

MARCH 2020

INDIVIDUAL & COMMUNITY-LEVEL IMPACTS OF THE BLACK MAMBA ANTI- POACHING UNIT



ACKNOWLEDGEMENTS

The authors would like to thank the four organizations that helped to make this study possible through funding, endorsements, or other support: The Living Desert Zoo and Gardens, California State University San Marcos (CSUSM), Helping Rhinos USA, and of course Transfrontier Africa (TA). Deep gratitude to Chantal Razoukhi and Elizabeth Colín, student field research assistants from CSUSM, as well as logistical support onsite from Romy Suskin. Thank you to Tom Tochtermann and Craig Spencer for advice and suggestions during the conceptualization and implementation of the study. We thank Carol Marcus, Natalie Gonzalez, Kyle Mulroe, Sarah Greely, and Allen Monroe for reading through previous versions of this report and for their insights in how to improve it. We are exceedingly grateful to TA for the coordination and use of their vehicles during the field research. The Chiefs in the communities of Maseke, Hluvukani, Acornhoek, and Welverdiend kindly provided us access to interview people in their communities. Our profound gratitude to the Mambas who skillfully and insightfully interviewed and interpreted in the field: Felicia Mogakane, Precious, Lewyn Maefala, Collet Ngobene, and Marble Madhlope. Last, we extend our deepest gratitude to the 140+ interviewees who generously took the time to share their views.



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GOAL

This investigation sought to understand if the primarily female-composed Black Mambas Anti-Poaching Unit is achieving its secondary goal of influencing support for conservation and wildlife among the nearby populace via community outreach and environmental education. additional attention was given to understanding the impact that the program has on the rangers themselves and how the Mambas may be perceived by support staff from their parent organization called Transfrontier Africa.



KEY TAKEAWAYS

- Through experiences and skills developed as a Black Mamba, rangers experience tremendous growth in self-esteem and self-efficacy. These changes are apparent not just in the workplace but in the personal and home lives of the Mambas. (Pg. 16-17)
- 100% of Mambas report that the program has fundamentally changed their beliefs about what women can do. (Pg. 16)
- Staff from Transfrontier Africa, the NGO which created and manages the Black Mambas, recognize and applaud the positive impact the program has had on the rangers. (Pg. 18-19)
- Transfrontier staff believe changes in the organizational and operational structure, leadership style, and Mamba training/development programs will enhance effectiveness of both their community outreach and anti-poaching efforts. (Pg. 21)

- Community residents from all four of the surrounding communities in which we surveyed tend to value nearby wildlife and protected areas, assigning, on average, values of eight or above on a 1-10 scale, with 10 representing 'extremely valuable/supportive'. (Pg. 25)
- Members of all four communities are, on average, highly unsupportive of poaching, assigning average scores below two on a 1-10 scale where one represents 'extremely unsupportive'. (Pg. 24-25)
- Members of all four communities recognize and are encouraged by the indirect benefits associated with wildlife tourism and conservation, which likely begets greater support for conservation. (Pg. 24-29)
- In three of the four communities, most residents sampled have not heard of nor interacted with the Black Mambas. In contrast, residents of Maseke are far more likely to be familiar with the Black Mamba Program with 57% of sampled residents reporting they have heard of the Mambas. (Pg. 30)
- The Bush Babies Environmental Education Program likely helps bridge the communication gap between Mambas and community residents. The mechanism for this may be that they help inspire children to be advocates for conservation and become future leaders and environmental stewards. (Pg. 32; 36-37)
- Residents from Maseke tend to assign slightly higher rankings of value and support for wildlife and protected areas. They are significantly more likely to report that their community benefits financially from the Big Five. This may be due to Maseke having a better functioning system of management and dispersal of funds from the game reserve and/or the extra educational efforts of the Bush Babies Environmental Education Program in the schools of the community. (Pg. 24-25)

EXECUTIVE SUMMARY

In summary, working as a Black Mamba significantly transforms and empowers female rangers financially, physically, and socially, as they realize they as individuals and women are capable of meeting the strenuous demands of anti-poaching patrol and other work-related duties that the society in which they live deems only fit and feasible for men. Mambas become more confident, have higher self-esteem, and

have an enhanced level of independence. Beyond individual-level transformations, this type of empowerment has the potential of creating positive society or community-level impacts as well. Transfrontier Africa staff attest to the transformation, but also recognize the program must improve management structures and protocols and enhance training and development of rangers to most successfully

each short and long-term anti-poaching goals. Importantly, there is room for improvement regarding how Mambas can interact with and inspire members of their local communities to support or engage in local conservation efforts.

Residents from the four communities sampled already have notably high average value and support for wildlife and protected areas, mostly related to the economic and social benefits that stem from living near or being employed by these sectors. One community, Maseke, stands out from the others in that they report greater community-level benefit from the Big Five, they are far more likely to be aware of the Black Mambas program, and they have slightly higher value/support for wildlife conservation. In comparison, the other three communities could have greater support for these causes. It is key to note that Maseke is the only of the four to host the Bush Babies Youth Environmental Education Program, led by the Mambas, which may be a contributing factor to their higher valuation of wildlife and conservation. It is also likely that a better distribution of the benefits from conservation among community members is a factor, too, but further investigation of that relationship is outside the scope of this study.

Based on these insights we conclude that the Black Mamba Anti-Poaching Unit which is already transformative for the female participants can further improve by creating and implementing changes to the internal management structure and organizational operations. Secondly, for the program to excel in its ability to connect with community members and encourage

in them pro-environmental attitudes and behaviors, emphasis should be given to installing Bush Babies Environmental Education programs in priority communities that currently do not have one. Thus far, the Black Mamba Anti-Poaching Unit has achieved unprecedented success in empowering women, through conservation employment and personal capacity building, deterring poaching in protected areas, and likely encouraging further support of wildlife and conservation in at least one local community.

The socio-economic and environmental challenges in South Africa are deep and complex and no single program can address them all. We believe the Black Mambas program has the potential to disproportionately contribute to social and economic equity as well as long-term conservation success. This contribution can improve even more by enhancing local engagement with, benefits from, and promotion of diverse conservation efforts, including education. The insight and recommendations presented in this report can inform continued development of the Mamba program to facilitate its progress toward these ambitious goals.



INTRODUCTION

Poaching in South Africa

Poaching in Africa has a long and gruesome history, one mired in colonialism, and in South Africa, in Apartheid. After whites disenfranchised local peoples and excluded them from newly 'protected areas' and the wildlife therein, poachers, in some ways, became 'the good guys', stealing from the rich to give to the poor (Duffy 2013; Hübschle 2017). However, not only is poaching a highly illegal activity and an unsustainable business model, it is a devastating force against wildlife populations and ecosystems as well as the social and economic well-being of nearby human communities (Poudyal et al. 2009; Ferrerira et al. 2015; Everatt et al. 2016).

Animals are poached from protected areas for three main reasons – (1) meat for local communities, (2) for sales as bushmeat/biltong and (3) for international traffic in animal parts (Lindsey et al. 2013; Anderson and Jooste 2014). Poaching for international trafficking has become an activity of organized crime syndicates, with the actual poachers sourced primarily from local communities, or in the case of poaching inside Greater Kruger National Park (GKNP), from neighboring Mozambique. Poaching to feed local communities or economies is done primarily by individuals living immediately near the protected areas and involves mostly snares which indiscriminately catch any large animal who becomes entangled in them (Milliken and Shaw 2012; Duffy 2013).

In general, wildlife populations in South Africa are rapidly dwindling, but the rhino is particularly threatened by poaching. Of The Big Five, the black rhinoceros (*Diceros bicornis*) is the only one listed as critically endangered across the African continent (Emslie 2012). They and the other four rhino species have experienced the most rapid, severe decline of any large terrestrial mammal in the last five decades (Hillman-Smith & Groves 1994). Rhino are poached because their horns command twice the price of gold when sold to feed the Asian market. The demand for their horn is from consumers who perceive them to be of medicinal value, despite having no demonstrated medical value (Truong et al. 2016). Even where the rhinos are legally protected, they have experienced decreases of greater than 90% and have been extirpated from many countries without the resources to protect them (Emslie et al. 2019).

While rhino are heavily affected by poaching, it is critical to note that countless other large mammals are also threatened by poaching for trade in animal parts. In contrast, international tourism increased by 51% from 2008-2018 (UNWTO 2019), including a subsequent increase in nature-based tourism (Balmford et al. 2009). As such, the demand for live wildlife viewing has also increased.

Tourism to see the Big Five (black rhino, African elephant, Cape buffalo, leopard, and lion) and other wildlife is a significant source of income for South Africa, generating more revenue than all the country's numerous gold mines or 3% of GDP, with 1 in 23 people employed by tourism (StatsSA, 2018). Moreover, tourism as an income source can 'keep on giving' since, over its lifetime, a rhino is worth far more alive than dead (Saayman & Saayman 2016). Thus, other countries in Africa that receive significant economic benefit from nature-based tourism and other wildlife-related activities can also benefit ecologically, economically, and socially if they protect and conserve species.

The persistence of rhinos and other megafauna may depend on the reintroduction of the animals to suitable private lands that benefit local people through both tourism and breeding (Götttert 2011). Multipurpose lands (extractive use, agriculture, tourism) represent the future of conservation, as expanding human populations pose an insurmountable challenge to the creation of large new protected areas in Africa that can accommodate large-scale migrations. Efforts to understand the complexities leading to poaching and to propose effective solutions to halt the activities are ongoing and increasingly necessary in South Africa, and across the globe.

In some areas that border Kruger National Park in the Greater Kruger National Park (GKNP) area, limited hunting and other extractive uses of wildlife are allowed, particularly in private reserves. Private reserves are also responsible for stopping poaching activities on their grounds. Many reserves now contract commercial anti-

poaching contractors. Unfortunately, some of the individuals employed here have themselves been convicted of poaching while ostensibly working to protect the animals (Warchol and Johnson 2009). The cost of maintaining a sufficiently large, armed, anti-poaching unit is prohibitive for many smaller reserves, or those reserves without steady, high levels of income. Few poachers apprehended by private forces are convicted, and even fewer face jail time. Equally as important, the so-called "fortress conservation" approach involving armed rangers leads to animosity from communities near the reserves. In the process of protecting animals, fortress conservation can undermine their effectiveness by cultivating more enemies than friends.



The mostly-woman, unarmed Black Mamba Anti-Poaching Unit (referred to as the Mambas hereafter) is an alternative approach to the armed anti-poaching patrols that are most commonly employed in fortress conservation approaches. The Mambas focuses exclusively on the Balule Nature Reserve (BNR), a part of the GKNP that covers over 52,000 ha (201 square miles). In addition to directly reducing poaching, helping to change the perceived value of living wildlife among the local communities is a sizeable component of the work of the Mambas. The research outlined herein assesses their social impact through personal development of the Mambas themselves, community interactions, and education.



The Black Mambas Anti-Poaching Unit

In parts of the GKNP area, limited hunting and other extractive uses of wildlife are allowed, particularly in private reserves. However, private reserves are responsible for stopping poaching activities in exchange. Many of these reserves contract commercial operators for their anti-poaching efforts. The cost of maintaining a sufficiently large, armed, anti-poaching unit is prohibitive for many smaller reserves, or those reserves without steady, high levels of income. The intensity of poaching activities is great, often with poachers carrying semi-automatic weapons and sophisticated anti-detection approaches. As rangers become better equipped, the poachers increase their armaments, which can lead to a cyclical, ever escalating intensification of the poaching wars.

Transfrontier Africa (TA), a non-profit conservation organization based in the Balule Region, developed a two-tiered model in 2013 to attempt to decrease poaching. In this approach, TA formed the Black Mamba Anti-Poaching Unit ("The Mambas" or "Black Mambas"). The communities where the women live are a common source of poachers, nearly all of whom are male. The mostly-woman, unarmed Unit is an alternative approach to the armed anti-poaching patrols that are most commonly employed, and it focuses exclusively on the Balule Nature Reserve.

At the time of this study, the Mambas patrolled five different parcels of the Balule Nature Reserve (BNR) in the Limpopo province of South Africa. Balule is a 55,000 hectare (212 sq mi) reserve formed of a

network of private lands that are adjacent with and open to each other and to Kruger National Park (KNP). Together with several other reserves, BNR is part of the Greater Kruger National Park (GKNP) and of the 1,733 km² Associated Private Nature Reserves (APNR). The KNP, APNR, and adjoining protected areas in bordering Mozambique and Zimbabwe collectively form 37,572 sq. km. of one of the richest areas of megafaunal diversity globally, titled the Great Limpopo Transfrontier Conservation Area or GLTCA (Great Limpopo Transfrontier Conservation Area 2018). Eventually, the GLTCA will be the core of an ambitiously planned 100,000 sq. km. Transfrontier Conservation Area (Peace Parks Foundation 2018).

The women are trained as a common armed ranger in terms of their physical fitness, combat, and firearms use. However, instead of patrolling perimeters with weapons at the ready, they conduct unarmed patrols around the whole of the reserve several times per day, on foot during the day and in vehicles at night.

The Black Mambas act based on the premise that presence leads to detection and deterrence. Armed response units act as the second tier of support for the patrolling Black Mambas during active poacher incursions. However, armed units are extremely limited in size, expensive, dangerous, cannot be everywhere, and have not proven to be effective in curbing poaching rates (Warchol and Johnson 2009; Annecke and Masubelele 2016).

Relative to before their founding, the Black Mambas have helped to reduce overall poaching, snaring, and poisoning activities of wildlife by over 76%.

Moreover, they have been able to significantly slow rhino poaching by 50%. In addition to patrolling, the other key function of the Black Mamba Program is to create pro-conservation social and behavioral change among residents of the nearby communities. Such a profound and long-term anti-poaching approach could be the most important impact of the Black Mambas. Possible social changes could decrease the number of people interested in poaching, and thus reduce the need for anti-poaching patrols.

The Black Mambas interact with local schools, provide intelligence on potential poaching activities in the local communities, assist researchers on BNR, and provide an appealing and non-threatening icon for the BNR conservation efforts. The Black Mambas' primary school education program, called the Bush Babies Environmental Education Program, works to inspire the next generation of conservationists. The Bush Babies program works in a dozen local schools and aims to provide environmental education and behavior change programs focused on school children. By changing local social norms, the Black Mambas can decrease the support for poaching and increase social scorn towards poachers.

Initial anecdotal data indicates that the Black Mamba Program may empower women as conservationists and social influencers. When they first started, the Black Mamba women were viewed as oddities in the local cultures because they were patrolling, wearing military uniforms, driving vehicles, and telling male poachers that they should desist. In the cultures of this area these actions are exclusively men's work. However, anecdotal data suggest that there have been perceptual changes, such that the

Mambas may now be seen as community heroes. One initial measure of this is that hundreds of women now regularly apply for the few open Black Mamba positions, even though the salary is barely above minimum wage.

Because the Mamba program has been so successful in reducing poaching and possibly in changing how the local culture views conservation and wildlife, there is great interest in creating anti-poaching programs similar to the Mambas elsewhere in Africa. To better understand the best practices to continue going forward, we sought to determine whether, to what degree, and how the Black Mamba program may be affecting pro-conservation perceptual and behavioral change among both the Mambas as well as the communities in which they live and work.

OBJECTIVES

The larger research plan, into which this study fits, involves researchers from Western Kentucky University, Rhino Mercy conservation organization, The Living Desert Zoo and Gardens, California State University San Marcos, Helping Rhinos, and the leaders of Transfrontier Africa (TA). Our research team has three larger objectives:

1. The research reported herein evaluates the impact of the Black Mambas program on attitude and behavioral gains with respect to conservation and wildlife, including the following:

- The Black Mambas and the TA support staff and on the self-worth, dignity, and self-efficacy of the Black Mambas in particular,
- Directly on the adult communities in which they live, and
- Indirectly on the adult communities in which they live through assessing impacts of the Bush Babies on the parents of communities with school children who participate in the Bush Babies Educational Program, run by the Black Mambas.

2. To review, compile, and distill the core institutional and operational processes that have resulted in the current Black Mambas program, including current and past successes, failures, and procedures. These data are reported separately by our partners at Western Kentucky University.

3. To document and summarize changes in poaching, poacher ingressions, poacher signs, snare confiscations, rhino and other large animal poaching events, and related poacher actions in Balule Nature Reserve in the time since the Black Mamba APU has started. These data are reported separately by Transfrontier Africa.

The above three objectives can be thought of as a case study of the Black Mambas, highlighting the core components necessary. With this approach, interested parties can create similar programs in other locations that need effective anti-poaching patrols. The results from this research will be used to create a series of best practice recommendations.

RESEARCH QUESTIONS

Our study sought to investigate the impact of the gender-based Community-Based Resource Protection (CBRP) approach of the Black Mambas Anti-Poaching Unit on the Black Mambas themselves and on their communities. The following inquiries were central to this study:

1. DOES THE BLACK MAMBA PROGRAM LEAD TO CHANGES IN SELF-ESTEEM, SELF-EFFICACY, AND GENDER ROLE EXPECTATIONS AMONG THE MAMBAS THEMSELVES?

2. DOES THE BLACK MAMBA PROGRAM LEAD TO BENEFICIAL PRO-ENVIRONMENTAL CHANGES AMONG THE COMMUNITIES FROM WHICH THE MAMBAS ORIGINATE?

Among the Black Mambas themselves, we sought to explore knowledge, attitude, and behavioral gains towards conservation and wildlife. In addition, we explored personal efficacy gains among the Black Mambas with respect to self-worth, dignity, sense of agency, and self-efficacy. We also sought to determine the influence of the Mambas on the communities in which they live and their ability to change the knowledge, attitudes, and perceptions of poaching and conservation. As of yet, the effectiveness of female anti-poaching units (APUs) has not been formally evaluated to understand gender influence on environmental patriotism, support for conservation, or community perceptions of local wildlife.

The Mambas can influence their communities through two possible avenues. First, we assessed their direct influence on the adults of the communities in which they live via individual interviews with community members. Second, we attempted to assess the potential indirect impact through the children affected by the Mambas via the Bush Babies Educational Program. We hypothesized that if the one community where the Bush Babies Program was active was more positive towards conservation and wildlife, that this Program may have contributed to that change. The Maseke community was the only community with a Bush Babies school children educational program, and we compared the attitudes of this community with the other three communities without a Bush Babies program.

To these ends, we have four hypotheses we attempted to test:

- 1. Black Mambas experience dramatic improvements in self-esteem, self-efficacy, and gender role expectations over what they experienced prior.**
- 2. Black Mambas impress and expand what Transfrontier Africa team members think the Mambas are able to accomplish.**
- 3. Black Mambas promote community engagement with and support for the environment and perceptions of local species as national patrimony.**
- 4. Black Mambas influence communities such that they decrease community support for poaching and poachers.**

METHODS

Our three core research team members are from Helping Rhinos, The Living Desert Zoo and Gardens, and California State University San Marcos (CSUSM). Data was collected through a series of structured in-person interviews. All interviews and the informed consent process were reviewed and approved by the CSUSM Institutional Review Board in 2017. Interviews occurred over a four-week period from January 12 to February 6 of 2018. While there was some degree of overlap, each of the three interview groups (Black Mambas, TA staff, and local community members) responded to unique questions, and thus, unique interview guides were used for each. The mixed-methods interviews included a series of open-ended questions as well as quantitative self-report questions designed to capture a numerical degree of support/value assigned by the interviewee.

The research team conducted interviews in English with 27 Black Mambas and the nine support staff from Transfrontier Africa, all of whom are fluent in English. All on-duty Mambas patrolling the BNR parcels on Grietjie, Olifants North, Olifants West, Maseke, Olifants West, and Tshukudu participated in the interview process. Interview audio was recorded and manually transcribed within one week of the original interview into a text document for subsequent textual review.

Additionally, we interviewed approximately 30 community members from each of the four different communities where most of the Mambas live (Maseke, Acornhoek,



Welverdiend, and Hluvukani), for a total of 120 community members. In some cases a 'community member' interviewee was not necessarily a resident of that community but a person who works full-time in the community and therefore spends a great portion of their time in the area.

The stratified purposive selection process for community resident interviews attempted to collect both (1) people who were likely to have interacted directly with the Mambas like family members, direct and nearby neighbors, school teachers, and (2) a more random sample of general community members that were not nearby neighbors of any Mambas, including local business owners, people at home when we visited, and employees of businesses.

Community member interviews were conducted in the first language of the participant, including mostly Tsonga and Sepedi (Northern Sotho). There were three or fewer interviews each in Zulu, English, and Afrikaans. Because our core research team speaks only English, these interviews were conducted by one of the five Black Mambas who had been trained to act as interviewers and translators. None of the Mambas were from the communities in which they interviewed, and none identified themselves

as members of the Black Mambas. The core research team acted as notetakers. These interviews were recorded but not transcribed due to the language challenges. However, recordings for all interviews are archived.

The quantitative self-report questions were presented as a discrete visual analog scale with possible scores ranging from one to ten, where one was the lowest level of support for a concept (“not at all valuable” or “not at all supportive”) and ten was the highest level of support for a concept (“extremely valuable” or “extremely supportive”). Similarly, to minimize language effects, five faces were placed above the numbers to visually represent the range in possible responses (Figure 1). These faces ranged from angry (1), to frowning face (3), to neutral with a flat line for the mouth (5), to slightly smiling face (7-8), to extremely happy face (10).

Three interview guides were used for our data collection (Appendix I, II and III). Interviews with Black Mambas focused on how the program has affected them personally as well as their perceptions and their personal support for nature, wildlife, conservation, poaching, game reserves, and KNP. The survey for the Transfrontier Africa Staff members focused on their perception of the women in the Mamba program, as well as assessments of how supportive local communities were of nature, wildlife, conservation, poaching, game reserves, and KNP. Interviews with community members

focused on whether they benefit from nature, and their personal support for nature, wildlife, conservation, poaching, game reserves, and KNP. General community members were also asked about their knowledge of and influence from the Black Mambas. Observational data was also recorded and used to support understanding of data collected from the interviews.

To analyze qualitative responses, an iterative coding and categorization process was used to uncover and refine codes. Based on prominent themes, topics, concepts and sub-concepts, and how they relate to each other, conclusions can emerge (Hesse-Biber 2004). The community interviews were not transcribed. Instead, coding of community interviews was completed based on the notes rigorously recorded from the recordings, amended by additional notes take during the course of the interview. Each question was coded separately, receiving a unique list of text and numbered codes. Microsoft Excel was used to record and organize assigned codes and perform simple summative analysis.

Microsoft Excel was also used in conjunction with R Commander Statistical Software to compute basic descriptive statistics of the quantitative data. Inferential and relational statistical analyses of the quantitative data were conducted using non-parametric tests because of the non-normal distribution of most of the quantitative codes.

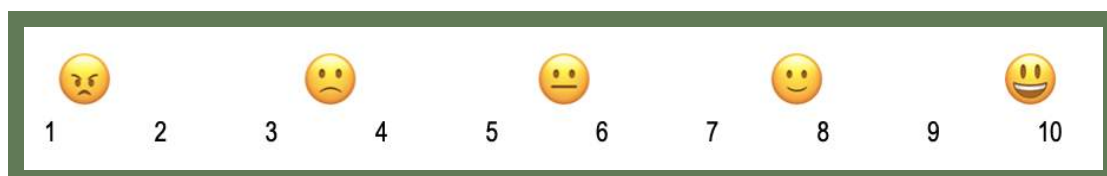


Figure 1. Discrete visual analog scale used during interview. Interviewees could refer to this scale to help determine and/or indicate degree of support or value.



RESULTS

This study investigated the perceptions of three distinct groups – general members of local communities, staff from Transfrontier Africa, and rangers of the Black Mambas Anti-Poaching unit. While each group responded to several of the same inquiries, each group also responded to unique inquiries. Results are therefore separated according to the type of respondent and presented below in three sub-sections. Recalling the four hypotheses of this study, the following two have been supported:

1. Black Mambas experience dramatic improvements in self-esteem, self-efficacy, and gender role expectations over what they experienced prior.

2. Black Mambas impress and expand what Transfrontier Africa team members think the Mambas are able to accomplish.

More evidence would be necessary to identify a direct relationship between the Mamba program and residents' perceptions of species as a national patrimony. However, the data collected in this study does provide some support that community members in Maseke are significantly more aware of the Black Mamba program(s). It is possible that the non-significant but consistently greater support for wildlife, protected areas, and decreased support for poaching among the Maseke community may be due in part to the Black Mamba and Bush Babies programs. Therefore, there is some evidence to suggest that these two hypotheses are partially supported:

3. Black Mambas promote community engagement with and support for the environment and perceptions of local species as national patrimony.

4. Black Mambas influence communities such that they decrease community support for poaching and poachers.

Perceptions Held by the Black Mambas

Mambas were initially attracted to the position to (1) have a well-paying job and income and/or (2) to engage in the opportunity to experience and protect nature. Black Mambas have been significantly transformed through the responsibilities of their position as well as the personal benefits, empowerment and security achieved by their position as a female game ranger.

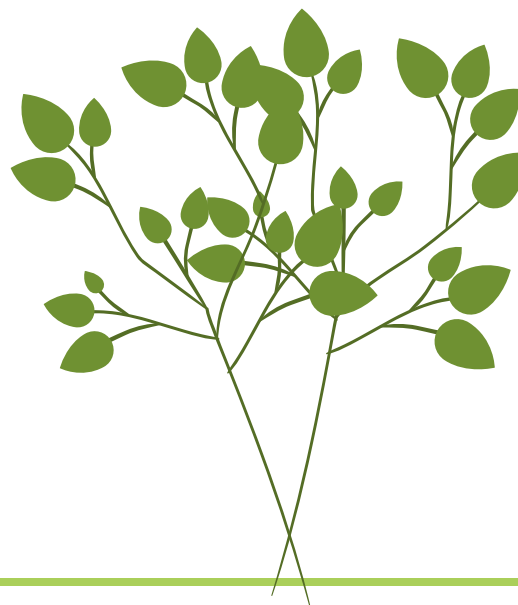
After witnessing their capabilities in day-to-day patrol duties, Mambas have heightened physical strength but also greater sense of personal confidence and capacity to complete challenging tasks,

especially those that peers and society had previously convinced them women were not capable of doing. Critical is that Mambas are financially empowered and, in most cases, the breadwinners in their families and even communities. Results from interviews with Black Mambas support the hypothesis that they experience dramatic improvements in self-esteem, self-efficacy, and gender role expectations over what they experienced prior. In total, 27 Black Mambas, 26 females and one male, participated in an individual structured interview. Participants are from eleven different community residences, with most living in one of four communities (Table 1).

	Name of Community Residence				
	Hluvukani	Maseke	Acornhoek	Wolverdiend	Other
# of Participants	7	6	4	3	7
% of Total	25.9%	22.2%	14.8%	11.1%	25.9%

Table 1. Community residences of Black Mamba interview participants. Number of Black Mambas residing in each of the four sampled communities among the 27 interview participants.

However, interview participants represented a diversity of locales and programs to which they were assigned as a Black Mamba (Table 2). Both the average and modal age of the respondents was 27, with a range of 20 – 30 years in age. Interview participants had been employed as a Mamba for between one day and five years; the average interviewee was employed for approximately 3.75 years.



Program/Locale	Number of Employees Interviewed	Percent of Total
Bush Babies Education Program	2	7%
Grietjie	5	19%
Jejane	4	15%
Maseke	7	26%
Olifants	6	22%
Operations	3	11%
TOTAL	27	100%

Table 2. Program and location assignments of Black Mamba interview participants. Note that 'Operations' refers to an office-based position assigned with coordinating and overseeing rangers' work and communications in the field.

Personal Impacts

A primary inquiry of this study was how Black Mambas have been personally impacted through their position and duties as a ranger. Before being employed as a Black Mamba only four of the 27 respondents had a job. While the most commonly reported reason for joining the Black Mambas was to acquire a job, other common reasons include the desire to experience, learn more about, and/or protect nature and its wildlife components. In relation to their desire to enjoy and protect nature, it is important to note that more than 80% of Mambas found it greatly valuable (reported by a '9' or above on the 1-10 scale representing 'not valuable' to 'extremely valuable') to have the game reserve and wild animals living nearby. On average, Mambas reported an average value score of 9.6 to 'wildlife living nearby', which is 0.9 – 1.9 higher than average ratings from the four communities surveyed. In other words, Mambas assigned a higher value to wildlife living nearby; whether this change in

change in valuation occurred after working as a Mamba or whether the position attracted women with more value for wildlife is unclear. Likely both factors are relevant.

A smaller portion of respondents recognized the unit's potential for empowering women as a factor in their decision to join. One respondent said that, "in our community... women can't do a man's job, so I was surprised to hear they were doing a man's job, so I want to go and do it... and that's when I came." Mambas reported a number of skills they have developed (see Table 3), which fall into the category of either (1) knowledge of nature and/or conservation, (2) technical skills, (3) and skills related to personal development. Technical duties are typically skills related to the duties and responsibilities of a Black Mamba and may include tasks like first aid, survival skills, and firearm management, to name a few. Skills related to tracking wildlife are categorized as knowledge of nature.

Category	Example Quote
Nature or Conservation Knowledge	<p>"While I'm at home I thought that when I see a buffalo I just see meat. When I look at an elephant I see the skin but now it's my friend and I am in love with natural things."</p> <p>"I've learned... how to identify tracks - if this is a black rhino or a white rhino and tracks for the leopards... they are quite confusing, but I can identify."</p>
Technical Skills	<p>"They taught us how to track how to catch a poacher... now I go home with experience; many people want to come to steal at night - we are able to see the tracks of those people, so you tell them what tracks they come from we have gained a lot because we know how to track."</p>
Personal Development	<p>"I learned a lot of things working as a team of ladies and to share and to go to interviews [with the press]. I was nervous before, but I'm better than before."</p>

Table 3. Skills developed by Mambas. Representative quotes of commonly reported types of skills or proficiencies developed while working as a Black Mamba.

Women in the Black Mamba program reported that it has transformed how they view themselves as well as what they think women are capable of doing. One interviewee touched on the way that the Black Mamba program allows women to take on non-traditional gender roles in a way that broadens their beliefs of what they are capable of:

“

To be a Mamba [changed] me. To see life like in all its positive way... I am a woman, you see, and here in Africa, they see this job [to] be for a man. But me, as a young woman, I am able to do this job and to walk in the bush to come across something scary to me, but I am able to [do this job].

”

Another explained the notion that others' beliefs about women's capabilities have changed,

“

They say to me that, 'wow, how hard you are going to work. We know that, no, you are not going to make it because that job is for [men], it is only meant for [a man].' But now, you can say that this job is not only meant for a [man], but for all of us or for a person who is ready to do this. They are coming back to me and saying that, 'no, I was wrong, and you were right.'

”

Of the 25 participants who responded to a question asking if their work as a Black Mamba has changed their beliefs about what women can do, 100% confirmed that, 'yes', it has. Typically, these women are the household breadwinners in the communities in which they live. They state that they are the educators and conservation advocates, and they are becoming community leaders. One respondent explained that, "I [feel] proud because our village - they are proud of us - we are strong [women]." Overall, working as a Black Mamba is socially empowering by providing financial

independence, garnering respect from peers and community members, and refining the definition of what women can do in their society. For example, one Mamba said that “now I can... take responsibility with my children, can able to support my mother, I can even to manage to save my living for [my] daughter so when she grow[s] up she can go to university.” These factors appear to lead to social empowerment of the female rangers, leading them to embody a sense and commitment to leadership in their communities. One respondent highlighted such an instance by explaining that,

“If I want my kid to pick up the papers I have to pick up the papers. Even if it's hard. And I see a paper in school I pick [it] up because I need to be the example. so that's how it changed. I had to be the leader of the pack. Not really the leader, but the matriarch.”

Personal Challenges

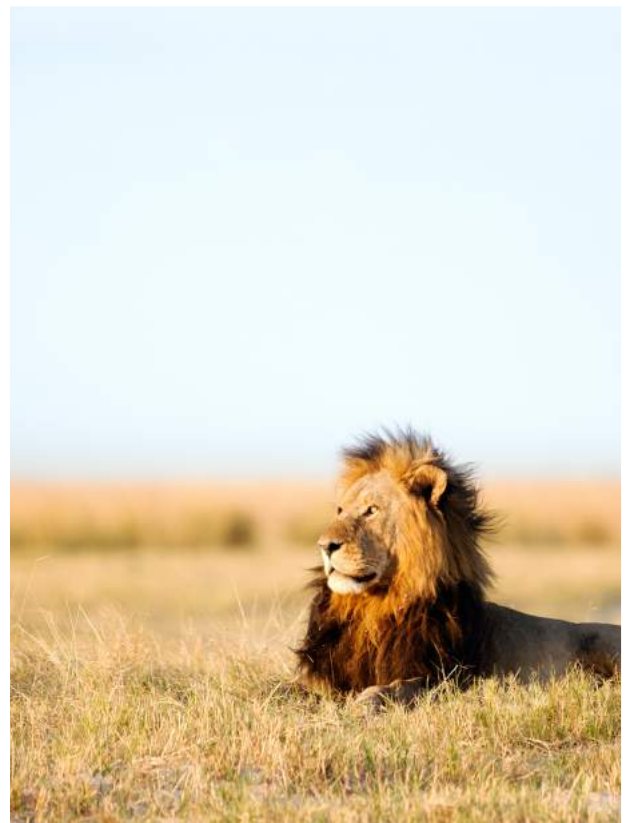
However, some challenges that Black Mambas encounter include the dangerous and strenuous work conditions as well as some negative attention and possible negative outcomes associated with their position in a traditionally male post and, more so, their work against potentially dangerous poachers. Not only do Mambas have to walk long and tiresome distances in the hot sun but, as one Mamba explained,

“Walking down the fence every day when we come across elephants and lions. We have to protect ourselves; we get scared. When you come across such things you have to think - What do I do now? Who do I call now?”

Another mentioned challenge is the threat posed by poachers both in and out of the reserve. One Mamba eloquently summarized this threat by saying that,

“A poacher it is not written that ‘I'm a poacher’ because poachers come from our communities - our unemployed brothers and fathers. And I might not know that they are poachers, so sometimes they can attack us because they know that we are working for the reserve... they cannot attack us [verbally], it would be physically. Especially in the bush.”

Such fears and concerns are important to consider when we ask how Mambas interact and/or communicate with their fellow community members when off duty.



Perceptions Held by Transfrontier Africa Staff

Perspectives of Transfrontier Africa (TA) staff were critical to consider because they work closely with the Black Mamba Anti-Poaching Unit and are knowledgeable on the past and current status of poaching in the area. Therefore, staff members' insight of current positive outcomes and recommendations for improvement can be helpful in guiding future directions of the Black Mamba program.

Overall, testimonies from Transfrontier staff supported the hypothesis that Black Mambas impress and expand what Transfrontier Africa team members think what is possible in this program. This study also asked if the Black Mamba program serves its purpose and, based on TA staff comments, there are several areas in which the program could be adjusted to still better achieve its objectives and mission. Currently the program excels in empowering the Mambas themselves but can improve its effectiveness in both on-the-ground anti-poaching efforts and community education and engagement about conservation. TA staff seek ways to improve training and development of the women as rangers so that they are further engaged and empowered as advocates for conservation. Additionally, some recognized current personal and society-level barriers may deter Mambas from bringing messages of conservation home to their communities. However, the Bush Babies Education Program was commended by nearly all as having been a successful avenue for Mambas to communicate with local people and potentially to begin pro-environmental behavioral change.

In total, nine staff members (5 males, 4 females) were interviewed. Staff members have worked with the organization for 0 to 12 years with six of the nine having worked with TA for less than four years. Five staff members are from South Africa and five are from foreign countries.

Effectiveness of the Program for Black Mambas

While most of the TA staff explained that they personally view women to be equally as capable as men, they recognized that giving women the opportunity to perform in what were traditionally male roles in the local culture is integral in allowing women to equally achieve success. Many noted that women beginning to work in the conservation field, especially in anti-poaching efforts, which is "seen as a really male dominated profession within any kind of reserve", has broadened their perceptions (or those of others) about what women can contribute, and how they can benefit personally, when given the opportunity to engage in these realms.

Additionally, TA staff members tended to report that the Black Mamba program is greatly effective in changing the women and men who participate in it. On a scale of 1-10, with one representing 'not effective' and ten 'extremely effective', all TA staff rated its effectiveness in empowering the individual as between six and eight, with an average rating of seven and maximum of eight. Similar to reports from the Mambas

themselves. TA staff were particularly impressed by how the women rangers are positively transformed by having access to disposable income, tools, and training for personal development, a sense of belonging and purpose, attention and respect from peers, and a platform for local-level leadership. However, one staff member presented an opinion in opposition to all the rest by explaining that,

“They are weak physically... They should be in kitchens at lodges. They are incapable. It's not a women's industry, it's a man's world. And that is just because they are designed badly as women, as they are weak.”

This dissenting opinion is mentioned here, and elsewhere, because it differed so greatly from the others in the small organization that it is worth highlighting and perhaps investigating further.

Effectiveness of the Program Against Poaching

Regarding the program's ability to stop poaching, the collective ratings of the eight TA staff who responded to this question indicate only mild effectiveness. On a scale of one, representing 'not effective', to ten 'extremely effective', TA-assigned ratings ranged from 3 to 8.5, with an average score of five. Five of eight TA staff assigned an effectiveness score of five or less. Commonly noted factors that inhibit effectiveness include the lack of full, 24-hour/night surveillance across the protected area and the highly skilled and elusive poachers against whom they are working. One member explained poachers will "try every-

thing they can to avoid being caught... they are now wearing sponges around their shoes and socks over them [so you don't get the print]." Several staff clarified that "[the Black Mambas] won't stop the poaching, but they will try and prevent it more than stop it... the early detection, that is their main focus." Another notes that,

“It's difficult to quantify. Bushmeat and snare removal - I put them at an 8 or 9. When it comes to poaching, they're not as involved... They're our first line of defense... they are looking for the tracks maybe going out into the fence, so it does give you a head start, so it does have some effect on poachers and also you got that visual barrier. People seeing them walking around probably [deters] them from coming in. So, you could say from that point of view they score high on the mark but are they stopping rhinos from being poached? It's too big of a picture. There are so many elements involved. If they found those tracks, 9 times out of 10 they will stop the poachers. Not the Mambas because they're the ones that go in to continue tracking them... it's always Protrak or someone else [who] gets the glory in the newspapers of arresting poachers.”

Other inhibitors to anti-poaching success are related to logistical and structural challenges within the Black Mamba program, which are discussed in a later section.

Effectiveness of the Program on Community-Level Social Changes

On the other hand, TA staff did assign higher ratings of effectiveness to the program's ability to spread the message of conservation to Mambas' home communities through the school children who participated in the Bush Babies environmental education programs. On average, the program's ability to spread conservation messages to communities were rated as 6.6 while its effectiveness in spreading the message to school children was 7.8. In both cases, one respondent assigned a significantly lower rating than the rest of TA staff. Excluding this person's ratings, the averages change to 7.3 and 8.6, respectively. Several interviewees noted how the Bush Babies program is educating hundreds of local children in at least 11 schools and helping them "get exposure" and teaching "a lot of nature and how to preserve it for the future." While one staff member said, "there is already a difference that you can see - that they are starting to see that they must protect nature", another noted that "we won't really know if they got the message as they should." Overall, TA staff appear to have assigned particular value to the Bush Babies education program and its ability to change the environmental knowledge, attitudes, and behaviors of local community members in the long run.

Several respondents directly related the Bush Babies program to the ability of the Mamba program to spread the message of conservation in their home communities in general. Others proposed that the financial

independence and pride Black Mambas establish as a result of their anti-poaching work is apparent when they return to their home communities, perhaps influencing community members' perception of conservation and the importance of working to protect local wildlife. While one interviewee noted that, "they really do spread the word... In their communities themselves, it's become a no-no to play with the kids of poachers." It's also worth noting that a staff member within TA stated that, on the contrary,

“

The Mambas have done absolutely nothing to convince people to pick up that paper, don't let that tap leak, wildlife is cool... They [don't care]... [Do you] think that the guy at the Toyota dealer goes home and tries to convince everyone that Toyota is better than Ford? No... He closes that shop and he goes home.

”

In contrast, all other TA staff members applauded the Black Mamba Program for its impacts on the individual Mambas, its focus on education, and overall intentions of deterring poaching through patrol and early detection mechanisms. TA staff recognized that the program attempts to take a "long-term" and more holistic approach to deter poaching, rather than a short-term militaristic method. However, staff also recognized that there is much room for improvement, especially considering that "we are still losing rhinos" in the reserve despite Mamba efforts. One staff member summarized by saying that, "when you look at the practical side there needs to be work done, obviously, but from the idea itself, I would give it a ten [out of ten]."

Potential for Improvement

In addition to challenges associated with improving basic anti-poaching efforts and results – e.g. early detection efforts, patrols, tracking, and enforcement – TA staff identified three other challenges associated with the current structure of the program. Firstly, interviewees consistently clarified that there are different degrees of dedication and work ethic across the individual Mambas. Creating a team with the utmost passion for wildlife, conservation, and other related matters is integral to success. One respondent said that, “some of them really want to be better than they are at the moment. And they listen and they want to achieve something. But then you get the others that are just here for the money.” Secondly, interviewees mentioned that although media coverage is necessary to collect funding, the increasing media attention may negatively influence the work of the Mambas by glamorizing them, so “they don’t really feel or do their job anymore; they don’t have the drive anymore... they got an attitude - ‘I can do what I want because I’m a Mamba’.” Finally, several TA staff suggested that the effectiveness and success of the Black Mamba program would benefit from different and/or improved upper level management personnel, structure, and leadership.

In one way, TA staff recognized that the Mambas and their efforts would benefit from a compassionate and supportive set of managers who inspires greatness through learning and continual improvement. For example, one member explained that what is fundamental is,

“

Management. Getting a good the right person for the [managerial] job... someone that can speak the language and understand what they are going through. A very compassionate person who can be very empathetic very patient and a good teacher... It needs to be someone they look up to that they respect that they are willing to go an extra mile for... What they are doing at the moment is good... but not what it could be.

”

The second largest category of challenges related to management referenced structural shortcomings. TA staff explained that the unit requires “serious management staff”. Another expanded by clarifying that,

“

We had all the mambas in place but we didn’t have the management in place ... our problem is the top structure... we had one person to look after the 6 ... and then it was just one guy trying to look after 26 women spread out across 50,000 hectares.

”

Other challenges related to management include specific points and suggestions such as hiring a female manager, a manager who speaks their languages, and clearly establishing one head manager rather than allowing others to act as manager and cause confusion. Overall, it’s clear that both Transfrontier Africa and the Black Mamba program would benefit from structural and social adjustments in upper-level management. Practical recommendations to begin to address these challenges and others mentioned above can be found on Page 37.



Perceptions Held by Local Community Members

The primary question we attempted to address with community member interviews is, does the Black Mamba program lead to beneficial pro-environmental changes among the communities from which the Mambas originate? Hypotheses were that (1) Black Mambas promote community engagement with and support for the environment and perceptions of local species as national patrimony. Secondly, (2) Black Mambas influence communities such that they decrease community support for poaching and poachers. Most members from each of the four communities reported that they support nearby protected areas and do not support poaching of wildlife.

Community members commonly cited the economic benefits and job opportunities that wildlife, protected areas, and the associated tourism/conservation industry creates for local people. The social benefits such as educational opportunities, recreation, and personal enjoyment of wildlife were also commonly recognized. Similarly, residents nearly completely

rejected the idea of hunting, and especially poaching, as they realized it subtracts from the collective potential benefit of wildlife to the community.

Infrequently mentioned but apparent was a portion of respondents who were critical of protected areas. Stated reasons for this opposition to protected areas included: (1) the land was unjustly taken by white people, (2) they don't receive financial benefit, and (3) such benefits as are distributed are concentrated within certain families or unevenly distributed by local leadership within the community.

For three of the four communities the extent to which such positive beliefs and attitudes about wildlife were related to or influenced by the Black Mamba program appears to be negligible. However, while not significant, there is evidence to suggest that Black Mambas had more potential for positive influence on Maseke residents' engagement with and support for local wildlife conservation efforts.

A statistically significantly greater percentage of the Maseke residents sampled were aware of and/or had interacted with the Mambas, $X^2(3, N = 119) = 25.04, p < .005$. This was likely because Maseke is the only community of the four evaluated that hosted the Bush Babies Education Program. The Bush Babies program allowed the Mambas to have a presence outside of the areas they protect, and to directly interact with the community. Maseke residents also appeared to value wildlife and protected areas slightly more than residents from the other three communities (Table 4). Whether this difference may be related to influence from the Black Mambas Program, or that their community financially benefits more from the Big Five (Figure 2), or that Maseke is simply closest to the Balule Nature Reserve is unclear.

Likely a combination of these factors, and potentially others, are at play.

Approximately 30 community members from each of the four most common residences of Black Mambas participated in an interview regarding perceptions and outcomes of both nearby protected areas as well as the Black Mambas Anti-Poaching Unit. Basic demographic information for these interviewees is presented in Table 4.

Location	Age		Gender		FT Employment*		TOTAL
	Mean Age	Std. Dev.	Female	Male	Yes	No	
Acornhoek	45	16	22 (71%)	9 (29%)	15 (56%)	12 (44%)	31
Hluvukani	40	15	19 (63%)	11 (37%)	6 (21%)	23 (79%)	30
Maseke	42	15	18 (60%)	12 (40%)	15 (52%)	14 (48%)	30
Wolverdiend	40	17	16 (55%)	13 (45%)	8 (29%)	20 (71%)	29
OVERALL AVERAGE	41	16	75 (63%)	45 (38%)	45 37%	70 58%	120

Table 4. Basic demographic information of general community member participants.

*Does not account for adult students or retired persons.

Perceptions of Local Wildlife & Protected Areas

Community members were asked a variety of questions about their perceptions and attitudes toward local wildlife and protected areas (Figure 3). In general, members of the four communities sampled reported that they value nearby protected areas, Kruger National Park, and game reserves. Respondents assigned greater value to KNP than to the general category of game reserves (Figure 3). It is worth noting that 59% of respondents indicated that The Big Five are 'extremely valuable'. Furthermore, while 44% of respondents said they reap personal financial benefit from The Big Five, a greater 68% recognized that others benefit financially (Table 5). Besides a few outliers, local people were extremely unsupportive of people hunting large animals on the reserve for either food or money.

If results are broken down by community (Figure 2), Acornhoek had the smallest percentage (29%) of respondents report that they received personal financial benefit from the Big Five than did other communities where at least 48% of respondents reported personal financial benefit. A chi-square test of independence reveals difference in reported personal financial benefit among communities, $\chi^2 (3, N = 119) = 3.66, p = 0.06$. Secondly, most interviewees from Maseke (93%) reported their community receives financial benefit from The Big Five, significantly more than the other three communities, $\chi^2 (3, N = 118) = 12.01, p = 0.0005$. Additionally, rankings of personal value of the Big Five are slightly positively correlated with rankings of both personal value for the reserve ($r_s = 0.34, p < 0.001$) and community-level financial benefit from the Big Five (Spearman's Rank Correlation, $r_s = 0.20, p = 0.03$).

	Supports Hunting for Food	Supports Hunting for Money	Values Big Five	Values KNP	Values Reserve
Acornhoek	1.80	2.50	8.06	8.42	8.43
Hluvukani	1.53	1.33	7.77	8.40	8.07
Maseke	1.30	1.33	8.77	9.47	8.65
Welverdiend	2.10	1.66	8.10	8.45	7.97
OVERALL AVERAGE	1.68	1.71	8.18	8.68	8.28

Table 5. Average reported value of support or value in the four communities sampled. Responses fall across a spectrum of 1-10 with lower numbers indicating less support or value.

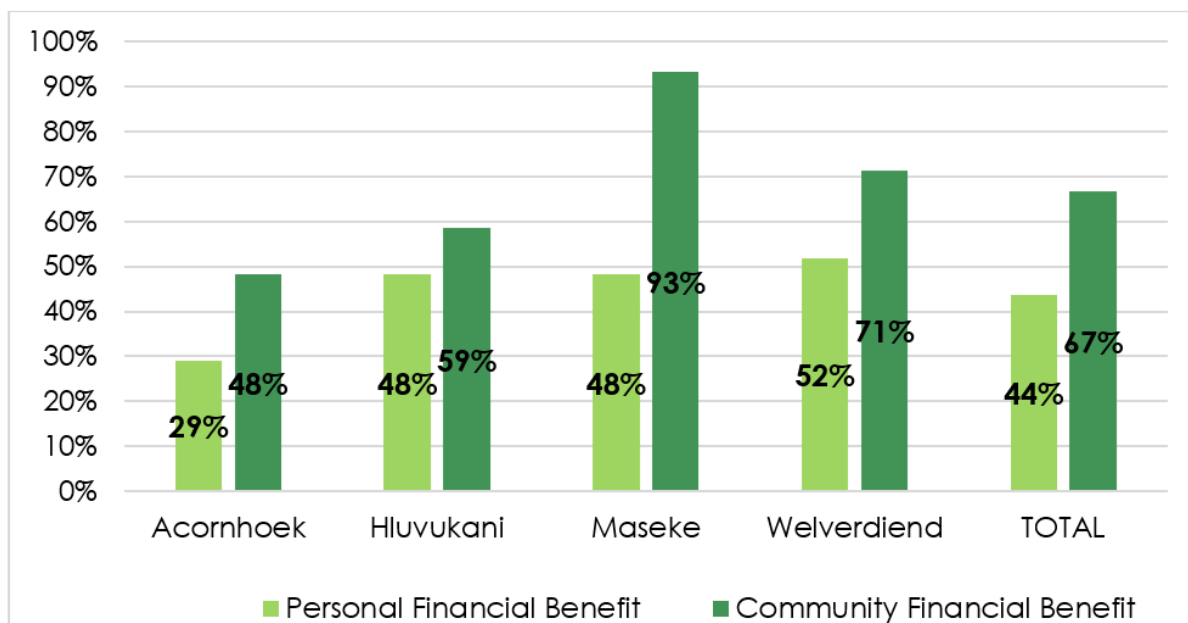


Figure 2. Personal and community-level financial benefits from The Big Five. Positive reports of personal and/or community-level financial benefits from The Big Five, shown by community.

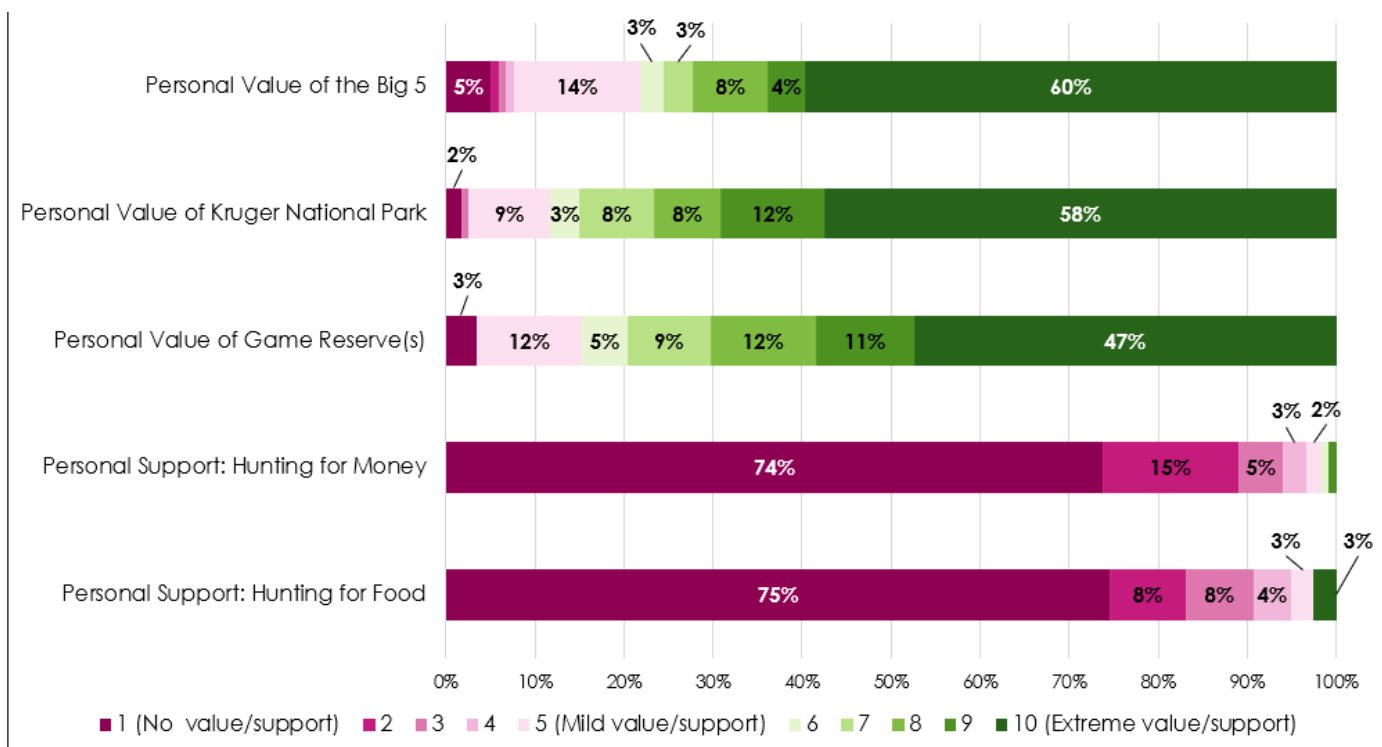


Figure 3. Community members' value and support of local wildlife & protected areas. Percentage of community members' rankings of degree of their support or value for local hunting, wildlife, and protected areas. Interviewees were asked specifically about their support for people hunting large animals living on the reserve.

Positive Perceptions

A majority of respondents expressed positive attitudes and perceptions about nearby protected areas (KNP and game reserves) and the wildlife living nearby (Figure 3). For the three statements about value of protected areas and wildlife, a minimum of 75% of the total respondents strongly valued these aspects, having expressed a value of at least seven out of ten (Big Five = 75%, KNP = 85%, local Game Reserves = 80%). Similarly, at least 95% of the total respondents did not support (responses of three or lower) hunting for money (95% no support) or hunting for food in protected areas (96% no support).

Across the three questions about wildlife and protected areas, the mean ranking of value within Maseke is consistently greater than those of other communities (Table 5). The difference is most clear in value assigned to KNP, where the mean value assigned within Maseke (9.47) is more than one whole ranking point above those of other communities (8.42, 8.40, 8.45). These data suggest that the personal value of KNP is not necessarily the same across the four communities (Kruskal-Wallis chi-squared = 6.42, p-value = 0.09). Similarly, among the four communities, Maseke has the lowest mean support for either type of hunting (Table 5).

Primary reasons for support of protected areas and wildlife were said to be due to economic and/or social reasons, with a smaller portion related to ecological reasons. Respondents often gave explanations which included both benefits and challenges associated with wildlife and protected areas.

Many interviewees stated, in one way or another, that wildlife should be protected and conserved “for future generations.” The basis for this claim was varied and not always clear; responses generally imply that future generations deserve to use all the economic, social, and ecological benefits of wildlife and protected areas.



Economic Reasons for Supporting Nature Protection

Positive perceptions were often described in relation to some sort of individual or community-level economic benefit derived from wildlife and/or protected areas. Interviewees often emphasized that The Big Five, and/or wildlife in general, provides benefits by (1) attracting tourism, (2) creating jobs for local people, (3) allowing for other (non-financial) resources to be used or extracted, (4) providing financial benefits not associated with employment, and (5) developing the local economy. Representative quotes from each category are presented in Table 6.

Category	Quote
Attracts tourism	<p>"Tourists come from overseas, and they bring money, which leads to jobs."</p> <p>"I support reserves, because tourists come to see animals, so it is a privilege to have them."</p>
Creates jobs/employment	<p>"Maseke [is] benefitting by jobs to have food on the table."</p> <p>"If [there are] no reserves, no jobs for children. [Employed] children can take care of others."</p> <p>"[Reserves are] good because the nearest community will get employed from those lodges."</p>
Provides other resources	<p>"Two times a year, they buy food for some of the community members (at Good Friday and again at Christmas). [These food parcels are] 80 kg of melle meal (corn meal) and 10 chickens. The reserve gives money and the chief then buys [the food] for the community."</p> <p>"[The reserves] help us [by allowing us] to fetch wood for fires and collect the mopane worms."</p> <p>"[The reserves] do [help with] infrastructure. For example, building classrooms, and sometimes give some meat [to schools]."</p>
Develops local economy	<p>"We are balancing the nature, and community benefits by jobs, tourists, and economy."</p> <p>"Tourists are coming from far away to fuel [the] economy and leave money."</p> <p>"In communities, [the reserves] donate to kindergarten, and games reserves, and lodges build infrastructures."</p>
Provides other financial benefits	<p>"During December, soccer tournaments that Kruger National Park sponsors, [the] team that wins gets the money, and that leads to benefits for the community."</p>

Table 6. Economic benefits of wildlife and protected areas. Representative quotes relating to the economic benefits of protected areas and wildlife living nearby. Categories are listed from most to least frequently mentioned.





Social Reasons for Supporting Nature Protection

Although great value was given to the economic benefits associated with wildlife living nearby, socially oriented benefits were about equally valued. Interview participants who value wildlife frequently described appreciation for (1) the accessibility of

nearby protected areas and wildlife, the ability to see, interact with, and enjoy nature and wildlife, (2) the ways in which protected areas protect people from wildlife, (3) educational opportunities provided and, less frequently but still apparent, (4) the pride associated with their local place and wildlife. Representative quotes to highlight each are presented in Table 7. Regarding accessibility, it is important to note that 64% of community members who participated in these interviews had visited KNP.

Category	Quote
Accessibility	<p>"For [going to the] game reserve, [we] don't have to use transport. You can walk by the fence to see animals; don't have to go far."</p> <p>"Most people can only see the animals through print, books, or magazines but we can see them close up."</p>
Ability to enjoy/interact with nature and wildlife	<p>"Wildlife is another kind of life, part of me and community. [I] feel refreshed to go to reserve to cheer [myself] up. Normally don't pay anything because you can see when you drive."</p> <p>"I feel blessed that it is nearby, unlike others who spend lots of money to come from far away. [They] only see the animals from TV until they come here."</p> <p>"When I see the animals, I am happy because they are God's creatures."</p>

Protection from Wildlife	<p>"I don't like them. I fear the animals, but like them when they stay in the reserves and I feel safe."</p> <p>"[The reserves] take care of animals and protect animals and keep them in so they don't eat livestock."</p>
Educational Opportunities	<p>"Kruger National Park must continue to protect nature and animals, so future generations can see and learn directly from the animals."</p> <p>"Kids benefit by being able to go to game reserves with camping experiences, educational as well."</p>
Local Pride in Place/Wildlife	<p>"They feel so important because other people, even from other provinces, are interested in coming here to visit."</p>

Table 7. Social benefits of wildlife and protected areas. Representative quotes relating to the social benefit of protected areas and wildlife living nearby. Categories are listed from most to least frequently mentioned.

Far less common than positive perceptions associated with the economic or social benefits of wildlife and protected areas, were ecological or environmental considerations. These reasons for support suggested the value of the wildlife or landscapes themselves (inherent value) and/or benefits they may provide to or maintain within the ecosystem (ecological integrity). One interviewee considered how ecological integrity can be disrupted if animals are hunted at unsustainable rates by explaining that, "[the animals] are put there for a reason. If someone kills animals, it is wrong. It takes out the reason they were put there in the first place." Another simply stated that "Kruger protects [the] environment." Other respondents mentioned the inherent value of wildlife by noting that they "deserve to live. They deserve to be protected". In other words, wild animals "are a part of nature" and have a right to life. Objections to poaching of

wildlife commonly cite that hunters are not only removing an individual or endangering a species/population, but "destroying nature" as a complete system.

Negative Perceptions

Of course, some negative perceptions of both the nearby protected areas and wildlife were expressed during the interview process. Most commonly noted was the threat or danger that wildlife poses to human communities. One person simply stated that it is "not good to live near game reserve. We are scared." Several interviewees explain that wildlife can hurt or injure people, they can spread disease to humans, and damage peoples' crops or livestock. In many cases, interviewees explained their objection to hunting large animals for food or money was related to the notion that the animal(s) could hurt or even kill the hunter.

Negative perceptions of nearby protected areas also existed but were less commonly expressed. In addition to protected areas containing what some perceive as dangerous wildlife, the most common objection associated with KNP was that “the land was taken by white people long ago.” One person mentioned that that “the idea of whites taking charge of animals like it belongs to them, when it belongs to all of us” is unjust and unacceptable. However, one interviewee added to their explanation that they “have no choice than to support Kruger... I don't support it, but it is necessary [to have].”

The second common objection to KNP, and in some cases to game reserves, was that these protected areas have not created as many jobs for local people or enough community-level benefit as they are marketed as having done. A few people acknowledged that jobs opportunities are provided by protected areas, but also stated that hiring local people is not a priority.

Specific to how communities distribute the financial benefits of nearby game reserves, several people stated that the benefits or financial profit ends up concentrated in certain families or individuals rather than being dispersed equally. In a few cases, respondents said that no financial benefit came from the reserve. One person stated that, “I am not seeing money, people say [the reserves] donate money, but [I am] not seeing it.” Some respondents explained they don't benefit personally from the Big Five because while “there is money coming out [to the community]... the chiefs get it but they don't give it to [us].” Another said, “yes, [the community gets financial assistance] but

royal families only. [They] only give [to their] own families, money from land claim.” wildlife commonly cite that hunters are not only removing an individual or endangering a species/population, but “destroying nature” as a complete system.

In a few cases the lack of support for wildlife may have been associated with lack of direct financial benefit. For example, one community member says, “I don't value wildlife because I don't work [at the reserves] and no one in my family works there.” In more than one case, a respondent noted that the community benefited from the reserve more so in the past than in the present. For instance, one explains that, “years ago, the reserves used to build houses for the community and used to put in taps. They still give light bulbs out.” In the four communities participating in this study, poor economic conditions and poverty are prolific and are often related to individuals' perceptions and behaviors related to use of wildlife resources. One respondent said, “I do support [poachers]. There is a lack of jobs they need to support family.”

Perceptions of Hunting for Large Animals in the Reserves

On a scale of one to ten, with one representing ‘not at all supportive’ and ten, ‘extremely supportive’, only 5% of community members interviewed mentioned any support for hunting large animals in the reserve for food. Of this, only 2.5% offered mild support, or a score between five and seven, and 2.5% expressed great support, or a score greater than seven (Figure 3).

A slightly smaller degree of support for hunting for money was observed, with only 3.4% reported support with a score of five or greater (Figure 3).

Although some interviewees noted that extreme poverty is what leads individuals to hunt for food, and sometimes money, a majority expressed concern that hunting on the reserve will corrupt “nature” or its balance, especially since the hunting can lead to extinction/extirpation of the animals. A second common response, and one that was related to the depletion of local wildlife, was the concern that tourism to see large animals (and other wildlife) will then decrease, causing a loss of jobs and downturn of the local economy. One respondent summarized their main concerns by commenting that,

“Poaching leads to a loss of animals, leading to no jobs, which leads to people being unable to see animals. Therefore, no overseas people will come and there will be no community benefits.”

Words like “selfish” or “greedy” were used to describe poachers because they “are destroying nature and... they are doing things only for themselves” and “where will their kids see the animals if they are gone?” A common sentiment was that, “the community doesn't always benefit, only the people hunting benefit”. Interviewees explained several ways that community is negatively impacted by the loss of wildlife and its associated social and economic benefits. One person said, poachers “should not make money to destroy wildlife. [They are] also destroying other persons' jobs.” On a larger level, “they are killing the economy.”

Many respondents also expressed concern for the safety of the hunter/poacher. Not only are there concerns that wildlife can injure or kill a person, but that rangers who are charged with the duty of protecting wildlife will kill the human poacher. This concern extended beyond the individual to the community-level when respondents voiced concerns about what will happen to the poacher's widow or children.

Knowledge and Impact of the Black Mambas

Most of respondents' beliefs about the value and appropriate use of local wildlife are, as they explained them, were not directly related to the influence of the Black Mambas program. Overall, only 4% of all respondents explicitly confirmed that interactions with the Mambas affected how they think about these conservation related topics. No community member sampled explicitly reported that interactions with the Mambas have affected how they think about people who hunt animals on game reserves. While a few interviewees noted that they were influenced by the Mambas, over 75% of 119 community members who were asked about the Mambas were entirely unaware of the Black Mambas program (Table 8).

However, it is possible that the Mambas contributed to higher levels of value/support for wildlife and protected areas found in Maseke. A significantly higher portion of respondents from Maseke have had interactions with the Mambas, $X^2 (3, N = 119) = 19.74, p = 0.0001$, and/or have heard of the unit, $X^2 (3, N = 119) = 25.04, p = .0001$, relative to the other three communities (Table 8). These differences suggest the Mambas are more likely to have influenced the conserva-

tion knowledge and perceptions of Maseke residents. In other words, knowledge of the Black Mambas program is not consistent across the four communities sampled (Kruskal-Wallis chi-squared = 7.46, $p = 0.06$). Eleven people from Maseke (37% of Maseke sample) noted that the Black Mambas do affect their community by either protecting local wildlife, benefiting the local economy by creating jobs, and/or providing educational opportunities to local people. At least two of these eleven people were parents of Mambas. In comparison, only two to five people from each of the other community samples described any awareness of the Mambas presence in their community. Finally, four people from Maseke (13% of Maseke sample) said that interactions with the Mambas have affected their view of wildlife. In contrast, only a single person from the other three communities combined reported the same.

Respondents who were aware of the Black Mambas were mostly able to identify or describe key aspects of the program such as anti-poaching efforts. A total of 22 (18%) community interviewees said that Black Mambas affected their local community; exactly half of these people were residents of Maseke. Most commonly, residents explained that Mambas affect local communities by conserving local wildlife and/or tracking and reducing poacher activity. Less frequently, descriptions of Mambas' work and impact included discussions about the empowerment of the local community/people, bolstering of the local economy by creating/maintaining jobs, maintenance of protected area fencing, and wildlife or environmental education in general or via the Bush Babies education program.

	Acornhoek		Hluvukani		Maseke		Wolverdiend		Total	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Heard of the Black Mambas	3	27	3	27	17	13	5	24	28	91
	10%	90%	10%	90%	57%	43%	17%	83%	24%	76%
Knows What Black Mambas Do	4	26	5	25	5	25	4	25	18	101
	13%	87%	17%	83%	17%	83%	14%	86%	15%	85%
Had Personal Interaction w/ Black Mamba(s)	0	30	3	27	9	21	0	29	12	107
	0%	100%	10%	90%	30%	70%	0%	100%	10%	90%

Table 8. Community member knowledge of Black Mambas by community. Frequency and percentage of respondents who are knowledgeable of the Black Mambas programs.

DISCUSSION & CONCLUSIONS



In the five years since its inception, the Black Mamba Anti-Poaching Unit (BMAPU) has successfully helped decrease poaching, snaring, and poisoning of wildlife in the Balule Nature Reserve. This study sought to expand the understanding of the broader program impact by investigating whether it also had significant social impacts.

This investigation was especially focused on the program impact on the women/rangers themselves and on the communities in which they reside. The central hypothesis was that the Mambas promote community engagement where they live to improve support for the environment and conservation of local species. The BMAPU complements their patrol and tracking with educational programs focused on children to improve environmental and conservation knowledge, attitudes, and behaviors of

nearby residents over the long-term. The goal is that entire communities near protected areas will become passionate stewards of their local environment and wildlife. Results and recommendations from this study can be used to refine and improve current practices to allow for even greater successes. Chief among these are that to improve community-level conservation or environmental outreach, engagement, and education, expanding the number of communities with Bush Babies Environmental Education Program should be prioritized.

Impacts on the Mamba Rangers

The female Black Mamba rangers experienced dramatic growth in their self-

esteem, self-efficacy, and expectations of women's societal roles and capabilities. Not only are they trained in and then tasked with physically, emotionally, and mentally challenging duties, the women work in positions that are traditionally performed solely by men in their culture. The culture change of which the Mambas are on the forefront is to transform from an exceptionally male dominated culture outside the home to one that is more egalitarian. As the "breadwinners" in their families and communities, Mambas are empowered to become confident, self-standing, and powerful leaders in their communities. Such an outcome, of course, has implications for the ability of the program to successfully engage with community members to influence their commitment to and trajectories in wildlife conservation.

That conservation can create economic benefits for local people can sometimes be an incentive for these people to support conservation efforts (Tomićević et al. 2010; Snyman 2012), and we see that borne out here, too. This relationship is frequently documented in literature on ecotourism initiatives, protected areas, and/or conservation and development projects. However, jobs or economic incentives alone are not enough to encourage community wide conservation success (Stem et al. 2003; Salafsky et al. 1999; Vasconcellos and Stronza 2008; Pelser et al. 2013). Cultural norms, education, well-being, and non-direct benefits are important factors, too (Stem et al. 2003; Pelser et al. 2013). Stem et. al (2003) found that people who participated in more ecotourism associated benefits (i.e. indirect income, trainings, infrastructure, idea exchange, etc.) were more likely to engage in

practices supportive of conservation. Mambas may have greater levels of conservation support because they reap direct financial benefit from their job, but other indirect benefits like training, education, and empowerment are likely larger contributors to these pro-conservation attitudes.

On a broader level, it is possible that effects from empowering these women financially and socially will spill over to other realms of local society that are not necessarily directly related to wildlife conservation. That a fellow community member, let alone a woman, can support local conservation efforts and be sufficiently financially compensated for doing so, has the potential to encourage others to support and engage in wildlife conservation efforts themselves. Further emboldening and supporting the Mambas as individuals would help them become greater rangers and leaders within their home communities. Transfrontier staff can capitalize and strengthen components of the program that build capacity leading to physical, intellectual, and overall social empowerment of the rangers themselves.

Transfrontier Africa Staff Perceptions

Transfrontier Africa staff also recognized the ways in which the Black Mamba program has completely transformed the female rangers. Crucially, they also identified several ways in which the program can be improved to better reach its goals. Critical to understand is that, like 'communities', the 'Black Mambas' does not reflect one single, unanimous or homogeneous group of beliefs, personalities, and behaviors.

On the contrary, there is a great spectrum of Mambas; while some are clearly dedicated to and passionate about their work, others view it as 'just a job' and are not nearly as driven to exceptionally high performance. Effectively managing, and perhaps adjusting, such a range of motivations and work ethic may be needed. Doing so will help ensure that the program is able to meet the high standards of anti-poaching duties and to most successfully engage and influence community member perspectives. In general, shortcomings of the BMAPU, especially those related to its ability to stop poaching in the reserve, are attributed to a currently less-than-effective structure of the program's various working components, management of them, and general leadership.

Community Impact

The relationship between African people and modern conservationists is often riddled with latent resentment stemming from injustice against them and their ancestors and current apathy. Considering these historical relationships and the unfortunate consequences still exist today, it was somewhat surprising that community members who participated in this study are especially supportive of wildlife/habitat conservation efforts. In rural communities like these that have been displaced, disenfranchised, and continually neglected, industries that generate positive and distributed economic development are especially prized. While nature-based tourism cannot be the ultimate solution for either socio-economic development or wildlife conservation, it certainly has a role to play. The community members involved in this study constantly noted the value of

this study constantly noted the value of nature-based tourism and the benefits it provides.

Since residents look to conservation and tourism for jobs and other types of socio-economic support (e.g. donations, infrastructure development, scholarships, food aid, etc.), the more that conservation areas can support local people through these indirect benefits, the better-supported conservation will become (Stem et al. 2003). This relationship is seen in the high percentage of community members who associated wildlife and protected areas with tourism and jobs, which often led to their high average rankings of value and support. Why financial benefits end up concentrated within certain families, and if there are ways to more evenly distribute these benefits across the community deserves further investigation. Ensuring equitable distribution benefits that are associated with conservation and tourism seems likely to inspire support from more individuals around Balule Nature Reserve. When local people (1) receive more benefits from wildlife, including tourism, hunting, and donations and, are (2) given a greater sense of ownership or responsibility of wildlife management, they may be more likely to support efforts to conserve the species and actively reject detrimental behaviors like poaching (Lewis et al. 1990; Gibson and Marks 1995; Vasconcellos and Stronza 2008; Jamal and Stronza 2017).

Similarly, community members expressed deep and nearly universal opposition to poaching. Usually this was expressed and explained by statements relating wildlife to tourism, jobs, and economic development. In most rural parts of southern Africa, income-

generating employment opportunities are difficult to find, and unemployment rates are remarkably high (Scherl et al. 2004; Spenceley & Goodwin 2007). The benefits from poaching are not only concentrated in only a very few individuals but also detract from long-term potential to of the area to be a tourism destination. Fewer animals means less tourism which was equated to fewer jobs and lower economic benefits. Note however that responses offered may have been influenced by the interviewees' perception that the interview was organized by a foreigner and the type of answer they would presumably prefer. Although all interviewers were black African residents of the area, white westerners were clearly associated with them during the interviews as data recorders. The association in this area with conservation is that it is a white person's passion.

Aside from the economic incentives for wildlife conservation, many responses described the benefit that wildlife creates for their own well-being, often describing their pure enjoyment for learning from/about and experiencing wildlife. Although there was a common sentiment that wildlife was best preserved strictly inside of the protected areas for the protection of humans and their livelihoods, people also urged that wildlife must remain for the use and enjoyment of future generations. The combination of these central incentives for conservation can make for especially concerned and engaged citizens. We would recommend that these incentives be incorporated in the design of current and future conservation and/or development programs in these areas.

However, in three of the four communities, we cannot conclude that the Mambas have

directly influenced the development of these views about wildlife and conservation. In these three communities, almost no one had interacted with or had knowledge of the Black Mambas. Based on follow-up discussions with the Mambas, most do not feel comfortable talking about their work as a Mamba in their home communities. It is therefore not surprising that they are not influencing their communities to be more supportive of conservation. However, Mambas are a part of a larger group of local people who work to support and financially benefit from conservation, which can influence others to be more supportive of conservation. These community-level nuances may reveal potential ways in which the Mambas can increasingly influence local communities.

Maseke: Importance of Financial Benefit Distribution & the Bush Babies

Significantly more community members from Maseke (57%) were aware of the Black Mamba program than from any other community. Similarly, more interviewees from Maseke (93%) reported that their community benefits financially from conservation. Depending on the question, respondents from the Maseke community were on average 22 – 45% more positive than found in other community samples. It is likely that Maseke was the most receptive to conservation in part because interviewees from there frequently mentioned that they directly benefited financially and through food parcel gifts thanks to the presence of the Maseke parcel of the Balule Nature

Reserve. In other words, their management and distribution of financial gains from conservation is done in a way that is beneficial to, widely recognized, and thus appreciated by community residents.

The high awareness level of the Mamba program in Maseke seemed connected mostly to the Bush Babies education program and their activities, including bringing Mambas into the classrooms. Note as well that the Bush Babies program does not operate in the other three communities. Not only are Mambas more visible in Maseke through the Bush Babies program, but it is likely that children share their lessons and experiences with the Mambas with parents and other relatives at home. Without individual Mambas directly and individually interacting with community groups to spread their messages of conservation, the Bush Babies program is essential. This education program allows the conservation message to filter through the community by creating a formal platform for

communication (rather than relying solely on ad-hoc word of mouth) and includes children who spread the message to their family.

Many adult community members across all four communities want wildlife to be preserved for the use and enjoyment of future generations. To do so, we must actively engage 'the next generation' as students, leaders and conservationists. To know how the Black Mamba program can best engage community residents and encourage pro-environmental attitudes and behavior change, we must first clarify how much of the pro-environmental behavior that was seen in Maseke is due to the Mambas and Bush Babies, and how much is due to equitable financial distribution. Generating the same type of successes that have been achieved in Maseke across the other communities near Balule Nature Reserve and KNP is vital not only for the goals of the BMAPU but for the long-term success of conservation across the landscape in general.

PRACTICAL RECOMMENDATIONS

While many of the recommendations below come directly from research participants, others have been developed based on an extensive review of these data in the context of insights from other literature.

Implement ongoing professional and personal development programs for the Mambas to encourage their passion, drive, and capabilities for the job. Elevating all Mambas to the same level of excellence, dedication, and empowerment can also help them to become leaders outside of their working hours, e.g. in communities and peer groups.

Expand and emphasize the Bush Babies youth education and general outreach and engagement components of the program in the other communities near where the Mambas operate, rather than where the Mambas themselves live.

Consider including a volunteer or internship-like component to the Black Mamba program where interested individuals from the local communities, especially women, can have the opportunity to become more involved in conservation. Such a program could also facilitate the growth of Mambas as leaders and teachers, which could prove helpful in the future if they were to be able to take on greater leadership roles within the operation. This would also deepen and broaden the connections of the BMAPU with more of the community women directly.

Facilitate relationship building directly between Black Mambas and local community leaders, possibly through presentations, shared study of problems, and encouraging Mamba participation in community leadership opportunities.

Recruit more Mambas to expand the capacity of the unit but do so at a much slower rate than before so management can keep up with the rate of growth and appropriately adjust as needed.

Scrutinize the current organizational structure and operational protocols of Transfrontier Africa to uncover areas of strength and weakness; use these insights to re-structure areas that may be inhibiting potential success of the BMAPU and of Transfrontier Africa in general. This would be a long-term process and would benefit from facilitation by an expert in organizational management.

Expand the supervisory/management staff of the BMAPU to allow for greater capacity to effectively lead, manage, and develop their capacity as an anti-poaching unit.

Consider recruiting a manager for the BMAPU who speaks the same language, ideally one from their communities who they find relatable and compassionate to their needs. Such a leader could leverage the Mambas to reach greater achievements as individuals and as a unit. Hiring Afrikaner men for this role has been created unnecessary challenges.

Investigate the current methods of disbursement of community benefit from game reserves and perhaps uncover potentials for improvement so benefit is more equitably distributed and local people experience more direct or collective benefit from protecting wildlife.

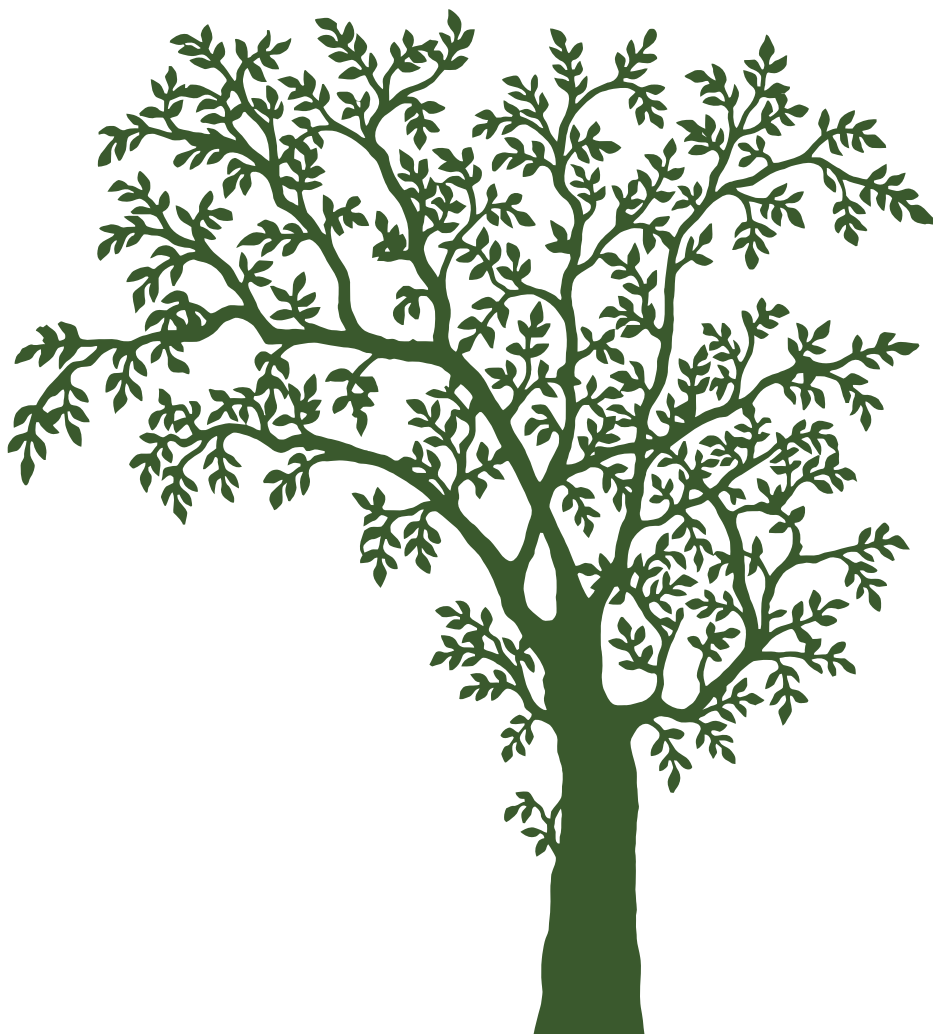


APPENDIX I.

Interview Guide for Community Residents.

1. How do you feel about the wildlife living nearby? (open ended)
 2. Do you personally get financial benefits from the Big Five and other wild animals?
 - a. If yes, how?
 - b. If not, why not?
 3. Does your community get financial benefits from the Big Five and other wild animals?
 - a. If yes, how?
 - b. If not, why not?
 4. On a scale of 1 to 10, where 10 is extremely valuable and 1 is not at all valuable, how much do you value the Big Five and other wild animals living nearby?
 - a. Please explain briefly.
 5. Have you been to Kruger National Park?
 - a. If yes, how often?
 - b. If not, why not?
 6. On a scale of 1 to 10, where 10 is extremely supportive and 1 is not at all supportive, how much do you support having Kruger National Park nearby?
 - a. Please explain briefly (Could you explain why you gave the score you did?)
 7. On a scale of 1 to 10, where 10 is extremely supportive and 1 is not at all supportive, how much do you support having the Game Reserves nearby?
 - a. Please explain briefly (Could you explain why you gave the score you did?)
 8. On a scale of 1 to 10, where 10 is extremely supportive and 1 is not at all supportive, how much would you support other people hunting a large animal on one of the reserves nearby for food?
 - a. Please explain briefly (Could you explain why you gave the score you did?)
 9. On a scale of 1 to 10, where 10 is extremely supportive and 1 is not at all supportive, how much would you support other people hunting a large animal on one of the reserves nearby to make money?
 - a. Please explain briefly (Could you explain why you gave the score you did?)
 10. Have you heard of the Black Mambas Anti-Poaching Unit?
 - a. If yes, what do you know about them? (prompts: Where do they work? What do they do?)
 - b. Do they affect your community? How, if so?
 11. Have you had any personal interactions with any women or men who work or have worked as part of the Black Mambas APU?
 - a. If yes, have your interactions with them affected how you think about wildlife?
 - b. If yes, have your interactions with them affected how you think about people who hunt animals on the game reserves nearby?
 12. Do you have any other thoughts about anything that we have spoken about that you would like to share?
-

-
1. Do you mind if I ask how old you are (or: Are you between 20-25, 26-30, 30-35, 35-40, or 40-45?)
 2. (Note Gender: M or F)
 3. Where do you live? (name)
 4. How long have you lived there? (quantitative)
 5. What is your occupation (or: job, work, thing that you do to get paid)?
 6. How many children do you have?
 7. How many children do you care for?



APPENDIX II.

Interview Guide for Black Mamba Rangers.

1. How long have you been a Mamba?
 2. Before you became a Mamba, what was your occupation?
 - a. Or if you were not working, what were you doing?
 3. Why did you join the Black Mambas?
 4. Have you been able to make your reasons for joining come true?
 5. What is your favorite thing about being a Mamba?
 6. What do you not like about being a Mamba? (was: What is your least favorite thing about being a Mamba?)
 7. Has being a Mamba changed how you feel about (alternatives: think of, see) yourself? (self-esteem)
 - a. Can you tell me more about your answer?
 8. Do you think that being a Mamba has changed how other people think about you? (self-esteem, via others)
 - a. Can you tell me more about your answer?
 9. Do you have any new skills that you have learned since being a Mamba? (self-efficacy)
 - a. If yes, how do you feel about those new skills?
 10. Has being a Mamba changed your beliefs about what women can do? (gender roles)
 - a. Can you tell me more about your answer?
 11. Do you personally benefit from (also: get financial benefits from) rhinos, giraffe, and other wild animals?
 - a. If yes, how?
 - b. If not, why not?
 12. Does your community benefit from (also: get financial benefits from) rhinos, giraffe, and other wild animals?
 - a. If yes, how?
 - b. If not, why not?
 13. On a scale of 1 to 10, where 10 is extremely valuable and 1 is not at all valuable, how much do you value rhinos, giraffe, and other wild animals living nearby?
 14. Have you been to Kruger National Park?
 - a. If yes, how often?
 - b. If not, why not?
 15. What is your opinion of Kruger National Park?
 16. On a scale of 1 to 10, where 10 is extremely supportive and 1 is not at all supportive, how much do you think that your community values having Kruger Park nearby?
 - a. Please explain (or, Could you explain why you gave the score you did?)
 17. On a scale of 1 to 10, where 10 is extremely supportive and 1 is not at all supportive, how much do you support having the Game Reserves nearby?
 - a. Please explain (or, Could you explain why you gave the score you did?)
-

18. On a scale of 1 to 10, where 10 is extremely supportive and 1 is not at all supportive, how much do you think the people in your community support having the Game Reserves nearby?
a. Please explain (or, Could you explain why you gave the score you did?)

1. How old are you? (quantitative)

2. (Note Gender: M or F)

3. Where do you live? (name)

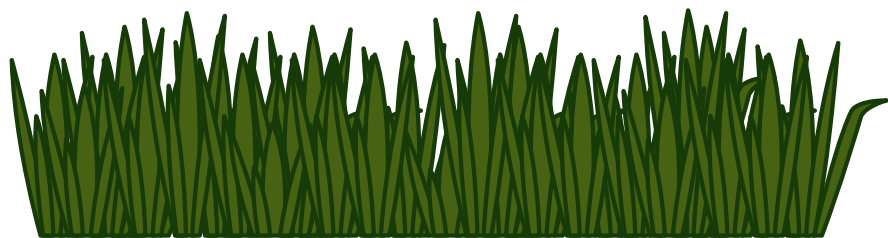
4. How long have you lived there? (quantitative)

5. Do you have any children?

a. If yes, what are their ages and genders?

6. Are there any other children living in your house with you (for example, nieces and nephews, or children of friends)?

a. If yes, what are their ages and genders?

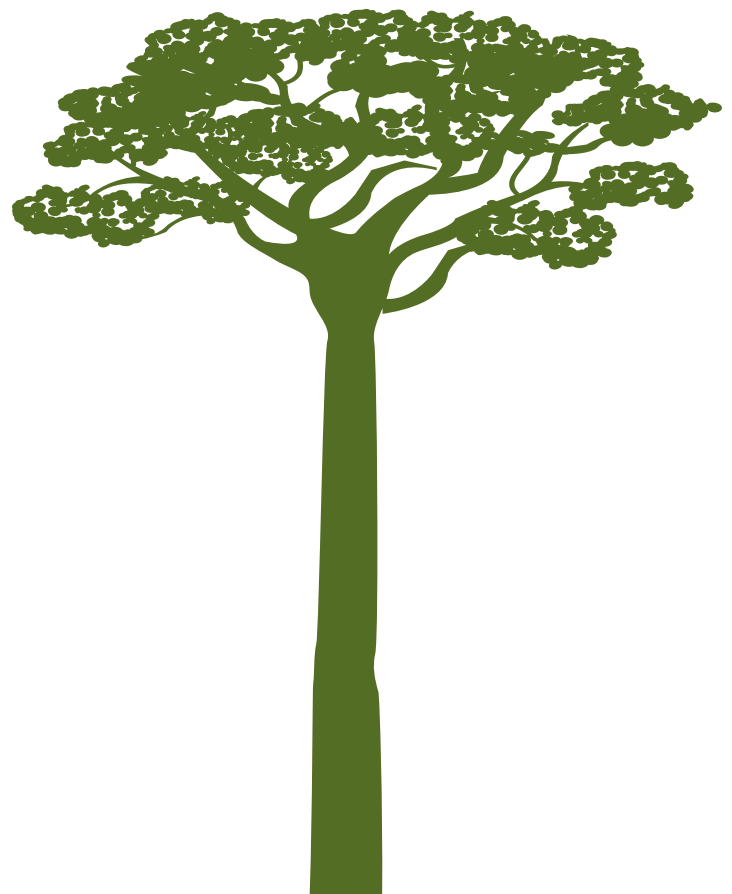


APPENDIX II.

Interview Guide for Black Mamba Rangers.

1. How long have you worked with TA?
 2. Before you started working here, what was your occupation?
 - a. Or if you were not working, what were you doing?
 3. Why did you join TA and the Black Mambas program?
 4. Have you been able to make your reasons for joining come true?
 5. So, how did your family react to you becoming a TA staff member?
 6. What is your favorite thing about being a TA staff member?
 7. What is your least favorite (do you not like) thing about being a TA staff member?
 8. Has being a TA staff member changed your beliefs about what women can do? (gender roles)
 - a. Can you tell me more about your answer?
 9. On a scale of 1 to 10, where 10 is extremely supportive and 1 is not at all supportive, how much do you think the surrounding (black African?) communities value having Kruger Park nearby?
 - a. Please explain (or, Could you explain why you gave the score you did?)
 10. On a scale of 1 to 10, where 10 is extremely supportive and 1 is not at all supportive, how much do you think the surrounding (black African?) communities value having the Game Reserves nearby?
 - a. Please explain (or, Could you explain why you gave the score you did?)
 11. What do you think of the Black Mamba program in general?
 12. How effective do you think the Mamba Anti-Poaching program is at stopping poaching on a scale of 1 to 10, where 10 is extremely effective and 1 is not at all effective.
 - a. Why is that?
 13. How effective do you think the Mamba program is at changing the women and men who participate in it, on a scale of 1 to 10, where 10 is extremely effective and 1 is not at all effective?
 - a. Why is that?
 14. How effective do you think the Mamba program is at spreading the message of conservation to the Mamba communities on a scale of 1 to 10, where 10 is extremely effective and 1 is not at all effective?
 - a. Why is that?
 15. How effective do you think the Bush Babies education program is at spreading the message of conservation among school children on a scale of 1 to 10, where 10 is extremely effective and 1 is not at all effective?
 - a. Why is that?
 16. What do you think are the top three things to change that would help improve the Black Mamba program?
-

-
1. How old are you? (quantitative)
 2. (Note Gender: M or F)
 3. Where are you from? (name)
 4. Where do you live now?
 5. How long have you lived here? (quantitative)
 6. Do you have any children or a partner?
 - a. If yes to children, what are their ages and genders? Where do they and/or your partner live?



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