas perhaps due to the relatively low densities of lion, availability of natural prey and lack of cattle. The community wildlife guardians collect ongoing data on human wildlife conflict in their villages and additional information is provided by Reserve management team and opportunistic records from operators and informers. The MOMS wildlife guardian data show that the majority of HWC records are for crop raiding (89.5 %) with most incidents caused by baboons (41.57%), then bush pigs (27.22%) and elephants (13.67%). Carnivore conflict was relatively low with 11 goats killed and 210 chickens in the 24 villages. Lion attacks across Niassa Reserve are not increasing despite both an increasing human and an increasing lion population and are stable at 1-2 lion

attacks per year. In 2015 one person was killed by a lion but he was hunting the lion for body parts so this was not a problem animal. An additional 3 people were killed by crocodiles. One person was injured by a hyaena when she was sleeping outside. Wild dogs were not recorded to cause any problems. In terms of livestock, leopard and hyaena are most common culprits. In a combination of data from MOMS Wildlife Guardians and NNR Reserve Community team, in 2015n 2015, 6 goats were killed by three leopards in three different villages and 5 goats were killed by hyaenas. One hyaena had to be killed as a problem animal as it was becoming a risk to people. It had lost one leg to snaring.

Solutions to Human carnivore conflict are varied. For carnivores protecting livestock in robust corrals or henneries with secure roofs and doors at night remains the best and only long term solution to reduce human carnivore conflict in Niassa Reserve but communities remain reluctant to take responsibility for their livestock. We have also been testing predator deterrent lights and reflective tape that if used correctly can prevent predators from approaching corrals. In 2016 additional solar Foxlights will be distributed to all wildlife guardians so that they can respond to specific events. Through conservation benefits communities can protect themselves. In 2014 and 2015, Mbamba village used their community conservation fund to buy an electric fence to reduce elephant crop raids. This fence is owned and maintained by the community and is a long term solution to reduce conflict with additional support from elephant beehive fences.

THREAT 3: UNSUSTAINABLE SPORT HUNTING OF LIONS AND LEOPARDS

Reduce unsustainable sport hunting of lions and leopards

In Niassa National Reserve, Mozambique sport or trophy hunting is allowed inside the protected area across nine hunting concessions covering 27,989 km² (66.6%) of the protected area estate (42, 500 km²). Sport hunting is increasingly controversial particularly for species that are facing widespread declines across their range like lions, leopards and elephants and particularly in a protected area. The decision to allow sport hunting inside Niassa Reserve rests entirely with the Ministry of Tourism and the NNR management team. Sport hunting was identified as a potential threat to lion and leopard populations in 2003 by NCP due to the large number of young lions and leopards being taken as trophies and the lack of consistent and science based quota setting procedures. The Lion regulations were developed by NCP and implemented in 2006 by the Reserve Management Authority with consultation of the operators and updated by WCS / MITUR in 2013, while the leopard regulations were implemented in 2010 by SRN and updated by WCS / MITUR in 2013 with a decrease in leopard quotas in 2014 based on NCP data. NCP acts as an independent auditor of all leopard and lions taken as trophies in NNR. Overall the number of lions taken as trophies across NNR in any given year is very low given the large area managed as sport hunting concessions but is additive to illegal mortality and this needs to be borne in mind. In 2015 six lions were killed for trophies representing 1 lion per 4000km² of the area hunted. Offtake was only 27.3% of the total quota (n = 22 quota). The percentage of lions taken as trophies that are over 6 years of age has increased from only 25% in 2004 to 100% in 2014 and 2015. The NNR lion regulations and Points system has clearly been successful at reducing the unsustainable sport hunting of lions and reducing offtake to sustainable levels. For all concession operators, the need for effective antipoaching and community engagement has to be enforced to reduce illegal offtake. Snaring is the main threat to lions, leopards and other carnivores in Niassa Reserve both within and outside of hunting concessions.

THREAT 4: DISEASE SPREAD FROM DOMESTIC DOGS

Reducing the disease risk to carnivores

The presence of a growing, unvaccinated population of domestic dogs inside villages in NNR is of concern. Domestic dogs are known to be the reservoirs of disease and the spread of canine distemper and rabies to carnivores poses a potential risk to lions and African wild dogs in particular. The domestic dog populations in Mbamba Village inside L5-South appear to have stabilised in Mbamba Village at around 40 dogs. A potentially rabid dog was killed in Manyuri village in 2015 but this could not be confirmed as the dog was destroyed before samples could be taken. Rabies Awareness was a focus of the 2015 MOMS Wildlife guardian workshop. There was no progress on conducting a vaccination campaign for all domestic cats and dogs in NNR. We continue to request a protocol for dealing with a potential rabies outbreak and regulations for dog ownership in NNR that includes vaccination, registration and rules on where dogs may be found (within village surrounds only).

ENVIRONMENTAL EDUCATION AND OUTREACH

Environmental education and outreach is part of all our programs as we share what we have learned with communities to increase tolerance, promote action, provide practical solutions and provide skills training. This program grew substantially in 2015 under the leadership of our education Manager, Andrew Mkanage. In 2015 we supported 13 full secondary school scholarships with an additional six awarded for 2016. The 7th Annual lion fun days reached more than 300 children and many adults with two days of fun and games with a conservation theme that were also attended by outside journalists, District government and NNR warden. Mariri and the Mbamba community have become increasingly concerned about the low level of school attendance in Mbamba village and the low number of children reaching Grade 7. Through consultation, we agreed to initiate a school lunch program in partnership with the Mbamba School and a parents. The program was started in August 2015 lead by our Education Manager, Andrew Mkanage and by October 2015 there was an increase of 124 children attending school just by providing one meal a day to all children who attended their classes. This will be continued in 2016 and monitored carefully.

We are very excited to have opened the Mariri Environmental and Skills Training Centre in block L5-South in 2015 after three years of construction. More than 40 local men have been trained in construction during this process and we have specifically trained 6 master masons, 5 carpenters, 2 plumbers, and 3 master thatchers and roofers and they are now able to take on contracts independently. Between August and November 2015 we hosted 55 children from four local villages for four night bush visits (Thursday-Monday). Once at the Environmental Centre their activities ranged from game drives, night drives, visiting and cleaning up fishing camps, visiting beehive fence, livestock breeding and conservation agriculture programs, climbing an inselberg, art, plays and film as well as ongoing discussions about safe behaviours, costs of poaching and mining, value of wildlife and clean environment to human health. None of these children or their teachers had ever been on a game-drive and most had never seen a lion and elephant or a hippo in anything but a conflict situation. An evaluation program is being developed to ensure knowledge is being transferred and to test whether the activities result in an increase in tolerance and change in behaviour over time. In 2015 we also hosted the Annual MOMS wildlife guardian training workshop (35 people), Still Standing and Mini basketball workshop which held a basketball workshop for more than 100 Mbamba children to teach leadership, teamwork, participation as well as health, education and conservation messages.

COMMUNITY PARTNERSHIP

NCP considers sustainable social, economic and community development in local villages a priority and we are trialling our approach in Mbamba Village (>500 households; >2000 people) Communities are a part of all our conservation, education and ecotourism programs. Our approach is to concentrate employment and benefits into the Mbamba community that live inside the concession unless these skills are unavailable as it is these people who are helping to manage this area and dealing with conflict with human-wildlife conflict in this area.

After the revitalization of Mbamba Association, with the election of new members in 2013 to represent the Mbamba village stakeholders, Mariri has been working to assist with the process of its legalization. The Association consists of 12 members and has a mandate for two years. In April 2015 the Associação de Utendeli ni Mazengo received formal notification that the Governor of Niassa has officially recognize the association. Next steps will be to open a bank account complete the Association office building and provide training in administration. Regular meetings are held with the Association, traditional leaders and Mariri to discuss all aspects of conservation management in L5-South (more than 20 meetings in 2015) with an open Annual general meeting held with the entire community in June –July of each year to report back progress from both partners. In 2016 we will work towards legalising our partnership through a MOU which will clearly detail the rights, responsibilities and benefits for Mariri and Mbamba Village.

In 2015 more than Mt 8 511 390 (US\$189 142) was paid directly to local people in Mbamba village in salaries, stipends, goods and assistance. More than 600 adults benefited directly from Mariri conservation, education, skill training and employment programs as well as the 300 children fed each day through the school lunch program. 150 people from the

local communities were employed as permanent or seasonal staff with an additional 100 women receiving payments for collecting and cleaning grass for thatching, and collecting water for construction in the village. More than USD19000 was spent on food bought locally to support local livelihoods - maize, goats, rabbits, ducks, chickens, honey and beans. In addition, in the absence of ecotourism Mariri provided a community conservation fund to Mbamba village which with performance payments came to a total of 285 000MT (\$7 500). The performance payment scheme adds to and decreases the base fund according to specific conservation criteria. It is designed to encourage conservation friendly behaviour and increase the fund. It can also be decreased through penalties if the community as a whole records poor performance. The performance payment criteria for 2015/ 2016 are agreed on through negotiation between Mariri and the Community and include payment for months with no elephants killed, effective goat corrals, sightings by visitors of wildlife species and penalties for snares recovers, elephant killed, large carnivores killed and goat owners with no goat corrals.

Food security is a serious threat to people living inside Niassa Reserve. The majority of soils in Niassa Reserve particularly in the eastern section of the protected area have low fertility. Our conservation agriculture, beehive fence and small livestock breeding programs are a community based approach to support alternative livelihoods and increase food security. While these are all volunteer groups they are now reaching more than 110 households in three villages. We have also started a school lunch program which is reaching 350 children a day. These programs have shown excellent initial results and will be scaled up to more households and villages in 2016 particularly six target villages within L4-East, our neighbour to the west that is currently an open concession.

SPREADING THE NEWS

On a broader level our management team contributed to the Lion Action Plan workshop in Maputo; National SMART workshop in Limpopo National Park; Biofund Exhibition in Maputo; and Community Based Natural Resource Management workshop in Maputo this year. Our conservation manager, Agostinho Jorge was selected to take part in Emerging Wildlife Conservation Leaders (EWCL) program in the US. We are GDA partners with the Reserve Management team and have formed a collaboration with our neighbours in Niassa Reserve (Lugenda Wilderness and Chuilexi Conservancy) to share information and resources and attended several meetings in this regard. Internationally, the Managing Director, Colleen Begg is a member of the African Lion Working Group, Cat Specialist Group and Pride – all carnivore conservation organisations.

THE WAY FORWARD

We believe our combined approach of monitoring, direct mitigation of threats, and antipoaching couple with strong community engagement is a practical and feasible model for securing carnivores in NNR. We are having some success. We will build on our activities 2016 particularly with a fully operational Environmental and Skills Training Centre that will support visits from both children for bushvisits and adults for conservation courses. In particular the beehive fence, livestock breeding and performance payment programs are showing success and will be scaled up into new villages in L4-East. The wildlife Guardian program has stabilised and is collecting very important information needed for management and the community guardians are beginning to act as extension agents in their villages. We hope to continue our collaboration with Reserve management team and other operators.

In 2016, we will focus particularly on developing a strong conservation culture in our lower and middle level local staff. Everyone on our team needs to understand and believe in our mission no matter whether they are scouts, the cook, a gate guard or the lion trackers and we need to ensure our mission is locally valid and supported. We will achieve this through site visits to other conservation projects, internal conservation courses and regular ongoing discussions and meetings. Building up our middle and lower level local conservationists must be a priority. As we move into our final year of the first 5 year management plan (2012-2016) of managing L5-South concession with the Mbamba community, we will be assessing all our programs, defining our middle term goals and focusing our efforts for the next five year period (2017-2021).

We remain deeply committed to Niassa Reserve, its conservation and communities for the long term and look forward to collaborating and working together further. 2016 is going to be both another challenging and exciting year as our team stabilises. We are very concerned about the increasing threats of alluvial gold mining and poisoning but hope to rise to the challenge as best as we can. None of this would have been possible without the tremendous support of our amazing team, our partners and our donors.

TABLE OF CONTENTS

MISSION STATEMENT	2
EXTENDED SUMMARY	3
TABLE OF CONTENTS	12
LONG TERM GOALS (25 YEARS)	13
MEDIUM TERM GOALS (2012-2016)	13
MANAGEMENT STRUCTURE AND APPROACH	14
2015 PROGRESS TOWARDS REACHING OBJECTIVES	16
Objective 1: To improve and streamline the business and logistical management of NCP and its Mozambican Entity, mariri investimentos	16
Conservation Monitoring	25
Objective 2: To provide long term monitoring of the status and threats to lions and other carnivores to assess our effectiveness and allow us to adaptively manage change.	25
THREAT 1: BUSHMEAT SNARING	39
Objective 4: To develop alternative protein sources to reduce reliance on bushmeat and snaring	39
Objective 5: To reduce bushmeat snaring by finding ways to improve Food Security and reduce human-wildlife conflict	42
Objective 6: To reduce bushmeat snaring and other illegal activities by effective antipoaching activities with community support and through providing alternative livelihoods to local hunters	51
THREAT 2: RETALIATORY KILLING DUE TO ATTACKS ON PEOPLE OR LIVESTOCK	70
Objective 7: To reduce human-carnivore Conflict through living fences, safe shelters and safe behaviours.....	70
THREAT: UNSUSTAINABLE SPORT HUNTING	74
Objective 8: To ensure sport hunting of lions and leopards in NNR is sustainable and meets conservation objectives..	74
EDucation and outreach	80
Objective 10: To develop a community outreach and environmental education program in NNR that increases tolerance and reduces conflict and provides niassa residents with locally relevant conservation material	80
COMMUNITY PARTNERSHIPS	96
Objective 11: develop community based model of conservation Management IN I5-south through partnership wiith Mbamba Village community	96
Objective 12: Mentor, guide and train Mozambican conservationists and staff and encourage staff participation in the project.....	109
Objective 13: Increase awareness of NCP work and importance of Niassa National Reserve to a broader audience both nationally and internationally.....	109
ASSESSMENT OF ACTIVITIES	110
ACKNOWLEDGEMENTS	117

LONG TERM GOALS (25 YEARS)

All NCP activities are achieved in collaboration with local communities, Niassa Reserve Management Authority and tourism operators. Our vision is a unique wilderness of Niassa National Reserve where lions and other carnivores continue to persist with the full participation and support of Niassa's local people.

Goal A: To secure ecologically stable leopard, spotted hyaena, wild dog and lion population in Niassa Reserve, with at least 1000-2000 lion with no concomitant increase in carnivore attacks on livestock and no unprovoked attacks on people from lions or other large carnivores. This will require reducing all current threats to carnivores in Niassa Reserve-bushmeat snaring, attacks, disease and underage sport hunting and increasing community engagement.

Goal B: To develop a legally binding, sustainable partnerships between the local communities and Niassa Carnivore Project to manage the Mariri- L5-South concession, (600km²) inside Niassa National Reserve as the first community based conservation area in Niassa Reserve, with stable wildlife populations, decreased illegal activities and increasing income and benefits for the Mbamba Village community to support conservation friendly development.

Goal C: To develop a locally relevant, sustainable environmental education and skills training program for Niassa residents centered around the Mariri Environmental and Skills Training Centre to promote conservation and ways to coexist with large carnivores and provide alternative livelihoods; with at least 300 -500 people visiting or attending courses at the Mariri Environmental Centre per year and a measurable increase in tolerance towards large carnivores and knowledge of conservation.

MEDIUM TERM GOALS (2012-2016)

Our 6 medium term goals (2012-2016) are listed below. For each goal we have identified targets and indicators where possible and these are listed in our annual work plan (available on request). It is important to bear in mind that this is a rapidly changing environment and these are moving targets as more information is collected and priorities change. In addition in many cases it is difficult to specify a specific target as there is no clear meaningful threshold for what can or should be achieved. For example we don't know what lion population Niassa can support as there is a growing human population and prey populations are still recovering. There is also no historical data. In most cases what we are looking for is a trend in the right direction i.e. an increasing population of lions, decreasing trend in human-wildlife conflict, decreasing trend in bushmeat snaring.

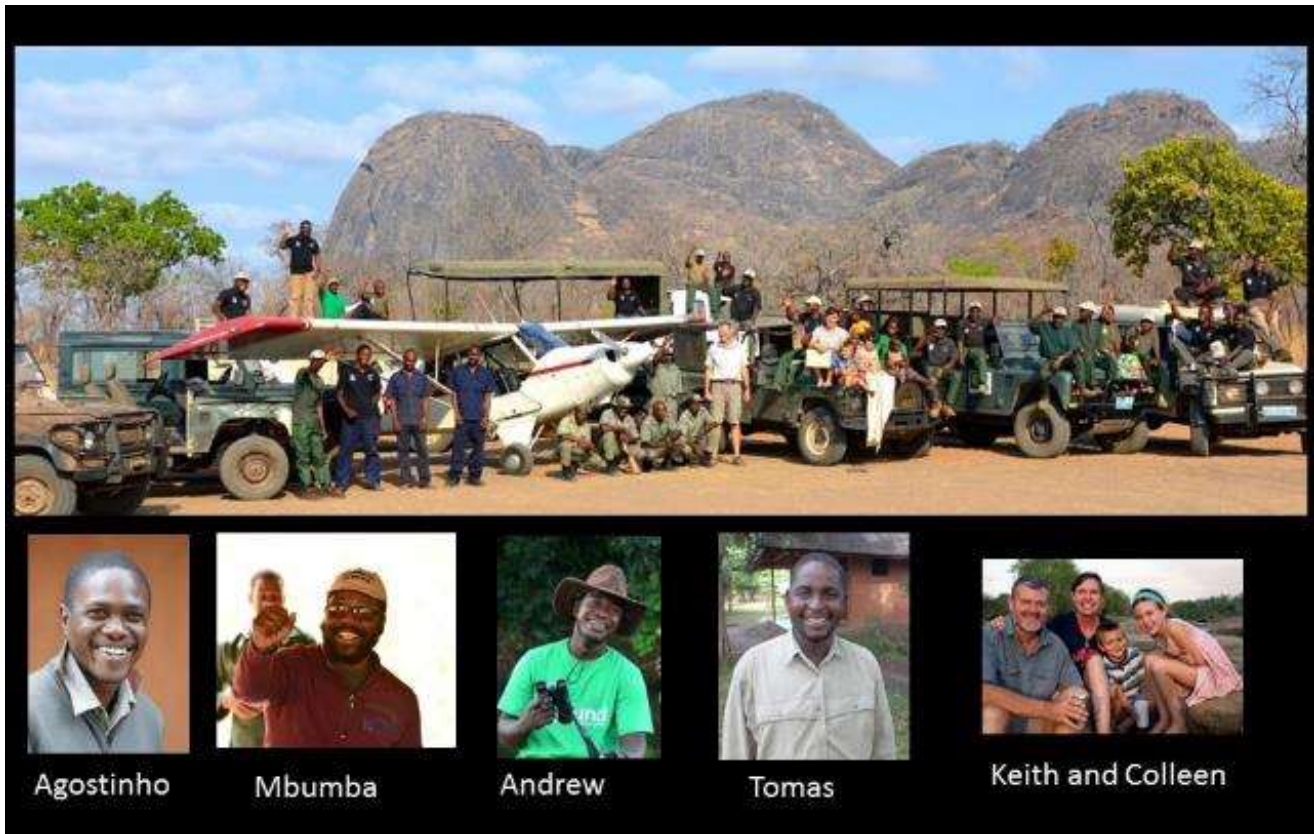


MANAGEMENT STRUCTURE AND APPROACH

Colleen and Keith Begg founded The Ratel Trust (TRT) a South African not for profit conservation trust in 2004 to support their conservation work in Africa. TRT is managed by three trustees, Colleen and Keith Begg and Stephen Clark. The Niassa Carnivore Project is a project of TRT that aims to secure large carnivore populations in Niassa National Reserve and develop a model of community engagement that work and manage. In addition NCPs work across NNR to secure large carnivores in partnership with the Reserve Management team (MOMS wildlife guardians, trophy monitoring, surveying, environmental education, reducing human-carnivore conflict), we also manage a concession (L5-South (580km²) in eastern Niassa Reserve. We have set up a Mozambican company, Mariri Investimentos to govern our conservation work, fulfil all legal requirements and provide long term security for our permanent staff. The headquarters of NCP and the Mariri Environmental and Skills training Centre are based in this concession and this area has also been our long term intensive study area since 2003 and our testing ground for new programs. Our work across NNR is governed by a 5 year MOU with the Ministry of Tourism while we have a 25 year lease for the management of the L5-South concession.

Annual financial reports for TRT are provided by FSG Consulting, South Africa provides annual financial reporting for TRT while an accountant based in Lichinga assists with labour, tax, accounting and HR requirements for Mariri Investimentos. We also produce a combined NCP financial report each year. CVA Advogado e Consultores provides ongoing legal and labour advice.

Mariri Investimentos and Niassa Carnivore Project, wherever possible, only hire Mozambicans (96%), aside from the Directors (Colleen and Keith Begg -RSA, Mozambican residents) and over 88% of our staff are from villages inside Niassa Reserve, particularly Mbamba Village. In 2015, we had 50 permanent staff (96% Mozambican; 88% from local villages) with an additional 88 people working in construction and conservation services (roads, airstrip, etc.) for the dry season.



In 2015 we had four Mozambican Managers, Agostinho Jorge (Conservation Manager); Mbumba Marufo (Community Manager), Tomas Buruwate (Camp and Logistics Manager and resident naturalist) and Andrew Mkanage (Environmental Education Manager). Staff development, training and involvement in our conservation program are considered a priority and a critical part our capacity building approach. We work with partners and are strongly collaborative both within and outside Niassa Reserve. We partners with the Niassa Reserve management authority (a co-management partnership between Ministry of Tourism and Wildlife Conservation Society) and neighbouring conservation holders, through an informal alliance, the Niassa Conservation Alliance. Central to our long term strategy is the Mariri Environmental and Skills training Centre in concession L5 –South. This forms the base and hub of our activities and allows us to effectively spread what we have learned to Niassa adults and children across Niassa Reserve.

Our long term strategy for lion conservation in Niassa Reserve is to develop a holistic model of community engagement with practical solutions to reduce threats and conflict and increase food security that can be sustainably implemented across NNR with local partners as well as provide excellent, monitored antipoaching to decrease illegal offtake. We don't have a community program, we ARE a community program with local communities involved in every aspect of our work from antipoaching to conservation education and monitoring. We base our conservation actions on sound targeted research to provide baselines against which actions can be measured and to find and implement locally based solutions for each threat in turn. We then work with the Reserve Management team and Reserve administrator to scale up successful programs one village at a time across Niassa Reserve. Further afield information is disseminated to wider conservation community through the social and scientific media, African Lion Working Group, Cat specialist Group and Canid Specialist Group and Pride Lion Conservation Alliance.

2015 PROGRESS TOWARDS REACHING OBJECTIVES

Linked to our medium term goals we identified specific objectives in our 2015 work plan. Here we present our progress in 2015, our failures, challenges and successes measured against these objectives and activities. We believe we made significant progress and have reported on this in detail. We recognize that this is a long report so a detailed executive summary and table of contents are provided to allow you to skip through those sections that are not of interest.

The threats to Niassa Reserve wildlife in general and carnivores in particular continue to increase with logging and gold and ruby mining escalating dramatically over the past 2-3 years exacerbating habitat loss. Direct killing of elephant for ivory and wild animals for meat and skins (bushmeat snaring, and targeted snaring for skins) continue. Poisoning of lions for lion bones is an emerging threats that needs attention. The potential disease risk from an increasing populations of unvaccinated domestic dogs inside Niassa Reserve remains high. An emerging threat includes Charcoal production which will lead to increased habitat destruction.



Logging



Elephant poaching



Population growth & habitat loss



Gold & Ruby Mining



Bushmeat snaring

THREATS



Unsustainable trophy hunting



Retaliation due to attacks



Skin trade



Disease – domestic dogs

OBJECTIVE 1: TO IMPROVE AND STREAMLINE THE BUSINESS AND LOGISTICAL MANAGEMENT OF NCP AND ITS MOZAMBICAN ENTITY, MARIRI INVESTIMENTOS

We believe that long term programs are the most effective, particularly because of the levels of trust and respect that are needed to work effectively with local communities and local Government, the need to develop the capacity and skills of our staff and the need to provide ongoing assessment of our actions to minimize unforeseen consequences. We are committed to building a motivated and capable Mozambican team with the leadership, management and conservation tools they need to be effective. In addition while our overall mission is conservation our internal mission is also to build a project that is ethical, productive and supports our staff with training and mentorship at all levels.

2015 Activities and outputs

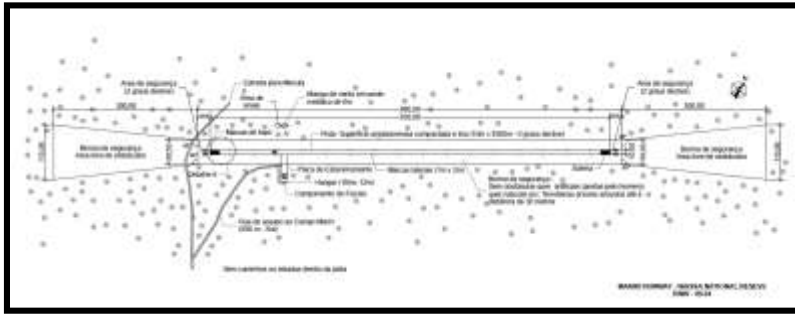
- We continued with our monthly meetings for all permanent staff to create a team with a shared identify and sense of purpose. We discuss challenges, conduct, labour law, conservation law, project goals and successes. These meetings have proven to be a very positive part of project and looked forward to by all our staff.
- Management of our donor database was improved through outsourcing the daily maintenance of the database.
- A volunteer, Ken Harman spent three months at Mariri training our two local mechanics in vehicle maintenance and workshop management. He will be returning in 2016 and 2017 for 8 months a year in the next two years to continue to train our mechanics and workshop team on site.
- Our plane was purchased (Husky A-1) and was operational in Niassa Reserve for 3 months flown by our volunteer pilot, Alan while Operations Director Keith Begg completed his pilot's license. An airstrip hangar was built (12m x 10m) with a scout quarters attached and rain water tank (see section on infrastructure).
- Registration of the Mariri airstrip is currently being handled by the Reserve warden through Lichinga. Detailed plans have been drawn up and all concrete markers are in place. This is out of our control – we hope this will be completed in 2016.
- We continue to work with Reserve team as GDA partners and collaborate other concessions through an alliance of like-minded concession managers (Niassa Conservation Alliance).
- Significant progress was made with completely the infrastructure needed for the NCP headquarters and staff quarters (see section on infrastructure below).

CHALLENGES

- Skills for accounting and human resources continue to be a challenge both onsite and in Lichinga. Lisette Gelber came to spend a month with Rachide onsite to streamline and improve our receipt system, financial reporting and book keeping. Rachide was sent on a 3 month finance course in Maputo during the 2016 wet season to improve his skills. More professional accounting is needed in Lichinga in 2016.
- Very few of our local staff are conservationists and understand and believe in conservation; they simply have their first job. We need to ensure that we provide additional experiences and training in conservation to build a team of conservationists. This takes time and will be done through on-site training and discussions as well as offsite field trips to other conservation areas and teams. We believe this is essential for the long term stability and sustainability of the project.
- The majority of our funding is single year funding. We need to attract more multiple year donors to ensure that we can plan and grow and ensure sustainability.
- We need to develop our team but each time we hire a new person we also have to build accommodation for them so that they can live on site. This has meant that we are constantly trying to deliver on staff accommodation and we are still short on middle management accommodation that we hope to rectify this year.

Mariri Airstrip

Eastern approach = S 12.17037 E 38.09366
 Western approach = S 12.17166 E 38.08599
 Elevation 253 meters



Official plans for the airstrip with all the required markings prepared by architect, Romina Gaona .



AIRSTRIP WITH MARKING READY FOR REGISTRATION.



HUSKY PLANE OPERATIONAL IN 2015



Map of NCPs concession L5-South (580 km²) showing the position of Mbamba Village, Mariri Environmental Centre and HQ of NCP, proposed site for ecotourism lodge and roads

INFRASTRUCTURE

Between 2012 and 2015 we built the Mariri Environmental and Skills training centre to serve all Niassa residents. This also serves as the HQ of the Niassa Carnivore Project and Mariri (which manages the concession). The M.E.C opened in August 2015. For the first time the people who live in Niassa can visit a wildlife area overnight and learn about conservation.

The M.E. Centre was built as a skills training course in construction with more than 40 local men receiving certificates for skills learned (carpentry, masonry, thatching, and plumbing). In addition, we have trained 3 roofing masters (Mistre), 2 ecoblock Masters, 6 masonry masters, 2 plumbers and 4 carpenters. The aim has been to develop local construction skills while building the centre to provide alternative livelihoods for local men, particularly those in the poaching age group.

The Environmental Centre currently consists of 5 cottages for 19 visitors; refectory, library, kitchen, showers, toilets, and laundry. It is surrounded by a polywire electric fence to keep elephants out and ensure the safety of our visitors. It has a well-developed vegetable garden, demonstration goat corral, plastic bottle bench and indigenous gardens.



REFECTORY



RECEPTION AND OFFICE



LIBRARY AND MUSEUM, MEETING ROOM



COTTAGES FOR VISITING LOCAL STUDENTS AND GROUPS



TOILETS WITH RECYCLED BOTTLE WINDOWS

The NCP headquarters are built at the same site as the Environmental Centre and consists of a main office/ reception, separate office block (2 offices), three staff manager houses with bathrooms, two middle management houses with a shared bathroom, and 12 staff rooms with shower block and latrines.

There is a fully functional workshop consisting of three containers for stores, spares and tools with a workshop cement area and carpentry area and a food store,



MIDDLE MANAGEMENT COTTAGES



STAFF QUARTERS (SINGLE ROOMS) AROUND A CENTRAL REFECTORY WITH SHOWERS AND LATRINES.

GUEST ACCOMMODATION

- Two guest Cottages (4 beds) with a shared bathroom were completed in the Mariri style for Eco tourists, researchers, visitors skills trainers and overflow from the Environmental Centre
- We have initiated construction of ecotourism units using local construction team that have been trained in past 3 years. This initial unit is being built at the Environmental Centre. Once the design has been perfected in 2016 these will be constructed in one site (3 units- 6 people) in L5-South with a further two sites planned for future years.



GUEST COTTAGES (4 PEOPLE; TWO ROOMS) WITH INDIGENOUS GARDEN AND SHARED BATHROOM

Hangar and Scout Camp

- We have completed construction of a secure hangar with lockable doors in 2015 at the airstrip.
- Attached to this hangar building is a scout camp with secure, shaded eating area, water tank collecting rain water, and three rooms to sleep 12 scouts as they come off patrol or are on standby.
- There is a cement 10,000 litre water tank to collect rain water runoff and a safe and secure with central covered courtyard for cooking and other activities.

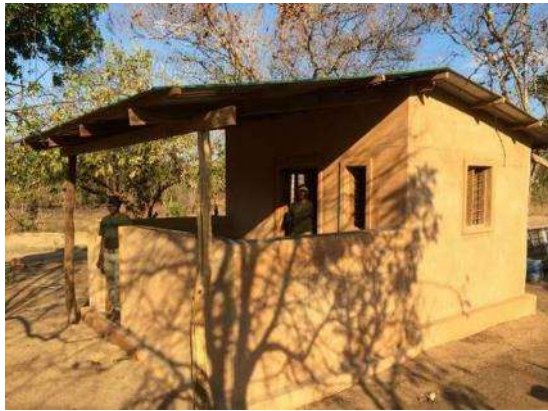




SCOUT QUARTERS ATTACHED TO HANGAR WITH 10,000LT WATER TANK, COVERED COOKING AND WORKING AREA AND ACCOMMODATION FOR 12 SCOUTS.

MBAMBA SCOUT POST

The Mbamba River scout post and control gate were completed in 2015 providing permanent accommodation and shelter for two scouts that are responsible for controlling traffic into the wildlife area.



MBAMBA SCOUT POST WITH SLEEPING QUARTERS FOR 2 SCOUTS AND A BOOM GATE

CHANGAWE SCOUT POST

This was completed in 2013 in partnership with Chuilexi Conservancy. This control post has one scout from Mariri and one scout from Chuilexi on permanent duty to control traffic into the northern sections of our concessions on our all-weather roads, with three times daily radio contact.

CONSTRUCTION IN MBAMBA VILLAGE

In 2015, we started building an office and meeting room for the Mbamba Association. This contains a large meeting room as well as store room and closed veranda. *See section on Mbamba Association.* This follows the construction of the Mosque in 2013, 2014 and we hope to rehabilitate the school at some point in the near future.

CONSTRUCTION PHILOSOPHY

- Our philosophy is to use local people, local materials and local techniques wherever possible.
- All buildings have been built by local men largely from Mbamba Village to provide ongoing employment and skills training.

- The majority of men employed did not have prior building skills. They have been trained on the job as part of a skills training course and have been provided with certificates for skills acquired to allow them to find other employment.
- Some Master builders have used their salaries to buy the tools necessary for them to be completely independent. The Scout posts and Association building were built in 2015 by a local construction team on contract trained by Mariri but now working independently on contract.
- All main buildings (except for Changawe post) have been built using ecoblocks (locally produced bricks with low amounts of cement).
- The majority of the buildings are thatched using local grasses to ensure an ongoing livelihood for local women. More than 400 local women have received an income from collecting and cleaning local grasses. These roofs will need to be replaced on an ongoing basis.
- Large timber requirements have been sourced outside of Niassa Reserve either through planks bought in Pemba with appropriate permits or furniture constructed at a Mozambican sustainable forestry (all bunkbeds, tables and couches).
- Wherever possible we use local skills adapted for our needs to support local economy – blinds, benches, screens, pottery.

NAKATOPI CAMP

A second simple, grass and tent camp is used by Directors (Colleen and Keith Begg) and lion research team at Nakatopi. This camp consists of simple small tents with thatched office area, sand floors (no cement). There are no plans to upgrade this bush camp. It is designed to be very ecologically friendly, low footprint and blend into the bush.

CONSERVATION MONITORING

OBJECTIVE 2: TO PROVIDE LONG TERM MONITORING OF THE STATUS AND THREATS TO LIONS AND OTHER CARNIVORES TO ASSESS OUR EFFECTIVENESS AND ALLOW US TO ADAPTIVELY MANAGE CHANGE.

Wildlife and socioecological Monitoring is essential to assess threats and monitor effectiveness. We do monitoring at two scales – across Niassa Reserve and within our concession L5-South. Key indicators have been identified for threats to the large carnivores (these are summarized in the table below) that are monitored on an ongoing basis to provide trends. These data are fed into larger datasets for biodiversity conservation that are collected by the Reserve management team (livelihoods, habitat transformation, prey population through aerial census etc.).

Indicator	Threat	How it is measured and scale
Attacks by carnivores on people and livestock	Retaliatory killing	Whole Reserve – monitored by wildlife guardians, Reserve team and NCP team.
Mortality of carnivores (snaring, poisoning, sport hunting, retaliatory)	All	Whole reserve – wildlife guardians, concession operators, informer network, radiocollared lions
Population trend in lions and hyaenas	All	Niassa Reserve through call up survey groundtruthed through monitoring in L5-South
Population trend in wild dogs	All	Wildlife guardians, opportunistic sightings of pack – we use pack size as well as individual recognition in L5-South.
Population trend in leopard	All	Camera trap surveys in key sites
Sport hunting offtake, age of trophies and efforts	Sport hunting	All of Niassa Reserve through monitoring and aging of all lion, leopard, hyaena trophies.
Snares removed; bushmeat poachers apprehended; bushmeat sales and consumption	Bushmeat snaring	SMART for antipoaching developed for whole NNR but currently only operational in L5-South; informer information from two villages and two external markets – Lichinga and Marrupa; specific surveys for consumption
Domestic dog population; blood samples of carnivores; disease outbreak	Disease	Across NNR through wildlife guardian program; blood samples collected from sport hunted trophies and animals that are immobilized.

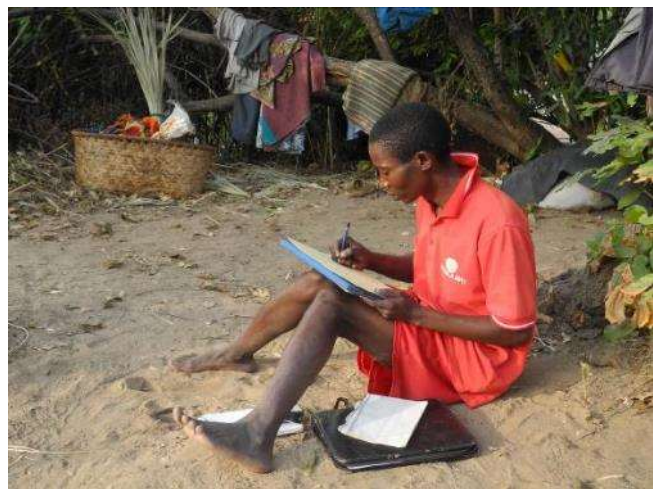
For monitoring of the success of our community partnership in L5-South, we monitor benefits to people (employment, participation in alternative livelihoods programs, revenue) as well as densities of key indicator species (lion, leopard, wilddog, hippo, impala, waterbuck, kudu, African skimmer). We have been collecting baseline data in this area since 2005.

Wildlife densities in Block L5-South are monitored in five ways:

- a) **Scout patrol records** all scouts are trained in data collection and digital devices to collect information on sightings of species. These data represent patrols completed in 2015 by Mariri antipoaching scouts, however the data are incomplete as some scouts are still learning how to use the digital devices. This should be seen as minimum distribution of wildlife. This type of data collection is on-going and will be improved as we go along.
- b) **MOMS Wildlife Guardians:** Mbamba village inside L5-S has a Niassa Reserve community monitor (Pedro Ajali) who collects information on the sightings of lion, leopard, and wild-dog inside Mbamba village as well as information on human-wildlife conflict and fish catch measurements. This is part of the NNR community monitor program that has been in operation since 2006 and currently supports 25 scouts in 24 villages across NNR. MOMS/ SMOG are co-managed by NNR and the Niassa Carnivore Project. NCP provides full funding for the program as well as technical and monitoring assistance to NNR for this program. The data collected are supplied in NCPs annual report. See section on MOMS - Community guardian program) with results.
- c) **Camera traps are** set up at dry season water points specifically to monitor lion, leopard and wild dog densities. These remote cameras are triggered by movement of all animals. In 2015 45 camera traps were set up in L5-South as specific locations to monitor the lion and leopard populations.
- d) **Opportunistic sightings** of lion, leopard, wild dog, spotted hyaena, buffalo herds and other sightings of interest are collected by Mariri research staff (Colleen and Keith Begg, Agostinho, Mbumba Marufo, Eusebio Waiti).
- e) **Specific surveys:** Ongoing regular surveys are conducted to monitor indicator species: lion, leopard, hippo, ungulates, fishing camps, African Skimmer. Lion are monitored through individual identification, camera traps and radio marking as part of a long term study by NCP on lions in L5-South. Leopards are monitored every three years through a camera trapping survey (2008, 2009, and 2010). In 2015, we completed a hippo and ungulate count.



REMOTE CAMERA TRAPS USED TO MONITOR CARNIVORE DENSITY AND PREY POPULATIONS



MBAMBA VILLAGE COMMUNITY GUARDIAN COLLECTED FISHING CATCH DATA FROM THE FISHING CAMPS

The lions in the intensive study area have been monitored since 2005 using individual recognition of individuals (scars, freckle patterns) and wherever possible radio collars. The aims of radio collaring are to assess density, mortality, turnover, cub recruitment, movement patterns around people and density. We do not do pure research. These data are used to ground truth and validate the reserve wide call up survey and to assess whether our community programs are having a positive effect. It was through these data that we were able to prove that bushmeat snaring is the major threat to lions in

NNR causing direct mortality to lions, rapid turnover in pride males and infanticide in cubs. In this section we provide information on our wildlife monitoring with other data presented under the wildlife guardian or antipoaching programs

CONSERVATION MONITORING IN CONCESSION L5-SOUTH- EVIDENCE OF A SUCCESSFUL COMMUNITY PARTNESHIP

L5-South holds relatively high wildlife densities particularly along the Lugenda River and the secondary rivers, Msangezi and Mbamba Rivers. It incorporates the most extensive network of braided channels on the Lugenda River (with concession L7 on the south bank) – a habitat high in biodiversity. All the plains game (Annex 1) found across broader Niassa Reserve are here, although Niassa wildebeest and reed buck are uncommon. Bushpigs and wart hog are becoming increasingly common. Side striped jackals are being increasingly seen in camera trap pictures.

Lion, leopard, spotted hyaena and African Wild Dog are present and relatively common. Cheetah and caracal do not occur in Niassa Reserve. Of the smaller carnivores’ African civet, Miombo genet, common genet, slender mongoose, banded mongoose, bushytailed mongoose, water mongoose, side striped jackal and water mongoose are very common. Honey badger, large spotted genet, African wild cat, African clawless otter, white tailed mongoose, dwarf mongoose, African polecat and serval are present. Antbear (aardvark) and porcupine are relatively common while pangolin are present but not often seen

Our goal is to conserve this wilderness areas with all its biodiversity and habitats. The value of birds, fish, reptiles, and amphibians as well as the even smaller beetles, spiders etc. are all part of the Niassa Reserve ecosystem and negatively affected by habitat destruction through agriculture and mining and use of mercury. There are many treasures here that are important for conservation efforts, biodiversity, medicinal and cultural uses and ecotourism. Through the Mariri Environmental Centre we are beginning to document the biodiversity in the area.

Some pictures of wildlife sightings taken in 2015 are provided below.



BUFFALO HERDS ARE FREQUENTLY SEEN ON THE CAMERA TRAPS



ELAND NUMBERS ARE INCREASING WITH A LOT OF CALVES SEEN IN CAMERA TRAP PICTURES



NARINA TROGON – A SPECIALIST FOREST BIRD AND SOUGHT AFTER BY BIRD WATCHING ECOTOURISTS



LIONS ARE INCREASING IN THE AREA – THIS IS A YOUNG MALE FROM THE F-PRIDE SOON TO BE INDEPENDENT

AFRICAN FISH EAGLES ARE GOOD INDICATORS OF “HEALTH” OF LUGENDA RIVER AND ARE AN INDICATOR BIRD DURING OUR RIVER SURVEYS



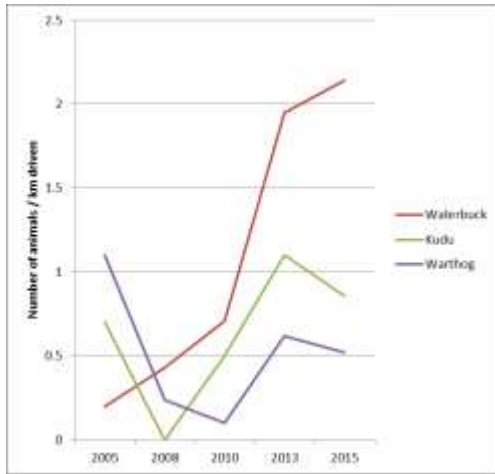
A LIONESSE IN THE M-PRIDE IS BLIND IN ONE EYE BUT HAS STILL MANAGED TO SUCCESSFULLY REAR CUBS.



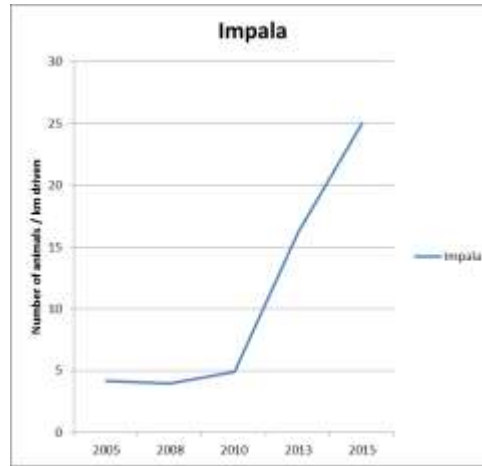
AFRICAN WILD DOGS ARE SEEN FAIRLY REGULARLY AT BOTH MARIRI AND NAKATOPI CAMPS, THERE ARE 3-4 PACKS IN THE AREA TOTALLY AN ESTIMATED 35 INDIVIDUALS. THESE NIASA RESERVE WILD DOGS ARE EXTREMELY IMPORTANT FOR GLOBAL CONSERVATION EFFORTS OF THIS SPECIES, ARE VERY IMPORTANT FOR ECO-TOURISM AND EDUCATION ACTIVITIES AND ARE THE EMBLEM OF NIASA RESERVE SO DESERVE SPECIAL ATTENTION.

Ungulates (Impala, waterbuck, Kudu and warthog). Herbivores are counted along a repeated road transect (25 km) driven through the study area within 10 km of the river in the open grassed woodland. The transect count is done in a vehicle in September / October by two observers between 05.30 and 08.00. This road is driven 3-5 times and the largest number of individuals seen of each species is used. This has been done since 2004 along the same road in the same way. The intention is not to provide a density of these species inside the study area within different habitats but to use a simple repeated method to monitor the trend in impala, waterbuck, and kudu and warthog numbers in this section of the concession. Results are then converted to the number of animals / km driven and compared.

The 2015 results show a continued increase in impala, waterbuck numbers on the floodplain with slight decrease in kudu and warthog. As bushmeat snaring now seems to be under control these fluctuations in numbers are most likely to be due to rainfall.



TREND IN WATERBUCK, KUDU AND WARTHOG POPULATIONS IN L5-SOUTH ALONG THE 21 KM OF THE LUGENDA BETWEEN 2005 AND 2015



TREND IN IMPALA POPULATIONS IN L5-SOUTH ALONG A 21 KM TRANSECT ON LUGENDA RIVER FLOODPLAIN BETWEEN 2005 AND 2015 SHOWING THE INCREASING POPULATION.

Hippo:

A regular count of hippo in the Lugenda River between the Mbamba River confluences and the Msangezi River confluence (26 km) has been done between 2004 and 2015. The count is done on foot and by canoe. In 2015 an additional aerial survey was done.

The hippo population has steadily increased from 76 hippo in 2004 to 183 hippo in 2015. The Mashaa hippo pool has increased from 38 individuals in 2013 to 56 and the Mpopo hippo pool has stayed stable at 63 individuals (compared to 67 in 2013). There are now two new pools with >10 hippos. Counts will again be done in 2017. Note that in braided channels where river is at some points more than 1km wide this only counts on the northern half of the river. The Hunting concession L7 is on the south bank. In 2016 we will also initiate counts from Mbamba River confluence to Nkuti confluence in L4-East.

One hippo was killed in front of Lusinge Camp (L7) by the local community; it appeared to be sick. A second hippo died of natural causes near Mpopo pool.

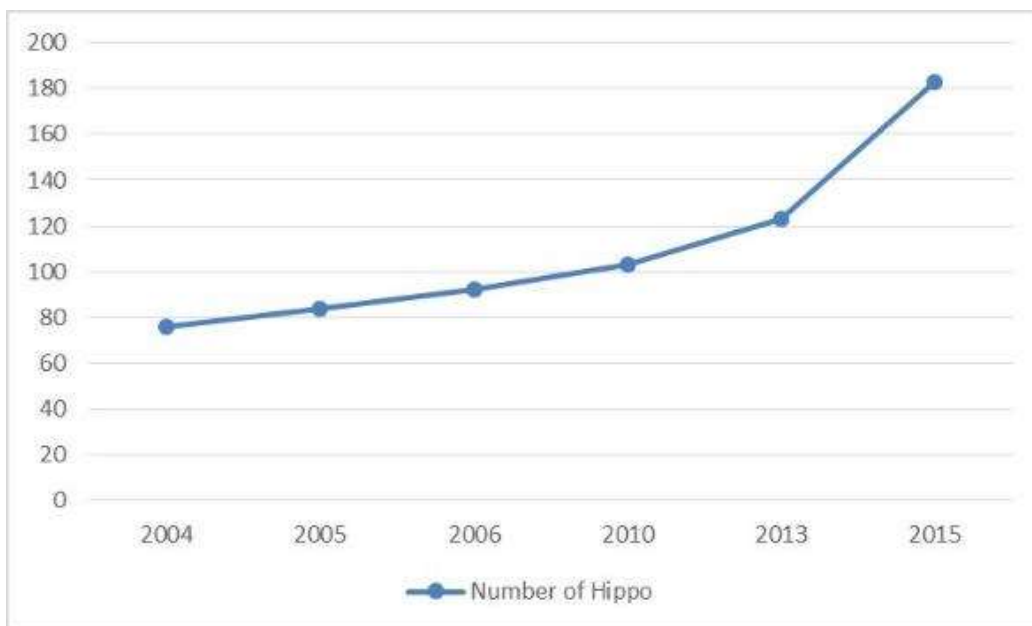


FIGURE: INCREASE IN HIPPO NUMBERS OVER TIME



HIPPO KILLED BY MBAMBA COMMUNITY IN FRONT OF LUSINGE CAMP – 2015

- **Buffalo:** It is difficult to count buffalo without an aeroplane. In 2016 buffalo counts will be done from the air. However, in L5-South there are three main herds – Mbamba (80), Mpopo (40) and Msangezi (250) with some solitary bulls with an estimated total of 400-450 animals. In 2016, L5-South will have an aeroplane active in the concession and regular counts will be done. Buffalo are the most common animal snared.

CONSERVATION MONITORING – LION, HYAENA, LEOPARD AND WILD DOG

- In 2015 there were 6-7 lion prides living inside L5-South, totally 25-27 adults and 3 cubs. Several of the lions were seen mating in 2015 and we are hopeful that more cubs will be born in 2016. The prides are currently made up of F-Pride (2 females, 3 subadult males); A-Pride (1 female, 1 subadult female, 1 cub), MA-Pride (1 female, 1 subadult female); R-pride (5 females, 1 subadult males, 2 cubs); M-Pride (3 individuals); C-Pride (1 adult female). In addition there are at least a coalition of 2 adult males, two other separate males, and four unidentified females that were seen in 2015.
- The lion population is currently stable at 0.04 lions / km² with 6-7 lions prides living inside L5-South, comprised of 25-27 adults and 3 cubs under one year old. No known lions have been snared in L5-South since the beginning of 2013.
- No known lions were snared in L5-south in 2015 matching the results from 2013 and 2014. One male dispersed into L7 and has not been seen; one male left L5-South and took over a pride in Chuilexi / L8 area and was sport hunted. One female was found dead in L7 but there was no sign of snaring.
- Between 2010 and 2012, only 22% of the known cubs born in the study area reached 1 year old. Sport hunting in neighbouring concessions and high levels of snaring within the concession of both males and females resulted in high male turnover which in turn resulted in infanticide (cubs killed by incoming males). **Between 2012 and 2015, the proportion of lion cubs reaching 1 year of ages has risen to 71% and prides are showing a more "normal" distribution of adults, cubs and subadults.** Litter size still seems low with only 1-2 cubs reaching adulthood.

THE TREND IN THE LION POPULATION ACROSS NIASSA RESERVE

- Niassa Carnivore Project conducts a lion and hyaena call-up survey across Niassa Reserve at regular intervals according to our MOU with Reserve Management. It has been completed in 2005, 2008, and 2012. In 2015 we conducted this survey with three teams (two with NCP staff and one NNR team lead by Dr Tomas Prin).
- We use a standardized playback technique that has been widely used in other areas (Kiffner et al 2011, Brink 2010, Ferreira & Funston 2010) and has been detailed in 2012 Annual report. Care was taken to match the survey protocols used in other recent studies to ensure comparable results.

- An hour was spent at each call station with calls played for 10 minutes, then no calls for 10 minutes while scanning for carnivore using a spotlight with a red filter and so on until the 60 minutes had been completed. A goat meat bait was hung at each call station to encourage carnivores to approach close enough to be aged. At each call station we recorded the number of incoming lions and other carnivores and determined their sex.
- Data were analysed using the statistically robust model developed by Ferreira & Funston (2010), to estimate population size with confidence intervals. Lion density was calculated for NNR overall in 2005, 2008, 2012, 2015 using exactly the same technique and using the same equipment.
- We recognise that this method does not provide a total count or census of lions in NNR; this is not the intention. We aim to monitor the trend in the lion population – is it going up, down or is it stable. It is impossible to do a count/ census over the whole protected area of 42 200km² particularly since the lions are not habituated, there relatively few roads and communities are widely dispersed and few observers could take photographs of lions for individual recognition. Track transects are difficult due to high pedestrian traffic, poor soils in some areas and extensive fires which means that carnivores seldom walk on the roads in the dry season.

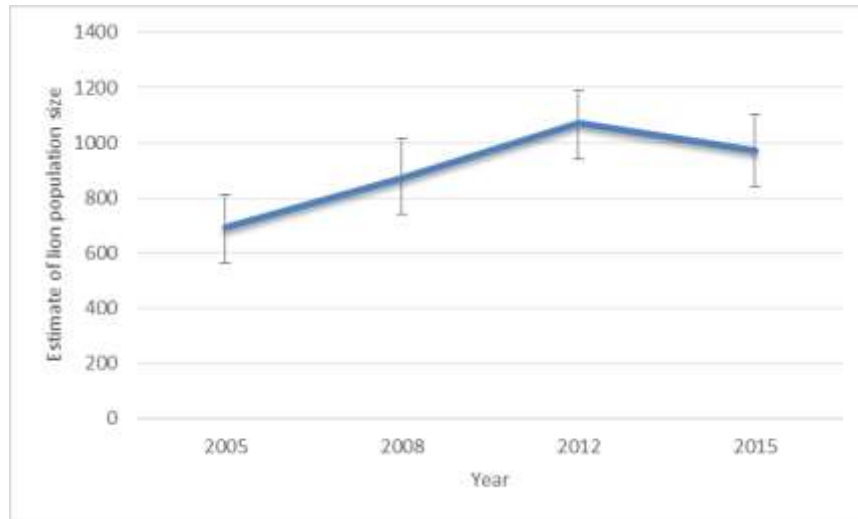
Table 1: Model parameters used to analyse Niassa call up survey data using model (Ferreira & Funston 2010)

Parameter	Value used
Probability adult lion will arrive at call station	0.734
Probability cub will arrive at call station	0.286
Effective area sampled at each call station	32.17
Maximum distance calls can be heard	3.2 km
Distance between call stations	10 km straight line

- In 2015, a total of 153 calling stations were completed, and 57 lions and 146 hyaenas responded. Based on the results of the call up survey, the Niassa lion population is currently stable but showing a slight decrease and still estimated at between 800-1000 lions. Additional data analysis is ongoing.
- Studies in other areas have shown that there is a threshold of human density above which coexistence between lions and people is difficult (above 25 people / km²; Riggio *et al* 2012). We would expect that some areas in Niassa Reserve where human population has been increasing and illegal activities have increased will show little lion activity e.g. north eastern section along Ruvuma River.
- This was found during the 2015 callup survey were the data suggest that there is no longer a uniform distribution of lions and other carnivores across NNR even along the Ruvuma and Lugenda Rivers where game densities are likely to be higher. Some areas in the west and north east of NNR appear to have suffered significant declines. In many areas it was not possible to use the same callup sites as there was high human presence and in some cases new villages. On three occasions, people responded to the squealing pig call hoping to steal meat.
- These data are supported by the data on mortality of lions collected by the community wildlife guardians and informers. MOMS wildlife guardian data show that in only 24 villages across Niassa Reserve large carnivores represented 30% of the deaths recorded with 15 leopard, 12 lion, 18 hyaenas and 3 wild dogs killed in 24 villages in 2015 alone. If we add in informer data, a minimum of 42 lions and 44 leopards were killed illegally in Niassa reserve in last two years. Add to this the 12 lions and 42 leopards killed legally by sport hunters in 2014 and 2015.

Trend in lion population size in NNR from call up surveys conducted in 2005, 2008, and 2012. Data analysed using the carnivore estimator model of Ferreira and Funston (2010).

Parameter	Call up survey Lion			2015
	2005	2008	2012	
Number of call stations	97	104	128	153
Number of animals that responded	27	36	40	57
Population Estimate (95% confidence limits)	693 (577-810)	871 (730-1013)	1071 (951-1191)	973 (842-1104)



Trend in the Niassa Reserve lion population over a ten year period.

Bear in mind that this only includes data from informers in two villages, plus Lichinga and Marrupa managed by Agostinho and 24 wildlife guardians in 24 villages. This is likely to be an underestimate as we do not have information from all the villages.

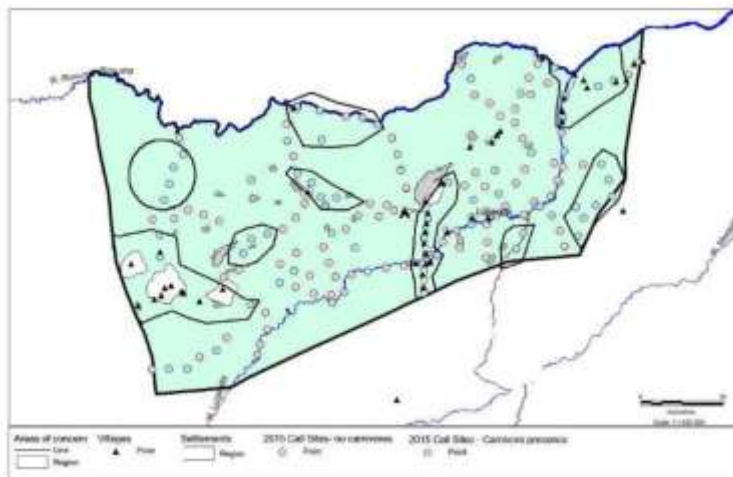


FIGURE: 2015 LION AND HYAENA CALL-UP SURVEY RESULTS SUGGEST SEVERAL AREAS OF CONCERN WHERE NO LARGE CARNIVORES WERE SEEN DURING THE SURVEY. THIS DOES NOT MEAN THAT NO CARNIVORES ARE IN THESE AREAS ONLY THAT DENSITIES APPEAR TO BE LOW AND ILLEGAL OFFTAKE AND THREATS MIGHT BE INCREASING IN THESE AREAS.



CUB BORN IN 2015 INTO MA-PRIDE

AFRICAN WILD DOGS

African wild dog numbers are difficult to assess directly. We monitor their status and distribution through long term monitoring of pack size and through opportunistic sightings from operators, our team, camera traps and community wildlife guardians. Due to the difficulties in monitoring the wild dogs over the expanse of Niassa Reserve, we primarily focus on reducing the threats to their survival (disease, snaring and poisoning) and providing environmental education and awareness. In the intensive study area we monitor all packs through photo ID. The opportunistic data collected on “special species” and mortality by the Community wildlife guardians spread across 24 villages in all three districts is very important for monitoring the distribution and health of the wild dogs. (See Objective 7 for more information on the Community wildlife Guardian Program).

African wild dogs are regularly seen in L5-South. Four packs are currently resident. One pack of 17-21 individuals around the Mariri Environmental Centre and three smaller packs of 9 and 7 and 4 around Nkopola and Msangezi. The wild dogs are breeding in the area and are regularly monitored through camera traps. ID cards have been developed for all individuals that can be identified from their coat patterns. **In total 45 individuals have already been visually identified from their coat patterns.**



CONSERVATION MONITORING BY MOMS COMMUNITY WILDLIFE GUARDIAN PROGRAM IN VILLAGES THROUGHOUT NNR

The program is managed by the MOMS coordinator, Horacio under the guidance of Mbumba Marufo, Mariri Community Manager in partnership with Reserve Administrator. Data is owned and provided by the MOMS community guardians on paper and entered into the computer by MOMS coordinator for broader management use.

Since 2006, Niassa Carnivore Project (NCP) has been financially supporting and mentoring the community monitoring program, MOMS. In 2009, the program was handed over to be managed on a day to day basis by NNR management team but with continued financial support from NCP. Guardians are paid monthly subsidies for part time work, provided with caps and T-shirts and all materials needed) as well as provide ongoing mentorship and support, and we provide skills training for coordinator. The community monitors not only collect information on fishing activities, human wildlife conflict and special species sightings but they also convey important information to their communication on rabies, ways to reduce human-wildlife conflict, safe behaviours and conservation and provide a link between communities and NCP/ Reserve management.

2015 Activities and Progress

- A dedicated vehicle was bought for the MOMS program and the MOMS Manager, received his driver's license.
- All stipends were paid on time to the 14 wildlife guardians from Mecula district and 3 from Negomano administrative post and 9 wildlife guardians from Mavago.
- Two new wildlife guardians from Lipembo village in Mavago and Ncuti village in Niassa were successfully recruited and trained.
- The MOMS annual training workshop was held at Mariri Environment Center for 22 wildlife guardians, Dir. SDAE from Mavago, representative of Dir. SDAE from Mecula, 3 students from Marrupa school of Ecotourism, 3 staff from NNR's community department, community manager of Chuilexi Conservancy and his assistant and 2 staff from NCP. The main topics discussed during the workshop were:
 - Training on the methods of data collection;
 - Involvement of the wildlife guardians in the mobilization of their communities to improve their goat corrals and shelters to reduce human and wildlife conflict;
 - Involvement of the wildlife guardian in mobilizing and raising awareness of rabies and other conservation related messages for Niassa Reserve ; improvement of the data collection and service to their respective communities sharing the data with them and keep the data safe and in proper folders;
 - Importance of having the guardians to act as a link between Niassa Reserve Management/NCP and their communities and leaders;
 - The establishment of a WhatsApp communication system among the focal point guardians and managers of NNR, NCP and Chuilexi Conservancy;
 - 27 certificates of attendance of the trained were given to the participants;
 - One bicycle and two radios were given as awards and incentives to the 3 best guardians; Materials, equipment, t-shirts and caps were distributed to guardians;
- The MOMS manager and his assistant managed to put all MOMS data into the computer, from 2013 to 2015. There is ongoing work to introduce the remaining data starting from year 2006. These datasets are very valuable and can serve as baselines to assess changes in NNR over time as there is now ten years of data on HWC, special species and fishing activities for selected villages. These data are available to NNR management team.
- Eight android cell phones were bought and distributed to the wildlife guardian, MOMS manager and his assistant to improve communication through WhatsApp.
- An exchange experience with WWF's Niassa Lake Reserve staff and community members and wildlife guardians, NNR staff and NCP staff was successful held. Three villages and two fishing camps were visited.



DEDICATED MOMS VEHICLE



MOMS MANAGER AND HIS ASSISTANT WORKING IN MAVAGO



MOMS WORKSHOP AT MARIRI ENVIRONMENTAL CENTRE



MOMS EXCHANGE VISIT WITH WWF



Awareness – safe shelters

In 2015, an effort was made to increase the extension / outreach role of the wildlife guardians in each village. The wildlife guardians have been mobilizing their communities to build safe shelters in their farms to protect themselves and their families at night, especially against carnivores, while guarding the fields. By December 2015, seven guardians had

built safe shelter in their own fields and another 3 guardians were close to finishing construction. These model shelters serve as an example to communities of how to protect themselves from carnivore attacks. It is very important that the wildlife guardians model the behaviour they want their communities to follow and live by example.



SAFE SHELTER FROM THE GUARDIAN FROM GOMBA VILLAGE – NOTE SLEEPING AREA ON STILTS

MONITORING OF SPECIAL SPECIES AND MORTALITY

- The number of sightings of different wildlife species in village surrounds were remarkably similar in 2014 and 2015 which suggests that these data are a reliable indicator of presence and declines are a possible indicator of concern. Once all the data is on the computer this will be a very interesting historical dataset: 2006-2015.
- These data do also provide presence/ absence data for special species such as wild dogs, lion, leopard and spotted hyaena across NNR which can be tracked over time and we specifically use these data to monitor wild dog pack size across Niassa Reserve.
- About 9891 different animals were seen by wildlife guardians in 2015 (compared to 8988 in 2014). As was the case in 2014, the special species most frequently seen in village surrounds were buffalo, (55% of sightings) then hippo (15%) and wild dog (10%).
- Lichengue, Mbamba, Matondovela and Ntimbo remain the villages with highest numbers of sightings of buffalo (50.3%). Mbamba, Mucoria village and Negomano-center together recorded 32% of the lion sightings. Mucoria, Nahavara, Mbamba, Mavago-Ibo and Negomano-center have together 56.4% of wild dog recorded. It is difficult to assess whether these high levels of special species in these villages reflects diligent guardians or high biodiversity in these areas.
- Mbamba village in L5-South where NCP community activities are concentrated continues to record the most frequent sightings of lions, wild dogs, and buffalo.
- The records of lions and wild dogs around Negomano sede are important as this area has experienced heavy bushmeat poaching and lion attacks on people in the past (2005-2006). In 2015 a lion killed a person when it was being hunted for a skin in Negomano area. Very few lions were seen in this area during call up survey.
- The number of sightings in the three districts of different species sightings were also remarkably similar for most species in 2014 and 2015 and the number of guardians was the same. This suggests that any relatively large differences (arbitrarily set at more than 20% difference between 2014 and 2015) between years may reflect actual declines in species and should be noted as areas for concern. Alternative data can then be looked at (illegal hunting, aerial census) to verify the decline. These areas have been highlighted in the table below for additional investigation.

SUMMARY OF THE NUMBER OF ANIMALS RECORDED IN 2015 AND (2014) SHOWING DECLINES IN THE NUMBER OF SIGHTINGS OF HIPPO, CROCODILE, LEOPARD AND HYAENA IN NEGOMANO AREAS AND TORTOISE, LION AND LEOPARD IN MECULA AREAS.

	Buffalo	Wildest	Hippo	Crocodile	Tortoise	Lion	Leopard	Wild dog	Hyena
	521	45	309	116	86	143	97	307	117
Mavago	(525)	(4)	(372)	(138)	(96)	(159)	(77)	(392)	(101)
	4014	387	1130	157	40	287	79	464	178
Mecula	(2994)	(440)	(964)	(189)	(116)	(389)	(135)	(489)	(174)
	620	222	55	73	40	94	29	216	65
Negomano	(498)	(124)	(87)	(114)	(38)	(84)	(44)	(223)	(24)
Total	5155	654	1494	346	166	524	205	987	360

Mortality

- Of particular conservation importance are the data collected on the number of dead animals seen in the villages. At present the MOMS guardians do not record why the animal has died to ensure all data is collected. As a result animals killed illegally as part of human wildlife conflict, retaliatory killing and bushmeat or for skins are all recorded similarly. This information is very interesting and highlights the threats to animals in Niassa and is important for management purposes and to illustrate to communities how many animals are dying.
- In 2015, 208 animals were found dead in the villages that were monitored by the wildlife guardians. It is likely that the majority of these deaths were due to bushmeat snaring and retaliatory killing in response to human wildlife conflict not natural deaths. It still remains difficult for the wildlife guardians to record the reason for the deaths without compromising their neutrality.
- As was the case in 2014, the highest mortality in a special species was recorded in buffalo, followed by crocodile, and tortoise. This year hippo and wild dog had lower mortality.
- The number of lions recorded dead in 2015 was 12 compared to 9 in 2014 in 24 villages.
- Large carnivores represented 30% of the deaths recorded. The number of carnivores being killed illegally should be of concern. In 2015, 15 leopard, 12 lion, 18 hyaenas and 3 wild dogs were recorded dead. This is likely to be the result of human wildlife conflict. These mortalities would have to be added to the number of animals killed as trophies by sport hunters and extrapolated to represent all 44 villages.
- In total in the past two years, 59 leopards, 21 lions, 35 hyaenas and 23 wild dogs have been killed in only 24 villages. There are 44 villages inside Niassa Reserve, more carnivores are also killed by sport hunters (6 lions, and 20 leopards in 2015) and through snaring.

•

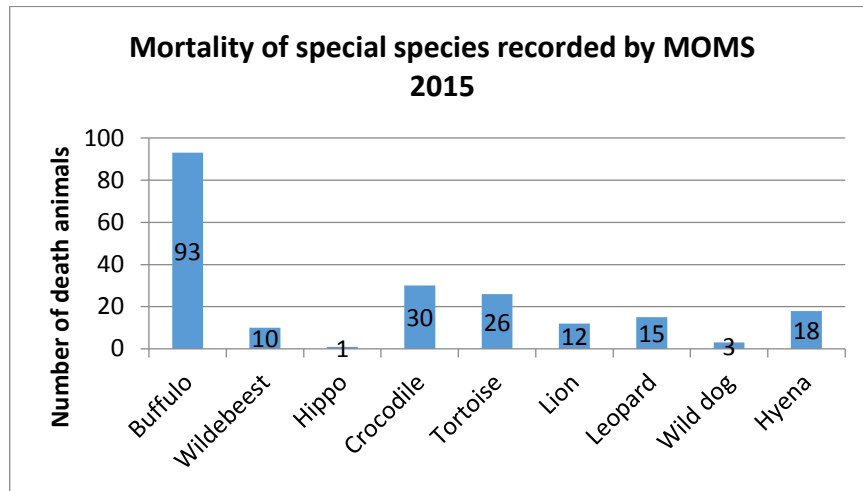


ILLUSTRATION OF THE NUMBER OF DEATH ANIMALS RECORDED BY THE GUARDIANS IN 2015

Community fishing

Monitoring of fishing activities has been a central part of the MOMS program since its inception in 2006. In the rainy season fisherman extend their activities to the small and seasonal rivers. This is the breeding time for the fish during the dry season woman and children also fish. The majority of fishermen recorded are Mozambican and very few were from Tanzania. These data are important as fish provide the main source of protein in Niassa Reserve year round. Any failure in fish stocks is likely to result in an increase in bushmeat snaring.

Fishing camps, amount of fish captured

Fishing activities were made during entire year. During the rainy season fisherman extended their activities to small and seasonal rivers. In the dry season woman and children also dedicate themselves to fish in Lugenda River. The majority of fishermen recorded are Mozambican and very few were from Tanzania.

In total 249 fishing camps were recorded by the wildlife guardians during 2015. 127 of these fishing camps were locating in Mecula, 83 in Mavago and 39 in Negomano areas. This is a minimum number as these data are limited by the movements of the MOMS guardians around their 24 villages.

- More than 32,617kg of fish were weighed in 2015. About 49% of this amount of fish was caught in Mecula district, 39% in Mavago and 13% in Negomano;
- The use of poison was recorded on about 25 occasions compared to 34 occasions in 2014. About 260 kg of the total amount of fish measured were caught by this method;
- Poison was more commonly used in Mavago (23 times) than in Mecula district (2 times) between September and October, and was used in the following rivers:
 - Licheringo river – in Mavago- Iringa village
 - Msawise river- Mavago – Msawise village
 - Cuntino river – Mavago – Namacambale village
 - Missuachi river– Mavago – Namacambale village
 - Chilunga river – Mavago - Ibo
 - Chapola river - Mecula – Naulala village,
- The majorities of fishing methods are well known to all fishermen in all camps and are used during the entire year depending on river conditions and materials available.

THREAT 1: BUSHMEAT SNARING

Snares are used to kill wild animals for meat and non-target species like carnivores are killed inadvertently. It is the major threat to lions, leopards, spotted hyenas and African wild dogs in Niassa Reserve as it kills both their prey and them directly. The mortality of lions in the intensive study area in 2008-2010 was 28% when natural mortality in other well protected areas was only 6 % of adults. Snaring causes rapid turnover in adult male lions and infanticide of cubs. Turnover in leopards is also high with no leopards camera trapped in 2009 being camera trapped in 2010 which suggests very high turnover (Jorge *et al.* 2013).

Research has shown that the majority of meat protein eaten in Niassa Reserve is currently being provided by bushmeat (meat of wild species rather than domestic livestock). Domestic meat protein is scarce and expensive. It costs more to buy a chicken (US\$3-4) than it costs to buy a guineafowl (\$0.60) or portion of bushmeat (US\$0.60 to \$1.60). The main reasons for not keeping domestic livestock are a large die off of chickens due to disease and lack of money to buy initial stock. In addition domestic livestock are kept as a savings account for emergencies and with small numbers are seldom eaten. There is little knowledge of animal husbandry and no veterinary care. In 2012 the majority of Niassa Residents were eating bushmeat at least 1-2 times a week (n = 1229 across; 34 villages).

The wire snares set to catch wild animals for meat not only kill the carnivores directly but also kill their prey reducing all wildlife densities. The bushmeat trade not only provides meat but the sale of ivory, meat, and skins provide a lucrative source of income for local hunters who have limited skills and job opportunities. The increasing snaring and poaching in Niassa are therefore exacerbated by food insecurity, lack of alternative livelihoods and low skills levels of local people inside Niassa Reserve. Indications from the 2014 aerial censuses suggests several ungulates are declining (Grossman *et al.*, 2014).

NCP aims to address snaring through a holistic approach of providing alternative income generating opportunities for hunters through skills training and employment of local people, providing an alternative protein source through small livestock breeding, increasing food security and developing effective anti-poaching that involves resident communities. The continued need for community involvement is critical as we do not believe that antipoaching alone will solve the problem in Niassa given size of the area protected and high levels of movement of people inside the protected area. We believe that equal amounts of funding should be spent on the guns and boots and community engagement approached. *Conservation of wildlife in areas where people are resident needs to be an informed choice not a forced activity.*

OBJECTIVE 4: TO DEVELOP ALTERNATIVE PROTEIN SOURCES TO REDUCE RELIANCE ON BUSHMEAT AND SNARING

LIVESTOCK BREEDING GROUPS

Lead by and data collated by Agostinho Jorge, Mariri Conservation Manager

The livestock husbandry program is part of the NCP program to reduce bushmeat snaring through antipoaching, alternative livelihoods and alternative protein. It aims to increase the quantity and diversity of meat protein available in the villages which we hope will increase food security, decrease reliance on bushmeat and will provide an alternative income for local households through sale. It is important to note that domestic rabbits cannot breed with any wild rabbits, and there is no danger of interbreeding with wild rabbits. In addition, domestic rabbits that escape are quickly eaten by local predators.

The program started in 2011 with data collected on snaring, bushmeat consumption and food needs of local households. We then initiated two domesticated guineafowl breeding programs with two local farmers, one in Mbamba village and one in Nkuti Village. The focus is on micro livestock that are already present in Niassa Reserve. This program aims to increase the quantity and diversity of meat protein available in the villages and opportunities for income generation

which we hope will increase food security, decrease reliance on bushmeat and will provide an alternative income for local households through sale. This program has full community support and assistance with livestock breeding was identified as a priority for community. These are voluntary groups and no payments for activities are provided. Each group decides on its own name, a leader and secretary as well as the rules to guide the functioning of the group. The NCP representative (Agostinho Jorge) provides advice but does not lead the process.

- T-shirts and caps are provided each year to all members of the original group with the name to develop a sense of identity. For the second generation, those that pay back their loans and graduate are provided with a T-shirt and certificate.
- Each person wishing to receive domestic livestock has to first show commitment by building a rabbit hutch and chicken coop before receiving animals. Guidance is provided on the elements needed in each coop (air, sunlight, safety, slatted floor to keep clean, ease of access etc.).
- All animals (rabbits, ducks, guineafowl, doves, and guinea pigs) involved in the Mariri LBG already existed in the Niassa Reserve before Mariri distributed the specimens in each village. No animal has been introduced in the reserve by Mariri to implement the programs with the LBGs.
- Domesticated rabbits, guineafowl, guineapigs, ducks, doves, turkeys are the animals available for the group. The first members chose animals from the list of available animals. Each member of the group is “seeded” with two female rabbits or a pair of domesticated guineafowl, ducks or guinea pigs as a micro loan. Other interested people can put their names on the waiting list kept by the “secretario” (secretary) of the group. The waiting list closes when double the number of names is on the list as each original member will pay back their loan in animals (barter micro credit scheme) to two new members supplemented with animals from Mariri to provide breeding stock.
- Eventually in the third or fourth generation it’s expected that a considerable number of household in the village will have received animals, the group will become too big and difficult to manage. That might be the moment for Mariri to leave the LBG group moving on its own and stop providing animals as microloan or incentives.
- It is the intention that each member of the group will eventually have several different types of micro-livestock (rabbits, ducks, guineafowl, guineapig, goats and turkey) to spread risk and increase diversity.
- Detailed records are kept of breeding to ensure inbreeding does not become an issue and to monitor breeding and income generated to assess success. The mating dates are recorded in the calendar to allow the members to control the gestation period. Records have to be kept by the group. This approach also increases the interaction between LBG members where they visit each other and provide support and sharing of experiences.

2015 Results and Activities

- To date the program has reached 85 households in three villages (Mbamba, Nkuti, and Macalange).
- In 2015, people started earning their first significant income from the LBG. Seven members of LBG allocated sold 38 animals to Mariri to be used at the Environmental Centre. Part of the Mariri philosophy is to source as much food as possibly locally. This generated 11 000.00 MT to the 7 households involved. An additional 10 animals were sold to Mariri, to “seed” new members in other villages. Five households have sold animals to other villagers.
- Five households reported that have started to eat the rabbits and ducks as a protein source.
- In August 2015, a major outbreak of Newcastle’s disease decimated the chicken population in Mbamba Village. As predicated LBG members were less affected by the Newcastle disease in Mbamba. Many villagers ended up having no animals as they rely mostly on chickens and thus reduced considerably their sources of animal protein and income. Members of Mbamba LBG did lose chickens however they did still had ducks, rabbits and other animals which reduced the impact of the Newcastle disease at the household level and reduced food insecurity.

- Contact was made with Mecula SDAE department to collaborate with the Newcastle's disease and they were encouraged to be partners in this program. The SDAE technician (Mr Manga) from Mecula has been designated for Mbamba village. He has been contacted to visit the Mbamba LBG and also for a collaboration regarding the vaccination for the Newcastle in Mbamba village.
- Eight guineafowl were bought and allocated to the Macalange LBG program. In addition, in 2015 domestic chickens hatched 3 of the 20 guineafowl eggs bought in to Mbamba.
- Establishment of the first members of the third generation of Macalange LBG – Macalange LBG has now 40 members in the LBG
- The Mariri LBG program was selected as the best social / community program in the district by the Comite de Gestao from Mecula District. It has significant community support.
- We identified the depredation of baby ducks by adult ducks and competition between chickens and ducks for eggs, death of ducks in very early stage of their lives as the main problems limiting the growth of duck populations in Mbamba and Macalange. These problems are less severe in Nkuti villages. There is still a need to determine the exact cause of the death of the baby ducks in the very early stage of their lives
- 40 members in Macalange and in Mbamba improved their hutches with 200 m of chicken mesh provided by the program to reduce animals being killed by predators. This was paid for with animals and money 500MT. Mariri provided the chicken mesh at a subsidized cost of 40Mt/m of chicken mesh to the villagers. Members from Nkuti and Macalange paid 20 animals for the mesh. The opposite result was produced in Mbamba where 20 people received 150m of chicken mesh and have not yet paid back their loans.
- Two visits of exchange experience were conducted between the members of LBG from Macalange, Mbamba and Nkuti and one visit was conducted to the Marrupa producers. Two households substantially improved their hutches based on the Marrupa experience. Two baby rabbits were successfully born in the hutches. The decision of the members from Mbamba to adopt the new design of hutch and being successful at breeding the rabbits can potentially encourage other members from the village to follow the same approach.
- At the moment the proportion of the species in the program is rabbits (50%), ducks (45%), guineafowl, doves, guinea pigs and turkeys (5%). Rabbits and ducks have a much better breeding and survival rate in these villages compared to guineafowl, doves and Guinea pigs as people seem more familiar with the management of these animals compared to doves.
- Guinea fowl are difficult to breed as they often lay eggs in the bush and the eggs get stolen. Also they are more difficult to control because sometimes they start stop sleeping inside the hutches and start sleeping on the trees.
- Turkeys were introduced in the group for the members to get familiar with them because no member had the experience on how to breed or raise turkeys before. They are sensitive animals and it was important to have people learning how to raise them before people start receiving them as incentives for paying back animals to the project. One farmer in Macalange currently is raising the turkeys and the plan is that the lessons gained by this member will be shared with other members that receive turkeys as incentive. Animals bred by this member will be shared with Mariri. Turkeys will be distributed to the members of the 4th generations, when they reach that level.
- Mariri built two improved hutches for the best breeders - Ms Florinda Arde, who reached 24 animals and Mr Titos Issa who reached 12 adult ducks in Nkuti. Mariri provided materials and labour for the construction of the hutches.
- Three male rabbits have been rotated among the Mbamba, Macalange and Nkuti LBG members to limit inbreeding.
- A total of 13 doves and guinea pigs were introduced as incentives in Macalange village and people were able to start breeding them. These animals were allocated to five families and were given as incentives for good records. Mariri hopes to use this experience to increase the numbers and diversity of these animals in villages. They already existed in Mecula district but were rare in Mbamba and inexistent in Macalange.



BEST DUCK BREEDER IN MACALANGE



THE EXCHANGE VISIT RESULTS IN IMPROVED HUTCHES BEING BUILT IN MACALANGE



IMPROVED HUTCH BUILT FOR BEST DUCK BREEDER



EXCHANGE VISIT TO FOR MACALANGE GROUP TO MARRUPA TO LEARN MORE ABOUT RABBIT BREEDING

OBJECTIVE 5: TO REDUCE BUSHMEAT SNARING BY FINDING WAYS TO IMPROVE FOOD SECURITY AND REDUCE HUMAN-WILDLIFE CONFLICT

Two of the main problems identified by communities that they would like help with are human-elephant conflict and food insecurity. It is impossible to have a conversation about conservation when people are concerned about where their next meal is coming from. Responding directly to the community's needs (not our needs) shows commitment as partners. In addition, improving food security will lessen the need for income from extractive use of wildlife resources (ivory, skins and bushmeat) and will decrease the rate of habitat transformation into fields through slash and burn agriculture. The aim is to find ways to increase food security in Mbamba village by decreasing human-wildlife conflict, increasing productivity, increases alternative livelihoods and increase skills and in so doing provide a model that can be put in place in other Niassa villages.

Our "living fence"/ Pao Piku program to reduce crop pests (bushpigs and warthogs), our program to assist farmers with building effective goat and small livestock corrals to reduce attacks and the alternative protein programs all also contribute to increasing food security as does employment and skills training.

CONSERVATION AGRICULTURE PROJECT: FARMER FIELD SCHOOLS

Data compiled and program lead by Mbumba Marufo (NCP Community Manager)

Food security is a serious threat to people living inside Niassa Reserve. The majority of soils in Niassa Reserve particularly in the eastern section of the protected area have low fertility.

The conservation agriculture program is a community based approach to increase productivity of Niassa fields in a sustainable way. It relies on the farmers to test, manage and maintain the conservation agriculture plots through a farmer field school (FFS). This program is independent but receives information, assistance and some training from CARE international.

Mbumba Marufo acts as an advisor but does not implement this program himself and farmers are not paid. The aim of this project is to bring new technology to the Mbamba community and elsewhere that can improve soil fertility and can conserve the soil humidity.

The FFS is testing the use of techniques to:

- **Retain water in the soil through mulching because the low and irregular rainfall in Mbamba;**
- **Improve the soil fertility through the use of legumes intercropping with the main crops, namely maize and sorghum;**
- **Improve the soil fertility through the use of fallow land approach using legumes;**
- **Identify leguminous perennial crop that can still cover the soil until the next crop season and at the same time is not attacked by kudus, impalas and other small antelopes.**

The FFS also create an environment where the farmer can learn by experimentation as they are the ones who design and implement the crop rotation. They also take care of the crops and harvest them at the end of the season. They compare the conservation agriculture approach with their traditional approach and take the decision themselves which approach better suits their needs. This approach is much more sustainable and results in higher adoption by other farmers. Some demonstrations are performed each weekly session like testing water infiltration of soil, transpiration of plants, comparison of water retention between the soils that are tilled and untilled and between soils that are mulched and uncovered.

2015 Activities and Progress

- The Mbamba farm field school (FFS) was started in 2012/2013 crop season, introduced by Mariri/ NCP. It has an area of 2397m² with 9 plots inside where different experiments are performed and compared. Eight plots have the same size, 225m², and the ninth plot covers 450m².
- In 2015 about 23 people in Mbamba were actively involved in the Farm Field School (FFS) activities. Among them nine were women and 14 men. The number of women continues to increase while the number of men actively involved has been decreasing. Since men have opportunities for other employment we support this development.
- In the wet season the activities consist of planting, weeding, monitoring the growth of the plants, performing experiments related to conservation agriculture principles, harvest and analyze the crop season results. During the dry season the activities consist on monitoring the growth of the cover crop left on the field to fertilize the soil and prepare the field for the next crop season.



MBAMBA WOMEN WHO ARE PART OF THE FFS GROUP

- In 2015 we expected all the members of FFS to graduate and to recruit new members, according to the conservation agriculture plan for 2015, however all the members “refused” to graduate and they decided to continue to be part of the FFS. These members continue to be fully involved in FFS activities during the crop season and a few new members have joined.
- Maize and sorghum were the main crops cultivated and they were inter-cropped with cowpea and holoco beans as the layout shows below. Three plots were planted with maize, two plots with sorghum one plot with peanut and the remained as fallow land. In the plot allocated to farmer’s practices the members decided to leave it as fallow land and planted sea bean instead of maize planted in beds.

FFS’s Field Layout for 2014/2015 crop season

Maize (Nov/Dec) + lablab (Jan)	Sorghum + lablab	Maize + cowpea relay	Sorghum + holoco	Maize + jack-bean
Farmer’s practices	Fallow land lablab	Fallow land Sea-bean	Farmer’s experiments	

- With assistance of CARE Nampula seeds for the 2014/2015 crop season were purchased for cowpea, lab-lab, mucuna (sea bean), canavalia (jack bean), peanut and holoco bean. The Maize and sorghum seeds were acquired locally in Mbamba. The peanut and holoco beans were used as an incentive for the member’s participation in the FFS.
- To allow FFS members to become self-sufficient, each FFS member received about 0.8kg of lab-lab, 1.5kg of mucuna and 1kg of canavalia for them to plant in their own fields. Surplus seeds would be bought by NCP to support continued CA activities. In addition this approach would enable CA members to earn some income, increase soil fertility in their fields as improved fallow land. The bean seeds (lab-lab, mucuna and canavalia) were to be planted as relay crops to avoid them competing with maize and sorghum.

- Unfortunately only five members planted these seeds. The other farmers cooked and ate the seeds during periods of food shortage. Some said that they didn't believe that NCP would actually buy their harvest. We hope that in 2016 more farmers will plant and store the seeds. This is a process and will improve over time.
- The five farmers that did plant the seeds sold their harvest to Mariri at the price of 250.00 MZN for lab-lab and mucuna and 300.00 MZN for canavalia. About 27kg of mucuna and 14 kg of canavalia were harvested by 05 farmers and together they earned 11150.00 MT as a benefit (see pictures below).
- These 5 farmers also planted lab-lab but lost their crops to antelope and nothing was harvested. It would be useful to test using reflective tape in some fields to see if this causes a significant difference in 2016.



MEMBERS OF MBAMBA FFS WEIGHING THE MUCUNA AND CANAVALIA BEANS THEY HAVE HARVESTED FOR SALE OF THE SEEDS.

Three main experiments concerned with water retention, increasing of soil fertility, and cover crops were conducted in the Farmer Field School in 2015.

- Water retention- we are testing mulching to cover the soil during the long dry season to help to retain water. In the FFS the remaining plants after the harvest are not burned and are used as mulch in the next crop season. Grass is also brought to the FFS by vehicle but this is expensive and not sustainable. Rather mulching should be produced *in situ*. This is particularly important for farmers that have large fields.
- Increasing of soil fertility – different types of beans were used to increase the soil fertility. Cowpea and hooch bean were intercropped with maize and sorghum while macula, canavalia and lab-lab were used as fallow land crops in-between the crop seasons.
- Cover crops- even after the beans have fixed nitrogen it will be lost if the soil is left uncovered for a long time. An experienced agronomist said that in between two seasons about 75% of nitrogen is lost if the soil not covered. We are looking for crops that can remain green and covering the soil in between the crop season with no rain.
- Mucuna is the best cover crop but it dries up in June/July leaving the soil without cover. Mucuna is also the best at improving the soil fertility during fallow land. Canavalia (lab-lab) can stay green in between the seasons but doesn't cover the soil well and the leaves are eaten by antelopes. It was the first time lab-lab was planted in the FFS but the results seems to show that will be difficult to manage this crop as it is so attractive to antelope.



MACUNA BEAN COVER



CANAVALIA COVER

- In 2015 a team from NNR community department visited the Mbamba FFS to exchange experience. They have shared an interest to partner with Mbamba FFS in the future to implement conservation agriculture in other villages inside NNR. This will be pursued in 2016.
- The yield in the FFS was very poor during the 2014/2015 season. This was not isolated within the Mbamba FFS and likely to be due to poor rainfall. Other FFS assisted by CARE Nampula also reported poor performance due the irregular distribution of the rain.
- The FFS collected only about 14kg of maize in total and 8kg of sorghum, compared with 50.3kg of maize harvested during 2013/2014 crop season. About 12kg of canavalia and 11kg of mucuna were harvested in the FFS.

Preparation of the 2015/2016 crop season

Before the crop season started a Conservation Agriculture training workshop was held in Mariri Environmental Centre with the aim to remind the members of Mbamba FFS about the concept of CA and what we wanted to achieve. The results of the 2014/2015 crop season were analyzed and some concepts of CA were demonstrated through practical experiment. In the workshop the plan for 2015/2016 crop season was also discussed and agreed among the members.

- The lion scholars performed a presentation of a safe and strong goat coral that they have built to protect Mariri's goats during their holiday program.
- For 2015/2016 crop season the members of FFS prepared the fields and planted maize in December 2015 as the main crop. This season, the FFS will test intercropping between maize vs mucuna and maize vs canavalia, 7 months after planting maize. They will also intercrop maize with cowpea.





CONSERVATION AGRICULTURE WORKSHOP AT MARIRI ENVIRONMENT CENTRE: DISCUSSIONS, EXPERIMENTS AND LEARNING FROM THE LION SCHOLARS ABOUT PROTECTING GOATS.

Challenges and way forward

It is a challenge to get farmers to implement CA in portions of their fields. During the 2015/2016 crop season mucuna and canavalia seeds will be distributed to the members of FFS to plant again with NCP offering to buy the seeds at the end of the season. Mariri expects this to be more productive than 2014/2015. We hope this will encourage other interested farmers to implement CA in portions of their fields. Mariri will provide technical assistance, training workshops and will sell mucuna and canavalia seeds at a subsidized price. Mariri hopes that there will be good results this crop season and plans to share this experience with other villages. Even small successes will increase food security.

ELEPHANT - BEEHIVE FENCE PROJECT

Lead by Mbumba Marufo, Mariri Community Manager

Elephants do not like bees and avoid beehives. Dr Lucy King from Save the Elephants developed and tested the use of elephant-beehive fences in Kenya to reduce crop raiding by elephants. We are testing the potential use of this fence in Niassa Reserve to reduce human-elephant conflict. The experimental beehive fence aims to reduce human and elephant conflict incidents in Mbamba village (and if successful, Niassa Reserve) and reduce the loss of yield due to elephant crop raiding. At the same time it is expected to produce a honey that will help the community members improve their diet and earn revenue from the sale of the honey. This project is funded by NCP with support from Houston Zoo and a Taronga Field Conservation Grant, with an initial donation from Save the Elephants and Elephant Advocacy Alliance and ongoing support from Houston Zoo.

The Goal was 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.

We hope to be able to bring to the Niassa Management team a long term and effective method of reducing elephant crop raiding that would be community based and sustainable with full community participation. In addition through the sale of the “Elephant-friendly honey” we aimed to provide fence owners with an alternative income and livelihood that encourages them to protect their fields.

2015 Activities and Progress

Effectiveness of elephant beehive fences

Six experimental beehive fences were built 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 experimental fences make up 1,122m perimeter, have 72 beehives among which 24 are currently occupied by bees, and 69 dummies hives.

- In 2015 three successful crop raiding events were recorded in Micangaula's neighbouring control farms while no crop raiding was recorded in the farm protected by the beehive fence. In the Minache beehive fence farm there were no elephant crop raiding events while the control farms had two elephant crop raiding events.
- During the three crop seasons, elephants raided the beehive protected farms on 13 occasions while the neighbouring control farms had 41 successful crop raids. On two occasions, elephant raided the fields where there were beehives but did not eat crops and appear to have been chased out by bees.
- The majority of the crop raiding of the beehive fence farms occurred when occupancy of beehives was low. In control farms, all 41 successful crop raids resulted in crop loss.
- The data show that the beehive fences reduce crop raiding by more than 60% but are not 100% effective expectations need to be managed. They do also have significant potential to create alternative income to farms through the selling of honey produced under the elephant friendly label.
- The beehive fences did not work in the 2014/ 2015 in Macalange as the fence was not maintained possibly due to low elephant crop raiding. There wasn't the same incentive to maintain the fences compared with areas with elephant crop raids. About 7 beehives were lost due fire once the beehive fence line was not cleared and four lost to termites.
- Two of the Mbamba beehive fences have started to suffer from lack of maintenance. Increased honey production and local rules developed by local beehive groups are important.

TABLE: CROP RAIDING EVENTS OVER THREE YEAR EXPERIMENTAL PERIOD (2012/2013; 2013/2014 AND 2014/2015 CROP SEASONS)

Beehive fences	Experimental farms	Control farms
Minache's fence (Mbamba village)	2	14
Uacondoa's fence (Mbamba village)	6	17
Namena's fence (Mbamba village)	5	10
Namango's (Mbamba village)	0	0
Mr Victor's fence (Macalange village)	0	0
Mr. Mário's fence (Macalange village)	0	0
Total	13	41

Scaling up

Following the success of the experimental fences, in 2014/ 2015 wet season more than 20 individual farmers requested beehive fences as well as the people in the original beehive group. In total since 2012, the project has built 19 beehive fences, 16 in Mbamba and two in Macalange villages. Six are the original experimental fences and 10 are individually

owned fences. The beehive fences currently have 4,112m perimeter and consist of 227 beehives and 223 dummies hives. Four of these fences are currently not operational due to lack of maintenance.

The following agreement was developed for NCP and benefit farmers:

Mariri will provide beehive to all interested farmers as and when they can. For the FFS farmers that were part of original beekeeping group and have maintained the experimental fences, each person will be given 12 beehives. The remaining 12 beehives will be given as a loan and will need to be paid back with honey. For the farmers that are not part of FFS the beehives can be bought on loan that can then be paid up with honey collected at a subsidized costs. The hive cost will be subsidised by Mariri with 50% paid by Mariri and 50% paid through honey – the total actual cost is \$30. Two jars of honey will purchase a hive (\$15).

For all these beehive farmers the fences will be individually owned and marked, all the income generated from the sale of the honey will go back to the owner of the beehive. Mariri will continue to pay the costs of the jar with label and marketing and transport. Each farmer is responsible for the maintenance of their fence and harvesting the honey. Training will be provided.

Until the farmers pay off their loans for the beehives, the beehive belongs to Mariri and it can be collected whenever Mariri observes that the maintenance is not been performed and that there is risk to lose the beehives.

More than 120 hives have been distributed so far. The original beehive group will assist other farmers with technical advice to construct their fences



BEEHIVES ARE MADE AT MARIRI ENVIRONMENTAL CENTRE BY FOUR LOCALLY TRAINED CARPENTERS

Alternative livelihoods

- In Mbamba village 30 local farmer and beekeepers, six of them women, are involved in the planning, construction, maintenance of the experimental beehive fences and the harvest of honey. In Macalange village, an additional 12 local farmer and beekeepers were involved.
- As result of the training received, all of the community members (42) involved in the beehive program are now able to build their own beehive fences and harvest the honey properly

- We have two markets in Pemba and are working to developing additional markets. At present we can sell all honey produced and more demand than supply.



Beehive group assisting individual farmers construct their fences

- Each jar of honey (500ml) is sold for Mt300 / \$7.9 under the Niassa Reserve Elephant Friendly label (Portuguese and English labels have been developed).
- In 2013 7.5L of honey was collected which gave \$118 (current rate) revenue for the beekeeper group. In 2014 3.5L of honey were collected (more than 10 litres was stolen) resulting in a revenue of \$55.
- In 2015, the beekeeper group earned 10,800.00MT revenue selling 18 litres of elephant friendly honey equivalent to the revenue from selling 216 litres of locally collected wild honey.
- The Niassa Carnivore Project is currently paying for the bottles and hives but labour, maintenance and harvesting of honey is provided by the community group.
- We estimate that each beehive fence which surrounds one field with a 500m of perimeter, needs 24 beehives and 24 dummies hives. This costs an estimated \$740 to build (materials, labour to build beehive, tyre rope, baobab rope).
- If only half of these 24 beehives are occupied and well managed it has potential of generating 50- 100 litres of honey per year for a single family. This honey can be sold under the elephant friendly label for \$789-\$1578 per household per year. This is a significant amount of income and is more than the costs of producing the fence.
- Each beehive costs \$30 to build (4 bottles of honey). We subsidise the cost and each beehive can be bought for two bottles of honey,
- Four local carpenters have been trained to make top bar beehives. Currently the carpenters are able to produce manually bars with precise 32mm or 33mm of width. Carpenters are paid a basic wage and then bonus for each beehive successfully produced.
- At present honey production is low due to poor maintenance, lack of harvesting and poor hive construction.



Elephant friendly produced by community beehives in 2015 and bottled at Mariri under the elephant friendly label



All funds from sale of the honey were delivered to the Farmer field school members who were jointly maintaining the experimental hives.

The Challenges: There are some factors that are negatively affecting the potential of the beehive fences that need to be resolved in 2016.

Theft: for three consecutive years, honey has been stolen and hives burned. The worst thing beside the theft itself, is the burning of the beehives as this kills all the bees and destroys a \$30 hive. This has to be dealt with by the community themselves. In 2015 8 beehives raided and honey stolen and hives burnt.

Maintenance – Farms that are located far from the village received poor attention if none at all, after the farmer has harvested his crops. When the crop season ends, the farmers move to the village leaving the bees by themselves. They hardly return to their fields. The bees suffers when the roofs are taken down and there is no people to put it back and also repair the grass that gives shade to the bees.

Water – water has been one of limiting factor. At dry season many water sources dry up and as a result bees leave the beehives. . Water needs to been taken to the beehives regularly during the dry season to prevent bees from leaving the hives. Regular visits need to be made.

Top bars making– the carpenters in Mariri have been improving in their carpentry skills and the need to make regular top bars. In order to increase honey production we need to put wax in all bars to orientate. In some beehives, the bees build one comb on more than two bars, limiting the efficiency of harvesting the honey.

Monitoring the beehives- the beehives need to be monitored regularly. Honey is lost as it is left too long in the hive. When the beekeepers go to harvest they find many broods and less honey in the combs. This can be resolved by employing beehive extension officers to encourage beekeepers, monitor maintenance and collect honey when it is ready.

We believe that many of these issues will be resolved if honey production can be increased and is clearly seen as a viable source of income. This program has a lot of potential to not only reduce crop raids but provide an alternative livelihood and actively involve farmers in protecting their fields.

OBJECTIVE 6: TO REDUCE BUSHMEAT SNARING AND OTHER ILLEGAL ACTIVITIES BY EFFECTIVE ANTIPOACHING ACTIVITIES WITH COMMUNITY SUPPORT AND THROUGH PROVIDING ALTERNATIVE LIVELIHOODS TO LOCAL HUNTERS

Lead by Agostinho Jorge and Keith Begg; data compiled by Agostinho Jorge

We conduct antipoaching activities in the areas under our management - L5-South We collaborate with NNR antipoaching teams that work across the whole Reserve and neighbouring antipoaching teams in concessions L7, L5-N and L8. In addition, we are a trial site for implementation of SMART (see below) with the intention that SMART will be implemented across NNR to monitor and incentivise antipoaching efforts in future. Anti-poaching is needed to remove snares,

apprehend gold miners and increase the opportunity costs for bush-meat and ivory poachers. In addition this forms a valuable form of employment and engages communities in the responsibilities of conserving “their” wildlife. As one elder put it “you don’t steal from your own shop”. Just like a goat is used as a saving account, so are the wildlife and natural resources in the area a “bank” for the community for the future as wildlife has the potential to generate revenue, employment, provide skills and continue to provide resources for building, medicinal use etc. into the future.

The aim of the antipoaching activities of NCP is to secure the L5-South concession using men from the local community to protect “their” area. This is currently the only area inside NNR using a community based and supported approach for antipoaching and conservation. Substantial progress was made in 2015 to improve the effectiveness of the NCP / Mariri antipoaching teams and secure the L5-South concession with full community support. Community engagement is critical and we believe one of the reasons for our success in reducing elephant poaching and snaring dramatically in the area since 2012. However, there is still much work to be done and many individuals in the Mbamba village community (our partners) are still involved in snaring, poaching and illegal gold mining. Building a conservation culture will take years. The benefits from conservation (employment, community projects, education) and the costs from getting cost must be high enough to make conservation a viable alternative to poaching. We need peer pressure and leadership to convince individual’s poachers in the community that poaching is not worth their while because the opportunity costs are too high.

While elephant poaching and mining are not directly related to lion conservation, our approach is to develop a model of community conservation that works and this cannot be a single species approach. Legal activities and the influx of non-residents into the area have destabilized the villages and have the potential to destroy all progress made with partnering with communities. For partnering, performance payments and revenue sharing to be effective there must be a clearly defined community to receive these benefits in return for achieving certain conservation targets. Illegal mining is currently the main risk to conservation in the L5-South concessions.

ANTIPOACHING STRUCTURE

- In 2015, the NCP/ Mariri scout force increased from 20 antipoaching scouts to 20 patrol scouts in five teams and eight gate guards. We increased the scout teams from three individuals to four individuals and hired additional people for a fifth team. All are Niassa Residents and predominantly from local villages in the area (mainly Mbamba Village). We had 5 patrol teams (Alpha, Bravo, Delta, Charlie, and Echo) each comprising four patrol scouts.
- The patrol schedule consisted of 8 days of patrol, 4 days standby and 4 days off duty (folga). These scouts are managed by Agostinho Jorge (Conservation Manager) and Keith Begg (Operations Director).
- We have four control posts. The Mariri Camp scout HQ, (-12.1779; 38.09302), Cancela Mbamba (S12.18976; E38.05869), Changawe control gate and airstrip. The Mbamba River control point monitors all pedestrian and vehicular traffic into the core game area, these include fishermen, honey gatherers, workers and people moving to scared sites and other villages inside Niassa Reserve. The Changawe Control post is a shared entry point with L5-North management by the Chuilexi Conservancy.
- The scouts are equipped with: 5 Motorola radios, 3 Trimble + 5 Cedars (digital devices to collect information on SMART system), 5 GPS (Garmin GPSmap 62), 5 cameras (Olympus), 4 binoculars, 14 knives, and 6 spears. In addition all scouts have backpacks, and full uniforms. It currently costs approximately \$5000 per patrol scout per year (salary, equipment, bonuses etc.). Our scouts are armed with 3 shotguns 1 (5x57mm) and 2 x .416. 12 additional firearms are in the process of being imported.
- Additional equipment dedicated to antipoaching includes two motorbikes for the rapid response unit (Sanlg 125) and 1 inflatable boat with motor for deployment in the wet season on the Lugenda River.
- A two seater plane was been purchased to assist with antipoaching and monitoring and was operational for 100 hours in 2015 between August and December and will be fully operational in 2016 to assist with antipoaching efforts.
- All scout effort is monitored via digital devices and SMART system (scout days, effort, area covered and illegal activities (snares recovered, ivory recovered). Monthly reports are produced comparing performance of different

scout teams and patrol effort (hours, patrols, area). Monthly reports as well as an annual SMART report are produced.

- Unique to Block L5-South is the relatively strong community support we have for antipoaching activities from the Mbamba community. There is no longer any conflict when we arrest poachers/ hunters from the local community. We believe that our results show this works.

The Challenges: Community engagement is essential and in 2016 we need to improve our reporting and outreach to the communities. We continue to have substantial problems with absenteeism, poor health and poor performance from the scouts with high turnover and disciplinary actions. For almost all the scouts this is their first ever job and work ethic is poorly developed; many are past poachers. We have taken men from the village with low levels of education, little world view, and no experience with conservation and equipped them as antipoaching scouts with the aim of protect wildlife from the same local communities they come from. But it will take many more years for them to become conservationists. This will not only require skills training in antipoaching/ ranger skills but also a concerted effort to provide an education in conservation and opportunities and experiences that convince them of the vision of conservation as a viable future for local communities rather than a developing a livelihood from illegal activities. At present most of the scouts are working on a job not working for conservation. This will take time and will result in high turnover. We believe that equal amounts of effort and funding have to be put into antipoaching and community efforts if we want to be successful.

To improve our antipoaching activities in 2016:

- Our Husky aeroplane will be operational for the entire dry season. Funding is secured, the operations Director has his license and hangar has been built.
- The airstrip will be registered and made into an all-weather airstrip with gravel to ensure we can use it in the wet season.
- We will continue to mentor and train our scouts on an ongoing basis and will be implementing an incentive system to encourage scouts to work hard and achieve good results. We will also be improving our conservation education of the scouts (and all of our local team) to help them understand and believe in conservation.
- If possible we will be hiring an outside but Mozambican head scout to provide mentorship and training for our scouts to provide a role model.
- We desperately need further training for our scouts and have finally been successfully at receiving permission from Reserve management to hold long term training sessions with Conservation Outcomes or others onsite to build team work and discipline. This will be at our own cost and will take place in the 3rd and 4th quarter of 2016.

ANTIPOACHING RESULTS 2015

Overview of Anti-poaching scouts (a detailed annual SMART antipoaching report is available on request; Data compiled by A. Jorge, Conservation Manager)

Despite regular and continuing challenges with the scouts (as mentioned above), we achieved good results. Our 28 antipoaching scouts in 5 teams, conducted more than 100 foot patrols and apprehended more than 1000 illegal gold miners, 3 bushmeat poachers and removed 58 snares. Only one elephant was killed in 2015 and no known lions were killed in snares.

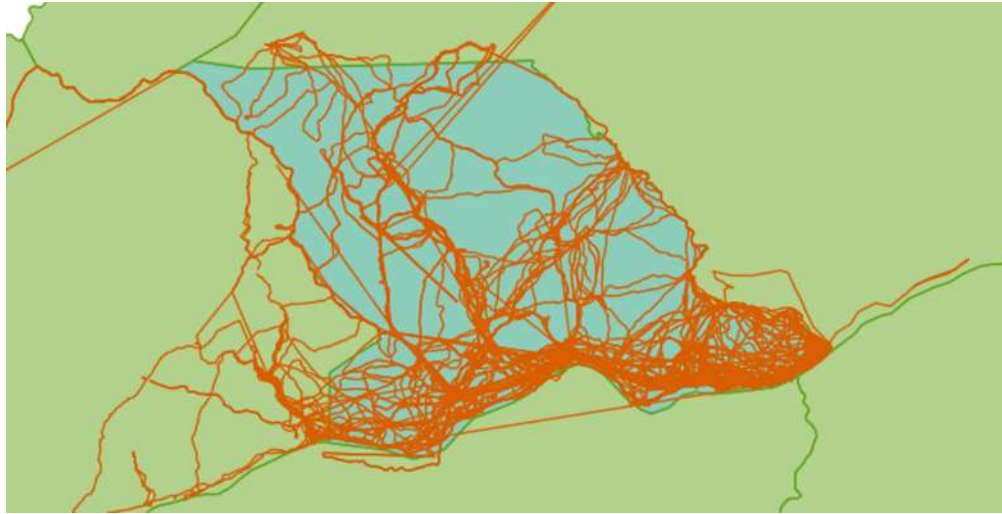


- L5-South is the only site in Mozambique that has successfully implemented SMART and has it up and running although there are still minor issues with development of reports. This has taken two years to achieve and is largely due to the efforts of Agostinho Jorge, our conservation manager with support from Peter Lindsey and Michelle Moehler from Panthera.
- All data are collected on digital devices and paper worksheets at present; the paper worksheets will eventually be phased out as our team become more proficient at digital data collection. SMART allows us to systematically collect, analyse and respond to antipoaching data. It allows us to compare the performance of different scout teams, and scouts and ensure we have effective coverage of the area we are managing. The annual SMART report is available on request and is provided to Reserve management team. All data provided here (except for informer data) come from the SMART report. This allows us to effectively monitor our effectiveness.
- A total of 112 foot patrols covering 1440 patrol days and 3 aerial patrols (49 hours of flying) were recorded in 2015. These patrols covered 4379km on foot mostly in L5S concession. The distance covered is not the total distance as for some patrols, tracks were not collected.
- Results show that while elephant poaching and snaring have gone down, illegal mining is increasing exponentially and is consuming a large amount of resources and time with little potential for resolution. The current NNR position that we should confiscate equipment is not a sustainable long term solution and is becoming increasingly dangerous.
- In 2015 the radio network was finally improved in Niassa Reserve in November 2015 and the Rungwe repeater was fixed. This is a major step forward. Our two neighbours, L7 and L5-North partner strongly with us on antipoaching patrols and we have received increased support from Reserve management.

SUMMARY OF ANTIPOACHING RESULTS IN L5-SOUTH – NIASSA CARNIVORE PROJECT (2013-2015)

Category	Year		
	2013	2014	2015
Area of concession	576.5 km ²	576.5 km ²	576.5 km ²
Number of scouts	14	20	28
Number of control posts	3	3	4
Area per scout	57.65 km ^{2b}	41.17	28.825
Scouts per area	0.017/ km ²	0.024/km ²	0.034 / km ²
Total number of patrols	102	83	112
Total number of individual patrols	347	514	
Total distance patrolled	7,380 km	7005 Km	4375 [#]
Training courses	0	4	0 ^b
Total day in training and on courses	0	120	0
Illegally killed elephants	15	13 ^a	1
Suspected elephant poachers arrested	1	3	0
Number of ivory recovered by scouts	7	28	6
Number of ivory recovered from informers	5	6	4
Ammunition recovered (AKM)	13	151	9
Captured bushmeat poachers	9	1	3
Wire snares removed	25	45	45
Rope snares removed	14	1	8
Guineafowl snares removed	?	62	
Illegal miners captured	6	> 218	> 1,000
Minerals confiscated	2	2 ^b	2
Mining instruments confiscated	< 20	> 200	> 600

- In 2015 the Mariri patrol strategy remained a combination of concentrating the patrol effort in areas with highest elephant concentration and illegal mining activity, areas with high concentration of elephant carcasses and using informer information and at the same time trying to ensure that almost all grids across the concession are visited.



SMART DATA SHOWING THE COVERAGE OF GROUND PATROLS COMPLETED IN 2015 WITH SOME PATROLS IN L4-EAST WHEN POACHING OR MINING ACTIVITY WAS REPORTED. NOTE THAT SOME AREAS WHERE THERE ARE NO PATROLS ARE INSELBERGS.

SCOUT TRAINING

- No specialized basic scout training was provided in 2015. Scout training is desperately needed, however at present it has been centralized and organised through NNR HQ. As a result no training was done for our scouts or any scouts in NNR this year. This has been resolved for 2016.
- In situ training of our scouts in SMART and data collection continued. Agostinho Jorge spent 90 hours over 60 days training the scouts and monitoring manager on SMART usage and data collection, use of GPS, trimbles etc.

USE OF INFORMERS

- The use of informers has proven very successful in other areas and in NNR to catch poachers.
- In 2015 we improved our informer network but we are still becoming skilled at running informers. There has been a high turnover of Mariri informers working relatively far away from Mariri i.e. in Lichinga and Marrupa. Four informers have given up working, two others have provided poor data and have been excluded. Both women and men work as informers.
- The identity and content of information provided by informers to Mariri is kept completely confidential. The information is only shared with the select management of NNR when necessary. The Information is also used to direct the Mariri antipoaching patrols. Communication with informers is done through letters, WhatsApp & sms (where there is network coverage) and personal contact and is an essential part of our antipoaching strategy to reduce poisoning, elephant poaching and trade in skins.

TABLE: TYPE OF INFORMATION REPORTED BY INFORMERS IN 2015

Category of Information*	Total Events
Bushmeat	> 500
Elephant poaching	30
Illegal mining	20
Lion trade	15
Other	100
TOTAL	> 570

*Based on the information currently available

Informer information has helped us to:

- Identified new mining areas and providing the first information of the involvement of government officials in illegal mining activity.
- Identified people involved in bushmeat snaring in Mbamba, Macalange, Marrupa, and Nkuti, the species targeted and more recently information on prices of bushmeat in Lichinga (these data are presented in section on bushmeat snaring and will be part of A. Jorge's PhD).
- Information leading to the capture of a person involved in elephant poaching.
- Information that assisted in the capture of 4 bushmeat poachers.
- Information on possible snaring of a waterhole to target lions and ungulates that resulted in vomiting and diarrhoea for residents who ate the meat.
- Information on composition, movements and numbers of elephant poachers in L5-South and surrounding areas.
- Provided the first indications of an escalation of poisoning for lion parts in April 2015 in the central and eastern section of Niassa Reserve (see section on poisoning).

The Challenge: Developing an effective informer network has been challenging as no one on our team has had prior skills in this. Our informer network has improved substantially however we have battled to find reliable people that can read and write, collect the information consistently and keep the confidentiality related to the work has been an ongoing challenge. It has also been challenging to ensure the reliability, of the information provided by the informers. We confirmed the case of four individuals who created false information to get paid small amounts of money. Based on this only information from certain informers have been shared where the information has been verified or information comes from people that are consistently providing good information. It has also been challenging to ensure that the people that stop collaborating as informers do not compromise the program by revealing the information that has been sharing with Mariri about bushmeat and other conservation related issues. It is particularly relevant for collaborators that come from close villages such as Mbamba. We have had two individuals who kept asking for small payment even after being out of the system. We also have the challenge of being able to use informer information to prevent poaching events rather than react to events that have already happened. We have not yet been able to use informer information to stop the poisoning of lions and other wildlife. Keeping regular contacts with informers especially in the wet season or when informers move regularly from their villages has been a challenge. In general there were difficulties to keep regular contact with informers from Lichinga and Marrupa that are far away and this might be one of the causes for the high turnover rate. The use of WhatsApp has been helping minimizing this problem in areas where there is good network coverage. We will continue to work on improving our informer network in 2016; further training is required.



MERCURY AND GOLD RECOVERED FROM GOLD MINING SITES



SCOUT TEAM BUILDING AND LEADERSHIP ACTIVITIES



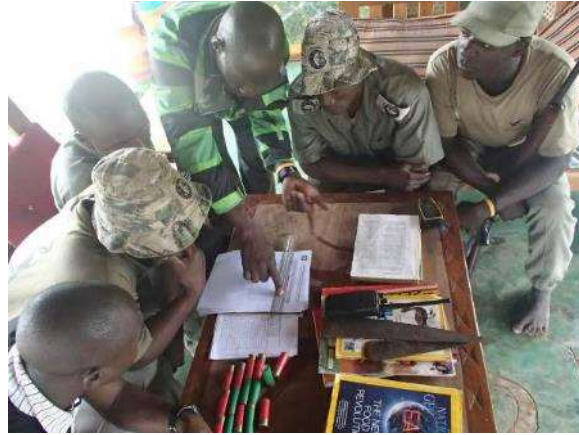
PATROLLING IN THE WET SEASON



EQUIPMENT ISSUED TO PATROL SCOUTS



A NEW INFLATABLE BOAT PURCHASED FOR WET SEASON DEPLOYMENT



REGULAR SCOUT REPORT BACK MEETINGS



PICTURES OF BUSHMEAT AND SNARES COLLECTED BY INFORMERS

- Charcoal production: Bags of charcoal were seen for the first time in Mecula village in 2015. In 2015 traders were seen selling charcoal cooker in Mbamba for the first time. This could lead to a rapid increase in destruction of the woodlands.



Lion Bone trade and poisoning:

- Informer information provide critical information on the increase I lion bone trade and poisoning. The informers provided information on the individuals and gangs actively involved in the trade of lion products in Niassa, the prices and their movements in NNR. Reports suggest that outside buyers come from Tanzania and Nampula. There are also indications of people from Mecula trading the skins however it is not yet clear what role they play in the all business. SanLg motorbike (125cc) and \$1500 motorbike were recorded as the highest reward for people providing a full lion carcass to the illegal traders.
- There has been an increase in the application of cotton pesticide “Ntofilo”, mostly coming from Cabo Delgado, on waterholes and on ungulates carcasses to kill lions and other animals for trade. However others are still using cable snares.
- We received information of 25 large carnivores (hyena, wildog, lions and hyenas killed) snared and poisoned out of close to 90 deaths recorded by different sources for several causes in 2015 in NNR.
- Four lionesses were killed in one poisoning incident in 2015, as well as leopard. Hundreds of vultures are also being killed by poisons. This is not unique to Niassa Reserve – at a recent African Lion Working Group Meeting, poisoning was highlighted as a major emerging threat throughout lion range.

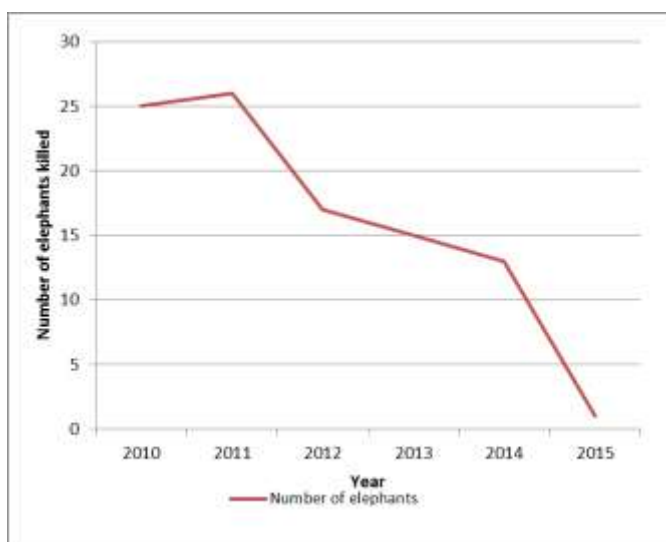
Logging

A person was arrested for being involved in commercial logging in L5-South. This was the first proper incident and needs to be under control.

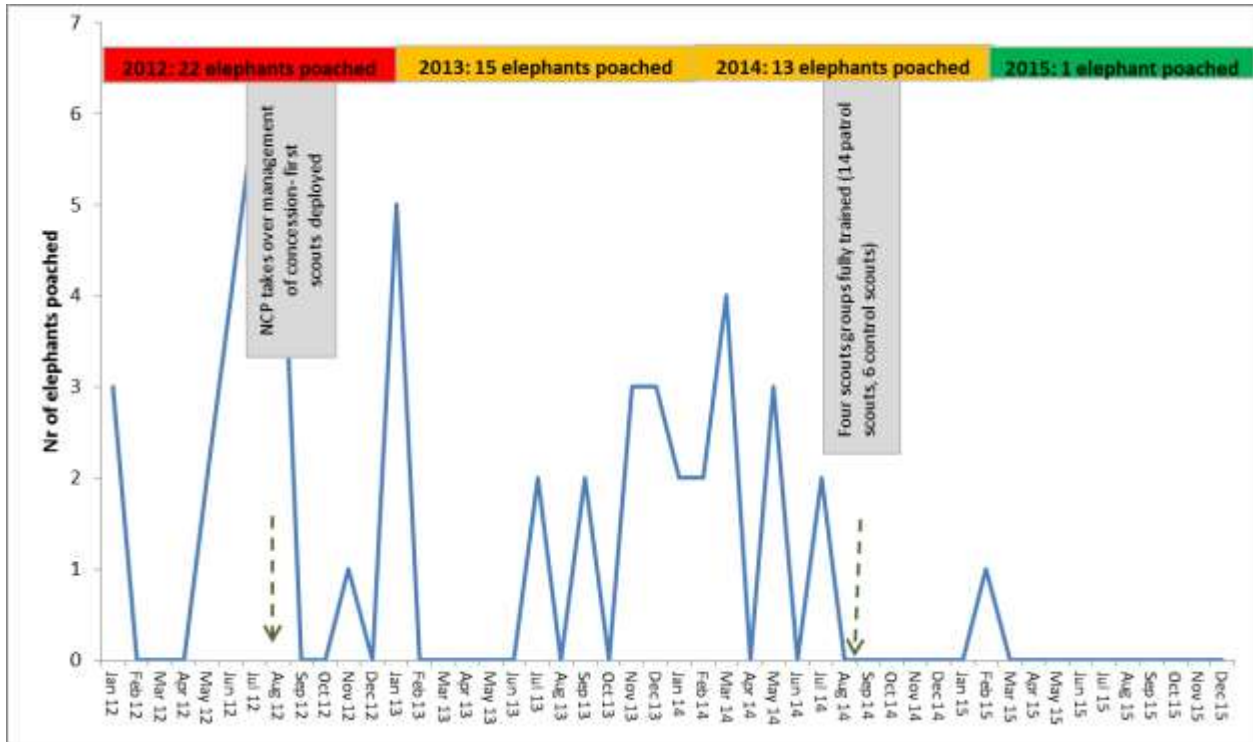


Elephant poaching

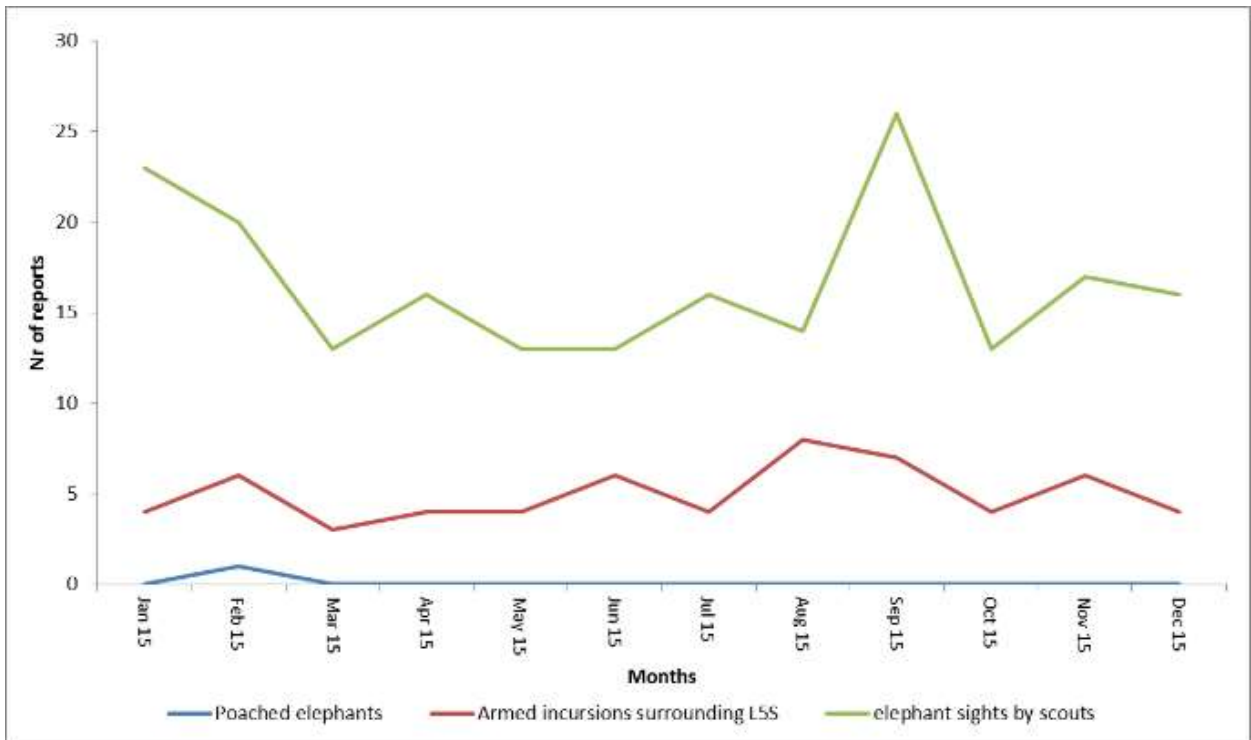
- Since late 2009 (7 years ago), a confirmed minimum of 99 elephants have been killed by poachers in L5-South over an area of only 580km². This was part of a widespread increase in ivory poaching in Niassa Reserve that began in 2009/2010 and saw the loss of an estimated 7500 elephants between 2011 and 2014 (Grossman *et. al.* 2014 – WCS aerial census report).
- In 2015, only one elephant was confirmed killed in L5-South in comparison to 13 elephants killed in 2014, and 14 killed in 2013. No elephants have been killed for ivory to the best of our knowledge in the past 12 months (March 2015-February 2016). These are positive results of our combined approach of antipoaching and community engagement
- **Our data show a dramatic reduction in elephant poaching in our concession.** Our data suggest that this reduction in poaching is due, in part, to the combined efforts of high coverage of antipoaching teams and substantial community engagement as detailed in this report. Mbamba village are partnering in managing this concession. We believe this is critical action needed to reduce poaching. The data indicate that this was not due to no elephants being left in the concession as elephants were regularly seen on patrols particularly in late dry season and were still a major cause of human wildlife conflict in Mbamba village in 2015. In addition informer information indicates that poachers were still in the area surrounding L5-South (see graph below).



DECREASE IN NUMBER OF ELEPHANTS KILLED IN L5-SOUTH SINCE 2010. NCP TOOK OVER MANAGEMENT OF THE AREA IN 2012



ELEPHANTS ILLEGALLY KILLED PER MONTH IN L5-SOUTH BETWEEN 2012 AND JAN 2015 SHOWING THE DECLINE IN ELEPHANT POACHING IN CONCESSION L5-SOUTH.



IN 2015 ELEPHANT MORTALITY FROM POACHING DECLINED TO ONLY ONE ELEPHANT IN ONE EVENT. NOTE THAT THIS REPRESENTS NUMBER OF EVENTS (REPORTS OR SIGHTINGS) NOT THE NUMBER OF ELEPHANTS OR POACHERS.



SCOUTS ON PATROL STOP TO WATCH A HERD OF ELEPHANTS IN THE MBAMBA RIVER

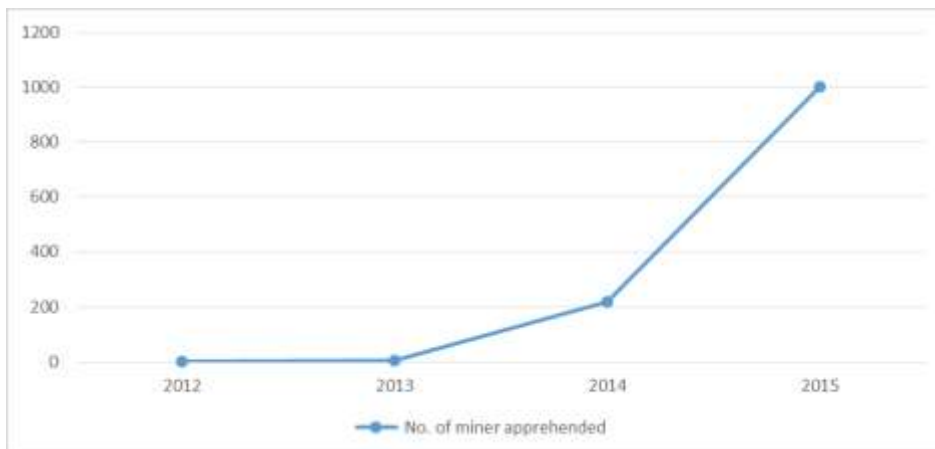
- L5-South together with L7, L8, L4 and L5-north remain areas of major concern both because of relatively high concentrations of elephants in the area along the Lugenda River and due to the close proximity of two villages that are heavily involved in elephant poaching - Mbamba Village inside the concession and Ncuti Village just outside the concession. The large amount of pedestrian traffic to mining sites and fishing camps makes law enforcement complicated.
- The high level of illegal gold mining in L5-South remains a risk for our future developments especially ecotourism and could undermine all our conservation and community gains made since 2012 (see section on illegal mining)
- There is still high poaching pressure in L4 concession an open concession and neighbour to the west. We hope to initiate work in this area (L4-East) in 2016 with support from Reserve Management team and local leaders of villages in the area.

Alluvial Gold Mining

In 2015 illegal mining activity increased substantially across Eastern Niassa Reserve and particularly in L5-South and L4-East to the point that it is becoming increasingly dangerous and unmanageable. As food insecurity increases, mining becomes the only alternative to earn small amounts of cash to buy essential items for households with no alternative. In some cases gold is being exchanged for maize. More than 1000 miners were apprehended in 2015 alone compared to 250 in 2014. Mining is currently the biggest threat to L5-South and neighbouring L4-east is connected to habitat destruction, mercury poisoning, and bushmeat snaring and social disruption.



- Police are currently unable to deal with the logistics of large number of people arrested due to the lack of space and conditions in the hail at Mecula district police. On the direction of NNR management team the current policy is to take the names of all people found mining and confiscate all their mining equipment and destroy camps this policy is no longer resolving the problem and is an unsustainable policy in the long term.
- The mining activities are destroying the river systems through digging and the use of mercury to wash the gold (see picture). Mercury is extremely damaging to human health and to river systems. NCP wrote a brief memo about gold mining and possible ecological consequences to guide the discussion.
- The rapid increase in mining is undermining our conservation programs as many people are not residents and have no long term connection to Niassa Reserve. In addition it requires a lot of time, effort and money to keep under control and these funds are being diverted from other programs for social development and antipoaching (removing snares). Our scouts have to spend the majority of their time controlling mining camps rather than reducing bushmeat snaring and elephant poaching.
- Gold mining is increasingly exponentially in L5-South and L4-East with more than 1000 miners apprehended in 2015, and this is only a fraction of the people involved.



INCREASE IN ILLEGAL GOLD MINERS APPREHENDED BY MARIRI ANTIPOACHING SCOUTS OVER PAST 4 YEARS.

- Informer information shows a gram of gold is sold for +- 1,000MT. Information suggests that a gold miner buyer can get gold in the amount up to 200,000MT. One buyer has bought a vehicle with his proceeds. This is clearly a lucrative business for the buyers and sellers of equipment.

- Agostinho Jorge conducted 165 interviews of miners to understand the industry. These data will be provided to a Mozambican student who will conduct a study on the effects of mining in 2016 in collaboration with the Reserve Management team. These data are therefore not fully analysed and only an overview are provided here.
- These data show that while the majority of miners are Mozambican (70%) with 30% Tanzanian, a low percentage of the Mozambicans come from local villages of Mbamba or Nkuti villages, which are the local villages in the area. This supports the view of the traditional leaders who state that their villages are being overrun by non-residents and that this is causing major problems as they do not have any control over them.
- People have been mining for gold mostly in the Nameta and Manyanga areas, upstream Mbamba River, western section of L5S concession. People are coming from several points (Lichinga, Marrupa, Mecula, Mavago, Tanzania, etc.) to mine in L5S but there are also locals involved in the activity.
- The gold and gemstones extracted are often sold locally to traders who come to buy the products on site or are taken to Tanzania. Traders are mostly from Tanzania but there are also traders coming from other parts of Niassa (Marrupa, Mecula, etc.) that also buy gold in Mbamba.
- The wet season is the most favourable time for miners to illegal extract minerals in at the same time more difficult time for scouts to arrest and move large groups of miners

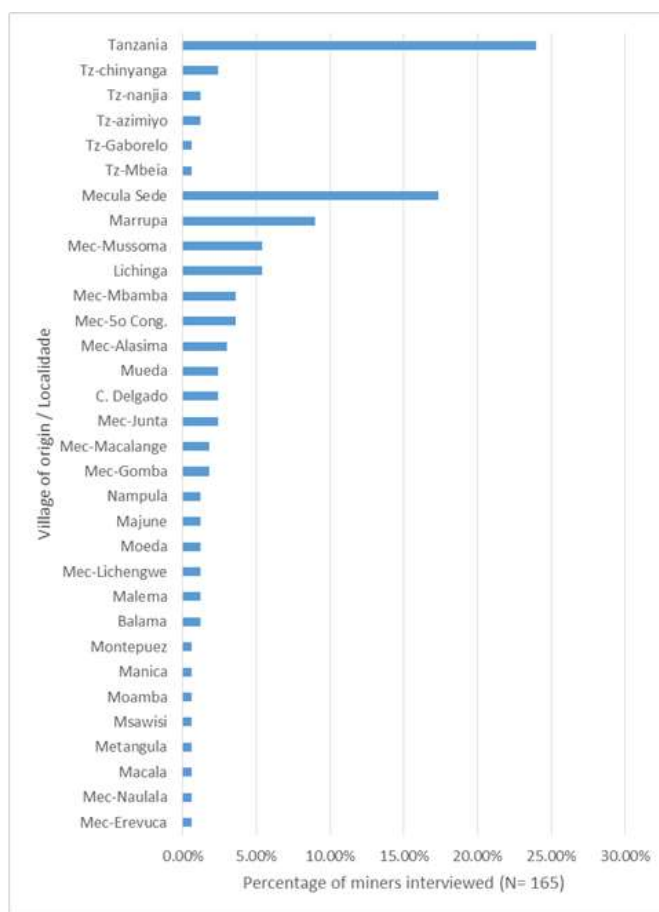
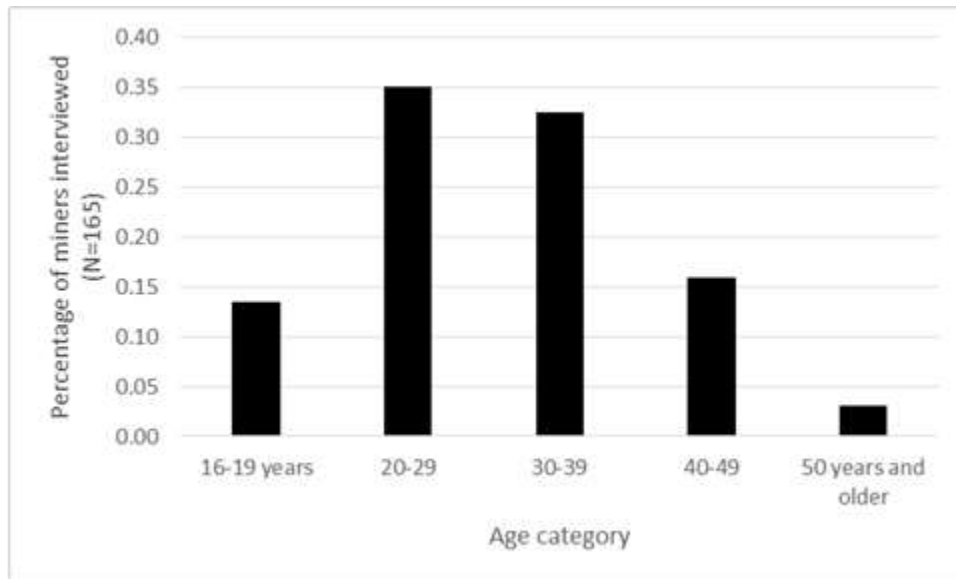


FIGURE: THE ORIGIN OF THE MINERS MINING AT SITES WITHIN L5-SOUTH AND L4-EAST SHOWING THE HIGH PERCENTAGE THAT COME FROM VILLAGES OUTSIDE THE BLOCK.



AGE DISTRIBUTION OF MINERS INTERVIEWED

- The majority of the miners are between 20 and 40 years old (more than 65%). This is physically demanding and dangerous work and this age group is desperate for alternative work to support their families.
- The majority are buying the mining equipment from villages and towns inside Niassa Reserve either from Mecula (>50%) or Mbamba (42%). **Restricting the sale of the locally available equipment may help to reduce mining**

Bushmeat snaring

- The influx of miners into NNR is likely to be increasing the demand for bushmeat as large numbers of miners need to be fed.
- The Mbamba Association and leaders re-affirmed their declaration not to snare in the L5-South concession due to the risks this posed for future ecotourism investment and the ongoing support from NCP. However, individuals within the village continue to snare and ongoing antipoaching activities are still needed to remove snares as certain individuals continue to snare.
- No collared / known lions have been snared in Niassa since 2012. In contrast in 2008 and 2009, 5-6 lion's skins were moving through Mbamba village each year. The increase in the lion population reflects this and we would hope to see a major increase in the next 5 years as the population stabilizes with more resident adult male lions. At least one leopard skin was traded from Mbamba village in 2015.
- **The number of individual animals harvested in Mbamba reduced from 99 animals in 2014 to 61 animals in 2015. The biomass harvested in the same period reduced from 15,704 Kg to 11,831 Kg. This information was provided by the same informers with no other changes so is likely to show a real decreasing trend in bushmeat snaring in the area, although there is still significant snaring occurring and more work needs to be done.**
- The price of bushmeat pieces varies from 50MT to 100MT in Mbamba, Macalange, Nkuti and Marrupa, regardless of the species and each piece weighs between 250g-500g. While in Lichinga bushmeat costs 150MT per kg and its often Sable, Buffalo and Warthog meat
- November 2015 – two buffaloes were shot to provide meat to illegal miners in the illegal mining site close to Chemambo illustrating the clear link between gold mining and the increase in bushmeat snaring.
- In 2015, three bushmeat snarers were caught and taken to the police. Mariri followed up on these cases. The bushmeat hunter caught in February 2015 returned to Mbamba village in March 2015 and has been around since then. The other two bushmeat poachers were taken to Marrupa, one returned to Mbamba in June because of his

health condition. Other continued in jail in Marrupa till December. The court case for these two poachers was initially scheduled for 25th February but was then postponed to March 2016. We will continue to follow up on these cases.

- Since 2014, of the 7 individuals that we have caught bushmeat snaring, one has been given 16 months of jail time, 4 have been released and two are awaiting trial. Bushmeat continues to be seen as a livelihood issue and not illegal poaching by the police and justice department.

- On a broader scale across Niassa Reserve, an overview of the data collected by Agostinho Jorge from Mbamba, Macalange, Nkuti, Marrupa and Lichinga on bushmeat trade and consumption shows that:
 - At least 710 ungulates, one bird and 26 large carnivores (hyena, wild dog, lions and leopard) were traded from Mbamba, Macalange, Marrupa and Nkuti between January 2015 and December 2015.
 - The total bushmeat, 115,176 Kg, from the ungulates generated an estimated 7,495,802 MT (US\$ 187 395).
 - A total of 41 ungulates were snared and exchanged for maize in Macalange and Nalama villages showing the strong link between bushmeat snaring and food insecurity.
 - The number of animals traded in Macalange increased considerably in the past year. This may be due to a new person collecting information and/or may be influenced by the return of miners from the Chemambo mining area.
 - Mbamba village appear to have lower harvest of bushmeat compared to Macalange and Marrupa in terms of number of individuals and bushmeat snaring appeared to go down in Mbamba in 2015. This indicates that bushmeat poachers targeted smaller bodied ungulates and most of the total biomass was comprised by small size animals. This may be in response to antipoaching efforts and community engagement.
 - The most important species in terms of number of individuals hunted between January and December 2015 were:
 - Macalange, Buffalo (27%);
 - Mbamba, sable, waterbuck and zebra (> 55%),
 - Marrupa, Bushpigs and duikers (> 50%);
 - Ncuti, Waterbuck (41%);
 - Lichinga, waterbuck (24%).
 - The most important species in terms of biomass hunted between January and December 2015 were as follows:
 - Macalange, Buffalo (54%);
 - Mbamba, Eland (23%);
 - Marrupa, Buffalo (60%);
 - Ncuti, waterbuck (41%),
 - Lichinga, waterbuck (77%).
 - This matches the MOMS data which shows that the largest numbers of animals killed are buffalo with more than 90 buffalo recorded dead in 2015 from 24 villages.
 - The price of a kilogram of bushmeat in Lichinga is almost three times the price of bushmeat in NNR and it is the same price of meat of goat, 150MT.

TABLE: NR OF INDIVIDUALS HUNTED, BIOMASS OF THE INDIVIDUALS HUNTED AND THE ESTIMATED VALUE GENERATED FROM THE SALE OF THE MEAT IN MACALANGE, MBAMBA, NKUTI, MARRUPA AND LICHINGA

Lichinga				Macalange [#]			Marrupa			Mbamba			Mecula Sede*			Ncuti		
Species	Nr indiv.	Biomass (Kg)	Value (mt)	Nr indiv.	Biomass (Kg)	Value (mt)	Nr indiv.	Biomass (Kg)	Value (mt)	Nr indiv.	Biomass (Kg)	Value (mt)	Nr indiv.	Biomass (Kg)	Value (mt)	Nr indiv.	Biomass (Kg)	Value (mt)
Buffalo	0	0	0	79	34,128	2,100,298	11	4,752	588,816	4	1,728	115,085	0	0	0	1	432	32,400
bushbuck	0	0	0	38	1,702	113,353	0	0	0	0	0	0	0	0	0	0	0	0
bushpig	0	0	0	0	0	0	33	1,518	101,099	1	46	3,064	0	0	0	0	0	0
Cane rat	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
Duiker	0	0	0	3	48	3,197	37	592	39,427	1	16	1,066	0	0	0	1	16	1,066
Eland	0	0	0	15	5,175	310,224	1	345	22,977	8	2,760	183,816	0	0	0	1	345	22,977
Guineafowl	0	0	0	0	0	0	1	1	67	0	0	0	0	0	0	0	0	0
Hartebeest	0	0	0	3	285	18,981	0	0	0	1	95	6,327	0	0	0	0	0	0
Impala	0	0	0	0	0	0	21	630	41,958	3	90	5,994	0	0	0	1	30	1,998
Kudu	0	0	0	40	5,400	296,703	0	0	0	3	405	26,973	0	0	0	0	0	0
Leopard	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Marmota	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
Ndope	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porcupine	0	0	0	22	210	13,986	0	0	0	0	0	0	0	0	0	0	0	0
Rabbit	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
sable	13	2,340	155,844	6	1,080	59,940	0	0	0	11	1,980	131,868	1	180	11,988	3	540	35,964
warthog	87	3,915	260,739	0	0	0	2	90	5,994	0	0	0	0	0	0	0	0	0
waterbuck	122	22,936	1,527,538	40	7,480	413,186	0	0	0	12	2,256	150,250	0	0	0	5	940	62,604
Wildebeest	6	570	37,962	1	95	6,327	0	0	0	5	475	31,635	2	190	12,654	0	0	0
zebra	0	0	0	41	7,380	407,592	0	0	0	11	1,980	131,868	0	0	0	0	0	0
Total	228	29,761	1,982,083	291	62,983	3,743,787	116	7,928	800,338	61	11,831	787,945	3	370	24,642	12	2,308	157,009

*No informer exists in Mecula Sede. The data collected was collected opportunistically by Mariri informers based in Macalange, Ncuti and Mbamba while visiting Mecula

includes some data from Nalama village collected between Septembers and between September and December 2015

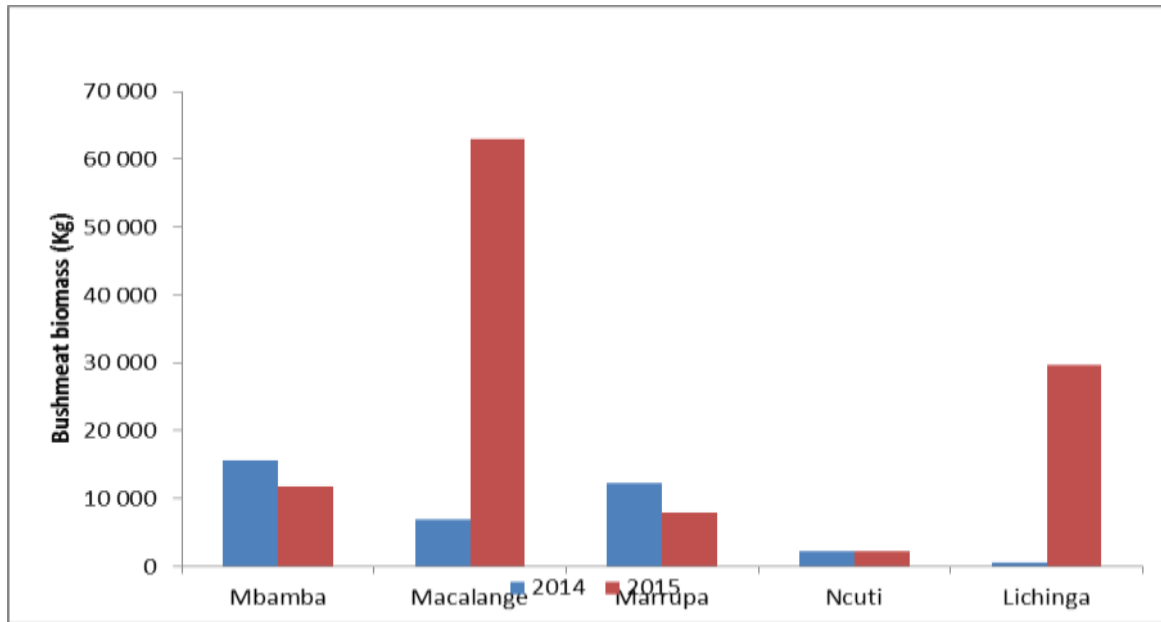


FIGURE. CHANGES IN THE NUMBER OF INDIVIDUAL ANIMALS SOLD AS BUSHMEAT IN MACALANGE, MBAMBA, MARRUPA AND NKUTI BETWEEN 2014 AND 2015 SHOWING THE SMALL DECLINE IN BUSHMEAT IN MBAMBA.

Implementation of SMART in L5-South

SMART is a combination of software and training materials that are designed to increase efficiency, boost morale, empower local staff and promote effective, transparent monitoring of antipoaching methods. In collaboration with the Niassa Reserve management team (MITUR-WCS) it was agreed that L5-South would be used as a trial site for SMART in 2014. SMART was implemented in 2014 and 2015. Our scouts were already using datasheets, GPS track logs and cameras and this seemed like the logical next step. In 2016 we hoped to assist the Reserve management team and other partners with scaling up SMART across Niassa Reserve. This was not possible due to staff changes in NNR team and lack of capacity in scouts in 2015.

- A SMART meeting was hosted at Mariri to finalise the NNR SMART model with representatives from Mariri, WCS, Reserve management and Panthera.
- Dr Peter Lindsey from Panthera came for two weeks to assist with finalizing the report format for SMART and help with implementation.
- A monthly report format for Mariri was developed and many small problems were resolved with constant assistance from Peter Lindsey from Panthera and Rich Bergl from South Carolina Zoo.
- Agostinho Jorge attended a 5 day course in southern Mozambique, National Technical Training Workshop on SMART implementation in Mozambique's Protected Areas from the 06 to 10 November 2015, to assist with development of SMART in Mozambique and provide feedback of implementing SMART on the ground.



SMART meeting held at Mariri with representatives of NNR Management, WCS, Panthera and Mariri/ NCP



SMART workshop in Limpopo National Park lead by Wildlife Conservation Society

- More than 60 days has been spent training scouts in using SMART and improving their effectiveness.
- In December, a data and monitoring assistant was hired to assist with daily management of SMART data as well as other datasets. More than 90 hours were spent in training.
- The SMART model was adapted to allow for collection of species sightings and monitoring data by our local research assistants.

The Challenges: SMART is still not working perfectly and will continue to be improved, however the issues are now small ones. Some challenges are technical (model, program, devices), while others are related to the low levels of literacy of our scouts, the basic SMART program being in English which make it difficult for our monitoring assistant to use it and the amount of time required to manage the SMART system, download equipment, check data input, correct mistakes and print reports. However there is no doubt that SMART is helping us monitor patrol effort systematically, has helped provided data for court cases to back up our scouts and is starting to help us plan our patrols more effectively.



Agostinho, Conservation Manager teaching Cristovao (monitoring and data assistant) and Samuel and Eusebio (research assistants) how to use SMART and collect data on digital devices (Cedar units).

THREAT 2: RETALIATORY KILLING DUE TO ATTACKS ON PEOPLE OR LIVESTOCK

OBJECTIVE 7: TO REDUCE HUMAN-CARNIVORE CONFLICT THROUGH LIVING FENCES, SAFE SHELTERS AND SAFE BEHAVIOURS

Human-carnivore conflict results in retaliatory killing of lions and leopards. Human – wildlife conflict in general leads to a loss of support for all conservation initiatives. Research in previous years has shown that lion and leopard attacks can be reduced through behavior changes, specifically sleeping inside a shelter during the wet season, never walking alone and improving goat corrals etc. A safe behavior poster was developed to promote awareness of behaviours that make people vulnerable and what actions people can take to reduce attacks themselves. We have developed a toolkit of methods used to protect livestock across Africa in collaboration with other lion projects which is available in Portuguese, English and French.

We have the following programs to reduce human - carnivore conflict (and in fact all human-wildlife conflict).

1. **NNR community guardian (MOMS) program:** The Community wildlife guardians collect information on all HWC conflict events in 24 villages across NNR. In program is financially support, managed and mentored by NCP in partnership with the NNR warden, Cornelio Miguel and NNR management team. Monitoring of lion attacks has across Niassa Reserve has been ongoing since 2003. Data is collected through MOMS guardians as well as NNR reports, operator reports and village reports.
2. **Elephant Beehive fences:** The aim of this program is to reduce elephant crop raids in village surrounds using a community supported and maintained elephant beehive fence.
3. **Community Conservation Fund:** A Conservation fund is provided to the Mbamba village as part of our partnership in return for achieving targets in micro land use planning and reducing snaring (performance payment). In 2014 and 2015 they used their fund to put up 20 km of polywire fencing to protect their fields.
4. **Quick response team to react to problem animals in Mbamba Village:** 4-5 permanent staff members from both our antipoaching team and our carnivore research team have the necessary experience, tools (firearm, traps, predator flashing lights) and skills (chasing elephants out of day time refuges, reflective tape, building effective corrals) to respond and deal with “problem” carnivores and elephants. A radio system has been donated to the community to allow them to contact NCP whenever they have a problem. In addition we work with the Reserve management team to respond to “problem carnivores” and provide our expertise and equipment to resolve these issues. This partnership needs to be strengthened as we are frequently not contacted and data on attacks are not passed on. We will address this in 2016.
5. **Living fences/ “Pao Piku” fences:** Bushpigs and warthogs are major crop pests in mashambas during the wet season both because they eat the crops and they attract lions into the field where people are sleeping and working. Farmers use bamboo fences to prevent bushpigs from entering fields. These fences are effective but have to be rebuilt every year as they are destroyed by fire and termites. In 2009/ 2010, the Niassa Carnivore Project in collaboration with Mbamba village and Reserve Management started an experiment to plant a living fence or hedge. These pao piku fences are extensively used in areas outside Niassa but were not yet in use in Niassa. In 2013 the Mbamba experimental fences grew well and are well established, they are now being used for cuttings for new security fences in the village, as the eastern boundary land use planning fence and are being planted around Mariri Environmental centre. However individuals are reluctant to plant them around their fields as it takes 2-3 years for them to be established and weeding is required despite their effectiveness. The community prefers reactive rather than proactive approaches. However, the fences are there and are slowly being used more and more.
6. **Safe behavior and effective goat corrals:** In 2014 we continued to reaffirm the importance of people taking responsibility for their safety through the Community Guardian program and environmental education programs The Safe behavior posters were redistributed throughout MOMS villages. Several activities at Lion fun days reiterated the importance of safe shelters and a comic book has been developed for wider distribution on safe behaviors. An incentive system for people who improve their goat corrals is being trialed in Mbamba Village.
7. **Predator Deterrent lights:** Use of flashing predator lights and reflective tape to reduce attacks on livestock particularly goats. We are currently collaborating with a number of other carnivore projects and Wildlife Conservation Network to develop a predator deterrent that uses light and sound to scare away predators when they come close to corrals. We are also testing a variety of predator lights (predator guard, Niteguard and Fox lights) and reflective tape on livestock corrals.



Solar powered flashing lights that look like eyes and deter predators and elephants

8. **NNR Protocols for dealing with problem animals and reporting on attacks:** NCP has repeatedly requested that NNR management team develop clear protocols to deal with problem animals (What is a problem animal? Who should be contacted? Who should get the meat? How can conflict be prevented etc., who can destroy the animal) and these need to be made clear to scouts, communities and operators. Once these protocols have been developed then these guidelines can be included in the Environmental education and outreach programs at Mariri Environmental Centre. There is still a widespread attitude that animals should be destroyed rather than livestock protected. This message has also been spread by District, National and Provincial Government officials who visited NNR. This is incompatible with long-term conservation goals. The protocol developed by NNR management team needs to detail clearly responsibilities and rights. People need to take responsibility for protecting their livestock effectively to prevent attacks before assistance with problem animals is given. In addition in 2015 we plan to work with NNR management team to ensure that all attacks reported are investigated and the data entered into a centrally available data base to add to the data NCP has already collected.

HUMAN-WILDLIFE CONFLICT ACROSS NNR

Some of the most important data collected by the MOMS wildlife guardians are on human-wildlife conflict events. The analysis of these data and trends over time will be very important once all the data has been digitized.

- 3038 conflict incidents were recorded between people and wildlife in 23 villages in 2015. Again this was remarkably similar to 2014 when 3092 conflict incidents were recorded in the same villages. There has been no increase in conflict. It appear to be stable.
- 89.5 % of the conflict events were crop raising with the majority of incidents caused by baboons (41.57%), then bush pigs (27.22%) and then elephants (13.67%).
- Baboons were the most problematic animals overall as they were involved in the highest incidences of crop raiding, stealing of food from grain stores, killing chickens (7.5%) and in some cases injuring people.
- Carnivore conflict was relatively low with only 11 goats killed and 210 chickens. Given that more than 649 goats were count in 11 of the community guardian villages in 2014 (they were not counted in the remaining 14 villages), human carnivore conflict in NNR is remarkably low.

- Four people were killed by carnivores. One person was killed by a lion in Negomano village when he was hunting the lion (not a problem animal), and 3 people were killed by crocodiles (Mussoma and Negomano villages)

TABLE: SUMMARY OF SELECTED HWC INCIDENTS RECORDED IN 2015

	Elephant	Buffalo	Baboon	Bushpig	Hippo	Lion	Leopard	Hyaena	Crocodile	Total
Farms	385	254	1205	827	48	0	0	0	0	2719
Food stores	0	0	39	0	0	0	0	0	0	39
Goat wounded	0	0	0	0	0	0	5	13	0	18
Goat killed	0	0	0	0	0	3	5	2	1	11
Chicken killed	0	0	17	0	0	0	9	201	0	227
Wounded person	0	3	2	0	3	0	1	4	7	20
Killed person	0	0	0	0	0	1	0	0	3	4
Total	385	257	1263	827	51	4	20	220	11	3038

- Human and wildlife conflict takes place all year. Predictably the number of incidents is higher during the crop season and reaches its peak in March when the main crops such as maize and sorghum become mature. The number of conflict events starts to decrease when people starts to harvest these crops.

The Challenges: Human and wildlife conflict (HWC) is a reality in all village and was monitored throughout the year. Collection of data on HWC is not an easy task as often the wildlife guardians are confronted with angry farmers which sometimes threaten the guardian with violence. When detailed data is collected i.e. the measurement of damage done to crops this often creates the expectation that there will be compensation later. This is particularly common for elephant damage. As the year pass by and no compensation is paid it becomes more difficult for some guardians to deal with the farmers in their villages. This can be reduced if the data collected is reported back to the communities and it is clear to the communities that these data belong to them. This was improved in 2015 and several report back meetings were one. This is an essential part of the MOMS guardian approach. It can in future be used by communities to help them make decisions about which animals cause the most problems and to have more realistic view of the level of conflict. These issues are extensively discussed during the annual training and report back workshops. Livestock owners are also reluctant to take responsibility for protecting their livestock, this is exacerbated by government officials who state that wildlife that enters villages should be killed. We believe that 80% of all carnivore attacks on livestock could be prevented through proper corralling and protecting in hutches.

IMPLEMENTING MICRO LANDUSE PLANNING TO REDUCE CONFLICT AND ILLEGAL POACHING

- A zonation plan governing resource use and pedestrian traffic is being developed in consultation with the Mbamba community in L5-South as part of our community based management of this

area. This takes into account important pedestrian routes, sacred sites, agriculture, tobacco as well as the needs of the environmental centre, conservation and future ecotourism needs.

- The first step initiated in 2012 and completed in 2013 was to secure areas for wildlife and future ecotourism activities in the eastern section of the concession. There was a particular need to limit expansion of fields to the east of Mbamba River into prime wildlife areas.
- In 2012 a written declaration was signed by Mbamba leadership confirming support for the boundary road. In 2013, the GPS of this boundary was finalized through community meetings with elders and the Association and a boundary road was opened to demarcate the limit. In 2014, this landuse boundary was finalized by the District Mecula Administrator. This boundary is 500 m from the Mbamba River except for the confluence where tobacco, an important cash crop) is allowed to be planted on the west bank.
- This boundary continued to be honoured in 2015 by the community leadership. A few farmers who planted over the line in 2015 had their tobacco plants removed by a community team.
- The community conservation fund is in part a performance payment for honouring the landuse line and achievement of this conservation target.
- This is the first community supported land use plan in Niassa Reserve. No limits have currently been placed on expansion to the west, or north. The Lugenda River limits expansion to the south. Landuse planning in Niassa Reserve is essential and we believe that performance payments could play an important role.
- Central to land use planning must be that significant revenues and benefits flow to the community to offset the costs of not opening new fields in most productive areas i.e. along river banks with high wildlife densities. We will continue to look for ways to increase the revenue from the wildlife area for the MBamba community including community based ecotourism which will be trialed in 2016/ 2017.

THREAT: UNSUSTAINABLE SPORT HUNTING

OBJECTIVE 8: TO ENSURE SPORT HUNTING OF LIONS AND LEOPARDS IN NNR IS SUSTAINABLE AND MEETS CONSERVATION OBJECTIVES.

In Niassa National Reserve, Mozambique sport or trophy hunting is allowed and supported by the Mozambican government inside the protected area across nine hunting concessions covering 27,989 km² (66.6%) of the protected area estate (42, 500 km²). The intention is to generate a tourism economy and provide additional infrastructure in an area that does not have ecotourism at present. Sport hunting is increasingly controversial particularly for species that are facing widespread declines across their range like lions, leopards and elephants and particularly in a protected area.

Though illegal offtake (snares, poison) , habitat conversion and retaliatory killing remain the main threats to lions, sport hunting has also been directly implicated in population declines in other areas with altered sex ratios of lions and leopards when it is unregulated, offtake is too high and young or female animals are taken (Loveridge *et al.* 2007; Lindsey *et al.*, 2013). Research has also shown that sport hunting can be sustainable with little to no negative impact on the long term persistence of a lion or leopard population if sport hunting is restricted to males that are at least six years of age in lions, seven years in leopards and quotas do not exceed 2-4 % of the adult male population.

Just in the past year the “Cecil saga” as well as numerous other incidents have resulted in global outrage and increasing debate about the conservation value of killing animals to save them, particularly given the declines in wild lions across their range. As a result, in 2015 Australia and France banned all import of lion trophies and USFWS listed lions from Eastern and Southern Africa as “Threatened” on the Endangered Species Act of the USFWS. A specific 4d rule was implemented which stated that from January 2016, lion trophies shot by USA clients could only be imported into the USA if it could be shown that the sport hunting activity “enhanced” lion conservation efforts. It is no longer enough for sport hunting of lions to simply be sustainable, it has to be shown to be beneficial to lion populations. Leopards are already on Appendix 1 of CITES and sport hunting is allowed but only if it can be shown to have a positive impact. In 2016, leopard sport hunting was stopped in South Africa due to increasing concerns about leopard population numbers.

The goal of the Niassa Carnivore Project is to secure the large carnivore populations in Niassa National Reserve by promoting coexistence between lions and people and actively mitigating human induced threats to large carnivores. Sport hunting was identified as a threat to lion, and leopard populations in 2003. The Lion regulations were written by NCP and implemented in 2006 by SRN (Reserve management authority) and updated by WCS/ ANAC in 2013, while the leopard regulations were implemented in 2010 by SRN and updated by WCS/ ANACA in 2013. The aim of these regulations was to ensure sport hunting was at least sustainable and offtake was minimized. NCP has been independently monitoring the offtake and age of lion and leopard sport hunting trophies in Niassa National Reserve for more than ten years. With regard to sport hunting it is the responsibility of NCP to provide annual independent monitoring on the offtake, age, and distribution of lions and leopards taken as sport hunted trophies for Mozambican authorities and Reserve management team, advise WCS/ MITUR on sustainable quotas and at regular intervals to monitor lion, leopard and hyaena population densities through Niassa Reserve to monitor the trend in these species and ensure quotas are sustainable. Our goal is to ensure sport hunting is not a threat to lions and leopards in Niassa and that it enhance lion and leopard conservation. At the same time we work in partnership with the NNR team to conserve this wilderness as a whole. It is important to recognise that this work is funded by NCP by independent donors and is not paid for by either WCS, Niassa hunting operators, sport hunting clients or ANAC and we do not have any vested interest in sport hunting.

For lions, these regulations and the “points system” for assigning quotas coupled with ongoing monitoring of lion and leopard sport hunting trophies have been successful at reducing offtake in NNR. For lions, only 6-10 lions are killed a year over an area of more than 20,000km². In addition the number of underage lions take as trophies has decreased from 75% to zero (Figure 1). All lion and leopard trophies have to be seen, measured and aged before they leave the protected area and full information must be provided. It is clear that lion sport hunting in Niassa is currently sustainable, well monitored and transparent. The sustainability of leopard sport hunting is more difficult to assess as leopards are very difficult to age from visual criteria and most of the animals taken as trophies are not over 7 years of age and illegal offtake is very high. Data do suggest that if quotas are limited to one leopard per 1000km² this will err on the side of caution (Packer et al, 2011; Jorge *et al.* 2013).

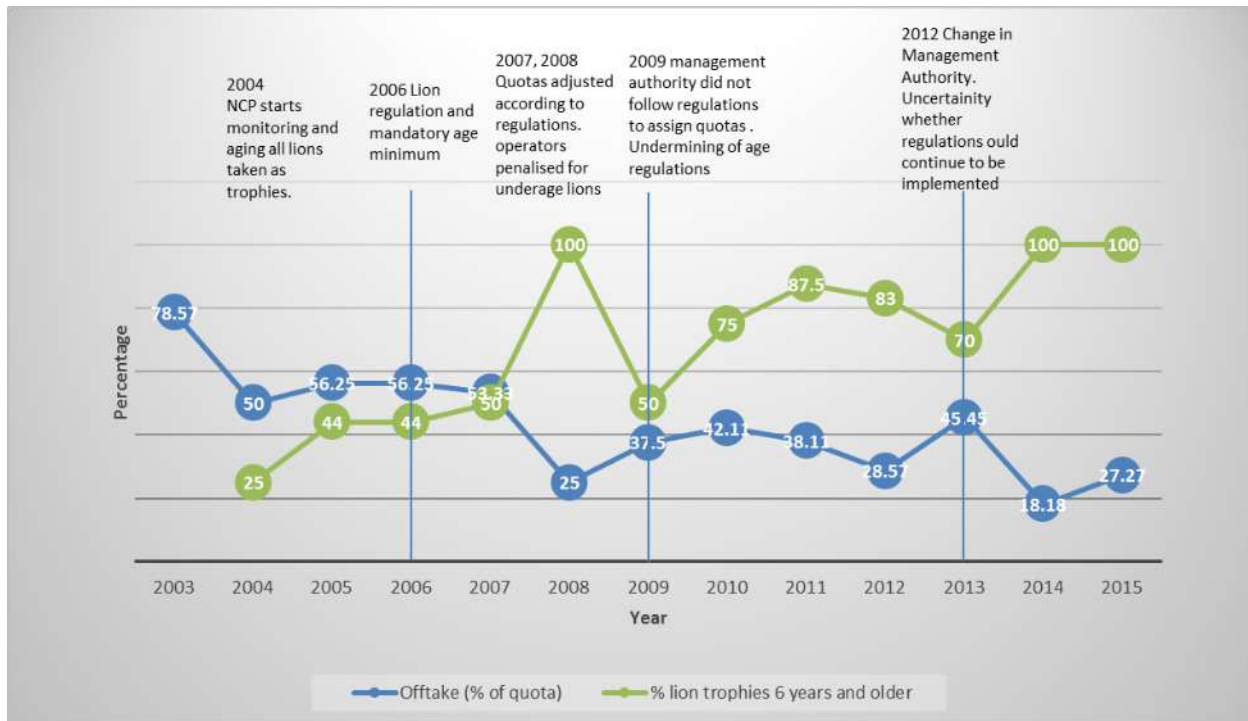


Figure 1: Change in offtake and age of trophies taken in Niassa Reserve between 2003 and 2015 showing the success of the NNR lion regulations and Points system for assigning quotas.

Proving that sport hunting actually enhances the conservation of lions and leopards is more complicated. On the surface, it seems counter-productive and hypocritical to allow the sport hunting of lions and leopards while fighting against illegal hunting since both are sources of non-natural mortality in this protected area. Illegal offtake is high for both species and increasing, particularly poisoning and bushmeat snaring (see antipoaching data and data on mortality in this report). The benefits to the lion and leopard populations must clearly outweigh the costs of individual animals being killed for sport for sport hunting to be a conservation tool -simply put; more animals must be saved than are killed.

At the moment, the measurable conservation benefits to Niassa Reserve from sport hunting in nine concessions are not trivial and include individual benefits to local people living inside NNR through employment as camp staff, trackers and antipoaching scouts in an area that has very few alternative sources of employment and currently no operational ecotourism; the establishment and maintenance of roads, camps, airstrips, and other infrastructure that allow the Niassa Management team access to remote areas for antipoaching efforts; daily communication by people on the ground of poaching events and informer information on poisoning, logging, mining, snaring etc. that allow for rapid response; provision of additional aerial support (more planes); and the employment and training of operator antipoaching scouts that complement the NNR antipoaching team (50-100 scouts are employed by operators in Niassa Reserve).

In addition, the concession fees generate about \$200,000 for conservation management for NNR and by law, 20% of the trophy license fees and concession fees are also required to be returned to communities living inside Niassa Reserve to provide a benefit from living with wildlife.

On the flip side, some concessions are not doing effective antipoaching and their community engagement is poor to non-existent. The 20% of the concession fees and trophy fees that are meant to be returned to communities by law are not tightly linked to wildlife presence so are unlikely to be acting as an incentive for communities to reduce illegal offtake or increase tolerance for human wildlife conflict. As shown by Jorge *et al* 2013, very few economic benefits are trickling down to communities from the sport hunting of leopards and this in no way compensates for attacks by leopards on livestock. There is no reason for this to be any different for lions. In fact the opposite seems to be true where communities are sometimes resentful that outsiders can kill animals for fun and money but they are not allowed to kill animals for food and income. However, this can be improved through better communication of where the 20% comes from, increased and better managed benefits flowing from operators to communities and better operator/ community relationships.

Therefore in NNR, perhaps counter intuitively and despite the caveats, stopping legal sport hunting of lions and leopards has a high risk of increasing illegal offtake of both species. Lions are the highest value species for sport hunters, since elephant hunting has been stopped in 2016. By stopping legal offtake of lions and/or leopards, we may cause sport hunting operators to become unprofitable which will reduce the funds they put into antipoaching and community engagement and ultimately may result in some operators abandoning their areas when a critical point is reached. These hunting concessions are very large (2200-4300km²) and Niassa is currently managed by the NNR management team in partnership with concession holders (both hunting and non-hunting). Open concessions have higher levels of illegal offtake as there is no regular presence, no resident antipoaching scouts, no infrastructure (roads, airstrips) allowing for rapid response and no benefits to communities. There is no viable ecotourism in Niassa Reserve at present and these concessions would therefore be abandoned and left unoccupied. Several concessions designated for ecotourism are currently available in Niassa Reserve and have not been taken by tourism operators. It is naive to think that the hunting concessions could all easily be converted to ecotourism concessions. More open concessions at this point would be disastrous for many species including elephants, lions, leopards, hyaenas, pangolin, plains game etc., as it would lead to less conservation management at a time when threats are increasing.

Overall these benefits from sport hunting do not enhance lion and leopard conservation efforts specifically but they do enhance overall conservation efforts and better protection of Niassa Reserve as a whole. Despite our ethical reservations about sport hunting lions and room for substantial improvement in conservation and community efforts, particularly in the distribution of revenue to communities in some concessions, we suggest that a ban on lion sport hunting should not be implemented at present until a viable plan is in place to prevent creating a vacuum.

We therefore recommend that:

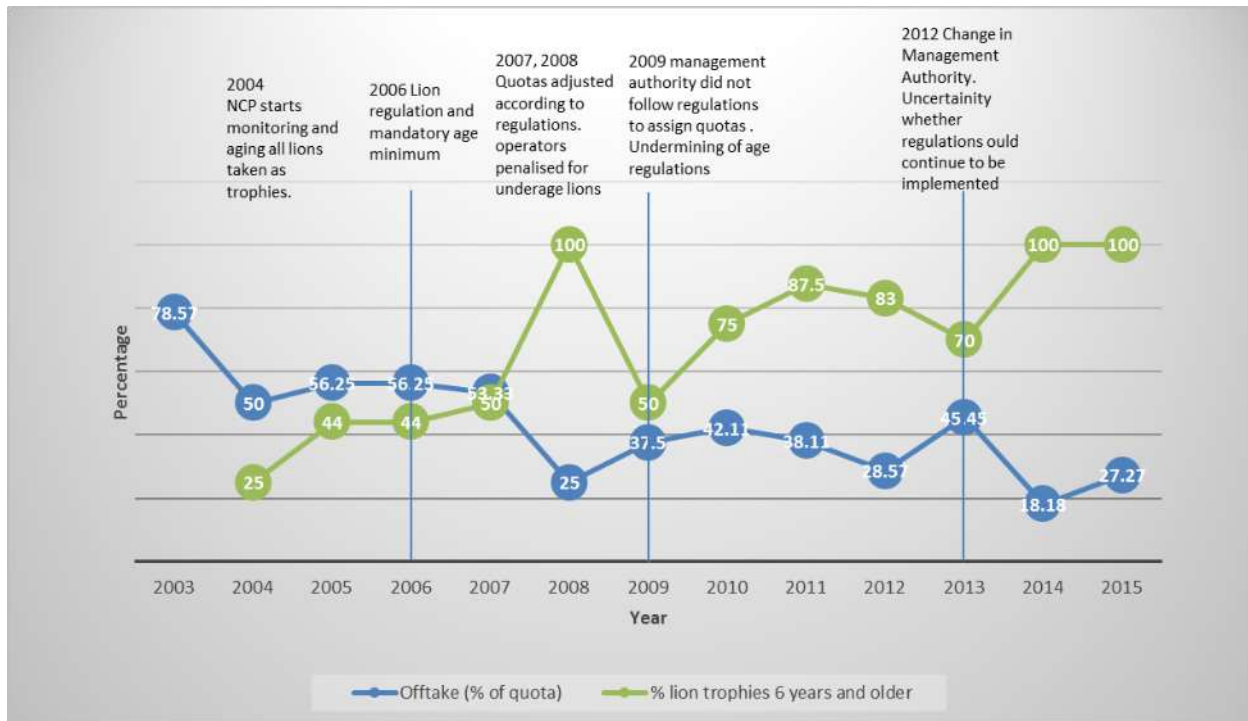
- 1) Lion and leopard sport hunting should continue in 2016 with quotas following the Points system and 1 leopard / 1000km² (see below). The regulations should remain in place, strictly enforced and monitoring should continue.
- 2) Increased pressure from NNR management team should be placed on ALL sport hunting operators to a) hire and train more local people, b) implement effective, monitored antipoaching, c) ensure daily radio communication and a year round presence and d) improve distribution of meat to local communities to provide a direct benefit from sport hunting to communities and to provide added support to programs to provide alternative red meat protein i.e. livestock breeding to reduce bushmeat snaring..
- 3) A desk top study is initiated to assess objectively whether stopping the sport hunting of lions (the 6-10 lions taken a year) could be done without causing operators to become economically

unviable and to assess what alternatives are available to secure the land currently occupied by sport hunters i.e. a Plan B. It is likely that the sport hunting of lions will be stopped in the near future through international pressure and concern for declining lion populations so this study should be a priority.

2015 Activities and progress

The goal of the Niassa Carnivore Project is to secure the large carnivore populations in Niassa National Reserve by promoting coexistence between lions and people and actively mitigating human induced threats to large carnivores. Sport hunting was identified as a threat to lion, and leopard populations in 2003. The Lion regulations were implemented in 2006 by SRN in partnership with NCP, and updated by WCS/ ANAC in 2013, while the leopard regulations were implemented in 2010 by SRN and updated by WCS/ ANACA in 2013. NCP has been independently monitoring the offtake and age of lion and leopard sport hunting trophies in Niassa National Reserve for more than ten years. With regard to sport hunting it is the responsibility of NCP to provide annual independent monitoring on the offtake, age, and distribution of lions and leopards taken as sport hunted trophies for Mozambican authorities and Reserve management team, advise WCS/ MITUR on sustainable quotas and at regular intervals to monitor lion, leopard and hyaena population densities through Niassa Reserve to monitor the trend in these species and ensure quotas are sustainable. Our goal is to ensure sport hunting is not a threat to lions and leopards in Niassa and that it enhance lion and leopard conservation. At the same time we work in partnership with the NNR team to conserve this wilderness as a whole. It is important to recognise that this work is funded by NCP by independent donors and is not paid for by either WCS, Niassa hunting operators, sport hunting clients or ANAC and we do not have any vested interest in sport hunting.

For lions, these regulations and the “points system” for assigning quotas coupled with ongoing monitoring of lion and leopard sport hunting trophies have been successful at reducing offtake in NNR. For lions, only 6-10 lions are killed a year over an area of more than 20,000km². The number of underage lions take as trophies has decreased from 75% to zero (see graph). All lion and leopard trophies have to be seen, measured and aged before they leave the protected area and full information must be provided. It is clear that lion sport hunting in Niassa is currently sustainable, well monitored and transparent. The sustainability of leopard sport hunting is more difficult to assess as leopards are very difficult to age from visual criteria and most of the animals taken as trophies are not over 7 years of age and illegal offtake is very high. Data do suggest that if quotas are limited to one leopard per 1000km² this will err on the side of caution (Packer et al, 2011; Jorge *et al.* 2013).



CHANGE IN OFFTAKE AND AGE OF TROPHIES TAKEN IN NIASSA RESERVE BETWEEN 2003 AND 2015 SHOWING THE SUCCESS OF THE NNR LION REGULATIONS AND POINTS SYSTEM FOR ASSIGNING QUOTAS.

Lion Trophy Monitoring

- Six lions were taken as trophies from five hunting concessions. Four hunting concessions did not hunt lions in 2015. One of these concessions was not operational (R1), two did not have lion hunts (L9, L3) and one had an unsuccessful lion hunt (L2).
- In total there was a quota of 22 lions provided by the Government for lion hunts in Niassa Reserve. Offtake was 27.3% of the total quota but 85.7% of purchased quota. This suggests that the offtake was not low because of unsuccessful lion hunts but because lion hunts were not sold.
- A suggested rule of thumb suggests that offtake should not exceed 1 lion / 1000km² hunted. In NNR, the offtake is less than 1 lion / 4000km² of the area hunted. This is clearly sustainable but the illegal offtake needs to be taken into account. Twelve lions were recorded killed by community wildlife guardians in just 24 villages and an additional four lionesses were poisoned. This is just the lions that we know about.
- There was only one unsuccessful lion hunt- as no suitable lion was seen. The percentage of hunts that were successful was 86%.
- All trophies were seen, measured and aged before they left the reserve.
- All of the 6 lions were over 6 years of age based on tooth wear. This is the second year in a row that 100% of the lions taken as trophies have been all been over 6 years of age.

Leopard Trophy Monitoring

- 20 leopard from a quota of 29 were taken as trophies from eight hunting concessions. This is 69% of the offtake overall. There were two unsuccessful hunts.
- Of the 20 leopard taken as trophies only four leopards (20%) showed obvious wear on their teeth and are likely to be older than 4. However, in 2015 there were fewer leopards under three years of age compared to previous year (20% vs. 50% in 2014). One female leopard was taken by mistake.

EDUCATION AND OUTREACH

OBJECTIVE 10: TO DEVELOP A COMMUNITY OUTREACH AND ENVIRONMENTAL EDUCATION PROGRAM IN NNR THAT INCREASES TOLERANCE AND REDUCES CONFLICT AND PROVIDES NIASSA RESIDENTS WITH LOCALLY RELEVANT CONSERVATION MATERIAL

THIS PROGRAM IS LEAD BY OUR EDUCATION MANAGER, ANDREW MAKANAGE WITH THE ENVIRONMENTAL CENTRE MANAGED BY TOMAS BURUWATE WHO IS ALSO THE RESIDENT NATURALIST.

MARIRI ENVIRONMENTAL AND SKILLS TRAINING CENTRE (S12.17780; E38.09151)

Since starting the Niassa Carnivore Project in 2003, we recognised the critical need for people who lived inside Niassa Reserve to be able to see wildlife and learn about conservation in a non-threatening positive way to promote coexistence. We needed to have an “ecotourism” experience for local Niassa residents not only for visitors.

In 2012, a long term dream started to become a reality with the building of an Environmental and Skills Training Centre in Niassa Reserve. Architectural plans were developed by Mozambican Architect, Romina Gaona. Funding was sourced for the first of three years of building (WCN donor and Houston Zoo). The plans were presented to Executive Director of SRN, MITUR (Dr Pariela, Dr Harun) Director of Education, Administrator of Niassa Reserve, and Administrators of Mecula and Mavago districts for comments. In May before building began the traditional leaders and elders from Mbamba village were invited to view the site, see the plans and comment. Several visits by and consultation with the Director of Education, Reserve management and Mbamba leadership have occurred throughout the process.

The aim of the Environmental Centre is to provide a field venue for bush visits by adults and children to see animals, conservation programs and hold locally relevant community workshops. We hope to build a relationship between Niassa residents based on locally relevant information, foster conservation values and provide skills training for adults to enable them to seek alternative non extractive livelihoods and a place for community training workshops.

In 2015, the Director of Agriculture of Mavago who visited Camp Mariri for the first time and has to regularly deal with human-wildlife conflict on an ongoing basis provided a perfect example of why the centre is needed. In his closing remarks and thanks for the visit he said “I have never seen an elephant before even though I live inside Niassa, this was my first time”. Yet, he is expected to make decisions about elephants and human wildlife conflict. As stated by our Education Manager the “Mariri

Environmental Centre came as an answer to the doubts that children and adults who live in NNR have with regards to living with wildlife in Niassa Reserve”.

The Mariri Environmental and Skills Training Centre was built in concession L5-South to increase awareness about wildlife conservation and foster a positive relationship between people living inside Niassa National Reserve and wildlife conservation through bush visits, conservation education and skills training. It also provides a unique venue for community workshops and meetings. It is perhaps surprising that many of the children and adults living in one of the largest remaining wilderness areas in Africa do not know what it means to live inside a protected area, and the importance of sharing this wonderful place with wildlife. The aim was to bring people who live inside Niassa Reserve to a place where they could see conservation in action and to a beautiful area of Niassa Reserve where it is possible to understand what conservation and ecotourism are and to see animals. Through the M. E. C we are also able to disseminate information on human –carnivore conflict, elephant beehive fences, small livestock breeding, conservation agriculture, rabies, SMART, reserve regulations, mining etc.

This has been the combined effort of many people and the way the Centre was built embodies the spirit of Niassa Carnivore Project and Mariri.

- From the very beginning the Mbamba Village, our partners in managing this area L5-South have been involved. The elders, Chiefs and Association helped us choose the site, they came to visit as we made progress, they provided the lists of people for employment, they celebrated success and helped us deal with problems, and they handed out certificates and congratulated their community for skills learned. They said that this is the first time people have earned any kind of certification.
- More than 60 local men received basic skills training in construction during the years of building under the guidance of architect Romina Gaona, and builders, Onesmus, Amade and Temba. The aim was to provide people with low or no education an opportunity to get skills and a certificate to show they had these skills to enable them to get other employment in future
- In total we have trained 6 master masons, 5 carpenters, 2 plumbers, 3 master thatchers and roofers and they are now able to take on contracts independently. Some of these master builders are now working on our first ecotourism camp as they now have the skill and have been asked to help on other construction projects. Visiting artists have made their contributions with an acid stained crocodile on the floor of the refectory, an elephant, fish and plastic bottle bench.
- The centre is part of all our conservation programs. The visitors can see and experience conservation at work and interact with our staff during their visit. Programs are flexible to allow this. If an elephant is killed we can take the children out to see this, visiting researchers are expected to include the children in their activities and share their experiences so that we can broaden horizons and show that conservation is holistic and fascinating.

- We not only teach environmental education and the importance of conservation but we try to live it too. The entire centre is run on solar power, we hire locally, we source as much of our food as possible from local sources (goats, chickens, vegetables, ducks, rabbits, maize, beans, honey), we have a goat corral for our goats, a vegetable garden is protected by reflective tape with local fertilizer made from dung, and the entire centre is surrounded by a polywire solar electric fence to keep elephants out and the visitors safe.

At this M. E. Centre, there are five cottages for children and teachers who come to visit (19 beds); two cottages for skills trainers/ researchers (4 beds); staff houses; offices; library, refectory, storeroom and workshop with carpentry shop (see section on construction for images of the centre). The M. E. Centre also supports the offices of Niassa Carnivore Project/ Mariri are based. Work still needs to be done on signs, gardens and paths. Additional books are needed for the library and a museum of skulls, seeds and various other interesting things is being developed.



CHILDREN FROM SCHOOLS ALL OVER THE MECULA DISTRICT COME TO THE ENVIRONMENTAL CENTRE FOR 4 NIGHTS TO LEARN ABOUT CONSERVATION AND WILDLIFE IN THE ANIMAL TRUCK.



FOR THE FIRST TIME CHILDREN AND TEACHERS CAN WATCH ELEPHANTS, LIONS, HIPPO AND OTHER WILDLIFE IN A SAFE ENVIRONMENT © R. CRAIG

2015 Activities

- We were very excited to open the Environmental Centre in August 2015, and we started receiving children and their teachers as well as community groups. A calendar of school visits was developed with support from Mecula Director of Education.
- A program of activities has been designed to cover several of the topics in the National curriculum, promote literacy and numeracy and inspire the children about conservation and ways to coexist safely with animals. We focus on locally relevant topics such as costs to ecosystem and health of people from rabies, mercury and poison; the costs of elephants and snaring; ways to protect yourself from attacks by large carnivores etc.
- We wish to give children and adults that live in Niassa Reserve locally relevant information that will initially just increase their knowledge but will lead to an increase in tolerance and eventually will lead to behaviour change and activism for conservation. A full program is available if needed.
- Strict rules are enforced at all times to keep all visitors safe and these are enforced by our staff.
- All visitors have access to our conservation staff during meals as we all eat together and we hope will be inspired and mentored by them.
- We are currently setting up a long term evaluation program through a PhD Student and volunteer (Lily Maynard) that will enable us to track activities that have the most impact and assess whether the messages are being communicated to the visitors to the Environmental Centre and transmitted to others (friends, parents).
- In 2015 we hosted 55 children from four villages for 4 night bush visits (Thursday-Monday). These were from Mbamba Primary School, Acordo de Lusaka Primary School (Macalange Village) and Lugenda Primary School.
- The 13 Lion Scholars who are all on secondary school scholarships visited the Environmental Centre on an official visit and through a holiday program where they assist on a variety of levels (built a goat corral, development an indigenous garden and vegetable garden) .They will visit the centre regularly through their regularly through their school careers as part of the mentorship program.



LION SCHOLARS VISIT THE M. E. CENTRE REGULARLY



LUGENDA SCHOOL GROUP



ACORDO DE LUSAKA PRIMARY SCHOOL – MACLANGE VILLAGE



ESCOLA PRIMARIA COMPLETA 7 DE ABRIL



2015 LION SCHOLARS

- Once at the Environmental Centre their activities ranged from game drives, night drives, visiting and cleaning up fishing camps, visiting beehive fence, livestock breeding and conservation agriculture programs, climbing an inselberg, art, plays and film as well as ongoing discussions about safe behaviours, costs of poaching and mining, value of wildlife and clean environment to human health. Through the M. E. Centre we are able to disseminate specific information on human – carnivore conflict, elephant beehive fences, small livestock breeding, conservation agriculture, rabies, SMART, reserve regulations, mining etc.
- None of these children or their teachers had ever been on a game-drive and most had never seen a lion and elephant or a hippo in anything but a conflict situation. Day and night drives are the favourite events of the 4 day visit. They covered a wide range of activities and topics as knowledge

builds tolerance and hopefully in the long term we can change behaviours. Underneath it all, was the simple need to make conservation fun, to inspire people about the very special place they live in and include them in conservation of this protected area.

- The topics that were discussed in this program include:
 - Conservation Law and what it means to live inside a protected area.
 - Threats to animals and why we should care - focus on elephant poaching, mining and snaring.
 - Health and My environment (litter, poison, clean water and air).
 - Know your animals and plants in Niassa Reserve.
 - We are different, but we are the same (building empathy for animals through knowledge).
 - The Ecosystem and food chains – links between difference animals and our activities with a focus on river system (fish, clean water, hippo etc.), honey gathering.
 - We work to conserve (different aspects of wildlife conservation activities).
 - Protect yourself - reducing human wildlife conflict and practical ways to reduce conflict.
 - Working together to find solutions to conservation and human needs. You can make a difference.



VISITING A FISHING CAMP – THE IMPORTANCE OF THE RIVERS AND FISH AS A PROTEIN; THE DANGER OF POISON



THEATRE AND ART ON CONSERVATION ISSUES TO SHARE IDEAS



LEARNING ABOUT WILDLIFE – IN THIS CASE REHABILITATION OF A CONFISCATED PANGOLIN



CLIMBING INSELBERGS – LEARN ABOUT ENVIRONMENT, DRAW CONTOURS, AND MAPS.



LEARNING TO USE BINOCULARS



LEARNING ABOUT TRACKS AND SIGN OF ANIMALS, IDENTIFY DIFFERENT SPECIES AND LEARN ABOUT THEIR HABITS



GAME DRIVES TO SEE ANIMALS IN NO THREATENING ENVIRONMENT EVEN LIONS, ELEPHANTS AND HIPPO

AND BUILD TOLERANCE AND KNOWLEDGE OF SAFE BEHAVIOURS



DIFFERENCES BETWEEN VILLAGE AND BUSH, WHY IS THE WILDLIFE IMPORTANT, WHAT IS A PROTECTED AREA



VISITS OF COMMUNITY GROUPS- LIVESTOCK BREEDING, BEEHIVE FENCES, CONSERVATION AGRICULTURE, GOAT CORRALS TO TAKE THE INFORMATION BACK TO THEIR PARENTS, SCHOOLS AND COMMUNITIES



TIME FOR GAMES WITH A CONSERVATION THEME LIKE PIN THE TAIL ON THE LION



ART AND CRAFTS TO SHOW WHAT YOU HAVE LEARNED AND SEEN. CELEBRATE THE BEAUTIFUL PLACE YOU LIVE IN AND UNDERSTAND WHY IT IS IMPORTANT

The Challenges: We are testing a lot of different activities to see which activities result in the information being retained and transmitted to their parents and friends given low literacy levels. Our programs are flexible and designed to take into account conservation activities that are happening in camp at the time. They will be refined over time. The low literacy levels of the students is a challenge as very little can be written or read and in many cases they do not speak or read Portuguese well. It is therefore difficult to assess what is retained. The distances we need to transport the children are long and the dry season is short. This limits the number of school groups we can host in a year between May and November. We also need to take into account exams and school holidays. And time for other community groups (training and skills training sessions.) We did not manage to bring all schools we scheduled for 2015. Children do not use the library effectively as all the field guides for animals and plants in Southern and East Africa are in English. There is no way around this at present as there are very few natural history field guides for reptiles, plants, mammals birds etc. develop for Mozambique but we will develop a few simple field guides in Portuguese – we already have bird and mammal checklists. The low number of children actually going to school means that there are many children that we are not reaching and it is the children that

are not in school that are likely to be engaged in illegal activities (snaring, poaching, mining etc.). We will need to also do bush visits with non-school going children to talk about conservation in future and will assess this in future...

EDUCATIONAL MATERIALS AND OUTREACH

- In November 2014 we hired an Education Manager (Andrew Mkanage) to lead the further development of our conservation education programs including the Mariri Environmental Centre, lion fun days, lion scholarships and educational materials. This environmental education program is designed to reach not only L5-South by eventually larger Niassa Reserve community through the Niassa Carnivore Project and in partnership with Reserve management team.
- The storybook was edited and a further 1000 Portuguese copies printed and distributed in 2016.
- The Spirit Creatures film produced by Keith and Colleen Begg on the spiritual connection people have to wildlife in Niassa Reserve was completed and won two International awards. A Portuguese version was completed and has been freely available in Mozambique in 2015 and broadcast on National Television.
- The elephant memorial continues to be regularly visited by school children, community groups and government officials and tells the story of elephant poaching in Niassa Reserve. This memorial has been very effective at illustrating the scale of the problem and already forms the focus of visits to Mariri Environmental Centre.



NIASSA PROVINCE GOVERNOR VISITS THE ELEPHANT MEMORIAL

THE 7TH ANNUAL LION CONSERVATION FUN DAYS

The lion fun days are held in Mbamba Village in November, with two mornings of fun art and game activities with a conservation theme. They involve Mbamba teachers and adults as well as 350 Mbamba children. These were started in 2009 by the Niassa Carnivore Project and have become a tradition. The entire village takes part and in 2015, many residents said that this is their festa, their day. The activities

consist of theatre, art, races that include both children and adults with a conservation theme. These games are brought to Mbamba village to provide a benefit from animals in the area, develop community spirit and provide conservation messages. They help to bind the community together and provide a benefit from conservation. The Mbamba teachers and school play an active role in these days and the days are led by the Mariri/ NCP staff with assistance from local teachers and Houston Zoo and Hogle Zoo, USA.

- In 2015, the conservation fun days were also attended by Mozambican journalists and the Reserve warden as well as the village association and traditional leaders.
- Activities included painting of murals with conservation messages (poisoning the rivers, mining, and fire), lion conservation dances and songs, theatre by school and NCP staff on poaching, illegal mining, poisoning in rivers and importance of animals for future tourism. The 10km race for men and 5km race for women are increasingly popular – running for lions and have a bicycle first prize, cell phone and radio as second and third prizes respectively. Children made animal masks, painted and ran races.
- Children receive toothbrushes, soap, toothpaste, school materials, lion bracelets, capulanas, bags and T-Shirts as prizes.
- Highlights were the Nsegue dance group who have development special conservation anti-poaching dances, the lion, zebra and goat game to illustrate the importance of goat corrals and school theatre illustrating antipoaching with all the NCP staff represented!
- These days are all about celebrating conservation, having fun and binding the reserve and its communities together.
- In 2015, a similar mask painting activity was also done at the Niassa Carnivore Project stand at the BioFund exhibition in Maputo which was attended by four of our staff to spread the carnivore conservation message.





STORY 1: MURAL PAINTED BY CHILDREN AND PRESENTED BY STAFF – FIRE DESTROYS HOME FOR ANIMALS AND PEOPLE, DESTROYS THATCHING GRASS AND FIREWOOD AND IS NOT GOOD FOR OUR AREA EVERY YEAR.



SCHOOL THEATRE: ELEPHANT POACHING IS DESTROYING NIASSA RESERVE

LION SCHOLARSHIP PROGRAM

The Lion Scholarship Program aims to provide secondary school scholarships to children living inside Niassa National Reserve. The scholarship comes through the Mariri / Niassa Carnivore Project (NCP) and the Mariri Environmental and Skills Training Centre based in concession L5-South. The scholarship program has two objectives: a) to promote education by providing an opportunity for children in remote villages with only a primary school to go to secondary school so that they have an increased opportunity to get a job rather than earning a living through fishing and poaching and b) to provide a strong benefit to communities from wildlife conservation. This scholarship comes to children from the wildlife in Niassa National Reserve. The need for secondary school education was identified as a critical need by fishermen and farmers in Mbamba Village (survey conducted in 2009 by NCP). This program also directly involves the Lion scholars in Niassa Reserve conservation through a mentorship program and visits to the Mariri Environmental and Skills training Centre with game drives and links to research and community conservation programs. This program has the full support of the Mecula Director of Education and currently forms part of the benefits provided to Mbamba Village as partners in Concession L5-South – Mariri.

Beneficiaries of the scholarship

In the first phase of this program (2013-2015), it has been children from Mbamba village who finish their education in Grade Seven (7) who have benefited from the lion scholarships to the Mecula Secondary School. This was initiated in 2009 as no children from Mbamba Village were attending secondary school. In 2016-2017 we would like to extend the program to other children from different schools within the

Mecula district linked to the Mariri Environmental Education and Skills Training Program in partnership with the Niassa Reserve Management Authority. We would also like to find funds to improve the boarding school which is currently not acceptable for children to board at as it is an old military barracks and the children sometimes share accommodation with police or army.

Criteria for selecting the candidates

- The candidate (child) must pass with good marks (13 above) in grade seven;
- The candidate (child) should write a short (less than one page) essay on why he/she needs a scholarship and what his/her future dreams (who does he/she want to become? E.g.: nurse, teacher, manager, etc.);
- Family conditions (the candidate can have an access of the scholarship if his/her parents are not able to pay for secondary school education);
- The candidate should have a record of good behaviour at school;
- The candidate's parents/guardians should show their interest in their children's career and give permission for their child to go to secondary school.

What the scholarship includes

The scholarship includes school materials, school fees, and costs for boarding school, school uniform, school shoes, casual shoes and casual clothes. It also provides pocket money, travelling allowance for holidays so that the children can return to their home village. An important part of the program is the link to conservation, wildlife and research through visits to the Mariri Environmental Centre. On returning to Mbamba Village at the end of the school year in 2014, the children immediately asked if they could come into the field in their holidays to learn more about conservation.

2015 Progress and Activities

- In 2015, fifteen children were awarded scholarships to secondary school, two were girls and thirteen boys. We supported two children in Grade 10, five in Grade 9, and eight children in Grade 8.
- Fourteen children were doing their secondary school at Mecula Secondary School, and 13 lived at boarding school, and one with her parents in the village. One child was attending the technical institute in Lichinga.
- All scholars received school materials, text books, school fees, costs for boarding school, food for boarding school where necessary, school uniform, school shoes, casual shoes and casual clothes. We also provided pocket money for personal items and a travelling allowance for holidays so that the children could return to their home village.
- As part of scholarship, children visited the Mariri Environment Centre during their holidays and helped with various activities - building a goat corral, establishing the vegetable garden and indigenous garden and being part of the team. Through this mentorship we hope they will learn about work ethic, leadership, commitment and build their confidence and determination to complete school. They also were the first group of children to visit the Environmental Centre when it opened.

- The results of examinations and test show that the majority of children did well and passed into the next grade. Among the fifteen children, eleven passed, (ten boys and one girl (73%)) and four failed, three boys and one girl, (27%).
- We do not continue the scholarship for those that failed. If they repeat the year with support from their parents and pass they can come back into the scholarship program. We need them to show commitment and the scholarship has to reward excellence.

TABLE: NAMES OF LION SCHOLARS AND THEIR GRADE

Name	Grade	Number of years of scholarship
Juma Issa	10	3
Maico Mauricio	10	3
Alberto Sauade	9	2
Anita Mauricio Changa	9	2
Domingos Cristovao	9	2
Safai Djei	9	2
Santos Celestino	9	2
Angela Joao Mandrassé	8	1
Domingos Daude	8	1
Raimundo Carvalho	8	1
Sabado Bacar	8	1
Issa Pita	8	1
Santos Manuel	8	1
Julio Francisco	8	1
Amade Eusebio Waite	8	1



LION SCHOLARS WHO ATTENDED MECULA SECONDARY SCHOOL AND WERE BOARDING

The Challenges: There are very few children to choose from in Grade 7 at Mbamba School. We would like to give equal scholarships to girls and boys and for the scholarship to be something that children aspire to but few girls are getting to Grade 7. To assist with resolving this issue we are trialling a school lunch

program to get more children into the Mbamba School. The Lion Scholars suffered from a lack of food on some days and went to school hungry despite full fees being paid for the boarding school. On some occasions children went to school without eating anything. To solve this we bought basic food (beans and rice) and kept these with a colleague in Mecula to provide to the children to cook when needed. There was also a shortage of textbooks. Children were given homework using textbooks but these books were not available. Mariri sourced an unused room to use as a library with support from Education Director, repainted it, put in shelves and purchased books so that the scholars would have books at the boarding school. At present the books in the library are still not enough to support the needs of the children but this is a start.

SUPPORTING CONSERVATION THROUGH SPORT -PARTNERSHIP WITH STILL STANDING AND MINI BASQUET

In 2015, Mariri partnered with Still Standing and Mini Basquet to bring Mini Basquetball to Mbamba village and connect it to health, education and conservation messages. The theme of the workshop was Joy of Life. The video of this initiative can be found here:

https://www.youtube.com/watch?v=2NDahwrfZ_o

“Joy of Life” has very similar aspirations to NCP. We hope that this initiative will grow as we think that sport is the perfect way to engage children and adults and provides a way to talk about different issues while focusing on health, education, leadership, participation and team work. Children learned basic ball skills, basketball, new songs and the value of sport. The Still Standing team lead by Edison Saranga were great Mozambican mentors for the Mbamba children, and youth, both girls and boys. We plan to partner further in 2016. At the end of mini-basketball activities, T-shirts were distributed to all children who participated, and basketball hoops and ten balls were donated to the school and have been put up outside the school.

We are discussing ways to take this initiative to more schools, strengthen the conservation and health messages, train local basketball players to keep the sport going and provide local leadership in 2016. This is a partnership in its very early stages but with significant potential with two not for profit organisations – NCP and Still Standing combining their resources and objectives.





FIVE-DAY WORKSHOP FOR MBAMBA CHILDREN ON MINI BASKETBALL AND THE JOY OF PARTICIPATION, TEAM WORK AND SPORT WITH A CONSERVATION THEME

COMMUNITY PARTNERSHIPS

OBJECTIVE 11: DEVELOP COMMUNITY BASED MODEL OF CONSERVATION MANAGEMENT IN L5-SOUTH THROUGH PARTNERSHIP WITH MBAMBA VILLAGE COMMUNITY

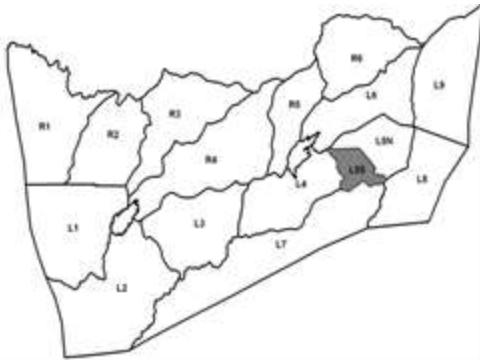
In 2012 we were awarded the management lease for concession. L5-South (580km²; 58,000 hectares) by the Ministry of Tourism. This is the smallest concession in Niassa Reserve and has been the intensive study area and base of the Niassa Carnivore Project since 2003. This concession, is being managed by us (The Ratel Trust) in partnership with the Mbamba Village community (2000 people) who live inside the concession as a Mozambican company Mariri Investimentos (name chosen by the community).

The aim is to develop L5-South as the first community based concession inside Niassa Reserve to provide a model of community engagement that works. Our goal is to successfully manage and secure this wildlife area in Niassa Reserve in partnership with the local community with decreased poaching (bushmeat snaring and ivory poaching), increased wildlife populations, reduced human-wildlife conflict, increased food security and real benefits from conservation flowing to the Mbamba community and people across Niassa (revenue, employment, conservation assistance).

The concession also provides security of land tenure for the Mariri Environmental and Skills Training Centre and Headquarters of NCP. Block L5-South lies in Niassa Province, Mecula District inside Niassa National Reserve (NNR) in the south eastern Lugenda Valley. L5-South borders two sport hunting concessions on the south bank of the Lugenda River (L8, L7) with ecotourism concessions to the west (L4, not active) and east (L5-north). It includes Mbamba village, a major village inside the protected area which supports approximately more than 2000 people and 410 households) and encompasses a mosaic of habitats. The southern boundary of the intensive study area is a 30 km stretch of the Lugenda River, which is the most intensively fished area along the 350 km of the Lugenda River contained within NNR. The river provides a critical protein and income source for several communities. This is the smallest

concession in Niassa Reserve and has been the intensive study area and base of the Niassa Carnivore Project since 2003.

In 2016 we hope to initiate management of the eastern section of concession L4-East, our neighbour to our west. This concession is currently open and is a major poaching and mining hotspot. Through initial discussions with the NNR Management team and traditional leaders we plan to work with 6 villages in this concession, who have already expressed an interest in partnering with us in conservation as we have done with Mbamba village.



MAP OF NIASSA RESERVE, SHOWING THE POSITION OF CONCESSION L5-SOUTH, THE SMALLEST CONCESSION IN NNR



LIPUMBULU MTN AND THE EASTERN LUGENDA RIVER INSIDE CONCESSION L5-SOUTH

NCP considers sustainable social, economic and community development in Mbamba Village and other NNR villages a priority and believe this should be an integral part of a conservation strategy. Our approach is to concentrate employment and benefits into the Mbamba community that live inside the concession unless these skills are unavailable as it is these people who are helping to manage this area and living with L5-South wildlife. The Mbamba Village community is involved in all aspects of conservation and social development of L5-South. Substantial investment into the Mbamba community was made in 2014.

It is important that we monitor the scale of community and individual benefits accrued by Mbamba village so that it can be determined what the costs will be to scale up these types of partnerships. There is no doubt that for communities to accept conservation and wildlife as a viable land use and to actively engage in conservation, substantial revenue and benefits need to flow to communities and individuals otherwise agriculture, development and extractive use will always be a more attractive alternative. People cannot be kept in abject poverty to suit conservation goals. Not only is this unethical but it is also unsustainable as Niassa communities aspire to better lives, better food security and all the trappings of success similar to everyone. The only alternative is to link conservation with “conservation friendly” development with excellent land use planning through performance payments and opportunity and revenue sharing.

The revenues, time, meetings and effort provided to the Mbamba community are therefore logged. At this point the revenues are all generated through philanthropy in the absence of sport hunting or ecotourism in this area. However if at all possible we plan to develop community based ecotourism in the area (2017 onwards) to provide a sustainable revenue stream to offset some of these conservation costs. It is apparent that some level of philanthropy will always be needed as revenues are likely to be low.

Employment provides the best and most obvious benefit from conservation but it is not the only benefit that can flow from wildlife. We also provide skills training, educational opportunities and community programs to increase food security and are concentrating on generating revenue for the community. Skills development is a critical component of our conservation programs and can be as simple as providing a person with the skills to improve the productivity of their own fields (conservation agriculture program) or breed livestock successfully (livestock breeding program, through to providing technical construction skills, training as a scout, researcher or driver).

INDIVIDUAL BENEFITS

Substantial investment into the Mbamba community was made in 2015 following our investment in 2013 and 2014. Specific assistance to the community over and above our specific community programs (elephant beehive fences, livestock breeding program, conservation agriculture farmer field school) is provided in the detailed table below.

In Summary:

- More than **Mt 8 511 390 (US\$189,142)** was paid directly to local people in Mbamba village in salaries, stipends, goods and assistance (see table)
- In 2015, more than 600 people benefited directly from NCP conservation, education, skill training and employment programs excluding the general support provided for the Mbamba School which included initiation of a Lunch program every day for all children who attend school, 13 secondary school scholarships and materials (>800, pens, pencils exercise books, sports equipment, teacher material).
- 150 people from local communities were employed as permanent or seasonal staff. The total amount paid directly to local staff (permanent and seasonal) from Mbamba village in salaries in 2015 was Mt 6 730 265 (estimated US\$168 256).
- Over 100 women from Mbamba and Macalange received payment for grass for thatching, people collected bamboo and assisted with road building and clearing of the airstrip.
- We have a philosophy of buying as much of our food requirements as possible locally – this includes maize, goats, rabbits, ducks, chickens, honey and beans.
- In addition Mariri provided a community conservation fund to Mbamba village which with performance payments came to a total of 285 000MT (\$7500). The Mbamba Community guided by their Committee used these funds to put up their own polywire electric fence.
- In 2015 we supported the local and district Government by assisting with the Governor’s visit (lunch for >110 people at Mariri, fuel, tents, and other food support), 25th June celebration, medical evacuation of 5 people to Mecula hospital, transport of “Chapa” from 20% as well as regular lifts for the teachers, doctors and Chefe de Posto and genera Mbamba population.

- Education is important to us and we provided 1000 of exercise books and pens and pencils, support a school lunch program for all children in the school and support 13 secondary school scholarships.



SCHOOL MATERIALS PROVIDED TO MBAMBA SCHOOL



GRINDING MILL PURCHASED BY MBAMBA RESIDENT THROUGH SUPPORT FROM MARIRI



VILLAGE CLEAN UP WITH VILLAGE CHILDREN



MATERIALS PROVIDED TO MBAMBA MOSQUE THROUGH A DONATION FROM ANOTHER MOSQUE

TABLE: COMMUNITY ASSISTANCE PROVIDED IN 2016

Item	Individuals benefited	Value MT	Value USD
Salaries of local permanent staff and bonuses	50	3 348 476	83 712
Skills training in construction provided to Mbamba residents	> 100	2 857 645	71 441
Employment in Conservation services (grass, bamboo, roads, etc.) to local residents	> 100	524 144	13 104
Assistance to the District Education Department with transport of books to Mbamba	-	-	-
Materials for Mbamba school (books, stationary)	200	51 445	1 286
Materials for Mosque – donation from Cape Town Mosque (prayer mats and books)			
Secondary school scholarships – conservation- Lion Scholars	13	337 500	7 500
Assistance to Mbamba School with food Lunch program	> 200	255 000	5 000
Assistance to the District Education Department with transport teachers Mbamba-Mecula-Mbamba	7	-	-
Locally purchased food for Environmental Centre to support local livelihoods (maize meal and goats, chickens) for Mariri	5	776 240	19 406
Stipends and training for 25 guardians of 25 villages	25	345 600	7 680
Local purchase of construction materials (Cement, etc.)	1	137 500	3 438
Lifts for Mbamba residents to Mecula or elsewhere and return	> 400	120 000	3 000
Financial assistance to Adamo Chaibo, Mbamba resident, to buy a low "grinding" (loan)	1	100 000	2 500
Purchase of baskets and pottery in Mbamba village	2	15 000	375
10 Lt of petrol donated to the Chefe Namanha to be transported to receive medical treatment in Mecula	1	550	14
Assistance with funeral and death of Chefe Ngolange	1	-	-
Mechanical assistance to fix motorbikes and grilling machine parts for several Mbamba villagers in the Mariri workshop	> 10	-	-
Assistance of 80 families with small livestock	> 80	60 000	1 500
Assistance to the Mecula District Government for the celebration of the 25th June		1 600	40
Assistance to the Mbamba Clinic with medical evacuation of patients from Mbamba to the Mecula Hospital (fuel or transport)	5	5 880	147

Assistance to the Mbamba administration to host the visit of the Niassa Province (grass, accommodation for people, tents, food, meal for 100 people at Mariri)	100	15 750	350
Assistance to the Mbamba Community with the electric fence-transport	Village	6 750	150
Assistance to the Mbamba Community with the Be3hive fence	>20 households; >120 beehives	81 000	1 800
Capulanas provided to the Mbamba dance group	18	1 440	36
T-shirts to Nsegue dance group	30	16 200	360
Access to a better market for tobacco for farmers	20	-	-
Sports equipment through Still Standing	>100		
Access to a better market to fish through transport of 20 baskets of fish to Marrupa	20	80 000	2 000
TOTAL		9 137 720	224 839

Community Conservation fund for 2015

The Community Conservation Fund was established in 2013 as part of NCP partnership with local communities. At present L5-South does not have ecotourism operational due to low game numbers and high levels of insecurity due to poaching and illegal mining? Funds are therefore provided from philanthropy.

A baseline fund is provided if community honours the agreed limit on the eastern side of Mbamba Village delineating an area for agriculture and development and an area for wilderness. This is added to through performance payments and a bed night fee from paying visitors who comes to L5-South. At present paying visitors are limited to external researchers, campers and a few donor visits but this will increase as ecotourism is established? Resource use such as fishing and honey collection is still allowed inside the wildlife zone but agriculture is not. Illegal activities (bushmeat snaring, mining, elephant poaching, poisoning, logging) are not allowed in any area as detailed by the Mozambican law for protected areas.

The Mbamba Conservation Community Fund for year 2015, announced during the annual meeting, was \$6,500. The exchange rate for the date of announcement (June 2015) was 1USD to 38.00mt approximately, meaning that the community fund was 247,000.00mt.

Performance payment scheme

In 2015 NCP formalized the implementation of a performance payment in partnership with Mbamba village to assure that people will make a strong link between benefits and conservation. The funds come to the village from animals and conservation. This was introduced by Mariri/ NCP but negotiated and

agreed on through several additional meetings. The performance payment scheme runs for 12 months at a time between Julys of one year to June of the next year culminating in the AGM.

The performance payment scheme was first discussed, at Mariri Environment Centre in 2014 and implemented for 2014/2015. At the AGM in 2015, additional criteria for performance payments were agreed and will be implemented for July 2015/ June 2016. The performance payments scheme was first agreed to by Mbamba Association and traditional leaders and then communicated to community by Mbamba Association at the June 2015 AGM. People from the village were invited to contribute addition criteria. This will be reassessed each year. The only criteria for the performance payments are that they must be easily measurable and related to conservation.



Annual General Meeting - Mbamba Village_ 2015



REPORTING THE RESULTS OF THE 2014/ 2015 PERFORMANCE PAYMENTS BACK TO THE MBAMBA VILLAGE AT THE AGM. REPORTED BY MBAMBA ASSOCIATION.

The performance payment scheme adds to and decreases the base fund according to specific criteria. It is designed to encourage conservation friendly behaviour and increase the fund. It can also be decreased through penalties if the community as a whole records poor performance. The performance payment criteria for 2015/ 2016 are described below. They are worked out and agreed to as USD amount as the exchange rates change during the year. On the day of the AGM they are converted to MT's and this is the amount used for that year.

Bonus:

\$200 for each month without an elephant death inside the block L5-South

\$3 each child that writes exams at year end at school;

\$10 if a visiting group sees each of elephant, buffalo, lion, leopard, wild dog or spotted hyaena during their visit.

\$3 for each adult that finishes a year of adult education

\$5 for goat owner that has a safe corral

In 2015, the Mbamba community received \$2,000.00 to add to the base fund of \$6500 for the 10 months without an elephant death inside L5-South (\$200 x10). The three elephants killed in L5-South and one snared Hyaena resulted in a penalty of \$1,150.00.

Penalties

\$300 for each elephant killed by poaching in L5-South

\$250 for lion or hyena killed because of snaring/ poisoning;

\$3 for each snare found by scouts inside block L5-S

\$5 for every goat owner that does not have a safe corral

Investment of community fund

Every year the Community Conservation Fund is the subject of intense and participative discussion among Mbamba community and 2015 was no exception. Suggestions ranged from buying food, buying a car and purchasing additional electric fencing materials. The discussion about investment of the money is guided by Mbamba Association but is meant to be a community decision with a participative process. Initially the Mbamba Association sent a letter to Mariri informing that their community decided to buy a vehicle pickup to transport people between Mbamba and Mecula center. Mariri advised them to develop a budget and assisted with realistic costs of running and maintaining a vehicle.

Later in the end of the year, after careful analysis, Mariri received communication from Mbamba Association informing that they decided to invest the fund to buy additional electric fencing materials to reduce elephant crop raiding and complete the electric fence. The entire village fields can now be fenced in three different areas. They asked Mariri's assistance to buy and transport the materials to Mbamba. This has been done. Mbamba community will use their fund to cover all the cost related to a purchase of the electric fence materials and will pay community members to maintain the fence.

Challenges in 2015:

- The low number of people that come to community meetings. AS a result meetings are frequently not representative of full community. It is hoped that as the fund grows and has the potential to affect more individual lives, attendance will improve. Similar problems have been encountered by district government officials.
- Some members continue to act out of self-interest instead of recognizing that they represent community and communication of decisions to broader community is poor. It is hoped that the provision of public noticeboards in Mbamba Village will encourage transparency and accountability.
- The lack of skills in leadership, administration, minute writing, and budgeting result in poor decision making. This will improve with skills training. For example – people employed from the fund to maintain the fence were paid for the whole year upfront instead of per month and as a result they did not do the work and there were no more funds to pay for something else..

SCHOOL LUNCH PROGRAM

NCP and the Mbamba community as Mariri have been increasingly concerned about the low level of school attendance in Mbamba village and the low number of children reaching Grade 7. The Community suggested that this was due to parents who did not want to send the children to school and teachers who were seldom at the school. Through consultation, it was agreed that as a benefit from conservation, Mariri and the Mbamba community would initiate a School lunch program to try and incentivise parents to send their children to school. The meal would also assist teachers as children would be able to concentrate for longer periods if they had better nutrition. For every child that completes the school exams an additional bonus will be given to the Community Conservation Fund (US\$3 per child). Education is a key part of conservation as without an education adults cannot find work and therefore rely on natural resources for income and food. We are committed to providing better education in Mbamba Village.

Through agreement the responsibilities for the program were split between Mariri, the teachers and the community. Mariri refused to bear all the responsibilities as these are the children of the village and it requires a deeper commitment.

Mariri committed to buying the food (rice, maize meal, beans, cooking oil, tomato paste etc.), cooking materials (pots, cups, spoons, forks, etc.), and two 200 litre drums for water (this amounts to USD17 000 / year for 350 children). Teachers committed to control the food and materials of the program provided by Mariri; encourage children to

attend school and keep a register, make sure that only children who come to school get food (one meal per day), request food from Mariri when the school is running shortage of it; and provide a monthly report on the food program. The Community / Parents agreed to prepare the food on a roster system, fetch water and provide firewood, construct refectory and kitchen to cook and eat and monitor the program.

This program comes to the village from the wildlife. If the wildlife disappears so does the food program.

Implementation of the program

Food program at Mbamba School started in September, 2015. In the first phase, we provided 562kgs of rice, 562kgs of maize flour (corn flour), 270kgs of beans in September and again in October, with the primary food, cooking oil, onion, vegetables, tomato paste, goat meat and fish. We also purchased spoons, forks, cups, pots and basins. We do not provide “junk” food (juice or biscuits) and believe that food should be locally sourced wherever possible to ensure this program is sustainable and support local food growers.

This program has only just begun and we only have three months of data so far but the results are encouraging although the teachers were poor at keeping good records. Before the food program started at Mbamba Primary school, teachers claimed that many children were not going to school regularly. The Table below shows the number of children registered and the number of children actually going to school before the program.

There was a noticeable increase in the number of children attending school after the lunch program started and by October all the children who had registered were again coming to school. There was an increase of 124 children just by providing a meal.

In 2016 it will be interested to note whether there is an increase in children registering at school because of the food program.

TABLE: IMMEDIATE EFFECT OF THE FOOD LUNCH PROGRAM – ONE MEAL A DAY

Grade	One	Two	Three	Four	Five	Six	Seven	Total
Registered 2015	81	71	43	45	25	29	20	314
Going to school before food program July 2015	31	28	22	22	13	15	10	141
End of year 2015	81	71	43	45	25	29	20	314



The community was given responsibilities of cooking food for children, fetching water and fire wood, constructing a simple kitchen and refectory for children to use as they eat food. The community tried to perform some of these responsibilities, like cooking and construction of kitchen but there was resistance to cook the food for free. The mothers wanted to be paid even though it was their children in the school. We believe that all partners must carry some responsibility for this to be sustainable and effective.



THE CHALLENGES: The major challenge in this program was the lack of participation of the community. Parents did not cook regularly, they did not fetch water, children were the ones fetching water, they did not bring fire wood, and they didn't construct refectory. Because of this, children ate in the classroom. This can be resolved over time but the community need to help support their children for this to work. Mariri will not pay people to cook lunch for children. In many other schools across Mozambique and elsewhere parent volunteer their time to the school. This culture of apathy and resistance to do community service is unusual in local communities. Another challenge was the distance to where water is fetched, since children were the ones fetching water, it was tough for them to walk a long distance, to Lugenda river to fetch water. The lack of adequate water points in Mbamba Village remains a major challenge that needs to be addressed by local government. At present there is one working water point for more than 2000 people.

Another constraint was the lack of reliable information on the number of children registered at the beginning of the year, children who came to school before food program started, and number of children participating classes during food program. The figure provided were not official figures written in a register as no register is being kept of the children actually coming to school each day. In addition the number of children who wrote exams was very low compared to the number of children participating lessons. For example, the average number of grade seven children participated classes in the last weeks of the term was 14, but only 9 wrote exams.

- We believe that this program is an important one as it addresses conservation and community development on a number of levels. Education is critical.
- Our Education Manager regularly talks with the community members to remind them why food was important to their children and the need for them to prepare food for their children before they go to school. Community members promised that they could employ some people to cook for their children at school, still the decision not confirmed
- We are investigating ways to build a water tank at the school to collect rain water off the roof.
- We will work with the teachers to find a proper way to register the children and ensure correct records are kept. Andrew has developed a form for the teachers to record the number of children at school each day.

DEVELOPMENT OF MBAMBA ASSOCIATION

Mariri is a partnership between the Niassa Carnivore Project and Mbamba Village represented by *Associação de Utendeli ni Mazengo* and community leaders to manage concession L5-South. *Associação de Utendeli ni Mazengo* and the community leaders play a critical role in connecting Mariri with people from Mbamba village. Together they have assured the fulfilment of all agreements signed with Mariri: the agreed limit between the conservation of natural resources and community development areas, reduction of elephant poaching and bushmeat snaring, and support for antipoaching scouts. Mbamba Association is also involved in the hiring process of seasonal workers by Mariri and assists with conflict mediation.

2014 Activities and Progress

- A public AGM is held in June/ July of every year. Both partners (NCP and Mbamba) are expected to report back to the community on their actions and responsibilities and main activities. In this meeting the baseline Community Conservation Fund and agree performance payments are publically calculated (see section on Performance payment and community Conservation Fund. The Association and leaders then work with the community to decide on how the funds will be spent, a budget is drawn up and this is communicated to NCP/ Mariri in writing along with any technical assistance that is needed. The decision on how to spend the funds lies entirely with the Mbamba community as long as it is legal and not against conservation objectives of partnership and objectives of Niassa National Reserve.
- Regular additional meetings between the Mbamba Association, Mariri Management and traditional leaders are held. Our lines of communication are open and good. We support a process where small issues are discussed and resolved before they become major points of conflict. The local government representatives are always invited but are seldom able to attend. In 2015, more than 30 meetings were held. Both sides take initiative and invited their partners to a meeting when there were a need for it. Over the past few years participation in the meetings has improved with everyone expressing their opinions. While there is frequently conflict and differences of opinion these are generally in the normal range of debate and are show a healthy relationships between two equal partners.

Legalization process

After the revitalization of Mbamba Association, with the election of new members in 2013, Mariri has been working to assist with the process of its legalization. The Association consists of 12 members and has a mandate for two years. An election will be held in 2016 for a new committee. All the financial and transport costs to get members to Lichinga have been covered by Mariri. In April 2015 the *Associação de Utendeli ni Mazengo* received formal notification that the Governor of Niassa has officially recognize the association. Next steps will be to open a bank account and complete the association office. The Association requires training in administration. Mariri is supporting the Association to complete the last step of its legalization which is publication of the *Associação de Utendeli ni Mazengo*

statutes in the National Gazette. This publication will allow the Association to open properly their bank account and get a NUIT.



MEMBERS OF ASSOCIAÇÃO DE UTENDELI NI MAZENGO SIGNING THE PUBLIC DEED IN LICHINGA

The Associação de Utendeli ni Mazengo is now a formal institution that can represent legally all Mbamba people with scope described on their statutes and can start officially the negotiation with NCP that will allow the Mbamba community to hold the legal 25% share of Mariri Investimentos and be the first legal partners in a concession in Niassa Reserve. Initially this relationship will be governed by an MOU until all partners are confident to move forward and necessary skills are in place.

Office for Associação de Utendeli ni Mazengo

As part of agreement, Mariri started to build the office for Associação de Utendeli ni Mazengo in 2015 and this will be completed in 2016. In consultation with four main leaders from Mbamba and the local government, the Association has chosen an agreed location for their office.



The office has a large room for tables and desks where the members will meet and will provide a venue for other community meetings. There is a store room to keep files and other community materials (electric fence materials) the entire cost of this building is being paid for by Mariri through donor funds. In addition, the contract for building this office is held by an Mbamba resident who was trained as a Master builder through skills training courses at Mariri illustrating the value of the skills training course.

OBJECTIVE 12: MENTOR, GUIDE AND TRAIN MOZAMBICAN CONSERVATIONISTS AND STAFF AND ENCOURAGE STAFF PARTICIPATION IN THE PROJECT

Skills development is a critical component of our conservation strategy. All our staff are from local communities and on the job training and mentorship is ongoing. We believe that all our staff need to understand the conservation vision of the project and what we are working towards not simply see this as a job. We still need to do substantial work on this.

- Three Mariri staff members completed their driver's licenses.
- Four staff members (head of antipoaching, Research assistant, Education Manager and Community Manager) attended BioFund exhibition in Maputo and visited Gorongosa National Park.
- Conservation Manager attended SMART workshop in Limpopo and was a trainer
- Director and Conservation Manager attended National Lion Action Plan Meeting in Maputo.
- Conservation Manager did a presentation in Maputo for private event on NCP
- Community Manager attended National Community Workshop in Maputo and presented on NCP
- Three local mechanics were trained on site by expert Ken Harmen.
- Human resources and bookkeeper received onsite training for a month by expert financial manager on financial system and book keeping (Lisette Gelber).

OBJECTIVE 13: INCREASE AWARENESS OF NCP WORK AND IMPORTANCE OF NIASSA NATIONAL RESERVE TO A BROADER AUDIENCE BOTH NATIONALLY AND INTERNATIONALLY

ACTIVITIES AND OUTPUTS

- We continued to work with our long term partners Houston Zoo, Panthera and Wildlife Conservation Network to develop multiyear funding and increase our skills. Ongoing fund raising continues and remains a challenge given the level of funding required.
- The Niassa Lion Project Facebook page was regularly updated to ensure regular communication with donors and friends of the project and reached 15000 followers. In October, conversations with donors showed that it was working to keep people up to date on what we are doing.
- A simple email newsletter (every 2-3 months) was continued with the help of volunteers Leda Marritz and Meredith Watts.
- We remain members of the African Lion Working group, IUCN Cat Specialist Group and Canid Specialist Group and WAZA and are also represented on the Lion SSP conservation projects website.

ASSESSMENT OF ACTIVITIES

Of the 167 specific activities listed in the 2015 work plan, 65% (108) were completed (green) and an additional 35 activities (21%) are in progress and will be completed in 2016 or were partially completed. Only 16 activities (9.5%) were postponed and 4.5% were discarded as no longer applicable. The assessment suggests that we should be allowing more time for activities as 21% could not be completed in time allocated although they will still be done.

OBJECTIVES & ACTIVITIES	
Objective 1: To improve and streamline the business and logistical management of NLP, the Ratel Trust and its Mozambican entity , Mariri investimentos	
Activities	
Improve and streamline financial reporting and link all accounts	Green
Improve workshop management and Mechanic Skills (9 LR and 2 trucks)	Green
Complete staff accommodation, common area and showers	Green
Develop shared tools to manage calendars, visitors, weekly plans, minutes	Yellow
Develop Visitor guidelines and costs for accommodation, food and time for NLP and Mariri- calendar for booking	Yellow
Audit of TRT accounts	Green
Produce NCP financial report	Green
Improve roads for wet season use and better coverage	Green
Develop operating manual for Mariri	Yellow
Purchase and import 4 second hand LR for MOMS, EE, Community programs	Green
Annual report for MITUR, NCP	
Objective 2: To provide long term monitoring of the status of lions and other carnivores in NNR to assess progress and provide early warning system of change	
Activities	
Collar all new lions in intensive study area to continue monitoring snaring, recruitment, turnover, movement patterns around the village.	Green
Camera trapping at waterholes to assess lion density in intensive study area	Green
Lion and Hyaena call up survey – NNR	Green
Complete analysis of leopard camera trapping data	Blue
Work with NNR team to develop monitoring of conflict, indicators	Yellow
Monitor indicator species and fishing camps in study area	Green
Monitor wild dog pack sizes through community monitors and ID	Green
Objective 3: To reduce human-wildlife conflict and involve community members in wildlife monitoring through community wildlife guardian program	
MOMS's coordinator drivers licence	Green
Workshop Mecula in Mariri?	Yellow
Workshop Mavago	Yellow
Workshop Negomano	Yellow
Annual workshop in Mariri	Green
Meeting between NNR manager and NCP to discuss about the MOMS's future	Yellow

Payment MOMS guardians from Mavago	
Payment MOMS guardians from Mecula	
Payment MOMS guardians from Negomano	
Wildlife guardians to assist one farmer in each of the 24 villages to build a predator proof corral and safe temporary shelter in each village as an example	
Community meetings to report back the data to the communities by MOMS guardians and raise community's awareness about rabies, attacks, conservation. Some of these meetings to be held at Mariri as broader conservation opportunity.	
Discussing about MOMS plan	
Continue to monitor and respond to all events of human-carnivore conflict in partnership with Reserve Management team and where possible improve corrals and provide information to prevent attacks happening again.	
Training of MOMS coordinator on computer data entry	
Create digital database and ensure all data up to date and available to NNR team	
Buy MOMS program vehicle	
Objective 3: To develop alternative protein sources to reduce reliance on bushmeat and snaring	
Assist at least 50 members from first and second generation LBG from Mbamba, Macalange and Nkuti cutting and transporting poles/bamboo to improve their hutches	
Buy at least 06 rolls of chicken wire to distribute to LBG members from Macalange, Nkuti and Mbamba as incentives for people with good performance and to sell to people at a subsidised cost;	
Assist with building 3 hutches for people with best performance in each LBG (Mbamba, Macalange and Nkuti)	
Organise at least two meetings to promote the use of the predator lights to protect the hutches from members of Mariri LBGs;	
Test pilot the use of predator lights in Macalange and Nkuti	
Define the standards for LBG members to sell livestock to Mariri for food	
Conduct at least two meetings with the District services of Economic Activities from Mecula (SDAE) and NNR team to understand the process of receiving the Newcastle vaccines and how Mariri can partner with them to get the vaccines for the Mariri program in a sustainable way	
Conduct at least three meetings with the Mbamba committee to define strategies on how the vaccine for Newcastle can be distributed among the villagers at a reasonable cost for Mariri and the community;	
Establish the second generation of LBG members in Nkuti with at least 10 members	
Stablish the third generation of the LBG in Macalange and Mbamba villagers with at least 30 members	
Buy at least 60 eggs of guineafowl , 15 doves and 10 guineapigs to distribute as incentives for people who pay animals back to the following generations in Ncuti, Mbamba and Macalange	
Visit at least twice per month each members of the LBG members in Nkuti, Macalange and Mbamba.	
Organise at least one meeting to exchange experience between the LBG members from Mbamba, Macalange and Nkuti	

Organise one visit for exchange experience for LBG members from Mbamba, Macalange and Nkuti to an animal breeder in Mecula, Marrupa or Lichinga	
Promote at least one exchange of males rabbits between members of LBG from Macalange, Mbamba and Nkuti and producers in Lichinga and Marrupa to improve the genetic diversity of rabbits	
Collaborate with Lichinga And Marrupa producers to assist Mariri on the collection of data to compare the reproductive output of familiar and semi-commercial Livestock programs with the Mariri programs.	
Organise a "graduation" ceremony to distribute certificates to members of LBG from Mbamba, Macalange and Nkuti who pay back the animals to the group.	
Collect samples of dead animals and collaborate with Lichinga Veterinary Department and Central Veterinary Lab in Maputo to assist with the analysis of samples from LBG from Mbamba, Macalange and Nkuti	
Monitor success of program- numbers of animals, sale and consumption	
Organise at least visit of SDAE to the Mariri LBGs and involve SDAE as partners;	
Produce an annual and progress report on LBG	
Objective 5: To reduce bushmeat snaring by finding ways to improve Food Security and reduce human-wildlife conflict	
Conservation agriculture	
Holding one learning meeting in the field/per week with meals	
Purchasing t-shirts and caps	
Planting lab-lab as intercropping with maize	
Planting jack-beans and lab-lab as relay crop	
Planting mucuna and lab-lab as fallow land crop	
Starting the production of Faidherbia seedling to be bartered for other goods and cash and planted to increase nitrogen in fallow fields	
Hold three field days in the FFS to present results and market seeds	
Provide 25kg sea bean, 12.5kg lab-lab, 20kg jack-bean sesame seeds to the FFS members on graduation	
First graduation ceremony for FFS	
Recruiting 25 new members for the FFS	
Buying jack bean, sea beans and lab-lab seeds produced in the farms of FFS members for redistribution in barter shop/ sail	
Sell or barter jack bean, sea beans and lab-lab seeds at subsidized price to promote adoption of CA in Mbamba village (
Preparing the FFS field	
Conducting training on CA at Mariri Environment Center for interested famers that will buy CA seeds	
Assisting FFS other interested farmers to preparing their fields	
Planting maize in the FFS	
Reports	
Elephant beehive fence	

Streamline and improve production of hives at Mariri through training of local carpenters	
Construction 9 new individual beehive fences	
Maintenance of beehive fences/supervision, once/month and whenever necessary	
Honey collection, bottling and selling and development of markets	
Reports	
Data collection	
Hire new assistant	
Discussion about beehive fence with Mbamba and Macalange and reporting back	
Discussion about beehive fence with interested villages or partner and assist them to establish their fence	
Data analysis for Master's degree	
Discussion with NNR about establishing beehive fences in additional two villages	
Objective 6: To reduce bushmeat snaring and other illegal activities by effective antipoaching activities with community support and through providing alternative livelihoods to local hunters	
Find funds and purchase Husky aeroplane - operational in NNR in 2015	
KSB to obtain pilots license	
Assist patrol scouts collecting patrol data in paper based form and with Trimble devices in L5S;	
Assist cancela scouts collecting data on traffic on the pedestrian and vehicle traffic on the cancelas using SMART;	
Conduct monthly and weekly meetings with antipoaching scouts to discuss the results of their patrols;	
Two report back meetings to Community Association on antipoaching	
Help two to three Mariri scouts continue improving their abilities using the computer;	
Collect MIKE data effectively for NNR	
Collaborate with NNR team to refine SMART	
Host one SMART training workshop at MARIRI in partnership with NNR team to scale up SMART in NNR	
Monitor the performance of Trimble devices during the data collection in the field;	
Produce antipoaching monthly reports using SMART software;	
Organize at least two meeting for Mariri scouts to report back to Mbamba community about results of their work;	
Define targets for Mariri antipoaching scouts: number of patrols for bushmeat, control illegal mining, regular patrol; area/distance patrolled; etc.	
Revise and update Mariri incentive scheme for Mariri antipoaching scouts;	
Organise inspection of equipment issued to the Mariri scouts;	
Assist with import and registration process of the Mariri firearms at MINT	
Produce Mariri Annual Antipoaching report	
Report back to Niassa Reserve Management entity, Panthera, ECF on the SMART implementation in L5S;	
Improve understanding of Bushmeat consumption	
Bushmeat PHD proposal complete and registered with UKZN	

Visit bushmeat informers at least twice every months	
Incorporate information provided by bushmeat informers (bushmeat hunters, mining, and possible elephant poaching) in the antipoaching operations;	
Share relevant information generated by the informers network, specially related to the elephant poaching and mining, with the MITUR-WCS team and the neighbour operators;	
Improve the flow of information collected by the bushmeat informers network through the celphones in places where the celphones network allows;	
Find new bushmeat informer to collect information about bushmeat availability and prices in Marrupa	
Refine the data collected and bushmeat questionnaire in Mbamba, Macalange and Nkuti, Marrupa and Lichinga	
Continue collaborating with the Mecula prosecutor and Marrupa magistrate on the Mariri related cases;	
One bushmeat community meeting in Mbamba and Macalange	
Produce a report on the activity with Mariri bushmeat informers	
Objective 7: To reduce human-carnivore Conflict through living fences, safe shelters and safe behaviours	
NNR wide monitoring system in place for attacks on livestock and people -	
Distribute safe behaviours poster	
Translation and distribution of Portuguese lion-human toolkit	
Test Predator guard lights on LBGS	
Test fox lights and reflective tape at goat corrals	
Assist NNR with development of protocol for problem carnivores	
Collect detailed data on all carnivore attacks	
Objective 7: To ensure sport hunting of lions and leopards in NNR is sustainable and meets conservation objectives.	
Activities	
Report back on 2014 trophy monitoring results in Annual report	
Advise MITUR/ WCS on lion and leopard quotas for 2015	
Monitor and age all lion and leopard trophies before they leave NNR in November as independent auditors for NNR management (CMB).	
Engage, where necessary, in the ongoing regional debate on sport hunting of carnivores providing the NNR perspective.	
Write paper on sport hunting and points system (10 years of data)	
Objective 8: reduce disease risk to lion, leopards and African wild dogs in Niassa	
Collaborate with WCS/ NNR team to develop program to vaccinate domestic dogs and cats and register owners with a landuse plan	
Take blood samples from all captured and sport hunted carnivores for disease analysis to provide ongoing assessment of disease risk (ongoing) (CMB, EW, KSB).	
Domestic dog survey	
Objective 10: to develop a community outreach and environmental education program in NNR that increases tolerance and reduces conflict and provides Niassa residents with locally relevant conservation material	

Activities	
Complete solar lights, polywire fence, second storage container	
Set up library and museum, PowerPoint and buy DVDs	
Print comic book	
Print second edition of storybook	
Print T-Shirts for Environmental Centre	
Develop field visit book for children	
Host visit to set up environmental education monitoring	
Visit by J. Marais on Snakes and snake bite for all staff and community members	
Host 50-100 children in 10 visits at Environmental Centre	
Develop basic conservation course visit -1-3 days for Officials	
Host lion fun days	
Develop draft outline of school visit program	
Identify Education Assistant	
Education Manager and Education Assistant to visit educational programs	
Buy and modify game drive vehicle	
Distribute Portuguese version of Spirit Creatures film	
Distribute ABC capulanas to adult education classes and women's groups	
mentor and manage lion scholars with 6 new scholars for 2016	
Develop short local DVD on lion conservation (20 minutes)	
Complete the Mariri plant book	
Objective 11: Develop community based model of conservation Management IN I5-south through partnership with Mbamba Village community	
Activities	
Legalization of the association completed	
Open bank account for the association	
Associations and leadership training and other first important training of association	
Construction of the Association office in Mbamba Village	
Regular meeting with the association twice a month	
Initiate early burning regime with community in L5South	
Work on map of area with local community - identification of sacred sites and resources	
Performance payment of community conservation fund of Mbamba community for community projects on provision of a budget -a direct benefit from having lions in the area.	
Report to the Mecula District Government and the Reserve administration on NLP activities through letters and personal visits (AJ, MM)	
Build notice boards for Mariri Environmental Centre and community	
Objective 12: Mentor, guide and train Mozambican conservationists and staff and encourage staff participation in the project	
Activities	
3 staff to obtain drivers licenses	
Education Manager and education assistant to visit educational programs	
Attendance at BIOFUND wildlife Expo	
AJ to attend Emerging Wildlife Conservation Leaders course in the US	
MM to complete data collection for Masters project	
AJ to register for PhD and collect data	

Objective 13: Increase awareness of NCP work and importance of Niassa National Reserve to a broader audience both nationally and internationally	
Activities	
Presentation in October 2015 - WCN Expo, Houston Zoo Gala	
Attend BIOFUND event and Expo	
4 newsletters in year	
Try and find a Mozambican company in Lichinga or Pemba that can contribute to the Mariri/NCP scholarship program	
Complete translation of Lion Tool kit into French , Portuguese and update English	
Launching of PRIDE with regular meetings and event	

ACKNOWLEDGEMENTS

This project is a team effort; nothing is achieved alone and there are many people to thank. We have been working in Niassa for 13 years now and it is impossible to mention everyone individually who has been a positive part of this journey but you are remembered and your help is appreciated.

We would like to offer special thanks to the Government of Mozambique and Ministry of Tourism for granting us permission to work in the Niassa National Reserve. We particularly thank the Niassa Reserve Management team (co-management team of the Wildlife Conservation Society and Ministry of Tourism) and look forward to working with them further, with specific thanks to the warden, Cornelio Miguel, Alastair Nelson, and Carlos Lopes Pereira. For 2015, we particularly thank our major partners, Wildlife Conservation Network, Houston Zoo and Panthera who help us with significant funding, technical advice and support in many different ways,



Thank you to our major donors in 2015 including: Anadarko, Cori Bargmann, Mary Boardman Foundation, The Blue Foundation, CGMK Foundation, Gemfields, Walt Disney Company; Michael and Tracy Dileo; Steven and Florence Goldby, Johnson Scholarship Fund, The Handsel Foundation, Utah's Hogle Zoo, Houston Zoo, Jon and Laura Mellberg, Laguntza Foundation, Mary Boardman, Kris and Peter Norvig, Panthera, Rebecca and Tom Patton, John and Audrey Ruggieri, Sue McConnell and Richard Scheller, The Tapeats Fund, David and Karie Thomson, Wild Cat Foundation; The Woodtiger Fund (through Lion Guardians US), Woodman Foundation, Wildlife Conservation Network, and Zynga as well as several anonymous donors.

For significant support over the past ten years that have not been mentioned above we specifically thank Mary Boardman, Bev Spector and Ken Lipson, Lisette Gelber, Walli Finch, Mark and Becci Crowe; Bruce and Trish Campbell, Cincinnati Zoo and Botanical Garden, Disney Wildlife Conservation Fund, Fauna and Flora International, Flint Chapter, Michael Piuze, John Stuelpnagel, Rare Species Fund, Predator Conservation Trust, Rufford Innovation Award and Wildlife Conservation Society.

We thank all our donors who keep us in the field, no matter how big or small the donation. Small gestures added together result in us meeting our budget each year. Thank you to Chip Owen and Houston Zoo for donations of solar chargers, torches, GPS and much other useful equipment. Thank you to Genentech for the donation of two more laptop computers. Special thanks to Greg Reis (OneAfrica) for his donation of crockery, cutlery, linen and other camp items for the Environmental Centre from his ecotourism camp. These donations in kind are extremely useful to us and allow us to make sure our team have the tools they need.

As always a very special thank you to the loyal and hardworking "Nkuli" team particular those that have been with us for more than 10 years - Alberto, Oscar, and Eusebio. We are very appreciative of the work of our 28 antipoaching scouts. We also thank the Mbamba community and Mbamba teachers for their patience as we figure this out together. Special mention of Amandio who helps us with our administration and accounting in Lichinga; he is a valuable member of the team. We also remain indebted to Romina Gaona, our amazing architect who is helping to bring the Environmental Centre to life and Themba for his help with teaching and overseeing the construction at Mariri. Our outmost thanks to Ken Harmen who came to Mariri as a volunteer and so soon became part of the team and helped us in so many ways especially training the mechanics and keeping the vehicle on the road; it would have been an impossible year without him. Special thanks to Lisette Gelber who came for a month to improve our financial systems and mentor Rachide.

In 2015 we were again privileged to have the assistance of volunteers who brought a variety of skills to our project. Thank you to Alastair Barnes who created Mary Boardman's bench, the baobab floor and crocodile floor and helped in a multitude of other ways, Alan Evan Hanes for coming in as a volunteer pilot for 3 months and helped with the hangar and lighting when he was not flying, Jillian Knox our first intern who came in 2014 and helped produce the Wild dog database, log camera trapping pictures and help in many ways. We are very grateful to Peter Lindsey from Panthera who came to help us develop SMART and work with Agostinho. For assistance with our environmental education initiatives we thank Houston Zoo who assists us in a multitude of ways including grant writing, funding, training and development of educational materials with particular thanks too Angie Pyle, Renee Bumpus, Peter Riger, and Sara Riger. Thank you to Chris Schmidt from Hogle zoo for her masks and crafts for children. Paula Ferro has played an integral and irreplaceable role in the Mbamba lion fun days that have become a tradition. Special thanks to Meredith Watts and Leda Marritz for all their ongoing help with newsletter and website, Glen Carrie for help with the website and Sam Worsley for help with data entry and mapping. We thank Sunnye Collins for assistance with environmental education activities at the Mariri Environmental Centre.

We thank all the Niassa tourism operators for their support and collaboration with sightings, logistics and information. A particular thanks to Lugenda Wilderness Trust and Chuilexi Conservancy Trust, our neighbours in Niassa.

Niassa Lion Project is administered by The Ratel Trust and we thank Stephen Clark for his on-going legal and financial assistance in his capacity as a trustee and Chairman of the Mariri Investimentos Board

A very special thanks to our managers, Agostinho Jorge, Mbumba Marufo, Tomas Buruwate and Andrew Mkanage – they are the future of conservation in Mozambique.