CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA

Eighteenth meeting of the Conference of the Parties
Colombo (Sri Lanka), 23 May – 3 June 2019

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Amend the listing of *Aloe ferox* in Appendix II.

Amend Annotation #4 with the underlined text:

All parts and derivatives, except:

a) seeds (including seedpods of Orchidaceae), spores and pollen (including pollinia). The exemption does not apply to seeds from Cactaceae spp. exported from Mexico, and to seeds from *Beccariophoenix madagascariensis* and *Dypsis decaryi* exported from Madagascar;

b) seedling or tissue cultures obtained *in vitro*, in solid or liquid media, transported in sterile containers;

c) cut flowers of artificially propagated plants;

d) fruits, and parts and derivatives thereof, of naturalized or artificially propagated plants of the genus *Vanilla* (Orchidaceae) and of the family Cactaceae;

e) stems, flowers, and parts and derivatives thereof, of naturalized or artificially propagated plants of the genera *Opuntia* subgenus *Opuntia* and *Selenicereus* (Cactaceae); and

f) finished products[1] of *Aloe ferox* and *Euphorbia antisyphilitica* packaged and ready for retail trade.

The proposed amendment to exclude finished products of *Aloe ferox* from regulation under CITES will facilitate the in-country processing of both primary and secondary extracts from leaf material, thereby promoting the sustainable and efficient use of wild harvested aloe resources whilst simultaneously enhancing benefits to community livelihoods and local economies. The annotation will not hinder effective regulation of the species as the major commodities that dominate the trade and the demand from the wild resource (i.e. raw *A. ferox* extracts) will remain under strict control. The amendment will instead simplify permitting and reporting, as well as compliance and enforcement. It is anticipated that the regulatory burden on both importers and exporters will be reduced by eliminating the need to inspect consignments of finished products which contain minimal amounts *of A. ferox* material. The proposal is in line with agreements and recommendations contained in the resolution on the 'Use of annotations in Appendices I and II' (Resolution Conf. 11.21 (Rev. CoP17)) and can be readily implemented. Identification of the raw materials and products in trade is not challenging and an identification sheet on the parts and derivatives covered under the annotation can easily be supplied (see Figure C below).

B. Proponent

[1] This term, as used in the CITES Appendices refers to product, shipped singly or in bulk, requiring no further processing, packaged, labelled for final use or the retail trade in a state fit for being sold to or used by the general public.

South Africa*:

C. Supporting statement

1. Taxonomy

1.1 Class: Angiospermae

1.2 Order: Asparagales

1.3 Familly: Asphodelaceae

1.4 Genus, species or subspecies, including author and year: *Aloe Ferox* Mill.

1.5 Scientific synonyms: *Aloe candelabrum* A.Berger, *Aloe galpinii* Baker, *Aloe horrida* Haw., *Aloe muricata* Haw., *Aloe perfoliata* Thunb., *Aloe pseudo-ferox* Salm-Dyck, *Aloe subferox* Spreng., *Aloe supralaevis Haw*., *Pachidendron ferox* (Mill.) Haw., *Pachidendron pseudo-ferox* (Salm-Dyck) Haw., *Pachidendron supralaeve* (Haw.) Haw

1.6 Common names: English : Bitter aloe, Cape aloe, Lucid aloe, Tap aloe
French: Aloè du Cap
Spanish: Aloe

1.7 Code numbers: 14121

2. Overview

Aloe ferox is a popular medicinal plant with a long history of use both locally and internationally. The species is favoured for its traditional use as laxative bitters and more recently as a source of raw material for health drinks and a range of cosmetic products (Van Wyk, 2013). The species is currently included in Appendix II to CITES and is one of South Africa's leading commercially traded plant species with a growing industry that generates financial benefits for local communities and businesses involved in the collection, processing and sale of natural aloe resources. The main commodity of the plant is the bitter sap extract derived from the leaves. There is also a growing demand for *A. ferox* finished products derived from the secondary extracts of the leaves (i.e. post removal of the bitter sap). Almost all of the material in commercial exports of *A. ferox* is wild-harvested in South Africa. The species is currently classified as Least Concern (LC) in both South Africa and Lesotho (Raimondo *et al.*, 2009), occurring intermittently in dense stands across a distribution range of around 168 000 km^2. Current levels of offtake are considered to be sustainable and, whilst management and monitoring of the species is largely informal and varying across the country, the extent of threats including over-utilisation and habitat loss, are said to be limited or reversible. Exact population numbers and trends have however not yet been elucidated and the research, management and monitoring of the species could be improved. Evidence of an illegal trade in the species is negligible and the major industry members maintain their compliance with local and international trade regulations. The proposed amendment to Annotation #4 will not impact the current utilisation trends in the country but will instead support efforts of local businesses as well as maintain and promote the sustainable use of the resource base. An accompanying decrease in the regulatory burden for both importers and exporters of unnecessarily regulating finished products with a low *Aloe ferox* content is anticipated.

3. Species characteristics

Aloe ferox, commonly known as the bitter aloe or Cape aloe is a commercially important plant species characterised by its tall, single stemmed tree-like shape and spiny succulent leaves (Figure A). The species is indigenous to the south-central region of South Africa where it occurs abundantly in rocky areas across a variety of different habitat types.

* *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

Figure A: *Aloe ferox* plants pictured in habitat within montane grasslands (left) in the Cathcart district of the Eastern Cape (© Kate Webster) and mountainous fynbos regions (right) in the Eden district of the Western Cape (© Graeme Pienaar), South Africa.

3.1 Distribution

Aloe ferox has a restricted distribution within South Africa (Figure B) extending from the Western Cape Province, intermittently throughout the Eastern Cape, and up into south-eastern Free State (Smith *et al*., 2016). The species also occurs in southern Lesotho (Smith et *al*., 2016). Previous records of *A. ferox* in the KwaZulu-Natal Province (e.g., Shackleton and Gambiza 2007), have been confirmed to be records of the similar looking *Aloe candelabrum*, a species which was recently resurrected from the synonymy with *Aloe ferox* (Smith *et al.,* 2016).

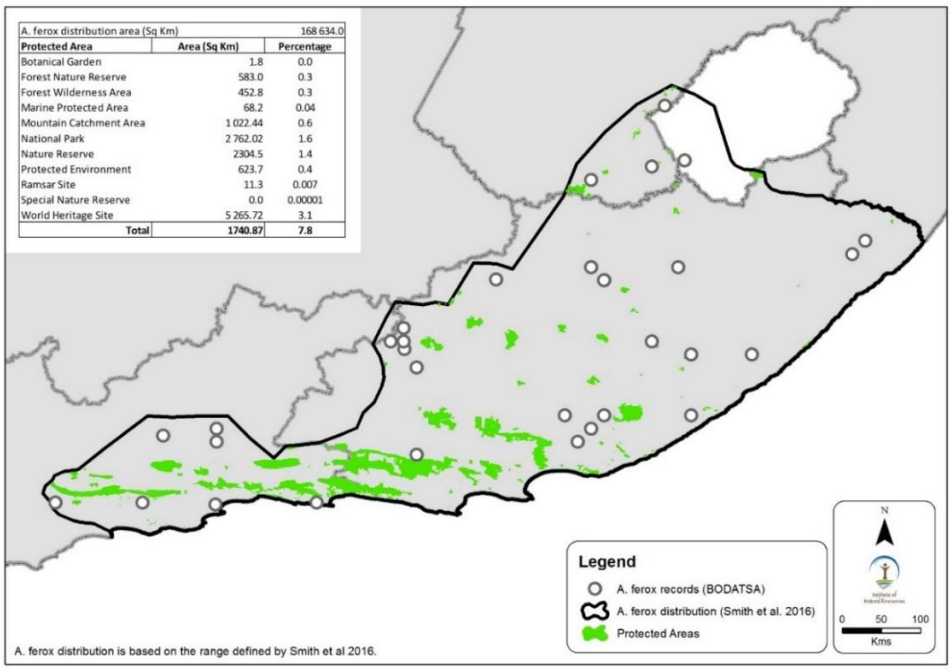

Figure B: National distribution range of *Aloe ferox* Mill. (adapted from Smith *et al.,* 2016).

3.2 Habitat

Aloe ferox grows under a wide range of climatic conditions in a broad range of habitats, including fynbos, grassland, Karoo vegetation and valley bushveld, typically on rocky hill slopes or across flat open areas (Newton and Vaughan, 1996; Van Wyk and Van Wyk, 2013; DEA, 2014). It is generally more abundant on arid, rocky hillsides up to 1000 m a.s.l. (Anjarwalla *et al.*, 2013). The plants are able to grow in a variety of soil types, including sandy, loamy sands and silty loams that are moderately

fertile and well drained. The species flourishes in extremely dry areas of the Karoo but also in moister areas in the eastern parts of its distribution (Van Wyk and Smith, 1996). The species is also able to establish healthy populations within disturbed areas quite successfully and is considered a pioneer plant that is amongst the first to emerge when livestock are removed from heavily overgrazed land.

3.3 Biological characteristics

Aloe ferox is a tall, long-lived, shallow-rooted, single stemmed plant with a rosette crown of succulent leaves and striking orange-red flowers that make it a standout specimen along the south central regions of southern Africa. The species flowers from May to August, but at higher altitudes flowering may be delayed until September (Holland *et al.*, 1977). Pollination is facilitated by birds and insects (Hoffman, 1988). Large quantities of broadly winged seeds are produced by individual plants each year (Holland 1978; Newton and Vaughan 1996). The seeds are wind-dispersed (Holland, 1978) and dispersal is thought to be limited at a small scale, but is medially efficient at a large scale as is evident in the relatively open distribution range of the species. In the wild, seeds of *A. ferox* typically germinate within three weeks of release, with their viability considerably reduced within a year after dispersal (Cousins and Witkowski, 2012).

According to landowners and harvesters of *A. ferox*, the time taken from seed germination to the first harvest of aloe leaves is 3 – 4 years. This is a relatively short period of time, indicating that *A. ferox* exhibits fairly fast growth compared to plant species such as *Encephalartos*. There is however a lack of consensus and sufficient empirical information regarding the growth rate of the species. Estimates on growth rates range between annual height increments of 1.1 - 4.6 cm and 16.7 – 25 cm (Holland and Fuggle, 1982; Newton and Vaughan, 1996; Shackleton and Gambiza, 2007). These differences could be attributed to site conditions such as differences in climate as well as the physical and chemical properties of the soil. Furthermore, the annual increments do not consider differential growth rates during the life of the plant. The species is able to withstand impacts of varying climatic conditions throughout its lifetime including wildfires, while the shallow, adventitious root systems that grow only a few centimetres below the soil surface, as well as the ability to store considerably large amounts of water in the leaves and roots (Holland *et al.*, 1977), allow these plants to benefit from relatively low amounts of precipitation in drier parts of its range (DAFF, 2015).

3.4 Morphological characteríistics

Aloe ferox is characterised by its tall (2–3(–5) m), erect, unbranched stem which is typically covered in a persistent 'skirt' of old, dried leaves contrasting sharply with the terminal rosette of erectly spreading, thick succulent leaves (Figure A). The leaves are large but rarely up to 100 cm long and are dull green to blue-green in colour with reddish teeth (~6mm long) along the margins and along the median line of the lower surface (Reynolds, 1950; Boon, 2010; Van Wyk and Van Wyk, 2013; Smith *et al*., 2016). The old, dried leaves are rubbery and brown and provide insulation to the growing stem against bush fires (Bond, 1983; Van Wyk and Smith, 1996). During the flowering season, the plants produce a single, candelabrum-like inflorescence with 5 – 8 erect, dense racemes bearing bright scarlet to orange (and sometimes white) tubular flowers (Smith *et al*., 2016).

3.5 Role of the species in its ecosystem

Field observations suggest that *A. ferox* are pioneer plants, amongst the first to emerge when livestock are removed from heavily overgrazed land. They thus begin a chain of ecological succession that ultimately leads to a more bio-diverse steady-state ecosystem in these previously disturbed areas. The species also plays an important role in supporting avian diversity as is evident from a recent study that showed a large number of birds (of more than 15 species) visiting populations of *A. ferox* during the flowering season (in winter) when other food resources are likely to be scarce (Kuiper *et al.*, 2015).

4. Status and trends

Aloe ferox is currently classified as a Least Concern (LC) species on the national Red List of South African Plants (Raimondo *et al.*, 2012) as well as on the Lesotho Plants List (2002). Whilst the species is considered to be common and abundant throughout its range (occurring in very dense subpopulations in certain regions), exact population numbers and long-term trends have yet to be elucidated. At present, local occurrences of unsustainable harvesting and habitat loss may pose a minor threat to the species in some areas across its natural range.

4.1 Habitat trends

Higher densities of *A. ferox* in some areas of the Eastern Cape have been attributed to a historical decline of large herbivores such as elephants, rhinoceroses and kudu. On the other hand, the recent establishment of game farms in both the Eastern and Western Cape is considered a problem for the species' persistence in some areas as wild animals often trample and eat through the entire leaves of the plants, severely impacting plant growth and recruitment in these areas. There has been a previous loss of habitat to crop cultivation and urban development/human settlement, particularly in the western parts of the species range. Additional quantitative analysis is required to assess the scale and impact of past and ongoing habitat changes.

4.2 Population size

In 2003, Donaldson estimated the population size of *A. ferox* to be in excess of 100 000 individuals. Prior to this, Newton and Vaughan (1996) estimated that 400 tonnes of dried leaf exudate was obtained from the leaves of around 10 million plants in 1994, suggesting that the population could be in orders of magnitude greater than that indicated by Donaldson (2003). Parker and Bernard (2008) suggest that the species has become synonymous with the Eastern Cape, having observed large stands of *A. ferox* reaching densities of more than 10 plants/km^2. A more recent study conducted in the province, recorded higher densities of between 4.3 and 7.3 individuals/m^2 in the communal area near Seymour Town (Melin *et al.*, 2017). These numbers however, cannot be extrapolated to the entire range of the species owing to the visible differences observed in plant abundance within and between subpopulations (DEA, 2014). A resource assessment conducted in 2014 failed to accurately estimate the size of the *A. ferox* population in South Africa (DEA, 2014). Nevertheless, the species is considered to be common throughout its national distribution range which is estimated to be around 168 000 km^2 (Figure B).

4.3 Population structure

There is no published information on the structure of the *A ferox* population.

4.4 Population trends

Recent population trends have not been assessed, but it is speculated that the population size in South Africa has increased over the past 30 years (Raimondo *et al.*, 2012) owing to the naturally common and abundant nature of the species in suitable habitat, as well as the fact that *A. ferox* is able to establish and thrive in areas with land degradation. However, aloe harvesters, industry stakeholders and management authorities in the provinces of the Eastern Cape and Western Cape have conflicting views regarding the national population trend of the species across the country.

In the Eastern Cape some subpopulations have been extirpated in certain communal areas of the province due to harvesting pressures. Aloe harvesters have observed a substantial decrease of the *A. ferox* population in the shared lands surrounding King Williams Town in particular, evident in the fact that they are having to walk longer distances (about two hours) to harvest aloes in denser thickets where their safety and security is compromised. Members of the *A. ferox* industry maintain that stable populations still occur in formally protected areas within the province (around Grahamstown). In the Western Cape, both harvesters and landowners are of the view that *A. ferox* populations are increasing. They have observed a high number of recruits in areas where harvesting occurs and believe that harvested populations have improved growth rates compared to un-harvested populations.

Impacts from previous and current land use changes have also contributed to fluctuating population patterns within areas of the Eastern and Western Cape Provinces. Subpopulations within newly converted game farms and existing poorly managed game reserves in the Eastern Cape region, are declining as a result of overgrazing by kudu, eland and other large game (Van Wyk and Smith 1996; Raimondo *et al.*, 2012; Van As *et al.*, 2016). In other areas where cattle are farmed, trampling of small plants resulting in reduced recruitment and demographic bottlenecks may be a problem but this requires further investigation (Van As *et al.*, 2016).

4.5 Geographic trends

Historical records indicate an almost continuous distribution of *A. ferox* across the southern Cape, extending from the Overberg District in the Western Cape, throughout almost the entire region of the Eastern Cape, eastwards as far as southern KwaZulu-Natal, and northwards into the southern parts of

the Free State and Lesotho. Whilst populations of the species may still dominate large areas across this range, habitat loss due to agricultural activities and human settlements have likely resulted in the fragmentation of populations in certain areas. The species is furthermore unevenly distributed in terms of numbers across its natural range, having large areas of very high abundance and areas in close proximity with little to no abundance (DEA, 2014). Up until fairly recently, *Aloe candelabrum*, from the East-central KwaZulu-Natal province was included in the synonymy of *A. ferox*, but was reinstated owing to several morphological differences (Smith *et al.*, 2016). This decreased the known range of *A. ferox* but the species remains regionally common.

5. Threats

In some areas over-exploitation and destructive harvesting of leaves by untrained harvesters have caused localised extinctions (Van Wyk and Smith 1996). This trend has not been observed in the Western Cape, but heavy harvesting occurs throughout communal lands of the Eastern Cape including in the Peddie, Idutywa, Butterworth and Qunu areas, as well as in some areas of the former Transkei region. Socioeconomic challenges such as poverty and unemployment in the province have resulted in many locals attempting to harvest aloe as a means of safeguarding their livelihood security (e.g. Chen *et al.,* 2012). Many of these new harvesters are not well trained and tend to neglect issues of sustainability, often removing too many leaves and harvesting young individuals (Melin *et al.*, 2017). Whilst Newton and Vaughan (1996) noted low mortality rates associated with heavy leaf harvesting, officials from the Department of Economic Development, Environmental Affairs and Tourism in the Eastern Cape (DEDEAT) have observed plants dying due to overharvesting (e.g. Booysen Park) and successive disease. Localised damage to harvested plants and low flowering occurrences in intensely harvested areas in the Eastern Cape have also been observed (DEA, 2014; Melin 2009). Whilst intense harvesting is localised, the longer-term impacts of high levels of harvesting on populations remains unknown (Melin *et al.*, 2017).

Habitat loss and degradation is thought to affect the species on a limited and reversible scale. Changing land use practices in both the Eastern and Western Cape Provinces are often associated with declining veld conditions which have potential impacts on the growth and recruitment of plants. Crop farming, cattle farming and the recent establishment of more lucrative game farms (Smith and Wilson, 2002; Carruthers, 2008) have been noted to have some impact on *A. ferox* subpopulations in certain areas of both provinces. Large herbivores and wild animals such as ostrich often eat through the leaves and seeds of the plants, thereby upsetting population structure and recruitment. Demographic bottlenecks in the 0.25 – 1 m tall height class have been observed in heavily grazed populations, whilst the 0.25 – 0.5 m height class is absent from areas with large numbers of cattle (Van As *et al.*, 2016). It is postulated that this may lead to local extirpations of *A. ferox* subpopulations in the next 70 – 100 years (Van As *et al.*, 2016), excepting from rocky areas that limit herbivory. In addition, recruitment is affected in areas where aloe is harvested on steeper land, as trampling reportedly removes valuable groundcover that provides protection for young plants through moisture retention and the provision of shade. Loss of groundcover results in bare and hard surfaces, which limits new plant growth and exacerbates erosion by rainfall. Seedlings and younger plants (~10 years old) are furthermore vulnerable to fires (Holland and Fuggle, 1982), as are older plants without a protective skirt of old leaves. Harvested plants may therefore be easily killed by a blaze (Bond, 1983), though high intensity fires can also kill plants with a protective skirt of old leaves. Shackleton and Gambiza (2007) recorded a 32% mortality following an intense fire on a site with 50 individuals with the protective skirt of leaves intact.

Aloe ferox is fairly resistant to diseases (Van Jaarsveld, 1996) and insect pests (Newton and Vaughan, 1996; Sachedina and Bodeker, 1999), although work by Zapata *et al.* (2013) show a strong susceptibility of the species to certain fruit pathogenic fungi. Climate change has been suggested as a potential threat to the species, with landowners advising that a drying climate along the western coast results in fewer flowers and seeds being produced whilst colder weather and frost in higher lying areas may result in plant mortality.

6. Utilization and trade

Aloe ferox is a popular medicinal plant with a long history of use both locally and internationally. To date, several studies have documented the phytochemical properties and health benefits of *A. ferox* leaf extracts, and the species has become an important commercial plant not only for its traditional use as laxative bitters but as a source of raw material for health drinks and cosmetic formulations around the world (Van Wyk, 2013). The *A. ferox* industry also provides significant socio-economic benefits to many rural South Africans who derive an income from the harvesting of leaves. The majority of material (95%) used in commercial *A. ferox* products is wild-harvested in South Africa and the bulk of this material is exported.

6.1 National utilization

Aloe ferox has been recorded in traditional medicine applications in both South Africa and Lesotho over many years (Hutchins, 1989; Williams, 2003; Van Wyk et al., 2008; Afolayan et al., 2014; Aston Philander et al., 2014; Mugomeri et al., 2016). General applications include the use of fresh leaves, juice, leaf decoctions and powder to treat a range of health problems including wounds and skin irritations (in humans and animals), eye infections, ulcers, digestive tract problems, bacterial infections, sunburn as well as immune deficiencies (Van Wyk, 2008; 2011).

Field investigations into the harvesting of plants have found that harvesting for commercial production is concentrated within a number of key districts in the Eastern and Western Cape Provinces (Newton and Vaughan, 1996; Melin, 2009). Materials are typically extracted from plants on an 18 – 36 month cycle by full time aloe harvesters (commonly referred to as 'tappers' i.e. those who tap/drain the leaves), farm workers and occasional labourers who wish to supplement their usual incomes (Newton and Vaughan, 1996). Reports on the number of leaves removed from individual plants differ significantly but in general, anything between 6 – 30 leaves can be harvested every 1.8 years depending on the plant's health, size of leaves and response to any previous harvesting events. The common method of harvesting is based on a 250- year old traditional technique of aloe tapping that has changed little over time:

- Only the bottom rows of leaves are manually cut with a sickle about 3 to 4 cm away from the stem to ensure no damage to vascular tissue so that the leaves can seal properly and not incur any infection;
- Leaves are stacked in a circular pile around a plastic lined hollow and left to drain;
- Piles can consist of anything between 150 and 500 leaves to 1000 leaves and draining takes between 2 – 6 hours;
- After tapping the bitters, the leaves are transported to factories for further processing and in some instances leaves are left behind and returned to the soil.

It is often challenging to estimate the quantities of plants being harvested for trade but a previous study from the mid 1990's, estimated that the leaves of approximately 10 million plants were being harvested each year to produce some 400 tonnes of exported *A. ferox* bitters (Newton and Vaughan, 1996). Given that only the leaves of plants are harvested, and that destructive harvesting events are localised and limited, past and current levels of trade are considered to be sustainable. There are a limited number of *A. ferox* plantations in some areas, particularly in the Western Cape, and the majority of commercial plant material is currently sourced from wild populations growing on private and communal lands.

6.2 Legal trade

Aloe ferox is currently one of South Africa's most commercially traded wild harvested plants. The plants are favoured most for the bitter sap contained in the leaves (flowing between the leaf rind and inner fleshy leaf tissue) which is extracted, crystallised (sometimes ground to powder) and traded globally. These 'bitters' along with secondary extracts, including the inner leaf jelly (in juice, gel or powder form), are used in beverages, medicines, and a range of healthcare and cosmetic products (Figure C). Use and trade of aloe bitters has been ongoing for centuries but use of the derived 'aloe gel' from the white spongy mesophyll layer of the leaf has only recently gained traction within the industry (Grace *et al.*, 2008) owing largely to an increase in the level of in-country processing in recent years (Knapp 2006). The development of new, refined *A. ferox* products has and continues to encourage the complete use of the harvested leaf material with little to no wastage of the valuable resources. At present, there are close to 20 local companies involved in the local and international sale of *A. ferox* raw materials and/or finished products containing *A. ferox* extracts. These raw materials and retail products ready for consumer use are available through online websites as well as through selected retailers, healthcare and wellness stores across major regions in the country.

The majority of the harvested plant material is destined for the export market and South Africa remains the leading exporter of *A. ferox* products. *Aloe ferox* extract comprised the vast majority of South Africa's CITES plant exports between 2005 and 2014, and is also one of the top three highest value CITES products exported from South Africa over this time period, earning the country an estimated USD153.8 million (Sinovas *et al*., 2016). Levels of international trade in extracted materials of *A. ferox* have steadily increased over time, and the demand for ready packaged consumer products (i.e. derivatives) continues to grow (Figure D). An increase in the amount of derived products exported over

the period 2006-2015 highlights the recent developments of the in-country processing of available secondary leaf material. The large majority of the derived goods on the market contain minimal amounts of *A. ferox* material (<50% *A. ferox* content) and/or contain secondary extracts from harvested leaves already drained for their bitters, altogether accounting for 85% of finished products (Figure E). An exclusion of finished products is therefore unlikely to have any detrimental impact on wild populations and, given that the primary bitter extract remains the commodity that is most in demand in the international market (ACSA member, pers. comm., 2018), it is unlikely to disrupt the observed trade trends or the effective regulation of wild harvested *A. ferox* materials. The exclusion will instead facilitate an increased production of consumer products (containing minimal amounts of already harvested *A. ferox* material), thereby increasing sustainability by satisfying a growing market without additional pressure on the resource base.

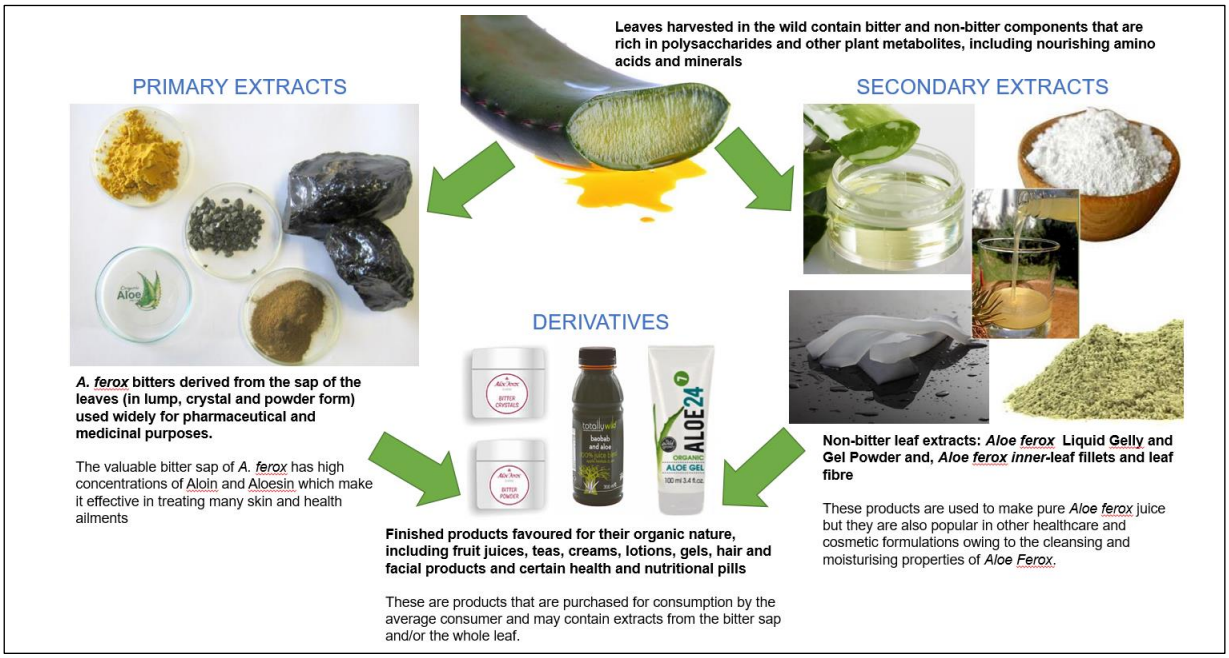

Figure C: Raw materials and finished products derived from the leaves of *Aloe ferox*.

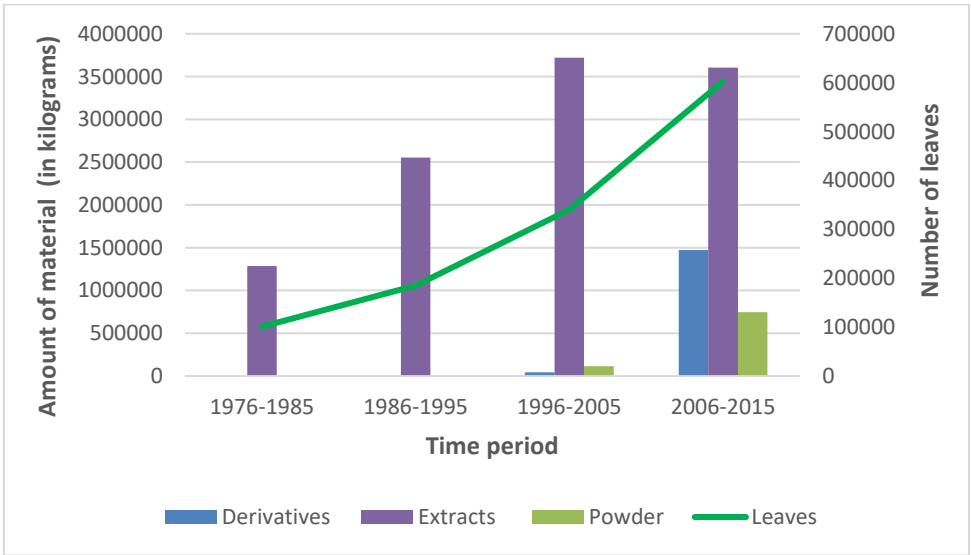

Figure D: *Aloe ferox* material exported from South Africa from 1976 to present (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK). For calculating quantities, only trade records reported in kilograms/grams were included.

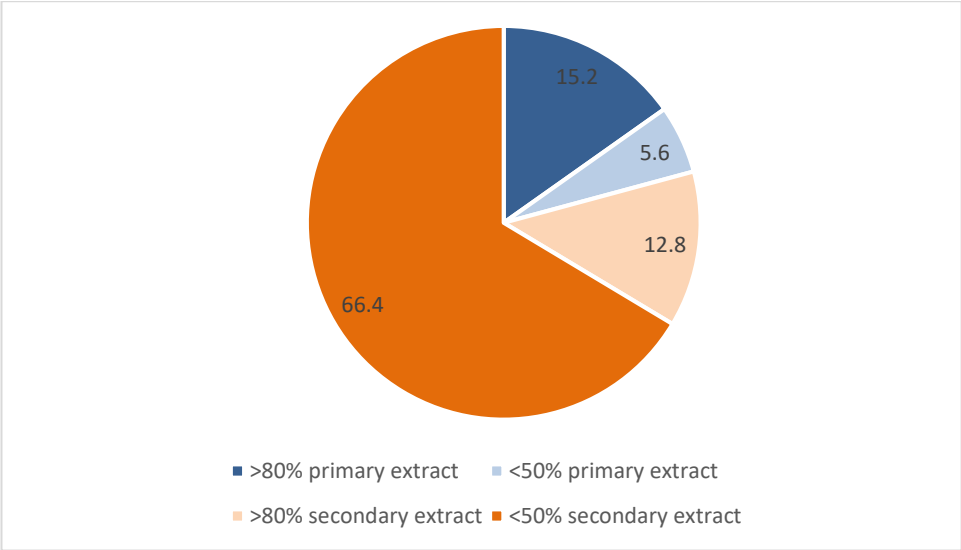

Figure E: Percentage of finished products containing large (>80%) and small (<50%) amounts or Aloe ferox primary and secondary leaf extract, as determined from an assessment of close to 130 finished products for sale online or through selected retailers both locally and internationally. Approximately 20 South African enterprises are presently involved in the processing and/or sale of *A. ferox* materials, with 10 companies involved in the direct creation, distribution and sale of ready packaged consumer goods containing *A. ferox* leaf extract.

6.3 Parts and derivatives in trade

The species is exported in various forms, namely extracts, derivatives, powder, leaves, live plants and seeds, dried plants, flowers, stems and stem/timber fragments. Both bitters and gels tend to be reported in international trade under the CITES trade terms "extract" (which refers to raw material) or less frequently "derivatives" (which refers to the packaged consumer products containing variable amounts of raw extracts) (Knapp, 2006). The bitter extracts are traded in lump or powder form (Figure C), whilst the inner leaf material is processed to a number of value-added and finished products like gel powder, pectin, tea, diced fillets fibre, various aloe drinks, health supplement pills and a wide range of cosmetic goods. Results from the most recent trade analysis conducted by South Africa's Scientific Authority for the period 2004-2013, found that Argentina had imported the greatest quantity of extract followed by Germany, Italy and Japan. Like most aloe species, *A. ferox* is favoured as an ornamental plant, but the export of live plants and seeds is negligible and accounted for only 3% of exports between 2004 and 2013.

6.4 Illegal trade

Although past studies have eluded to an illegal trade in extracts of the species (Newton and Vaughan, 1996), there has been no tangible evidence to support this and any current illegal offtake and /or trade is considered to be negligible at this time.

6.5 Actual or potential trade impacts

Whilst not thoroughly evaluated, the local use of, and demand for *A. ferox* is thought to be limited in comparison to international commercial trade. A recent non-detriment finding for the species revealed that harvest and international trade in *A. ferox* is non detrimental at present. Past and present trade trends have shown that the primary bitter extract (in all its forms) remains the chief product for export (Figure D). It is unlikely that an exclusion of finished products, which mostly have a low content of *A. ferox* and/or contain only secondary extracts from already harvested leaves, would negatively impact the resource base or undermine the effective regulation of trade in the species. Excluding finished products of *A. ferox* from CITES controls would render the trade in consumer products less restrictive, thereby enabling any future demand to be met through incentivising the continued, improved usage of already harvested leaf material (i.e. with minimal wastage). The annotation would also simplify permitting and reporting, as well as compliance and enforcement, and thus the regulatory burden on both importers and exporters will be reduced. The proposed amendment to the current annotation ensures that the major commodities which dominate the trade and the ongoing demand from the wild resource (i.e. raw products and extracts) will remain under CITES controls.

7. Legal instruments

7.1 National

The National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA) provides for the management and conservation of biological diversity within South Africa; the use of indigenous biological resources in a sustainable manner; the fair and equitable sharing among stakeholders of benefits arising from indigenous biological resources; and the Act also gives effect to ratified international agreements relating to biodiversity which are binding on South Africa. Section 43 of NEMBA makes provision for the development of Biodiversity Management Plans for Species (BMP-S) that warrant special conservation attention. A BMP is currently being developed for *A. ferox*. Chapter 6 of NEMBA provides for Bioprospecting, Access and Benefit-Sharing (BABS) regulations in South Africa. Any commercial activity involving the use/export of *A. ferox* resources requires a BABS permit (valid for five years). The National Environmental Management: Protected Areas Act No 57 of 2003 (NEMPAA) provides for the establishment of protected areas that promote the conservation of ecologically viable areas representative of South Africa's biological diversity. *Aloe ferox* occurs within areas protected under this Act.

7.2 International

South Africa is a signatory to the Convention on Biological Diversity (CBD), and this entails a commitment to accept and work towards the objectives set out by the Convention. Of relevance to the conservation and use of *A. ferox* are the supplementary agreements of the CBD that have been ratified by South Africa, including the Nagoya Protocol on Access and Benefit Sharing (ABS). *Aloe ferox* is included in Appendix II to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The listing includes all parts and derivatives of the species except seeds, seedling or tissue cultures obtained *in vitro*, in solid or liquid media, transported in sterile containers and; cut flowers of artificially propagated plants.

8. Species management

Whilst active, ad hoc management of the species takes place across certain parts of the country, there is currently no formal management or monitoring plan in place for *A. ferox*. The Department of Environmental Affairs is currently in the process of developing a BMP for the species to address matters of sustainable utilisation and monitoring, amongst others, on a national basis.

8.1 Management measures

Most *A. ferox* materials (95%) are harvested from wild populations, and a smaller percentage (5%) is harvested from cultivated stands. Harvesting typically takes place on private and communal land, especially on land closer to roads (Newton and Vaughan, 1996; Melin, 2009). Harvesting knowledge and skills have been passed down over generations as a family custom, and the harvesting practice (commonly referred to as tapping) hasn't changed much over the past two centuries (Newton and Vaughan, 1996). In general, the Western Cape populations are reportedly better managed for sustainable utilisation than the Eastern Cape populations owing largely to the different land tenure arrangements and informal local control plans among industry members and trained harvesters.

Informal unplanned management in the form of age-old indigenous harvesting practices (see section 6.1) include the following considerations for responsible harvesting.

- There must be sufficient leaves on the plant.
- Only a fraction of the lower leaves can be cut from each plant so that the growth point is not injured, and only the leaves that would die naturally at the end of the season should be taken.
- Leaves must be fat / thick. Thin leaves indicate that if harvested, the plant is less likely to survive the dry period. In addition, thin leaves result in lower product yields, which acts as an economic deterrent to harvesting (i.e. low return per unit effort).
- In winter rainfall areas, winter is the better season for harvesting (cooler and wetter); harvesting leaves in summer is not favored as cut leaves develop a skin very quickly, which reduces the bitter yield.

The industry is also required to comply with the South African National Standards (SANS) 368 standard for *A. ferox*, developed by the South African Bureau of Standards (SABS), which outlines the types/sizes of plants that can be harvested, as well as when and how the plants should be harvested based on historical harvesting methods used by previous generations of tappers.

8.2 Population monitoring

At present, there are no field monitoring programmes in place for the species and the direct effects of harvest on wild populations still need to be elucidated. National monitoring of exports takes place where trade data are regularly extracted from the CITES Trade Database (UNEP World Conservation Monitoring Centre, Cambridge, UK) and analysed. However, data quality has been flagged as an issue due to reporting errors. It is also difficult to quantify the number of wild plants impacted from the variety of products exported.

8.3 Control measures

8.3.1 International

In addition to CITES permits, any commercial activities involving the use/export of *A. ferox* resources require BABS permits (valid for five years).

8.3.2 National

Harvest of *A. ferox* is not allowed within protected areas, and there has been no reports of illegal harvesting from protected areas in either the Eastern or Western Cape. The majority of commercial, wild *A. ferox* harvesting, approximately 70%, occurs on private land with controlled access, where tappers obtain permission from landowners to harvest, and the landowners control and monitor access and offtake. In some instances the harvesters may pay a fee landowners for access to the plants (O'Brien, 2005; Bosch, 2006) and are permitted to harvest no more than 10 – 12 leaves per plant over a six week period with a harvesting cycle of between 18 and 36 months, depending on the plant condition and season (Newton and Vaughan, 1996; DEA, 2014). Some harvesters implement self-imposed restrictions on their offtakes in that they will only harvest leaves that are of sufficient length and thickness because yields of bitters decrease dramatically in smaller, developing leaves. Other factors that limit overuse include limited road infrastructure for transporting harvested material, inaccessible and steep areas, as well as the distance to processing facilities (the approximate economic radius for collecting leaves is 30 km).

8.4 Captive breeding and artifical propagation

Although the species is considered to be relatively easily propagated by seed (Holland *et al.*, 1977; Bosch, 2006; Bairu *et al.*, 2009), current cultivated stocks do not supply the demand for the species. The first *A. ferox* plantation was established near Albertina in the Western Cape in 1976. Several other plantations have more recently been established around the same area (Van Wyk, 2013). The exact extent of cultivated stands within South Africa is not known but industry members have confirmed that cultivated stocks account for less than 5% of harvested plant material. Large areas of abandoned wheat fields (already disturbed) are available for plantations and rapid scale-up is possible if necessary.

8.5 Habitat conservation

It is estimated that 7.8 % of the distribution of *A. ferox* occurs within protected areas (see Figure B). There are no formal programmes for habitat conservation outside of protected areas, however, due to the commercial value of *A. ferox*, there is a high incentive for habitat conservation amongst resource users, and landowners are thus encouraged to conserve the habitat to maximize sustainable harvest. Field visits also suggested that abandoned croplands are starting to be re-established with *A. ferox* plants.

8.6 Safeguards

The proposed amendment to Annotation #4 is in accordance with the provisions set out in Resolution Conf. 11.21 (Rev. CoP17), and will allow for continued CITES controls over the commodities that first appeared in trade, which are also the commodities that dominate the current trade and demand for the

wild resource (i.e. *A. ferox* extracts). It is anticipated that the proposed amendment will not result in greater numbers of plants being harvested, but will instead incentivise increased in-country processing of the already harvested leaves that are often just discarded. A BMP for *A. ferox* will further guide the implementation of sustainable use and trade principles and practices. An additional monitoring mechanism is available through permit conditions to BABS permits, which require the mandatory completion of biannual reports on the volume/quantity/format of wild material collected as well as the quantity of raw/processed material sold locally or exported.

9. Information on similar species

Records extracted from the CITES trade database show that *A. ferox* is the only aloe reported to be exported as extracts or derivatives. The only other majorly commercial aloe favoured for its extracts and derivatives is *Aloe vera*, but this species was deleted from the CITES Appendices (CoP 9, 1994) owing to its widespread domestication and naturalisation in countries all around the world. All other aloes from South Africa are exported in the form of live plants and seeds, rarely as dried plant material and never in the form of extract (Newton and Vaughan, 1996 CITES). The flowers and stems of *A. ferox* can be confused with those of *A. marlhortii* (CITES App II) or *A. candelabrum* (not yet accepted as a separate species), but given the low prevalence of these parts in trade, misidentifications will be negligible.

10. Consultations

South Africa consulted with Lesotho by electronic mail dated 11/12/2018.

11. Additional remarks

12. References

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