

# In situ conservation challenges of *Brackenridgea zanguebarica* Oliv.: A South African case study

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**Abstract.** Rasethe MT. 2022. *In situ conservation challenges of Brackenridgea zanguebarica* Oliv.: A South African case study. *Biodiversitas* 23: 3876-3883. This qualitative study probed the factors that are hindering the successful management of *Brackenridgea zanguebarica* Oliv, a South African plant that is listed as Critically Endangered on the South African Red Data List. The plant is restricted to one state-owned nature reserve in the Limpopo province, South Africa. *Brackenridgea zanguebarica* is a threatened medicinal plant sought after by laypeople and traditional healers and often found in *muthi* markets across South Africa. In this country, this species is confined to the Thengwe village in the Vhembe district of the Limpopo province. Information on this species was collected using semi-structured questionnaires and focus group discussions during face-to-face interviews with all conservationists employed in the state-owned nature reserve. The interviews were complemented by extensive field observation on the population status of *B. zanguebarica* across the reserve. The results showed that *B. zanguebarica* is mainly being managed using environmental regulations and patrols in reserve to arrest and charge persons found in the reserve harvesting *B. zanguebarica*. The reserve only has seven permanent officials. They do their work without firearms to protect themselves from poachers and no cars are used during patrols due to the lack of proper roads in the mountainous area. The conservation officers mentioned that there is always new evidence of illegal harvesting of *B. zanguebarica* across the nature reserve. Field observation of the harvested populations indicated high levels of unsustainable harvesting. The harvesting reported by conservation officials and observed is of concern and will increase the risk of extinction of this species. The implementation of regulations as the sole management tool for this species in the Brackenridgea Nature Reserve is not enough, resulting in a situation where the current management of *B. zanguebarica* in reserve is not effective.

**Keywords:** Conservation, indigenous plant, Limpopo Province, *Mutavhatsindi*, threatened

## INTRODUCTION

*Brackenridgea zanguebarica* is a small tree that grows up to 5 m high and 3 m wide belonging to Ochnaceae botanical family (Tropical Plants Database 2018). It has a single stem characterized by rough bark with yellow pigment underneath (Mutshinyalo 2011). According to Mutshinyalo (2011), *B. zanguebarica* leaves are elliptic to obovate, approximately 40–50 mm long, glossy dark green above, paler green below, hairless, with numerous lateral and tertiary veins prominent on both sides.

Geographically, *B. zanguebarica* occurs in the dry lowland forests and woodlands of many African countries, including Kenya, Malawi, Mozambique, South Africa, Tanzania, and Zimbabwe (Monjane 2017). Although this species is widespread in most African countries, in South Africa there is only one known subpopulation. It is protected in the Brackenridgea Nature Reserve situated in Thengwe–Mafukani region of the Vhembe district in the far northern part of the Limpopo province (Williams and Raimondo 2008). The species is commonly known by its vernacular name of *Mutavhatsindi*, which is also the clan name of the people in the surrounding communities. Due to its limited occurrence and rarity, complemented by extensive population reduction, this species is listed as Critically Endangered A2ad; B1ab (ii,v) on the South African National Red Data List of Plants (South African

National Biodiversity Institute 2018), implying that the species is facing an extremely high risk of extinction.

The land where *B. zanguebarica* is naturally found was proclaimed a secured nature reserve in 1992 and no harvesting activity is permitted (Todd 1999). Despite this, this tree continues to form part of a group of cash plants and traditional medicines in many South African cultures across the various provinces. Almost a decade after receiving legal protection, Williams et al. (2000) surveyed one of the largest *muthi* markets (markets selling healing floral and faunal materials) in South Africa. This market supplies various medicinal materials to traders in the country and from outside. Williams et al. (2000) found that 12% of the 50 studied shops sold *B. zanguebarica*. Botha et al. (2001) reported these materials as being in high demand in *muthi* shops situated in the Limpopo and Mpumalanga provinces. Its roots and bark are heavily traded in different districts of the Limpopo province for multiple therapeutic purposes, including as a catalyst for most medicine, as magic performance medication, and as a remedy to protect people and homesteads from witchcraft (Moeng 2010). The Venda people who inhabit the Vhembe district harvest the species for both personal and financial gain (Tshisikhawe 2002; Magwede and Van Wyk 2016). Rasethe et al. (2019), who recently surveyed traditional healers' consultation rooms and *muthi* markets in all five districts that constitute the Limpopo province, reported similar findings. The

Vhavenda people who live in the vicinity of the Brackenridgea Nature Reserve, harvest *B. zanguebarica* in bulk for medicinal purposes (Sithavhakhomu 2012). The Tsonga people who inhabit the Mopani and Vhembe districts also collect this tree for consumption as food, for religious purposes, and as an ornamental object (Anthony and Bellinger 2007). It is worth mentioning that most users and harvesters of *B. zanguebarica* in the afore-mentioned studies reported collecting the material in Thengwe–Mafukani region where the species is naturally found and protected. Tshisikhawe and Van Rooyen (2012), who studied the population biology of *B. zanguebarica* in the presence of harvesting, found that the collection pattern and techniques of illegal harvesters have negatively affected the species in and around the Brackenridgea Nature Reserve.

It is worthy to note that the continuing use of and trade in *B. zanguebarica* materials as observed above create questions regarding the efficacy of the conservation and management of the species. The species is localized and is enclosed in only one area of a South African proclaimed nature reserve with strict measures prohibiting its disturbance and harvesting, as highlighted earlier. This study, therefore, embarked on qualitative research to comprehend the underlying factors and opinions of conservationists working in the Brackenridgea Nature Reserve to curb the continuous illegal harvesting of *B. zanguebarica* in this protected area. Data reported in this study will form part of a species management plan.

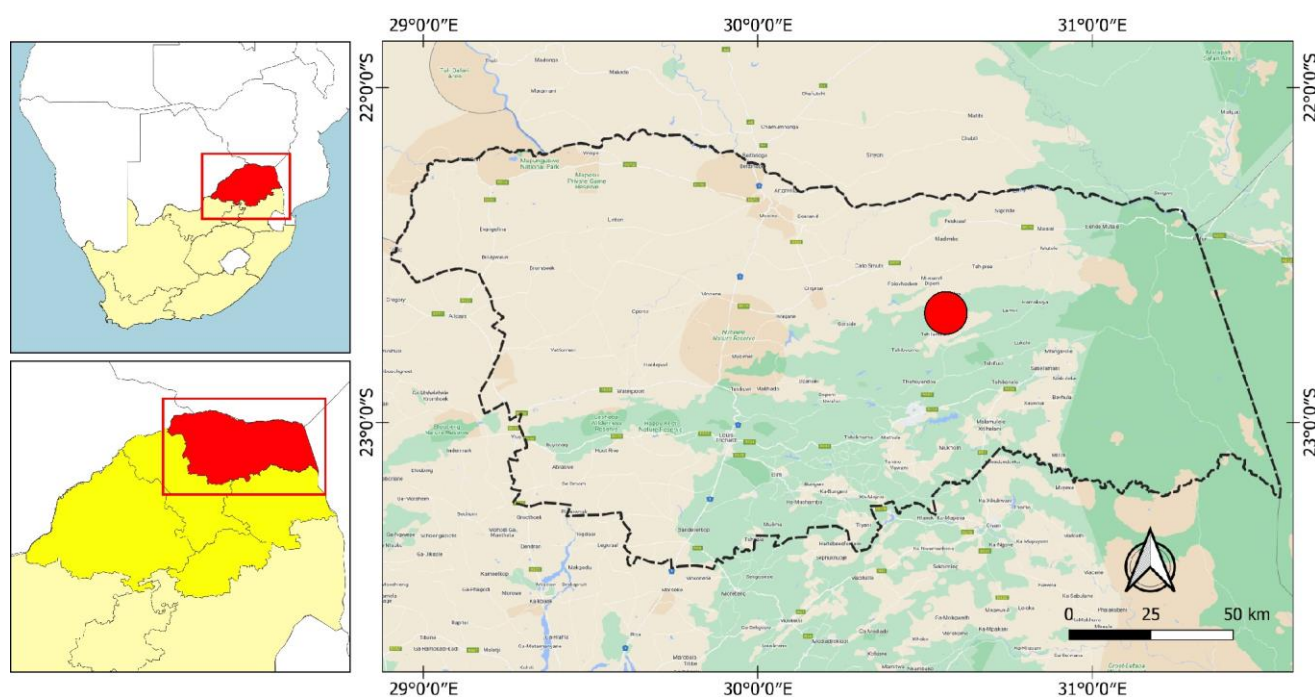
## MATERIALS AND METHODS

### Description of the study area

The current exploratory research was conducted in the Brackenridgea Nature Reserve located in Thengwe–Mafukani region of the Vhembe District Municipality of the Limpopo province, South Africa (Figure 1). The Brackenridgea Nature Reserve occupies a total area of 110 ha (1.1 sq. km), which was designated a state-owned protected area in 1992 (Todd 1999). Management of this reserve is the responsibility of the local nature conservation authority, the Limpopo Department of Economic Development, Environment and Tourism (LEDET).

### Vegetation description

The Brackenridgea Nature Reserve is located in the VhaVenda Miombo, which is a component of the Sourish Mixed Bushveld and Soutpansberg Arid Mountain Bushveld. It includes various habitats, with *Azelia quanzensis* Welw., *Aloe aculeata* Pole-Evans, *Ansellia africana* Lindl., *Berchemia discolor* (Klotzsch) Hemsl., *Bridelia mollis* Hutch., *Euphorbia confinalis* R.A. Dyer subsp. *confinalis*., *Ficus glumosa* Delile., *Crassula lanceolata* (Eckl. & Zeyh.) Endl. ex Walp., *Grewia flavescens* Juss. and *Kalanchoe lanceolata* (Forssk.) Pers. is the most common and important taxa (Low and Rebelo 1996). Climatically, the studied area falls in the semi-arid summer rainfall area with very dry winter (Berger et al. 2003).



**Figure 1.** Map of the Limpopo province indicating the Brackenridgea Nature Reserve in the Vhembe District, South Africa

### Data collection

Conservationists were conveniently selected as suitable participants for the study because they are directly involved in the day-to-day management and conservation of *B. zanguebarica* in the studied area (Figure 2). They were readily available to participate in the research and most of them have worked for several years as conservationists in this area. They were therefore the appropriate persons to furnish the researcher with the data required to achieve the objective of this study.

Information was gathered using questionnaires (i.e., open-ended and semi-structured) and focus group discussions during face-to-face interviews with participants, complemented by extensive observations of the population status across the studied area to verify the views of interviewees. According to DeFranzo (2011), these qualitative data collection methods can help researchers gain insight into a problem, uncover trends in thought and opinions, and dive deeper into the problem. Such research often offers guidance for potential quantitative research. The interview questions were designed to elicit relevant information on the socio-demographic characteristics of conservationists, such as gender, age, years of experience; perceived problems with the illegal harvesting of *B. zanguebarica* in the protected area; and possible strategies that could be adopted to prevent this.

### Ethical consideration

Prior to data gathering, consent to conduct this study in the Brackenridgea Nature Reserve was sought from the LEDET and all conservationists (n=7) working in this reserve after they had been informed of the objective of the study. Participants gave their informed consent for the publication of all results and any accompanying images, before commencing with the interview schedules as required by the University of Limpopo's ethics committee.

Researchers also adhered to the ethical guidelines of the International Society of Ethnobiology ([www.ethnobiology.net](http://www.ethnobiology.net)).

### Data analysis

Data analysis in qualitative research typically falls into two categories, namely content and theme analysis (Namey et al. 2008). Content analysis was used in the current study. It evaluates the frequency and salience of particular words or phrases from the data text to identify keywords or repeated ideas. The data were read into Microsoft Excel 2000 and analyzed using descriptive statistics such as percentages and frequencies, and cross-tabulations.

## RESULTS AND DISCUSSION

### Socio-demographic profile of conservation officers

The majority of the participants (n=7) were males (n=5, 71.4%), with a minority of females (n=2, 28.5%). This finding indicates that the wildlife conservation workforce in the studied area is still male-dominated. This may have positive consequences as far as the conservation of *B. zanguebarica* is concerned. The species occurs in stony mountainous areas that require extreme physical fitness and effort from conservation officers as they execute multiple activities, including daily patrols to combat illegal harvesting of the population and to spot other factors (i.e., invasive alien plants) that may threaten the species. Men may be able to better chase interlopers through the nature reserve if they have to and uncover other threats to the population. It is worth stating that the inadequate staffing (n=7) at the Brackenridgea Nature Reserve (110 hectares) is one of the potential shortcomings of the conservation of *B. zanguebarica*. It is not practical for seven people, mainly in their middle age, to effectively manage and enforce the law in this sizeable reserve.



**Figure 2.** A. Yellow colour on the bark; B. Leaves of *B. zanguebarica*

Most (57.5%,  $n=4$ ) of the questioned conservationists were over the age of 50, followed by those aged between 40 and 49 (28.5%,  $n=2$ ), and just 14.2% ( $n=1$ ) were 29 years old. This finding is of concern considering the empirical evidence that there is a correlation between diminished duty performance and older age with respect to job tasks that require rapid reaction and physical strength (Riddle 2007). The multi-faceted job of participants in this study includes among other things daily patrols to combat illegal activities across roughly 110 hectares, engaging with local communities and visitors to the reserve, and infrastructure and equipment maintenance. Given these demands and their average age, their suitability for the management and conservation of *B. zanguebarica* is dubious. However, there are studies (Peña 2013; Moen 2017; Blomé 2018) that show that older workers have the most institutional knowledge. In the context of this study, it can be said that these workers can share with young employees conservation wisdom based on much practical experience and knowledge of the nature reserve. As such, the current staff members at Brackenridgea Nature Reserve can help to mentor and train younger employees as far as certain initiatives to conserve *B. zanguebarica* are concerned. We, therefore, recommend that younger males and females should be employed alongside the current older staff members to effectively conserve this species. This diversity will unearth plenty of fresh conservation perspectives and problem-solving tactics that may be missed by the existing staff members.

#### Management strategies for *Brackenridgea zanguebarica*

Targeted threatened species management is a central component of efforts to prevent species extinction (Scheele et al. 2018). *Brackenridgea zanguebarica* is primarily managed legislatively by means of three regulations, namely the Limpopo Environmental Management Act, 7 of 2004 (LEMA); the National Environmental Management: Biodiversity Act, 107 of 2004 (NEMBA); and the Threatened or Protected Species (TOPS) regulations. The latter regulations were promulgated in terms of section 59 of NEMBA. The conservation of threatened species with legislation is a global practice (McOmber 2002). The TOPS generally regulates plants that are known to be threatened, mostly by direct use, or that are subjected to potentially unsustainable harvesting practices. With the above regulations in place, no one is allowed to harvest, trade, or export the regulated species without a permit from the relevant authority. In addition to this, LEMA prohibits any person from picking any listed plant along a public road for a distance of 100 m on land next to such a road or in a provincial or private nature reserve in the Limpopo province. This legislation can also be used to prosecute offenders.

The participating conservation officers divulged that the above-mentioned pieces of legislation are strictly implemented and that any person found in the reserve harvesting *B. zanguebarica* can be charged according to the amount found in possession and can be imprisoned for 3 years. According to the participants they achieve this through daily patrols (Monday to Friday) that look for any

illegal activities on reserve. Despite these efforts, there is always new evidence of *B. zanguebarica* harvesting across the nature reserve (*personal observation*), and species materials are continuously recorded as being exploited by indigenous people (Tshisikhawe and Van Rooyen 2012). The plant remains in high trade in the *muthi* markets in and beyond the Limpopo province (Williams et al. 2013; Rasethe et al. 2019). An effective solution to this problem can be public awareness and cultivation which can both help in reducing the demand for this species. As such, it is clear that the implementation of LEMA, NEMBA, and TOPS as management tools for this species in the Brackenridge Nature Reserve is not effective. This, however, is not surprising. There are multiple underlying factors with great potential to render such legislations ineffective as management tools. For instance, as highlighted earlier, there are only seven employees who are responsible for the daily patrol over an area of 110 ha of land. They do this between 07h30 to 16h30 on foot, looking for anything that might affect the existence of *B. zanguebarica*. Four participants confirmed that the illegal collection of this species simply occurs during the day in parts of the reserve not yet or already patrolled by conservation officers.

The employees work eight hours per day and then go home. This opens the door for illegal harvesting of the plant population across the nature reserve by night. Studies showed that users of popular threatened plants in protected areas harvest illegally at night, often in quantities large enough for both trading and personal subsistence purposes (Chen et al. 2016; Opperman et al. 2018). In addition, the fence around the *B. zanguebarica* population is in a dilapidated condition, so its purpose as an effective conservation barrier is questionable as illegal harvesters can easily enter or exit the reserve with little effort. The erection of a proper fence around protected areas to separate them from the surrounding local communities may be an effective long-term management tool for threatened plant species (Hayward and Kerley 2009; Ferguson and Hanks 2010). To benefit from fencing as an effective mechanism to protect *B. zanguebarica* against illegal exploitation, the local government should invest in a proper fence and should monitor the area regularly with both day and night patrols. The data gathered in this study clearly suggest that the efficacy of LEMA, NEMBA, and TOPS as effective foundational conservation tools for *B. zanguebarica* is presently being overshadowed by the above-mentioned factors. They will only serve as effective tools once these factors are sufficiently addressed.

#### Challenges associated with the management of *Brackenridgea zanguebarica*

Understanding both internal (i.e., natural and human) and external (i.e., reproduction, viability, and adaptability) factors that may cause threatened plants with extremely small populations to become vulnerable to extinction is very important from a management point of view (Chen et al. 2014). With particular reference to *B. zanguebarica* in the Brackenridge Nature Reserve, Tshisikhawe et al. (2013) studied external factors and made scientific



conservation recommendations for its management plan (Tshisikhawe 2016). However, until various internal factors pertinent to human beings are addressed, the recommendations made on the management plan of *B. zanguebarica* are likely to contribute little to the species' conservation.

We strongly concur with Goldstein (2003), who observed that a conservation plan for species in protected areas from behind a desk is a waste of effort; it is key to first listen to people's perceptions and ideas for solutions. The participants mentioned the following as contributing to the ineffective management of *B. zanguebarica*:

*Lack of educational awareness regarding the conservation of species among the nearby communities*

Studies indicate that protected area management is largely about people management and capacity, not necessarily technical issues. It depends therefore on effective communication and education (Goldstein 2003; Nielsen 2012). Consequently, it is not surprising that the participants in this study stated that conservation awareness efforts with respect to *B. zanguebarica* that reach out to rural communities around the nature reserve could actually go a long way in building a positive attitude and behaviors that would address illegal harvesting. In fact, the value of such initiatives for the protection and sustainable use of threatened plant biodiversity in the protected areas is well documented in the literature in South Africa (Venter 1998), other African countries (Holmes 2003), and elsewhere (Steinmetz et al. 2014). Equally, there is evidence that links a lack of such initiatives in communities adjacent to the protected areas with increased illegal harvesting of natural resources in these areas (Vodouhê et al. 2010). Therefore, one can argue that the lack of educational awareness about the conservation of *B. zanguebarica* among communities around the Brackenridge Nature Reserve as pointed out by participants in this study contribute to the illegal exploitation of species in the study area. We are of the view that the establishment of a long-term educational conservation program aimed at these communities will be beneficial to strengthening the communication and educational components of the reserve as far as *B. zanguebarica* is concerned. This program could be achieved with the establishment of a *B. zanguebarica* education center in the nature reserves, with a full-time awareness specialist focused on creating conservation awareness using the Tshivenda local dialect. This can be complemented by hand-outs of a comprehensive set of relevant educational materials written in the same language. These efforts can reach the local populace of all ages by extending to the local elementary and secondary schools, as well as community meetings where the older people from the villages normally gather weekly/monthly to discuss and find solutions to various issues affecting them.

*No firearms and ammunition are provided*

According to the participating conservation officers, the fact that they are not armed puts their lives in danger. They mention that some of the illegal harvesters come armed and

ready to attack. They are not fully free when executing their routine foot patrol duties across the natural serve as they fear being killed as they cannot defend themselves. In addition, some officers disclosed that sometimes when they see illegal harvesters, they refrain from acting as they do not know whether the perpetrators are armed or not. This is logical given the reality that over 1 000 rangers have been killed in protected areas over the past 10 years worldwide. Of these, 80% were murdered by commercial poachers and armed militia groups (Lotter et al. 2016). As such, to improve the effectiveness of safeguarding *B. zanguebarica*, all conservation officers working in the Brackenridge Nature Reserve should go through compulsory comprehensive firearms training and should always carry firearms during field patrols. This should be augmented by other appropriate equipment such as high-resolution binoculars and digital very high frequency (VHF) radios. This will go a long way to ward off illegal harvesters, who will know that they will have to surrender or be shot if they are caught, serving as an effective deterrent to any illegal activities in the nature reserve.

*The dilapidated and poor-quality fence enclosing the nature reserve*

Interviewees are of the opinion that the fence around the reserve makes it easy for people to enter, and this was also observed by researchers as highlighted earlier, thus underlining the urgent need for the erection of a proper fence. As previously mentioned, the role of a proper fence as a relevant management tool in combating unlawful encroachment by people into protected areas is well documented in Africa. It is clear that a proper good quality fence around the Brackenridge Nature Reserve will aid in the conservation of the *B. zanguebarica* population. In this regard, a well-constructed and maintained electrified fence will be a viable long-term conservation tool to restrict the movement of illegal harvesters into and out of the nature reserve. To save on electricity, the proposed fence can be electrified during the night and patrolled on foot during the day to ensure no illegal entry into the reserve. In addition, the use of sophisticated technologies such as the installation of hidden cameras along the fence (i.e., monitored live from control rooms), and/or the use of drones to monitor the fence during the day may also be helpful, especially in light of very limited conservation staff in the Brackenridge Nature Reserve. Although these suggestions can be very costly to successfully implement, they will go a long way to address the illegal exploitation of *B. zanguebarica* in this reserve. Failure to implement such recommendations means that the population of this tree will continue to be bark-stripped illegally, causing a severe decline in tree health. Therefore, the local government should prioritize and direct their financial resources to the studied area and other protected areas housing threatened plant species in the province.

*Lack of accommodation for staff in the nature reserve*

Participants highlighted another challenge that exacerbates the illegal exploitation of *B. zanguebarica* in the studied area. They reasoned that if they have proper

accommodation in reserve, the current level of unsustainable illegal exploitation of this species can be lowered for the following three reasons: 1) it will be easy for them to do night patrols on flexible schedules; 2) they won't have to face hours of traffic in the mornings (and sometimes lack transport), which means that they will always be at work on time; and 3) the culprits will not freely harvest the species knowing that officials are around. This has the potential to reduce the extent of illegal materials harvested. We observed an alarming number of *B. zanguebarica* being severely ring-barked right next to the administration offices of the nature reserve. If the conservation officers are accommodated in the reserve, culprits may not have the chance to freely harvest this species in the vicinity of the offices. Studies have shown that South African conservation officers working in protected areas are closely watched by perpetrators, who know their names, where they live, and their patrol hours (Makhado et al. 2012; Mouton 2013). The devastating illegal harvesting of *B. zanguebarica* in the studied area is partly worsened by the fact that perpetrators are well aware that conservation officers in the Brackenridge Nature Reserve do not do night patrols and only work from 07h30 to 16h30. They take advantage of this to exploit this tree in their absence without any fear of being caught.

#### *The relationship between conservation officers and nearby traditional leaders*

There has been a good relationship between conservation officers and the traditional leaders from the local communities with respect to the presence of *B. zanguebarica* in communal areas. However, due to the high level of uncontrolled bark harvesting, the *B. zanguebarica* population outside the Brackenridge Nature Reserve has been depleted with no single plant surviving, and this has led to the illegal harvesting of materials inside the reserve (Tshisikhawe et al. 2013). As an attempt to curb this practice, the conservation officers are continually training traditional leaders on species management and conservation awareness. They are in turn expected to divulge the knowledge to community members in their respective villages. These officers raised the concern that the traditional leaders may not be reporting back to the community, something that has the potential to increase the illegal harvesting of *B. zanguebarica* in the nature reserve. According to the participants, the local traditional leaders live in harmony with community members, and they are still influential within their jurisdictions. This finding warrants further investigation. However, it is probable that the traditional leaders do convey the conservation information about *B. zanguebarica* to community members in their jurisdictions and the community members simply disregard the instruction and illegally harvest the species, perhaps prompted by lack of employment opportunities in rural areas which is one of the main problems of illegally harvesting the species. Due to the popularity of this species as a powerful holistic medicine across South Africa, we cannot rule out the possibility that strangers (people from other provinces of South Africa) are also illegally harvesting *B. zanguebarica* in the studied area. Although

not specifically for this species, illegal exploitation of plant resources by strangers is very common in the Limpopo province (Twine et al. 2003). It is also likely that traditional leaders are reluctant to convey the conservation messages to the rural community members in their jurisdictions for fear of losing respect or people becoming reluctant to follow their orders. Irrespective of these postulations, conservation officers stated that they would like to share the conservation information about *B. zanguebarica* with the members of the community in collaboration with traditional leaders through a workshop if given support from the head offices of the relevant departments. This is a good initiative as it will show unity among the local nature conservation authorities and traditional leaders as far as the management and conservation of the *B. zanguebarica* population is concerned.

#### *Ineffective punishment imposed on the illegal harvesters*

According to the participants, the illegal harvesters of *B. zanguebarica* are mainly members of the communities surrounding the nature reserve, predominantly youths, rarely elders. Illegally harvested materials are sold to traditional healers and *muthi* traders. Conservation officers catch most of the illegal harvesters themselves. However, sometimes reliable local informants tip them off and they ultimately make successful arrests. The local community police forum that occasionally patrols the *B. zanguebarica* population also helps to arrest perpetrators. However, participants feel that the current punishment mechanisms to stop the illegal harvesting of this species are not effective. This assertion stems from past experiences where illegal harvesters were arrested and fined in the amount of R3 500 each and later realized on bail of R1 000 per person. Conservation officers stated that these punishments are not sufficient as the same offenders are regularly re-arrested for the same offense. Furthermore, they mentioned that the principal reason why people (including the previously arrested) keep coming back to illegally harvest *B. zanguebarica* is that its materials are one of the most coveted in Limpopo province and that the profits made from trading these materials are much higher than the imposed fine. Conservation officers, therefore, recommended that stringent fines and lengthy jail sentences of three years or more should be compulsory minimum punishments for offenders, both illegal harvesters and those found in possession of materials. According to the participants, this will not only curb the demand for *B. zanguebarica* materials but also ensure the continued survival of the entire population. However, it should be highlighted that illegal harvesters are driven by the need to improve their income and as such are willing to take the risk of imprisonment (Gavin et al. 2010). This means that the illegal harvesting and trading of *B. zanguebarica* materials may not be successfully stopped until the local socio-economic issues are addressed. Therefore, the creation of job opportunities (i.e., paid leadership positions for local youth) in the nature reserve for local people will help deter them from illegal harvesting and trade of this species.

In conclusion, the management of the only existing population of the critically endangered *B. zanguebarica* in a protected area is not effective. The recurring illegal harvesting reported by conservation officials is of concern and will increase the risk of extinction of this species. Officials should be given the necessary tools (cars, ammunition, and proper uniform) to improve the management of this species. Accommodation should be created in reserve (permanent infrastructure and/or camping equipment) to ensure 24-hour security to protect the species. To further improve the management of this species, public awareness is important, the buyers/users have to buy a legal product not a product illegally harvested. Furthermore, the cultivation of this species, as well as providing local people with seedlings should be considered in order to reduce the demand by supplying the species in the market which will balance the economic value and sustainability of *B. zanguebarica*. A good propagation method, using tissue culture or conventional technique should be looked into. The management of this species should receive more attention due to its conservation status and the fact that it is only found in one area in South Africa. Similar to *Encephalartos* species and the rhinoceros that are being protected in other state-owned nature reserves, this species should be given conservation priority to prevent its extinction.

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