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GOVERNMENT NOTICES • GOEWERMENTSKENNISGEWINGS

DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT

NO. 2192 **24 June 2022**

NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004)

BIODIVERSITY MANAGEMENT PLANS FOR ALOE FEROX AND HONEYBUSH SPECIES *(CYCLOPIA SUBTERNATA AND CYCLOPIA INTERMEDIA)*

I, Barbara Dallas Creecy, Minister of Forestry, Fisheries and the Environment, hereby in terms of section 43(1)(b) and 43(3)(a) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), publish the Biodiversity Management Plans for *Aloe ferox* and Honeybush Species *(Cyclopia subternata and Cyclopia intermedia)*, as set out in the Schedule hereto, for implementation.

In terms of section 43(3)(c) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), I hereby assign the responsibility for implementation of the Biodiversity Management Plan for *Aloe ferox* to the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism.

I hereby assign the responsibility for implementation of the Biodiversity Management Plan for Honeybush Species *(Cyclopia subternata and Cyclopia intermedia)* jointly to the Western Cape Department of Environmental Affairs and Development Planning and the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism, supported by the Honeybush Community of Practice and the Department of Forestry, Fisheries and the Environment. This joint assignment of responsibility for implementation of the Biodiversity Management Plan for Honeybush Species *(Cyclopia subternata and Cyclopia intermedia)* is a temporary arrangement pending the finalisation of a process to identify a suitable person, organisation or organ of state that is willing to be responsible for the implementation of the Biodiversity Management Plan for the Honeybush Species.

BARBARA DALLAS CREECY
MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT

SCHEDULE







BIODIVERSITY MANAGEMENT PLAN FOR ALOE FEROX

Jointly developed by
Eastern Cape Department of Economic Development, Environmental Affairs and Tourism and Department of Forestry, Fisheries and the Environment and the South African National Biodiversity Institute (SANBI)

Lead Agent: Eastern Cape Department of Economic Development, Environmental Affairs and Tourism

Implementing Agencies: (Harvesters, TRAFFIC, Industry, Provincial conservation agencies, SANBI/Scientific Authority, Western Cape Department, CapeNature, DFFE, DSI, Lesotho Department of Environment, MDTPA, District and local municipalities, Tribal Authorities. Landowners, Communities, Aloe Council, Tappers &COGTA)

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LIST OF ABBREVIATIONS

ABS	Access & Benefit Sharing
ARC	Agricultural Research Council
BABS	Bioprospecting Access & Benefit Sharing
BMP-S	Biodiversity Management Plan for Species
CBD	Convention on Biological Diversity
CITES	Convention on Internationl Trade in Endangered Species
DAFF	Department of Agriculture Forest and Fisheries
DFFE	Department of Forestry, Fisheries and the Environment
IUCN	International Union for Conservation of Nature
NDF	Non -Detriment Finding
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
NEMPAA	National Environmental Management Protected Areas Act
NGO	Non-Government Organisation
NMU	Nelson Mandela University
NP	Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity
SABS	South African Bureau of Standards
SAHTA	South African Honeybush Tea Association
SANBI	South African National Biodiversity Insitute
SANS	South African National Standards
SMME	Small, Medium and Micro Enterprises
TOPS	Threatened Or Protected Species
UJ	University of Johannesburg

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DEFINITIONS

In this BMP, unless the context indicates otherwise, a word or expression defined in the Biodiversity Act or Protected Areas Act or the Norms and Standards for the development of BMPs has the same meaning

Biome	Means a large naturally occurring community of flora and fauna occupying a major habitat, e.g., forest or tundra.
Biotrade	means the buying and selling of milled, powdered, dried, sliced or extract of indigenous genetic and biological resources for further commercial exploitation
Commercial exploitation	Means the engaging in any bioprospecting activity with the intention of making a profit.
Conservation	The management of the biosphere so that it may yield the greatest sustainable benefit to the present generation while maintaining its potential to meet the needs and aspirations of future generations. The wise use of natural resources to prevent loss of ecosystem function and integrity.
Commercialisation	In relation to indigenous biological resources, includes the following activities: (a) the filing of any complete intellectual property application, whether in South Africa or elsewhere; (b) obtaining or transferring any intellectual property rights or other rights; (c) commencing product development, including the conducting of market research, and seeking pre-market approval for the sale of resulting products; or (d) the multiplication of indigenous biological resources through cultivation, propagation, cloning or other means to develop and produce products, such as drugs, industrial enzymes, food flavours, fragrances, cosmetics, emulsifiers, oleoresins, colours and extracts; (e) trading in and/or exporting of indigenous biological resources to develop and produce products, such as drugs, industry enzymes, food flavours, fragrances, cosmetics, emulsifiers, oleoresins, colours, extracts and essential oils; and (f) commercial exploitation;
Harvesters	A person or organization that collects or obtains a resource for future use.
***In-situ* conservation**	Means the conservation of biodiversity in the wild through the conservation of ecosystems and natural habitats, and the

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	maintenance and recovery of viable populations of species in their natural surroundings.
IUCN Red Data List	Means a global or national list providing information on a species' risk of extinction (usually by taxonomic group) and prepared under the auspices of the International Union for the Conservation of Nature.
Least concern	A species is Least Concern when it has been evaluated against the IUCN Red List criteria and does not qualify for any other Red List category. Species classified as Least Concern are considered at low risk of extinction. Widespread and abundant species are typically classified in this category (**Error! Hyperlink reference not valid.**).
Long term survival	Means to ensure the survival of a species until the next human generation, approximately 30 years.
Over exploitation	The action or fact of making excessive use of a resource.
Overgrazing	Graze (grassland) so heavily that the vegetation is damaged, and the ground becomes liable to erosion.
Over harvesting	Means taking more from the land (or sea) than it can replace. It includes extreme farming, grazing, fishing, and using fresh water. **Over-harvesting** is harmful in the long term.
Pollination	The transfer of pollen to a stigma, ovule, flower, or plant to allow fertilization.
Population	A group of individuals of the same species, occupying a **defined** area, and usually isolated to some degree from other similar groups.
Propagate	Breed specimens of (a plant or animal) by natural processes from the parent stock.
Regulation	A rule or directive made and maintained by an authority.
Subpopulation	A part or subdivision of a population, especially one originating from some other population
Tappers	A person that taps a tree for the sap or juice, a blast furnace, cask, or other container for their contents.
Threat	Means any action that causes a decline and compromises the future survival of a species or anything that has a detrimental effect on a species. Threats can be human induced or natural. BMP-S should focus on mitigating human induced threats to species.
Trade	The action of buying and selling goods and services.
Treaty	A formally concluded and ratified agreement between states.
Viable	The ability of a species or population to survive or persist and reproduce over multiple generations or a long time period.

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Other numerous stakeholders have contributed to the process of drafting this BMP by participating in key stakeholder consultation workshops, reviewing and commenting on the draft documents and finalization of the draft document. People and/or organizations that made invaluable contributions to the BMP included but not limited to, Industries, Communities, Eastern Cape Department of Economic Development, Environmental Affairs and Tourism, Department of Environmental Affairs, the South African National Biodiversity Institute, **Error! Hyperlink reference not valid.**, Gauteng Department of Agriculture and Rural Development, TRAFFIC, CSIR and Institute of Natural Resources. All the members of the public that participated in the stakeholder engagement workshops are acknowledged for their contributions.

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EXECUTIVE SUMMARY

Aloe ferox is a long-lived, tree-like succulent plant endemic to South Africa and Lesotho. It has a restricted distribution within South Africa extending from the Western Cape Province, intermittently throughout the Eastern Cape, and up into south-eastern Free State. The species also occurs in southern Lesotho. Previous records of *A. ferox* in the KwaZulu-Natal Province have been confirmed as the similar looking *Aloe candelabrum*, a species that was recently resurrected from the synonymy with *A. ferox*.

Aloe ferox plants are characterised by a single stem that is typically clothed in a dense apical rosette of large, succulent leaves as well as a persistent skirt of older, dry leaves. The rosettes of succulent leaves form the basis of a thriving *Aloe ferox* industry in South Africa where leaf material from wild plants are collected to produce bitters and gels for commercial use in the pharmaceutical and cosmetic industries. The *A. ferox* industry provides significant socio-economic benefits to many South Africans, from local communities who derive an income from harvesting of the plants, to small businesses who employ people to manufacture *A. ferox* products for both the local and international markets.

The species is included in Appendix II of CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) to ensure that international trade in the plants does not threaten their survival in the wild. Large volumes of the species have been exported since the 1980s and the market for *A. ferox* products continues to grow. The ongoing extractive use of the resource requires proper in-country management of the species in terms of a Biodiversity Management Plan for Species (BMP-S) as specified in Chapter 3 of the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) herein refered to as NEMBA. Furthermore, the significant financial benefits accrued from the collection, processing, and sale of *A. ferox* resources; requires that the management of the resource is equal across its range and that it upholds the rights of stakeholders along the trade supply chain, whilst also ensuring the protection of customary rights and laws relating to access and benefit sharing from the resource.

In developing the BMP, stakeholders were identified, and several engagements took place from 2018 to 2020. Stakeholders ranged from national government and their entities, provincial conservation authorities, National Governmental Organisations (NGOs), Communities, and Academia.

The aim of the BMP-S is to ensure the long-term survival of *A. ferox* in habitat, whilst ensuring that the livelihoods of stakeholders are respected.

To achieve this aim, seven objectives have been identified during the development of the BMP as indicated below. These are supported by several actions as per the action plan of this BMP.

- To ensure that the wild harvesting of A*. ferox* is carried out in an adaptive, practical, participatory, and transparent manner that maintains the long-term survival of the species in the wild.
- To ensure that the wild collection of *A. ferox* does not adversely affect the structure and functioning of the surrounding environment.

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- To establish and implement monitoring systems for *A. ferox* that provide the scientific evidence required to inform responsive management practices.
- To ensure that collection and management activities are carried out under legitimate tenure arrangements and comply with relevant laws, regulations, and agreements.
- To ensure that the customary rights of local and indigenous communities 'to access their land including indigenous/traditional knowledge associated with A. ferox and to manage collection/harvesting areas are recognised and respected and integrated into the permitting process/decision making process.
- To ensure that through fair and equitable sharing of benefits derived from the biotrade and bioprospecting of *A. ferox*, the conservation and sustainable use of the species is promoted, and the livelihoods of communities are enhanced.
- To promote transnational management of *A. ferox* across its natural range in South Africa and Lesotho

By implementing this BMP, a major benefit amongst others will be to obtain the support of owners, managers, and occupiers of land on which *A. ferox* occurs for the implementation of conservation actions. This should ensure the species does not go extinct and instead becomes better managed over time, maintaining the status of Least Concern.

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1. INTRODUCTION

Aloe ferox Mill. (Family *Asphodelaceae*), commonly known as the Bitter aloe or Cape aloe is a tall, single-stemmed, succulent shrub indigenous to the south-central regions of Southern Africa. It occurs most commonly in the Western and Eastern Cape Provinces, extending northwards into the Free State Province, as well as southern Lesotho (Reynolds, 1950; Smith *et al.,* 2016). These plants are a prominent feature across the landscape in these regions, particularly in the Eastern Cape Province, where they occur in many habitats, from mountain slopes and rocky outcrops to vast, flat, open areas. Apart from being able to grow in a wide variety of soil types, *A. ferox* plants thrive under the different climatic conditions prevalent across the landscape. This adaptability and robustness have allowed for the historic and ongoing utilisation of the popular indigenous aloe species.

Aloe ferox is arguably the most commercially utilized indigenous plant in South Africa and one of the most highly traded botanical species in the world. The plant is most valued for the raw materials obtained from its large succulent leaves which are wild harvested and processed in South Africa to be exported globally to be used in a number of consumer products. An average of around 300 000kg of *A. ferox* primary (bitter-sap) extract has been exported from South Africa to various countries, including Argentina, Germany, Italy, the United Kingdom, Japan and the United States of America, each year over the past three decades (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK). The actual amount of raw material is probably closer to 400 000kg/annum when exports of powdered extracts are included. More recently, the aloe industry has seen an increase in the processing of secondary leaf (gel) extracts and the trade in finished products comprising these secondary extracts (Grace *et al*., 2008). The industry has developed into a multi-million-dollar business and the market for aloe products continues to flourish as more people become aware of the natural health benefits and value of the species. In addition to revenue generated by the industry, significant socio-economic benefits also accrue to rural-based individuals and communities who derive an income from aloe leaf harvesting (Melin *et al*., 2017).

Majority of the *A. ferox* raw materials are obtained from plants growing in the wild. Whilst the species is known to be common within suitable habitat across large parts of the country, figures on densities/relative abundance are deficient. Furthermore, estimates of harvest impact, and long-term population trends are also lacking. Current levels of offtake and commercial trade are deemed to be sustainable at present and the vested interest in keeping the plants alive has inadvertently assured the preservation of the species for many decades and continues to do so. However, as the market continues to grow, the country may be faced with new economic and employment opportunities in the face of ongoing socio-environmental challenges, and the potential for over-exploitation of natural resources exists. Knowledge on the distribution and size of the resource base, in addition to documented levels of harvesting impacts and other notable threats across the species range, is vital for the sustainable management of its populations. Effective natural resource management of *A. ferox* is essential if a high value, sustainable local and international market is to be supported in the long term. The potential threat to the species arising from increased wild harvesting pressures and a lack of effective harvest control, as well as the subsequent bioprospecting ventures for local, national, and international trade, has

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culminated in the development of this management plan, which will contribute to the regulation of ongoing commercial extraction in order to ensure the long-term, *in situ* survival of this valuable species.

1.1 Aim of the BMP

The aim of this BMP-S is to ensure the long-term survival of *A. ferox* populations in the wild, whilst also ensuring that the livelihoods of stakeholders are respected. Specific activities need to be undertaken to safeguard sustainable utilisation of the species and to establish systems to monitor ongoing impacts of commercial extraction and cultivation.

1.2 Objectives of the BMP

The seven objectives of the management plan are:

- To ensure that the wild harvesting of A*. ferox* is carried out in an adaptive, practical, participatory and transparent manner that maintains the long-term survival of the species in the wild.
- To ensure that the wild collection of *A. ferox* does not adversely affect the structure and functioning of the surrounding environment.
- To establish and implement monitoring systems for *A. ferox* that provide the scientific evidence required to inform responsive management practices.
- To ensure that collection and management activities are carried out under legitimate tenure arrangements and comply with relevant laws, regulations, and agreements.
- To ensure that the customary rights of local and indigenous communities 'to access their land including indigenous/traditional knowledge associated with *A. ferox* and to manage collection/harvesting areas are recognised, respected and integrated into the permitting process/decision making process.
- To ensure that through fair and equitable sharing of benefits derived from the biotrade and bioprospecting of *A. ferox*, the conservation and sustainable use of the species is promoted, and the livelihoods of communities are enhanced.
- To promote transnational management of *A. ferox* across its natural range in South Africa and Lesotho

1.3 Benefits and anticipated outcomes of the BMP-S

A major benefit of the BMP-S will be to obtain the support of owners, managers, and occupiers of land on which *A. ferox* occurs, for the implementation of conservation actions. This should ensure the species does not go extinct and instead becomes better managed over time, maintaining the status of Least Concern. BMP-S allow for conservation management plans to be legally gazetted under South African policy in terms of NEMBA. This will facilitate the attainment of the aim of the plan because the support of the government and the support of the role-players and stakeholders will be ensured. Participation of such a broad range of stakeholders is imperative for ensuring the success of the BMP-S process.

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1.4 The anticipated outcomes of the management plan include:

- Up-to-date and detailed resource distribution and population data and maps that will provide guidance for conservation measures or management tools (such as harvest quotas, harvest areas/seasons, harvest techniques) to be developed and applied in the industry.
- Greater consistency in management of the resource base across the provinces.
- A greater awareness among landowners with *A. ferox populations*, local authorities, and government bodies with regards to the threats facing the species – particularly the risks associated with unsustainable harvesting and illegal trade – as well as the socio-economic and environmental importance of maintaining the Least Concern status of the species. Land use practices are more ecologically sustainable.
- A greater awareness and skills development among communities, traditional leaders, traditional practitioners, and tappers on how to sustainably harvest the species. Traditional Authorities take better control of their areas through capacitation so that tapping is brought under better control.
- Empowerment of communities in general business management, how to run meetings, keep accounts etc. This would assist with improving their general skills and also increase the drive towards having communities moving up in the *A. ferox* product value chain.
- Establishment of an *A. ferox* Bioprospecting Forum with membership from industry, communities, researchers, other stakeholders, and provincial government who will meet on a quarterly basis to cover all bioprospecting initiatives for the species. This forum can also discuss, develop, and implement ways to control illegal tappers and buyers primarily through standard management strategies (that can include guidelines in local languages, as well as management structures for Traditional Authorities and harvesters (not all are working on tribal land)) to implement. Issues of fair and equitable sharing of benefits between the industry and communities can also be discussed in this forum.

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2. BACKGROUND

2.1 Conservation Status and Legislative Context

2.1.1 Threat Status

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), population numbers and long-term trends have yet to be estimated. At present, local occurrences of unsustainable harvesting and habitat loss may pose a minor threat to the species in some areas across its distribution.

The species is found in many reserves and although it is not currently afforded any special protection under National legislation, it is considered a protected species in the Free State and the harvesting of wild plants is somewhat controlled by the respective provincial biodiversity conservation authorities in the Eastern and Western Cape Provinces. Reliable estimates of population size and long-term population trends are required and there is a need for a global assessment to be carried out jointly by Lesotho and South Africa (using the International Union for the Conservation of Nature's (IUCN) Red List categories and criteria, Version 3.1).

2.1.2 Cultural / traditional status

Usage of aloe plants in Africa is an age-old practice with many cultures using plant extracts to treat a range of health problems in both humans and livestock. Leaf extracts of aloe spp. have been used to treat (amongst other things), skin and eye irritations, ulcers, digestive tract and bacterial infections, STIs, immune deficiencies as well as for hygiene purposes. *Aloe ferox* has in particular, been popular amongst indigenous people for many decades and has often been depicted in ancient Khoisan rock paintings (rock paintings of *A. ferox* have been found in a cave on the farm Pieterberg, Genadeberg, near the Orange River, east of Zastron). Ethno-ecological records show *A. ferox* to be the most frequently cited of all the medicinal *Aloe* spp. in southern Africa amongst traditional medicine users (Grace *et al.*, 2008). The species extracts have been favoured most prominently for their potent laxative effects, but its local applications are much more varied. In 1967, Dr Chris Barnard performed the first heart transplant, and he drew on the traditional knowledge of indigenous people by using the sap of *A. ferox* to promote wound healing through accelerated rates of reproduction of the cells responsible for the formation of collagen. Use of the species was adopted by colonists at the Cape of Good Hope and *A. ferox* was first



Aloe ferox included in a Bushman Rock Painting as reproduced by G.W. Reynolds (1950) from Plate 51 of Rock Paintings in South Africa (1930), with permission from Miss D.F. Bleek.

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exported to Europe as early as the late eighteenth century (Pole-Evans, 1919). The species remains one of the most commonly used Aloe species in South African traditional medicine practices whilst the market for formal health products containing *A. ferox* extracts is also growing. The uses of Aloe spp. for preventative and rehabilitative therapy, magical and ritual purposes in southern Africa were also recorded according to Grace *et al.* (2008).

2.1.3 Applicable International Agreements

The following international treaties and conventions to which South Africa is Party are relevant and important to consider:

- **The Convention on Biological Diversity (CBD)**

South Africa has acceded to the CBD in 1995. This Convention has three main objectives, namely, the conservation of biological diversity; sustainable use of its components; and the fair and equitable sharing of benefits arising from the utilization of genetic resources. Although it is a non-enforceable Convention, becoming a Party to the CBD does entail acceptance of the Articles and Objectives of the Convention, which include *inter alia*, establishing methods to monitor and conserve biodiversity and engaging in fair and equitable benefit sharing. Accordingly, South Africa's National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA) has been promulgated to enable South Africa to meet its commitments to the Convention. The Conference of the Parties (COP) is the governing body of the CBD and advances implementation of the Convention through the decisions it takes at its periodic meetings.

- **Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (Nagoya Protocol on ABS)**

The Nagoya Protocol on ABS is an international treaty adopted under the auspices of the Convention on Biological Diversity (CBD) in 2010 and has entered into force on 12 October 2014. South Africa ratified this Protocol in 2013. Its objective is the fair and equitable sharing of benefits arising from the utilization of genetic resources, thereby contributing to the conservation and sustainable use of biodiversity and implementing the three objectives of the CBD.

The Nagoya Protocol on ABS significantly advances the Convention's third objective by providing greater legal certainty and transparency for both provider and user countries of genetic resources and their associated traditional knowledge by establishing more predictable conditions for access to genetic resources and traditional knowledge associated with genetic resources, benefit sharing and compliance.

Convention on International Trade in Endangered Species of wild Fauna and Flora (CITES)

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement of which South Africa is a signatory. More than 183 countries as of May 2020 are currently party to this Convention which is the largest wildlife conservation agreement in existence. The trade in wild animals and plants is a major threat to the survival of some species. The contracting Parties therefore recognize that international co-operation is essential for the protection of certain species of wild fauna and flora against over-exploitation for

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international trade. CITES aims to ensure international trade in specimens of wild animals and plants does not threaten their survival.

Currently *A. ferox* is included on Appendix II of CITES, with an annotation excluding finished products, whereas trade in other derivatives is regulated. International trade in species listed on Appendix II must be strictly regulated in order to avoid utilisation incompatible with their survival. All aloes other than Aloe vera are included on CITES under Appendix II (with some species on Appendix I) as trade has impacted the survival of wild populations of certain species. The exclusion of finished products of *A. ferox* from regulation under CITES is aimed to 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

2.1.4 Applicable National legislation

The South African environmental policy framework is defined by the Constitution, the National Environmental Management Act 107 of 1998 (NEMA), the subsidiary National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA) and the National Environmental Management: Protected Areas Act No 57 of 2003 (NEMPAA). These are introduced below.

- **The Constitution of the Republic of South Africa Act 108 of 1996**

The Constitution provides the starting point from which to consider the administration of environmental law. It is the supreme founding law of the democratic, post-apartheid South Africa, fundamentally defines the country's legal and administrative order, and enshrines a Bill of Rights which applies to all law and is binding on all organs of state. In the context of *A. ferox* harvesting, trade and regulation, section 24 of the Constitution stipulates that everyone has the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent ecological degradation and secure ecologically sustainable use of natural resources while promoting justifiable economic and social development.

- **National Environmental Management Act 107 of 1998 (NEMA)**

NEMA provides for co-operative environmental governance by establishing principles for decision making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state; to provide for certain aspects of the administration and enforcement of other environmental management laws; and to provide for matters connected therewith.

- **The National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA)**

NEMBA provides for the management and conservation of biological diversity within South Africa, as well as the use of indigenous biological resources in a sustainable manner, the fair and equitable sharing among stakeholders of benefits arising from bioprospecting involving indigenous biological resources; and gives effect to ratified international agreements relating to biodiversity which are binding on South Africa. The Minister may, in terms of Section 56 of NEMBA and by notice in the Government Gazette, publish a list of species that are threatened

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or in need of national protection (TOPS). Section 43 of NEMBA also makes provision for the development of Biodiversity Management Plans for Species (BMP-S) which are not listed in terms of section 56 but which does warrant special conservation attention as a tool to manage species such as *A. ferox*.

- **National Environmental Management: Protected Areas Act No 57 of 2003 (NEMPAA)**

NEMPAA provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial, and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas; and for matters in connection therewith.

- **Bioprospecting Access and Benefit Sharing (BABS) Regulation of 2008 as amended in 2015.**

Chapter 6 of the National Environmental Management: Biodiversity Act (2004) deals with provisions for Bioprospecting, Access and Benefit-Sharing in South Africa. Associated with the legislation, the Bioprospecting, Access and Benefit Sharing BABS Regulations of 2008 as amended in 2015, was gazetted. The purpose of these regulations is to: a) prescribe the notification process for the discovery phase of bioprospecting involving any indigenous genetic and biological resources contemplated in section 81A (2) of the Act; b) prescribe the permit system set out in Chapter 7 of the Act insofar as that system applies to bioprospecting involving any indigenous genetic and biological resources or export from the Republic of any indigenous genetic and biological resources for the purpose of bioprospecting or any other kind of research; c) set out the form and content of, and requirements and criteria for benefit-sharing and material transfer agreements and; d) set out the administration process of the Bioprospecting Trust Fund.

- **Patent Amendment Act, 2005 (Act No. 20 of 2005)**

The Patent Amendment Act provides for mandatory disclosure of information relating to any role played by an indigenous biological resource, genetic resources, or traditional/indigenous knowledge in an invention, by any applicant for a Patent. These provisions are included to ensure that the indigenous peoples and local communities from where indigenous biological resources and/ or its associated traditional/indigenous knowledge originate accrue fair and equitable share of benefits.

- **Protection, Promotion, Development and Management of Indigenous Knowledge Act, 2019 (Act No. 6 of 2019) (IKS Act)**

The IKS Act provides for the protection, promotion, development, and management of rights of indigenous knowledge communities. Also provides for access and conditions of access to knowledge of indigenous communities, amongst other things. These provisions are included to ensure that the indigenous communities from where natural resources and/ or its associated indigenous knowledge originate accrue fair and equitable share of benefits.

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2.1.5 Applicable Provincial legislation

Whilst *A. ferox* is not listed as a protected species within the Eastern Cape and Western Cape Conservation ordinances (Cape Nature and Environmental Conservation Ordinance 19 of 1974; Western Cape Nature Conservation Laws Amendment Act 3 of 2000), the harvesting of wild plants of the species is controlled by the respective provincial biodiversity conservation authorities in these Provinces. In the Free State Province, the Nature Conservation Ordinance 8 of 1969 provides for the conservation of certain species of fauna and flora and declares all indigenous aloe species as protected under this legislation. Moreover, in the Western Cape *A. ferox* is classified in terms of Nature Conservation Ordinance as "***indigenous unprotected flora***". The species is specifically excluded for Schedule 4 (protected flora) by this annotation:' "All species of the genus Aleo except those specified in Schedule 3 and the species *Aloe ferox*." In the Eastern Cape, *A. ferox* is listed as a protected in two pieces of legislation (Transkei Decree and Ciskei Environmental Conservation Act) that are still regulating Biodiversity in the Province. Currently there are three legislations in the province and the provincial department is in the process of reviewing the Provincial Environmental Management Legislation.

2.1.6 Motivation for assigning priority to the development of this Biodiversity Management Plan

Aloe ferox materials are primarily harvested from wild populations. The growing commercial value of *A. ferox* and the potential of the species to generate financial benefits for local rural communities culminates in the probability of increasing harvesting pressure on the resource base. A recent Non-Detriment Finding (NDF) assessment (on the impact of international trade - gazetted in draft) has identified the need for a BMP to contribute to sustainable harvesting practices and improved monitoring and management of the resource base. The BMP is also deemed necessary under the Biodiversity Economy Operation Phakisa Laboratory initiative, concerned with the bioprospecting/biotrade economy of South Africa. *Aloe ferox* has been identified as one of the key indigenous species used in international biotrade and is one of six primarily wild-harvested species that have been prioritised for a BMP under the biodiversity economy initiative.

2.2 Species detail

2.2.1 Taxonomy and Description



Order: Asparagales
Family: Asphodelaceae
Subfamily: Asphodeloideae
Genus: *Aloe*
Species: *ferox*
Common Names: Bitter aloe, Cape aloe, Red aloe, Tap aloe (English), bitteraalwyn, bergaalwyn (Afrikaans), ikhala (isiXhosa), inhlaba (isiZulu).

Aloe ferox Mill. was first described and figured by Dutch botanist, Casper Commelin in his *Praeludia botanica*, published in 1703, but was formally described by Scottish

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botanist, Phillip Miller in 1768. The Latin name '*ferox*' means ferocious referring to its spiny leaves. It is a robust, long-lived, single-stemmed plant which usually grows 2–3 m tall but can sometimes reach up to 5 m in height (Reynolds, 1950). The stem is covered in persistent dried leaves, and the crown is a dense rosette of dull green to reddish leaves held erect to somewhat spreading. Each leaf can be up to 1 m long, with dark brown spines along the margins and often scattered on the leaf surfaces, especially on the lower surface. The flowers are borne along up to eight cylindrical racemes on a branched panicle, and are scarlet, sometimes orange, tubular and about 3 cm long with stamens protruding from the narrow mouth. Forms with white flowers are rare but are also known to occur within the distribution range (Reynolds, 1950).

2.2.2 Distribution and habitat

A. ferox is endemic to South Africa and Lesotho and occurs in a variety of biomes such as Albany Thicket, Fynbos, Grassland, Indian Ocean Coastal Belt (Raimondo, 2012), and more specifically in the Cape Floristic Region and Succulent Karoo. The species has a wide but concentrated distribution extending from the Western Cape Province (Swellendam district), throughout the Eastern Cape Province (including the former 'homelands' Transkei and Ciskei), up into south-eastern Free State and southern Lesotho (Fig.1, Smith *et al.* 2016). 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 widespread and common.

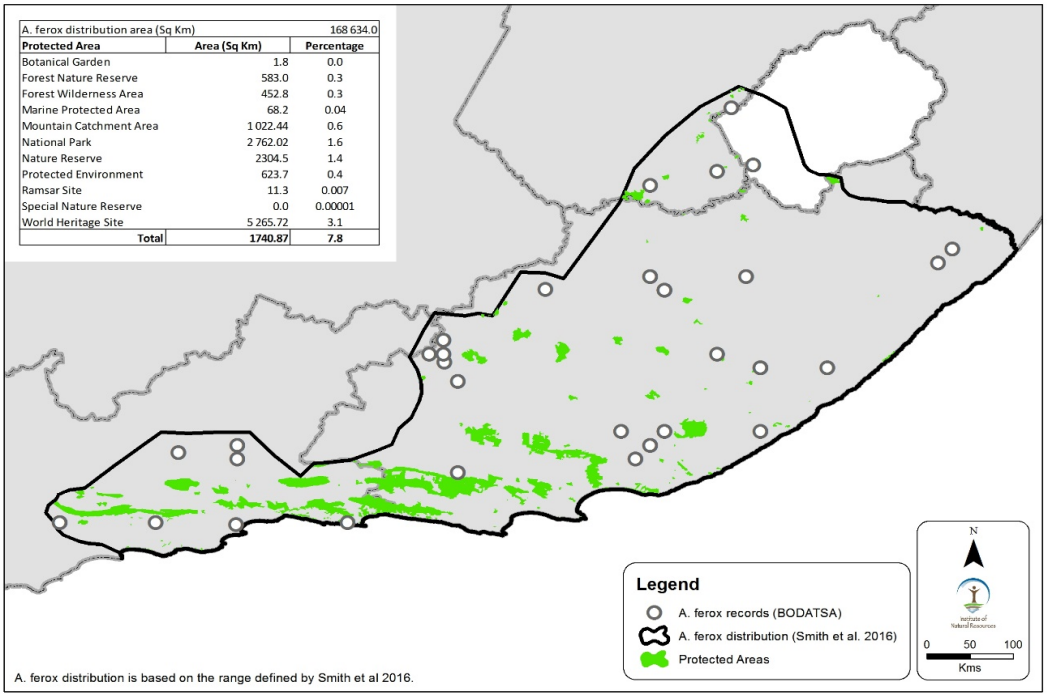


Figure 1: National distribution range of *Aloe ferox* (generated using information from the Smith *et al.*, 2016distribution map and SANBI BODATSA Data)

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It is one of the dominant species in the valley bushveld vegetation of South Africa (Anjarwalla *et al.*, 2013) and can grow in a variety of habitats, soils and, under different climatic conditions in both rocky areas and flat, open lands. These plants show a remarkable adaptability in terms of rainfall, and they flourish in the extremely dry areas of the Karoo but also in relatively wet areas in the eastern parts of their distribution (Van Wyk and Smith 2005). The shallow, adventitious root systems that grow only a few centimetres below the soil surface allow aloes to benefit from relatively low amounts of precipitation (Smith and Van Wyk, 2009)). The species is most abundant on arid, rocky hillsides up to 1000 m altitude, where mean temperature ranges from 27-31 ºC and annual rainfall is 50-300 mm (Anjarwalla *et al.*, 2013).

2.2.3 Biology and ecology

Aloe ferox is a long-lived, slow growing, perennial species with individual specimens having an estimated life span of up to 150 years (Newton and Vaughan, 1996). Based on field observations of wild plants, Shackleton and Gambiza (2007) estimated that plants reach sexual maturity at around 0.5 m in height are likely to be around 36 years of age at a height of 1 m. They proposed an average height increase of 2.8 cm per year (ranging from 1.7 cm – 4.6 cm between different sites). Smaller plants (<6 cm) would almost double in height while taller plants (>2m) would grow by only 1% in 12 months. In the same study, the mean number of leaves per plant increased by two per plant per year. Adult *A. ferox* plants flower mainly in winter during May and June in coastal populations, although somewhat later inland (occasionally to as late as November). The flower morphology suggests pollination by birds and honeybees. It is self-incompatible and only a few flowers per raceme flower simultaneously. The fruit is an ovoid capsule up to 3 cm long and is many seeded (i.e., the plant produces large quantities of seed (Newton and Vaughan 1996)). The seeds are about 9 mm long, broadly winged and wind-dispersed (Holland 1978). Dispersal is thought to be limited at a small scale but is medially efficient at a large scale as is evident in the large distribution range. Dispersal distance is dependent on plant height and wind speed. At a wind speed of 20 km/hour, seeds can be dispersed over 30 m from individuals that are 3 m tall. During spring winds (40 km/hour), the dispersal distance may exceed 50 m from plants that are taller than 5 m (Stokes and Yeaton 1995).

Mature seeds of *A. ferox* are orthodox, surviving in a dry state without significant reduction in their viability for a period of time. In the wild, seeds of *A. ferox* typically germinated within three weeks of dispersal, with their viability considerably reduced at least year after dispersal (Cousins and Witkowski, 2012). They are reportedly suited to long-term storage in freezers (DAFF 3013). The species is considered to be relatively easily propagated by seed (Holland *et al.*, 1977; Bosch, 2006; Bairu *et al.*, 2009) but can also reproduce vegetatively by means of cuttings, although this rarely happens in the wild and the use of cuttings for cultivation is limited by the single stem characteristic of these plants (DAFF 2015). *Aloe ferox* contributes important roles in the surrounding ecosystems. Field observations suggest that *A. ferox* are pioneer plants, and that these plants are 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 previously disturbed areas. The species also plays an important role in supporting avian diversity as is evident from a recent study which showed that large numbers of birds (from more than 15 species) arrive to populations of *A. ferox* during the

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flowering season (in winter) when other food resources are likely to be scarce (Kuiper *et al.,* 2015).

2.2.4 Population status and trends

Aloe ferox is considered to be common and abundant throughout its range, occurring in very dense subpopulations in certain regions. 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 during the 1990's, 400 tonnes of dried leaf exudate was obtained from the leaves of around 10 million plants, suggesting that the population could be in orders of magnitude greater than that indicated by Donaldson (2003). Parker and Bernard (2008) suggested that the species has become synonymous with the Eastern Cape, having observed large stands of *A. ferox* reaching densities of more than 10 plants/km2. A more recent study conducted in the province, recorded higher densities of between 4.3 and 7.3 individuals/m2 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 differences observed in plant numbers within and between subpopulations (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.

It has been proposed that the species' adaptability to various habitats and conditions, it's growing habit and, ability to colonize degraded landscapes has resulted in an increase in the population size and range over the past 30 years (Raimondo *et al*., 2012). Aloe harvesters, industry stakeholders and management authorities in the Eastern Cape and Western Cape, however, 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).

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Current information on the status of the species is largely anecdotal and there remains a lack of robust data on the extent, size and trends of the *A. ferox* population. A comprehensive resource assessment is still required for the species.

2.2.5 Impact factors

Within its range, A. *ferox* populations may be adversely impacted by a range of threats as summarised in the table below (Table 1).

Table 1: Summary of identified known and potential threats impacting *Aloe ferox* across its distribution range

Threat	Impact	Range
Unsustainable and destructive harvesting	Not fully known but can be severe (causing localised extinctions) in some cases. Destructive harvesting may result in reduced survivability of adult plants as well as a loss of recruitment potential in heavily harvested areas.	Within and around several communal areas across the Eastern Cape Province.
Habitat loss and degradation	Limited	Urban and agricultural development in the Western Cape is notable. Grazing by cattle and large wild animals is a problem in parts of the Eastern Cape.
Climate change	Uncertain	Drier conditions in some parts of Western Cape may impact recruitment potential of populations whilst cooler, frostier conditions in other areas may lead to increased plant mortality, although these hypotheses have not been scientifically tested.
Pests and disease	Uncertain	Although the species is known to be relatively resistant to insect pests and disease, the occurrence and potential impact of pathogens have not been documented in wild populations.

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 Ngqushwa Local Municipality – Ngqushwa (Peddie), Raymond Mhlaba L M – Seymour and Adelaide 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.,

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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 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. There has been continuing loss of habitat to cultivation and urban development, especially in the western parts of its range whilst 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, 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. 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. These claims have not yet been tested.

2.2.6 Diseases

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 *Botrytis cinerea*, *Penicillium digitatum*, *Penicillium expansum* and *Penicillium italicum*. Other studies have found that plants in cultivation may be prone to disease including aloe cancer (also called galls), leaf spots, bacterial infections and aloe rust (DAFF, 2013). A few of these lead to the rapid demise of the plants or spoil their appearance.

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2.2.7 Utilisation

- **Use Value**

Aloe ferox has a long history of use in both local and international applications. The species is most widely favoured for its purgative effects, but its extracts have a much wider application. As far back as the age of exploration, European sailors who reached the Cape, reportedly adopted practices of the local indigenous communities, and used the plant to treat cuts, burns and chafing. In the late 1700's Swedish naturalists who visited the Cape including Dr Andrew Sparrman and Carl Peter Thunberg, made several references to *Aloe ferox* in their documented observations of the local indigenous flora and the communities who used them (Reynolds, 1950). Sparrman gave an account of the preparation of a drug from the sap drained from aloe leaves whilst Thunberg recorded the first commercial preparations of the aloe bitters (gum) in the Riverdale district (Reynolds, 1950).

The plants are favoured most for the primary bitter sap extract 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 (Fig. 2). To date, several studies have documented the phytochemical properties and health benefits of *Aloe ferox* leaf extracts. The chemical composition of the leaf sap of the species is clearly related to provenance (Van Wyk *et al*., 1995) which has commercial implications. The bitter and non-bitter extracts are rich in polysaccharides and other plant metabolites, including nourishing amino acids and minerals that have been promoted as having anti-microbial, anti-septic, antioxidant, anti-inflammatory, anti-cancer, anti-tyrosinase, age-defying, moisturising and detoxifying properties Van Wyk and Gericke, 2000; Choi *et al.*, 2002; Kambizi *et al.*, 2004; Loots *et al.*, 2007; Van Wyk *et al.*, 2009; Mwale and Masika, (2010). The valuable bitter sap of *A. ferox* has also been proven to have a higher Aloin and Aloesin content than the more widely used Aloe Vera, presumably making it more effective in treating skin and health ailments. Majority of *A. ferox* extracts (~95%) comes from wild plants and this adds to the allure of *A. ferox* products in both the local and international markets.

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Figure 2: Raw materials and finished products derived from the leaves of *Aloe ferox*.

- **Local use and harvesting**

  Aloe ferox has been recorded in traditional medicine applications in both South Africa and Lesotho (Hutchins, 1989; Williams, 2003; Van Wyk *et al.*, 2008; Afolayan *et al.*, 2014; Aston Philander *et al.*, 2014; Mugomeri *et al.*, 2016). Most commonly, aloe bitters are orally consumed as a purgative (laxative) medicine in humans and used for the same indication to treat cattle in both South Africa and Lesotho. Other 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, arthritis and sinusitis, ulcers, digestive tract problems, bacterial infections, sunburn as well as immune deficiencies (Van Wyk, 2008; 2011). The inner leaf parenchyma has in particular become a popular ingredient in skin and hair care products that are sold both locally and internationally. The amount of *A. ferox* used locally is considerably limited as compared to the tonnes of material traded internationally.

  Harvesting of plants primarily involves the removal of leaves to extract bitters and aloe gels which can then be utilised in cosmetics, hygiene products and as complimentary medicines. Harvesting knowledge and skills have been passed down through generations as a family custom amongst harvesters, and the harvesting practice (commonly referred to as aloe tapping) hasn't changed much over the past two centuries (Newton and Vaughan 1996). Harvesting of leaves is sustained by cutting only the older leaves (at the bottom) and preserving the younger ones around the growing tips. The 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. Cut leaves are stacked in a circular pile around a plastic lined hollow and left to drain for a number of hours; 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. The leaf gels are obtained by removing the outer leaf tissues and/ or by scraping it from the

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leaf blade cut lengthwise. On average, materials are typically extracted from plants on an 18 – 36-month cycle by full time aloe '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.

At present, only a handful of companies in South Africa are involved in the harvest and processing of *A. ferox* raw materials and/or secondary extracts for export and/or use in local value-adding production chains. Majority of these companies are based in the Western Cape Province where resources are obtained from privately-owned lands and informal management takes place at the behest of landowners. The industry in the Eastern Cape is much less concentrated with only three or four major processing facilities active in the province. Pressure on the resource base in some areas are however immense owing to a range factor that include ill-planned government development initiatives to address poverty and unemployment as well as a lack of concerted efforts to manage harvest practices and conserve the species. Incidences of over-harvesting in parts of the Eastern Cape Province presents challenges for the sustainability of the resource base as well as the livelihoods dependent on it.

- **International Trade**
  Aloe ferox is currently one of the most highly traded plant species in the world. The majority of the *A. ferox* material in trade is wild harvested in South Africa; minimally to completely processed; and exported to consumer countries around the world. South Africa remains the chief exporter of *A. ferox* raw materials and certain consumer goods with countries including Argentina, Germany, Italy, the United Kingdom, Japan and the United States of America accounting for a major portion of all imports. *Aloe ferox* is exported in many different forms but commodities including raw extracts and processed derivatives account for majority of the trade events involving the species. The export of raw extracts dominates the international trade in *A. ferox* by sheer volume (Fig. 3). According to the CITES trade database the first legal international export of *A. ferox* extract from South Africa was in 1981 with annual exports of crystalline and powdered bitters averaging around 380 000kg each year over the past three decades. Whilst the use and trade of aloe bitters has been ongoing for centuries; 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. These 'derived' goods account for less than 10% of the international trade with majority of exports destined for EU member states. At present, it is estimated that more than 20 local companies are involved in the domestic and international sale of *A. ferox* raw materials and/or finished products containing *A. ferox* extracts.

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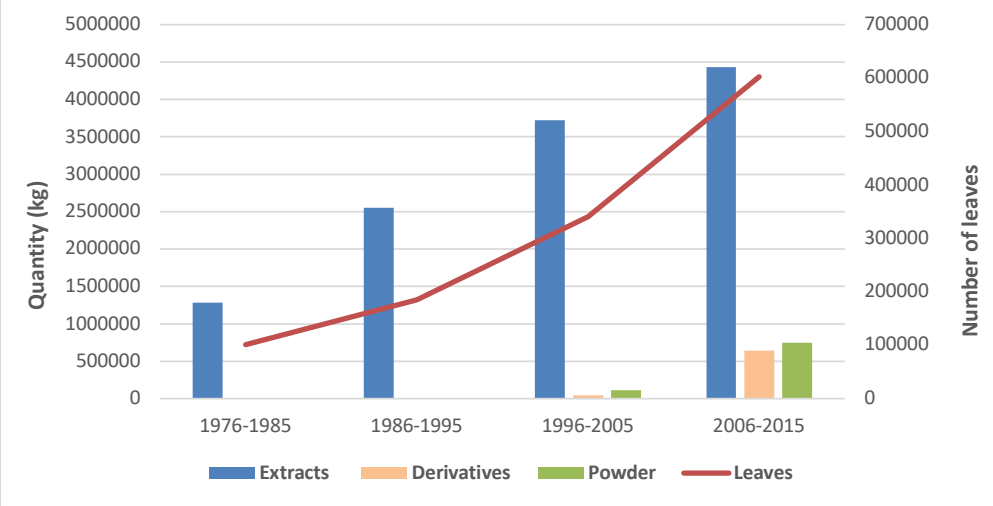


Figure 3: *Aloe ferox* material exported from South Africa between 1976 and 2015 (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK). Trends show a steady increase in the amount of aloe materials exported as extract and powder whilst the later exports of derivatives are due largely to the development of the in-country processing and manufacturing of finished products made largely from secondary leaf materials. The market for extract has been relatively stable since the year 2000. According to the Aloe industry, any fluctuations are related to droughts i.e. when less sap can be tapped from the aloes.

Given that the large quantities of *A. ferox* extracts being exported are sourced from wild collected material, a Non-Detriment Finding (NDF) assessment for the species has recently been conducted (in accordance with Section 60 (1) of the NEMBA) to ascertain whether or not trade in *A. ferox* has a detrimental impact to the species survival in the wild. Results from the assessment (yet to be published) indicate that there are currently no major threats imposed by legal local and international trade on the wild populations of *A. ferox* in South Africa. However, since it is not clearly known whether the national population of *A. ferox* is increasing, decreasing or stable, especially in relation to harvesting impacts, a scientifically robust resource assessment is required to assess the size of the resource base and to devise a programme for the monitoring of populations at key sites. Provincial management of the species also needs to be improved and these issues should be addressed in this BMP.

It is difficult to ascertain the scale of illegal harvest but an earlier study by Newton and Vaughan (1996) reported a high likelihood of an illegal trade in *A. ferox* extracts, almost equivalent in scale to that of the legal trade and involving the harvest of some 7 million plants per year. Whilst this may be an overestimate and is in need of updating, it is possible that an illegal trade is ongoing (Knapp, 2006; Melin *et al*., 2017) due to a lack of proactive management in the aloe industry (Knapp, 2006).

- **Impact of use and trade**

  Most *A. ferox* materials (95%) are harvested from wild populations, and a smaller percentage (5%) is harvested from cultivated stands. *Aloe ferox* responds well to harvesting where sufficient

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control over offtake is instituted. Sustainable harvesting is common practise over most of the species' range where collection occurs. 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. The harvesting and processing of the plants has been historically centred in the Eastern and Western Cape Provinces where the species occurs most widely and abundantly (Melin, 2009). The majority of the companies involved in the harvesting and export of *A. ferox* raw materials and finished products are based in the Western Cape Province. Harvesters in this province are mostly active on private farmlands between Swellendam and Uniondale where access to, and harvest of the resource is controlled by landowners. Some companies have also invested in small plantations of *A. ferox*. Only a few companies (<5) are known to be active in the Eastern Cape Province where harvesting is less restrictive, occurring on communal lands in and around some of the major towns e.g., Seymore and Uitenhage. There have been several issues raised around the management of certain populations where overharvest has been noted around some of the larger towns particularly in areas close to roads, rural settlements, and processing factories (Melin *et al.* 2017). The companies active in the Eastern Cape have taken on the responsibility of providing training on sustainable harvesting methods of the resource.

It is often challenging to estimate the quantities of plants being harvested for use and 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 use and trade are considered to be sustainable. The seemingly good economic profitability of the industry has cultivated a vested interest in keeping the plants alive that has inadvertently assured the species preservation along with sustainable livelihood opportunities.

- **Monitoring and management of use**
  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 development of this BMP will focus on addressing matters of sustainable utilisation and monitoring, amongst others, on a national basis.

2.2.8 Propagation

South Africa is a dry country, and this species does not make large demands on the environment, for it can easily be grown organically, requires little maintenance, needs relatively little additional water and is tolerant of droughts. In relation to cultivated material, high value products from drought-resistant succulent plants such as *A. ferox* is ideally suited for future production expansion.

Aloe ferox is easy to cultivate from seed and by planting the top parts of old plants. It can also be micro propagated *in vitro* from root and embryo tissues (DAFF 2013). It grows best in free

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draining compost which should be soaked and allowed to dry out between watering, with only a light watering regime during winter. Waterlogged, saline and alkaline soils are an unsuitable cultivation medium for this aloe species (DAFF, 2013). 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. Where populations have been destroyed and are to be re-established, local seed should be used in order to prevent genetic contamination.

2.2.9 Socio-economic challenges

Majority of the tappers are drawn from predominantly poor black household and possess low levels of educational qualifications to understand the true economic benefit of the *A. ferox* value chain. Their situation is no different from practices of the mining sector in which the dangerous job of extraction of mineral resources is undertaken by miners, but the greatest value is derived by processors and manufacturers.

- The tapper communities are largely price takers and have little to no negotiating power in setting prices of their hard laboured product. The current licensing regime is not developmental in nature to enforce shared economic benefit to the tappers. In addition, limited alternatives such as the lack of value-add processing technologies exacerbate this problem.
- As the potential growth of the industry, the requirement for a guaranteed steady supply of raw materials, for an agro-processing facility to be economically viable, is often difficult to meet without the establishment of primary cultivation to support the supply of wild species harvesting. Most often, small scale entrepreneurs have on their own struggled to meet this requirement.
- Owing to perceived use of antiquated technologies in the harvesting of the product and at times in areas with high levels of dangers to the tapper with low rewards, this industry has failed to innovate and attract young people towards it.
- All medicinal benefits of natural plants need to be substantiated by rigorous scientific studies to gain traction to the health market. The variations in quality and the absence of standards applicable to the industry make it difficult for SMMEs to trade their products in the formal sector and export markets.
    - Research organisations such as the CSIR and Universities could play a more active role in research that will help to develop the industry as well as empower the communities of tappers to ensure ownership in the value-added stages of the *A. ferox* value chain. This intervention will promote the success of SMMEs as well as ameliorate the poor conditions that many tappers live under.
- The issuance of licence on harvesting of the species by the Environmental directorate should be done in consultation with the Economic Development directorate as well as Department of Agriculture Forestry and Fisheries to ensure equitable share of species economic benefit

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for all involved in its value-add chain as well as strong species preservation regime strategies.

2.2.10 Past conservation measures

The species has not received any formal, specific conservation interventions in the past. Resources are currently managed on an ad hoc basis by landowners and communal leaders. It is estimated that 7.8 % of the distribution of *A. ferox* occurs within protected areas. No legal harvesting takes place in protected areas and *A. ferox* is tapped primarily on privately-owned and communal land. Approximately 70% of harvesting occurs on private land, where tappers obtain permission from the landowner to harvest, and the landowner monitors access and harvest (i.e., only a certain number of leaves and plants that can be tapped over a regulated period of time). This is particularly common in the Western Cape Province. Harvest control strategies are difficult to implement in communal lands because natural resources are viewed as public goods. In general, the Western Cape populations are reportedly better managed for sustainable utilisation than the Eastern Cape populations due to different land tenure arrangements and informal local management plans that have been passed on between harvesters from generation to generation.

3. Planning methodology

3.1 Identified role players.

Stakeholders were identified through a literature review as well as consultation with DFFE colleagues who are responsible for the implementation of Biodiversity Economy and Bioprospecting, Access and Benefit Sharing (BABS) regulations. During the stakeholder identification process, the names and contact details of stakeholders were registered to a database of interested and affected parties.

3.2 Description of the process to be followed in drawing up this BMP

The planning methodology or the processes followed in the development of the BMP-S is outlined in terms of section 5 of the Norms and Standards for BMP-S.

3.3 Process for stakeholder consultation

The stakeholder consultation workshops took place as follows; the first workshop took place on 29 and 30 November 2017, in King Williams Town (*Steve Biko Centre*), the second workshop took place on the 19 June 2019 in the Western Cape Province (George Research Farm) and the last workshop took place on the 10-11 October 2019 in King Williams Town (*Steve Biko Centre*). Various stakeholders including Industries, Government entities, NGOs, research institutions, collectors, harvesters/tappers and landowners attended and participated in these consultation workshop.

3.4 List of stakeholders

The following stakeholders were included in the stakeholder database:

- National Government Stakeholders (i.e., DFFE);
- Parastatals (i.e., SANBI, CapeNature, ECPTA)
- Provincial Government Stakeholders (i.e., DEDEA-EC, DEADP);

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- Municipal Stakeholders (i.e., Nelson Mandela Metropolitan Municipality);
- Academic or Research Stakeholders (i.e. UJ, NMMU, ARC, CSIR);
- Industries (i.e., Parceval Pty. Ltd., Gower Enterprises)
- The Aloe Council of South Africa
- Private Conservation Stakeholders (SAHTA);
- Landowners
- Traditional Authorities
- TRAFFIC
- Tappers other Stakeholders

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4. Description of objectives

Table2: Context support for the seven objectives identified for this BMP

NO	OBJECTIVES	DESCRIPTION
1.	**To ensure that the wild collection of A*. ferox* is carried out in an adaptive, practical, participatory and transparent manner that maintains the long-term survival of the species in the wild.**	The South African Constitution (Art. 24) requires that future as well as present generations can use *A. ferox* whilst promoting justifiable economic and social development. For this reason, there is a need to ensure that wild stocks of *A. ferox* are sourced sustainably.
2.	**To ensure that the wild collection of *A. ferox* does not adversely affect the structure and functioning of the surrounding environment.**	There needs to be a greater commitment to ecologically sustainable land use practices. The monitoring system established should consider *A. ferox* throughout its range, and in different ecosystems and usage regimes, under various management regimes and levels of protection. It should be able to detect changes in the quantity of plants, the structure of populations, and the overall health of the plants as affected by a range of threats. Thus, ensuring the protection of the species and the environment.
3.	**To establish and implement monitoring systems for *A. ferox* that provide the scientific and trade evidence required to inform responsive management practices.**	Regular monitoring of the harvest of and trade in *A. ferox* will allow for the identification of any threats to the sustainable utilisation of the species thereby enabling authorities to manage offtake more effectively.
4.	**To ensure that collection and management activities are carried out under legitimate tenure arrangements and comply with relevant laws, regulations and agreements.**	Collectors, tribal authorities and conservation managers have a clear and recognised right and authority to use and manage the target resources. This include but not limited to, traditional use and practice, access rights and cultural heritage. Local communities and indigenous people with legal or customary tenure or use rights maintain control, to the extent necessary to protect their rights,

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		traditional knowledge or resources, over collection operations.
5.	**To ensure that the customary rights of local and indigenous communities 'to access their land including indigenous/traditional knowledge associated with *A. ferox* and to manage collection/harvesting areas are recognised, respected and integrated into the permitting process/decision making process.**	To ensure that customary rights of local and indigenous communities, access to their land, traditional knowledge associated with *A. ferox* and management of harvesting areas are recognised and integrated into the decision making process.
6.	**To ensure that through fair and equitable sharing of benefits derived from the bio trade and bioprospecting of *A. ferox*, the conservation and sustainable use of the species is promoted, and the livelihoods of communities is enhanced.**	In doing so, South Africa will service its obligations as a Party to both the International Convention on Biological Diversity and the Nagoya Protocol, which seek to ensure that equitable sharing of benefits leads to biodiversity conservation.
7.	**To promote transnational management of *A. ferox* across its natural range in South Africa and Lesotho.**	To ensure regional co-management of *A. ferox* through communication with Lesotho Department of Environmental affairs and relevant stakeholders (e.g., NGO and Industries for the effective global conservation of the species

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5. Action plan for *aloe ferox*

Table 3: Detailed action plan for *Aloe ferox* (including objectives, actions, indicators and champions of the plan)

Objective	Sub-Objective	Actions/Resources	Intended Outcome	Indicators/Due Date	Implementing Party
1. To ensure that the wild collection of *A. ferox* is carried out in an adaptive, practical, participatory and transparent manner that maintains the long-term survival of the species in the wild.	Management of wild collection of *A. ferox* is supported by a resource inventory assessment and monitoring programme	Undertake an adequate and practical resource assessment of *A. ferox* across its range. [**Resources: R500000]**	Evidence generated to indicate number of plants densities and the extent of protection of resource base in protected areas.	Report on *Aloe ferox* Resource Assessment **Timeline: 14 months**	**Lead Implementing agent:** SANBI **Collaborators:** DEDEAT, CapeNature and Department of Environmental Affairs and Development Planning
		Compile provincial operational guidelines for decision making processes	Baseline information is made available to provincial conservation authorities and all industry stakeholders on the population size, distribution and structure across the species range, to inform where harvesting should be permitted	Each permit evaluation application is informed by the resource assessment **Timeline: Ongoing from time resource assessment becomes available.**	**Lead Implementing agent:** DEDEAT, CapeNature and Department of Environmental Affairs and Development Planning **Collaborators:** SANBI

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Objective	Sub-Objective	Actions/Resources	Intended Outcome	Indicators/Due Date	Implementing Party
	Conservation status of *A. ferox* is assessed and reviewed periodically and/or as needed	Review national conservation status of *A. ferox*. **[Resources: R80 000]**	Conservation status of *A. ferox* is regularly assessed to allow for adaptive management	Revised Red list assessment on SANBI'S website **Timeline: Within one year of publishing the BMP**	**Lead Implementing agent:** SANBI **Collaborators:** Department of Environmental Affairs and Development Planning, Industry, DEDEAT, Harvesters, TRAFFIC and SANBI
	Develop sustainable use principles and guidelines to promote the conservation of the species in the wild	Develop a sustainable harvesting protocol based on existing literature and practices of experienced harvesters.	Collection and harvest instructions and rules are produced including the establishment of a suitable frequency of return harvests that will be available to all known harvesters.	Harvesting guidelines published and distributed This will be reviewed annually and included in harvester guidelines **Timeline: Within one year of publishing the BMP**	**Lead Implementing agent:** DFFE **Collaborators:** Department of Environmental Affairs and Development Planning, Industry, DEDEAT, Harvesters, TRAFFIC, SANBI, District and local municipalities, Private landowners and communities
		Disseminating guidelines and train	Landowners and harvesters are fully	Number of copies of the guidelines distributed per annum	**Lead Implementing agent:**

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Objective	Sub-Objective	Actions/Resources	Intended Outcome	Indicators/Due Date	Implementing Party
		harvesters and landowners	aware of how to harvest sustainably	Number of harvesters trained on how to use the guidelines per annum Harnessing of local harvester's expertise to train other harvesters **Timeline: Ongoing**	Provincial conservation authorities (DEDEAT & CapeNature) **Collaborators** Industries (eg Aloe Council)
		Augmenting the species in the wild with seeds or seedlings in areas where the resource has been depleted, taking care to only use locally sourced seeds	Increase the number of *A. ferox* plants in the designated areas	Number of communities who have started to augment their Aloe populations	**Lead Implementing agent:** Provincial conservation authorities (DEDEAT & CapeNature), **Collaborators** Industries (e.g., Aloe Council)

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Objective	Sub-Objective	Actions/Resources	Intended Outcome	Indicators/Due Date	Implementing Party
2. **To ensure that the wild collection of *A. ferox* does not adversely affect the structure and functioning of the surrounding environment**.	Harvesting does not impact negatively on the surrounding environment	Determine the impact of harvest and infield processing on the surrounding environment e.g., firewood collection for boiling of extracts	To identify alternative arrangements to mitigate impacts on the environment and integrate these into the harvesting guidelines	Results of independent research report Translating the findings of the report into the harvesting guidelines **Timeline: 36 months**	**Lead Implementing agent:** Industries **Collaborators** Provincial conservation authorities, Department of Agriculture, landowners, , Municipalities, and SANBI
	Sensitive taxa and habitats that could be affected by collection of *A. ferox* are identified and adequately protected.	Determine impact of harvest on the larger ecosystem and if any rare or threatened species are being affected.	Spatial layer of *A. ferox* localities is overlaid with layer of threatened species using GIS maps.	Updated database and map on the distribution of *A. ferox* and threatened species **Timeline: Within one year of publishing the BMP**	**Lead Implementing agent:** SANBI **Collaborators** DEDEAT & CapeNature
		Develop a decision support tool for provincial conservation authorities that identifies area where harvesting should not be permitted as it would	No-go areas are mapped to prevent negative impact on ecologically sensitive ecosystems and species.	The decision-making tool and must include • Threatened ecosystem • Area where threatened species occur	**Lead Implementing agent:** SANBI **Collaborators** DEDEAT& CapeNature

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Objective	Sub-Objective	Actions/Resources	Intended Outcome	Indicators/Due Date	Implementing Party
		result in negative impact to the sensitive ecosystems and species		• Areas of exceptions and critical biodiversity **Timeline: Within one year of publishing the BMP**	
3. To establish and implement monitoring systems for *A. ferox* that provide the scientific and trade evidence required to inform responsive management practices.	Based on the resource assessment, baseline information will be documented, sites can be identified for ongoing monitoring, and the monitoring plan will be developed.	Establish and implement a resource monitoring programme of *A. ferox* across its range to guide and assess impacts of ongoing wild collection.	Undertake foundational study on which future monitoring should be based	Scientifically sound monitoring programme **Timeline: 14 months after the publication of the BMP**	**Lead Implementing agent:** SANBI **Collaborators:** DEDEAT, CapeNature and Department of Environmental Affairs and Development Planning, landowners, communities
		Map all areas of the species distribution where wild harvesting is occurring.	The area where wild collection is carried out is clearly defined and its boundaries are established.	Production of harvesting maps across the South African range of the species **Timeline: 12 months and updated annually**	**Lead Implementing agent:** DEDEAT, Department of Environmental Affairs and Development Planning & CapeNature **Collaborators**

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Objective	Sub-Objective	Actions/Resources	Intended Outcome	Indicators/Due Date	Implementing Party
					SANBI & Industries
	Monitor legal, illegal and unregulated trade in *A. ferox*	Establish total quantity in trade (both legal, illegal and undocumented nationally, regionally and internationally and cross-check against results of resource assessment and provincial harvesting permits to determine whether continued off take is sustainable.	Database of CITES trade records for South Africa maintained by DFFE.	Updated CITES Trade database **Timeline: 12 months and updated annually**	**Lead Implementing agent:** DFFE **Collaborators** TRAFFIC, Aloe Council & Provincial authorities, SANBI
			Database of illegal and undocumented trade developed	Report on illegal and undocumented trade **Timeline: Within three years**	**Lead Implementing agent:** TRAFFIC **Collaborators:** SANBI, DFFE, DEDEAT, CapeNature
			Database of provincial harvesting permits per year is created and maintained.	Annual report of provincial harvesting databases **Timeline: 12 months and updated annually**	**Lead Implementing agent:** CapeNature & DEDEAT **Collaborators** TRAFFIC

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Objective	Sub-Objective	Actions/Resources	Intended Outcome	Indicators/Due Date	Implementing Party
			CITES Trade analysis using updated databases	Analysis report **Timeline: 18 months and updated annually**	**Lead Implementing agent:** SANBI **Collaborators** TRAFFIC
		To determine relevant management interventions to ensure sustainability	Harvest and trade data informs collection activities and sustainable offtake is guided by an adaptive management approach	Updated *Aloe ferox* NDF **Timeline: 36 months**	**Lead Implementing agent:** SANBI/Scientific Authority **Collaborators** DEDEAT, CapeNature, Department of Environmental Affairs and Development Planning & all stakeholders
		To determine whether the amended CITES annotation #4 has impacted the international trade in *A. ferox* specimens and how, the amended annotation #4 has affected the	Provide CITES secretariat with information pertaining to Decision 18.323 - 18.326 on the Annotation of Cape aloe (*Aloe ferox*)	Report from South Africa **Timeline: CITES COP19**	**Lead Implementing agent:** SANBI & DFFE **Collaborators** Scientific Authority, Industries/Aloe council

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Objective	Sub-Objective	Actions/Resources	Intended Outcome	Indicators/Due Date	Implementing Party
		population size, distribution, status, and harvest of *A. ferox*			
4. To ensure that collection and management activities are carried out under legitimate tenure arrangements and comply with relevant laws, regulations and agreements.	Tenure, management authority and land use rights are clearly defined for the collection of *A. ferox* in the wild.	Information is provided by collectors and industry to prove legal access or prior informed consent.	Ownership, tenure or land use rights of the collection area are clearly defined through documents such as land/title deeds, lease agreements, collection permits, prior informed consent, letters of permission from landowners and land registry records.	Available material transfer agreement **Timeline: On going**	**Lead Implementing agent:** DFFE/BABS unit **Collaborators** Industries/Aloe Council, DEDEAT, CapeNature, Department of Environmental Affairs and Development Planning and tribal authorities
	Implement & enforce legislative provisions and standardisation of the 3 legislative tools for the whole of Eastern Cape	Eastern Cape to revise and standardise (merge) its existing environmental legislations.	A single piece of legislation is passed by the provincial legislature and implemented.	Updated legislation gazetted **Timeline: 48 Months after the publication of the BMP (2022)**	**Lead Implementing agent:** DEDEAT **Collaborators:** All stakeholders

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Objective	Sub-Objective	Actions/Resources	Intended Outcome	Indicators/Due Date	Implementing Party
	Standardize as far as possible the management and control measures across the provinces in accordance with recommendations made in the Non-Detriment Finding (NDF) assessment for *A. ferox* to ensure effective conservation of the species across its range.	Establish a task team to determine where differing management, control and regulatory measures between the two provinces can be aligned.	Well managed resource base that is easy to control and monitor	Task-team established **Timeline: 48 Months after the publication of the BMP**	**Lead Implementing agent:** DFFE **Collaborators** TRAFFIC, CapeNature, SANBI, Aloe council, Tappers and Department of Environmental Affairs and Development Planning

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Objective	Sub-Objective	Actions/Resources	Intended Outcome	Indicators/Due Date	Implementing Party
	To make certain that all role players involved in the value-chain of *A. ferox* are well informed, equipped and trained on legislative aspects relating to the conservation and management of the species	Create awareness on the legislative provisions (compliance promotion to all relevant role players)	All roles players are aware and compliant with legislative provisions	Compliance with relevant legislation (determined by the number of reports and prosecutions) **Timeline: Ongoing**	**Lead Implementing agent:** DEDEAT & CapeNature **Collaborators** DEA&DP, Industry, Tribal Authorities and Communities
		Training and communication workshops are held at provincial level to improve the capacity of law enforcement officers and to inform traditional authorities and all stakeholders that supply *Aloe ferox* on how to report and manage non-compliance	Improved capacity of the law enforcement and compliance amongst harvesters Tribal Authorities including all harvesting stakeholders furnished with contact details of the relevant authorities	Number of training and communication workshops held at provincial level to improve the capacity of law enforcement officers and to inform traditional authorities and all stakeholders that supply *Aloe ferox* on how to report and manage non-compliance. **Timeline: Ongoing**	**Lead Implementing agent:** DEDEAT & CapeNature **Collaborators** DEA&DP, Industry, Tribal Authorities and Communities

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Objective	Sub-Objective	Actions/Resources	Intended Outcome	Indicators/Due Date	Implementing Party
5. To ensure that the customary rights of local and indigenous communities 'to access their land including indigenous/traditional knowledge associated with *A. ferox* and to manage collection/harvesting areas are recognised, respected and integrated into the permitting process/decision making process.	Agreement with local and provincial authorities are based on appropriate and adequate knowledge of livelihoods resource tenure, management requirements and resource value *A. forex*	Establish a mechanism to facilitate community liaison	Local communities' rights to use wild collected *A. forex* and manage communal collection areas shall be recognised and respected	Mechanism established and communities capacitated to manage their resource well **Timeline: Ongoing**	**Lead Implementing agent:** DEDEAT & CapeNature **Collaborators** Communities, Tappers, DFFE-BESU, Raymond Mhlaba, and Nelson Mandela municipalities
		Develop Biocultural Community Protocols	Documented customary system for accessing communal land to collect species and also obtain traditional knowledge associated with the species	The BCP developed Timeline: 36 months after the publication of the BMP	**Lead Implementing agent:** DSI & DFFE-BESU **Collaborators** Communities supported by DFFE, DSI, DEDEAT; SANBI, COGTA, District and Local Municipality
		To ensure that ABS considerations are implemented at a community level through coordination, monitoring,	Compliance of the ABS agreements and related regulations	Number of benefits shared for the resource Tangible benefits to communities are evident **Timeline: Ongoing**	**Lead Implementing agent:** Industries and Landowners **Collaborators** SANBI, DEDEAT, Industry, (DFFE: BABS) and other stakeholders

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Objective	Sub-Objective	Actions/Resources	Intended Outcome	Indicators/Due Date	Implementing Party
		compliance and enforcement of relevant ABS regulations			
		Undertake a research project on community livelihoods and development associated with *A. ferox* and the impact on the resource.	To unlock the maximum value of the resource for the country while also promoting fair value and equitable sharing of benefits and resilient of the resource.	Recommendations on equitable pricing Recommendations for integration on BSA's to ensure fair dispensation The total turnover generated by the industry of whether the industry is growing or not **Timeline: Ongoing**	**Lead Implementing agent:** DFFE **Collaborators** Industries, DFFE-BABS unit (for the implementation of a price to be paid to harvesters), communities.
6. To ensure that through fair and equitable sharing of benefits derived from the biotrade and bioprospecting of *A. ferox*, the conservation	Implement and enforce material transfer agreements and benefit sharing agreements	Explore and implement interventions that would enhance the conservation and management of the	At least two business and conservation initiatives implemented	Identification of the initiatives **Timeline: 12 months after the publication of the BMP**	**Lead Implementing agent:** DEA&DP and DEDEAT **Collaborators** Private landowners, DFFE-BABS Unit, Tribal

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Objective	Sub-Objective	Actions/Resources	Intended Outcome	Indicators/Due Date	Implementing Party
and sustainable use of the species is promoted and the livelihoods of communities are enhanced.	including permitting system provisions of NEMBA and the BABS Regulations.	resource through a holistic business and conservation approach with organisations such as the Cape Aloe movement		The conservation value and benefits derived are well documented and traceable **Timeline: Implementation starts 24 months after the publication of the BMP**	conservation authorities, Industry & Communities
7. To promote transnational management of *A. ferox* across its natural range in South Africa and Lesotho.	To understand existing conservation measures in Lesotho and to develop a conservation plan based on the available knowledge and preliminary research findings	To work with Lesotho Government through the MDTPA structures (Biodiversity and Protected Area Working Group) to understand existing *A. ferox* harvest and conservation measures in Lesotho	Inform the MDTPA of the BMP and to understand the existing knowledge of *Aloe ferox* in Lesotho Obtain buy in from Lesotho for future conservation actions	Records of decisions for the MDTPA meetings **Timeline: 12 Months after the publication of the BMP**	**Lead Implementing agent:** DFFE, Lesotho Department of Environment & MDTPA **Collaborators:** DEA&DP & CapeNature

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Objective	Sub-Objective	Actions/Resources	Intended Outcome	Indicators/Due Date	Implementing Party
		Liaise with Lesotho Government to consider conducting preliminary research into volumes of *A. ferox* being harvested and traded from Lesotho and develop a conservation action plan for *A. ferox* to ensure co-management of the resource if necessary	Lesotho considers the conservation plan for *A. ferox*	Conservation action plan developed **Timeline: 36 Months after the publication of the BMP (dependent on outcome of preliminary research)**	**Lead Implementing agent:** DFFE, Lesotho Department of Environment & MDTPA **Collaborators:** Industries, TRAFFIC & NGO's

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6. Implementation Mechanism

The Eastern Cape Department of Economic Development, Environmental Affairs and Tourism is the lead implementing agent for this BMP. An *Aloe ferox* community of practice is going to be established to assist in overseeing the implementation of the BMP.

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BIODIVERSITY MANAGEMENT PLAN FOR TWO HONEYBUSH SPECIES (*CYCLOPIA SUBTERNATA AND CYCLOPIA INTERMEDIA*)



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DEFINITIONS

In this BMP, unless the context indicates otherwise, a word or expression defined in the Biodiversity Act or Protected Areas Act or the Norms and Standards for the development of BMPs has the same meaning.

Biotrade means the buying and selling of milled, powdered, dried, sliced or extract of indigenous genetic and biological resources for further commercial exploitation.

DFFE EIA screening tool means the web-based national screening tool[1] used by proponents intending to submit applications for environmental authorisation in terms of the Environmental Impact Assessment (EIA) Regulations 2014 (as amended), to identify any environmental sensitivities that might affect their proposed development site.

Industry: All organisations and stakeholders involved in the commercial honeybush sector, including *inter alia* industry associations, honeybush farmers and landowners, harvesters, processors, sellers, etc.

IUCN Red Data List means a global or national list providing information on a species' risk of extinction (usually by a taxonomic group) and prepared under the auspices of the International Union for the Conservation of Nature.

Role player means a natural or juristic person(s) who have a direct role to play in the implementation of the Biodiversity Management Plan for the species and whose role is captured in this Biodiversity Management Plan.

Species means a kind of animal, plant or other organism that does not normally interbreed with individuals of another kind, and includes any sub-species, cultivar, variety, geographic race, strain, hybrid or geographically separate population.

Threat means any action that causes a decline and compromises the future survival of a species or anything that has a detrimental effect on a species.

Virgin land means land containing indigenous vegetation (i.e., indigenous plant species occurring naturally in an area), regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

[1] https://screening.environment.gov.za/screeningtool/#/pages/welcome

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LIST OF ACRONYMS

ABS	Access and Benefit Sharing
AGRISETA	Agriculture Sector Education Training Authority
AIS	Alien Invasive Species (as defined by NEM:BA)
ARC	Agricultural Research Council
BABS	Bioprospecting, Access and Benefit Sharing
BMP	Biodiversity Management Plan
BMP-S	Biodiversity Management Plan for species
BSA	Benefit-Sharing Agreement
CARA	Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983)
CBA	Critical Biodiversity Area
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Fauna and Flora
COP	Conference of the Parties
CSIR	The Council for Scientific and Industrial Research
DALRRD	Department of Agriculture, Land Reform & Rural Development
DEA&DP	Western Cape Department of Environmental Affairs and Development Planning
DEDEAT	Eastern Cape Department of Economic Development, Environmental Affairs and Tourism
DFFE	Department of Forestry, Fisheries, and the Environment
DFFE (RCSM)	Branch Regulatory Compliance and Sector Monitoring of the Department of Forestry, Fisheries and the Environment
DFFE (NRM)	Branch Natural Resource Management of the Department of Environment, Forestry and Fisheries
DSI	Department of Science and Innovation
ECPTA	Eastern Cape Parks and Tourism Agency
EIIF	Ecosystem Infrastructure Investment Framework (WC)
ESA	Ecological Support Area
FPA	Fire Protection Association
GDP	Gross Domestic Product
GREF	Garden Route Environmental Forum
HCoP	Honeybush Community of Practice
IDPs	Integrated Development Plans
IUCN	International Union for Conservation of Nature
M&E	Monitoring and Evaluation
NEMBA	South Africa's National Environmental Management: Biodiversity Act 10 of 2004
NDF	Non-Detrimental Findings
NPGRC	The National Plant Genetic Resources Centre of South Africa
SDFs	Spatial Development Frameworks
SAHTA	South African Honeybush Tea Association
SANBI	South African National Biodiversity Institute
SANPARKS	South African National Parks
SCLI	Southern Cape Landowners Initiative

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TOPS	Threatened or Protected Species
UCT	University of Cape Town
WCDoA	Western Cape Department of Agriculture

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The authors also wish to additionally acknowledge the many stakeholders who took part in workshops, meetings and calls for comments – for a list of workshop participants please see *Appendix A: List of stakeholder workshops with participants.*

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EXECUTIVE SUMMARY

Honeybush species (members of the genus *Cyclopia* Vent.) are endemic to the Western and Eastern Cape provinces of South Africa. The distribution range of *Cyclopia* extends from the Cedarberg north of Citrusdal, southwards to the Cape Peninsula and eastwards to Port Elizabeth. *Cyclopia* species have been used commercially since the 19th century for the production of honeybush tea, a caffeine-free beverage considered by many to provide a range of health benefits.

Cyclopia subternata and *Cyclopia intermedia* are amongst the *Cyclopia* species that are currently declining in the wild due to a number of challenges, including (amongst others): (i) ongoing illegal harvesting within communal lands and nature reserves, as well as on private farms where land owners are absent; (ii) the removal of excessively large quantities of plant material too frequently, resulting in overharvested, unhealthy populations; (iii) an expansion of human settlement and agricultural lands into areas where the species occurs; and (iv) invasive alien encroachment by species such as black wattle (*Acacia mearnsii*) and pine (*Pinus sp*.) that shade out indigenous plants such as honeybush. Impacts from these threats may vary across the species distributions. Although *C. subternata and C. intermedia* are commonly used in the commercial tea industry, they are both classified as Least Concern in accordance with the International Union for Conservation of Nature's (IUCN) red list criteria. However, a proper management plan and regulation is needed to ensure that sustainable harvesting and best practice takes place within this sector.

This Biodiversity Management Plan (BMP) was drafted following the Norms and Standards for the development of BMP-S which came into force in March 2009 and in terms of section 43 of the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA). As part of developing the BMP stakeholders were identified and several engagements took place from 2018 to 2020. Stakeholders ranged from national government and their entities, provincial conservation authorities, Non-Governmental Organisations (NGOs), the private sector, communities, and academia.

The aim of this BMP is to ensure the long-term survival of *C. subternata and C. intermedia* populations in the wild, whilst safeguarding and respecting the livelihoods of stakeholders. Specific activities need to be undertaken to enable the sustainable utilisation of the species whilst ensuring that systems are in place to monitor ongoing impacts of commercial extraction. To achieve this aim, seven objectives have been identified during the development of the BMP as indicated below. These are supported by several actions as per the action plan of this BMP.

- To ensure that wild collection of *C. subternata* and *C. intermedia* is carried out in an ecologically sound and sustainable manner that maintains long-term survival of the species in the wild.
- To ensure that wild collection of *C. subternata* and *C. intermedia* does not adversely affect the environment, including ecosystem function.
- To ensure that collection and management activities are carried out under legitimate tenure arrangements and comply with relevant laws, regulations and agreements.
- To ensure that through fair and equitable sharing of benefits derived from the biotrade and bioprospecting of *C. subternata* and *C. intermedia*, the conservation and sustainable use of honeybush species is promoted.

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- To ensure wild collection of *C. subternata* and *C. intermedia* is based upon adaptive, practical, participatory and transparent management practices.
- To inform management practices that can rationally be applied to other commercial *Cyclopia* species, whether reseeders or resprouters.
- To ensure the protection/management of genetic *C. subternata* and *C. intermedia* resources.

The BMP is therefore not an exhaustive research document but has been informed by best practice and available science brought together and synthesized from the inputs of the broad spectrum of stakeholders in the honeybush society.

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1. INTRODUCTION AND WHY THE SPECIES NEED A BMP

1.1 Introduction

Honeybush species (members of the genus *Cyclopia* Vent.) are endemic to the Western and Eastern Cape provinces of South Africa. The distribution range of *Cyclopia* extends from the Cedarberg north of Citrusdal, southwards to the Cape Peninsula and eastwards to Port Elizabeth. *Cyclopia* species have been used commercially since the 19th century for the production of honeybush tea, a caffeine-free beverage considered by many to provide a range of health benefits. The tea is generally thought to have a pleasant taste and aroma. Species occur as components of fire-prone fynbos vegetation on both coastal plains and in mountainous regions of the Cape Floristic Region. They are all long-lived perennials, varying from tall, erect, tree-like shrubs to slender, woody subshrubs or small, loose, sprawling shrublets. Adaptations to survive recurrent fires have had a major influence on the life strategies and habit of all the species in the genus (Le Maitre & Midgley, 1992; Schutte *et al*., 1995). Honeybush species have two main fire survival strategies: sprouters (often also referred to as 'resprouters') and non-sprouters (often also referred to as 'reseeders'). Sprouters have a woody rootstock from which new coppice shoots are produced after fire, resulting in a multi-stemmed appearance at ground level. Non-sprouters, on the other hand, lack a woody rootstock. They are obligate reseeders (they can only regenerate from seed after fire) and are easily recognized by the presence of a single main stem, at least at ground level (Schutte, 1997). Of the 23 currently recognised *Cyclopia* species, it is primarily seven species, namely *Cyclopia intermedia* ("bergtee"), *Cyclopia subternata* ("vleitee"), *Cyclopia longifolia* ("Van Stadens tea"), *Cyclopia genistoides* ("kustee"), *Cyclopia maculata* ("Genadendaltee"), *Cyclopia plicata* ("Naaldblaartee") and *Cyclopia sessiliflora* ("Heidelbergtee") that support South Africa's commercial honeybush industry value chain. These species have particular ecological requirements and accordingly require tailored management protocols. *C. genistoides* a small, multi-branched, resprouting woody shrub, is commonly cultivated for commercial purposes and occasionally harvested in the wild and is not the subject of the current BMP-S. This BMP-S focuses on *C. intermedia* and *C. subternata*, which are primarily harvested from the wild. *C. subternata* is a single-stemmed reseeder, whilst *C. intermedia* is a multi-stemmed resprouter.

1.2 The need for a biodiversity management plan for *c. Subternata and c. Intermedia*

C. subternata and C. intermedia are amongst the *Cyclopia* species that are currently declining in the wild due a number of challenges, including (amongst others); (I) ongoing unlawful harvesting, destined for international trade, within communal lands and protected areas, as well as on private farms where land owners are absent; (II) the removal of excessively large quantities of plant material too frequently, resulting in overharvested and unhealthy populations; (III) expansion of human settlement and agricultural lands into areas where the species occurs, and; (IV) invasive alien plant encroachment by species such as black wattle (*Acacia mearnsii*) and pine (*Pinus* spp.) that shade out indigenous plants such as honeybush (McGregor, 2018). Impacts from these threats may vary across the species distributions. Other wild harvested species affected by the same issues are *C. plicata*, *C. sessiliflora* and *C. maculata.*

In terms of choosing which species to include in this BMP, after extensive stakeholder consultation the decision was made to focus on *C. subternata* and *C. intermedia* in this first iteration of the BMP. The reasons behind this decision can be summarised as follows:

- Together, *C. subternata* and *C. intermedia* make up approximately 95% of the wild harvested honeybush crop (see section 3.1). As such, by focussing on these two species this BMP should

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address the sustainable use and conservation of the vast majority of wild-harvested honeybush, as well as much of the general environmental impact resulting from wild honeybush harvesting activities.

- *C. subternata* and *C. intermedia* represent the two major fire survival strategies used by *Cyclopia* species (reseeders and resprouter; see section 1.1) which impact on their sustainable management as such the management actions outlined for these two species can likely also be applied to the remaining *Cyclopia* species that are harvested in the wild which are not currently included in the BMP.
- In terms of available resources and capacity to implement a BMP, it became clear through the ongoing stakeholder engagement process that the actors that would be responsible for implementation possess very limited capacity and funding to implement the actions contained in the BMP. It was accordingly considered impractical to currently include in the BMP all *Cyclopia* species that are utilised by the honeybush industry.
- It is anticipated that once the updated TOPS regulations are gazetted and implemented that they will support sustainable utilisation of commercial *Cyclopia* species that are not yet included in this BMP.
- A BMP is inherently focussed on the sustainability of wild species in their natural habitat, as opposed to managing species that are currently mostly sourced from cultivated crops, e.g. *C. genistoides* (a notable exception to this is management of the potential genetic contamination of wild populations from cultivated species, which is therefore included in this BMP). In this regard it is anticipated that the BMP and the Sector Development Plan for honeybush that is currently being development will mutually support each other.

2. AIMS AND OBJECTIVES OF THE BMP

2.1 The aim

The aim of this BMP is to ensure the long-term survival of *C. subternata and C. intermedia* populations in the wild, whilst safeguarding and respecting the livelihoods of stakeholders. Specific activities need to be undertaken to enable the sustainable utilisation of the species whilst ensuring that systems are in place to monitor ongoing impacts of commercial extraction.

2.2 The objectives of the management plan:

- To ensure that wild collection of *C. subternata and C. intermedia* is carried out in an ecologically sound and sustainable manner that maintains long-term survival of the species in the wild.
- To ensure that wild collection of *C. subternata and C. intermedia* does not adversely affect the environment, including ecosystem function.
- To ensure that collection and management activities are carried out under legitimate tenure arrangements and comply with relevant laws, regulations and agreements.
- To ensure that through fair and equitable sharing of benefits derived from the biotrade and bioprospecting of *C. subternata* and *C. intermedia,* the conservation and sustainable use of honeybush species is promoted.
- To ensure wild collection of *C. subternata and C. intermedia* is based upon adaptive, practical, participatory and transparent management practices.

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- To inform management practices that can rationally be applied to other commercial *Cyclopia* species, whether reseeders or resprouters.
- To ensure the protection/management of genetic *C. subternata* and *C. intermedia* resources.

3. CONSERVATION STATUS AND LEGISLATIVE CONTEXT

3.1 Conservation status

Although *C. subternata and C. intermedia* are commonly used in the commercial tea industry and sourced mostly from the wild, they are both classified as Least Concern (declining) by the Red List of South African Plants in accordance with the International Union for Conservation of Nature's (IUCN) red list criteria (Schutte-Vlok & Raimondo 2016). Honeybush is used as a tea and/or ingredient in various commercial products and is increasing in popularity such that the rate of demand is likely to exceed the current capacity of supply. The wild harvested crop is still the mainstay of the industry making up 70% of the annual processed honeybush tea crop (G. McGregor, personal communication, 7 December 2020) of 289 tons[2] (McGregor 2017a). *C. subternata* and *C. intermedia* are not presently considered to be threatened with extinction, but they are under pressure from harvesting: *C. intermedia* makes up 85% of the wild harvested crop and *C. subternata* contributes 10% (McGregor 2017a). Ongoing unsustainable harvesting practices are impacting the species and populations of both species are reported to be declining (Schutte-Vlok & Raimondo 2016). Proper management and regulation are needed to ensure that sustainable harvesting and best practise takes place within this sector.

3.2 Legislative context

3.2.1 Applicable international agreements

The following international treaties and conventions to which South Africa is Party are relevant and important to consider (De Villiers & McGregor 2017):

The Convention on Biological Diversity (CBD)

This Convention has three main objectives, namely; the conservation of biological diversity; sustainable use of its components; and the fair and equitable sharing of benefits arising from the utilization of genetic resources. South Africa has ratified the CBD in 1995. Although it is a non-enforceable Convention, becoming a Party to the CBD does entail acceptance of the Articles and Objectives of the Convention, which include *inter alia*; establishing methods to monitor and conserve biodiversity and engaging in fair and equitable benefit sharing. Accordingly, South Africa's National Environmental Management: Biodiversity Act, 2004 [(Act no.10 of 2004 (NEMBA)] has been promulgated to enable South Africa to meet its commitments to the Convention. The Conference of the Parties (COP) is the governing body of the CBD and advances implementation of the Convention through the decisions it takes at its periodic meetings.

[2] The average annual production of processed honeybush tea between 2006 and 2019 was 289 tons per year, with a very high average of 542 tons in 2010 to 2012, dropping to 250 tons per year in 2017 to 2019 (McGregor 2017a).

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Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (ABS)

South Africa ratified this Protocol in 2013. The Nagoya Protocol on ABS is a supplementary agreement to the CBD and provides a legal framework for the effective implementation of the third objective of the CBD, namely the fair and equitable sharing of benefits arising from the utilization of the genetic resources. This protocol also sets out rules for access to genetic resources for both provider and user countries. It also includes specific obligations to support compliance with national legislations and regulations of the countries providing access to genetic resources and their associated traditional knowledge. These compliance provisions contribute in ensuring the sharing of benefits when genetic resources leave the provider countries.

The Aichi Biodiversity Targets and biodiversity mainstreaming

The CBD in 2010 adopted the Strategic Plan for Biodiversity 2011-2020 at the 10th Meeting of the Parties (COP) in Nagoya, Japan. To achieve global biodiversity conservation the plan outlines 20 Aichi Targets including Target 12 which is particularly relevant for the purposes of the BMP-S, viz.: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained. The Aichi targets were due in 2020 and will be replaced by the Post-2020 Global Biodiversity Framework, which has yet to be finalised.

Convention on International Trade in Endangered Species of Fauna and Flora (CITES)

Neither *C. subternata* nor *C. intermedia* are included in any of the CITES appendices despite it being an internationally traded species. This is due largely to there being no evidence to date that trade is causing a significant threat to the survival of these species in the wild.

3.2.2 Applicable National Legislation

The South African environmental policy framework is defined by the Constitution, the National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA), the subsidiary Threatened or Protected Species (TOPS) Regulations of 2007 and, the Bioprospecting Access and Benefit Sharing (BABS) Regulations of 2008 as amended in 2015. These are introduced below (De Villiers & McGregor 2017).

The Constitution of the Republic of South Africa of 1996

The Constitution provides the starting point from which to consider the administration of environmental law. It is the supreme founding law of the democratic, post-apartheid South Africa that fundamentally defines the country's legal and administrative order and enshrines a Bill of Rights which applies to all law and is binding on all organs of state. In the context of *C. subternata* and *C. intermedia* harvesting, trade and regulation, section 24 of the Constitution stipulates that everyone has the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent ecological degradation and secure ecologically sustainable use of natural resources while promoting justifiable economic and social development. In addition, section 33 of the Constitution stipulates that everyone has the right to administrative action that is lawful, reasonable and procedurally fair and, in the event that such rights have been adversely affected by administrative action, the right to be provided with written reasons.

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The National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA)

NEMBA provides for the management and conservation of biological diversity within South Africa, including the use of indigenous biological resources in a sustainable manner and, the fair and equitable sharing among stakeholders of benefits arising from bioprospecting involving these indigenous biological resources. This Act also gives effect to ratified international agreements relating to biodiversity which are binding on South Africa. The Minister may, in terms of Section 56 of the NEMBA and by notice in the Government Gazette, publish a list of species that are threatened or in need of national protection (Threatened or Protected Species, TOPS). Section 57 of the NEMBA makes provision for the restriction of activities involving listed TOPS, which is relevant to the harvesting of *C. subternata* and *C. intermedia* in the wild. Section 43 of the NEMBA also makes provision for the development of Biodiversity Management Plans for Species (BMP-S) as a tool to manage high value species such as *C. subternata* and *C. intermedia*.

Threatened or Protected Species (TOPS) Regulations – 2007

The initial TOPS regulations published in 2007 did not include reference to *C. subternata* and *C. intermedia*. However, the latest draft list of TOPS regulations, published with amendments to the regulations on 31 March 2015, included the listing of both *C. subternata* and *C. intermedia* as protected species.

To date the Eastern Cape DEDEAT issues provincial permits for various activities relating to wild honeybush harvesting, cultivation and processing, whereas none of the *Cyclopia* species have a protected status in the Western Cape. However, it is anticipated that once the updated TOPS lists and regulations are published a standardised permitting system will be implemented across both provinces which will then more effectively address unlawful harvesting.

Bioprospecting Access and Benefit Sharing (BABS) Regulation of 2008 as amended in 2015.

Chapter 6 of the National Environmental Management: Biodiversity Act (2004) provides a framework for regulating Bioprospecting, Access and Benefit-Sharing in South Africa. Associated with the legislation the Bioprospecting, Access and Benefit Sharing (BABS) Regulations, 2008 as amended in 2015 were gazetted. The purpose of these regulations is to: a) prescribe the notification process for the discovery phase of bioprospecting involving any indigenous genetic and biological resources contemplated in section 81A (2) of the Act; b) prescribe the permit system set out in Chapter 7 of the Act insofar as that system applies to bioprospecting involving any indigenous genetic and biological resources or export from the Republic of any indigenous genetic and biological resources for the purpose of bioprospecting or any other kind of research; c) set out the form and content of, and requirements and criteria for benefit-sharing and material transfer agreements; and d) set out the administration process of the Bioprospecting Trust Fund.

In the absence of a sector-wide benefit-sharing agreement between the holders of traditional knowledge on honeybush and the honeybush industry (such as currently exists for the rooibos industry), there has been a delay in the industry complying with BABS regulations. Compliance with BABS regulations should also lead to advances in the sustainable use and conservation of honeybush species.

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Protection, Promotion, Development and Management of Indigenous Knowledge Systems Act 6 of 2019

Of significance and relevance to this BMP is the Protection, Promotion, Development and Management of Indigenous Knowledge Systems Act, 2019, which was signed in to law in August 2019. The aim of the act is to prevent the unauthorised use and misappropriation of knowledge developed over time by the country's indigenous communities. It promotes use of the knowledge "in the development of novel, socially and economically applicable products and services." (RSA, 2019) but only with appropriate involvement and compensation for the indigenous knowledge holders. A National Indigenous Knowledge Systems Office (NIKSO) will be established that will be responsible for the management of the rights of indigenous communities. The promulgation of this Act aligns directly with the Aichi Biodiversity Targets 16 and 18 which deal respectively with the fair and equitable sharing of benefits arising from their utilisation (ABS) and legislation for the protection, incorporation and integration of traditional people and their knowledge in biodiversity management.

Provincial ordinances that regulate C. subternata and C. intermedia harvesting in the wild

Wild harvesting of *C. subternata* and *C. intermedia* is also controlled by the respective provincial biodiversity conservation authorities in the Eastern Cape and Western Cape provinces. The Eastern Cape authorities rely on the Nature and Environmental Conservation Ordinance 19 of 1974 ('the Ordinance') which has subsequently been published as Western Cape Nature Conservation Laws Amendment Act 3 of 2000 in the Western Cape. No *Cyclopia* species are listed as protected flora in the Western Cape but both *C. subternata* and *C. intermedia* are listed on the protected Schedule 4 of the Ordinance in the Eastern Cape. As of 2012 the Eastern Cape has been the only Province that could provide permits for the honeybush tea industry through registering honey bush tea sellers and growers. As soon as the new TOPS regulations have been published to include honeybush tea species, both Provinces will be able to implement the same set of legislation for the first time, which is important for adequate oversight of the industry. The Western Cape Biodiversity Bill is also currently in the process of approval by Parliament to be promulgated.

4. INFORMATION PERTINENT TO THE CONSERVATION OF THESE SPECIES

4.1 Diversity within species

The genus *Cyclopia* Vent. is a member of the tribe Podalyrieae in the Fabaceae (legume) family. This morphologically diverse genus was established by Ventenat in 1808; the most recent taxonomic revision recognised 23 species in five sections (Schutte 1997). Most species are well defined and may be separated using a combination of morphological characters (Schutte 1997). This study acknowledged however, that the taxonomy of some species would benefit from further study, particularly in those taxa in which both sprouting and non-sprouting (reseeding) forms occur. *C. subternata* exhibits little morphological variation across its range, apart from the size of its leaflets and the length of the flower stalks. *C. intermedia* shows considerable variation across the species range in the size of the calyx lobes and bracts. Both of these species show considerable genetic and chemical variation across their ranges (Schutte 1997; Stander *et al.* 2019; Galuszynski 2020).

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4.2 Distribution and habitat requirements

C. subternata is widely distributed along the coastal plains and mountain ranges of the southern Cape region (Tsitsikamma, Outeniqua and Langeberg mountains), where it occurs on southern aspects at altitudes between 160 and 1000 m a.s.l. (see map on page 10), often in close proximity to seeps or drainage areas. *C. intermedia* is the most widespread of all *Cyclopia* species, found at altitudes of between 500 and 1700 m a.s.l. across both inland and coastal mountain ranges that include the Witteberg, Anysberg, Swartberg, Touwsberg, Rooiberg, Kammanassie, Kouga, Baviaanskloof, Langeberg, Outeniqua, Tsitsikamma and Van Stadens mountains (see Figure 1). It is therefore adapted to more arid habitats. Both species are long-lived perennials that occur in stony and loamy soils with low pH. Plants of *C. subternata* are erect, single-stemmed shrubs up to 3.2 m tall, which do not resprout after fire as they lack a woody rootstock from which to do so. In contrast, plants of *C. intermedia* are robust, multi-stemmed shrubs that are able to sprout from a woody rootstock after fire. They attain a height of up to 2 m (Vlok & Schutte-Vlok, 2010).

4.3 The statement of threats adversely affecting these two species

Threats associated with *C. subternata* and *C. intermedia* include the unsustainable and sometimes unlawful wild harvesting of plants for the honeybush tea and related bioprospecting industries; habitat loss and degradation; alien invasive species (AIS); as well as inappropriate fire management and extended drought periods. These threats have resulted in the decline of the species in some areas (Schutte-Vlok & Raimondo 2016a; Schutte-Vlok & Raimondo 2016b) and display a varying degree of impacts on the natural occurrence of healthy *C. subternata* and *C. intermedia* populations. Some information on each threat is presented below.

4.3.1 Lack of control of harvesting and over harvesting

This occurs in areas characterized by communal land ownership, absentee landlords and a lack of policing in easily accessible formally protected areas, or in the form of poaching in out-of-sight areas on farms and protected areas. The unsustainable or overly frequent harvesting of biomass, or unplanned harvest intervals, leads to a decline in *C. subternata* and *C. intermedia* plant survival, abundance and biomass. This in turn leads to a decline in seed set and soil stored seed banks, resulting in less seeds available for regeneration after fires. The extent to which the harvest and trade in *C. subternata* and *C. intermedia* is detrimental and poses a risk to populations in the wild will be determined through the undertaking of a non-detriment finding assessment for these species. Through this process the vulnerability of these species will be assessed in relation to how well they are managed.

4.3.2 Land transformation

This refers mainly to the expansion of agricultural activities, infrastructure development and urban sprawl into areas where *C. subternata* and *C. intermedia* would naturally grow. Examples include the development of fruit orchards and timber plantations as well as settlements and tourist resorts across the species' distribution range. An emphasis on strengthening law enforcement capacity and facilitation to enable legal compliance (with e.g. NEMA and CARA) is needed.

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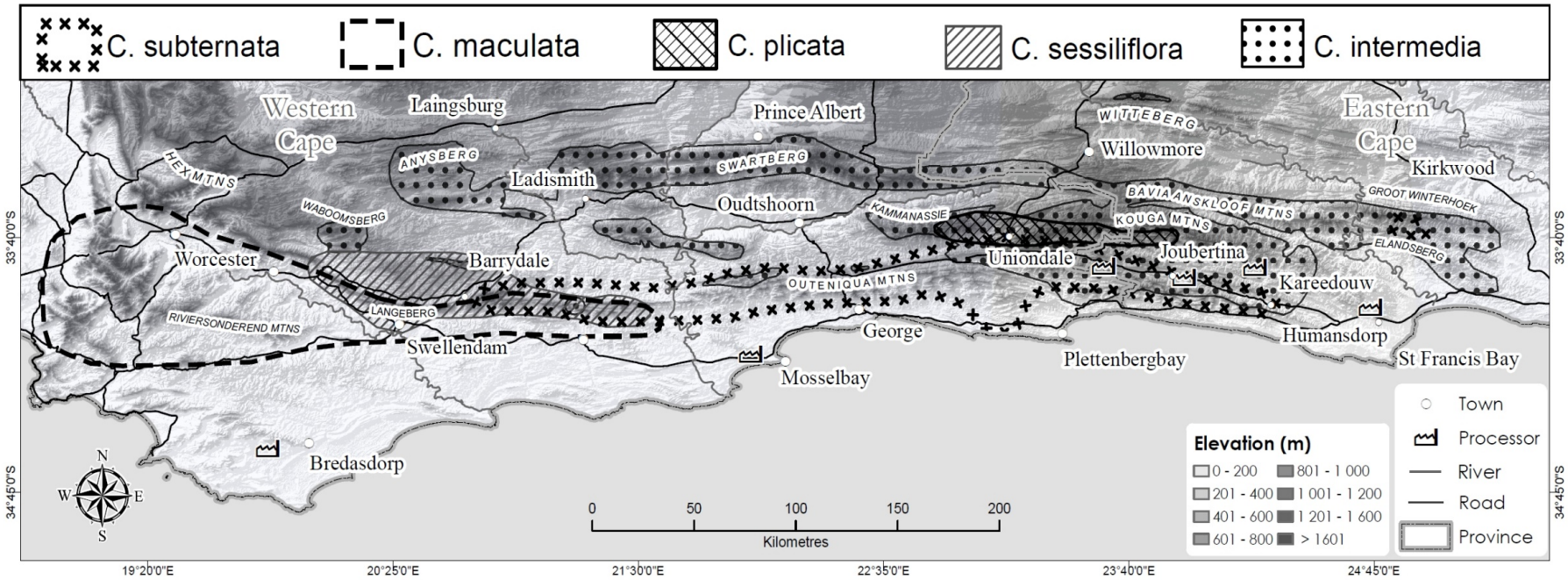


Figure 1: Distribution map of the areas where the five wild harvested Cyclopia species occur (adapted from McGregor, 2018).

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4.2.3 Alien plant invasion

There is widespread alien plant invasion in much of the honeybush-bearing land. On mountain slopes and along drainage lines, plants such as *Acacia mearnsii, Hakea sericea* and *Pinus sp.* out-compete many fynbos species including *C. subternata* and *C. intermedia*, leading to reduced population sizes. Alien species occur as dense stands or individual plants, and while the dense stands are extremely difficult to eradicate, their expansion should at least be held in check. Scattered individual alien plants are in some instances relatively easy to eradicate and should be targeted by landowners for removal as soon as possible to prevent further spread. Where practical, these lower density infestations should also be a place for targeted bio-control release. Invasive alien plant infestations may also lead to higher intensity fires as these plants take longer to be consumed by the fire, resulting in high seed mortalities in the soil.

4.3.4 Unnatural fire regimes

Fires that burn at too-short return intervals can reduce the diversity of a fynbos system by destroying the slow-maturing, overstorey, non-sprouting *Protea* and *Leucadendron* species in fynbos systems (Vlok & Yeaton, 1999; Vlok & Yeaton, 2000; Kraaij & Van Wilgen, 2014). Research has shown that these species play an important role in maintaining species diversity in fynbos ecosystems. The threshold for fire return interval needs to be identified for relevant catchment areas, as this would differ from the coastal mountains to the arid inland mountains. Through competitive interactions these *Protea* and *Leucadendron* species ensure that sprouters (resprouters) do not outcompete other species, and that gaps are created for seedlings (of e.g. *Cyclopia* species) to colonise and establish after fires. Conversely, the absence of fire over many years causes honeybush populations to decline as *C. subternata* and *C. intermedia* plants are outcompeted by other fynbos species and are reduced to scraggly, unharvestable forms.

Cyclopia species are vulnerable to short return interval fires and droughts – both of which are features of a climate change influenced present and future (DEA&DP, 2017). All *Cyclopia* species are dependent on periodic fires. Seeds are ant-dispersed and dependent on the heat of fire to stimulate germination; fire kills soil pathogens and creates gaps for species to colonise and seedlings to establish and manifest themselves. *Xylocopa* (Carpenter) bees are the effective pollinators of honeybush species and are part of the solitary group of bees that make their homes in the dead branches of e.g. previously burnt *Protea* plants. They are therefore also affected by fire regimes.

4.3.5 Genetic contamination

Genetic contamination results from the human-induced flow of genes from plants of one population to those of another population through pollination, with possible hybridisation events or infraspecific genetic shifts. The establishment of cultivated honeybush orchards in close proximity to naturally occurring wild populations of *C. subternata* and *C. intermedia* is recognised as a threat to the genetic integrity of these species. There are potentially serious downstream consequences, such as progeny with weakened genetic bases that are unable to adapt to climate change. It is considered important to protect and buffer

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wild/undomesticated types to conserve their genetic diversity for use in selective honeybush breeding (as is done often and successfully with other commercial crop plants such as tomatoes, potatoes etc.).

Bringing in or establishing foreign genetic material (e.g. from another location or species) into natural areas through broad cast sowing of seeds or planting seedlings is a serious threat. *C. intermedia* is a variable species that is genetically diverse, with populations from the inland mountains (Witteberg, Anysberg, Swartberg, Touwsberg, Rooiberg, Kammanassie, Gamkaberg) having longer calyx lobes and bracts, and those from the Kouga, Baviaanskloof and coastal mountains having rounded calyx lobes and bracts. Detailed studies on the genetic variation between populations of species have indicated that there is great variability between populations (Galuszynski, 2020; Galuszynski and Potts, 2020a, 2020b). There is major concern that movement of genetic material from these different ecotypes into other areas will result in genetic contamination or hybridisation (Potts, 2017); especially if augmentation is considered. It is only by retaining the richness in diversity that genetic fitness will be ensured.

4.3.6 Pests and disease

Cultivation plot establishment could potentially also result in the proliferation of emerging crop pests to natural populations of *C. subternata* and *C. intermedia*. These pest introductions could not only reduce the biomass of plants available for wild harvesting but could act as a reservoir for the re-infestation of cultivation sites.

4.3.7 Retention of germplasm and related information within South Africa

The Honeybush industry in South Africa is making a meaningful economic contribution to the country. Should the honeybush species be grown outside the country it will result in a loss of opportunity in Gross Domestic Product (GDP) contribution, profit and employment. These losses would represent a reduction in benefits to share and hence result in a possible decline in the desire and efforts to conserve *Cyclopia* species.

4.3.8 Climate Change and Drought

In response to climate change the fynbos biome is known to be particularly vulnerable - it is likely to contract with loss of an estimated 51-65% of its unique fynbos bioclimatic conditions (Midgley et al. 2002). The combined effect of alien invasive species and more frequent fire returns is likely to cause biodiversity loss and reduced ecosystem functioning (Foden et al, 2018). The physical requirements of suitable habitat have been noted for Honeybush: in decreasing order of importance: soil type, rainfall seasonality, rainfall, aspect, elevation above sea level, and temperature (WCDoA, 2016). Climate change research that included the honeybush-producing areas of the Western Cape has shown that climate-related impacts on honeybush could include reduced seed germination and seedling success due to increased drought frequency during winter, impacts on yield due to erratic rainfall, increased impact from fungal soil-borne diseases due to water logging as a result of increased heavy rainfall events, and impacts from an overall increase in high fire risk conditions (WCDoA, 2016). As a result of these impacts, wild honeybush could experience decreases in population sizes and increased habitat fragmentation, particularly in marginal areas, which will result in a loss of genetic resources (WCDoA, 2016). Changes in pest and disease complexes could affect cultivated honeybush, while there may be changes in which areas are suitable/unsuitable for honeybush production (WCDoA, 2016). Stressed plants would also likely be susceptible to a broader range of pests and diseases that have not yet been identified. Models

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estimating the potential impact of intermediate and worst-case scenarios of climate change on *C. intermedia* shows a projected range loss of 25% on average (G. McGregor, personal communication).

4,4 Use value of *C. intermedia* and *C. subternata*

Local use of the plants can be dated back to the 1800's when leafy shoots and flowers were dried to make 'tea-water' (Latrobe, 1818). Extractions of the plants were also used to treat illnesses related to the respiratory system (Bowie, 1830). Today, the dried leaves and stems of *Cyclopia* species are used to make quality herbal-tea products for which there is a large and growing global demand. Of all the utilised species, *C. subternata* and *C. intermedia* are known to produce very good quality teas making them two of the most popular species in the industry. Honeybush extracts can also potentially be used as preservatives or flavourings in ready-to-drink beverages such as iced tea, fruit juice blends and sweets, or as fragrances in cosmetic products. International patents have already been registered regarding the use of honeybush extracts to replace the existing preservatives used in wine, beer and cider.

5. PLANNING METHODOLOGY

5.1 Identified role players

Stakeholders were identified through a literature review as well as in consultation with the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) through the Honeybush Community of Practice (HCoP) group. During the stakeholder identification process, the names and contact details of stakeholders were registered on a database of interested and affected parties. The database is to be used to:

- Capture all details pertaining to identified stakeholders (names, contact details, etc.) so that they can be notified of the proposed project;
- Invite stakeholders to scheduled stakeholder workshops; and
- Update stakeholder details as the process proceeds.

5.2 Description of the process followed in drawing up this BMP

The planning methodology or the processes to be used in the development of the Biodiversity Management Plans for species (BMP-S) is outlined in terms of section 5 of the Norms and Standards for BMP-S.

5.3 Process for stakeholder consultation

Several versions of early drafts of the BMP were distributed for targeted stakeholder comment via the HCoP, and the following stakeholder groups were consulted via a series of workshops:

- National Government Stakeholders [e.g., Department of Forestry, Fisheries and the Environment (DFFE)];
- Parastatal (e.g., SANBI, CapeNature, ECPTA, SANParks);
- Provincial Government Stakeholders (e.g., DEDEAT, DEA&DP, WCDoA);
- Municipal Stakeholders (e.g., Nelson Mandela Municipality);
- Academic or Research Stakeholders (e.g., Rhodes University, UCT, ARC, Stellenbosch University);
- Industry participants (i.e., Gower Enterprises);

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- Industry Associations (SAHTA);
- NGOs (e.g., Living Lands);
- Private Conservation Stakeholders;
- Landowners;
- Wild harvesters and local communities;
- Other Stakeholders

The stakeholders that took part in workshop engagements are included in *Appendix A: List of stakeholder workshops with participants.*

5.4 Verification and approval by relevant experts on the quality and context of the species related issues

All actors to assist in this regard. The drafting team continually reviewed the work over an extended period of time and invited inputs from relevant external experts.

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6. ACTION PLAN FOR THE BMP FOR *C. SUBTERNATA* AND *C. INTERMEDIA*

AIM: The aim of this BMP is to ensure the long-term survival of *C. subternata* and *C. intermedia* populations in the wild, whilst safeguarding and respecting the livelihoods of stakeholders.

Note: Deadlines refer to the timelines for an action to be undertaken, starting from when the final BMP is gazetted for implementation.

OBJECTIVE 1: To ensure that wild harvesting of *Cyclopia subternata* and *Cyclopia intermedia* is carried out in a manner that maintains long-term survival and genetic integrity of the species in the wild.

CRITERION 1.1.: Conservation status of *Cyclopia subternata* and *Cyclopia intermedia* is reviewed and updated regularly.

Wild harvested honeybush makes up 70% of the annual harvest with only 30% originating from cultivated sources. *C. intermedia* forms 85% of the wild harvested honeybush crop and *C. subternata* accounts for 10%. With increased demand for the crop and better rates per kilogram of wet tea, wild harvesting is an attractive source of income for landowners and harvesters. With its unique fynbos ecological characteristics, long term survival of the plants can only be achieved by ecologically responsible harvesters and landowners with knowledge and experience. The last regional assessment in 2016 categorised the species as 'Least Concern' on the basis of IUCN criteria and expert inputs to the assessment. Based on updated assessments of the quality and quantity of plants in the field, our understanding of the resource base is dynamic, requiring periodic conservation status reassessments.	
Action 1.1.1	Conduct IUCN Red List national conservation assessments of *Cyclopia subternata* and *Cyclopia intermedia*.
Actors	Main: SANBI Supporting: experts and conservation agencies
Indicator	Conservation status of *Cyclopia subternata* and *Cyclopia intermedia* is regularly assessed according to IUCN Red List categories and criteria, and published online
Deadline	2021 and then every six years.

CRITERION 1.2: Wild harvesting practices are based on the Wild Honeybush Harvesting Field Guide (McGregor, 2018) and adequate assessments and monitoring of *C. intermedia* and *C. subternata* populations is ongoing so that harvesting intensity and trade is sustainable.

Appropriate sustainable harvesting advice and permitting needs to be informed by adequate inventory assessments and ongoing monitoring of *C. intermedia* and *C. subternata* populations so that wild harvesting intensity does not threaten the persistence of the species in the wild. The extent of the resource sourced from unlawful wild harvest needs to be informed by trade surveys in consumer markets.	
Action 1.2.1	Establish a resource monitoring programme for the two species across their ranges to assess impacts of ongoing wild harvesting.

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Actors	Main: SANBI, academic institutions – Rhodes University, provincial conservation authorities, consultants Supporting: SAHTA, HCoP
Indicators	Monitoring programme methodology finalised in a report and monitoring in progress. Data management plan in place.
Deadline	24-36 months

Use the results of the resource assessment to support the determination of whether current and anticipated future offtake will negatively impact wild populations of *C. subternata* and *C. intermedia* and determine if quotas or other regulations are required. Improved management of wild harvesting results in reduced loss or decline in populations of the species due to ongoing or growing harvesting pressures. It can further result in an improvement in the state of overharvested populations. These populations would be expected to regenerate, setting seed and increasing in number of individuals through seedling recruitment.	
Action 1.2.2	Undertake an assessment of the resource base extent and character for the two *Cyclopia* species
Actors	Main: SANBI, academic institutions, HCoP, consultants Supporting: SAHTA, HCoP, landowners
Indicator	Report(s) on extent and character of the resource base of the two *Cyclopia* species is produced. Report on sustainability of current harvesting activities produced (Non-Detriment Finding), with recommendations. Provincial conservation authorities are using baseline information from the resource assessments to clearly define the boundaries where legal wild collection (i.e. with a permit) is permitted or could be permitted based on the state of the resource at that time.
Deadline	24-36 months, repeated 6-8 years later

Trade data informs compliance/non-compliance with regulations, and the extent of unlawful harvesting. Permits issued are informed by ongoing monitoring and evaluation of the resource. Action dependent on TOPS implementation.	
Action 1.2.3	Establish a monitoring / traceability system through TOPS (e.g. e-Permit reporting) that link total quantities in trade (locally and internationally) and cross check with permit conditions / volumes issued and processing output, to determine extent of unlawfulness.
Actors	Main: WC & EC permitting authorities, DFFE, TRAFFIC Supporting: other NGOs, Industry, AGRI SETA (harvesters & experts), SAHTA, DEA&DP, DFFE (BABS), WCDoA, HCoP, honeybush processors
Indicators	Maximum allowed collection quantities are defined and based on available supply and ecological criteria. Database of trade records (industry records and DFFE BABS permit records) per year is in place and maintained by DFFE.

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	Trade data provided in report by transactional advisors contracted by DFFE Trade data report available to permitting and enforcement authorities. Each permit issued is substantiated by a resource assessment. Provinces implement TOPS when in force. Provincial conservation agencies / processors / stakeholders able to detect unlawfully sourced material being presented for processing Provincial conservation agencies able to trace honeybush material through the value chain
Deadline	12 months and ongoing.

CRITERION 1.3: Industry, landowners, farmers, field harvesters, and relevant government officials are capacitated regarding the ecology of the species, and the harvesting guidelines and field guide for both species are maintained, endorsed and implemented.

Harvesting of plant material is subject to adequate training and monitoring of those involved in the harvest and trade of *C. intermedia* and *C. subternata*.	
Action 1.3.1	Conduct training and information sharing workshops for industry, farmers, landowners, field harvesters incl. EMIs and compliance officers to educate relevant stakeholders on the ecology of the species and sustainable harvesting as well as the implications of this BMP, legislation and compliance, protocols and recommendations for the sustainable harvesting of these plants
Actors	Main: HCoP Supporting: DALRRD, Cape Nature, DEDEAT, DEA&DP, ECPTA, Academics, NGOs, WCDoA, HCoP, EMIs, compliance officers and landscape partners.
Indicator	• Stakeholder database kept up to date inclusive of industry, processors, farmers (commercial and emergent), landowners, field harvesters and (all applicable persons, incl. EMIs, compliance officers) • Number of Stakeholders trained and capacitated in the two range provinces on the implementation of the BMP-S and regulations (TOPS and BABS) pertaining to the sustainable harvesting / use / development and conservation of the species. • BMP-S monitoring reports provide insight into legal compliance and successful delivery of the actions in the BMP. • Distribution of all relevant materials (e.g. BMP-S, legislative notices, guidelines/field guides, plans and strategies) to all relevant stakeholders • Checklist of best practice harvesting principles developed and distributed to honeybush stakeholders • Number of training and communication initiatives within the provinces to develop/refresh the skills of relevant stakeholders
Deadline	Ongoing training to those previously not trained and regular refresher courses to all (dependent on funding and capacity of landscape partners)

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Wild harvesting guidelines should include a suitable frequency of return harvests based on population size and species ecology and be widely distributed to harvesters. They should be maintained and endorsed by provincial authorities, supported by the HCoP and adhered to by industry.	
Action 1.3.2	Review & revise sustainable harvesting guidelines for *Cyclopia subternata* & *C. intermedia* based on lessons learned from implementation of the current guidelines, as well as the outcomes of resource assessments, incl. management advice for other commercial *Cyclopia* species.
Actors	Main: DEDEAT, DEA&DP Supporting: WCDoA, DALRRD, DFFE, NGOs, SAHTA, honeybush processors, Living Lands
Indicators	• Collection and harvest instructions/guidelines and rules are produced that inform the basic procedures of harvest for *C. subternata*. • Revised guidelines for both species produced that include information on suitable frequency of return harvests based on population size and species ecology. • Harvesting guidelines for both species are available and widely distributed. • Population decline through excessive and too-frequent harvesting is minimised and there is an improvement in the health, regeneration and recruitment of (harvested) populations of *C. intermedia* and *C. subternata*. • Field officers provide feedback on the effectiveness of current guidelines.
Deadline	Guidelines for *C. intermedia* already developed Guidelines for *C. subternata* = 12 months Revised harvesting field guidelines for both species = 60 months Distribution and Implementation = ongoing

CRITERION 1.4: An accreditation or certification scheme component for the honeybush sector is introduced that promotes legal access to, and sustainable use of, *C. intermedia* and *C. subternata.*

A system is developed that enables monitoring and checks the compliance of all stakeholders with regulations and guidelines relevant to the sustainable use of *C. intermedia* and *C. subternata*. Industry members are provided with support to enable compliance with the standard, and offenders are challenged. The scheme component incorporates best environmental practice and represents increased self-regulation by industry.	
Action 1.4.1	Develop the environmental component of an accreditation system and honeybush industry certification/assurance scheme implemented by a recognised industry organisation for harvesters and other industry members.
Actors	Main: SANBI, DFFE, SAHTA, WCDOA Supporting: WC DEDAT, DEDEAT, HCoP, academia
Indicator	Environmental component of a certification/assurance scheme established and subscribed to by at least five SAHTA members.
Deadline	36 months

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Action 1.4.2	Develop a standardized database of harvesters, harvesting & cultivating farms, landowners, processors and other honeybush stakeholders including EMI's and compliance officers
Actors	Main: HCoP Supporting: SAHTA, DEDEAT, DEA&DP, DFFE (biodiversity economy), WCDoA, DEDAT
Indicator	Database developed populated and available to the Actors
Deadline	With immediate effect, updated regularly

OBJECTIVE 2: To ensure that wild harvesting of *Cyclopia subternata* and *Cyclopia intermedia* does not adversely affect the environment, including ecosystem function.

CRITERION 2.1: Sensitive taxa and habitats that could be affected by harvesting of *C. intermedia and C. subternata* are identified and adequately protected.

In many cases harvesting takes place in remote, otherwise unused, relatively pristine areas. Most of these sites are in mountain catchment areas where low levels of impact are key to water security for the lowlands. It is therefore important to keep harvesting and the development of related infrastructure such as roads to a minimum. Detailed information on the location of and recommended management for CBAs and ESAs in the Western Cape Province may be sourced in the Western Cape Biodiversity Spatial Plan and Handbook (Pool-Stanvliet et al. 2017). The DFFE EIA screening tool can also serve as an informant here, as it provides cadastral level information.	
Action 2.1.1	Use provincial/national sensitivity mapping and existing decision-support tools to identify areas where harvesting could be considered so as to not result in negative impacts on sensitive ecosystems and species. Areas to be included in decision support tool must include: • Threatened ecosystems • Areas of exceptional and critical biodiversity [CBAs, Protected Areas (PAs)]
Actors	Main: SANBI, DEDEAT, DEA&DP & CapeNature Supporting: WC/EC DoA and DFFE (Conservation Management & Ecosystem Management)
Indicator	• GIS systems employed that overlay locality data for *C. intermedia* and *C. subternata* with data on sensitive areas and threatened species. • Provincial authorities make use of GIS systems to inform ecologically responsible harvesting activities/permitting.
Deadline	12 months / ongoing

CRITERION 2.2: The impacts from adjacent land uses are monitored and managed in order to address inappropriate landscape transformation and maintain the functioning of an environmentally sustainable system

The extent of inappropriate and unlawful use of land within the honeybush cultivation and wild harvesting footprint requires ongoing monitoring, to track and avoid adverse impacts that limit

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development of the honeybush industry. Conversely, both industry and the relevant permitting authorities need guidance based on land use data analyses, regarding where best to expand the honeybush cultivation footprint in a manner that is environmentally sustainable. Detailed information on the location of and recommended management for CBAs and ESAs in the Western Cape Province may be sourced in the Western Cape Biodiversity Spatial Plan and Handbook (Pool-Stanvliet et al. 2017). The DFFE EIA screening tool can also serve as an informant here, as it provides cadastral level information.	
Action 2.2.1	Update and maintain land-use GIS layers useful for the identification of existing transformed land (suitable) as well as virgin land (unsuitable) for the cultivation of Honeybush species (focussed on the honeybush footprint).
Actors	Main: WCDoA, DEADP, HCoP, SAHTA to drive updating and maintenance of the maps (supported by partners). Supporting: DFFE, SANBI, SANParks, CapeNature and municipalities.
Indicator	• Non-virgin land suitable for Honeybush cultivation continues to be identified and provided to relevant permitting authorities. • Virgin land requiring protection identified via stewardship, reserve expansion and other conservation prioritisation processes and this information provided to relevant permitting authorities.
Deadline	Report on an annual basis.
Action 2.2.2	Advise and strengthen relevant permitting authorities to avoid issuing permits / authorisations for ploughing of virgin land and exercise control and monitoring of unlawful activities carried out within the honeybush footprint
Actors	Main: DEA&DP (Environmental Law Enforcement), CapeNature, ECPTA, WCDoA, DEDEAT (Compliance and Enforcement) Supporting: DFFE (Biodiversity Compliance and Enforcement), SANParks
Indicator	• Report indicating the extent of virgin land developed for Honeybush cultivation or used for other unlawful activities or developments • Unlawful land users identified and charged • Report presented to HCoP, to EMIs and compliance officers
Deadline	Monitoring ongoing; report produced and presented annually.
Action 2.2.3	Promoting proactive compliance on the legislative provisions of land use and ensure adequately resourced compliance monitoring of unlawful activities on virgin land.
Actors	Main: DFFE, DALRRD, DEDEAT, DEA&DP, CapeNature Supporting: SAHTA, HCOP, WCDoA
Indicator	• Report (action 2.3.3) indicating the extent of virgin land developed for Honeybush cultivation or used for other unlawful activities or developments • All reported unlawful land use cases are followed-up and addressed • Report (action 2.3.3) presented to landowners, processors and other honeybush stakeholders.
Deadline	Ongoing, and annual reporting as per the Norms and Standards for BMP-S.
Action 2.2.4	Promote use of identified existing transformed (non-virgin) land for the cultivation of *Honeybush* species (in areas previously dedicated to agriculture and forestry but no longer used for these purposes) while avoiding sensitive areas such as CBAs &

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	ESAs, e.g. wetlands, key corridors that might need to be restored and or maintained as natural in support of broader ecosystem function.
Actors	Main: DFFE (Biodiversity Economy Strategy Unit), DEDEAT, DEA&DP, WCDoA Supporting: SANParks, CapeNature, private land owners, natural resource management agencies, SAHTA
Indicator	• Develop GIS layers (see action 2.2.1) indicating transformed land available for honeybush cultivation within the distribution range (Western and Eastern Cape) • Map presented at HCoP and to other honeybush stakeholders.
Deadline	Ongoing

OBJECTIVE 3: To ensure that harvesting and management activities are carried out under legitimate tenure arrangements and comply with relevant laws, regulations and agreements.
CRITERION 3.1: Stakeholders in the honeybush industry are made aware of relevant national and provincial legislation and regulations that affect their operations, and the process of compliance to allow for honeybush to be sustainably used and well managed. Stakeholders are also empowered with easily accessible best practice materials (e.g., drawn from the guidelines/field guide). The permitting and enforcement authorities are properly capacitated to perform their control and enforcement measures, and related monitoring and evaluation activities.

Most wild honeybush harvesting takes place on privately owned land according to an arrangement between the farmer and a harvesting team. But there is an issue with unlawful harvesting in protected areas, communal areas and on farms where landlords are absent. Harvesting of honeybush species is regulated through the permitting system provided for in terms of provincial ordinances or national legislation/regulations. The system provides for proof of legal acquisition and assist in combatting supply of unlawfully harvested honeybush materials. Other relevant regulatory requirements are listed and explained in the Wild Honeybush Harvesting Field Guide. All applicable national legislation and provincial controls regarding the use and conservation of *C. intermedia* and *C. subternata* must be strengthened, implemented and adhered to.	
Action 3.1.1	Implement and enforce (where necessary) the terms of the Threatened or Protected Species (TOPS) and the Bio-prospecting, Access and Benefit Sharing (BABS) regulations for the Honeybush industry.
Actors	Main: DFFE (BABS Unit), DEA&DP, DEDEAT. Supporting: industries and communities
Indicator	Documentary proof (permits) of compliance with the NEMBA, including the TOPS and BABS regulations & relevant provincial legislation
Deadline	Ongoing

For the honeybush resource base to be well-managed, the Eastern and Western Cape Provinces need to co-operate extensively, including in standardising as far as possible their control and enforcement measures, and their monitoring and evaluation. This facilitates compliance by industry.

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Action 3.1.2	Standardize as far as possible the management and control measures and actions across the provinces in relation to the harvesting/use/development of Honeybush species across the entire distribution range.
Actors	Main: Provincial conservation authorities and DFFE (RCSM) Supporting: SAHTA, Industry, HCoP
Indicator	Align conservation regulations and targets and policies in the Eastern and Western Cape Provinces for *C. intermedia* and *C. subternata.* Provinces implement TOPS when in force. Keeping of complete records by the relevant actors.
Deadline	24 months

Tenure, management authorities and land use rights are clearly defined for the harvesting of *C. intermedia* and *C. subternata* in the wild. Legal access and harvesting must be the standard pre-requisite.	
Action 3.1.3	Harvesters and industry prove prior written consent and legal access as per legislation.
Actors	Main: SAHTA, Industry, DEDEAT, CapeNature, ECPTA and private and communal landowners Supporting: HCoP
Indicator	All honeybush material processed is legally sourced in compliance with permit requirements, as substantiated by relevant documentation. [processors to keep a record of all required traceability documentation (TOPs permits, land owner permission for wild harvesting, etc.)]. Contracts signed where applicable. Complete records are kept of all acquired documents.
Deadline	Ongoing

Community participation in HCoP and SAHTA is improved	
Action 3.1.4	Maintain advocacy and community participation
Actors	Main: HCoP Supporting: All role players: DEDEAT, Cape Nature & DEA&DP, DAFF, WCDoA, ARC, SAHTA, Municipalities, ECPTA
Indicator	Advocacy and community participation/organisation improved [Extent of participation in HCoP & SAHTA – number of people/interventions, organisations/communities/sectors represented]
Deadline	Ongoing - annual report in relation to community participation in HCoP and SAHTA

OBJECTIVE 4: To ensure that customary rights of local and indigenous communities to use and manage applicable collection areas are recognised and respected.

CRITERION 4.1: Tenure, management authority and use rights are clearly defined for access to *Cyclopia* species in the wild.

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The rights and interests of local communities (where applicable) are upheld and access to resources needs to be provided subject to prior inform consent. Legal access and harvesting must be considered in harvesting guidelines and industry procedures.	
Action 4.1.1	Support landowners / land managers & local communities in implementation of any new legislation e.g. BABS and IKS regulations. All available information on land tenure, traditional knowledge associated with honeybush species and community-level benefit-sharing mechanisms need to be reflected in material transfer and benefit sharing agreements, biocultural community protocols and the National Recordal System on IKS.
Actors	Main: DFFE (BABS Unit), Supporting: WCDoA, CapeNature, SAHTA, HCoP, DEDEAT and DSI
Indicator	DFFE (BABS unit) and DSI provides data to be shared with the industry relating to BABS/IKS regulatory requirements (incl. details of resource management and highlights the legal processes and benefit sharing options between communities, landowners and the industry).
Deadline	Ongoing

CRITERION 4.2: The honeybush value chain is subject to South African regulations on Access and Benefit Sharing in relation to the Nagoya Protocol and the CBD. Communities are informed of their ABS rights and appropriately enabled to participate in benefit-sharing discussions.

A sector-wide benefit sharing agreement akin to that produced for the rooibos industry is envisaged for the honeybush industry. This would impact on local community livelihoods and the sustainable utilisation of wild populations of *C. intermedia* and *C. subternata*.	
Action 4.2.1	A benefit-sharing agreement (BSA) is negotiated by industry & relevant communities, assisted by government.
Actors	Main: DFFE (BABS unit) Supporting: Communities, industry, SAHTA.
Indicator	BSAs and other agreements between stakeholders concluded to satisfaction of Minister DFFE and biotrade/bioprospecting permits awarded.
Deadline	5 years

OBJECTIVE 5: To ensure that, through fair and equitable sharing of benefits derived from the biotrade and bioprospecting of *Cyclopia,* the conservation and sustainable use of honeybush species is promoted.

CRITERION 5.1: The benefits derived from the biotrade and bioprospecting of *C. intermedia and C. subternata* are shared to directly promote the conservation of honeybush species and the ecosystems in which they occur. A monitoring and evaluation system is introduced that allows for tracking ABS outcomes for biodiversity conservation within the honeybush footprint.

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For compliance with the CBD and the Nagoya Protocol, to both of which instruments South Africa is a ratifying Party, conservation and sustainable use of biodiversity should be promoted and implemented through equitable benefit sharing. This is presently effected through the BABS regulations of DFFE.	
Action 5.1.1	Devise and introduce a monitoring and evaluation system that tracks the extent of conservation of honeybush genes, species and ecosystems derived through honeybush biotrade or bioprospecting permits issued by DFFE.
Actors	Main: Academic partner - UCT Supporting: DFFE (BABS Unit), HCoP, SAHTA, DEDEAT, Cape Nature & DEA&DP, SANBI
Indicator	A M&E plan is produced and implemented.
Deadline	36 months and ongoing

OBJECTIVE 6: To ensure the management of wild *Cyclopia subternata* and *Cyclopia intermedia* is based upon ecologically sound, adaptive, practical, participatory and transparent practices.
CRITERION 6.1: A holistic and long-term approach to ecologically sound management is implemented for the industry.

Unnatural fire regimes, AIS clearing and planning across the distribution range of *C. intermedia* and *C. subternata* needs to be addressed and managed. Invasive alien plants have a negative impact on biodiversity (*e.g.* through competition, increasing fire intensities) and ecosystem services (*e.g.* water provision, pollination systems, scenic values), and as such also on Honeybush species. This should be addressed as part of integrated farm-level land management plans.	
Action 6.1.1	Revise existing information materials (sustainable harvesting guidelines, field guide & ecological review) to include more detail on ecologically sound fire management. These are to prioritise the long-term maintenance of the whole ecosystem and will be distributed to relevant stakeholders incl. Landowners/FPAs/Municipalities.
Actors	Main: HCoP Supporting: DEDEAT, DEA&DP, CapeNature, Garden Route Environmental Forum (GREF) / Southern Cape Landowners Initiative (SCLI)] & Landowners, academia, Fire Protection Associations (FPA) & landowners' initiatives
Indicator	• Summarised information materials (as per sustainable honeybush harvesting guidelines) on ecologically sound fire practices related to fynbos ecosystems in the honeybush footprint produced • Information materials incorporate encouragement and advice for stakeholders to join FPA's and Landscape initiatives • Record of new and revised information material distributed to relevant stakeholders • Records of controlled/prescribed burns indicate improved fire management across the species distribution range (SCLI) • Continued financial investment by the FPAs/CapeNature/ECPTA in ecologically sound fire management in the honeybush footprint

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	• Number of awareness raising events by the HCoP and its partners in support of FPAs & landowners' initiatives
Deadline	Ecological review (McGregor, G.K.; 2017c) updated in 24 months and followed by updated guidelines and field guides over the period.
Action 6.1.2	Develop integrated farm-level land management plans to manage for wild honeybush
Actors	Main: Landowners, Living Lands Supporting: HCoP, DEA&DP, DEDEAT, WCDoA
Indicator	Number of integrated land management plans developed by honeybush landowners actively harvesting wild honeybush
Deadline	2 years
Action 6.1.3	Promote legal and effective alien vegetation clearing through integrated catchment management and monitor Honeybush species recovery after fires
Actors	Main: ECPTA, CapeNature, landowners Supporting: HCoP, DEA&DP, DEDEAT, DFFE (NRM), Living Lands
Indicator	Integrated management plans (and farm-level honeybush harvesting plans, a template of which is provided in the Wild Honeybush Harvesting Field Guide) include AIS and ecologically sound fire management regime.
Deadline	Ongoing

CRITERION 6.2: Alien invasive plant species (AIS) are successfully managed through implementation clearing plans.

Honeybush stakeholders need to be aware of the impacts of AIS on wild honeybush and on the benefits they can derive from alien biomass. This also includes their role in managing wild honeybush and following sound ecological principles in the honeybush footprint.	
Action 6.2.1	Advise honeybush-bearing landowners (i.e. communal, provincial, protected areas, private and municipal) to adhere to CARA and NEM:BA relevant to honeybush i.e. clearing of AIS through NRM programmes, cautious control of AIS in indigenous vegetation, duty of care, etc.; stakeholders are encouraged to report the presence of AIS though online projects such as iNaturalist.
Actors	Main: DFFE, DALRRD Supporting: Landowners, WCDoA, CapeNature, SANParks, SAHTA, DEDEAT, DEA&DP, Living Lands, Municipalities and Communities, iNaturalist
Indicator	WCDoA/ DALRRD to give 1 presentation on CARA/NEMBA compliance at SAHTA. Increase in iNaturalist records of AIS within the honeybush footprint.
Deadline	24 months and ongoing

The harvester community is highly knowledgeable about the nature of the landscape in which they harvest and are well positioned to identify the occurrence and extent of AIS. During the off-season they potentially could be contracted to manage AIS or report the presence of AIS by logging online records on a platform like iNaturalist.

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Action 6.2.2	Promote the involvement of the harvester and local communities in the monitoring and removal of AIS in Honeybush areas (piloting & capacitating).
Actors	Main: HCoP Supporting: landowners, NGOs (incl. Living Lands), harvesters, DALRRD, DFFE-NRM
Indicator	Harvester community involved in the mapping, monitoring and clearing of AIS (reported on via HCoP discussions and feedback)
Deadline	24 months and ongoing

CRITERION 6.3: Pollinator vectors, pests and diseases of honeybush are monitored and researched, and management advice is generated

The productivity of commercial honeybush species is impacted by pollinator activity, and the prevalence of pests and diseases. Research on these aspects, with recommendations for management interventions, are required to safeguard the health of the wild and cultivated stocks on which the industry depends. Biocontrol is a method of controlling pests such as herbivorous insects and pathogenic fungi, and relies on predation, parasitism or other natural mechanisms, but typically also involves an active human management role. Biocontrol is an important component of integrated pest management as well as safeguarding the important role of pollinators.	
Action 6.3.1	Prioritise and promote research on the pollinators, diseases and pests (natural and/or invasive) that either could or are known to impact populations of wild and cultivated honeybush species.
Actors	Main: SAHTA, ARC & academic partners Supporting: HCoP, DEDEAT, DEA&DP, WCDoA, DALRRD, land owners
Indicator	Technical reports/theses/published literature produced, including biocontrol protocols for honeybush pests SAHTA communicates management advice to its members
Deadline	Ongoing

CRITERION 6.4: The possible impacts of climate change and drought are identified and assessed, and possible measures are taken to minimise these impacts.

In the honeybush growing region fires are occurring more frequently, burning larger areas at a time, and prolonged droughts are being experienced, all of which impacts on *Cyclopia* species. The best way to address the impacts of climate change and drought is to maintain natural veld in an ecologically healthy state (i.e., ensure that fires are managed in an ecologically sound way; invasive alien plants are cleared; etc.). Nonetheless, other proactive measures are required to safeguard honeybush biodiversity at the gene level.	
Action 6.4.1	Dissemination of information on climate change impacts on Honeybush.
Actors	Main: HCoP Supporting: SAHTA, DEA&DP, DEDEAT, provincial departments of Agriculture, Academia
Indicator	SmartAgri brief for the Honeybush sector disseminated.

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Deadline	As information becomes available.
Action 6.4.2	Undertake gene banking for conservation in areas most likely impacted by climate change and identify 10 suitable collection sites for seed collection.
Actors	Main: SANBI (MSB), NPGRC (national genebank), ARC Supporting: HCoP, SAHTA, regional conservation agencies, DFFE
Indicator	Representative seed samples collected from 10 prioritised sites and deposited with NPGRC and the Millennium Seed Bank.
Deadline	48 months

OBJECTIVE 7: To inform the management of genetic integrity of *C. subternata* and *C. intermedia*, that can rationally be applied to all commercial *Cyclopia* species, whether reseeders or resprouters.

CRITERION 7.1: Best practices for the successful cultivation of Honeybush species are developed and promoted so as to maintain genetic integrity and diversity.

The movement of material of honeybush species, including for augmentation, should optimally involve local genetic material only (i.e. genetic stock is not moved between areas). A protocol is then used to educate the honeybush community on genetic contamination issues. Populations of *C. subternata* and *C. intermedia* in formal protected areas remain intact and conserved and are not harvested (these are benchmark populations that need to be maintained and protected as reference populations).	
Action 7.1.1	Develop a protocol for ecologically appropriate cultivation of Honeybush and minimisation of genetic contamination and erosion in wild populations. Promote establishment of *Cyclopia* orchards from local genetic stock on (clearly demarcated) existing/abandoned transformed lands.
Actors	Main: WCDoA (Farmer Support and Development & Research, Technology and Development Services), DEA&DP, Eastern Cape Agriculture, ARC, academia, CapeNature, DEDEAT Supporting: SAHTA, HCoP
Indicator	Protocol document available and has been distributed. Protocol document promoted at SAHTA and HCoP to stakeholders in the sector, in understandable terms.
Deadline	36 months
Action 7.1.2	Consolidate available information on Honeybush genetics and identify priority research to be undertaken (gap analysis).
Actors	Main: HCoP Supporting: ARC, Academia
Indicator	Priority future genetic research recommendation report produced.
Deadline	12 months, then ongoing

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Appendix A: List of stakeholder workshops with participants

Table 1: List of stakeholders from the Honeybush BMP Stakeholder Consultation Workshop held 5-6 December 2017 in George

Abongwe Ketelo	Clyde Lamberts	Lenhard Jonas	Prince Ramafalo
Albert Ackhurst	David Newton	Mashadi Nkoana	Shirley Pierce Cowling
AnneLise Vlok	Elzette Bester	Mncedisi Cindi	Solly Molepo
Arnold Vlok	Gerald Mabeba	Natalie Feltman	Stanley Tshitwamulomoni
Asanda Zulu	Gerrie Ferreira	Neil Crouch	Tebogo Mashua
Azwinaki Muingi	Gillian McGregor	Noluthando Bam	Thea Carroll
Ben van Staden	Humbulani Mafumo	Nomalungisa Mbangcolo	Thembinkosi Tyali
Cecilia Bester	Kganya Masenake	Phumla Nkhatshwa	

Table 2: List of stakeholders from the Honeybush Tea BMP workshop held 20 June 2019 in George

Albert Ackhurst	Dick Carr	Ked Dodds	Rupert Koopman
Azwinaki Muingi	Frances Balayer	Natalie Feltman	Sthembile Ndwandwe
Cindi Mncedisi	Gerrie Ferreira	Neil Crouch	Thembinkosi Tyali
Clyde Lamberts	Gillian McGregor	Noluthando Bam	
David Newton	Humbu Mafumo	Pippa Karsen	

Table 3: List of stakeholders from the public meeting on the Draft Honeybush Biodiversity Management Plan held 4 March 2020 in Uniondale

Albert Ackhurst	David Newton	Gerrie Ferreira	Noluthando Bam
AnneLise Vlok	Denny Davids	Gillian McGregor	Paul-Luc Michau
Azwinaki Muingi	Dereck de Toit	Humbu Mafumo	Preshanthie Naicker
Barry Jacobs	Dick Carr	Ian Terblanche	Raymond Booysen
Barry Thompson	Donovan Brunette	Jan de Jaar	Shannon Daniels
Berenise Pieterse	Ebrahim Mohamed	Jan Louw	Thembinkosi Tyali
Bredon Jonas	Eugene Smith	Johan Kritzinger	Theo Adams
Cecil Opperman	Elmarie Kritzinger	Kim van Niekerk	Thinus Viljoen
Chris Lee	Erika Smith	Luzuko Dali	Toetie Douw
Christian Jacobs	Ewald Gerber	Macdam Nell	Willem Goemas
Clyde Lamberts	Frances Balayer	Melikhaya Pantsi	Zoliswa Snel
Cornelius Julies	Gerhard Mulder	Neil Crouch	

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Appendix B: Actions that cannot be implemented in the first 5-year implementation cycle due to lack of funds or capacity.

Should funds or capacity become available these actions can be pursued, but if not, they will not be reported on in the first 5-year implementation cycle and will be considered for inclusion in the possible second version of the BMP during the first review.

Resource mobilisation to be undertaken for the implementation of the actions within the BMP, including monitoring and enforcing compliance. Additionally, DFFE (Biodiversity Conservation) to provide endorsement and support for sourcing of funds by implementing agencies/supporting actors to assist towards the implementation of the actions within the BMP.	
Action 1.4.6	Determine and obtain the funding & other resources required for monitoring and enforcing compliance (cross cutting)
Actors	Main: DFFE (RCSM) supported by DFFE (Biodiversity Conservation), Supporting: AGRI SETA (harvesters & experts), SAHTA, DEDEAT, DEA&DP, DAFF, WCDoA, HCoP
Indicator	Monitoring and compliance enforcement costs secured each financial year

Action 2.3.1	Manage and monitor impacts from surrounding/adjacent land uses and adjust use/management of the species accordingly
Actors	Main: Provincial & national natural resource management authorities & SAHTA Supporting: DFFE, SANBI
Indicator	During the 5-yearly review of this plan, incorporate impacts from surrounding/adjacent land uses and adjust use/management of the species accordingly.

Action 2.3.4	Review, revise and if necessary, enforce a cooperation agreement on the clearing of virgin land. Coordinate virgin land MoA with WCDoA and DEA&DP.
Actors	Main: WCDoA, DEA&DP Supporting: CapeNature, DALRRD
Indicator	Cooperation agreement kept current and relevant

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